Anatomy for Dentistry

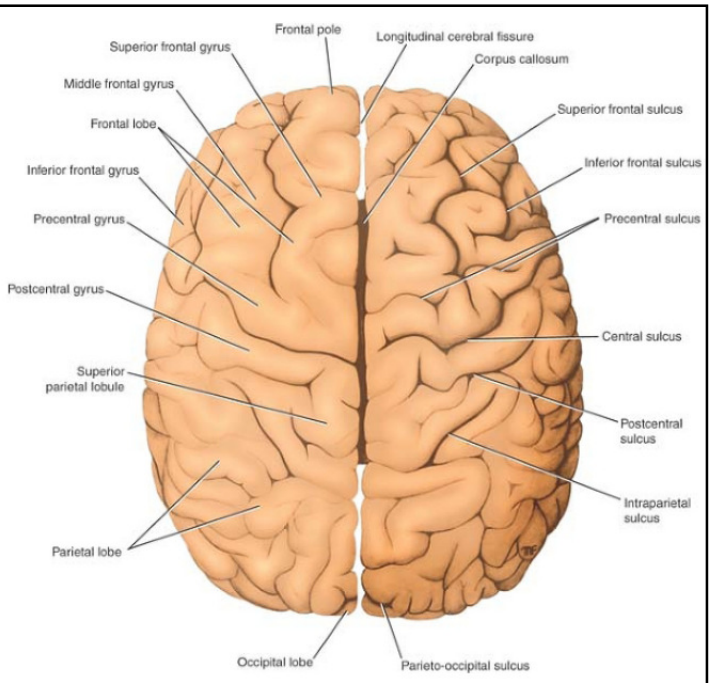
Dr. Mohammad Alsalem, PhD

Cerebrum

- Diencephalon
- Telencephalon

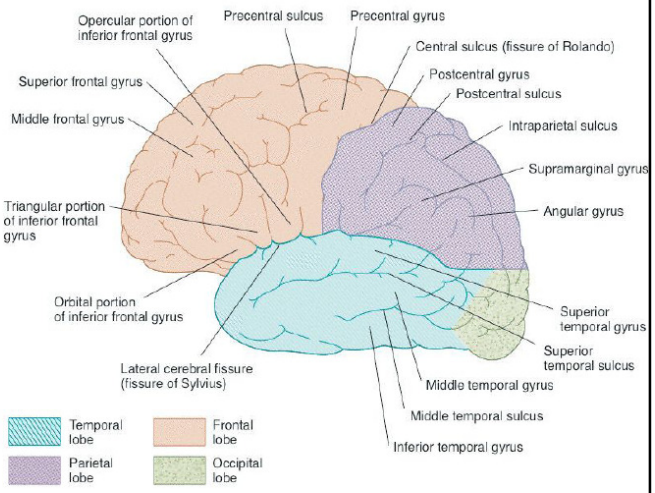
- Two cerebral hemispheres divided by:

- Longitudinal cerebral fissure
  - falx cerebri
  - anterior cerebral arteries.



Cerebral Hemispheres

- General appearance:
  - **Gyri (folds)**
  - **Sulci or fissures**
- To increase the surface area
- Divided into lobes:
  - **Frontal**
  - **Parietal**
  - **Temporal**
  - **Occipital**



Main Sulci

- **Central**

- runs downward and forward
- the only sulcus that indents the superomedial border and lies between two parallel gyri

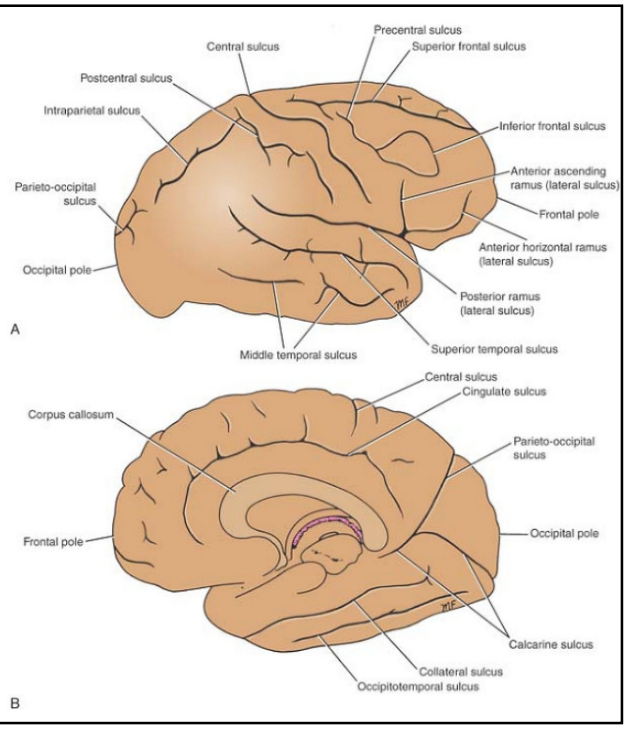
- **Lateral**

- Stem + 3 rami

1- anterior horizontal ramus

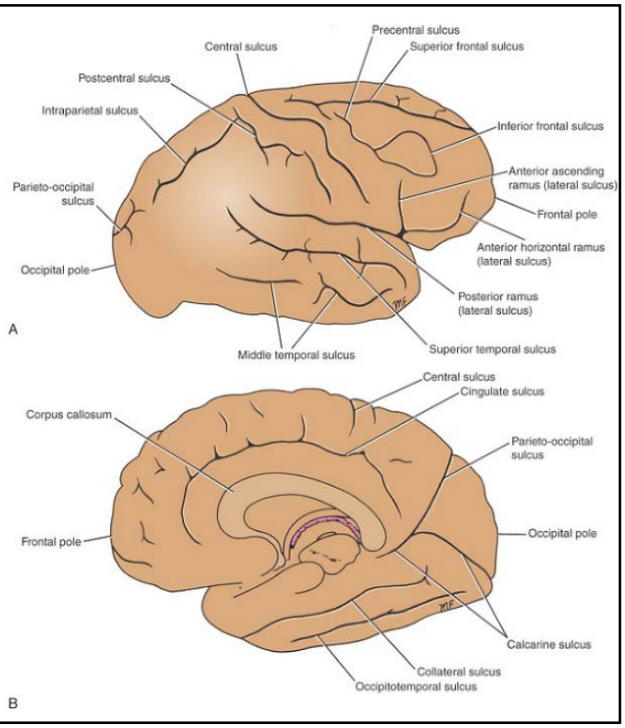
2- anterior ascending ramus

3- the posterior ramus



Main Sulci

- **Parieto-occipital**
  - begins on the superior medial margin of the hemisphere
  - Runs downward and anteriorly on the medial surface
- **Calcarine sulcus**
  - begins under the posterior end of the corpus callosum and arches upward and backward to reach the occipital pole,



Frontal lobe

- Anterior to the central sulcus an superior to the lateral sulcus
- **Three sulci :**

1- Precentral sulcus parallel to the central sulcus

2- Superior frontal sulcus

3- Inferior frontal sulcus

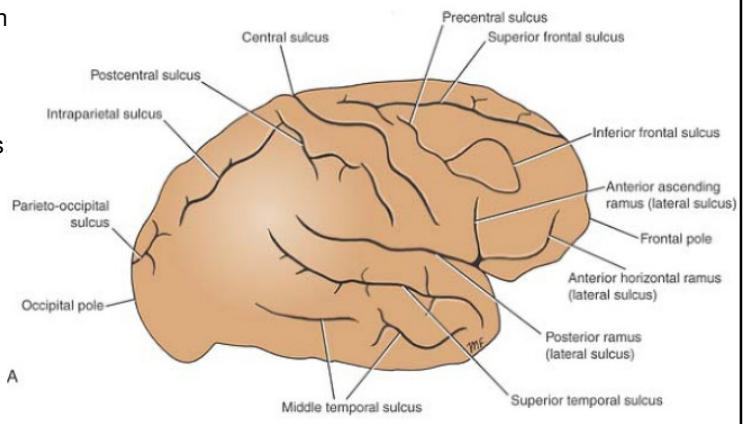
- **Four gyri:**

1- Precentral gyrus

2- Superior frontal gyrus

3- Middle frontal gyrus

4- Inferior frontal gyrus



Parietal lobe

- Posterior to the central sulcus and superior to the lateral sulcus
- **Two sulci :**

1- Postcentral sulcus: parallel to the central sulcus

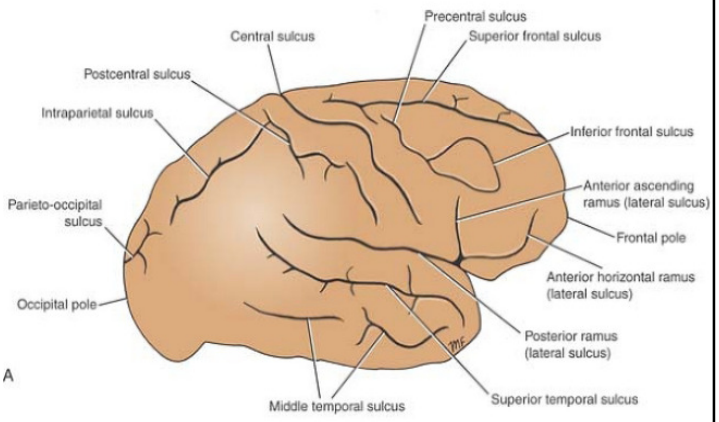
2- Intraparietal sulcus

- **Three gyri:**

1- Postcentral gyrus

2- Superior parietal lobule (gyrus)

3- Inferior parietal gyrus



Temporal lobe

- Inferior to the lateral sulcus
- **Two sulci :**

1- superior temporal sulcus

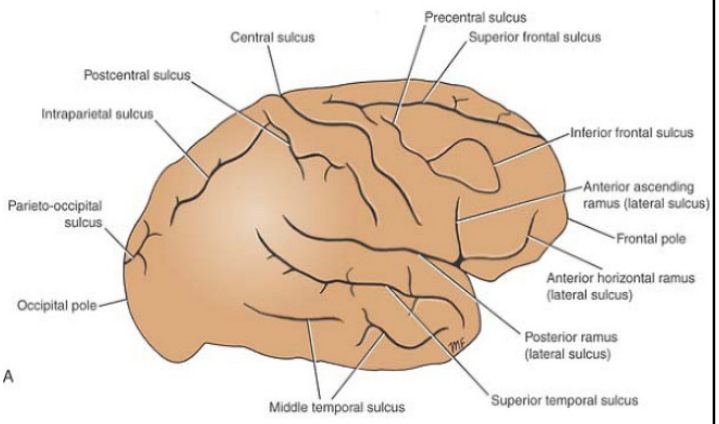
2- Middle temporal sulcus

- **Three gyri:**

1- Superiortemporal gyrus

2- Middle temporal gyrus

3- Inferior temporal gyri

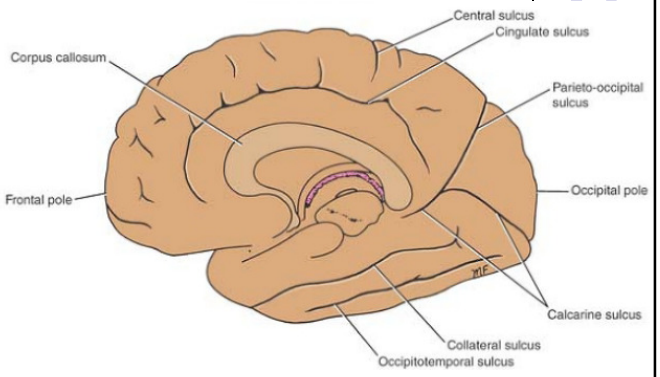


Cingulate gyrus

- Begins beneath the anterior end of the corpus callosum and continues above the corpus callosum until it reaches its posterior end.

- Lies between:

- **Callosal sulcus**
- **Cingulate sulcus**

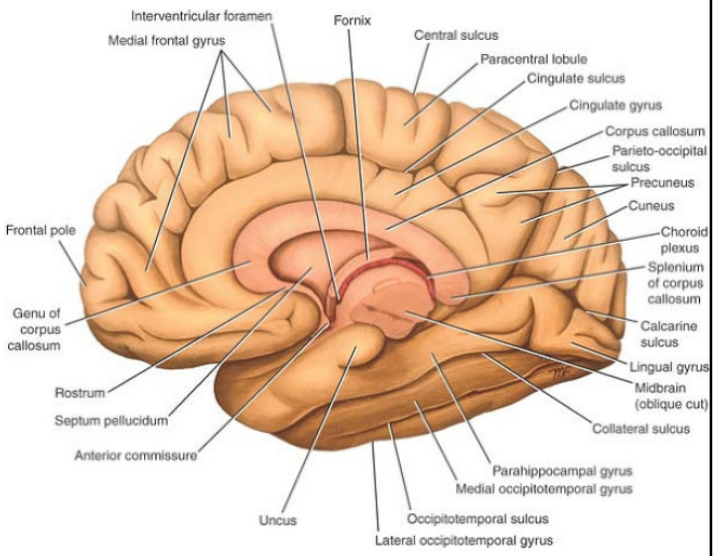


Precuneus

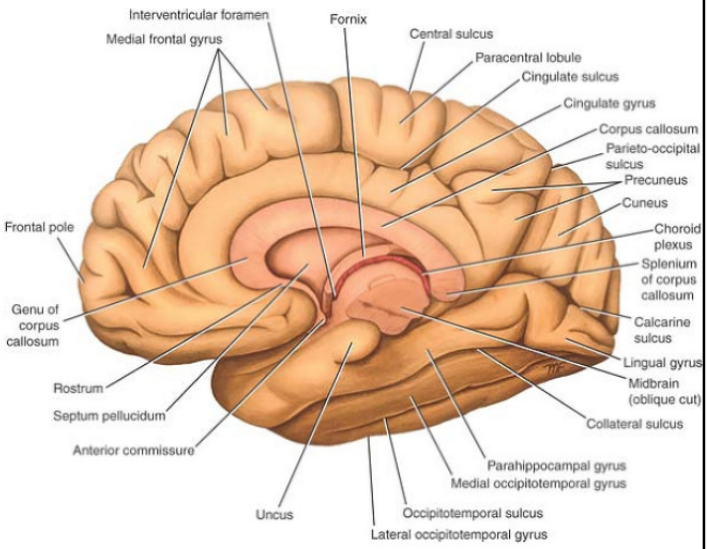
- Bounded anteriorly by the posterior end of the cingulate sulcus and posteriorly by the parieto-occipital sulcus.

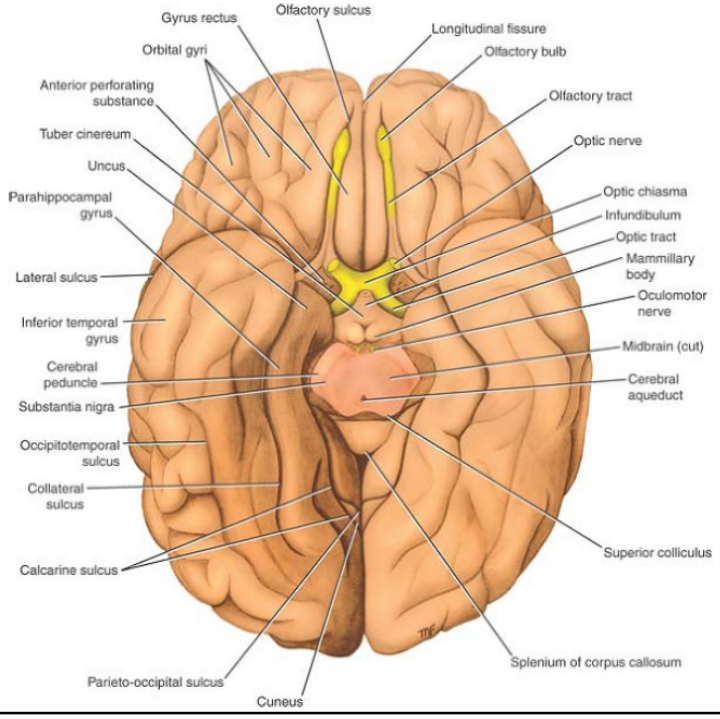
Cuneus:

- Bounded above by the parieto-occipital sulcus, inferiorly by the calcarine sulcus, and posteriorly by the superior medial margin.

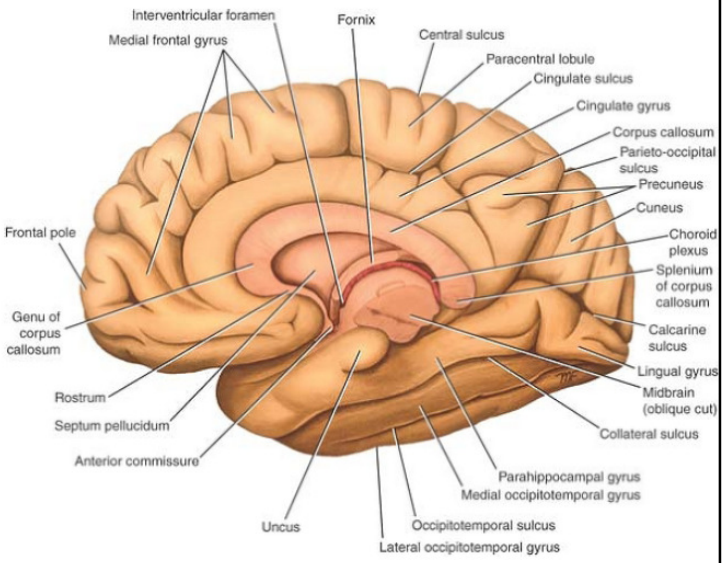


- **Collateral sulcus**: on the inferior surface of the hemisphere runs anteriorly below the calcarine sulcus.
- **Lingual gyrus:** between the collateral sulcus and the calcarine sulcus
- **Parahippocampal gyrus:** anterior to the lingual gyrus Its anterior end is the (**uncus**)



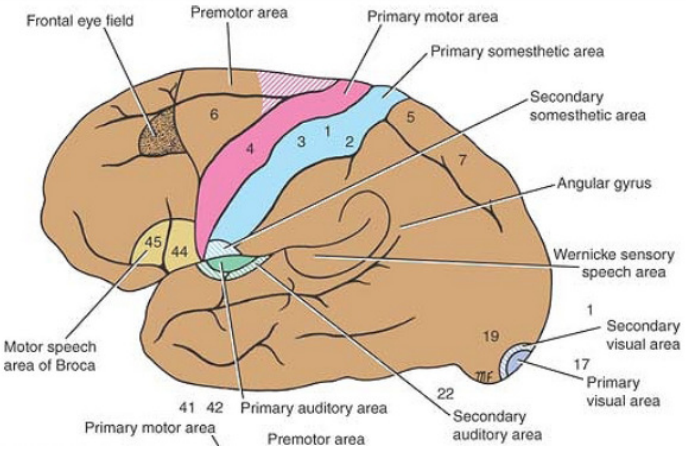


- **The medial occipitotemporal gyrus:** bounded medially by the collateral sulcus and laterally by the occipitotemporal sulcus.
- **The lateral occipitotemporal gyrus lies lateral to the sulcus**



Frontal lobe

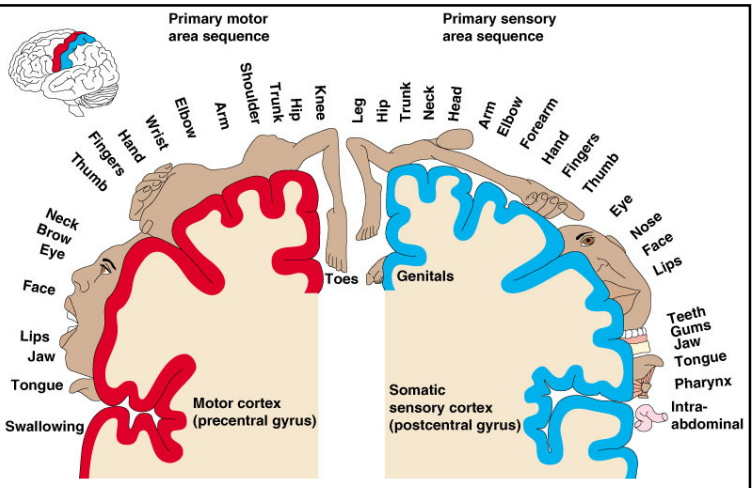
- The precentral area
- **The posterior region**: motor area, primary motor area, or **Brodmann area 4**, occupies the precentral gyrus extending over the superior border into the paracentral lobule



- **The anterior region**: the premotor area, secondary motor area, or Brodmann area 6 and parts of areas 8, 44, and 45. It occupies the anterior part of the precentral gyrus and the posterior parts of the superior, middle, and inferior frontal gyri.

Primary motor area

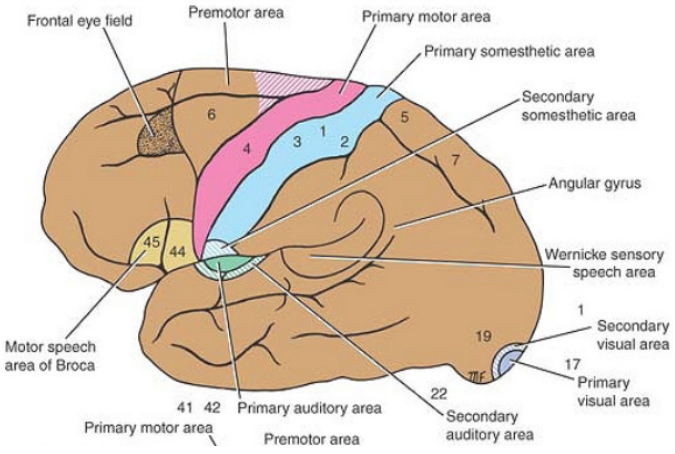
- isolated movements on the opposite side of the body
- The area of cortex controlling a particular movement is proportional to the skill involved in performing the movement



- The primary motor cortex is not responsible for the design of the pattern of movement but is the final station for conversion of the design into execution of the movement

Premotor area

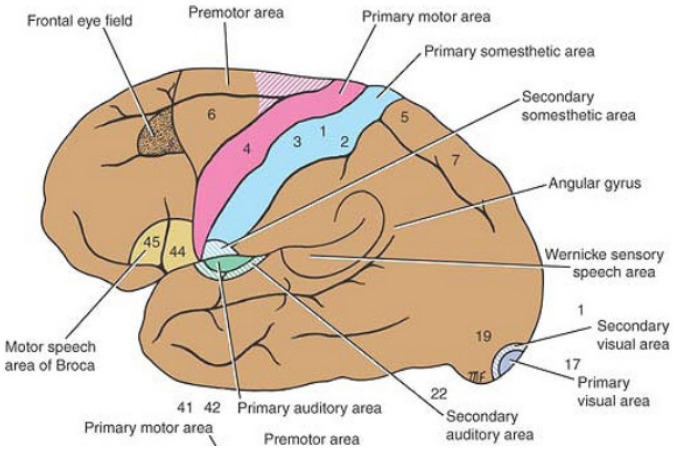
- Store programs of motor activity assembled as the result of past experience.
- Programs the activity of the primary motor area.
- Involved in controlling coarse postural movements
- Receives numerous inputs from the sensory cortex, the thalamus, and the basal ganglia



- Destruction of the primary motor area (area 4) produces more severe paralysis than destruction of the secondary motor area (area 6)
- Lesions of the secondary motor area alone produce difficulty in the performance of skilled movements, with little loss of strength.
- The jacksonian epileptic seizure is due to an irritative lesion of the primary motor area (area 4)

Frontal eye field

- **Location:** extends forward from the facial area of the precentral gyrus into the middle frontal gyrus (parts of Brodmann areas 6, 8, and 9).
- **Function:** control voluntary scanning movements of the eye and is independent of visual stimuli

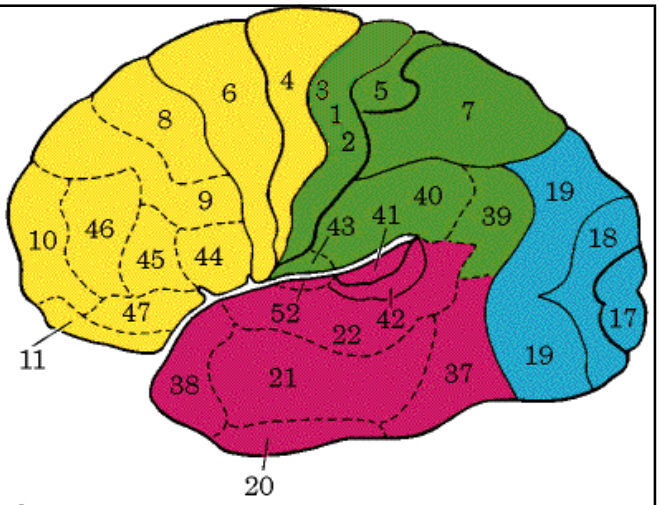


Motor speech area of Broca

- **Location:** inferior frontal gyrus between the anterior and ascending rami and the ascending and posterior rami of the lateral fissure (Brodmann areas 44 and 45)
- **Function:** formation of words by its connections with the adjacent primary motor areas

Prefrontal cortex

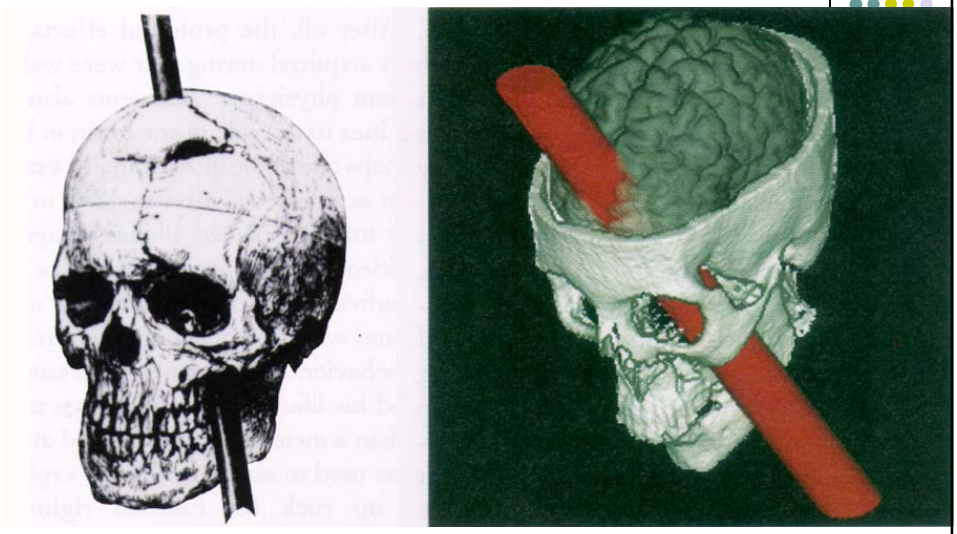
- **Location:** anterior to the precentral area. It includes the greater parts of the superior, middle, and inferior frontal gyri; the orbital gyri; most of the medial frontal gyrus; and the anterior half of the cingulate gyrus (Brodmann areas 9, 10, 11, and 12)



Function

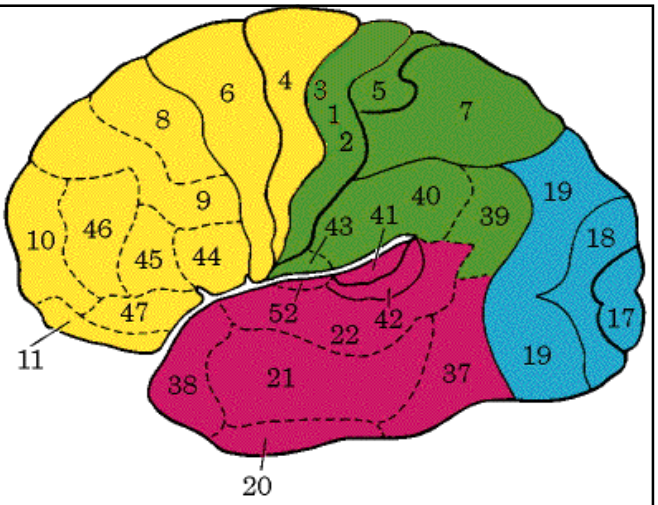
- Individual's personality.
- Regulator of the person's depth of feeling.

Phineas Gage

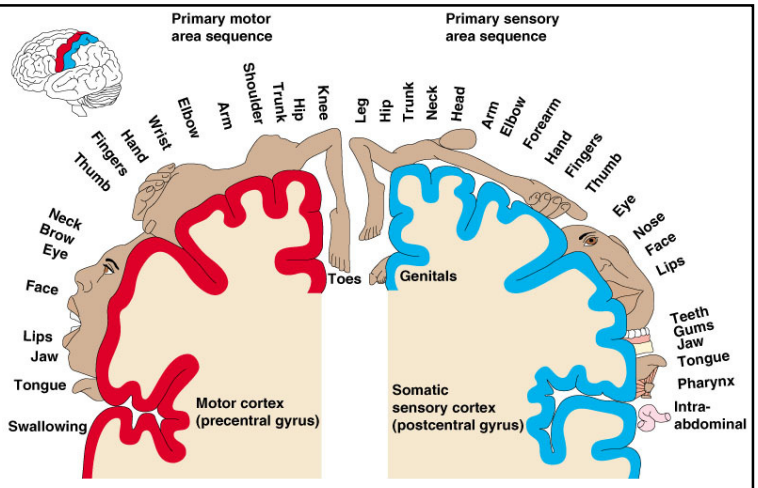


Parietal Lobe

- **Primary somesthetic area (primary somatic sensory cortex S1):**
- **Location:** postcentral gyrus on the lateral surface of the hemisphere and the posterior part of the paracentral lobule on the medial surface (Brodmann areas 3, 1, and 2)

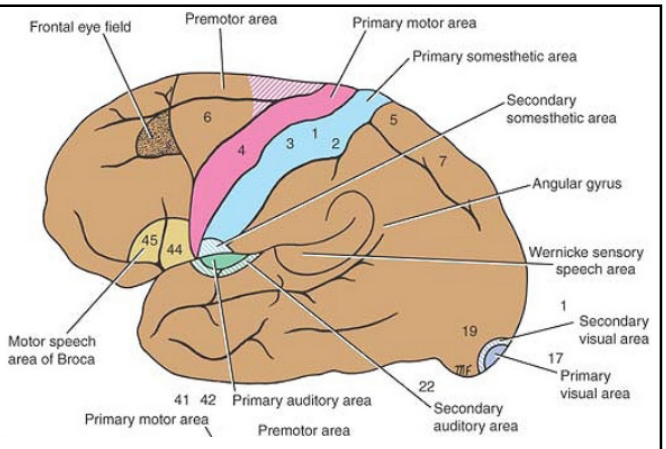


Primary somatic sensory cortex S1



- The size of the cortical area allocated to each part of the body is directly proportional to the number of sensory receptors present in that part of the body.

Secondary somesthetic area (secondary somatic sensory cortex S2)



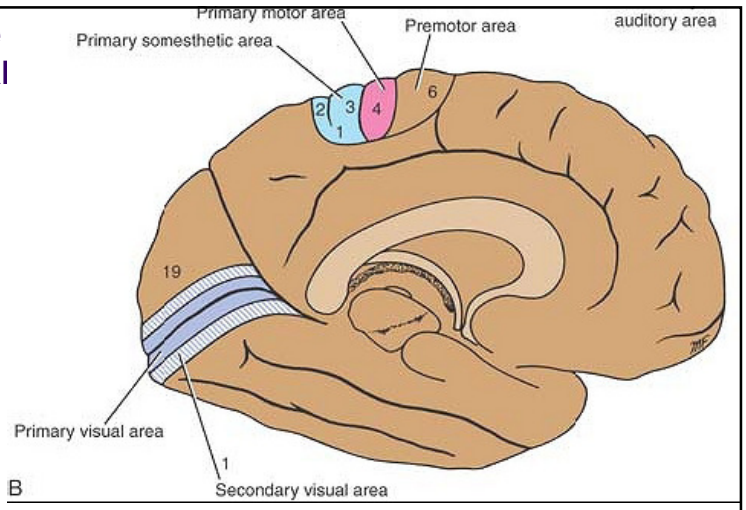
- **Location:** superior lip of the posterior limb of the lateral fissure
- **Function:** transient cutaneous stimuli, such as brush strokes???

The somesthetic association area

- **Location:** superior parietal lobule extending onto the medial surface of the hemisphere (Brodmann areas 5 and 7).
- **Function:** not only receives information concerning the size and shape of an object but also relates this to past sensory experiences. “recognize objects placed in the hand”

Occipital lobe Primary visual area

- **Location:** the walls of the posterior part of the calcarine sulcus and may extends around the occipital pole onto the lateral surface of the hemisphere (Brodmann area 17)

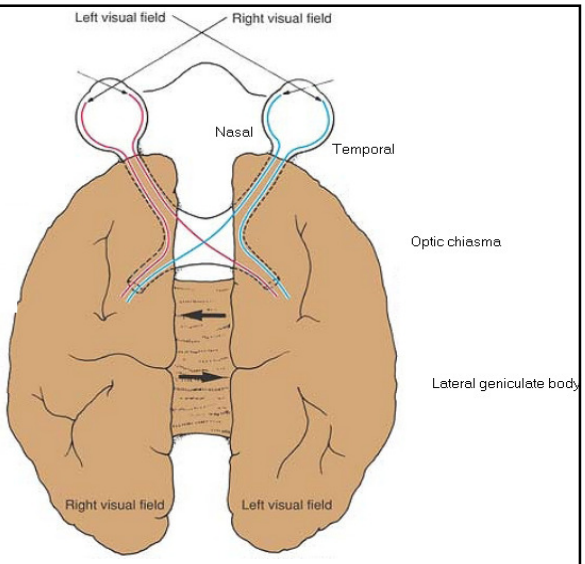


The secondary visual area:

- **Location:** (Brodmann areas 18 and 19) surrounds the primary visual area on the medial and lateral surfaces of the hemisphere

Occipital lobe primary visual area

- **Function:** receives fibers from the temporal half of the ipsilateral retina and the nasal half of the contralateral retina. The right half of the field of vision is represented in the visual cortex of the left cerebral hemisphere and vice versa

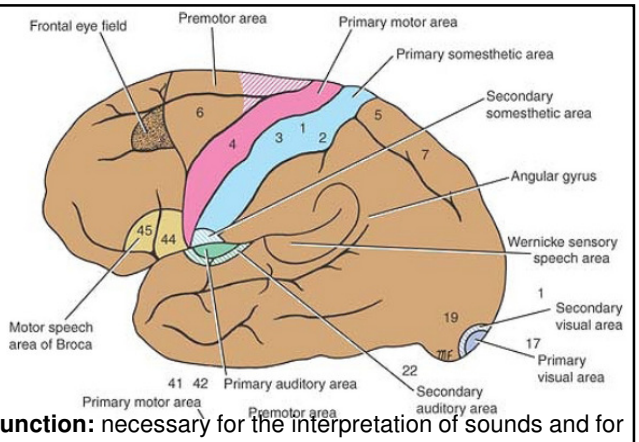


The secondary visual area

- **Function:** relate the visual information received by the primary visual area to past visual experiences, thus enabling the individual to recognize and appreciate what he or she is seeing
- **Occipital eye field**: reflex and associated with movements of the eye when it is following an object. (dependent on visual stimuli)

Primary auditory area

- **Location:** (Brodmann areas 41 and 42) inferior wall of the lateral sulcus
  - **Anterior part**: sounds of low frequency
  - **Posterior part**: sounds of high frequency.



Secondary auditory area

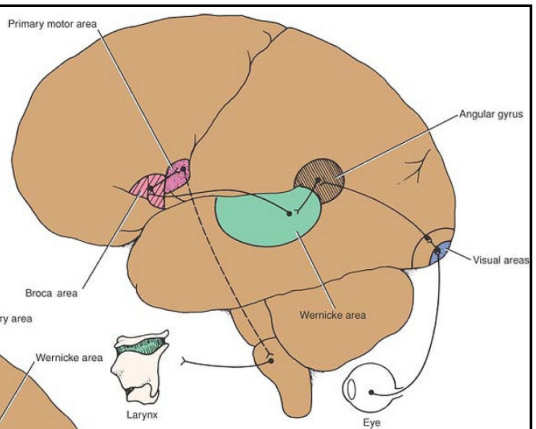
- **Location:** posterior to the primary auditory area in the lateral sulcus and in the superior temporal gyrus (Brodmann area 22)
- **Function:** necessary for the interpretation of sounds and for the association of the auditory input with other sensory information.

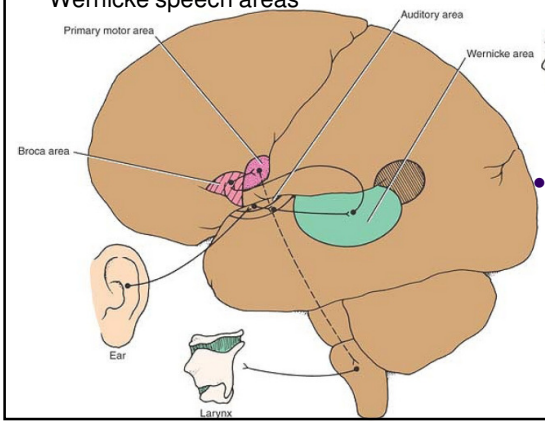
Sensory speech area of Wernicke:

- **Location:** in the superior temporal gyrus, with extensions around the posterior end of the lateral sulcus into the parietal region.
- **Function:** permits the understanding of the written and spoken language and enables a person to read a sentence, understand it, and say it out loud

Clinical notes:

- **Expressive aphasia:** Destructive lesions in the left inferior frontal gyrus **(Broca's)**
- **Receptive aphasia:** Destructive lesions restricted to the **Wernicke speech area**
- **Global aphasia** Destructive lesions involving both the Broca and Wernicke speech areas



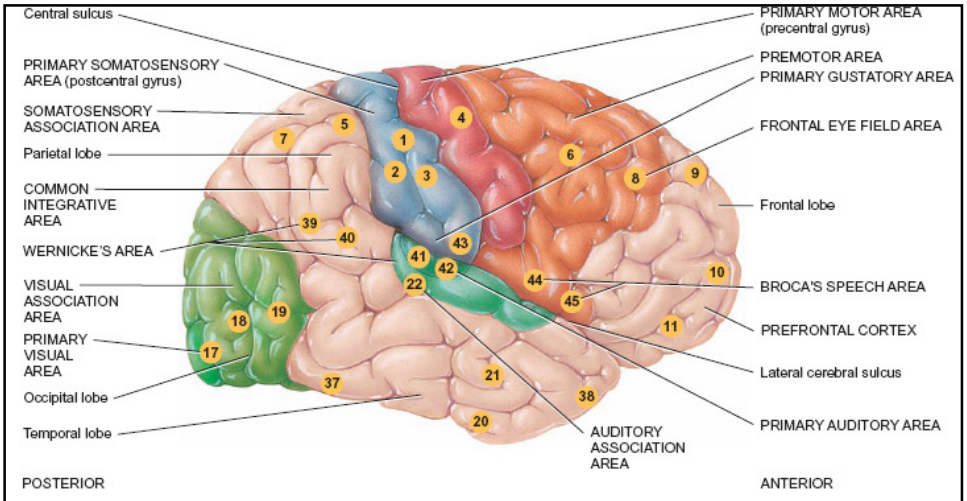


Clinical notes:

- Destructive lesions in the angular gyrus in the posterior parietal lobe produces:

- Alexia: inability to understand written words

- Agraphia: loss of writing ability



The taste area:

- Situated at the lower end of the postcentral gyrus in the superior wall of the lateral sulcus and in the adjoining area of the insula (Brodmann area 43).