

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).

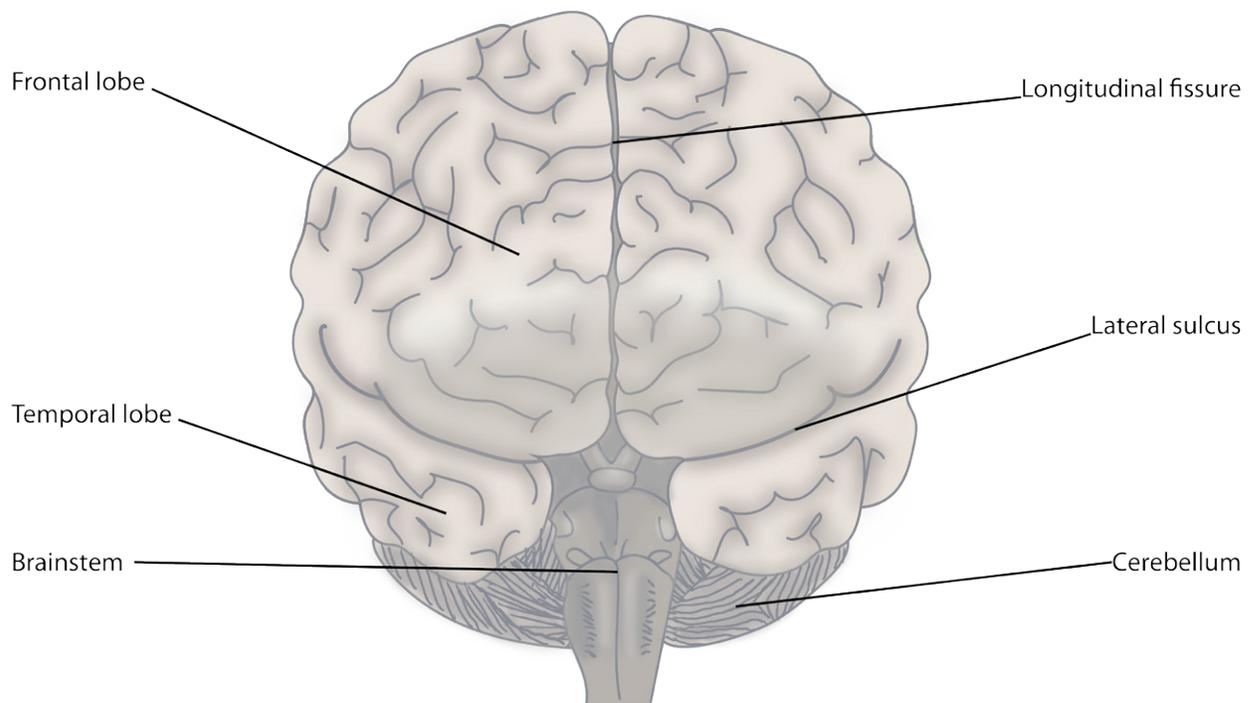


Figure 8.1 - Anterior view of the brain

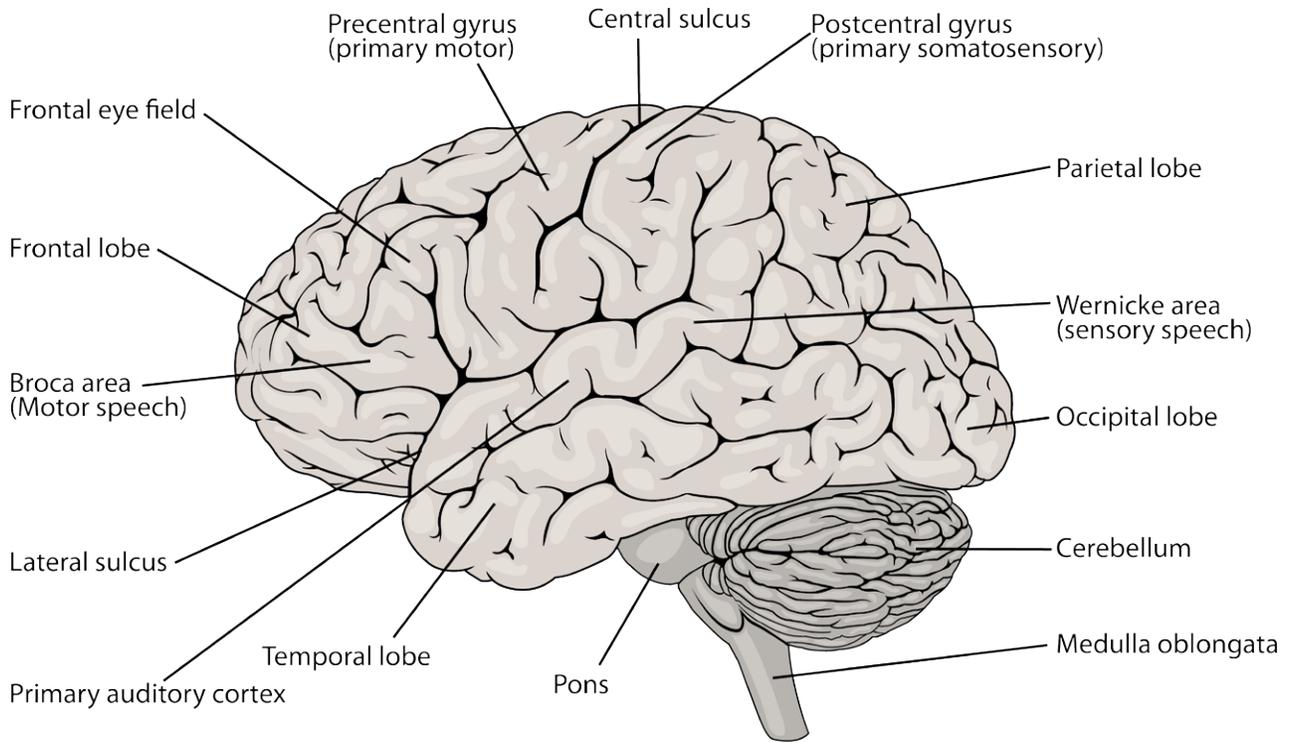


Figure 8.2 - Lateral view of the brain

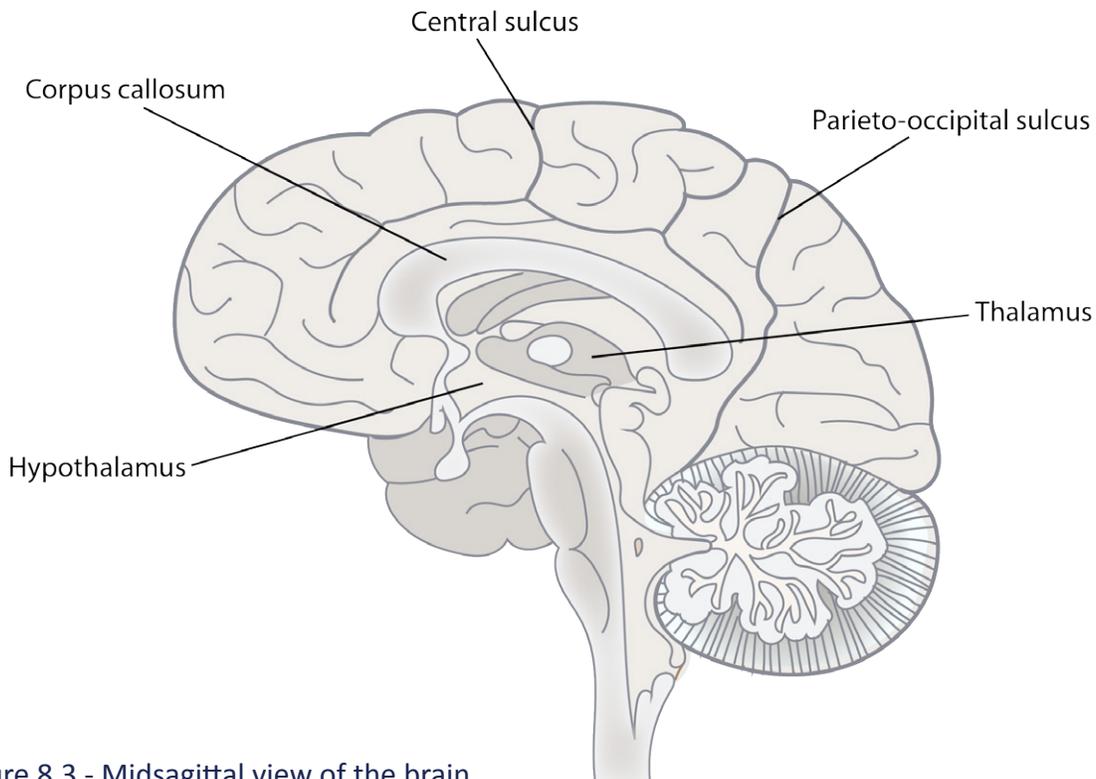


Figure 8.3 - Midsagittal view of the brain

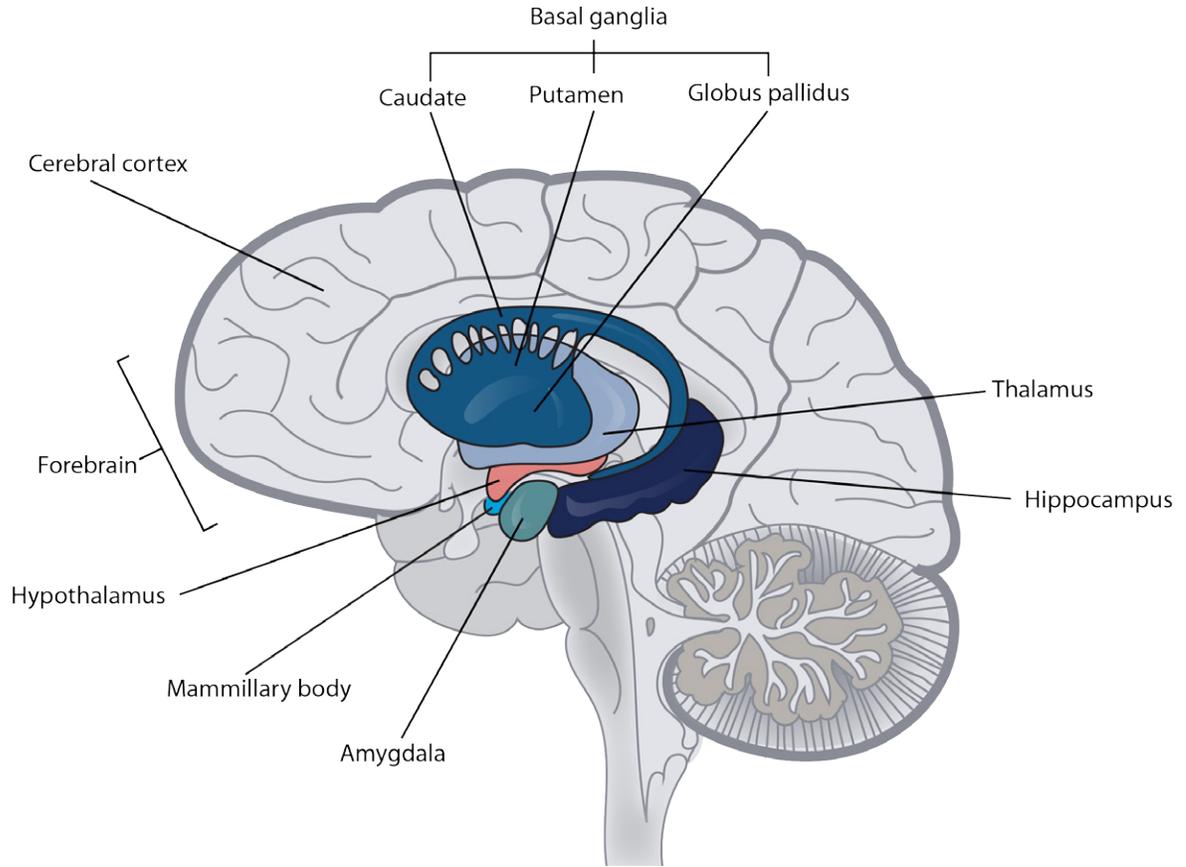


Figure 8.4 - The limbic system and basal ganglia

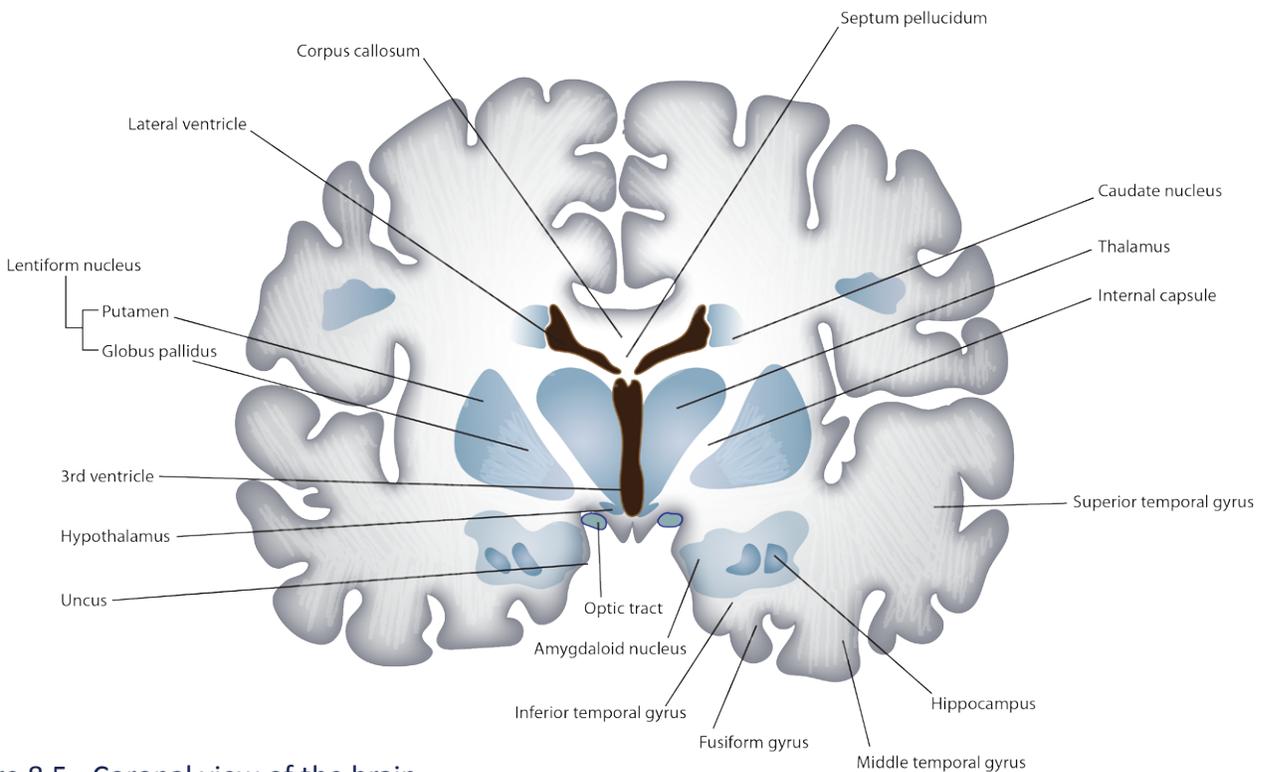


Figure 8.5 - Coronal view of the brain

- 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

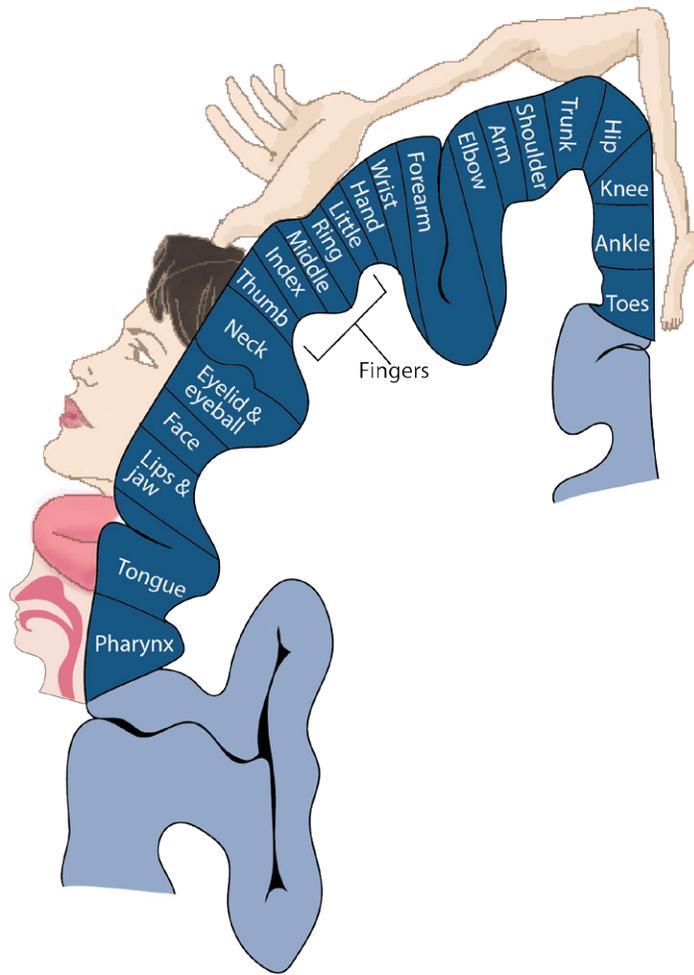


Figure 8.6 - The homunculus

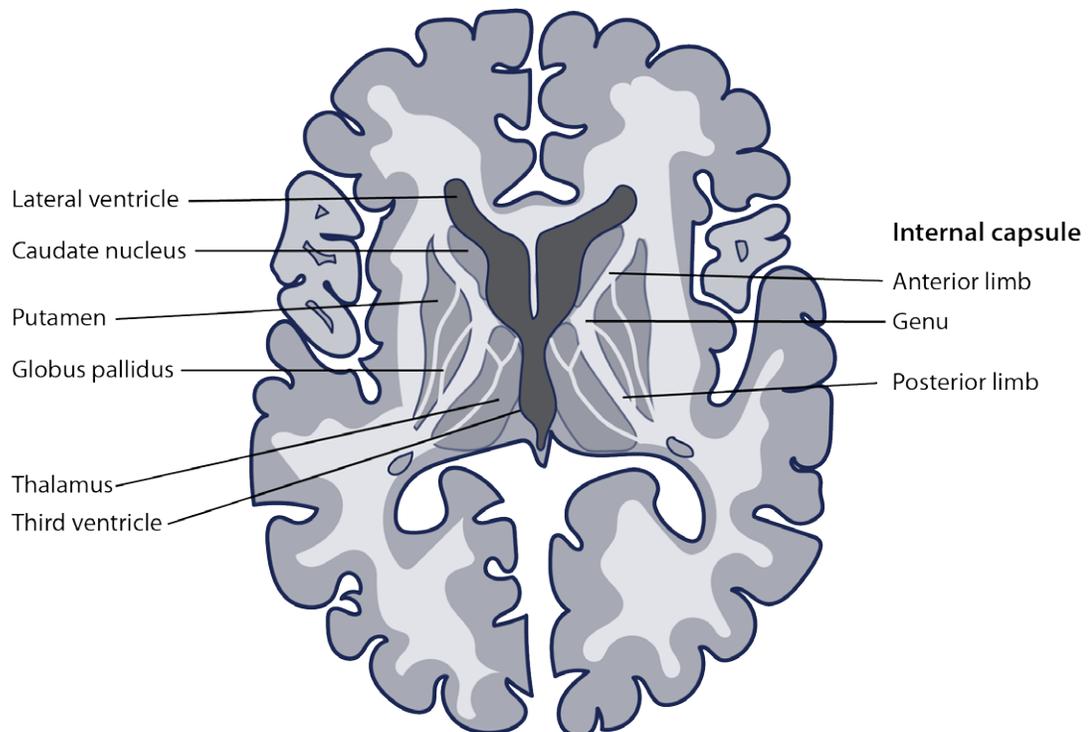


Figure 8.7 - Transverse view of the brain

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)?

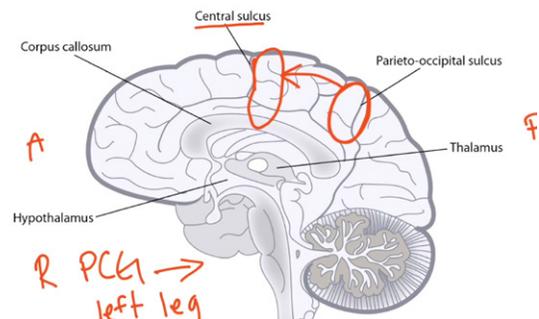
- **The patient is right-handed → left hemisphere is dominant**
- **Damage to the angular gyrus of the dominant parietal lobe → Gerstmann syndrome (agraphia, acalculi, finger agnosia, and left-right disorientation)**

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)**

