Cerebrum :

* 2 Cerebral hemispheres يفصل بينهم longitudinal fissure ، خلالها : Falx cerebri
  * مثبتة من الامام ب Crista galli
  * مثبتة من الخلف ب Tentorium Cerebelli
* Connected by : Corpus callosum

* Each cerebral hemisphere has :

3 Surfaces :
1. Superolateral surface
2. Medial surface
3. Inferior surface

3 poles :
1. Frontal pole
2. Temporal pole
3. Occipital pole.

3 main Sulci :

1. Central sulcus (Fissure of Rolando) : Deep sulcus on the superolateral surface about (1/2 inch) behind the midpoint between frontal & Occipital lobe.
   ↳ Mainly appear superolaterally, and small part in Medial surface.

2. Lateral sulcus (Fissure of Sylvius) : Consists of a short stem (inferior surface) and on reaching the Superolateral surface, it divides into 3 Rami :
   1. Anterior horizontal Ramus
   2. Anterior Ascending Ramus
   3. Long Posterior Ramus.

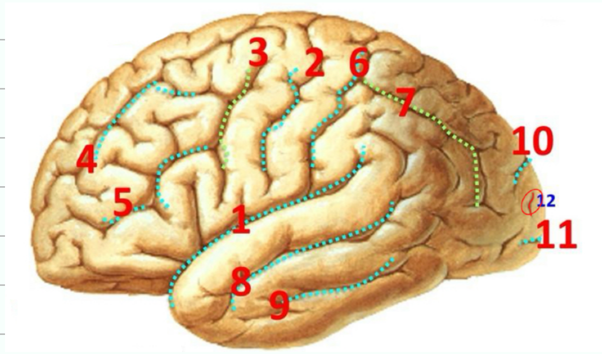
3. Parieto-occipital sulcus : Begins on the margin of the hemisphere about 2 inches (5 cm) Ant. to the Occipital pole
   ↳ Mainly seen in Medial surface, and small part on Superolateral surface.

4. Calcarine sulcus : begins below the splenium of the corpus callosum to the occipital pole
   ↳ Divided by parieto-occipital sulcus into precalcarine and postcalcarine sulcus

4 lobes :
1. Frontal lobe
2. Parietal Lobe
3. Temporal Lobe
4. Occipital Lobe.

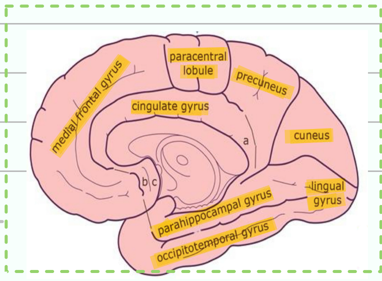
Sulci on the SuperoLateral surface :

1. Lateral sulcus
2. Central sulcus
3. Precentral sulcus
4. Superior frontal sulci
5. Inferior frontal sulci
6. Postcentral sulcus
7. Intraparietal sulcus
8. Superior temporal sulci
9. Inferior temporal sulci
10. Parieto-occipital sulcus
11. Calcarine sulcus
12. Lunate sulcus (Simian)
    ↳ At the occipital lobe



Gyri on the Medial surface of Cerebrum :

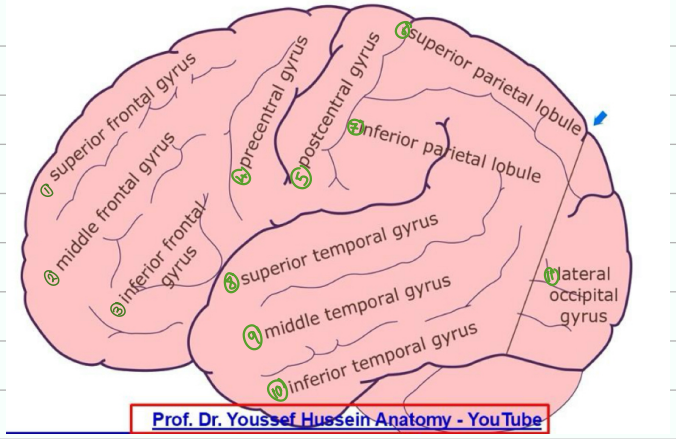
1. Medial frontal gyrus
2. Cingulate gyrus
3. Paracentral lobule
4. Precuneus
5. Cuneus
6. Lingual gyrus
7. Parahippocampus.
8. Occipitotemporal gyrus.

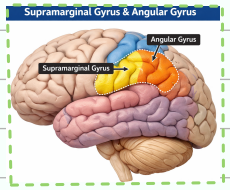


Gyrus	Lobe	Key Function
Cingulate	Limbic	Emotion, behavior
Medial frontal	Frontal	Executive functions
Paracentral lobule	Frontal + Parietal	Lower limb motor & sensory
Precuneus	Parietal	Visuospatial awareness
Cuneus	Occipital	Vision (upper field)
Lingual gyrus	Occipital	Vision (lower field)
Parahippocampal	Temporal	Memory

Important gyri on Superolateral Surface :

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪





Supramarginal gyrus (area 40) : is gyrus around the posterior end of the lateral sulcus.

Angular gyrus (Area 39) : is gyrus around the posterior end of the superior temporal sulcus.

Sulci on the Medial surface :

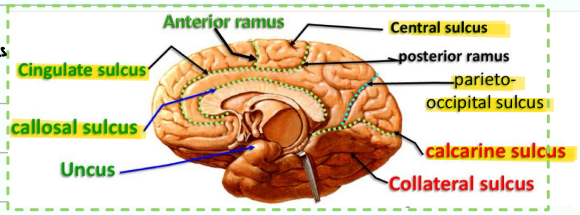
① Callosal sulcus : close to the upper surface of the corpus callosum

② Cingulate sulcus : About fingers breadth above and parallel to the callosal sulcus
↳ It ends by dividing into two rami infront and behind the central sulcus

③ Central sulcus : between the two branches of the cingulate sulcus

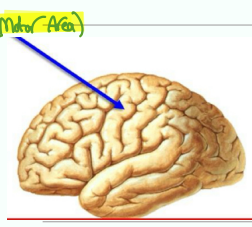
④ Parieto-occipital sulcus.

⑤ Calcarine sulcus.



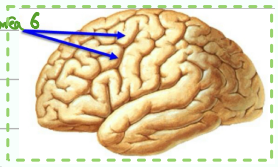
Functional areas of the Superolateral surface :

* Primary motor area → corresponds to the precentral gyrus (Brodmann area 4), Anterior part of the paracentral lobule controls motor functions, primarily on the opposite side of the body.



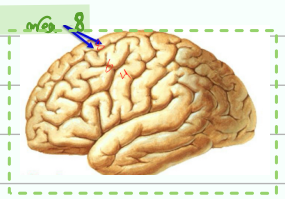
- A body represented in upside down.
- The muscles of the head are represented most ventrally closest to the lateral fissure; then, proceeding dorsally, are the regions for the neck, upper limb, and trunk on the lateral aspect of the hemisphere.
- On the medial aspect of the hemisphere is the motor representation for the pelvis and lower limb.
- size depends on skill, not mass of the muscle
- **Lesion** of the area 4 results in contra-lateral **hemiplegia (UMNL)**.

* Premotor area 6



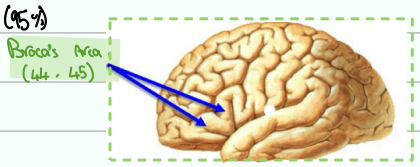
→ Located Anterior to Precentral gyrus / It is the origin of Extra pyramidal fibers
- Controls more complex movements
- Involved in the planning of movements and storage of the learned movements to bring them Later on.

* Frontal eye field area 8 (Brodman area 8)



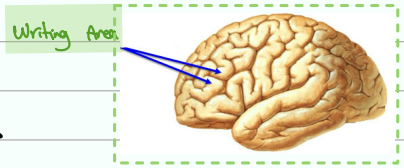
- It Lies Anterior to the premotor cortex
- It controls movements of the eyes when eyes follow a moving target.

Motor speech (Broca's area) 44, 45 :



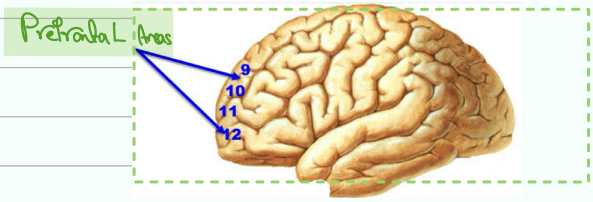
- Lies in inferior frontal gyrus of frontal lobe of the dominant hemisphere (95%)
- Associated with language production
- It brings about the formation of words by its connections with the adjacents primary motor areas, the muscles of the speech.

Writing Area (Exner's Area)



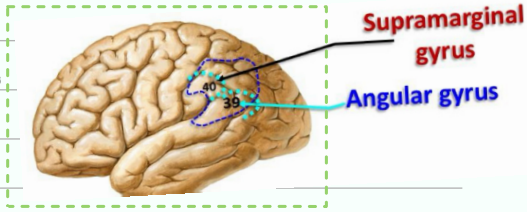
- It lies in the middle frontal gyrus
- The person able to express himself in written words

Prefrontal Areas (9, 10, 11 & 12)



- Are Lie in the most Anterior part of the frontal lobe
- It is Responsible for :
  1. Planning, thinking, Remember and problem solving
  2. Motivating, emotions, good & Sinful behavior, mood
  3. Telling of Lie and Truth.

Sensory speech area (Wernick's area 39, 40)



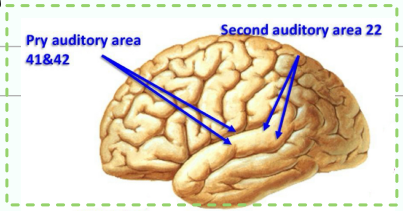
- Language comprehension.
- It Lies in Superior temporal gyrus of temporal lobe extending to inferior parietal gyrus, Angular and Marginal gyr
- It's connected to motor speech Area, Auditory area and visual area.
- It is responsible for understanding spoken and written words.

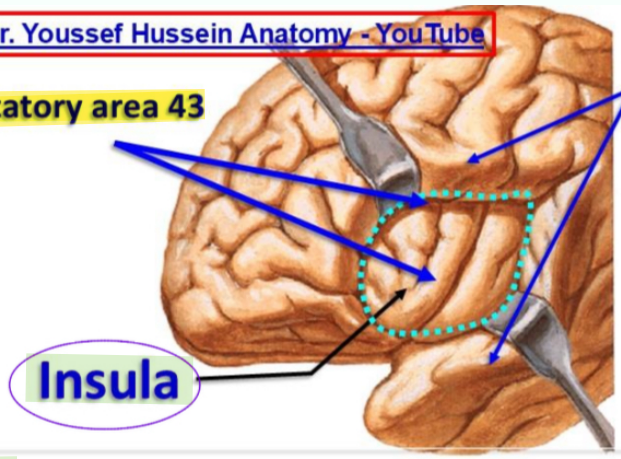
Primary Auditory Area (41, 42) :

- It is present in the floor of the lateral sulcus and the middle part of the superior temporal gyrus (Heschel's gyrus)

Auditory Association Area (Secondary) (Area 22)

- It is responsible for Recognition and Interpretation of the sounds

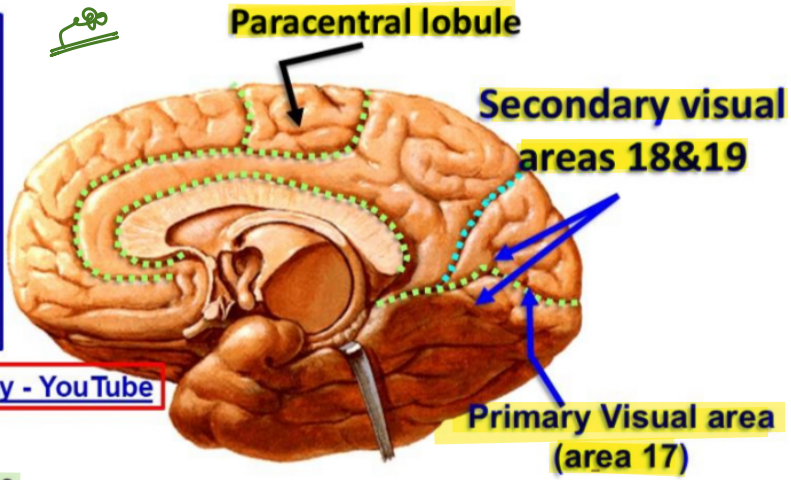




- **Insula** lies at the bottom of the deep lateral sulcus and cannot be seen from the surface unless the lips of the sulcus are separated.
- **Gustatory area** (area 43): lies in the insula .
- It is concerned with the recognition of the taste sensation.

1- Paracentral lobule;

- It continues with the motor and sensory areas in the lateral surface.
- It gives motor fibres and receives sensation from the pelvis and lower limb of the opposite side.
- It controls the micturition and defecation.

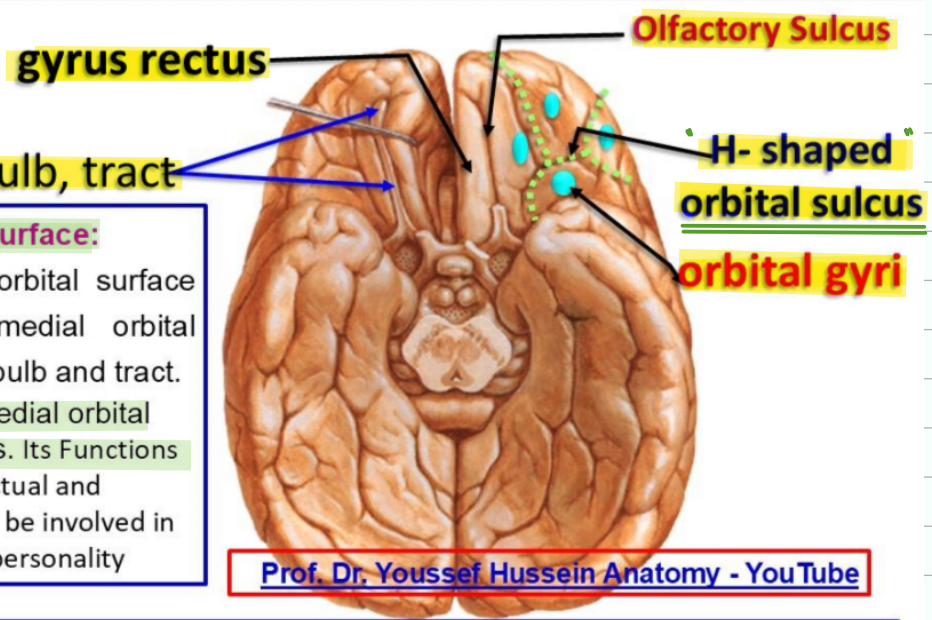


2- Primary Visual area (area 17);

- It lies on the depth of calcarine sulcus
- It receives visual sensation from the lateral geniculate body (**LGB**) via the optic radiation..
- Damage of the primary visual area causes **blindness**.

3- Secondary Visual (association) area (area 18, 19):

- It lies in the occipital lobe surrounding the primary visual area.
- Damage of this area causes **visual agnosia** (people can not identify the objects).



- **On the orbital surface:**

- Olfactory sulcus; on orbital surface close and parallel to medial orbital border, contains olfactory bulb and tract.

Gyrus rectus: between medial orbital border and olfactory sulcus. Its Functions (unclear) is related to Intellectual and emotional expression; It may be involved in higher cognitive function as personality

- Orbital sulcus: is H shaped sulcus lateral to the olfactory sulcus.

- Anterior, posterior, lateral and medial orbital gyri: on the orbital surface.

- On the tentorial surface:

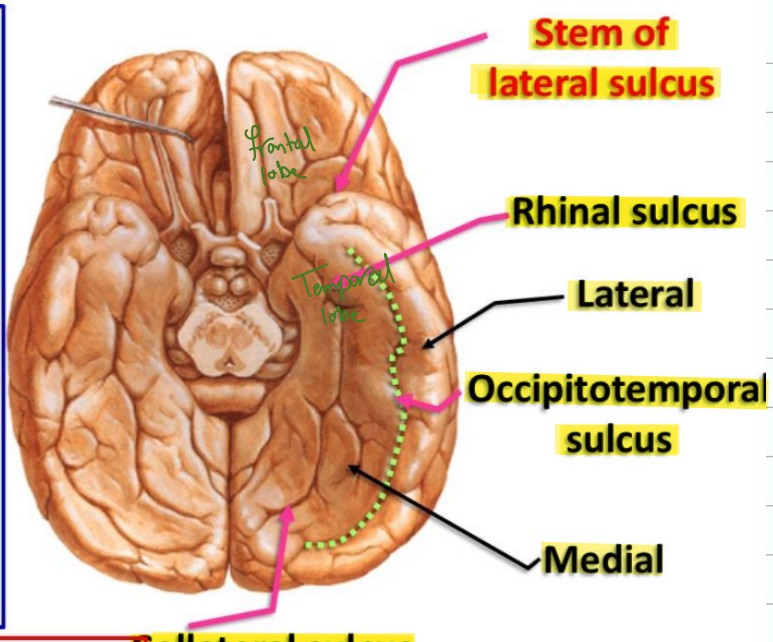
1- **Stem of lateral sulcus** between the frontal and temporal lobes.

2- **Occipito-temporal sulcus**: from occipital pole to temporal pole.

3- **Medial and Lateral occipitotemporal gyrus**: medial and lateral to occipitotemporal sulcus.

4- **Collateral sulcus**: It runs anteriorly below the calcarine sulcus.

5- **Rhinal sulcus**: extends anteriorly from collateral sulcus.



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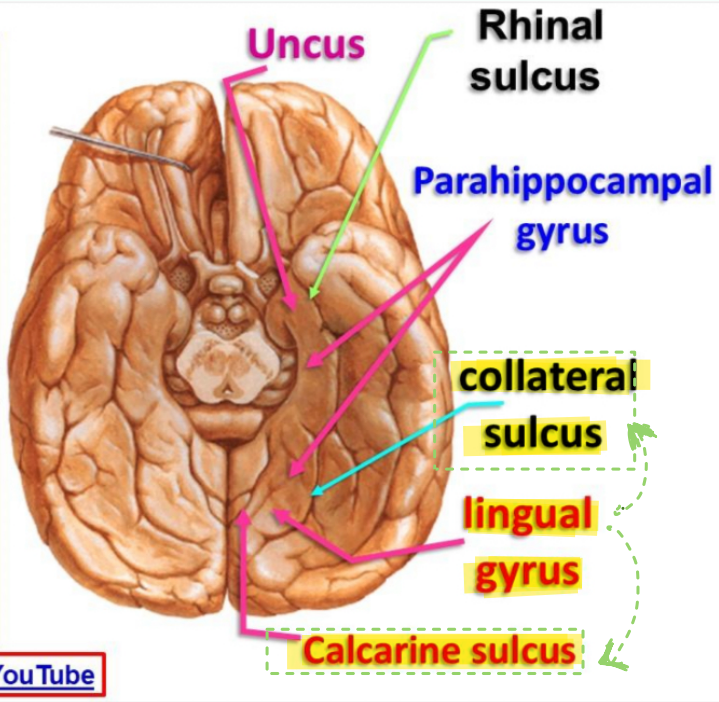
On the tentorial surface:

- **Lingual gyrus** between collateral sulcus and calcarine sulcus
- **Para hippocampal gyrus** anterior to the lingual gyrus (**Limbic system**)

- **Uncus** anterior to Para hippocampal gyrus, a hook-shaped convolution close to the temporal pole medial to the rhinal sulcus. **Center of the olfactory**



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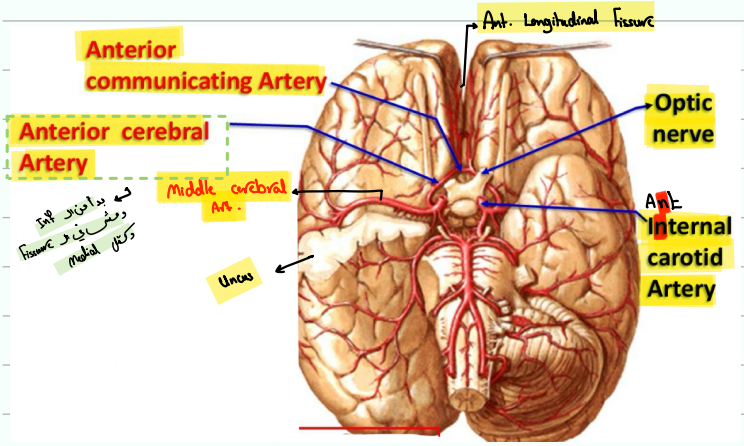
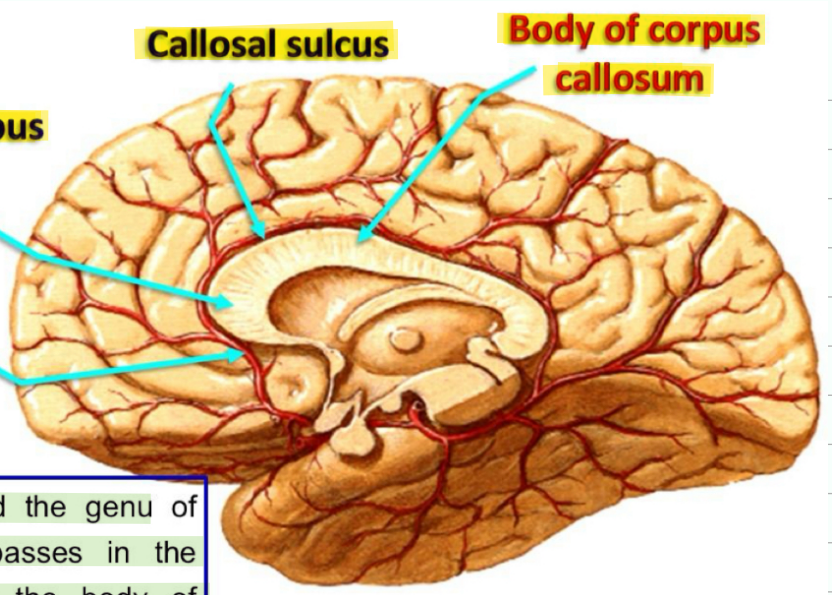
Blood Supply of the Cerebrum:



Anterior cerebral Art:

- O: One of the Two terminal branches of ICA.
- Course: it passes medially above optic nerve to median Longitudinal fissure

⟹ It communicates with the opposite side by Ant. communicating Artery.



- Then, it curves around the genu of corpus callosum and passes in the **callosal sulcus** above the body of corpus callosum in the medial surface.

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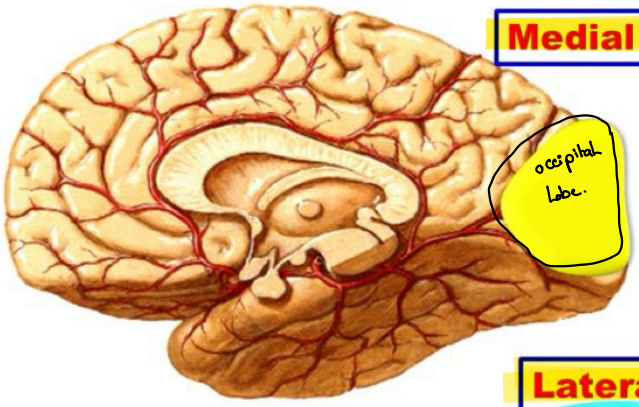

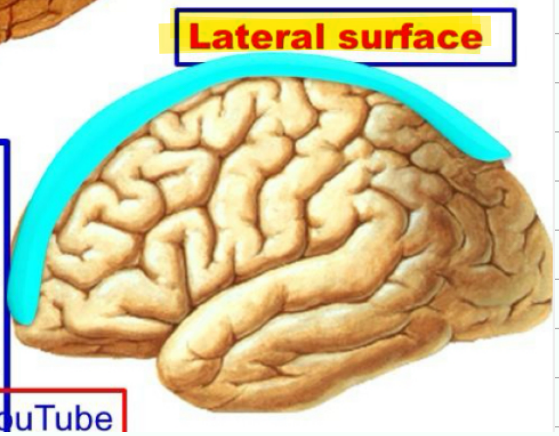

- **Cortical branches of anterior cerebral artery,**

a- Medial surface except the occipital lobe.

b- Upper one finger breadth of superolateral surface except the occipital lobe.

c- Medial part (1/3) of the orbital surface on the inferior surface.

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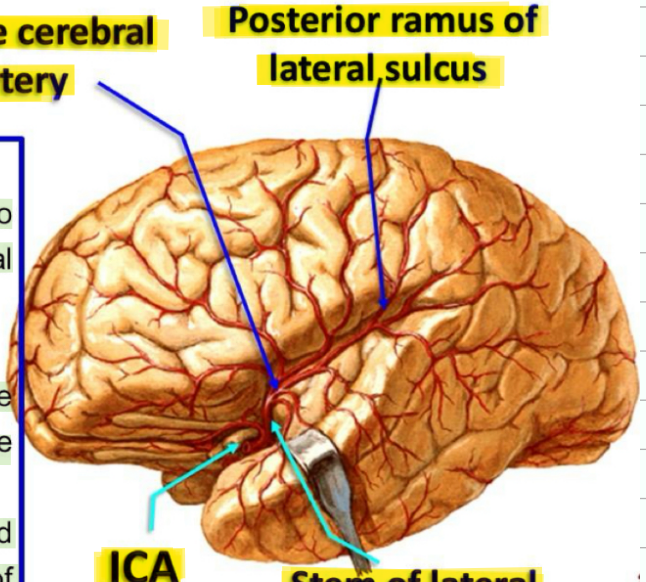

- **Middle Cerebral Artery**

** **Origin**: is the larger of the two terminal branches of the internal carotid artery.

** **Course:**

- It passes laterally in steam of the **lateral sulcus** (opposite to the pterion).
- Then it turns upward and backward in the posterior ramus of the lateral sulcus.