



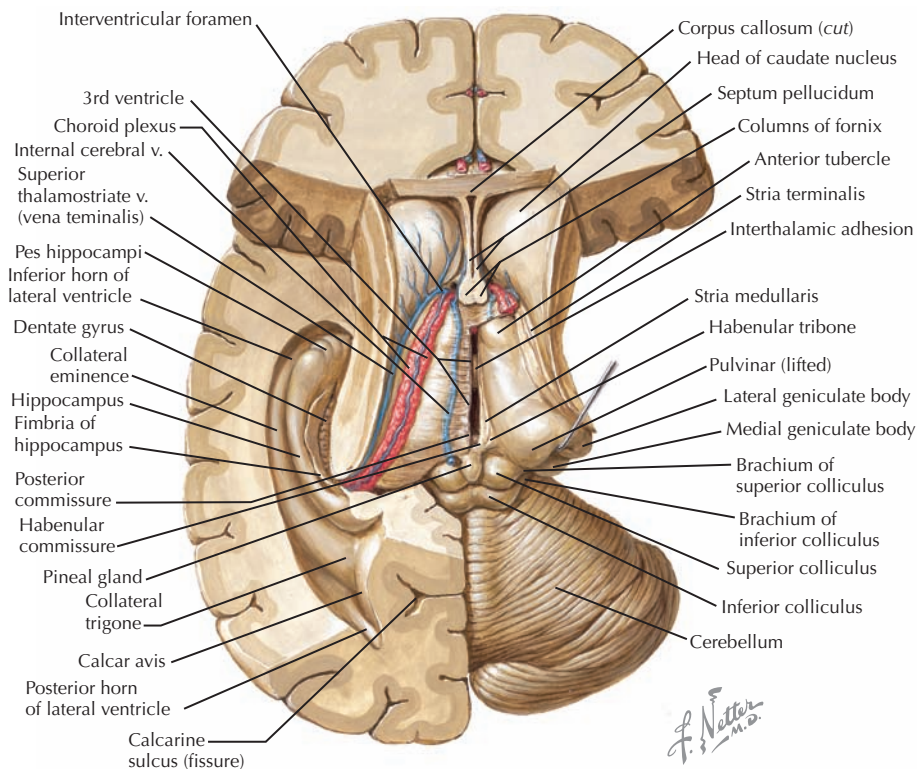
**CHAPTER 8**  
**Thalamus**

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# 8 Thalamus

## THALAMUS IN SITU

<b>Location</b>	Paired, medially placed, deep egg-shaped nuclear structures that form part of the lateral wall of the 3rd ventricle
<b>Architecture</b>	Composed of multiple nuclei, which receive input from many cortical and subcortical structures
<b>Function</b>	Functions as the "gateway to the cortex." Sensory input, other than olfaction, relays through the thalamus before reaching the cortex. All output to the cortex from the cerebellum and basal ganglia relays through the thalamus. The thalamus also relays limbic input to the cortex
<b>Clinical Significance</b>	Due to its multiple functions, damage to the thalamus can cause many problems, including sensory abnormalities, visual-field deficits, and behavioral changes  Lesions to the sensory area can cause numbness on the contralateral body and face



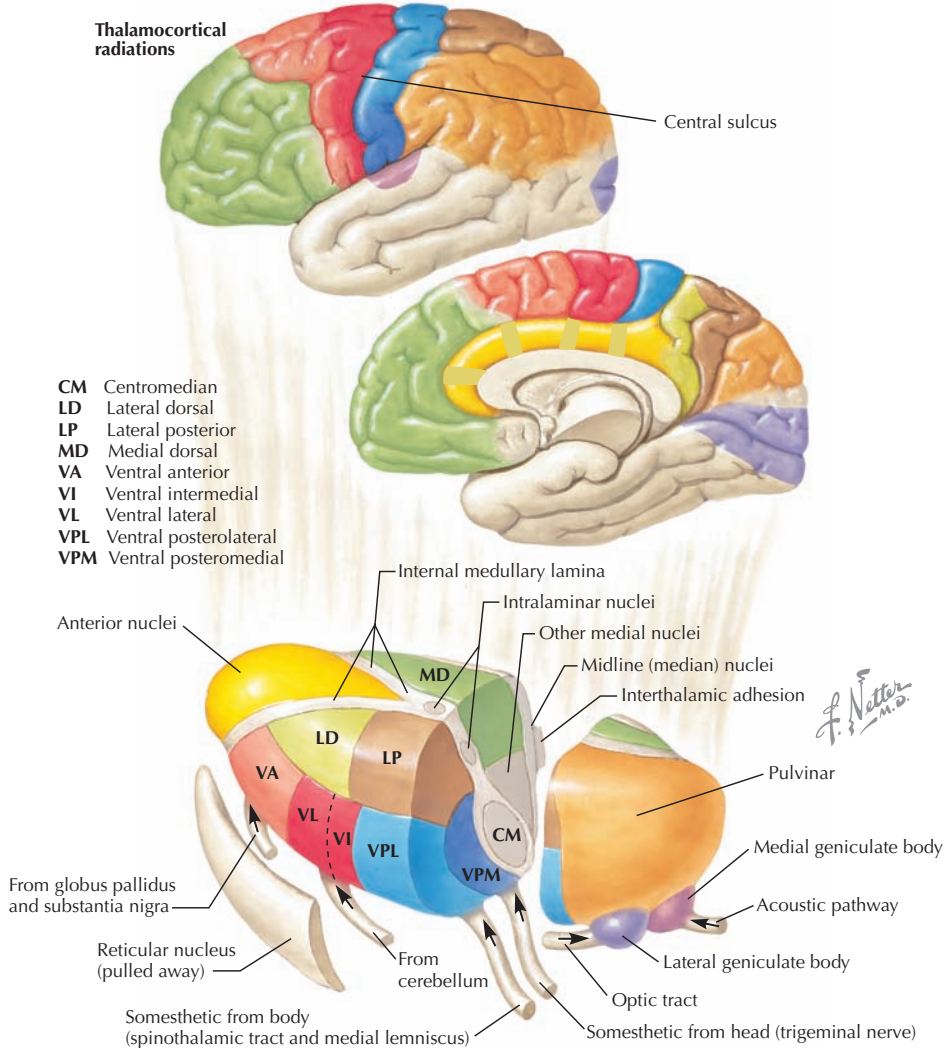
**THALAMIC NUCLEI**

- The thalamus is composed of many nuclei, which have motor, sensory, and limbic connections.
- Some nuclei are nonspecific in nature.

NUCLEUS	INPUT(S)	OUTPUT(S)	FUNCTION
<b>Sensory Nuclei</b>			
Ventroposterolateral (VPL)	Spinothalamic tract Medial lemniscus	Primary sensory cortex	Somatic sensation for contralateral body
Ventroposteromedial (VPM)	Trigeminothalamic tract, pontine taste area	Primary sensory cortex	Somatic sensation for contralateral face, taste
Medial geniculate (MGN)	Brachium of the inferior colliculus	Primary auditory cortex	Hearing
Lateral geniculate (LGN)	Optic tract	Primary visual cortex	Vision
Pulvinar	Lateral geniculate body (LGB), medial geniculate body (MGB), superior and inferior colliculi	Visual association cortex	Visual processing
<b>Motor Nuclei</b>			
Ventrolateral (VL)	Cerebellum and basal ganglia	Primary motor cortex	Modulation and coordination of movement
Ventroanterior (VA)	Basal ganglia	Premotor cortex	Initiation and planning of movement
Ventrolateral (VL)	Cerebellum	Primary motor cortex	Coordination of movement
<b>Limbic and Nonspecific Projection Nuclei</b>			
Anterior (Ant)	Mammillothalamic tract	Cingulate cortex	Memory storage and emotion
Mediodorsal (MD)	Temporal lobe, amygdala, hypothalamus	Prefrontal cortex	Motivation, drive, emotion
Centromedian (CM)	Slow pain pathways	Nonspecific cortical projections	Emotional content of pain

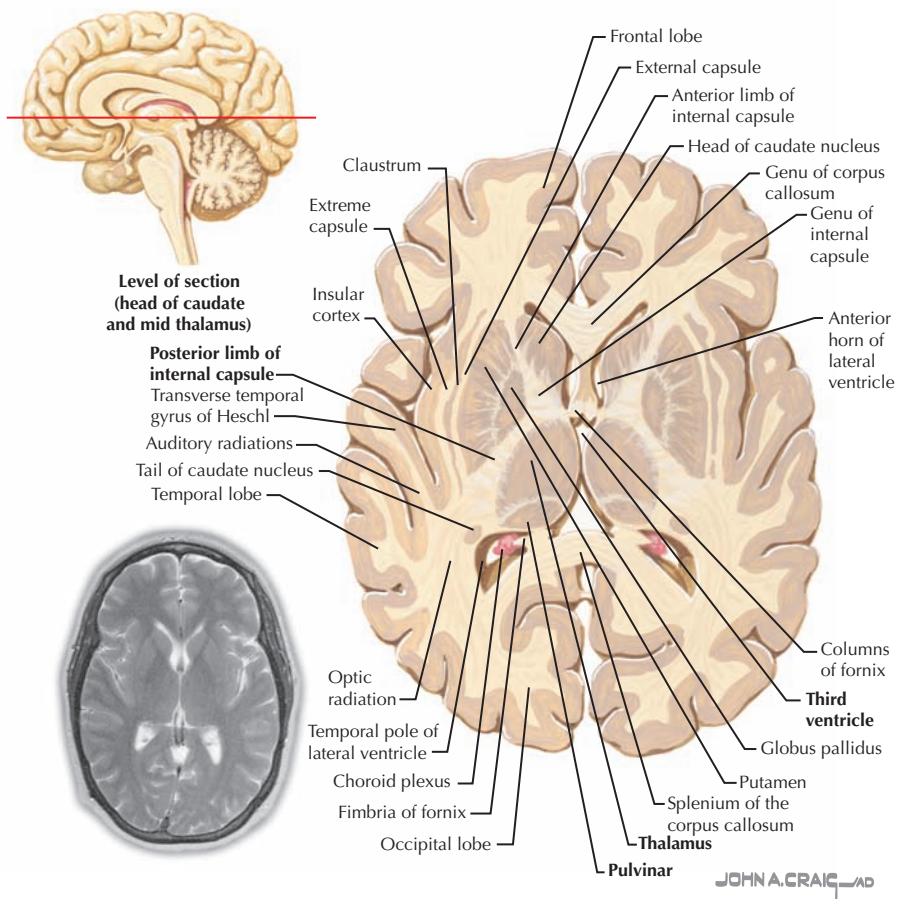
# 8 Thalamus

## THALAMIC NUCLEI *continued*



**THALAMUS IN HORIZONTAL SECTION**

- Thalami form the lateral walls of the third ventricle.
- Posterior limb of the internal capsule separates thalamus from the lentiform nucleus.
- Pulvinar is demonstrated in the artwork below.



## 8 Thalamus

### THALAMUS IN CORONAL SECTION

STRUCTURE	ANATOMIC NOTES	FUNCTIONAL SIGNIFICANCE
Thalamus	Individual nuclei are anatomically separated. The thalamus defines the borders of the 3rd ventricle	
LGN of the thalamus	Comma-shaped, lateral nucleus of the thalamus	Serves as the visual relay center from the optic tract to occipital cortex. Lesions can cause visual field defects
MGN of the thalamus	Medial to the lateral geniculate nucleus	Serves as the auditory relay center from the inferior colliculus to auditory cortex
MDN of the thalamus	Most dorsal and medial nucleus; forms part of the wall of the 3rd ventricle	Part of the limbic system
CM thalamus	Located ventral to the MDN	Involved in the central modulation and perception of pain
Lateral thalamus	Contains multiple nuclear structures, including the VL and VPL	Involved in motor and sensory relays

**THALAMUS IN CORONAL SECTION** *continued*

