

# NEUROLOGY

## Section I - Cerebral Hemispheres

- I. Cerebral Hemispheres and Landmarks
  - A. Sulci and fissures are the grooves of the brain.
    1. Longitudinal fissure (Figure 8.1)
    2. Lateral sulci
    3. Central sulci (Figure 8.2)
    4. Parieto-occipital sulci (Figure 8.3)
  - B. Lobes
    1. Frontal lobe
      - a) This region of the brain is responsible for judgement, concentration, orientation, and primitive reflexes.
      - b) The primary motor cortex is the location of all of the upper motor neurons that are responsible for movement.
      - c) The frontal eye field region is associated with eye movement.
      - d) Broca's area is responsible for motor speech.
    2. Parietal lobe
      - a) The primary sensory cortex processes all sensory input from the contralateral side of the body.
      - b) The angular gyrus is involved in performing mathematical calculations, writing, distinguishing left from right, and identifying fingers on the hand.
      - c) Damage to the dominant parietal cortex results in Gerstmann syndrome.
      - d) Damage to the non-dominant parietal cortex results in hemispatial neglect.
    3. Temporal lobe
      - a) Superior temporal gyrus
        - (1) Contains the primary auditory cortex
        - (2) Contains Wernicke's area
      - b) The hippocampus is responsible for memory formation (Figure 8.4 and 8.5).

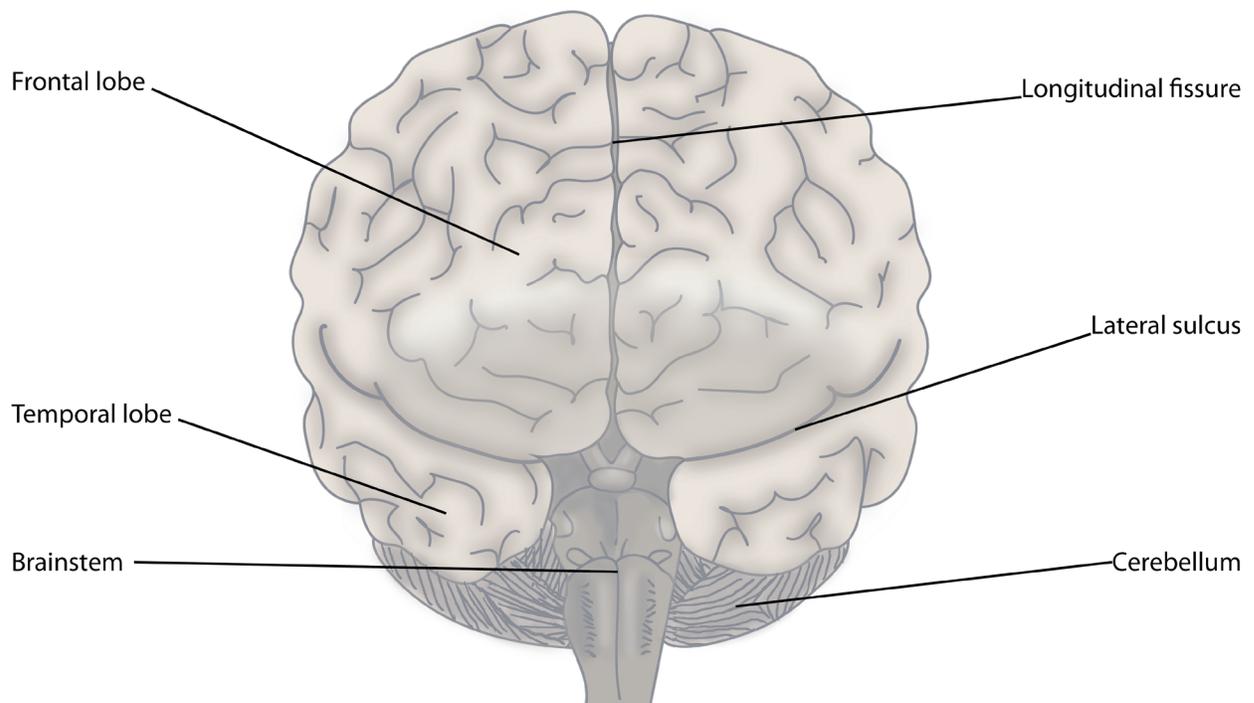


Figure 8.1 - Anterior view of the brain

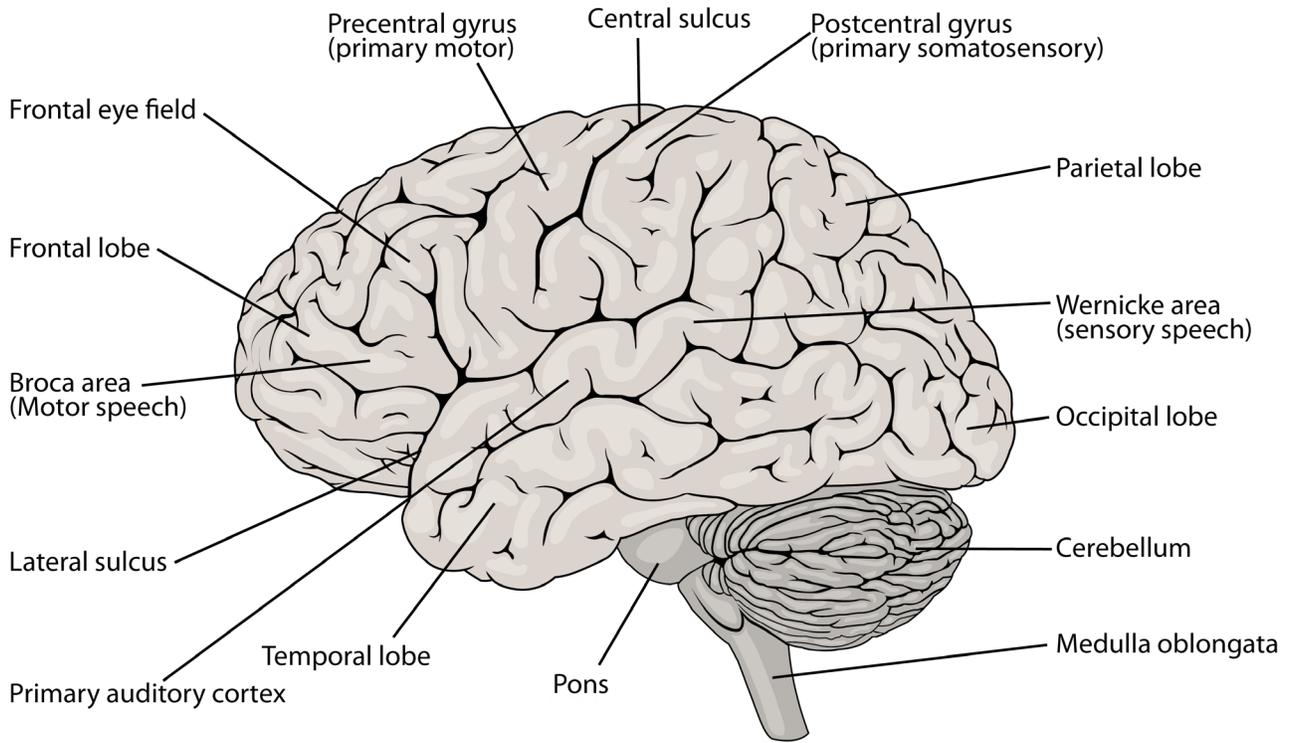


Figure 8.2 - Lateral view of the brain

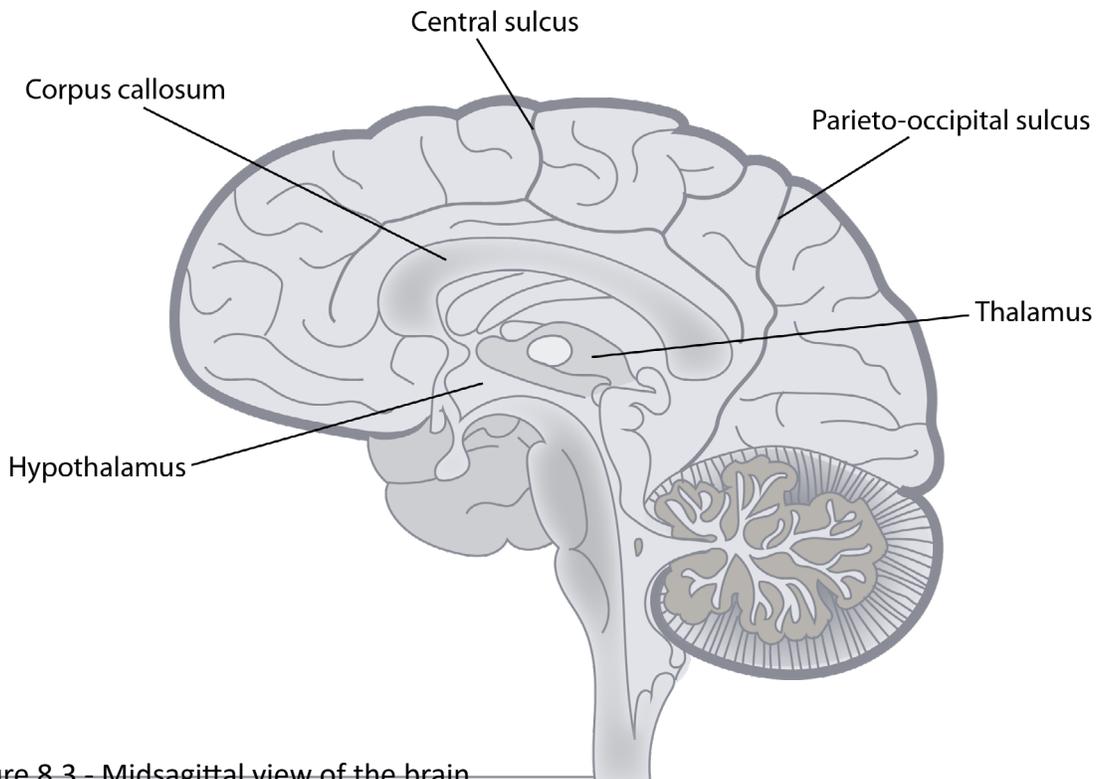


Figure 8.3 - Midsagittal view of the brain

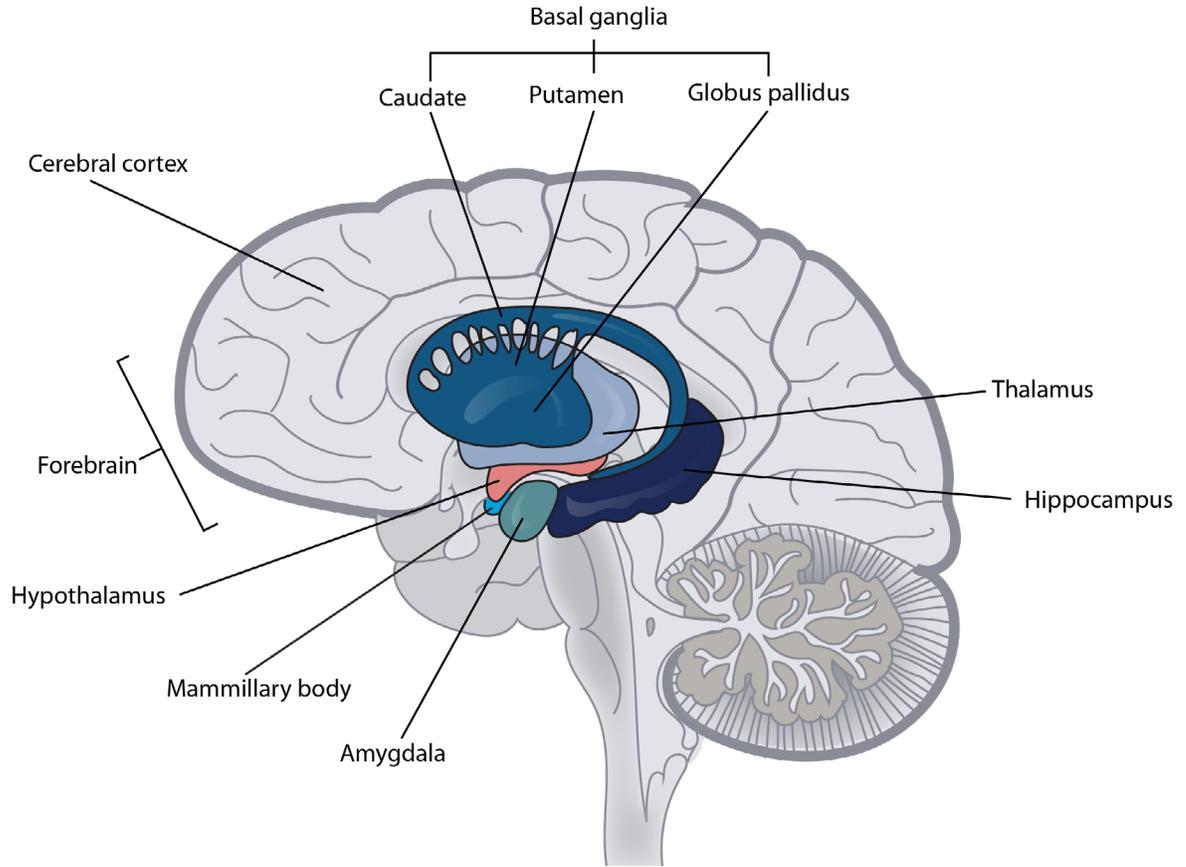


Figure 8.4 - The limbic system and basal ganglia

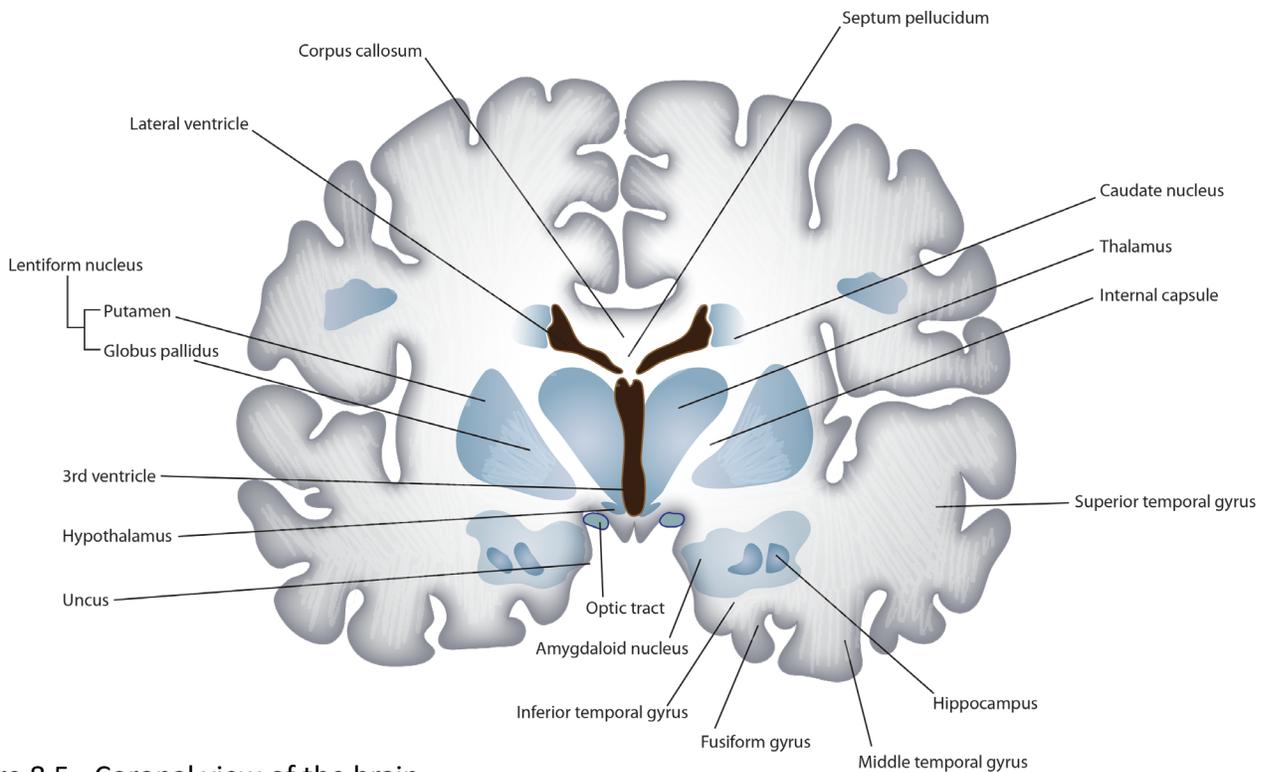


Figure 8.5 - Coronal view of the brain

- c) The amygdala is associated with emotions and decision making.
- d) The fusiform gyrus is responsible for facial recognition.
- e) The uncus is associated with seizures and can compress the third cranial nerve during an uncal herniation.

#### 4. Occipital lobe

- a) Primary visual cortex

### II. Homunculus (Figure 8.6)

#### A. A representation of the body superimposed over the precentral and postcentral gyri

- 1. The precentral gyrus is responsible for movement of the contralateral side.
- 2. The postcentral gyrus is responsible for tactile sensation of the contralateral side.

### III. Internal Capsule (Figure 8.7)

#### A. Anterior limb

#### B. Posterior limb

- 1. The anterior  $\frac{2}{3}$  of the posterior limb contains motor fibers of the corticospinal tract.
- 2. The posterior  $\frac{1}{3}$  of the posterior limb contains sensory fibers of the thalamocortical tract.

#### C. Genu

- 1. Contains motor fibers of the corticobulbar tract

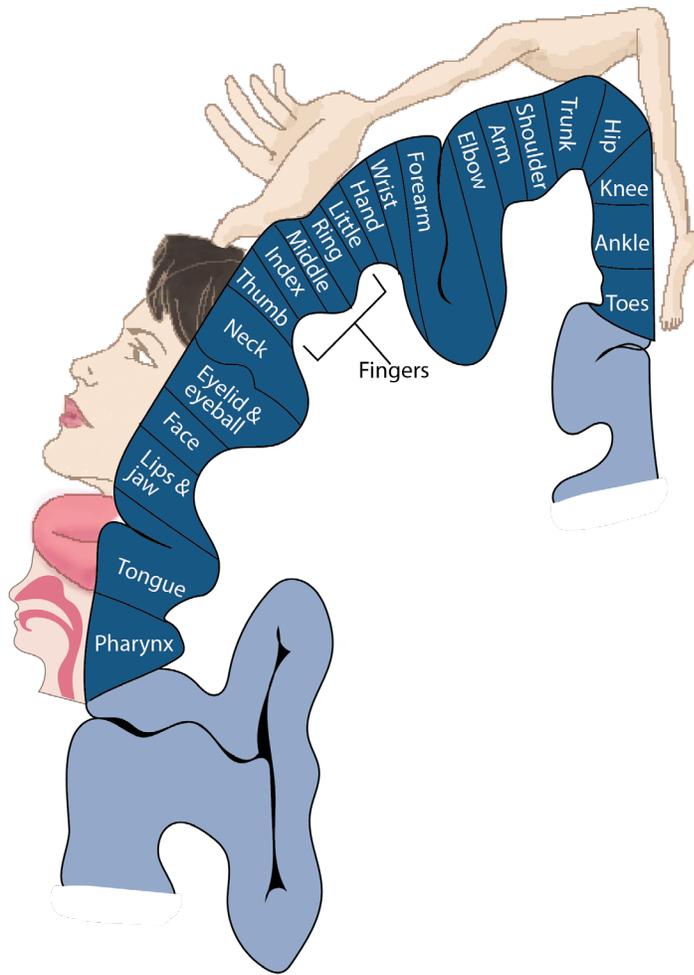


Figure 8.6 - The homunculus

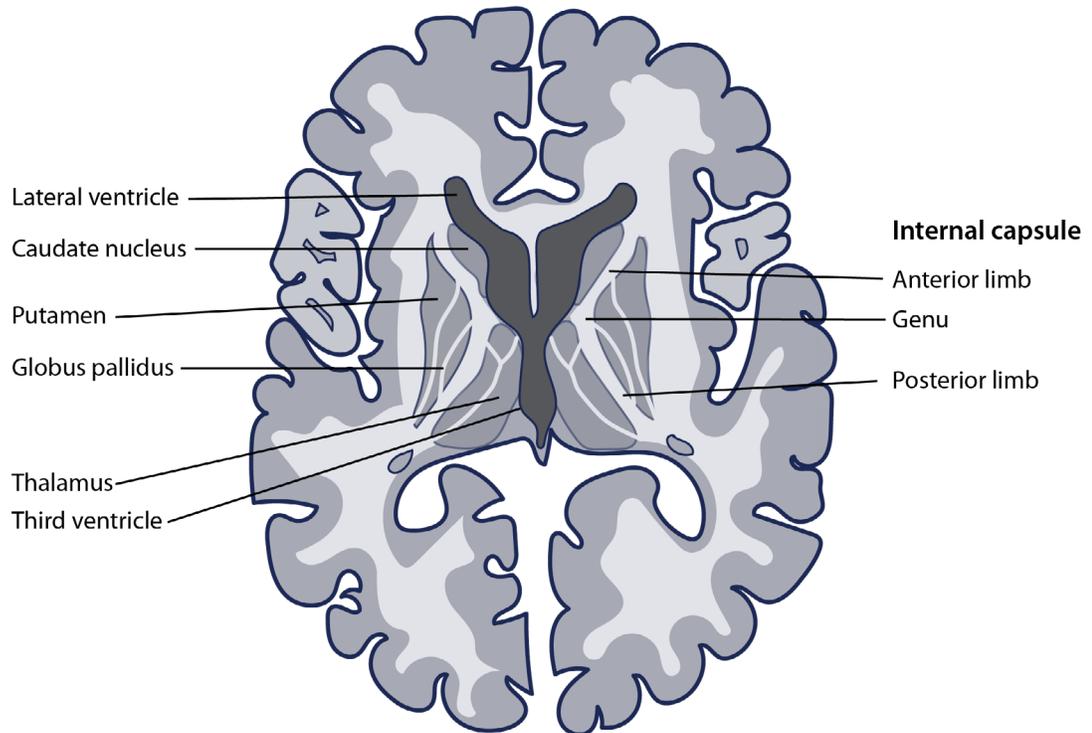


Figure 8.7 - Transverse view of the brain

## REVIEW QUESTIONS



1. What symptoms should you suspect in a patient who has damaged the left primary motor cortex?

- **Right-sided paralysis**

2. How would the left and right eyes be impacted if the left frontal eye field region was damaged?

- **Left-sided deviation**

3. A 64-year-old right-handed female is brought to the ED after the sudden onset of tingling and burning on the right side of her body. Upon examination there is a complete loss of sensation of the right arm. What region of the brain is damaged?

- **Left primary sensory cortex (the parietal lobe)**

4. If the entire parietal lobe was involved, what other symptoms would you suspect in this patient (see question above)?

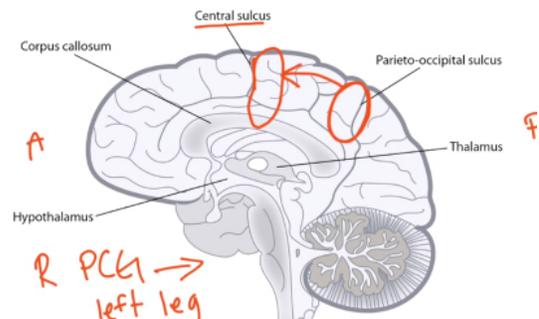
- **The patient is right-handed → left hemisphere is dominant**
- **Damage to the angular gyrus of the dominant parietal lobe → Gerstmann syndrome (agraphia, acalculi, finger agnosia, and left-right disorientation)**

5. A 63-year-old male had a stroke one week ago and he no longer recognizes his wife or children when they enter the room. What region of the brain was likely damaged?

- **The patient has prosopagnosia (can't recognize faces) due to damage to the fusiform gyrus of the temporal lobe**

6. A tumor originating from the medial aspect of the right parieto-occipital sulcus projects anteriorly, compressing the postcentral gyrus. What symptoms would this patient likely experience?

- **Tumor compresses the medial aspect of the right postcentral gyrus (primary sensory cortex) → sensory abnormalities in the contralateral leg (left leg)**



7. A 70-year-old woman presents with paralysis of the right leg. What region of the brain is likely damaged?

- **The medial aspect of the left precentral gyrus (primary motor cortex)**

