

The Brain

Learning Outcomes:

3. Identify the anatomical structures that form the thalamus and hypothalamus and list their functions
4. Identify the components of the cerebellum and list their functions

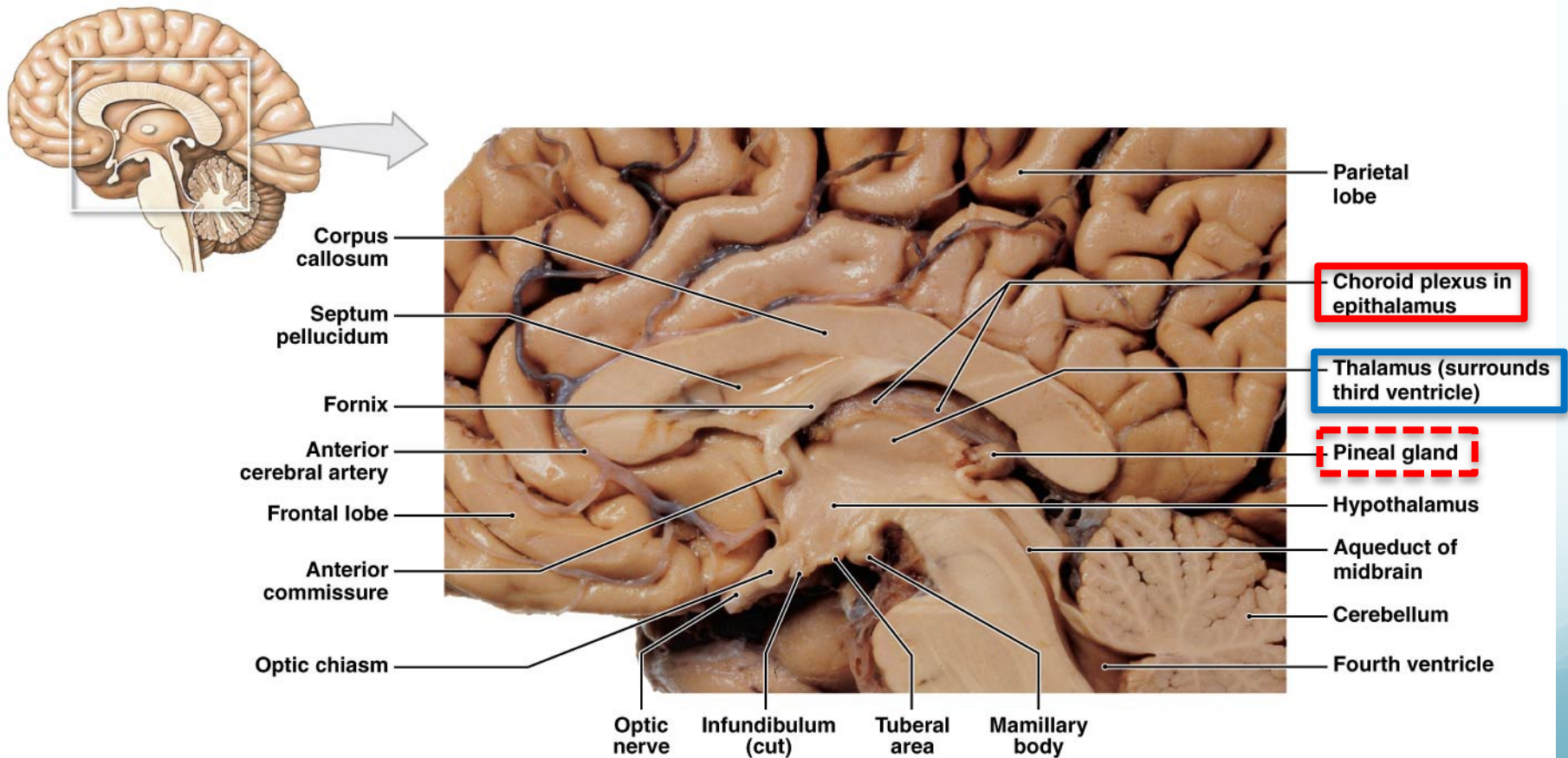
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The Diencephalon

- The diencephalon consists of:
 - **Epithalamus**
 - **Thalamus**
 - **Hypothalamus**

Epithalamus

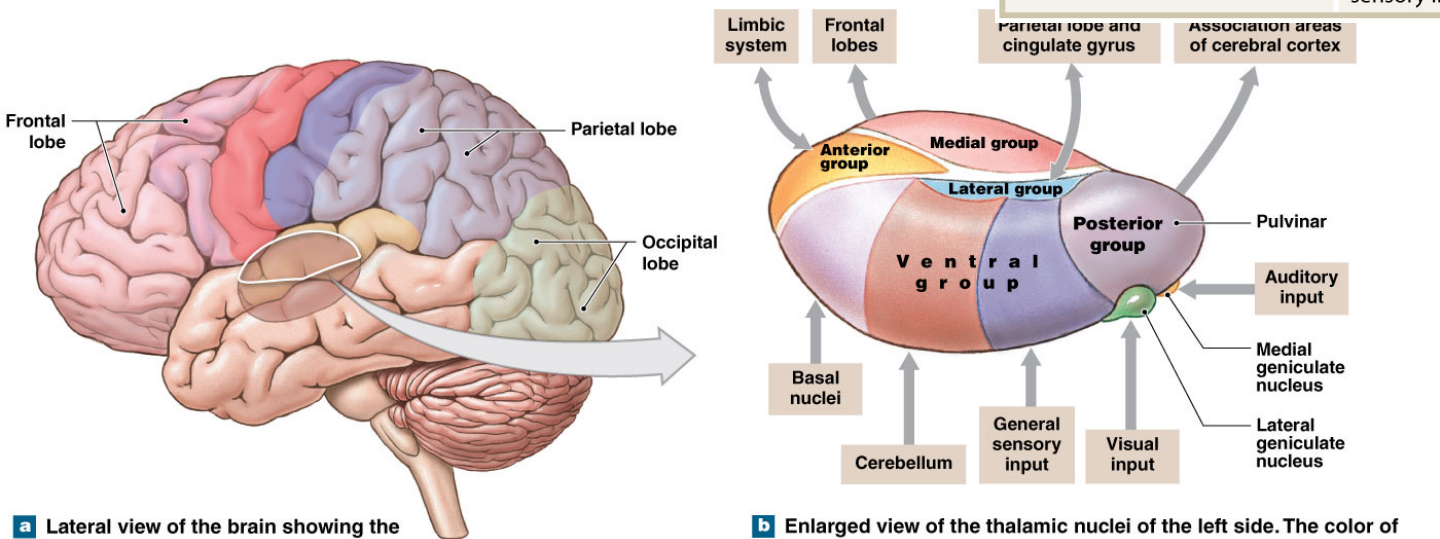


a Midsagittal section through the brain. This view shows the major features of the diencephalon and adjacent portions of the brain stem.

Thalamus

Table 16.5 The Thalamus

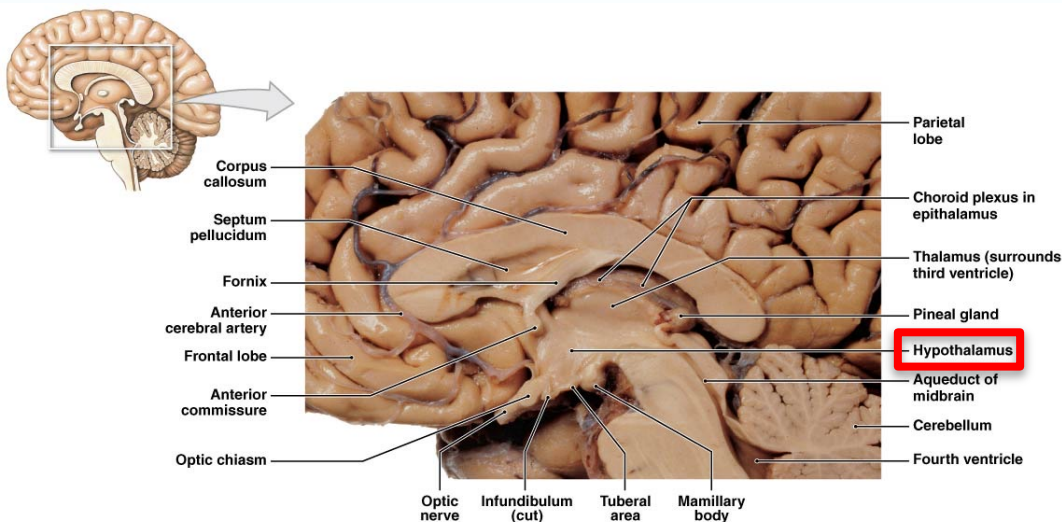
Structure/Nuclei	Functions
Anterior Group	Part of the limbic system
Medial Group	Integrates sensory information and other data arriving at the thalamus and hypothalamus for projection to the frontal lobes of the cerebral hemispheres
Ventral Group	Projects sensory information to the primary sensory cortex of the parietal lobe; relays information from cerebellum and basal nuclei to motor areas of cerebral cortex
Posterior Group	
Pulvinar	Integrates sensory information for projection to association areas of cerebral cortex
Lateral geniculate nuclei	Project visual information to the visual cortex of occipital lobe
Medial geniculate nuclei	Project auditory information to the auditory cortex of temporal lobe
Lateral Group	Forms feedback loops involving the cingulate gyrus (emotional states) and the parietal lobe (integration of sensory information)



a Lateral view of the brain showing the positions of the major thalamic structures. Functional areas of cerebral cortex are also indicated, with colors corresponding to those of the associated thalamic nuclei.

b Enlarged view of the thalamic nuclei of the left side. The color of each nucleus or group of nuclei matches the color of the associated cortical region. The boxes either provide examples of the types of sensory input relayed to the basal nuclei and cerebral cortex or indicate the existence of important feedback loops involved with emotional states, learning, and memory.

Hypothalamus



a Midsagittal section through the brain. This view shows the major features of the diencephalon and adjacent portions of the brain stem.

b Enlarged view of the hypothalamus showing the locations of major nuclei and centers.

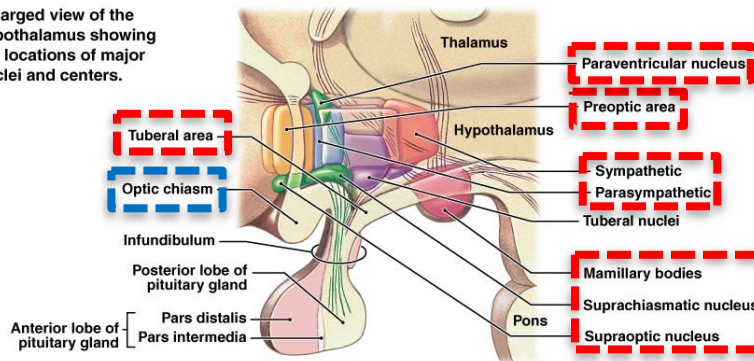


Table 16.6 The Hypothalamus

Region/Nucleus	Function
Hypothalamus in general	Controls autonomic functions; sets appetitive drives (thirst, hunger, sexual desire) and behaviors; sets emotional states (with limbic system); integrates with endocrine system (see Chapter 19)
Paraventricular nucleus	Secretes oxytocin, stimulating smooth muscle contractions in uterus and mammary glands
Preoptic area	Regulates body temperature via control of autonomic centers in the medulla oblongata
Autonomic centers Sympathetic Parasympathetic	Control heart rate and blood pressure via regulation of autonomic centers in the medulla oblongata
Tuberal nuclei	Produces inhibitory and releasing hormones that control endocrine cells of the anterior lobe of the pituitary gland
Mamillary bodies	Control feeding reflexes (licking, swallowing, etc.)
Suprachiasmatic nucleus	Regulates daily (circadian) rhythms
Supraoptic nucleus	Secretes antidiuretic hormone, restricting water loss at the kidneys

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Cerebellum

