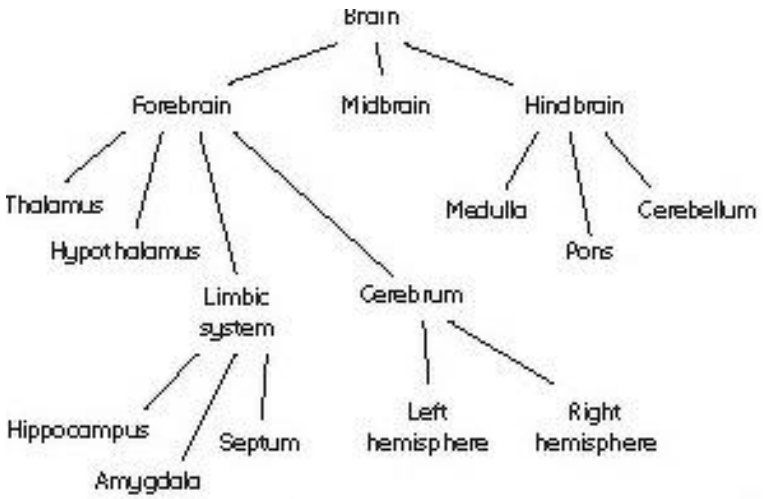
HUMAN ANATOMY & PHYSIOLOGY-II- BP201T

UNIT: 1 (NERVOUS SYSTEM)

CLASS: 7

TOPIC: STRUCTURE OF THE BRAIN

- The brain is a large organ weighing around 1.4 kg, which lies within the cranial cavity. Its parts are:



Blood Supply and Venous drainage:

- The Circulus arteriosus and its contributing arteries play a vital role in maintaining a constant supply of oxygen and glucose to the brain when the head is moved and also when a contributing artery is narrowed.
- The brain receives about 15% of the cardiac output approximately 750 mL of blood per minute.
- Autoregulation of Cerebral arteriolar diameter maintains a constant blood flow to the brain, Compensating for fluctuations in systemic blood pressure.
- This mechanism protects the brain, provided that systemic blood pressure remains within the 65-140 mmHg range.
- Venous blood from the brain drains into the dural venous sinuses and then downwards into the internal jugular veins.

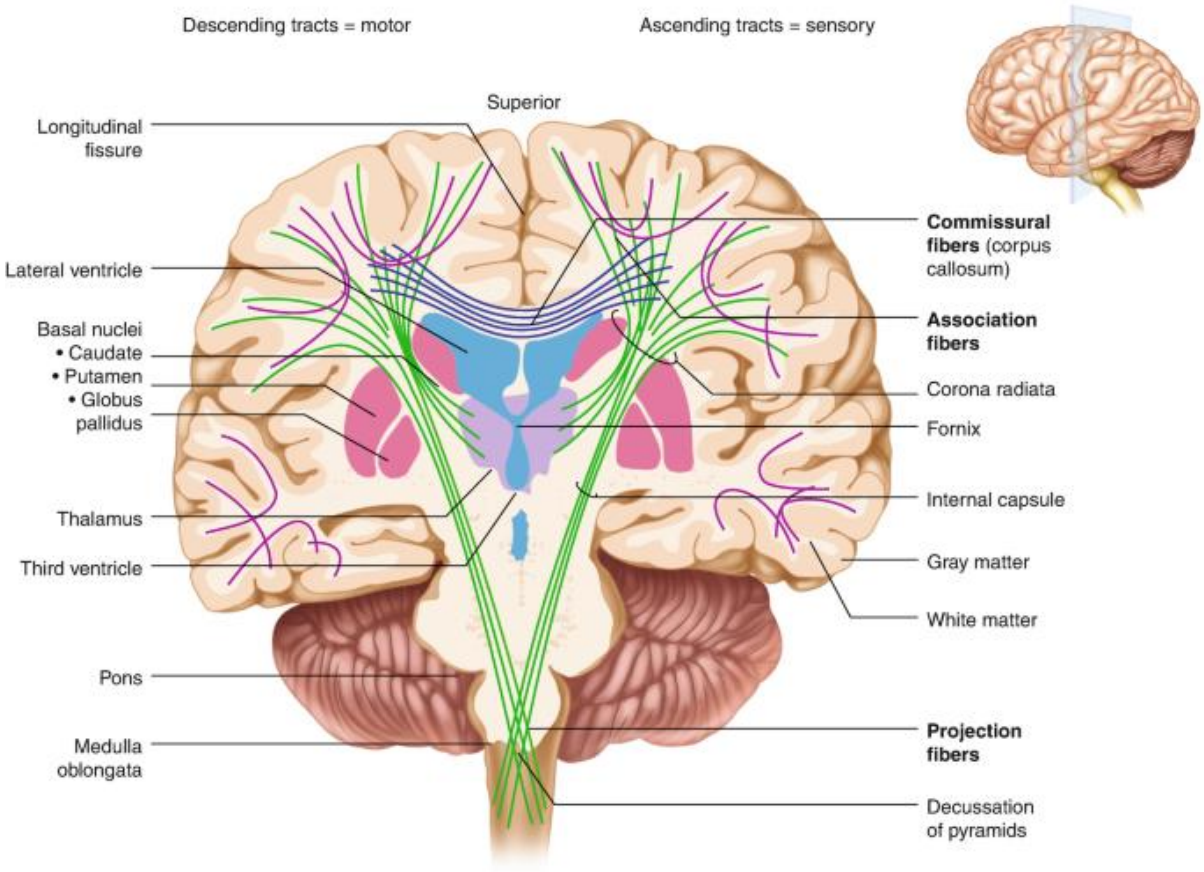
Cerebrum:

- Largest part of the brain and it occupies the anterior and middle cranial fossae.
- It is divided by a deep cleft, the longitudinal cerebral fissure, into right and left cerebral hemispheres, each containing one of the lateral ventricles.
- Deep within the brain, the hemispheres are connected by a mass of white matter (Nerve fibres) called the Corpus Callosum.

- The falx Cerebri is formed by the dura mater. It separates the two cerebral hemispheres and Penetrates to the depth of the Corpus Callosum.
- The Superficial part of the cerebrum is composed of nerve cell bodies (grey matter), forming the Cerebral Cortex and the deeper layers consists of Nerve fibres (axons, white matter).
- The surface of the Cerebral Cortex shows many infolding's or furrows of varying depth.
- The Exposed areas of the folds are the gyri (Convolutions) and these are separated by Sulci (fissures).
- These Convolutions greatly increase the surface area of the Cerebrum.
- Each hemisphere of the cerebrum is divided into lobes, which take the names of the bones of the cranium above them:
    - Frontal
    - Parietal
    - Temporal
    - Occipital
- The boundaries of the lobes are marked by deep Sulci. These are the Central, lateral and Parieto-occipital sulci.

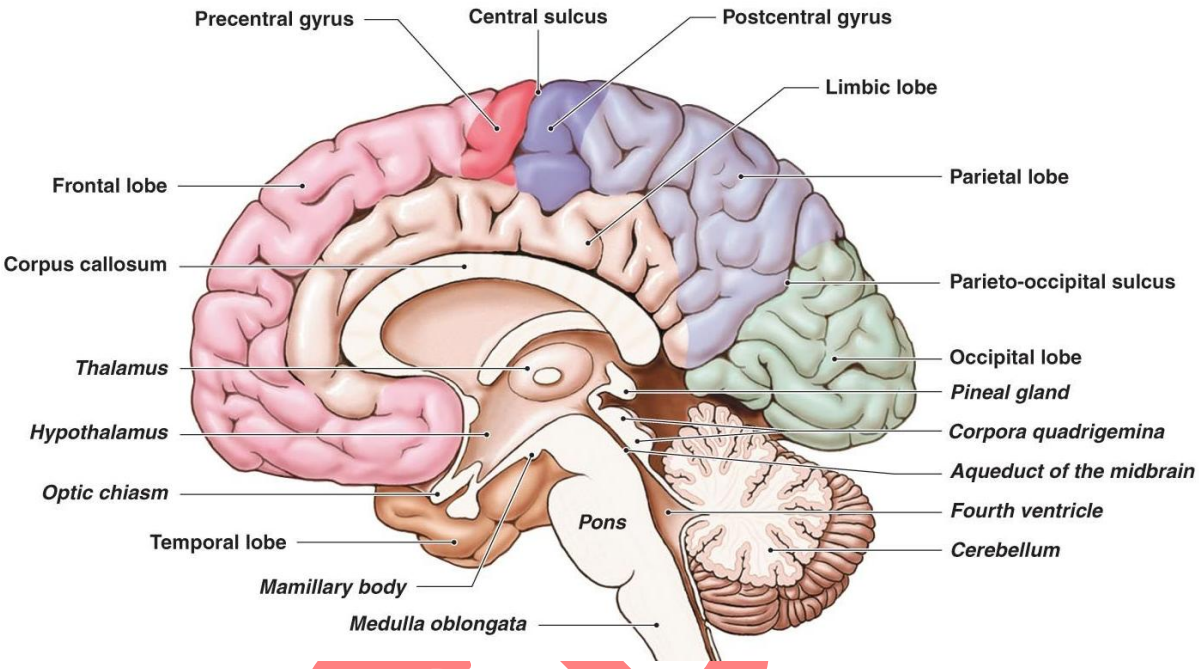
Cerebral Tracts

- The surface of the Cerebral Cortex is composed of grey matter (nerve cell bodies).
- Within the cerebrum the lobes are connected by masses of nerve fibres, or tracts, which make up the white matter of the brain.
- The afferent and efferent fibres linking the different parts of the brain and spinal cord are:
    a. Association (arcuate) tracts: which are most numerous and connect different parts of a cerebral hemisphere by extending from one gyrus to another, some of which are adjacent and distant.
    b. Commissural tracts: Which connect corresponding areas of the two cerebral hemispheres; the largest and most important commissure is the Corpus Callosum.
    c. Projection tracts: Which connect the cerebral cortex with grey matter of lower parts of the brain and with the spinal cord. E.g. Internal Capsule.
- The internal Capsule is an important projection tract that lies deep within the brain between the basal ganglia and the thalamus.
- Many nerve impulses passing to and from the cerebral cortex are carried by fibres that form the internal capsule.
- Motor fibres within the internal Capsule form the pyramidal tracts (Corticospinal tracts) that cross over (decussate) at the medulla oblongata and are the main pathway to skeletal muscles.
- Those motor fibres do not pass through the internal capsule form the extra pyramidal tracts and have connections with many parts of the brain, including the basal ganglia, thalamus and cerebellum.



Basal Ganglia:

- Group of Cell bodies that lie deep within the brain and form part of the Extrapyramidal tracts.
- They act as relay stations with connections to many parts of the brain, including motor areas of the Cerebral Cortex and thalamus.
- Their functions include initiation and fine control of complex movement and learned coordinated activities, such as posture and walking.
- In addition, basal ganglia influence many aspects of cortical functions including memory, thinking, learning, problem solving, emotions, Consciousness etc.
- Basal ganglia disorders are Parkinson disease and schizophrenia.
- Two ganglia lateral to thalamus are Globus pallidus (closer to thalamus) and putamen (closer to cerebral cortex) – lentiform nucleus. Third basal ganglion is Caudate Nucleus, all together known as Corpus Striatum.
- If control is inadequate or absent, movements are jerky, clumsy and uncoordinated.


Precentral gyrus
Central sulcus
Postcentral gyrus
Limbic lobe
Frontal lobe
Parietal lobe
Corpus callosum
Parieto-occipital sulcus
Thalamus
Occipital lobe
Pineal gland
Hypothalamus
Corpora quadrigemina
Aqueduct of the midbrain
Optic chiasm
Pons
Fourth ventricle
Temporal lobe
Cerebellum
Mamillary body
Medulla oblongata