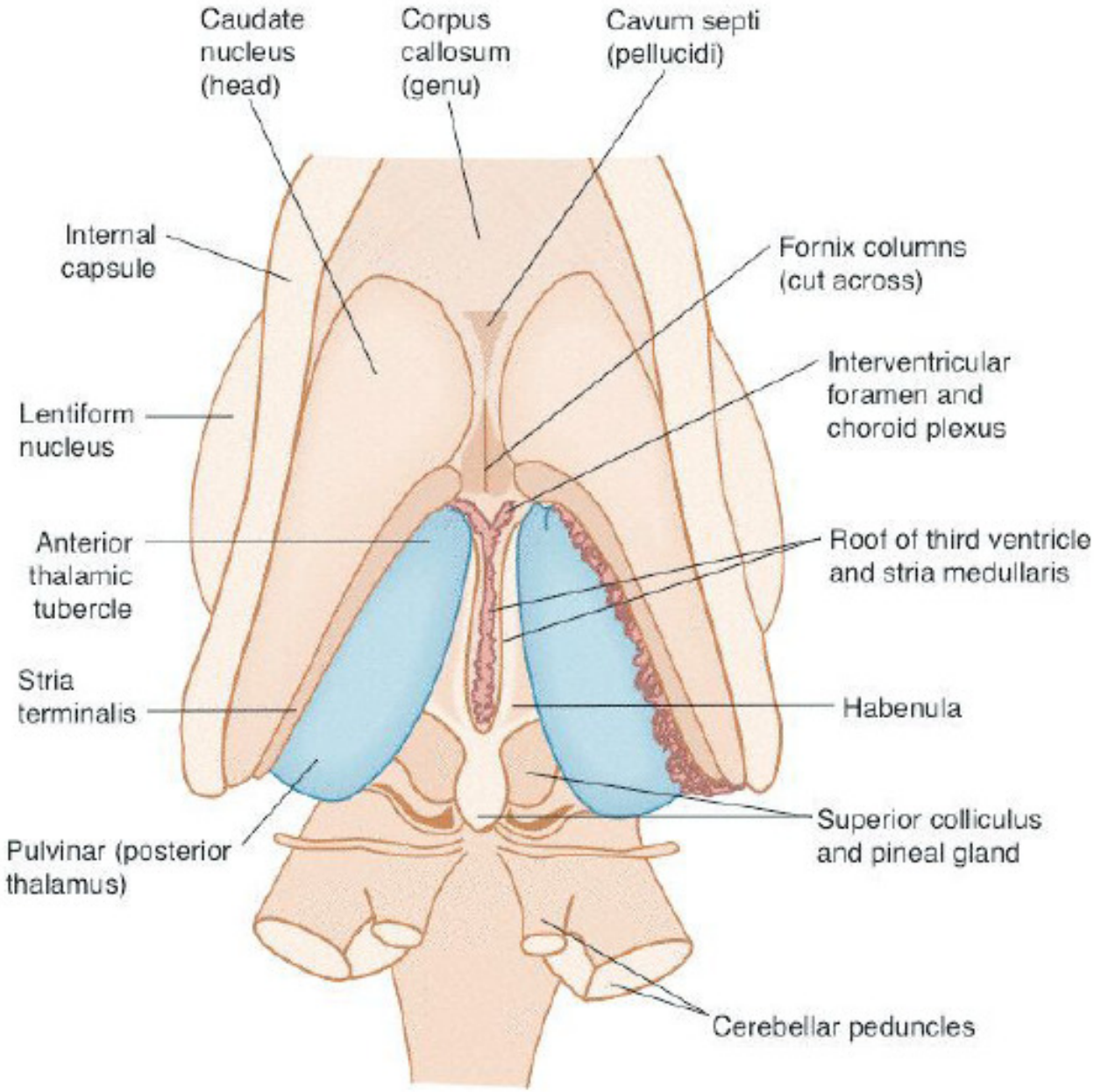
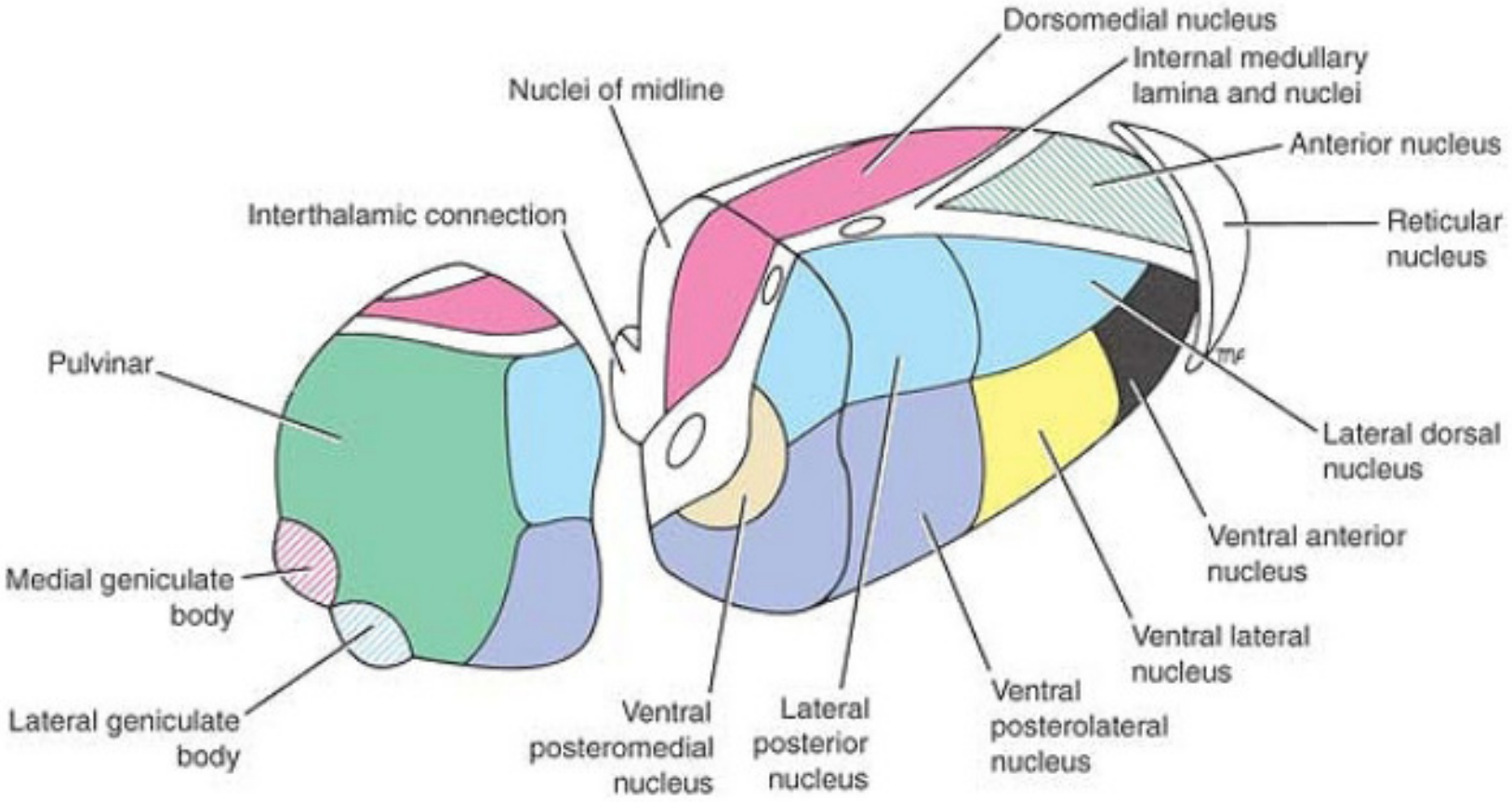
Thalamus

- large, ovoid, gray mass of nuclei
- The anterior end: narrow and rounded and forms the posterior boundary of the **interventricular foramen**.
- The posterior end: expanded to form the **pulvinar**
- The inferior surface is continuous with the tegmentum of the midbrain.
- The medial surface of the thalamus forms part of the lateral wall of the third ventricle (**interthalamic connection)**



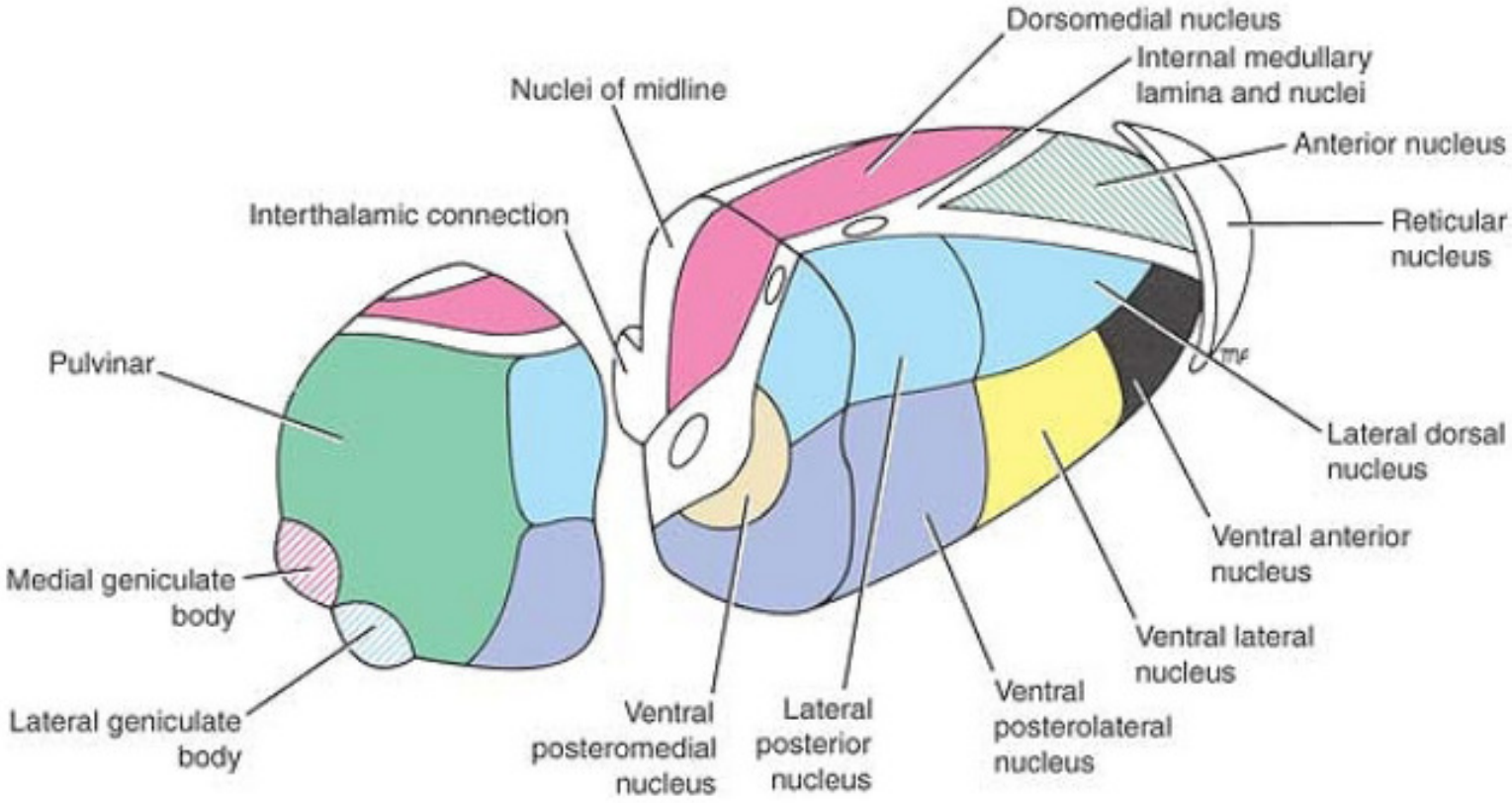
Thalamus

- **Stratum zonale:** thin layer of white matter, covering thalamus on its superior surface
- **External medullary lamina:** lateral surface
- **Internal medullary lamina:** vertical sheet of white matter (Y shape) which divide it into:
  - **Anterior part:**
  - **Medial part**
  - **Lateral part**



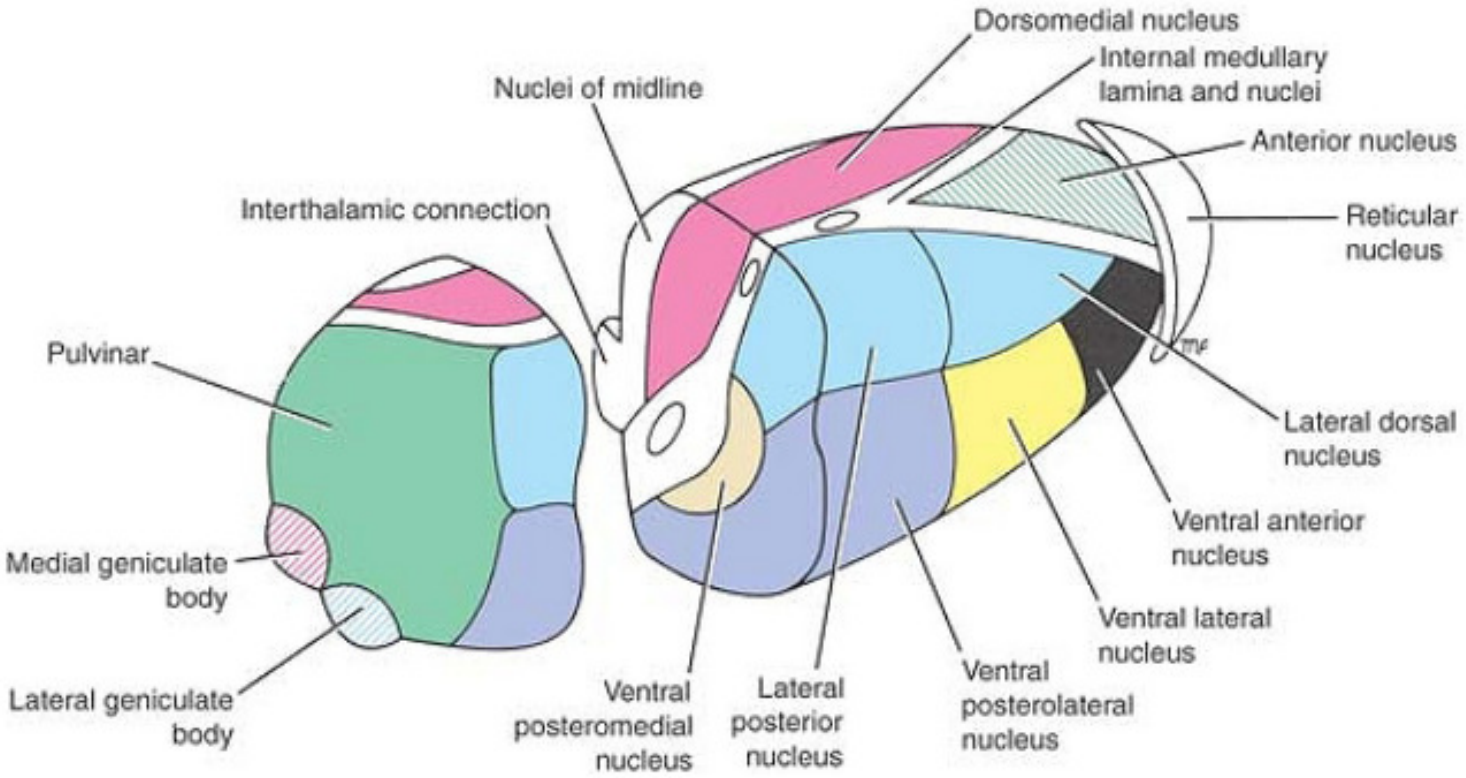
Thalamus

- **Anterior thalamic nuclei:**
  - **Location and connection:** bordered by the limbs of the internal lamina. receives fibers from the mamillary bodies via the mamillothalamic tract and projects to the cingulate cortex of the cerebrum
  - **Function**: limbic system, concerned with emotional tone and the mechanisms of recent memory.



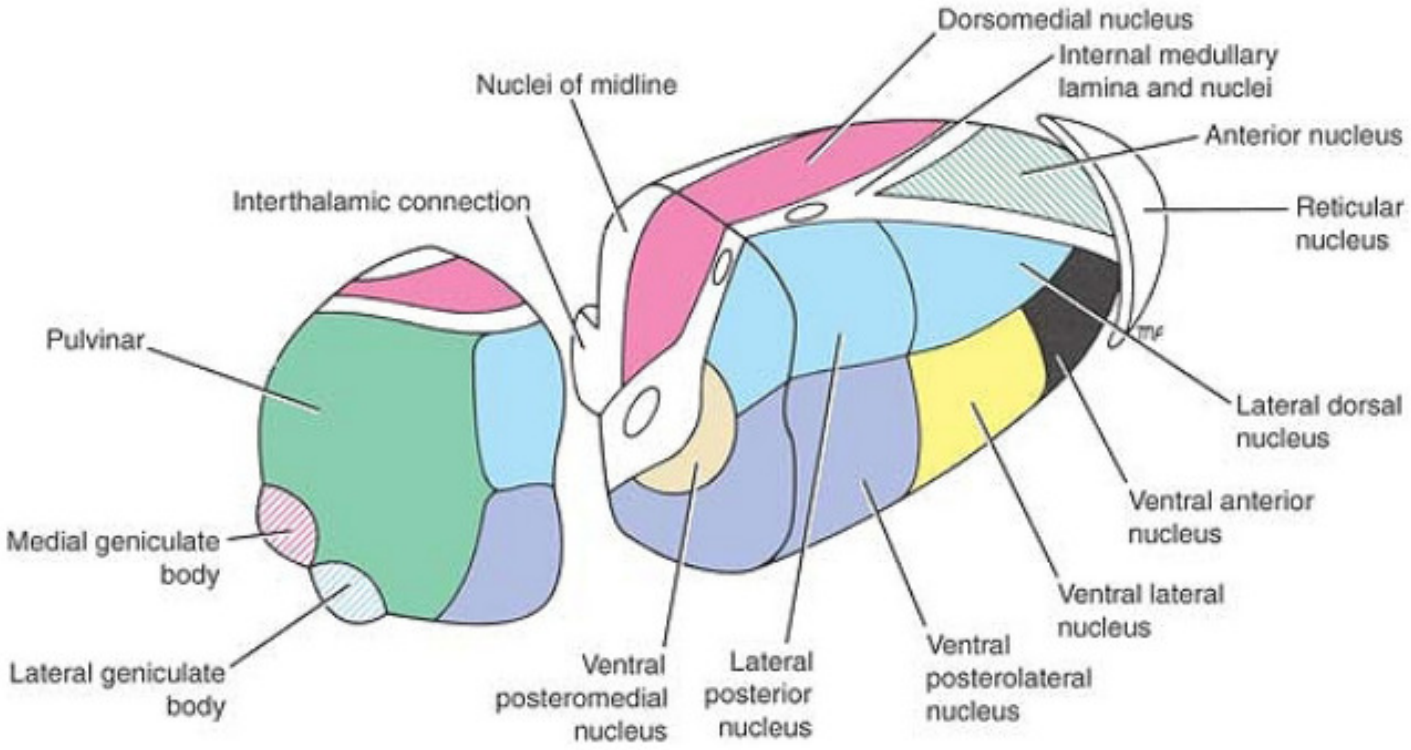
Thalamus

- **Dorsomedial nucleus:**
  - **Location and connection:** (Medial part) connections with:
    - The prefrontal cortex
    - The hypothalamic nuclei
    - All other groups of thalamic nuclei
  - **Function:** integration of sensory information (somatic, visceral, and olfactory information (emotional feelings)



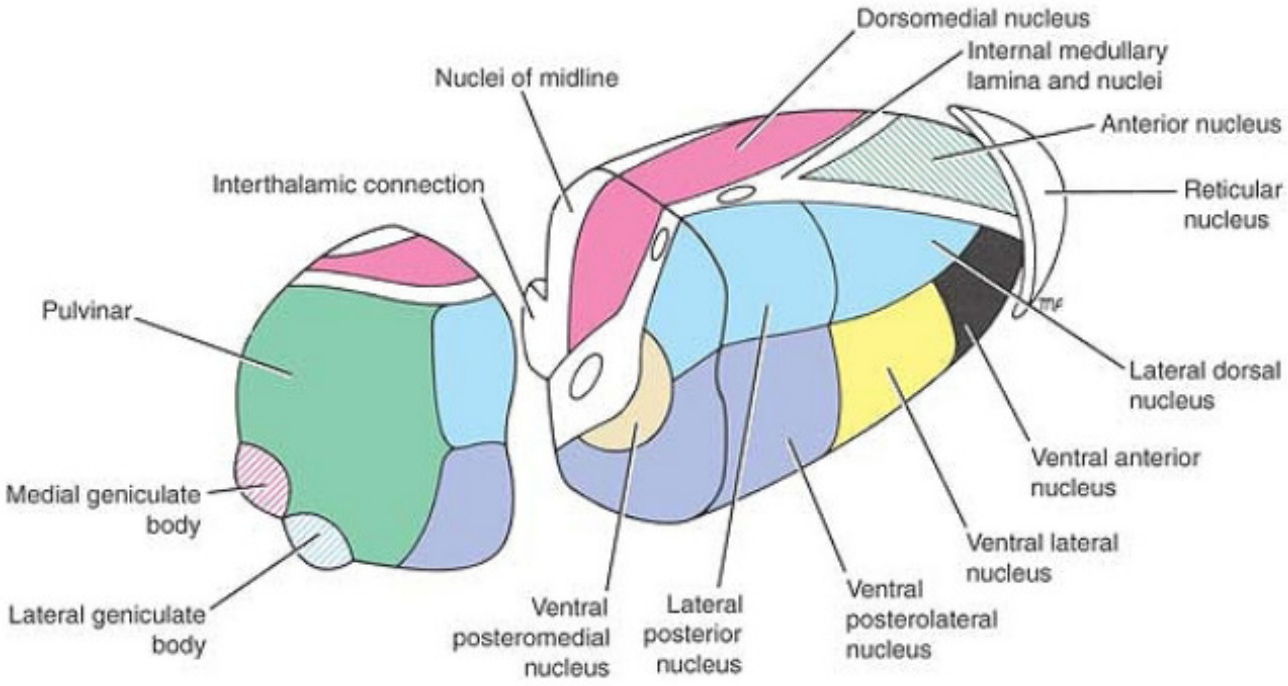
Thalamus

- **Intralaminar nuclei:**
- **Location and connection:** (within the internal medullary lamina) connections with:
  - reticular formation
  - the spinothalamic and trigeminothalamic tracts;
  - send efferent fibers to other thalamic nuclei
- **Function:** influence the levels of consciousness and alertness



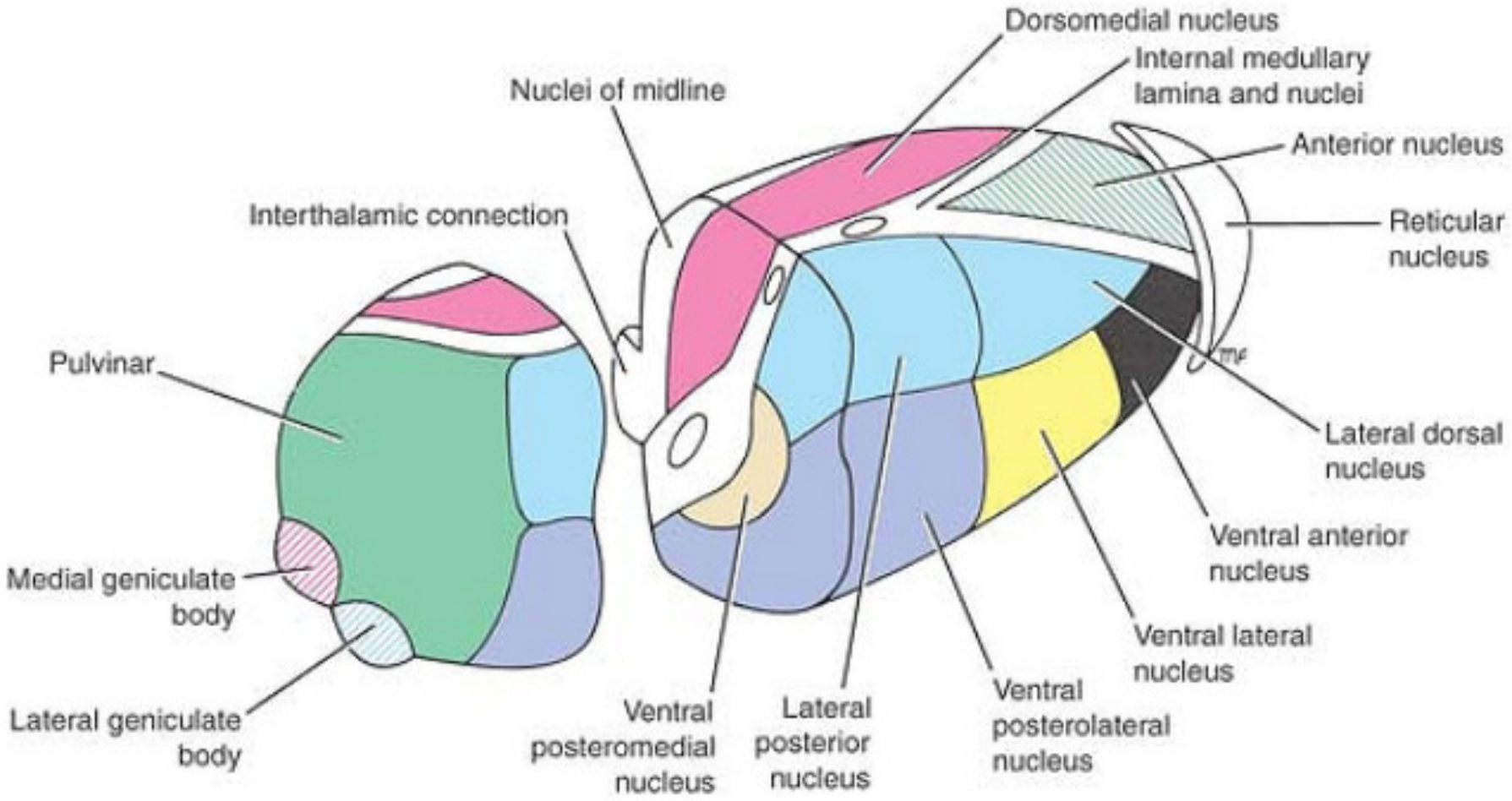
Thalamus

- **Ventral anterior and Ventral lateral:**
  - **Location and connection:** (lateral part) connections with:
    - Reticular formation
    - substantia nigra
    - corpus striatum
    - premotor cortex
    - other thalamic nuclei
    - cerebellum
  - **Function:** Influences activity of motor cortex



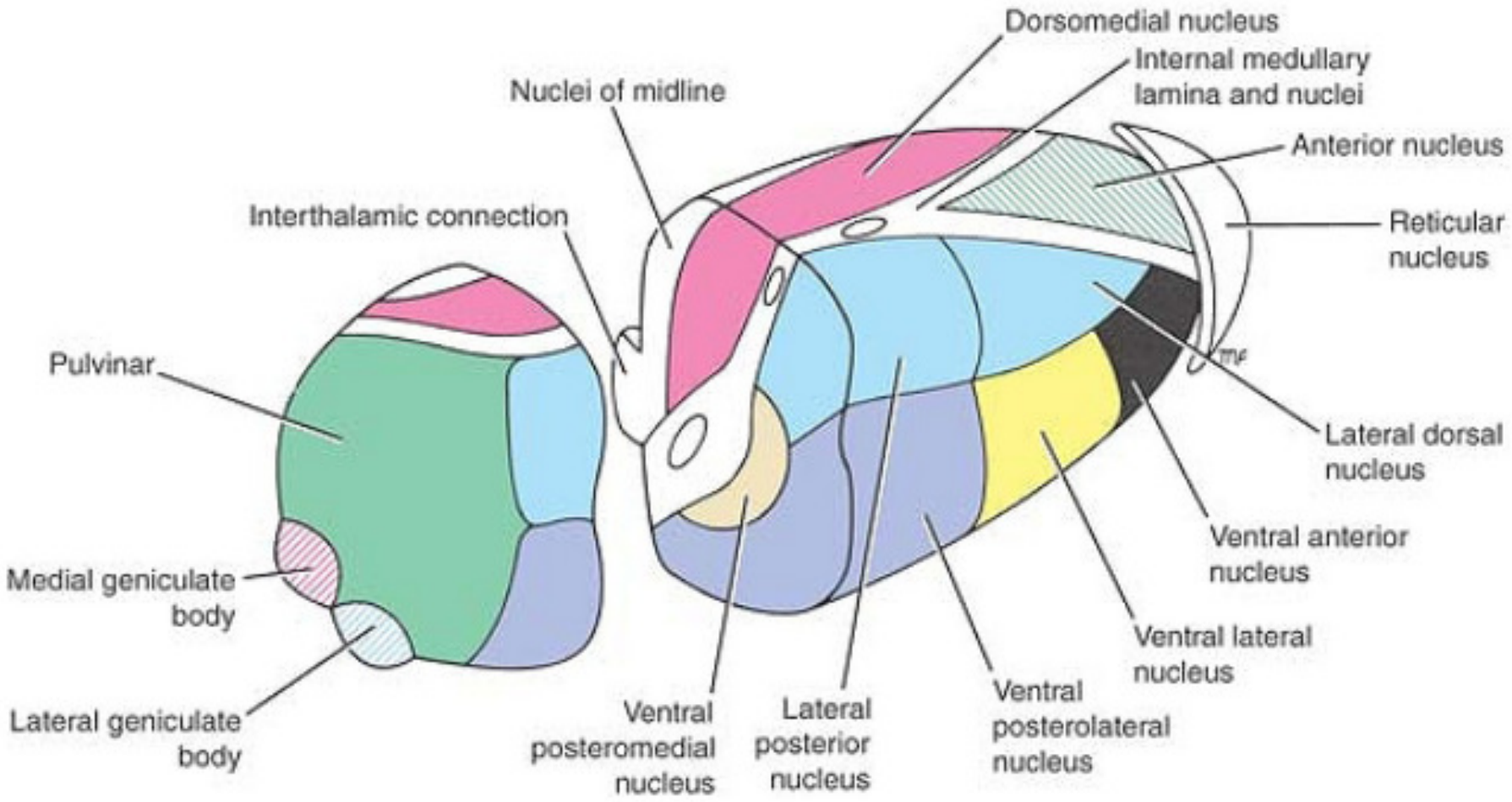
Thalamus

- **Ventral Posteromedial (VPM):**
  - **Location:** Lateral part
  - **Afferent connection:** Trigeminal lemniscus, gustatory fibers
  - **Efferent connection:** Primary Somatic sensory cortex
  - **Function:** Relays common sensations, Head & Neck



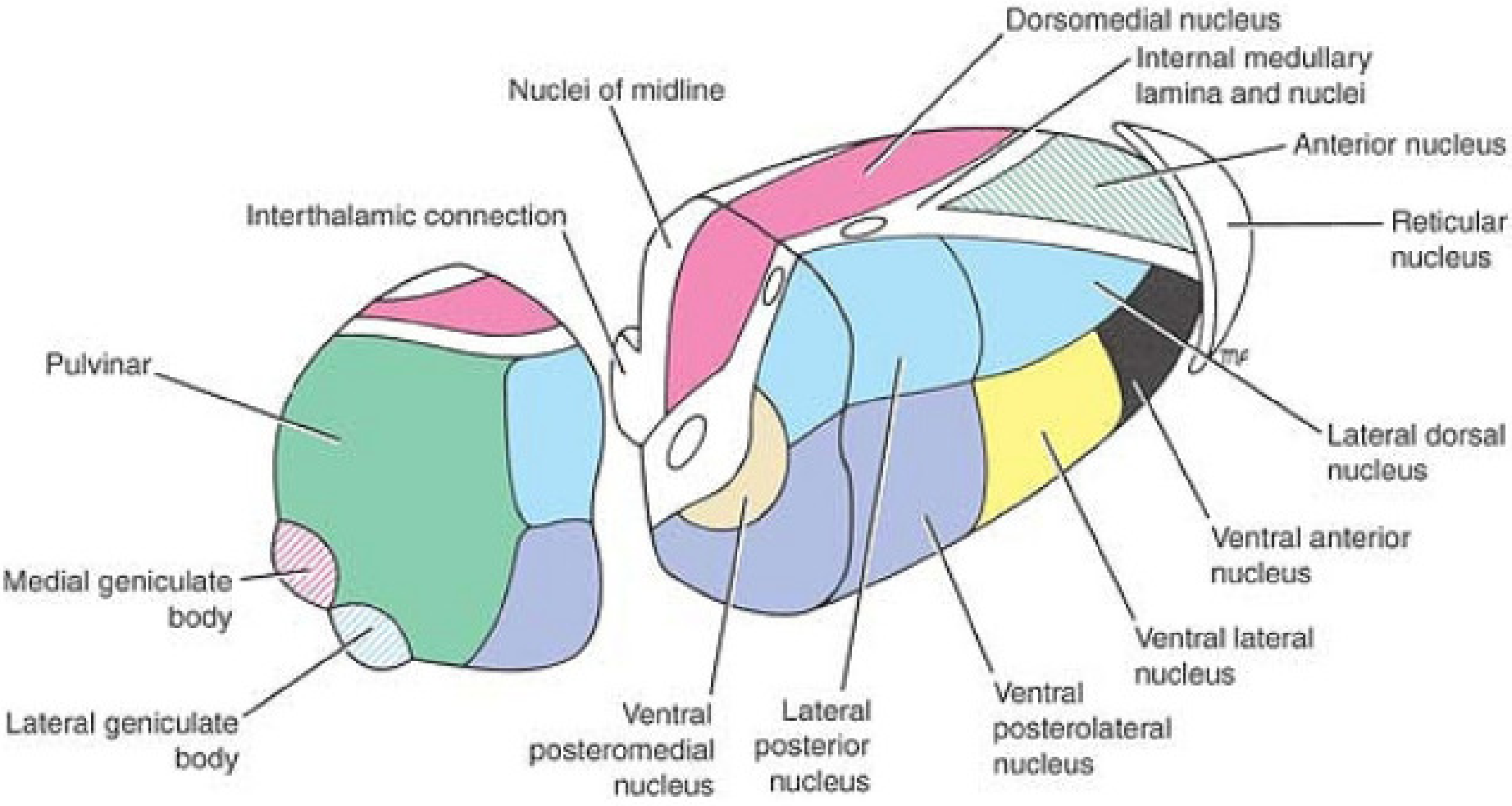
Thalamus

- **Ventral Posterolateral (VPL):**
  - **Location:** Lateral part
  - **Afferent connection:** Medial and spinal lemnisci
  - **Efferent connection:** Primary Somatic sensory cortex
  - **Function:** Relays common sensations



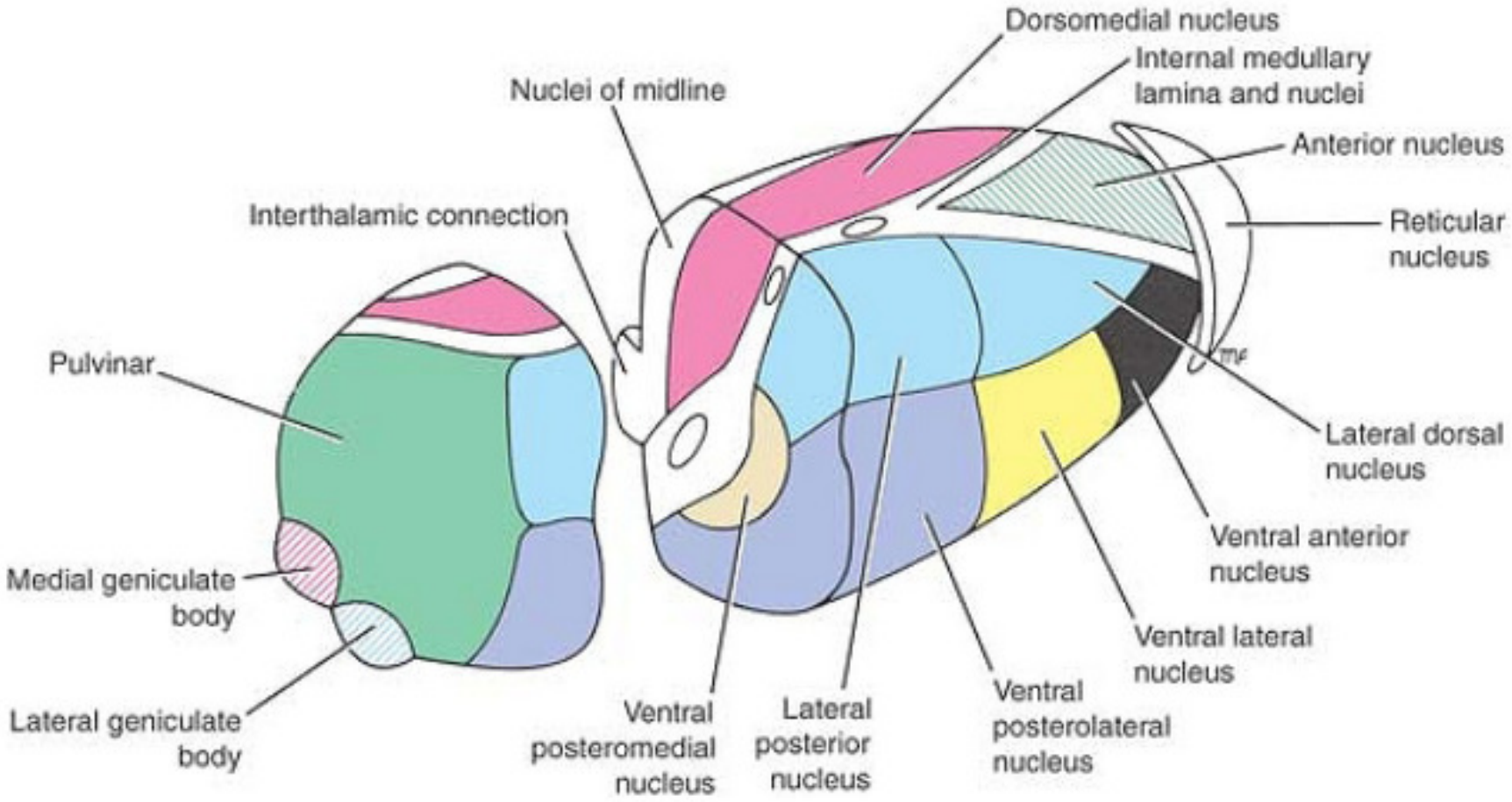
Thalamus

- **Lateral geniculate body:**
  - **Location:** undersurface of the pulvinar of the thalamus
  - **Afferent connection:** Optic tract.
  - **Efferent connection:** Optic radiation to visual cortex of occipital lobe
  - **Function:** Visual information from opposite field of vision



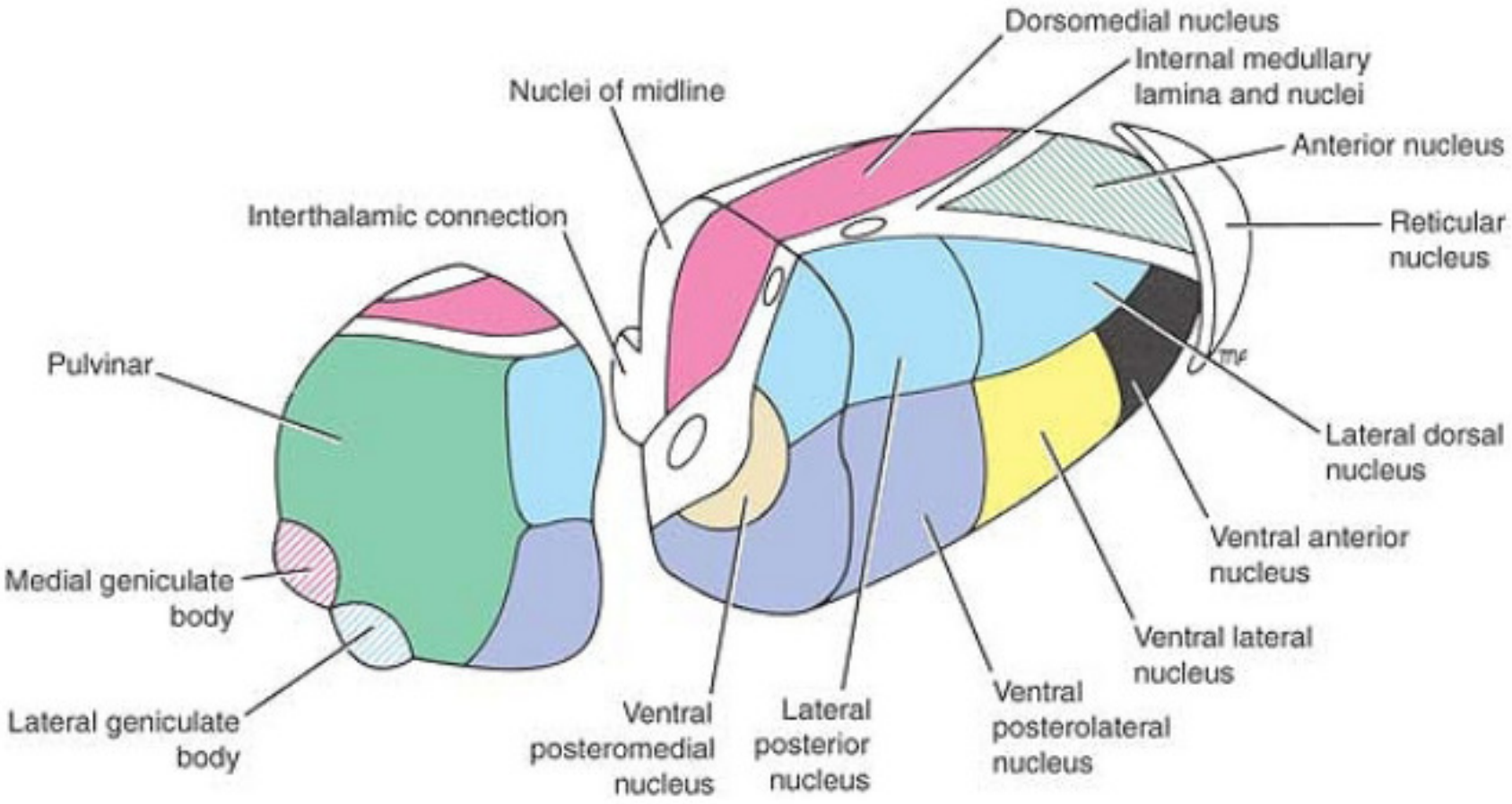
Thalamus

- **Medial geniculate body:**
  - **Location:** posterior surface of the thalamus beneath the pulvinar
  - **Afferent connection:** inferior colliculus receives both ears but predominantly from the opposite ear.
  - **Efferent connection:** auditory cortex of the superior temporal gyrus.
  - **Function:** Hearing



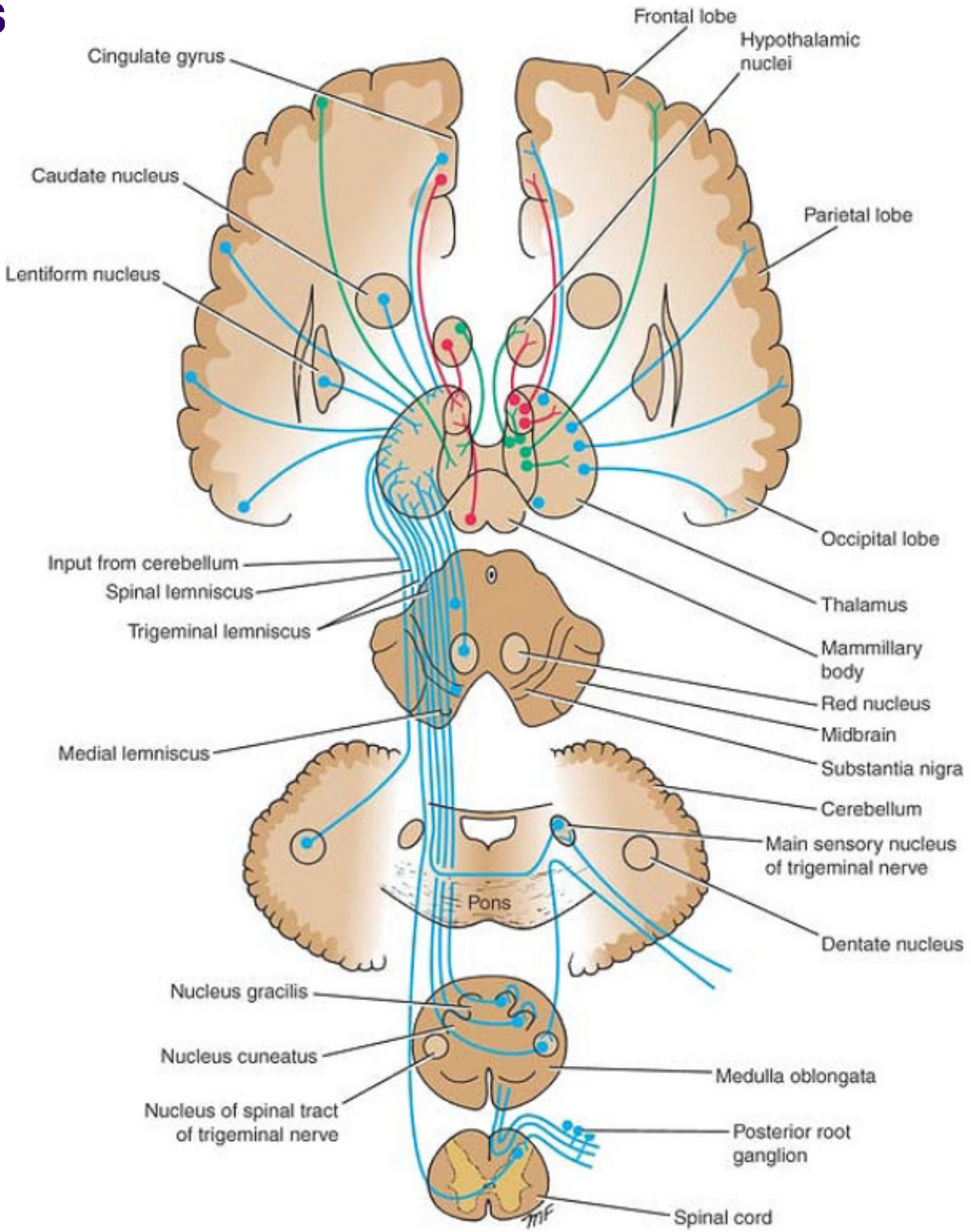
Thalamus

- **Reticular nucleus:**
  - **Location:** between the external medullary lamina and the internal capsule
  - **Afferent connection:** Cerebral cortex, reticular formation
  - **Efferent connection:** other thalamic nuclei
  - **Function:** cerebral cortex regulates thalamic activity???



Connections of Thalamus

- Every thalamic nucleus (except the reticular nucleus) sends axons to specific parts of the cerebral cortex and cerebral cortex sends reciprocal fibers back to the thalamic nuclei
  - ➢ Information received by the thalamus is always shared with the cerebral cortex
- Sensory-motor axonal loops involving the cerebellum and the basal nuclei:
  - ➢ Cerebellar-rubro-thalamic-cortical-ponto-cerebellar loop
  - ➢ Cortical-striatal-pallidal-thalamic-cortical loop



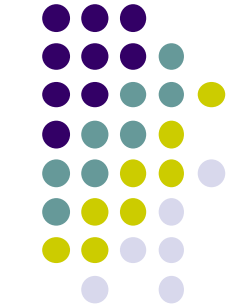
Functions of Thalamus

- Relay station for all sensory information of all types (except smell)
  - VPL, VPM, MGB, LGB and Dorsomedial nucleus
- Influences activity of motor cortex
  - VL, VA
- Influences levels of consciousness and alertness
  - Intralaminar nuclei
- Emotional tone, mechanisms of recent memory
  - Anterior thalamic nuclei

Functional Divisions

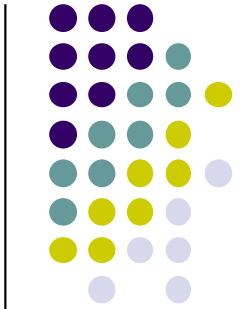
- **Sensory nuclei**
- **Motor nuclei**
- **Intralaminar nuclei**
- **Limbic nuclei**
- **Multimodal nuclei**

Lesions of the Thalamus



- **Damage to VPM and VPL:**
  - **Due to**: Usually thrombosis or hemorrhage of one of the arteries supplying the thalamus.
  - **Symptoms**: loss of all forms of sensation, including light touch, tactile localization and discrimination from the opposite side of the body
  - Vascular lesion of the thalamus may also involve the midbrain and internal capsule and produce extensive motor and sensory deficits. (Symptoms overshadowed)
- **Dejerine–Roussy syndrome (thalamic Pain):**
  - May occur as the patient is recovering from a thalamic infarct
  - Symptoms: Spontaneous pain occurs on the opposite side of the body.

Lesions of the Thalamus



- **Abnormal Involuntary Movements:**
  - **Due to**: vascular lesions of the thalamus.
  - **Symptoms**: **Chorea** (involuntary movements, the extremities and twitching of the face) and **athetosis** (slow, involuntary, convoluted, writhing movements of the fingers, hands and toes)
  - Vascular lesion of the thalamus may also involve the neighboring caudate and lentiform nuclei (Symptoms overshadowed)
- **Thalamic hand:**
  - The wrist is flexed, the metacarpophalangeal joints are flexed, and the interphalangeal joints are extended.
  - Fingers can be moved but slowly