The Diencephalon

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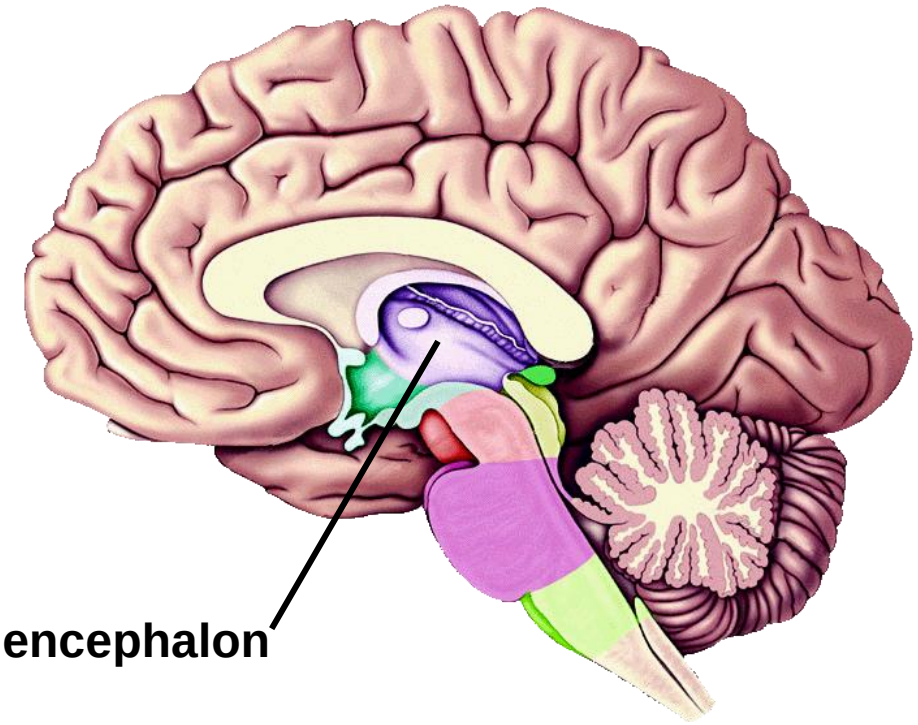
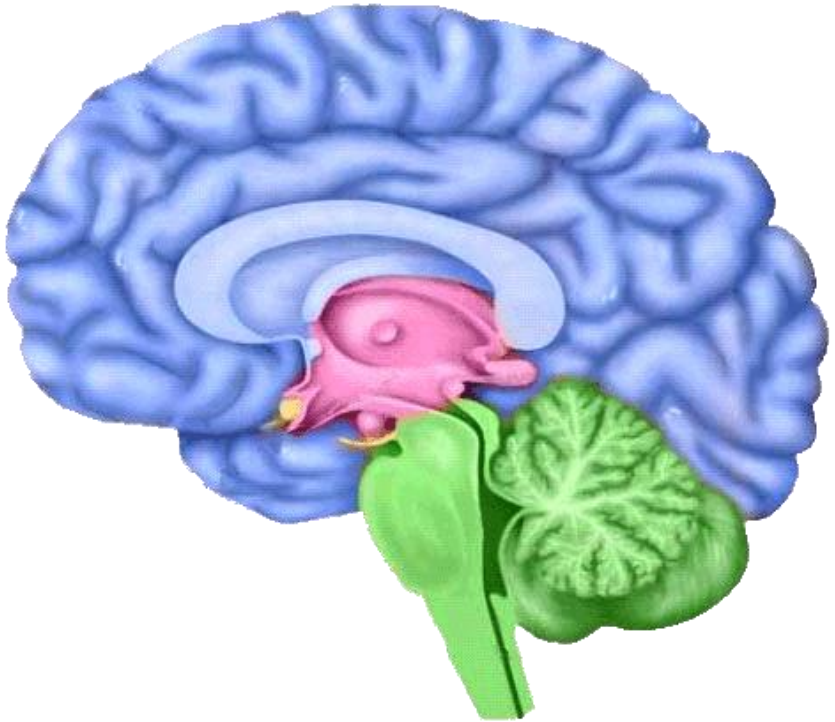
Position of Diencephalon

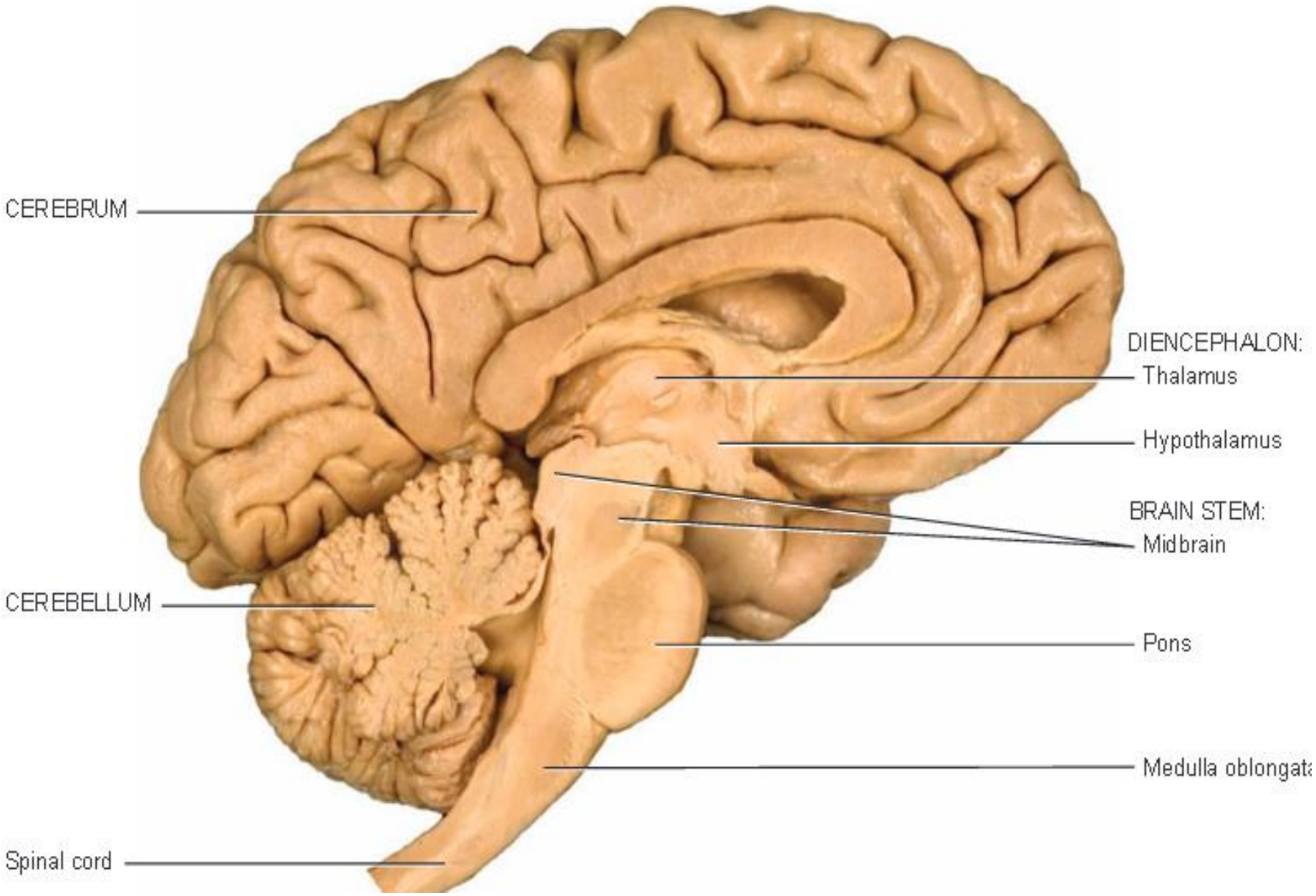
- **Position**: **Lies between midbrain and cerebrum, almost entirely surrounded by cerebral hemisphere**

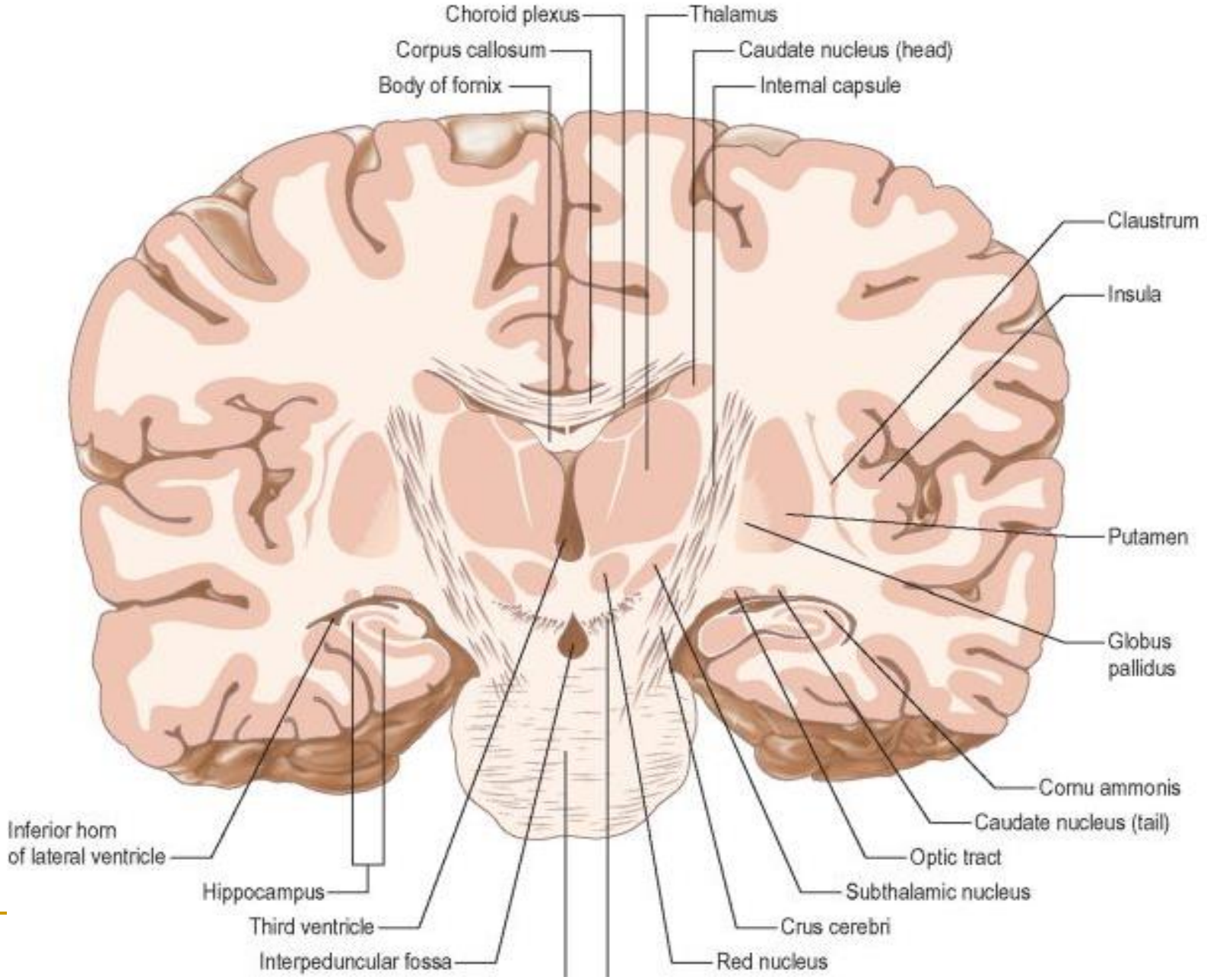


Subdivision of Diencephalon

- **Doral thalamus or thalamus**
- **Metathalamus**
- **Epithalamus**
- **Subthalamus**
- **Hypothalamus**

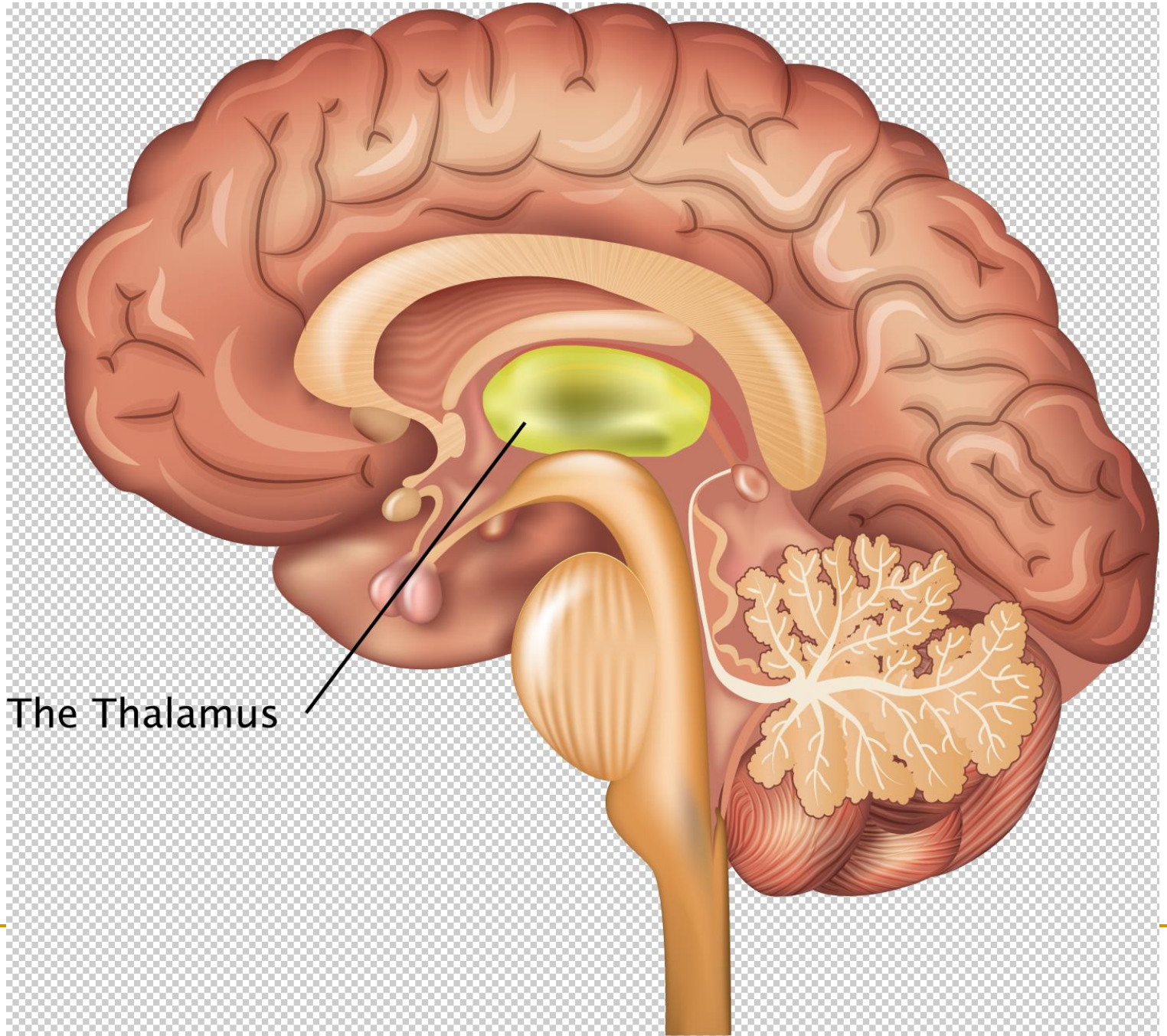



CEREBRUM
DIENCEPHALON:
Thalamus
Hypothalamus
BRAIN STEM:
Midbrain
CEREBELLUM
Pons
Medulla oblongata
Spinal cord

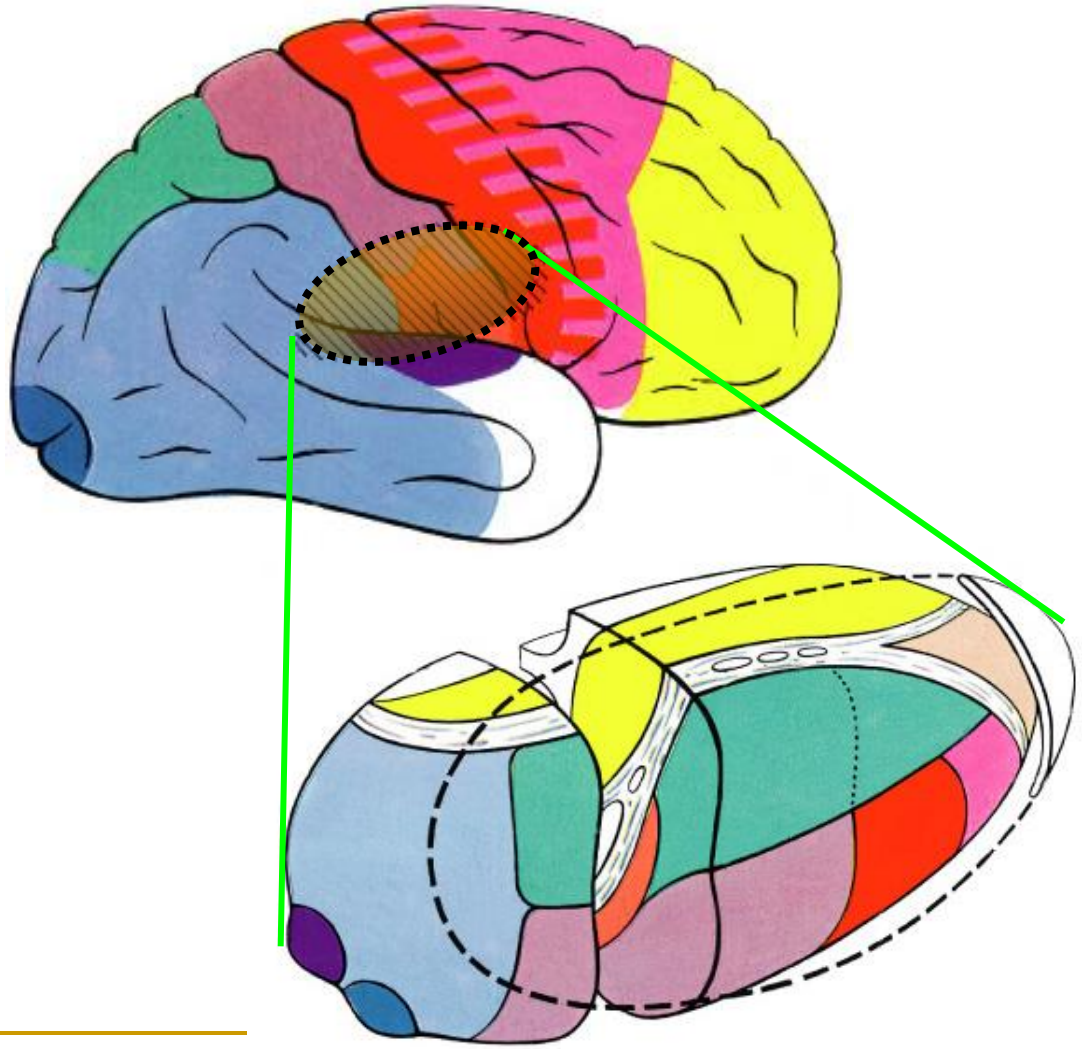

Choroid plexus
Thalamus
Corpus callosum
Caudate nucleus (head)
Body of fornix
Internal capsule
Claustrum
Insula
Putamen
Globus pallidus
Cornu ammonis
Caudate nucleus (tail)
Optic tract
Subthalamic nucleus
Crus cerebri
Red nucleus
Inferior horn of lateral ventricle
Hippocampus
Third ventricle
Interpeduncular fossa

Thalamus

- **The Thalamus means- inner chamber**
- **length- about 3 cm**
- **Makes up 80% of the diencephalon, consists of paired oval masses of gray matter organized into nuclei.**


The Thalamus

Thalamus

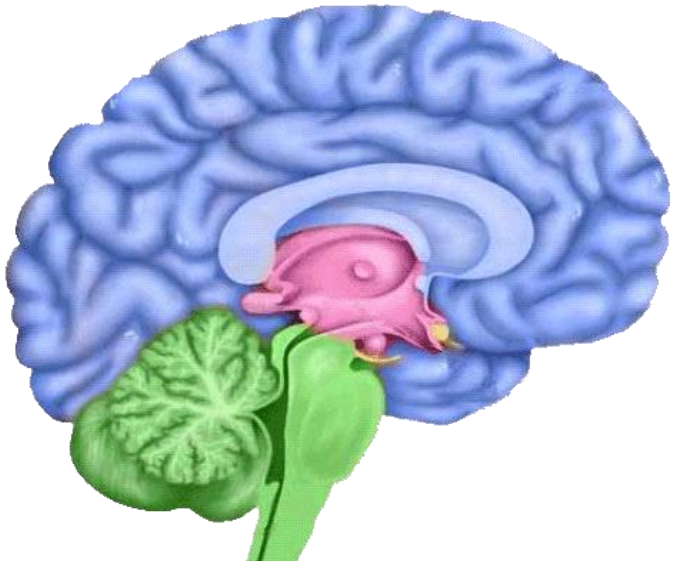


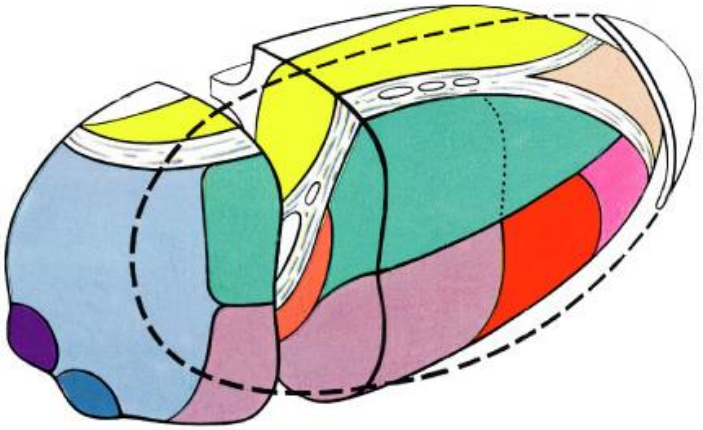
External features

- A large egg-shaped nucleus mass
- poles/ends-2

1. Anterior end －anterior thalamic tubercle
2. Posterior end － pulvinar

Surfaces- 4 (superior, inferior. Medial and lateral)



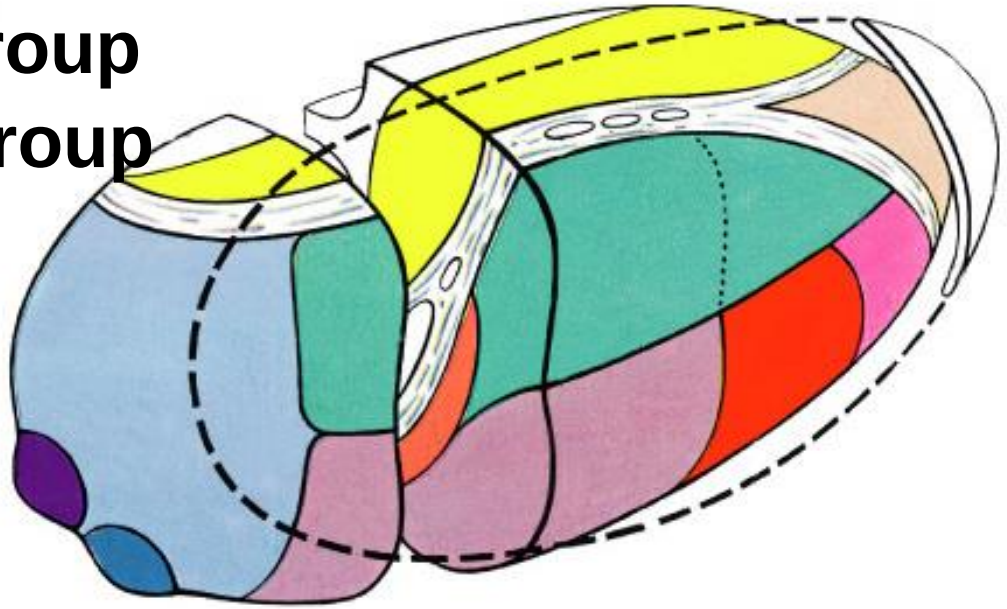


- **Medial surfaces of the two thalami are interconnected by a mass of grey matter called- interthalamic adhesion**
- **Inferiorly, medial surface is separated from hypothalamus by – hypothalamic sulcus**

Classification of Nuclei of Thalamus

Three nuclear group — divided by internal medullary lamina

- **Anterior nuclear group**
- **Medial nuclear group**
- **Lateral nuclear group**



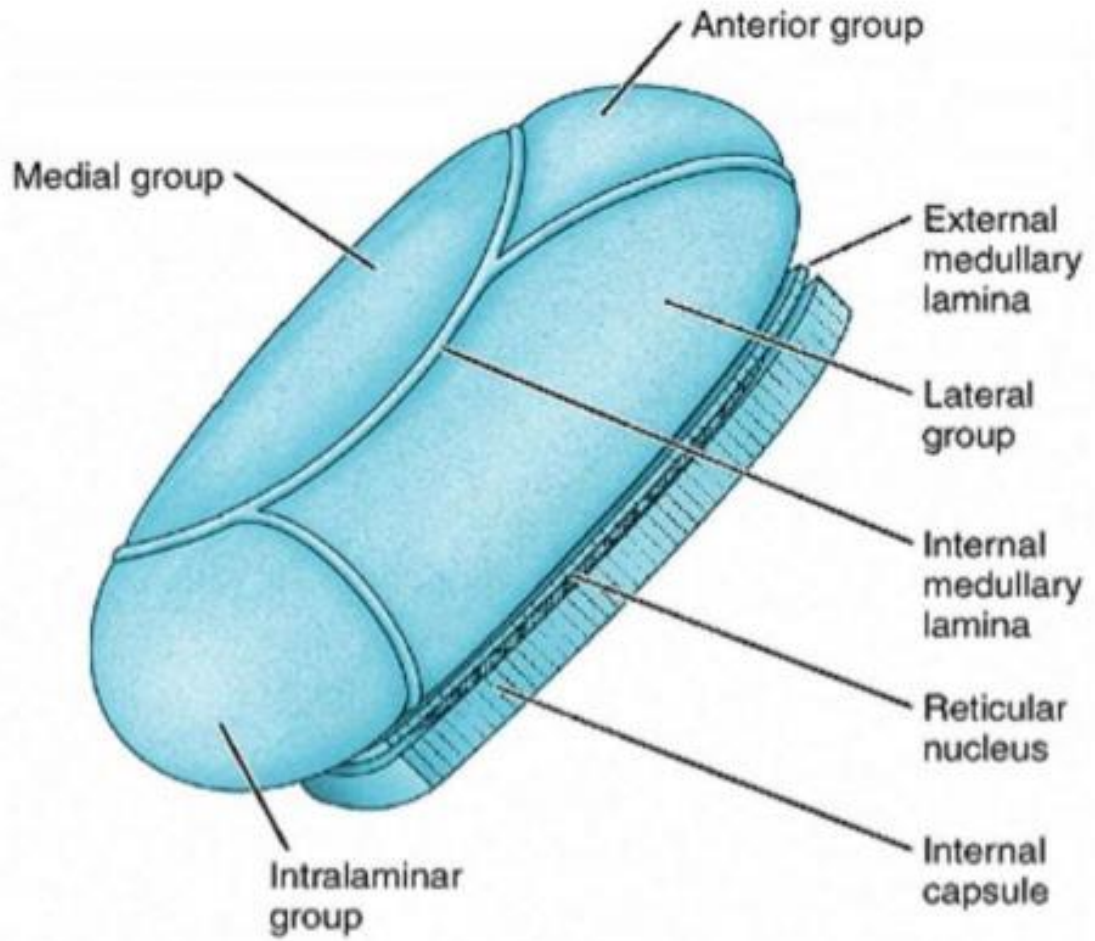
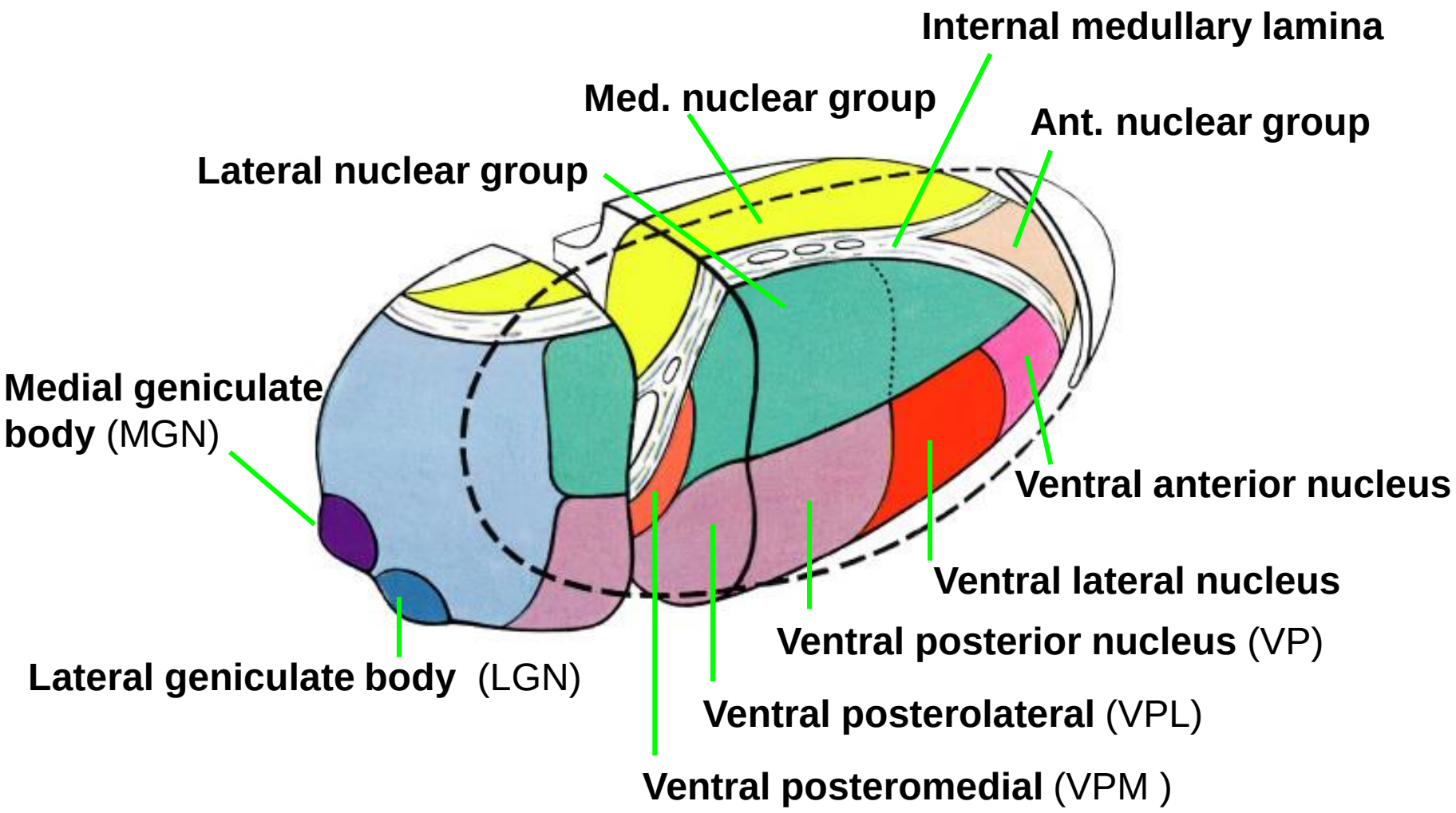


Figure 11-3. Schematic diagram showing the major nuclear groups of the thalamus.


Internal medullary lamina
Med. nuclear group
Ant. nuclear group
Lateral nuclear group
Medial geniculate body (MGN)
Ventral anterior nucleus
Ventral lateral nucleus
Ventral posterior nucleus (VP)
Lateral geniculate body (LGN)
Ventral posterolateral (VPL)
Ventral posteromedial (VPM)

Subdivision	Principal Nuclei	Common abbreviation
Ant. nuclear group	Anterior nucleus	
Med. nuclear group	Medial dorsal nucleus	
Lat. nuclear group- divide into 2 parts		
(1) Nuclei in the lateral group	Lateral dorsal	LD
	Lateral posterior	LP
	Pulvinar	
(2) Nuclei in the ventral group	Ventral anterior	VA
	Ventral lateral	VL
	Ventral posterior- 2 parts	VP
	Ventral posterolateral	VPL
	Ventral posteromedial	VPM

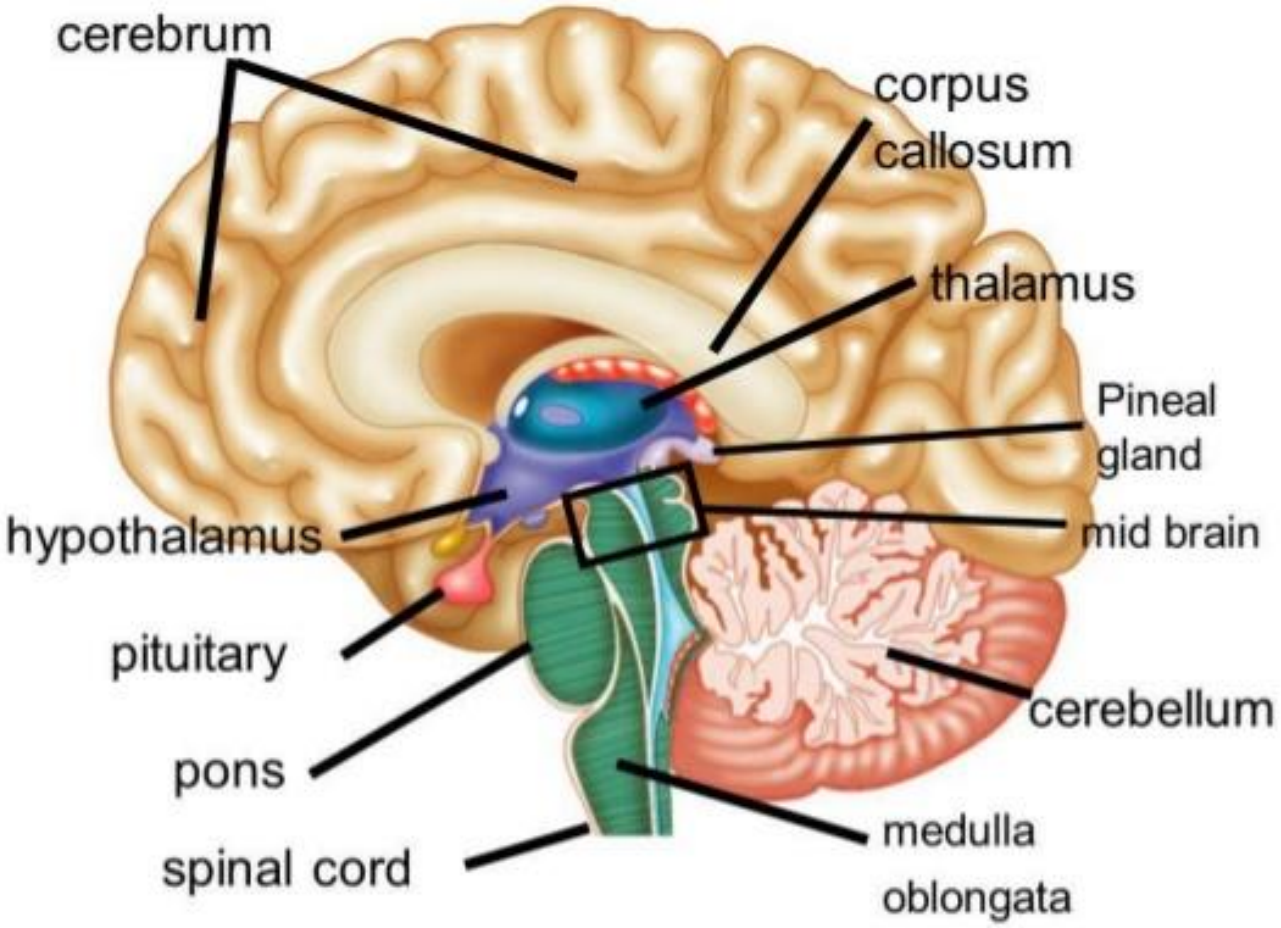
Hypothalamus

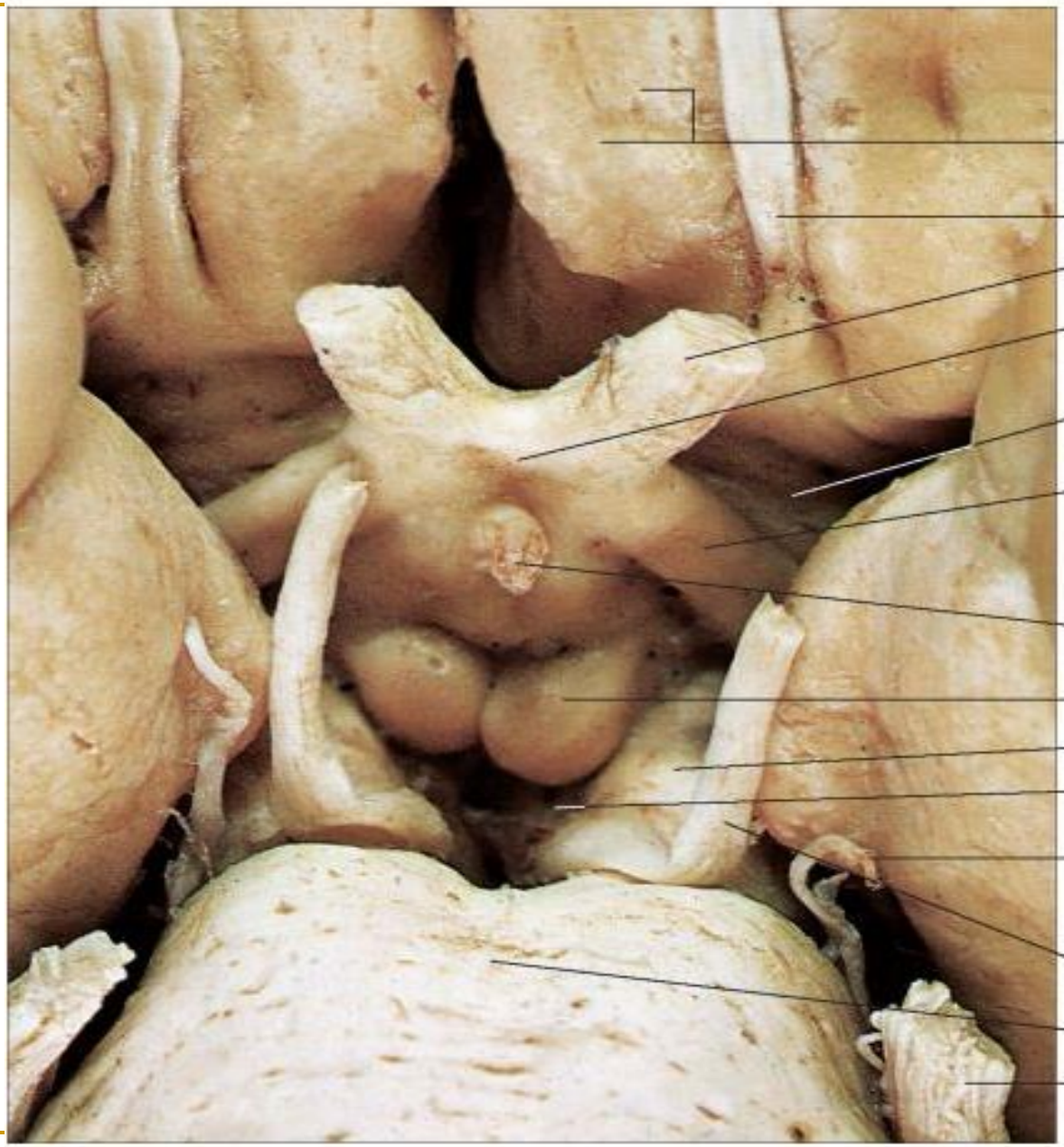
- **The hypothalamus(hypo- under) is a small part of the diencephalon located inferior to the thalamus.**

Boundaries

- **Superiorly: hypothalamic sulcus**
- **Inferiorly:**
  - **optic chiasma**
  - **tuber cinereum**
  - **Infundibulum**
  - **mamillary body**
- **Anterior: lamina terminalis**
- **Posterior: continues with midbrain**

Location of hypothalamus

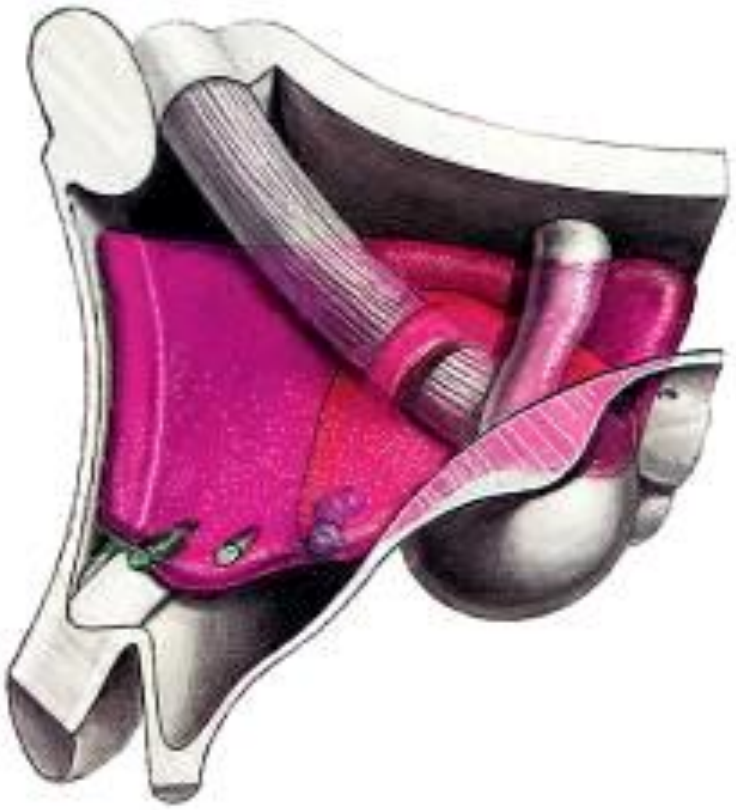



Gyri recti of the frontal lobe
Olfactory tract
Optic nerve
Optic chiasma
Anterior perforated substance
Optic tract
Tuber cinereum with attached infundibular stem (pituitary stalk)
Mammillary body
Crus cerebri
Posterior perforated substance (in interpeduncular fossa)
Trochlear nerve
Oculomotor nerve
Pons
Trigeminal nerve

Hypothalamus

Subdivisions

- Preoptic region
- Supraoptic region
- Tuberal region
- Mamillary region



1. **The mammillary region- most posterior part of the hypothalamus.**

- **It includes the mammillary bodies and posterior hypothalamic nuclei**

The mammillary bodies are two, small, rounded projections that serve as relay stations for reflexes related to the sense of smell.

2. **The tuberal region- the widest part of the hypothalamus, includes the dorsomedial nucleus, ventromedial nucleus, and arcuate nucleus, plus the stalk like infundibulum which connects the pituitary gland to the hypothalamus.**

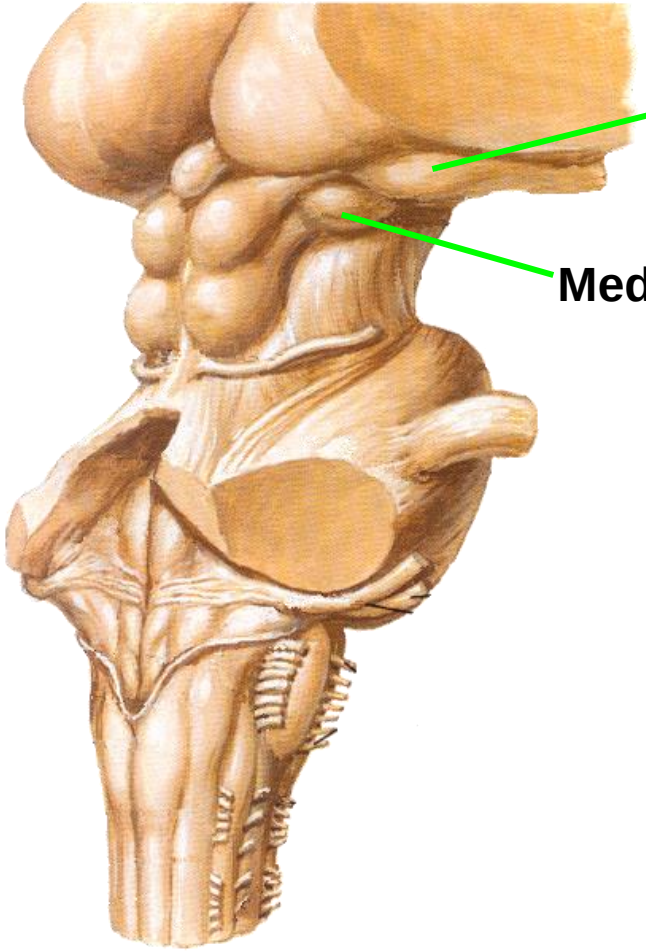
3. **The supraoptic region- lies superior to the optic chiasm (point of crossing of optic nerves) and contains the paraventricular nucleus, supraoptic nucleus, anterior hypothalamic nucleus, and suprachiasmatic nucleus**

4. **The preoptic region- anterior to the supraoptic region. The preoptic region contains the medial and lateral preoptic nuclei.**

Functions of Hypothalamus

- Autonomic control
- Endocrine control
- Temperature regulation
- Regulation of food and water intake
- Emotion and behavior

Metathalamus

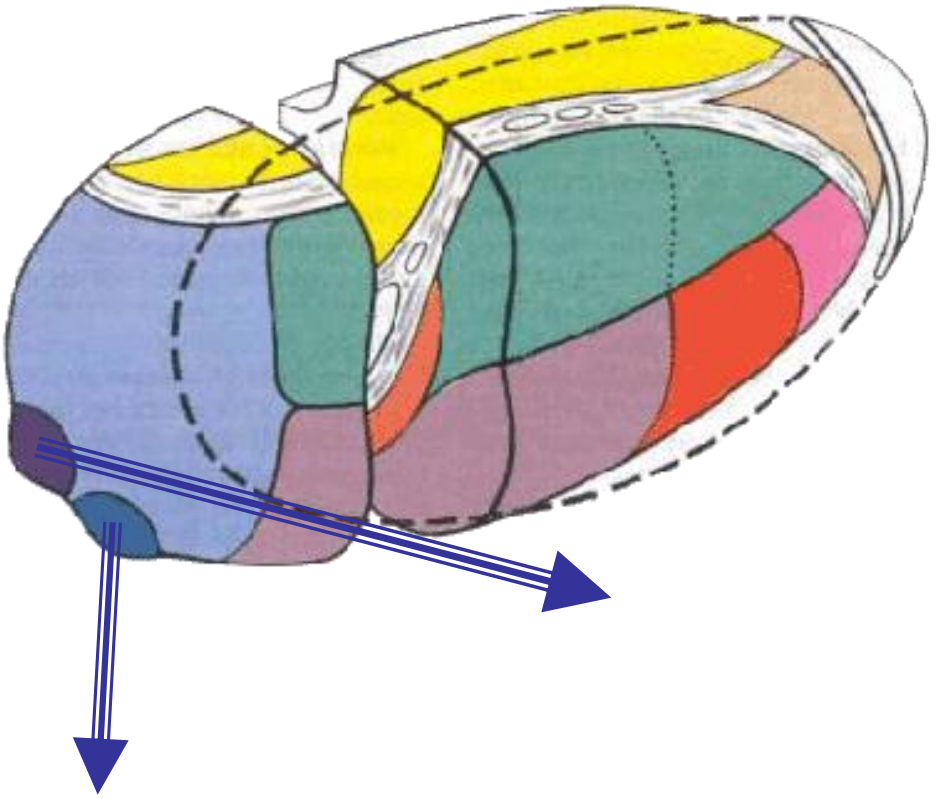


Lateral geniculate body (LGN)

Medial geniculate body (MGN)

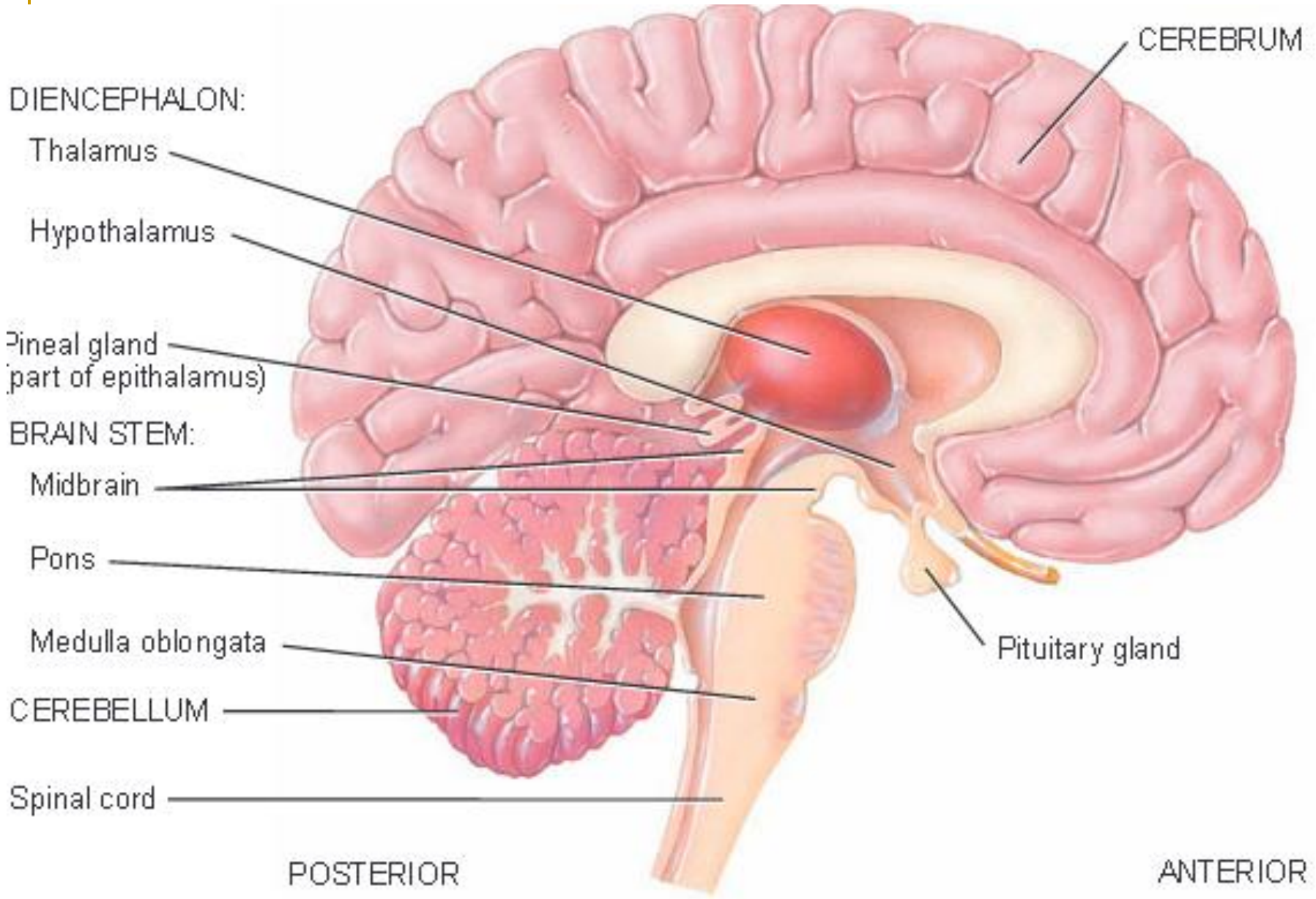
Metathalamus

- **Medial geniculate body** (MGN) ★
  - Relay station of audition
- **Lateral geniculate body** (LGN) ★
  - Relay station of vision



Epithalamus

- **The epithalamus is a small region superior and posterior to the thalamus. It consists of the pineal gland and habenular nuclei**



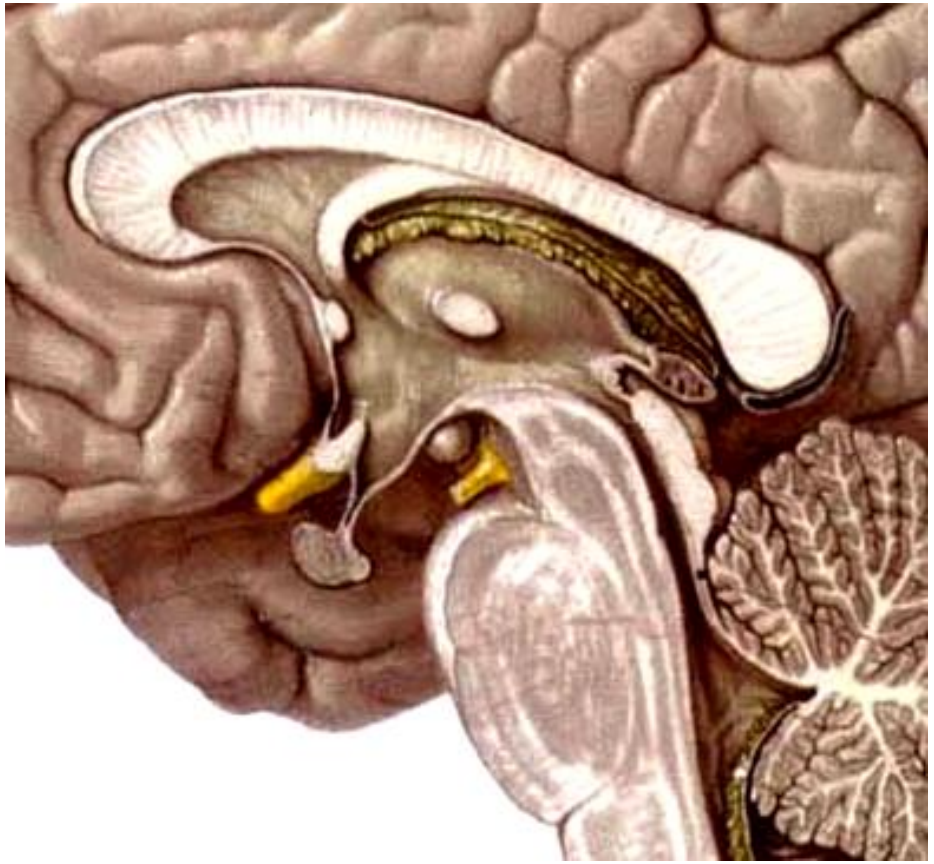
(a) Medial view of sagittal section

Pineal gland

- size of a small pea and protrudes from the posterior midline of the third ventricle .
- The pineal gland is considered part of the endocrine system because it secretes the hormone melatonin.

Subthalamus

- **Position**: transition zone between diencephalons and tegmentum of midbrain
- **Content:** subthalamic nucleus, parts of red nucleus and substantia nigra



Third ventricle

- **Position**: a narrow ventricle cleft lies within diencephalons
- **Boundaries**
  - **Roof: choroids plexus**
  - **Floor:**
    - **optic chiasma**
    - **tuber cinereum**
    - **infundibulum and mamillary body**
  - **Anterior: lamina terminalis**
  - **Posterior: continuous with mesencephalic aqueduct**
  - **Lateral wall: dorsal thalamus and hypothalamus**
- **Communication**

Third ventricle →mesencephalic aqueduct → fourth ventricle