

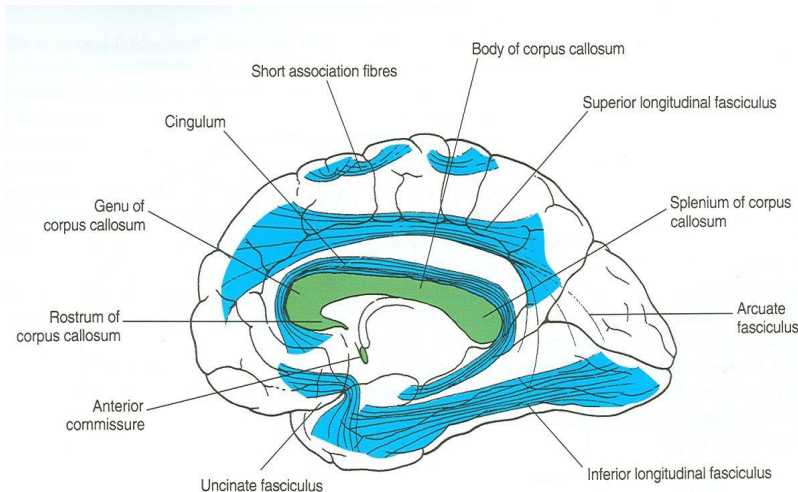
## CEREBRUM II - CEREBRAL MEDULLA

### TYPES OF FIBRES :

- **Association fibres** : They connect cortical areas lying within same cerebral hemisphere.
- **Commissural fibres** : They cross midline & connect cortical areas *in one hemisphere* to functionally related cortical areas *in the other hemisphere*.
- **Projection fibres** : They connect cortical areas to areas outside cerebral hemispheres.

### ASSOCIATION FIBRES :

- **Short** : They connect adjacent gyri in same lobe.
- **Long** : They travel through white matter & connect gyri of different lobes.

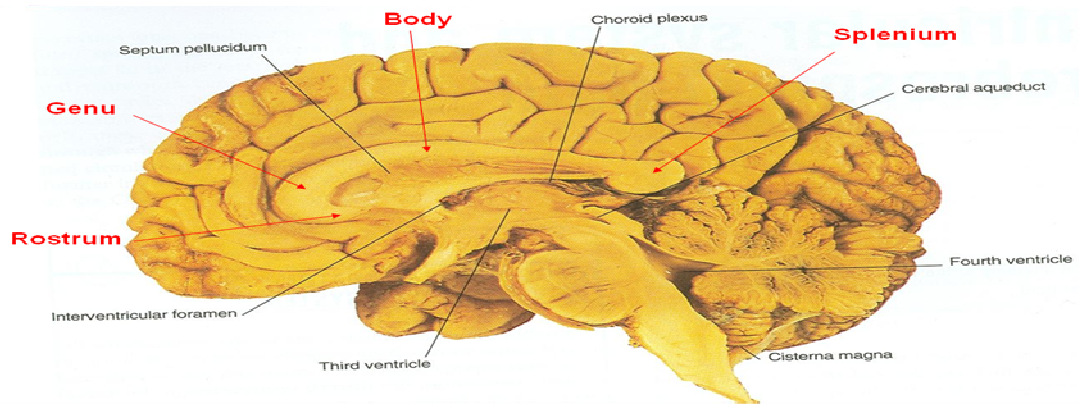


### LONG ASSOCIATION FIBRES :

- **Superior longitudinal fasciculus** :
  - Connects **frontal & occipital lobes**.
  - A part connects **frontal & temporal lobes** in dominant hemisphere ( **arcuate fasciculus** ) : links Broca's and Wernicke's areas ( **areas important for language function** ).
- **Inferior Longitudinal fasciculus** :
  - Runs from **occipital to temporal poles**.
  - Connects primary visual & visual association areas.
  - Contributes to function of **visual recognition**.
  - Lesion : **object agnosia** ( cannot recognize *objects* ), **prosopagnosia** ( cannot recognize *faces* ).
- **Uncinate fasciculus** :
  - Connects **frontal & temporal lobes**.
  - Connects parts involved in **regulation of behavior**.
- **Cingulum** :
  - Travels along **frontal, parietal and temporal lobes**.
  - Connects parts of **limbic lobe**.

### COMMISSURAL FIBRES :

- **Corpus callosum** :
  - The largest of commissural fibres.
  - Connects corresponding regions of **frontal, parietal & occipital lobes in both hemispheres** (but not temporal).

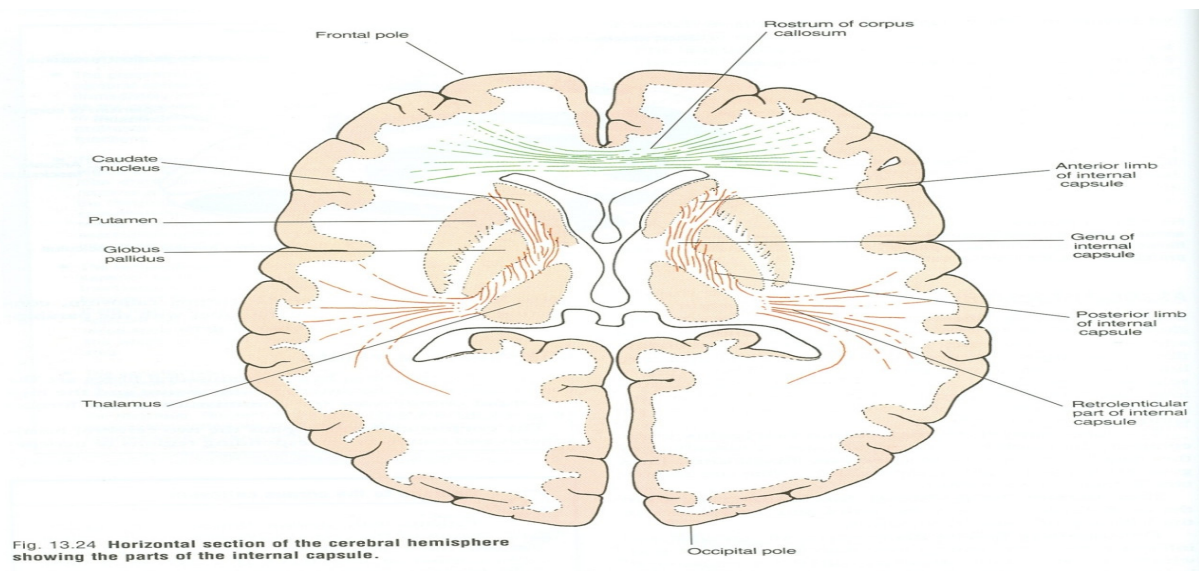


- **Major parts of Corpus callosum :**
  1. **Rostrum** : connects the inferior surfaces of frontal lobes.
  2. **Genu** : fibres curve forwards to form **anterior forceps (forceps minor)** that connect frontal lobes.
  3. **Body** : most of fibres run transversally & connect parietal lobes.
  4. **Splenium** : fibres curve backwards to form **posterior forceps (forceps major)** that connect occipital lobes.
- **Anterior commissure :**
  - Formed of a small & a large bundle.
  - The **small bundle** connects olfactory regions in **temporal lobes**.
  - The **large bundle** connects the rest of **temporal lobes**
- **Hippocampal commissure :** They connect **the fornix** on each side.

### PROJECTION FIBRES :

- They are ascending & descending fibers.
- Fibres projecting to & from cerebral cortex are distributed radially as **corona radiata**.
- Fibres become concentrated to form **the internal capsule**.

### INTERNAL CAPSULE :



- It is a V-shaped band of projection fibres.
- **It is divided into :**
  1. **Anterior limb.**
  2. **Genu.**
  3. **Posterior limb.**
  4. **Retrolenticular part.**

- **Anterior limb :**
  - **Site :** between head of caudate nucleus & lentiform nucleus.
  - **Contents :**
    1. Fibres from anterior nuclear group of thalamus to **cingulate gyrus**.
    2. Fibres from medial nuclear group of thalamus to **prefrontal cortex**.
    3. Frontopontine fibres.
- **Genu :**
  - **Site :** between head of caudate nucleus & thalamus.
  - **Contents :** Corticobulbar fibres.
- **Posterior limb :**
  - **Site :** between thalamus & lentiform nucleus
  - **Contents :**
    1. Corticospinal fibres.
    2. Fibres from ventral posterior nucleus of thalamus to **postcentral gyrus**.
    3. Fibres from ventral anterior & ventral lateral nuclei of thalamus to **motor regions of frontal lobes**.
- **Retro-lenticular part :**
  - **Site :** behind lentiform nucleus.
  - **Contents :**
    1. Fibers from medial geniculate body of thalamus to **auditory cortex**.
    2. Fibers from lateral geniculate body of thalamus to **visual cortex**.
    3. Parieto- temporo- & occipitopontine fibres.

### White Matter of the Cerebral Hemisphere

- Nerve fibres within the subcortical white matter are classified on the basis of their origin and termination.
- Association fibres link cortical regions within a single hemisphere. Important systems are : the superior longitudinal fasciculus, arcuate fasciculus, inferior longitudinal fasciculus and uncinate fasciculus.
- Commissural fibres pass between corresponding regions of the two hemispheres. The principal commissural system is the corpus callosum.
- Projection fibres run between the cerebral cortex and various subcortical structures. They pass through the corona radiata and the internal capsule. Particularly important fibres in this category are corticospinal, corticobulbar and thalamocortical projections.



# THE END

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## SELF QUIZ

**1- Association fibers include all of the following EXCEPT :**

- a. Corpus callosum.
- b. Superior longitudinal fasciculus.
- c. Inferior longitudinal fasciculus.
- d. Cingulum.
- e. Fasciculus uncinatus.

**2- Regarding Corpus callosum all of the following are correct EXCEPT :**

- a. It connects similar cortical areas of the two hemispheres.
- b. It is supplied by the anterior cerebral artery.
- c. It is formed of association fibers.
- d. It transmits information between the 2 hemispheres.
- e. The posterior end is called the splenium.

**3- The commissural fibers of the brain include all of the following EXCEPT :**

- a. Corpus callosum.
- b. Cingulum.
- c. Anterior commissure.
- d. Posterior commissure.
- e. Hippocampal commissure.

**4- Regarding the anterior limb of the internal capsule, all the statements are correct EXCEPT :**

- a. Lies between head of the caudate nucleus and the lentiform nucleus.
- b. Contains the anterior thalamic radiation.
- c. Contains fibers from the anterior thalamic nucleus to the cingulate gyrus.
- d. Contains nonfrontopontine fibers.
- e. Supplied by branches of the anterior cerebral and middle cerebral arteries.

|      |      |      |      |
|------|------|------|------|
| 1. a | 2. c | 3. b | 4. d |
|------|------|------|------|

## TRUE (OR) FALSE

**1- The fibres that interconnect the two cerebral hemispheres include :**

- a. The cingulum.
- b. The uncinate fasciculus.
- c. The corpus callosum.
- d. The hippocampal commissure.
- e. The geniculocalcarine tract.

|      |      |      |      |      |
|------|------|------|------|------|
| a. F | b. F | c. T | d. T | e. F |
|------|------|------|------|------|

**2- The following are true with regard to the internal capsule :**

- a. It is made up of grey matter.
- b. The anterior limb separates the caudate nucleus from the lenticular nucleus.
- c. Fibres connecting the frontal lobe to the red nucleus are found in the posterior limb.
- d. Corticothalamic fibres are found in the anterior limb.
- e. Contralateral spastic hemiplegia can result from infarction of the lenticulostriate artery.

|      |      |      |      |      |
|------|------|------|------|------|
| a. F | b. T | c. T | d. T | e. T |
|------|------|------|------|------|