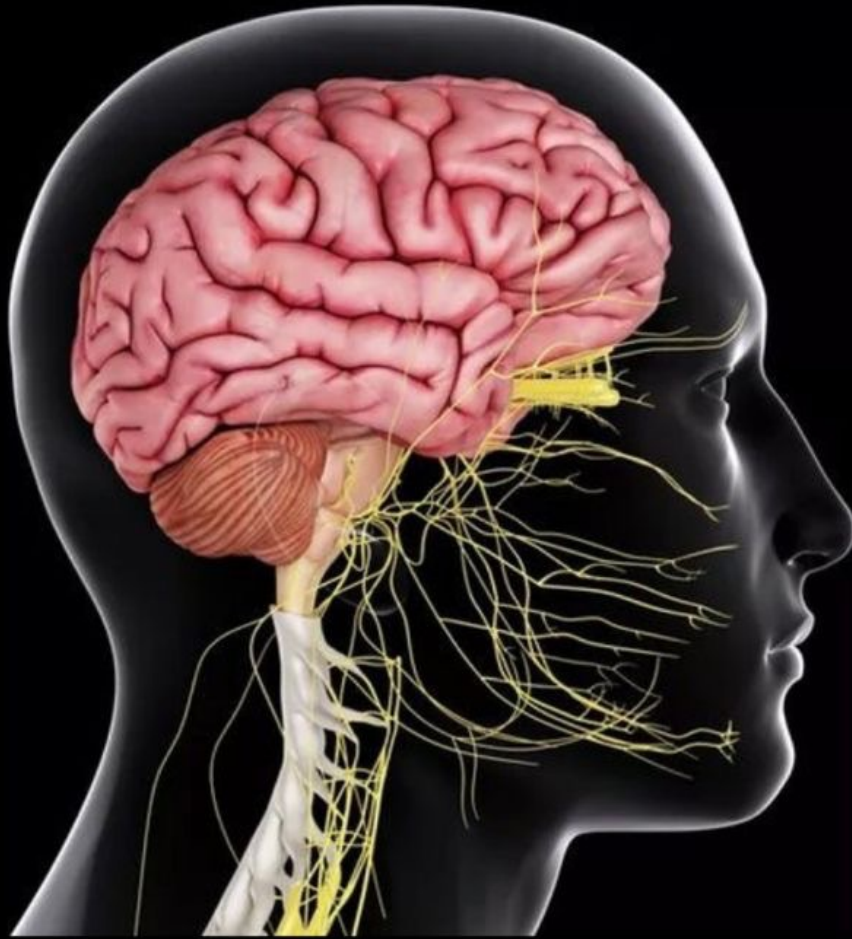




CENTRAL NERVOUS SYSTEM



SUBJECT : Anatomy

LEC NO. : 8

DONE BY : Batool ALzubaidi & Hashem Ata

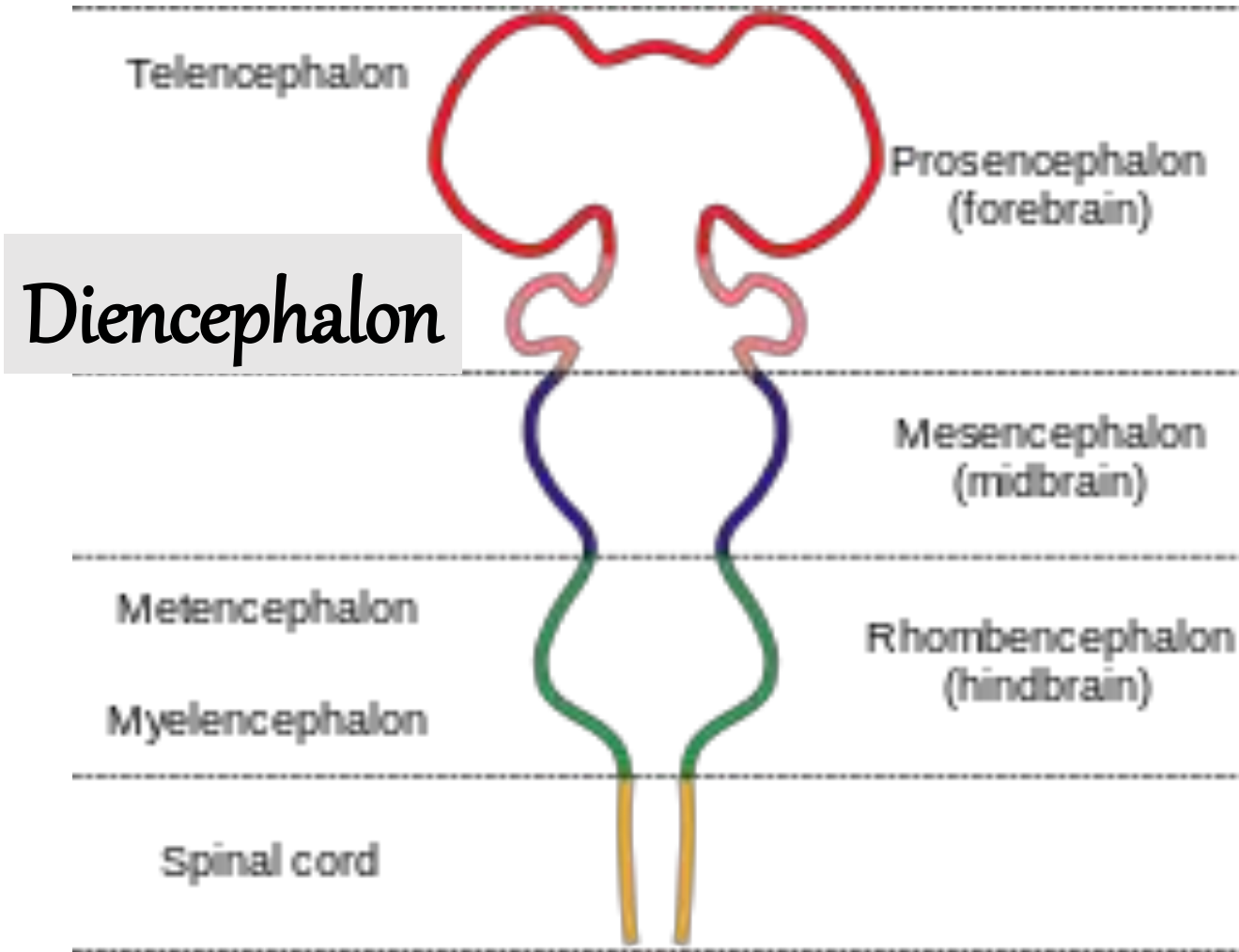
وَقُلْ رَبِّ زِدْنِي عِلْمًا



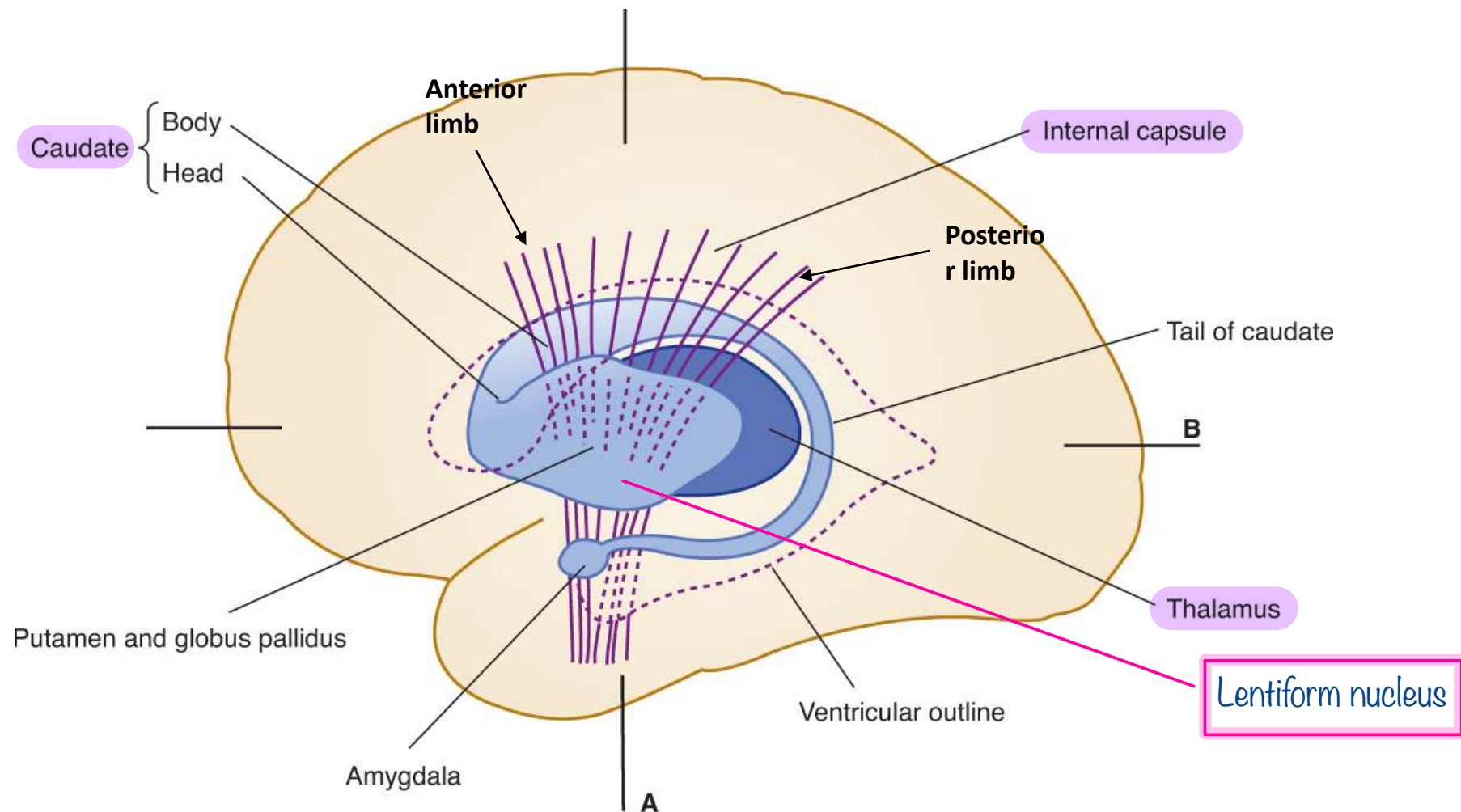
Diencephalon

Dr Ashraf Sadek *PhD, MD, MRCPCH*

Assistant Professor of anatomy and embryology



ال neural tube فيه ٣ dilations الجاي cranially و كبير اسمه
 prosencephalon و هاد مكون من ٢ lateral dilatations ال telencephalon ال هو ال cerebrum ال Brain
 hemispheres نفسهم و في بينهم space اسمه ال diencephalon ال هو cerebral hemispheres بين التين
 تحت ال corpus callosum



Source: Waxman SG: *Clinical Neuroanatomy: Twenty-Seventh Edition*; www.accessmedicine.com
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Caudate & lentiform nucleus » basal ganglia

Diencephalon includes: ↘

1- **Thalamus**

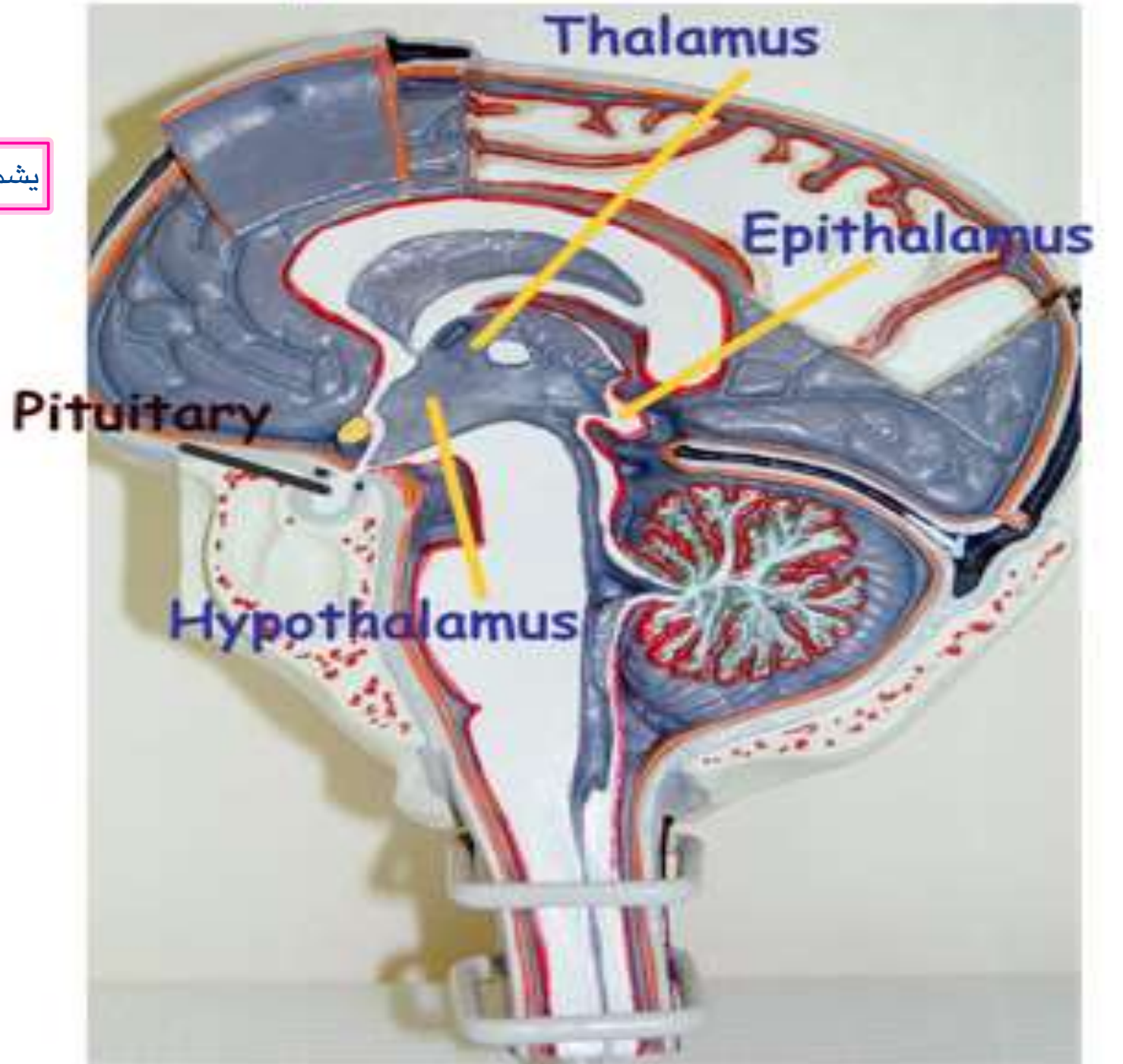
يشمل كل ما هو thalamus

2- **Hypothalamus**

3- **Epithalamus**

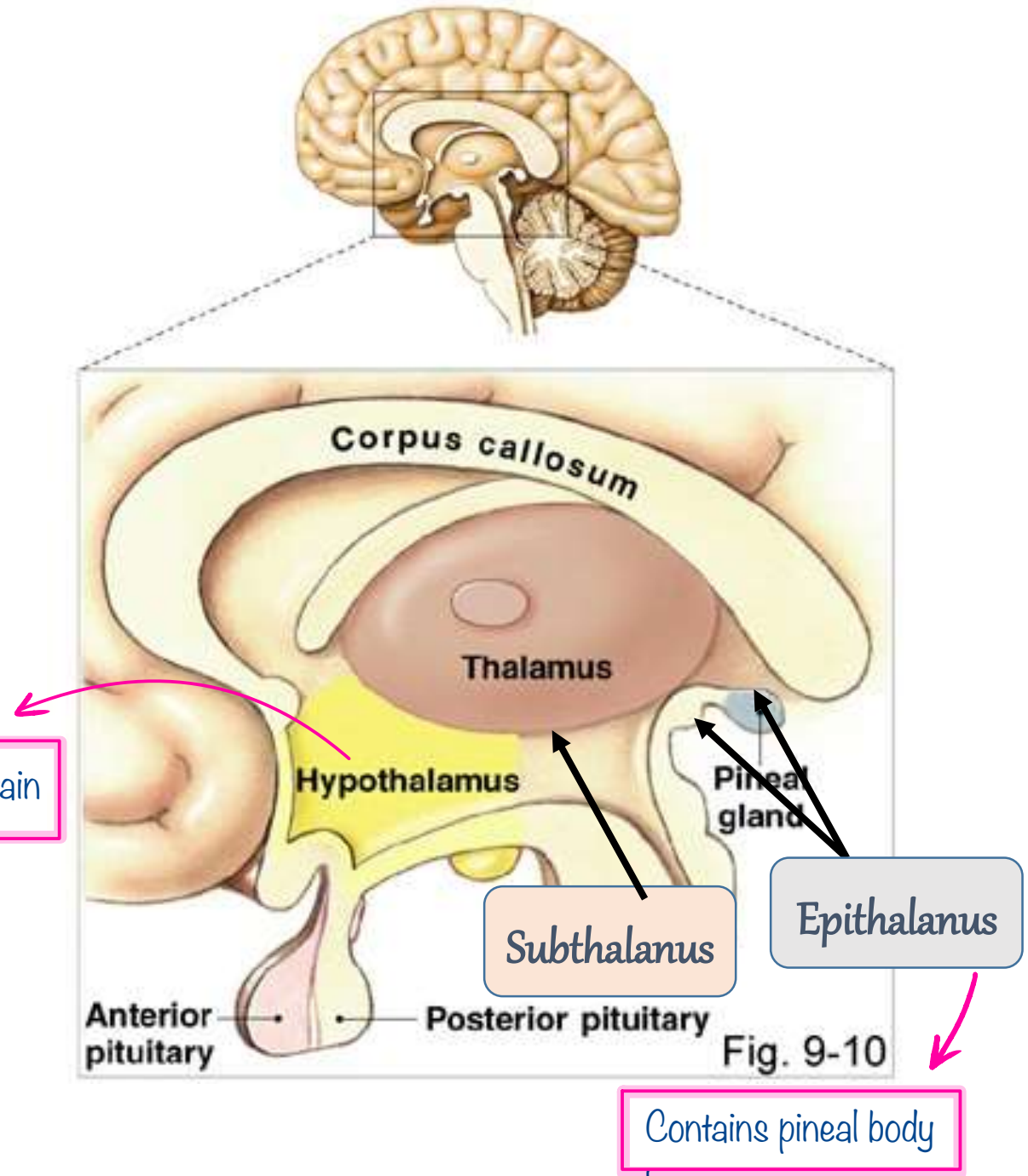
4- **Subthalamus**

5- **Metathalamus**



Diencephalon includes:

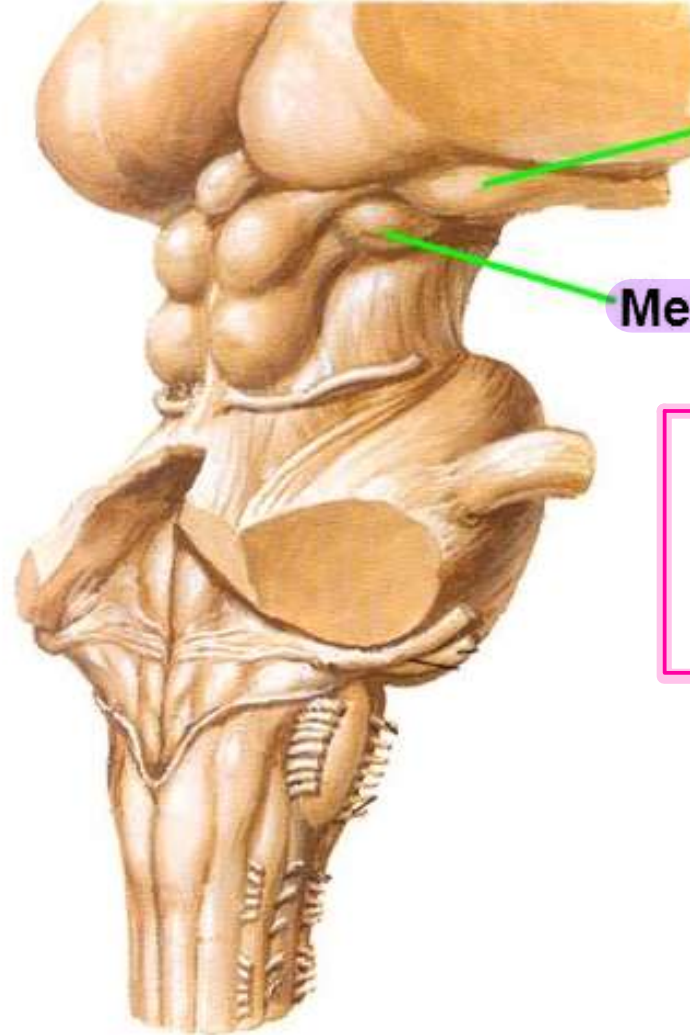
- 1- Thalamus
- 2- Hypothalamus
- 3- Epithalamus
- 4- Subthalamus
- 5- Metathalamus



Diencephalon includes:

- 1- Thalamus
- 2- Hypothalamus
- 3- Epithalamus
- 4- Subthalamus
- 5- Metathalamus

Metathalamus



Lateral geniculate body (LGN)

Medial geniculate body (MGN)

هدول جنب ال back of the midbrain ال جنب ال
superior and inferior colliculus ال medial متوصلة
inferior و ال lateral متوصلة بال superior

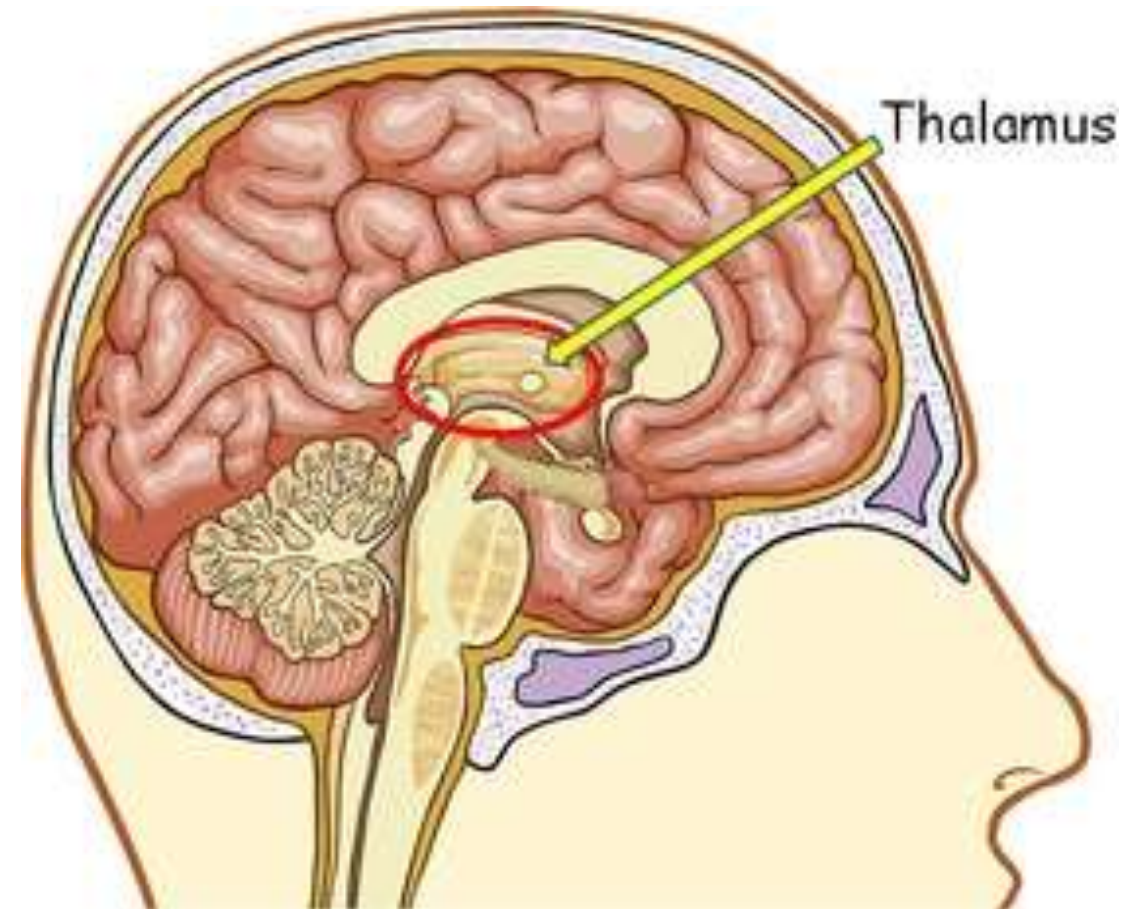
Thalamus

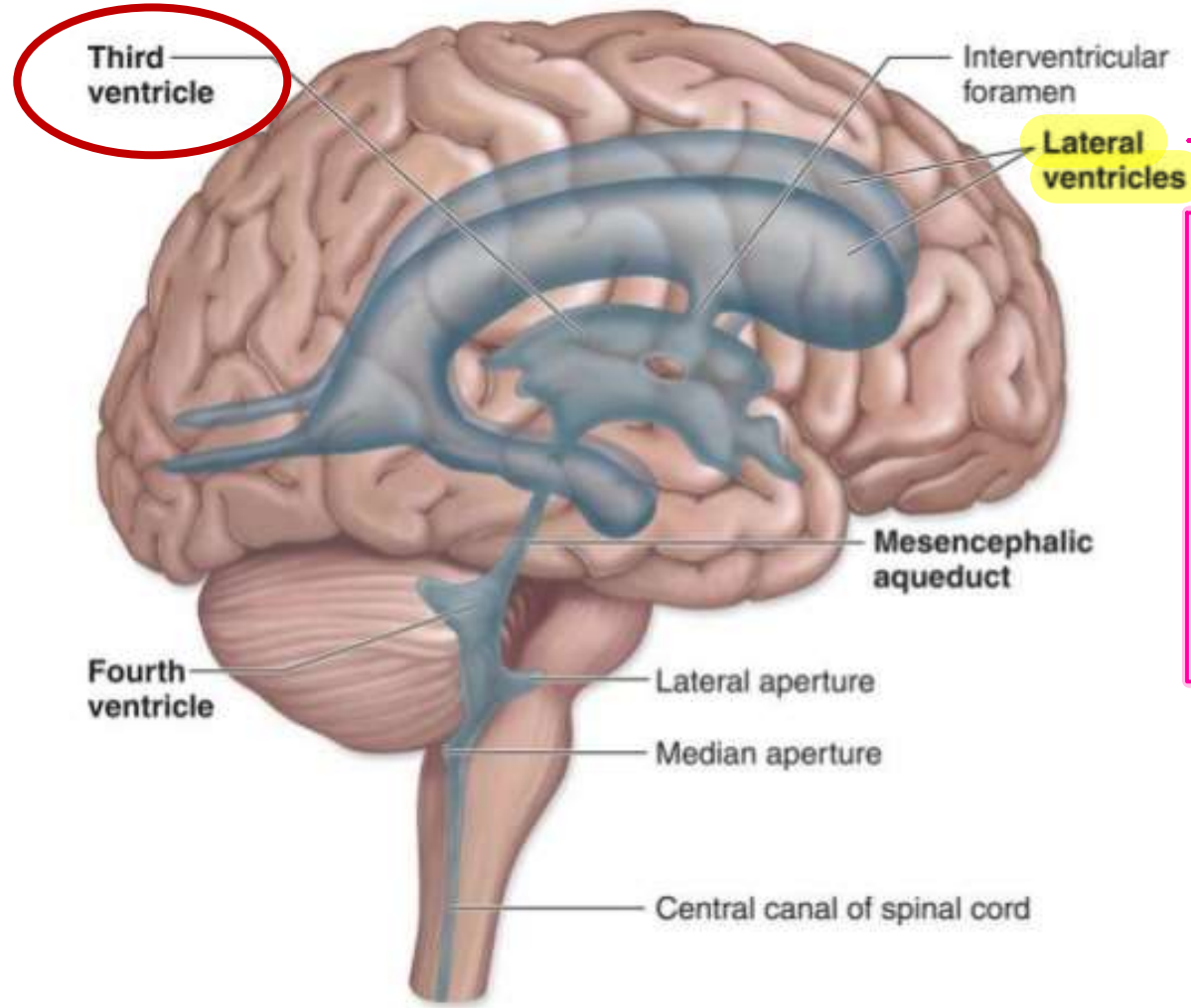
-It is an **oval** mass of **grey matter** which acts as a **gateway** for the **cerebral cortex**.

سكرتيرة ال cerebral cortex

-It relays all **sensations** except **smell**.

-It also relays **motor** and **limbic** impulses.

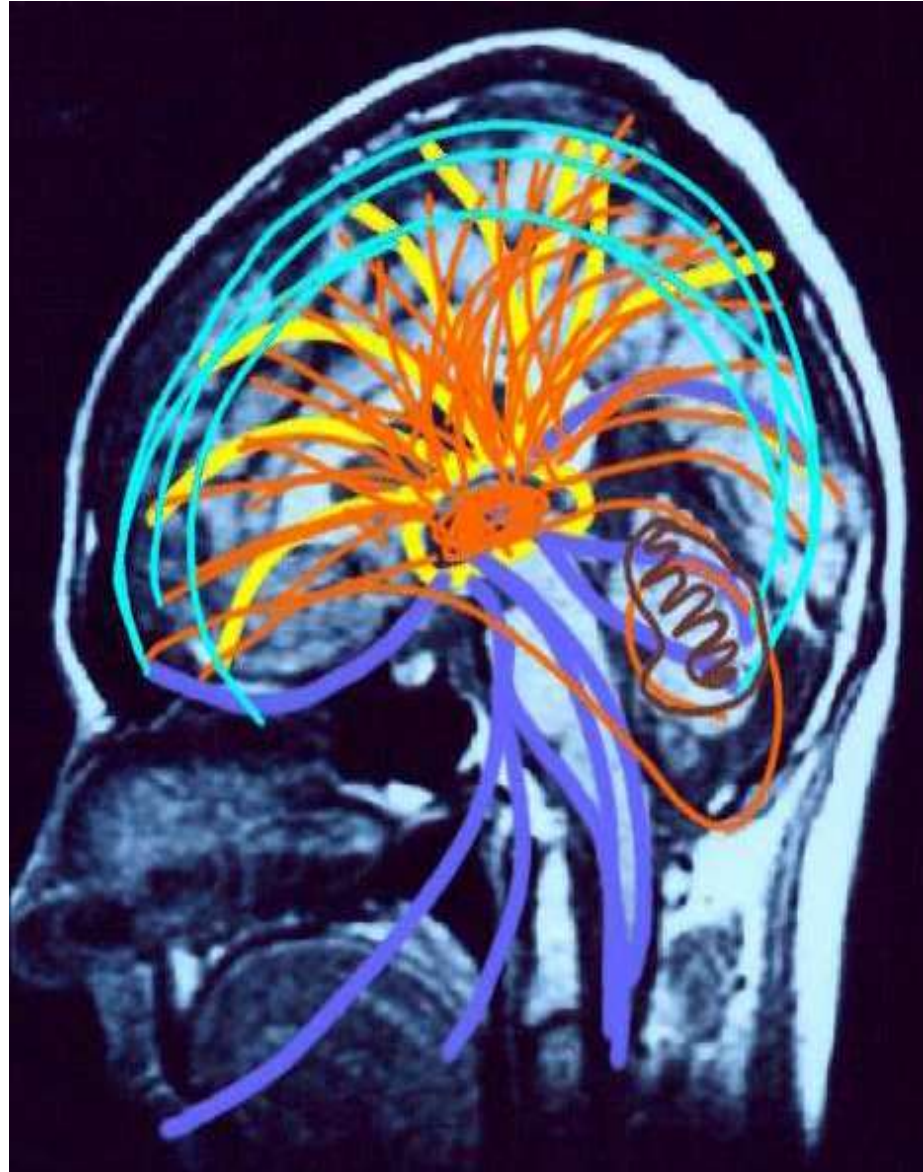




اله من الامام anterior horn و اله
posterior and inferior و body
horns و متوصل ب foramen صغير
اسمه interventricular foramen بال
third ventricle الي موجود between
الثنتين thalami right and left

(a) Lateral view

Relay station for
all sensations
except smell

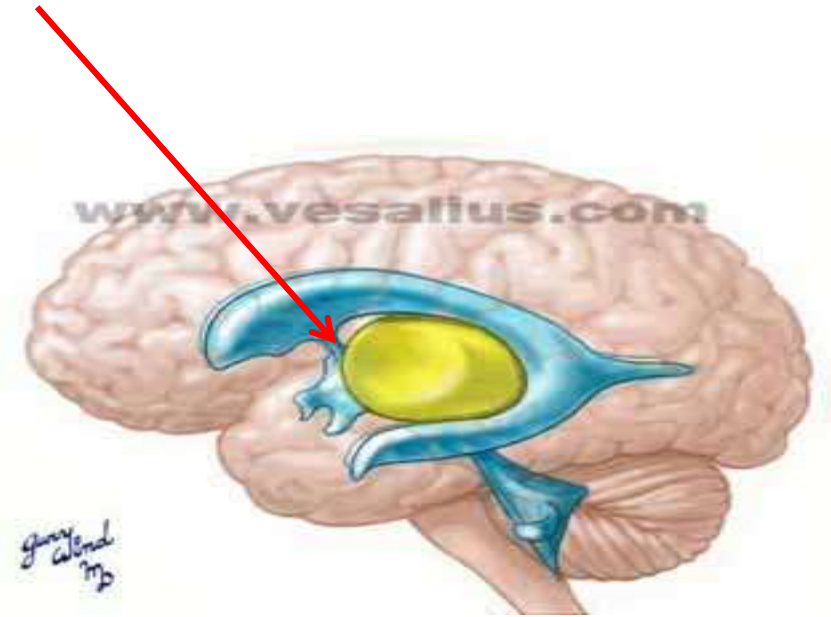
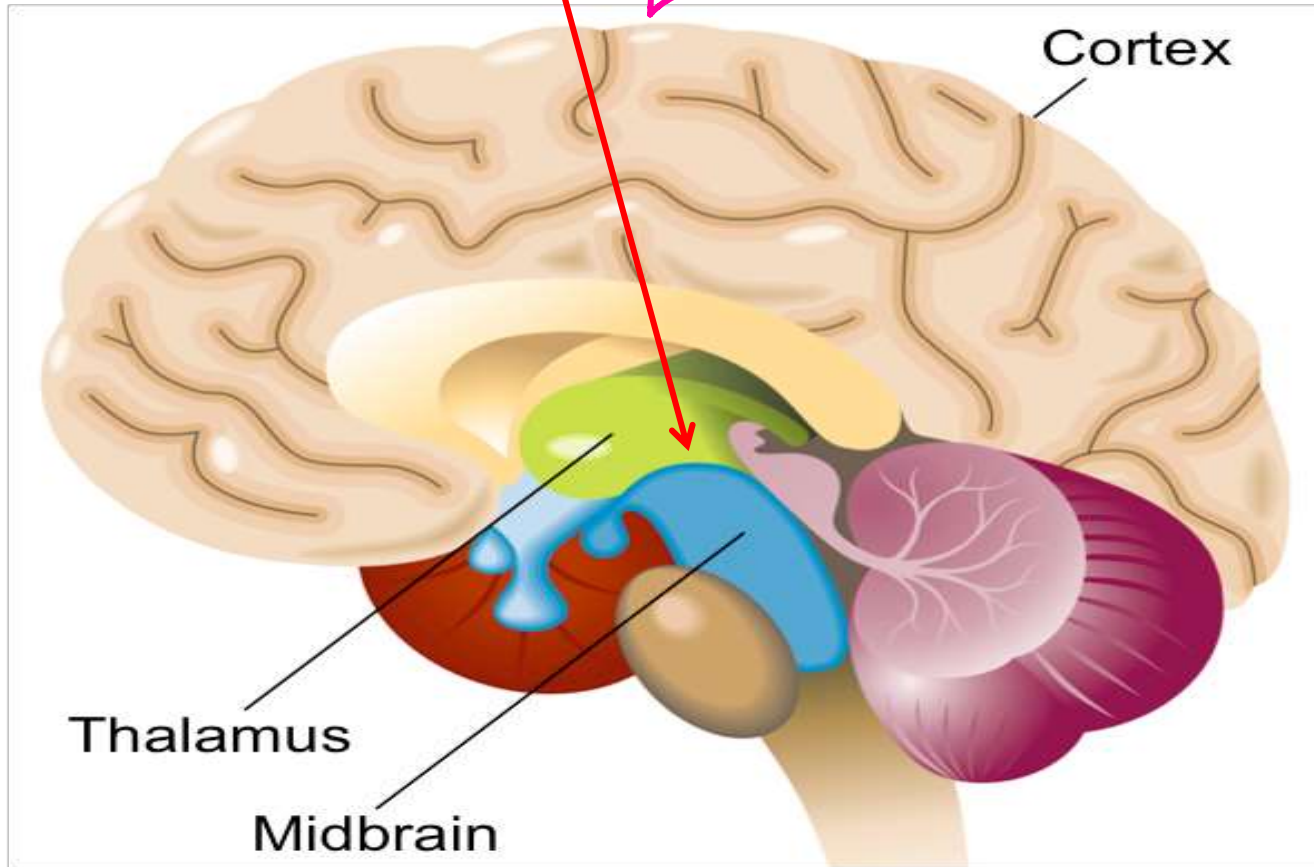


Ends:

نفت سلابد ۹ →

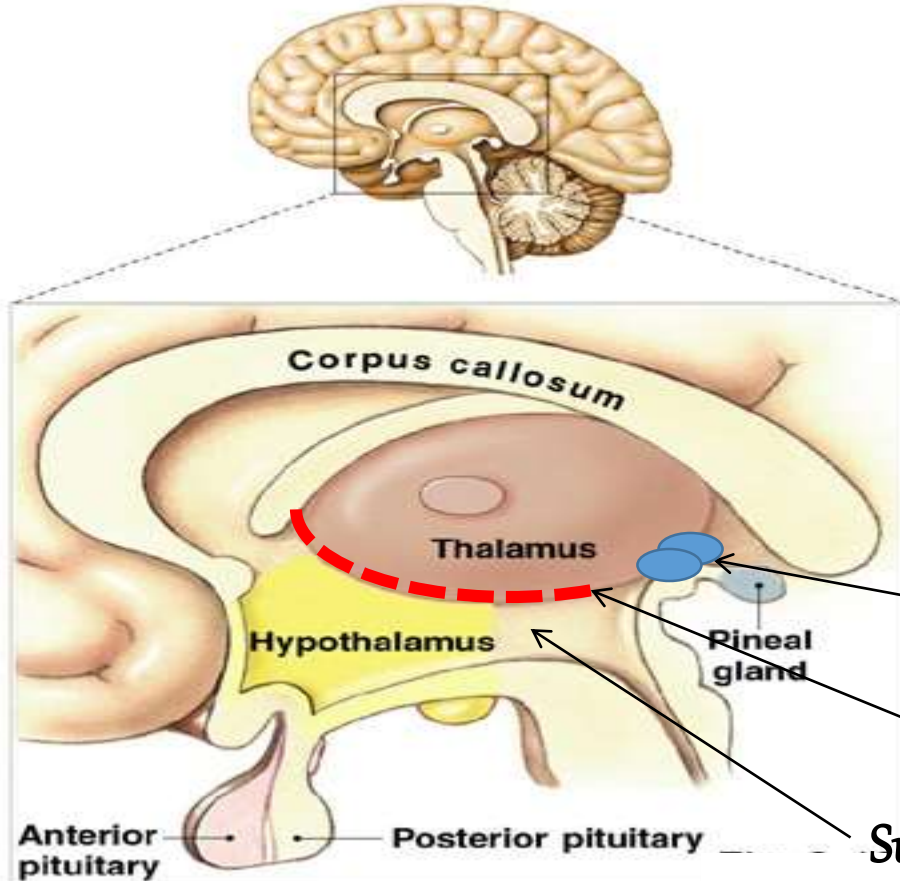
Anterior end-----Interventricular foramen of Monro

Posterior end-----Pulvinar Part of thalamus



Surfaces:

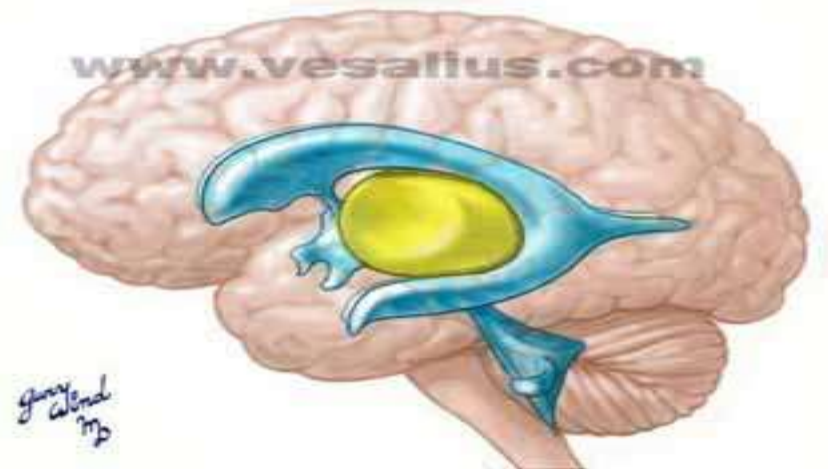
- Superior---floor of body of lateral ventricle.
- Inferior---hypothalamic sulcus separated thalamus from hypothalamus and subthalamus.
 - posterior part---MGB, LGB (metathalamus)



MGB, LGB (Metathalamus)

Hypothalamic sulcus

Subthalamus



❖ Medial surface :

lateral wall of third ventricle
(interthalamic adhesions)

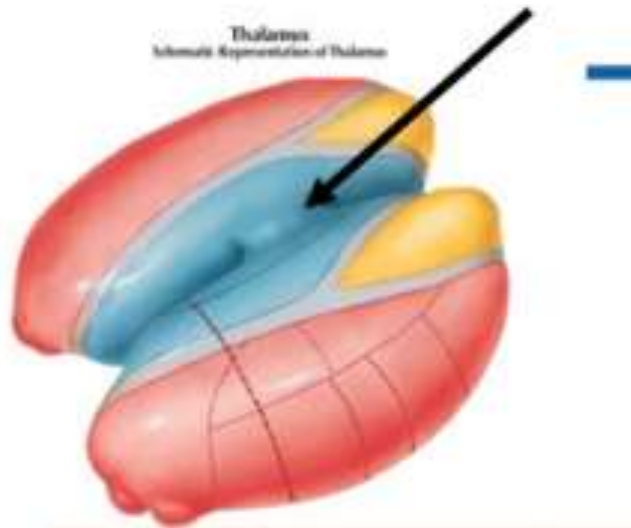
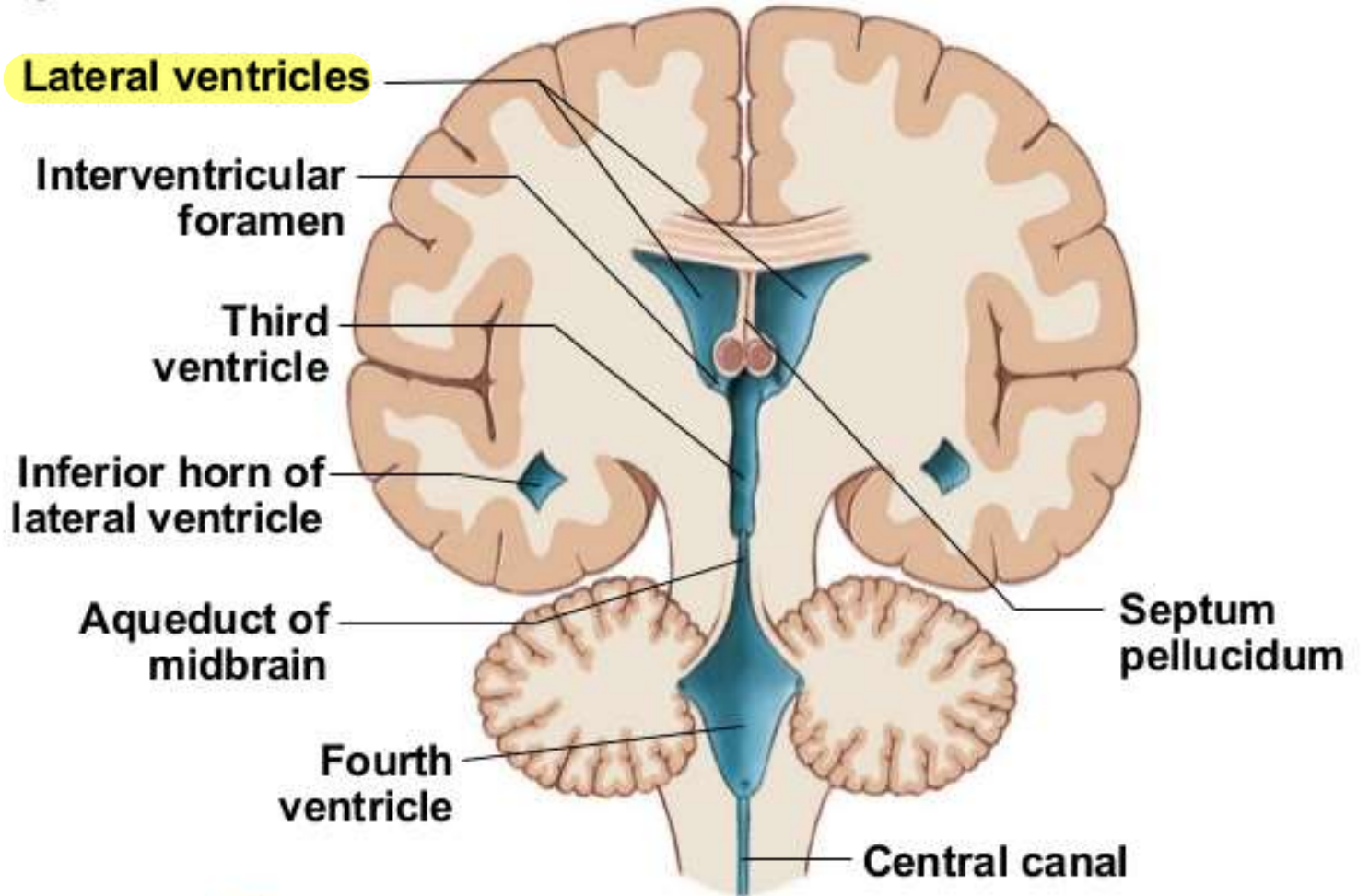
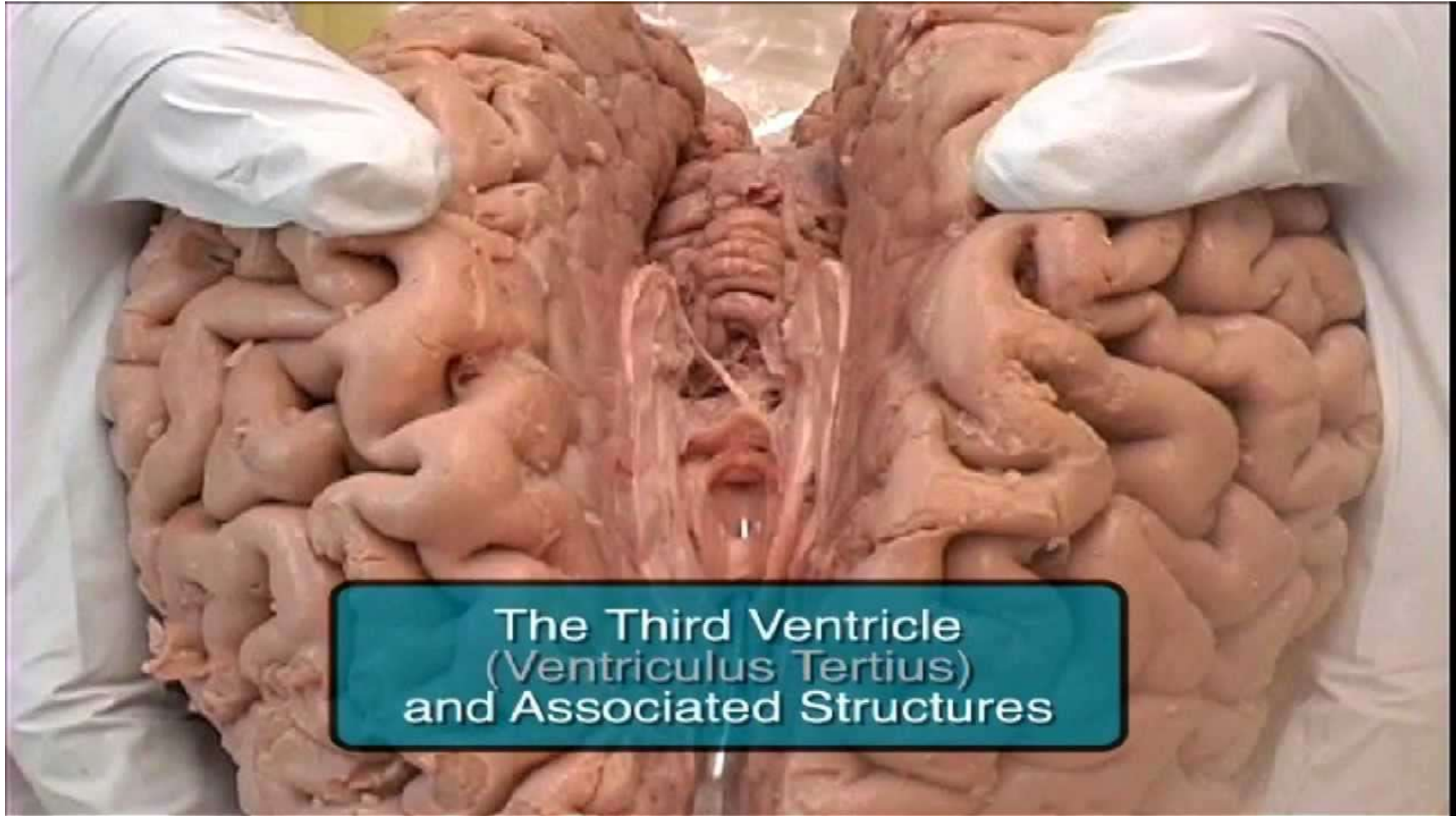


Figure 16.2d Ventricles of the Brain



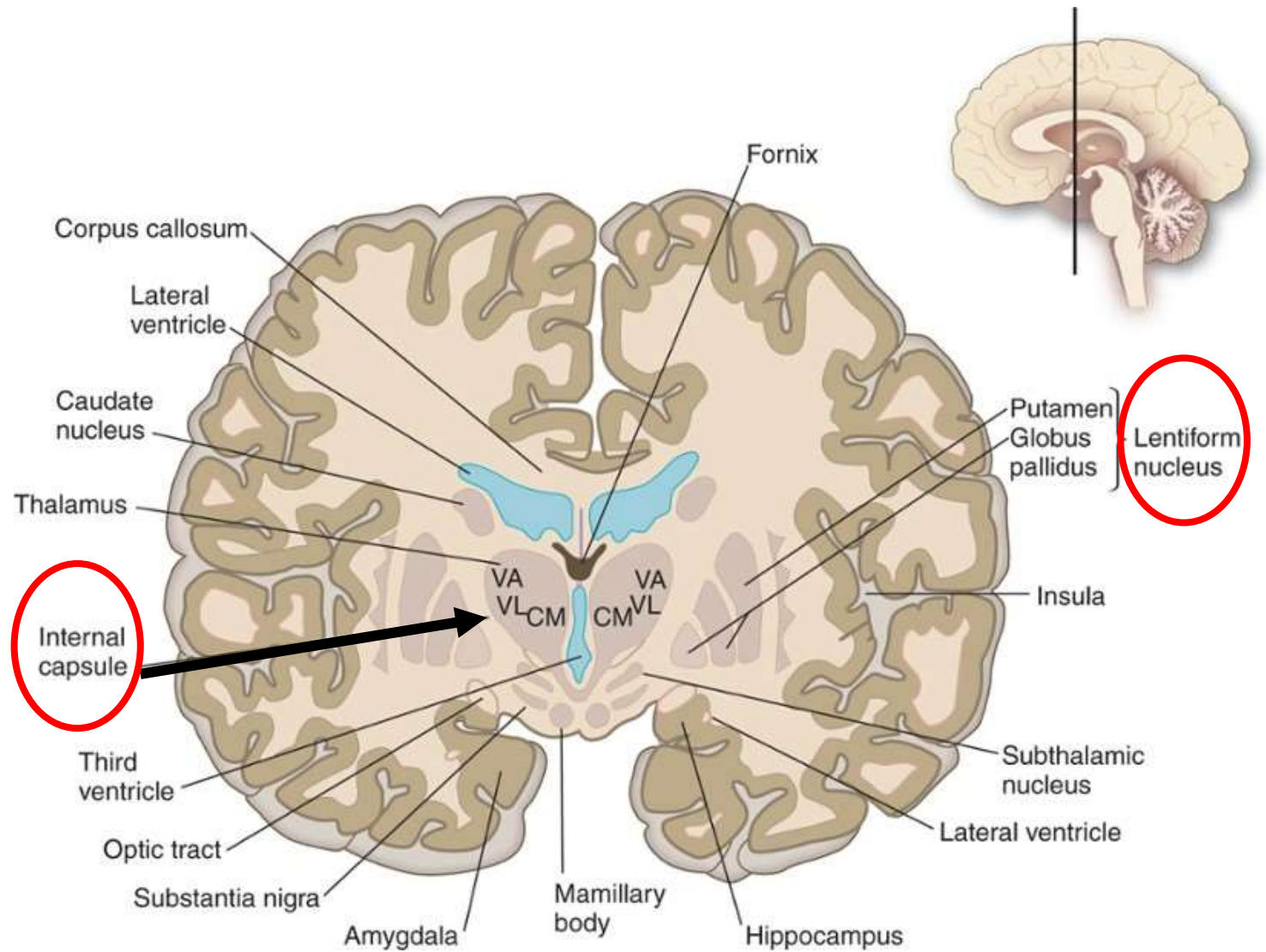
d Diagrammatic coronal section showing the interconnections between the ventricles

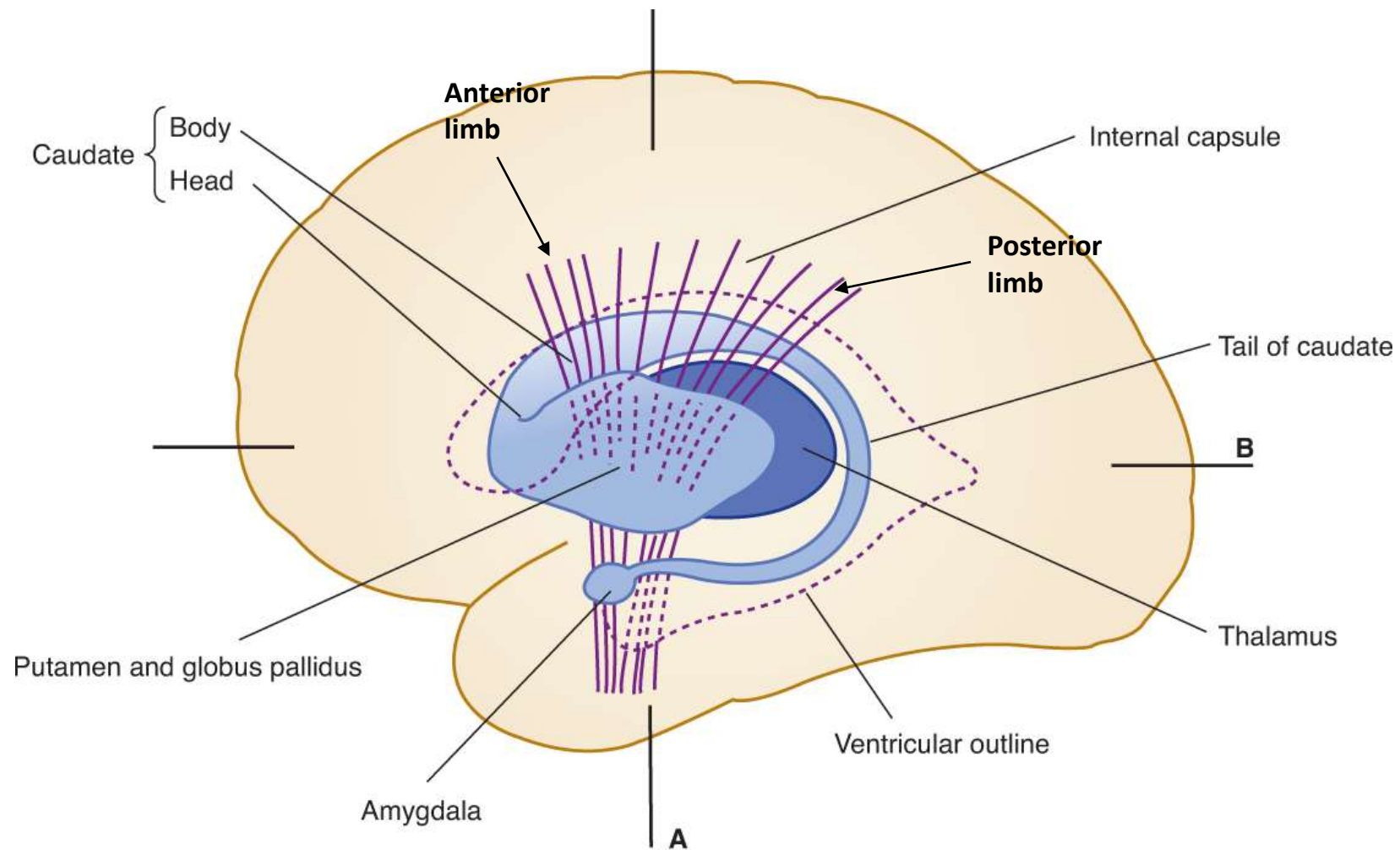


**The Third Ventricle
(Ventriculus Tertius)
and Associated Structures**

❖ Lateral surface:

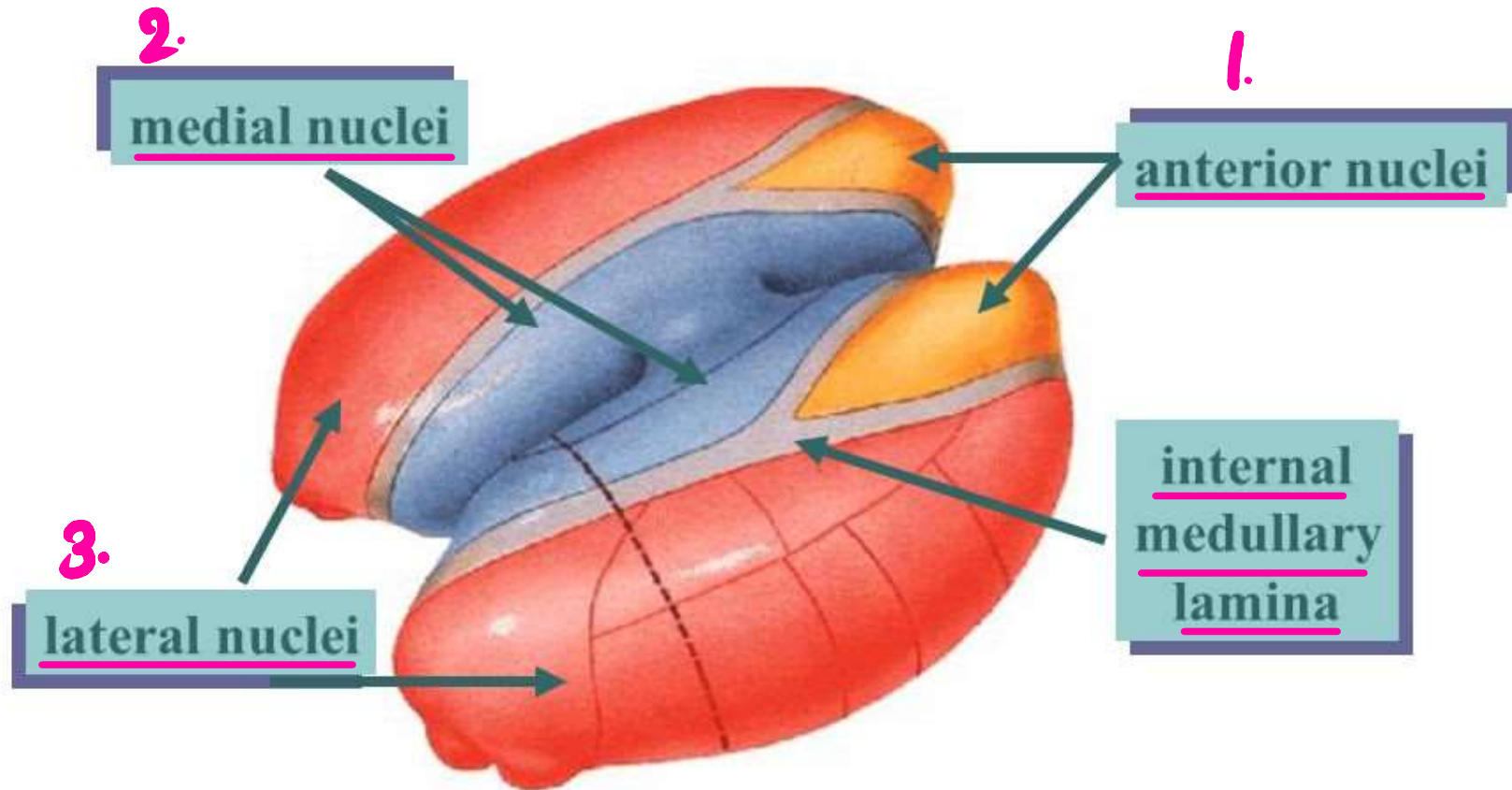
internal capsule
separating it from
lentiform

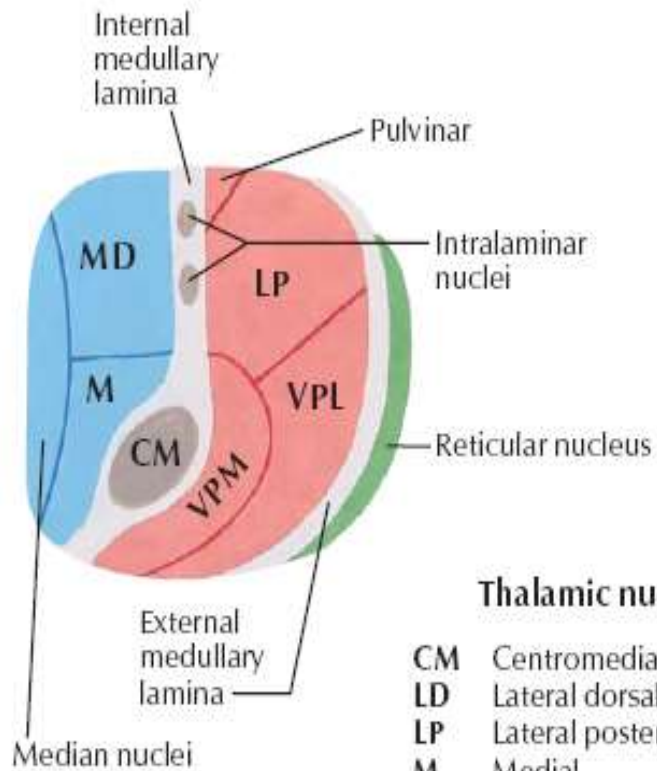




Thalamic nuclei:

Thalamus is divided by Y-shaped sheet of white matter (internal medullary lamina) into:



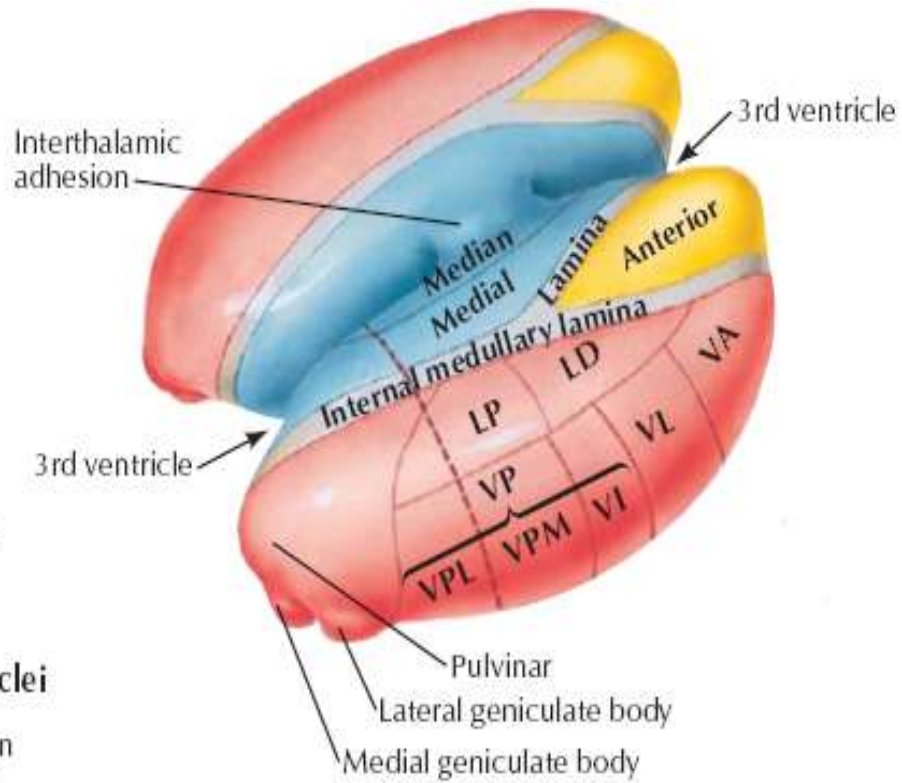


Schematic section through thalamus

(at level of broken line shown in figure at right)

Thalamic nuclei

- CM Centromedian
- LD Lateral dorsal
- LP Lateral posterior
- M Medial
- MD Medial dorsal
- VA Ventral anterior
- VI Ventral intermedial
- VL Ventral lateral
- VP Ventral posterior
- VPL Ventral posterolateral
- VPM Ventral posteromedial



Schematic representation of thalamus

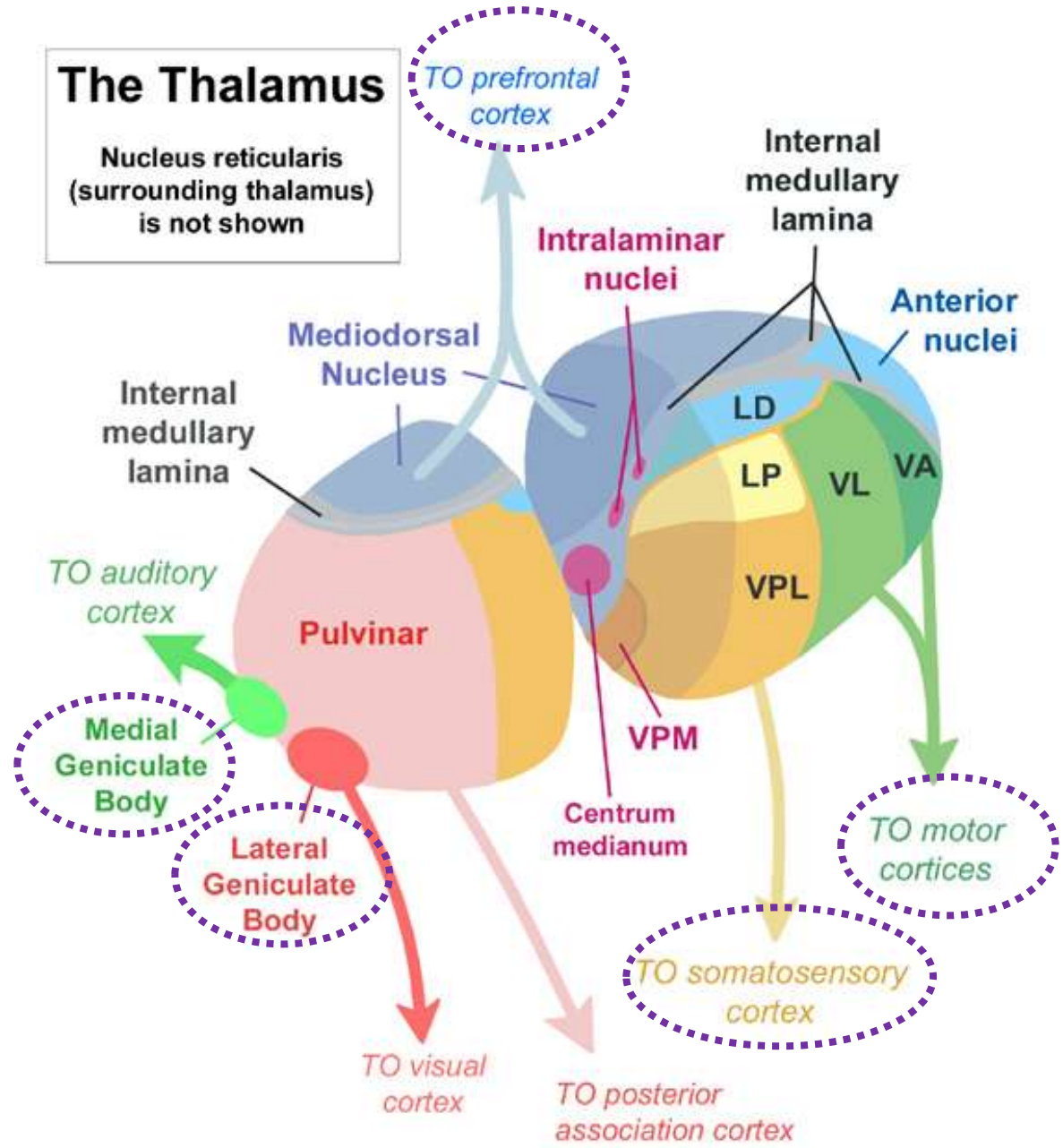
(external medullary lamina and reticular nuclei removed)

- Lateral nuclei
- Medial nuclei
- Anterior nuclei

The Thalamus

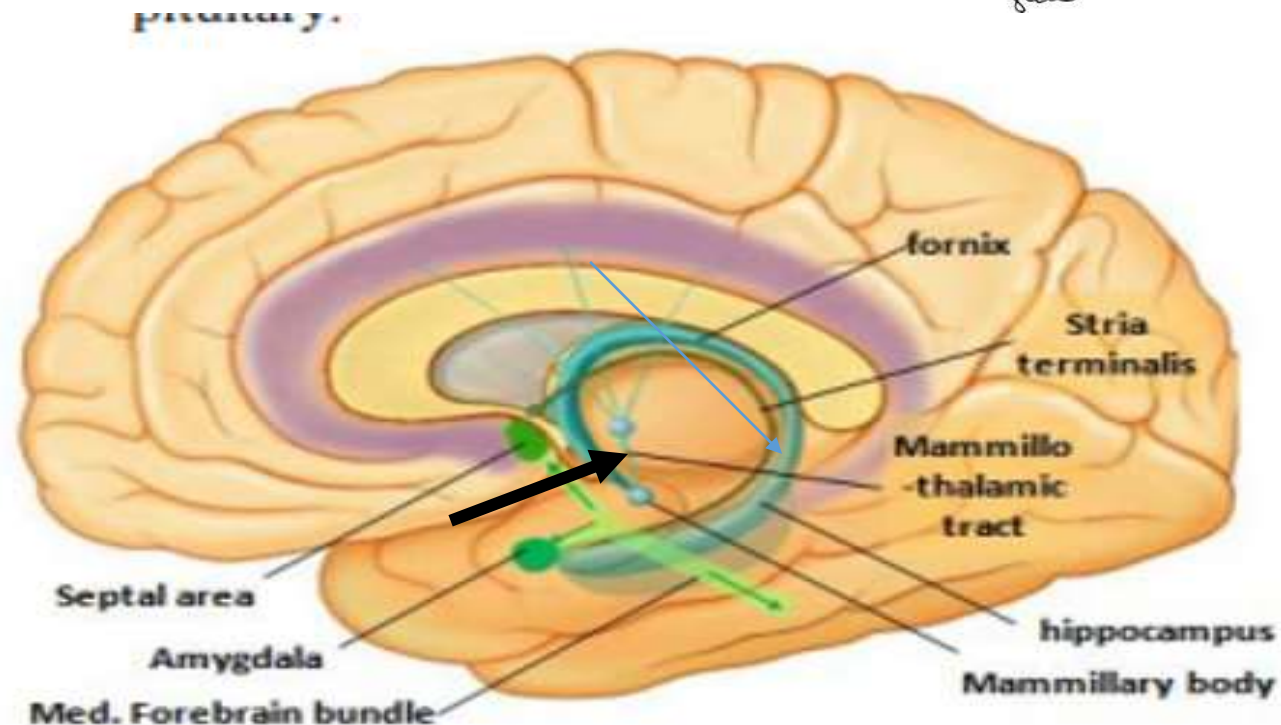
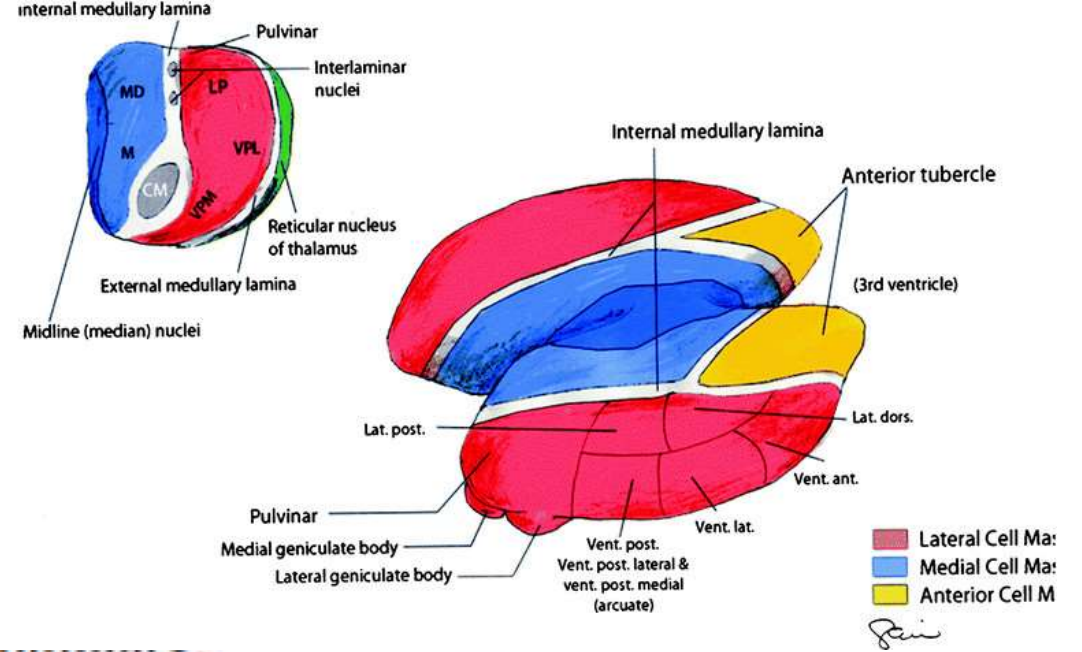
Nucleus reticularis (surrounding thalamus) is not shown

connections



Anterior nuclei:

- **Site:** between the 2 limbs of the Y-shaped internal medullary lamina.
- **Afferents:** receives the mammillo-thalamic tract from the mammillary bodies.
- **Efferents:** sends the anterior thalamic radiation to the cingulate gyrus
- **Function:** forms part of the limbic system (Papez circuit) which is concerned with emotions and recent memory.



Medial nuclei (Dorso-medial nucleus):

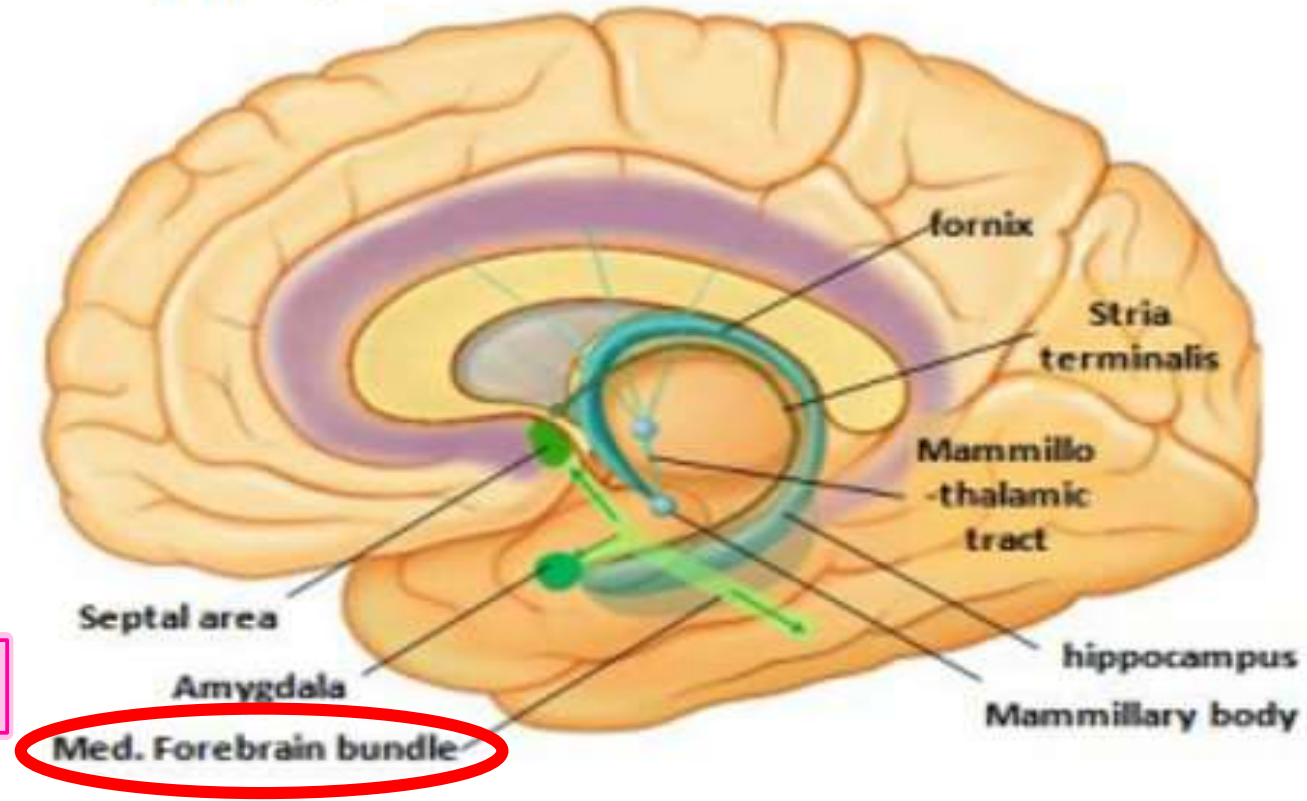
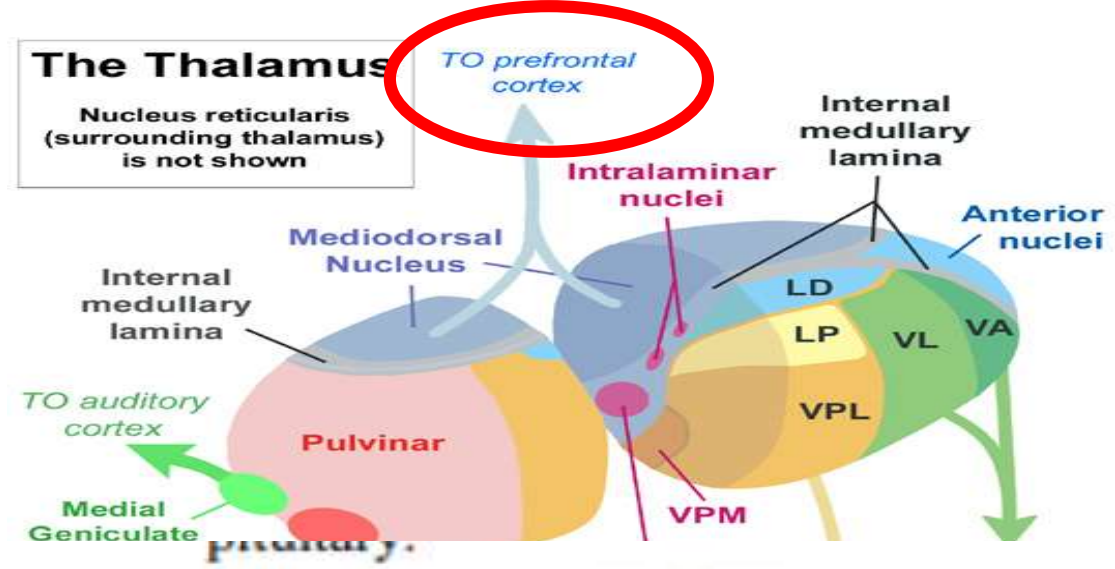
- **Afferents:** from the Part of caudate nucleus
hypothalamus, amygdala &

olfactory cortex

- **Efferents:** via the medial forebrain bundle to the prefrontal cortex.

- **Function:** forms part of the limbic system involved in thinking & mood.

بتخزن ال fear sensation الي مرتبط بالرائحة و الذكريات



lateral part of thalamus: Divided

into: 1.

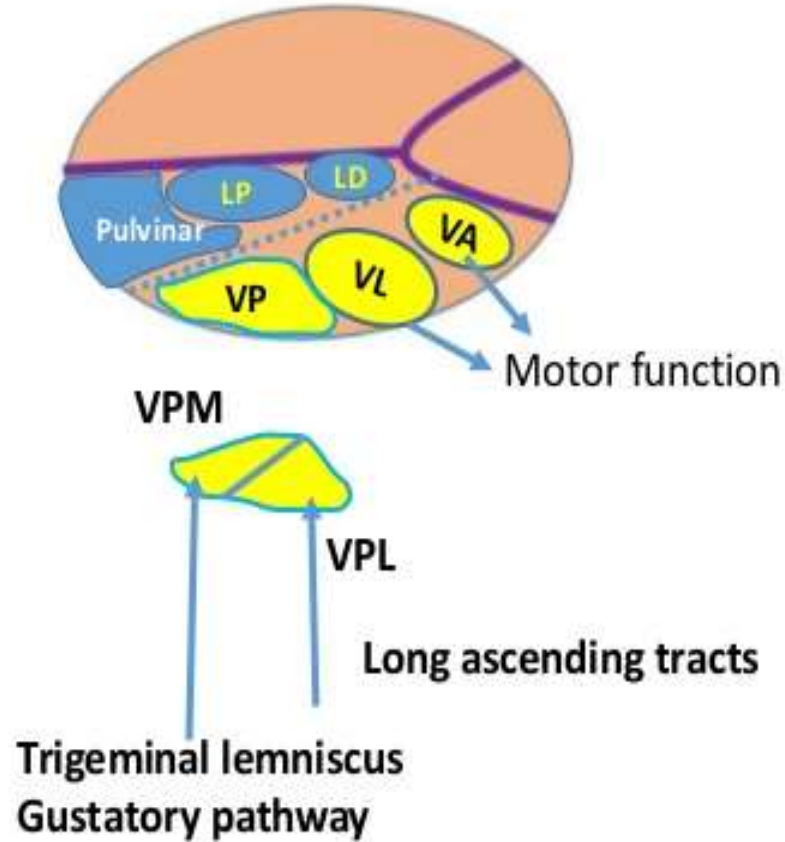
Dorsal tier:

Includes 3 association nuclei:

- Lateral-dorsal nucleus, Lateral-posterior nucleus & Pulvinar.

- Afferents: they receive input from the other thalamic nuclei and integrate them; the thalamus is considered as a multisensory processing unit.

- Efferents: to the sensory association areas of the cortex



1. Anterior thalamus

Anterior nucleus of thalamus

2. Medial thalamus

Dorsomedial nucleus

3. Lateral thalamus

A. Dorsal tier

Lateral dorsal

Lateral posterior

Pulvinar

B. Ventral tier

Ventral anterior

Ventral lateral

Ventral posterior

VPM

VPL

2. Ventral tier: 3 nuclei:

1- Ventral-anterior (VA) nucleus:

- Afferents: from the basal ganglia (globus pallidus).

- Efferents: to the supplementary motor area. Complex movement like bimanual movement

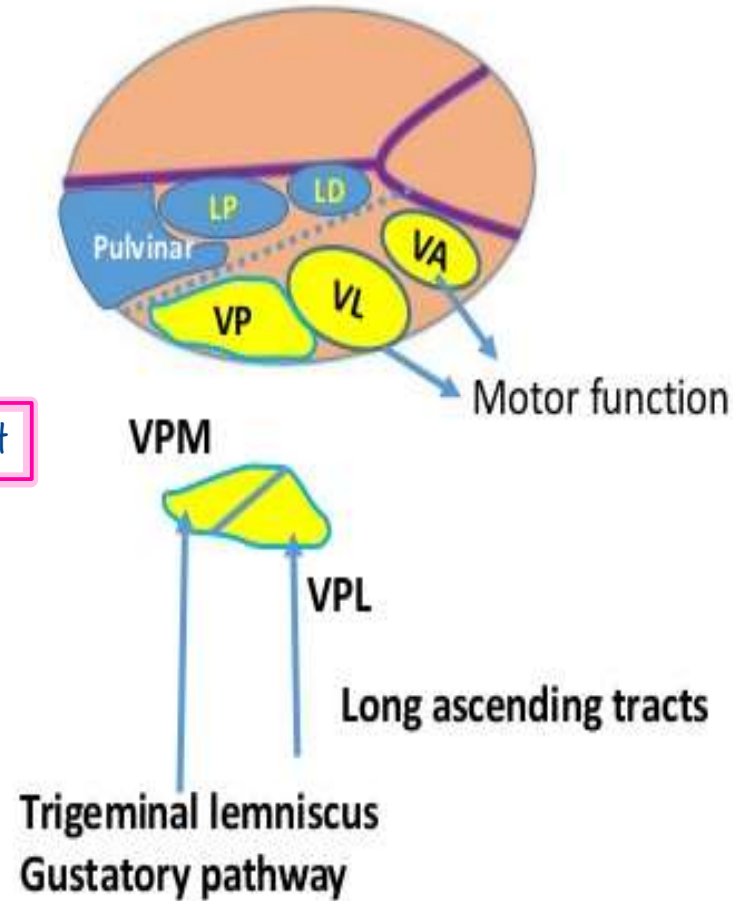
- Function: relays motor circuits.

2- Ventral-lateral or ventral-intermediate (VL or VI) nucleus:

- Afferents: from the cerebellar nuclei.

- Efferents: to the motor and premotor areas.

- Function: relays motor planning of voluntary movement.



1. **Anterior thalamus**
Anterior nucleus of thalamus
2. **Medial thalamus**
Dorsomedial nucleus
3. **Lateral thalamus**
 - A. Dorsal tier
 - Lateral dorsal
 - Lateral posterior
 - Pulvinar
 - B. Ventral tier
 - Ventral anterior
 - Ventral lateral
 - Ventral posterior
 - VPM
 - VPL

3- Ventral-posterior nucleus (VP nucleus) is sensory & includes 2 parts:

a. VP Lateral (VPL)

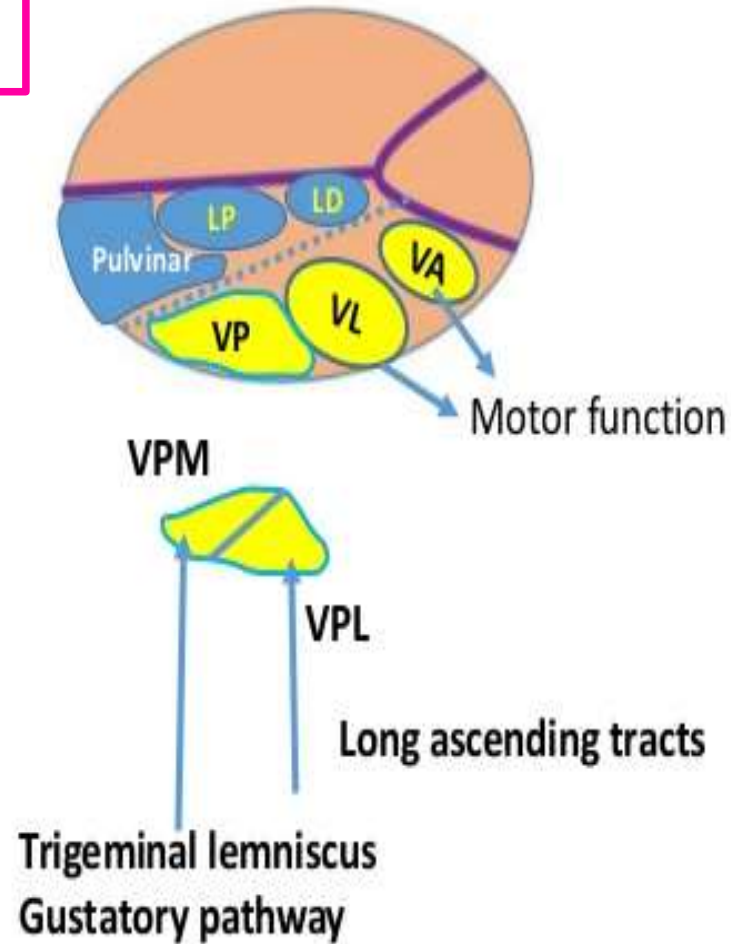
- Afferents: receives the medial & spinal lemnisci.

- Efferents: to the upper 2/3 (body area) of the postcentral gyrus.

b. VP Medial (VPM)

- Afferents: receives the trigeminal lemniscus & solitariothalamic tract (carrying taste).

- Efferents: to the lower 1/3 (head area) of the postcentral gyrus.



1. Anterior thalamus

Anterior nucleus of thalamus

2. Medial thalamus

Dorsomedial nucleus

3. Lateral thalamus

A. Dorsal tire

Lateral dorsal

Lateral posterior

Pulvinar

B. Ventral tire

Ventral anterior

Ventral lateral

Ventral posterior

✓ VPM

✓ VPL

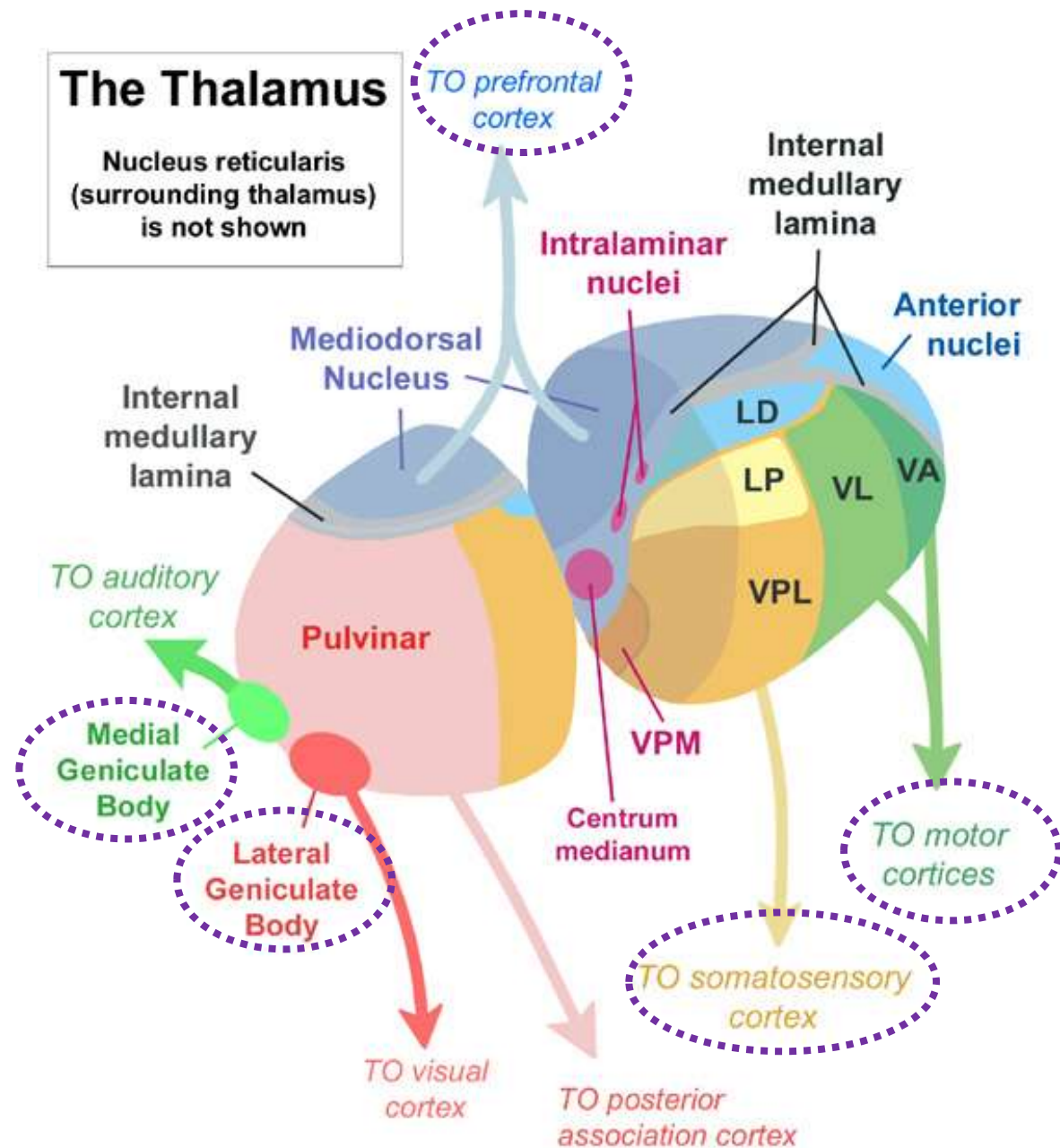
Medial & lateral geniculate bodies:
(both are called *metathalamus*)

1. The medial geniculate body (MGB)

- **Afferents:** receives *auditory* input from the *inferior colliculus* of midbrain.
- **Efferents:** projects *auditory radiation* to the *auditory area* of cortex.

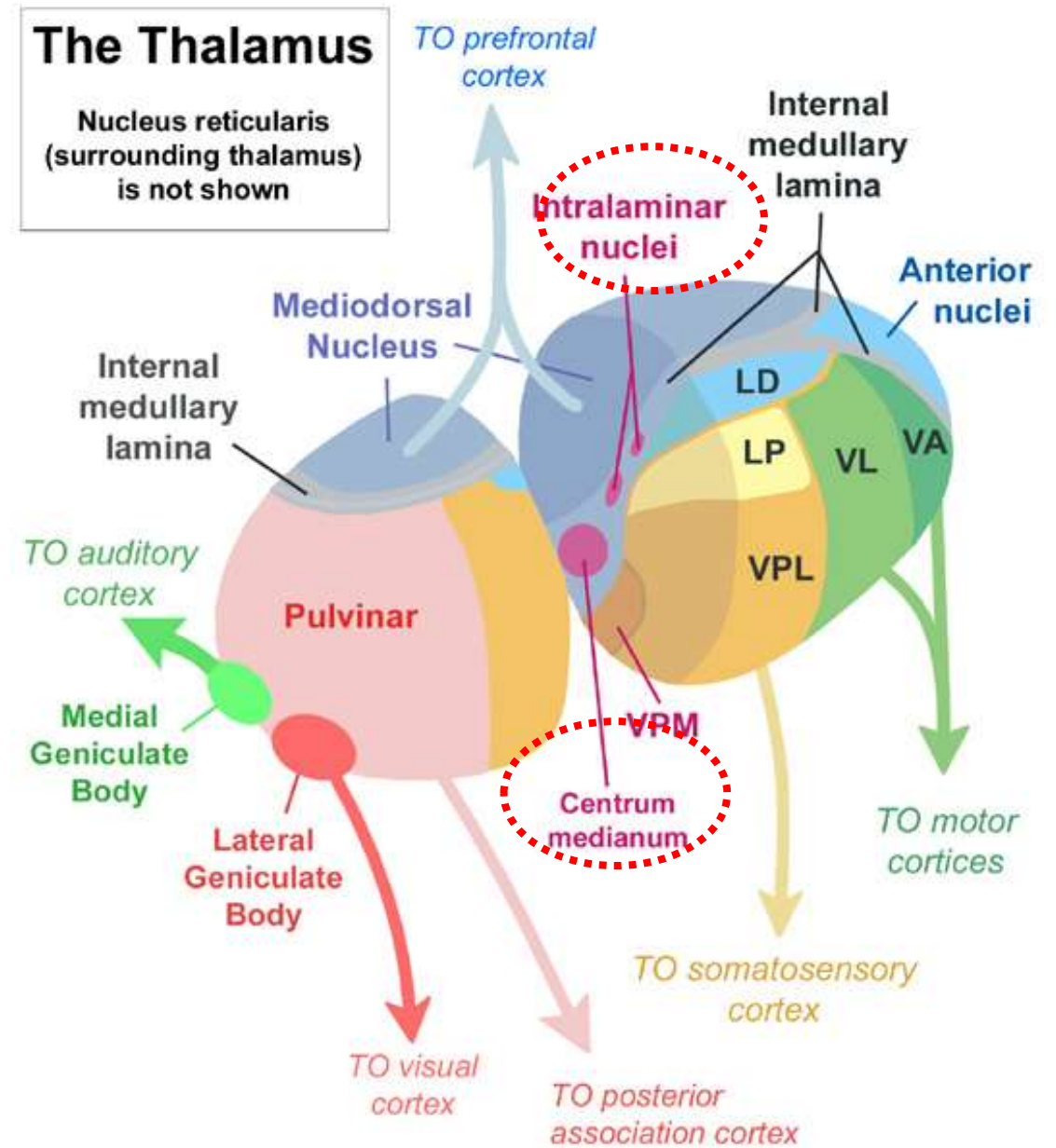
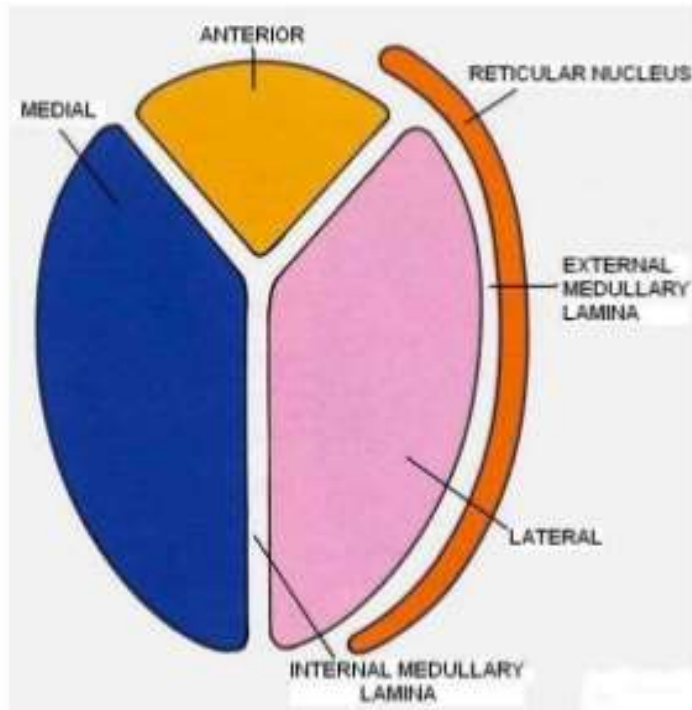
2. The lateral geniculate body (LGB)

- Receives *visual* input from the *optic tract*.
- Projects *optic radiation* to the *visual area* of cortex.



Intralaminar nuclei (within the internal medullary lamina) & **Midline nuclei**

- Functions: part of RAS responsible for alertness.



Blood supply of Thalamus:

Arterial:

Medial & anterior regions by

posteromedial group of posterior cerebral artery.

Lateral & posterior parts by

posterolateral group of posterior cerebral artery (thalamogeniculate artery).

Venous drainage: by the thalamostriate vein.

Applied: Thalamic syndrome Vascular lesions of the thalamus (thalamogeniculate artery) decreased threshold to pain with overreaction to painful stimuli & spontaneous pains

Hypothalamus

ما راح يجي بالامتحان

Extent:

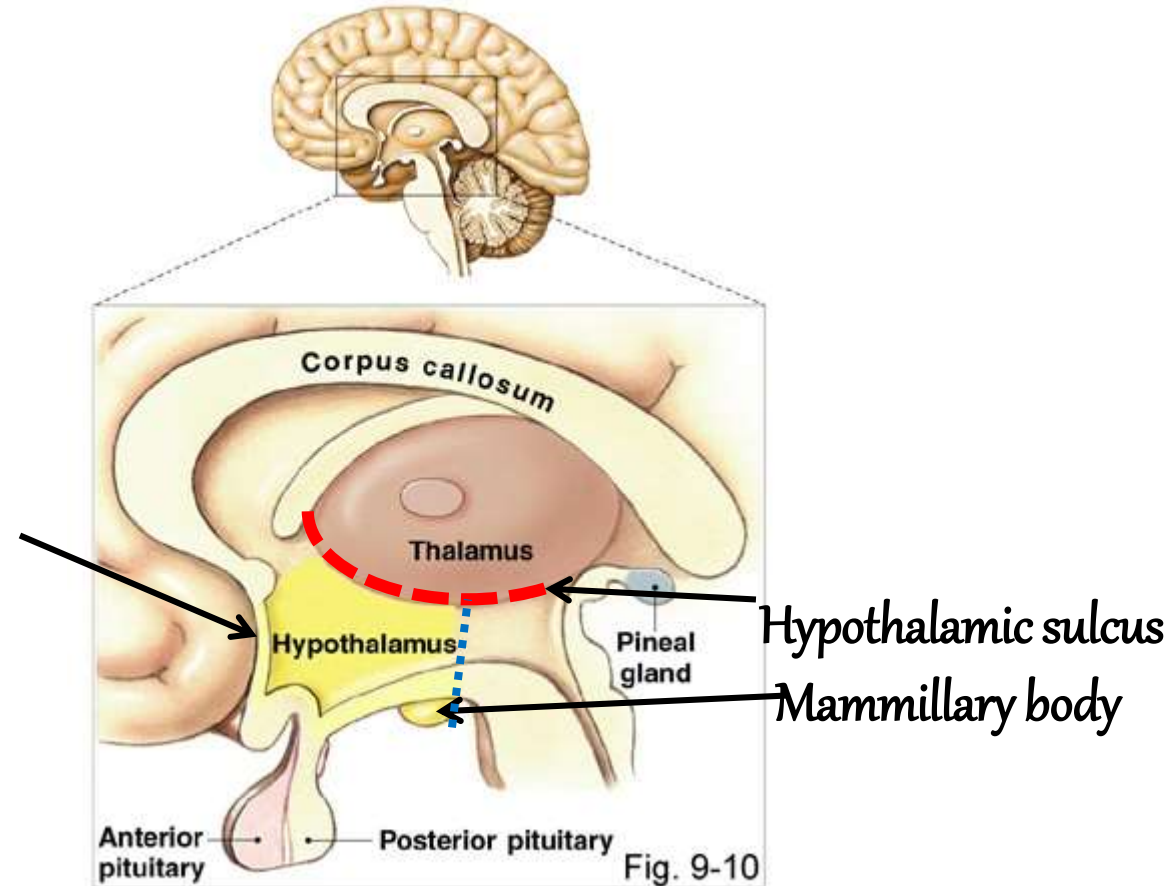
Superior: hypothalamic sulcus

Anterior: Lamina terminalis

Posterior: Mammillary bodies

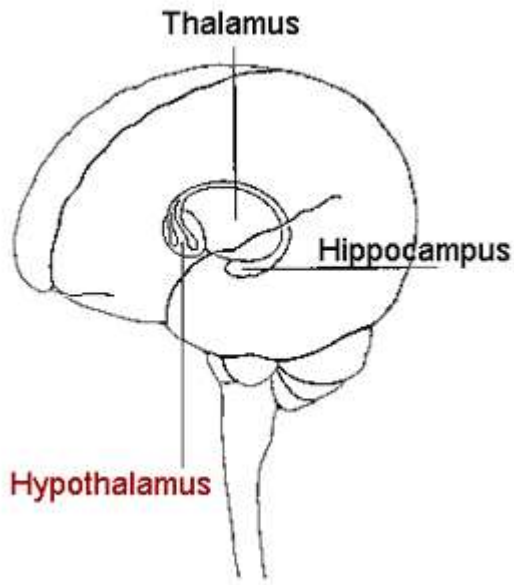
Inferior: Interpeduncular fossa
(base of the brain)

Lamina
Terminalis

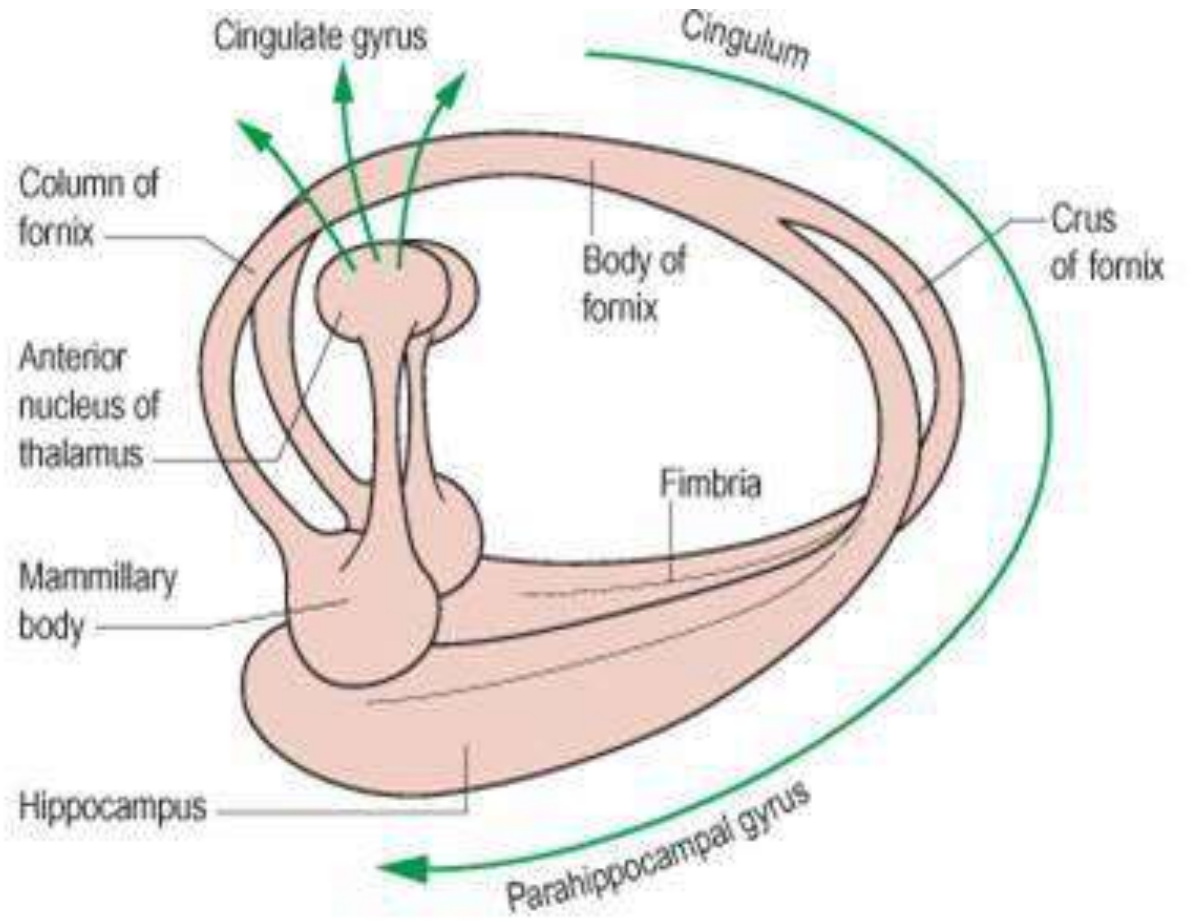


Limbic system:

Hippocampus --- fornix --- mammillary body --- ant. n. of thalamus
--- cingulate G. (emotion, recent memory)



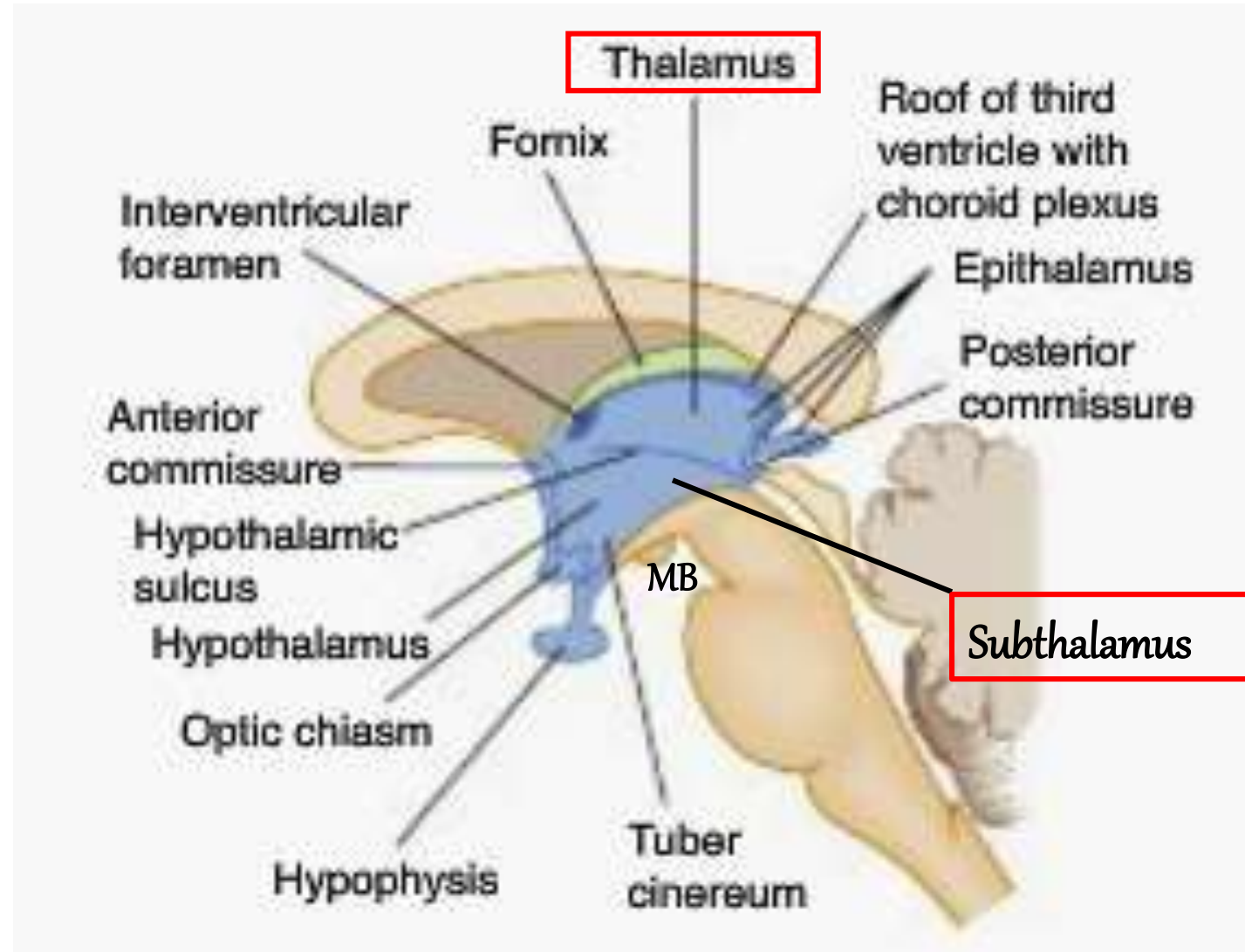
المجموعه الجانبيه ال
تتبع عن طريق
المجموعه الجانبيه-تحتية
لل tract ال
thalamic nuclei اسمها ال
الradiation ال تحتية
الcingulate ال
ب. gyrus. ناد متصل ب
الparahippocampus و ال
hippocampus



Subthalamus:

-Inferior to thalamus lying between the thalamus and midbrain

-Subthalamic nucleus is a part of basal ganglia (involved in muscular activity)



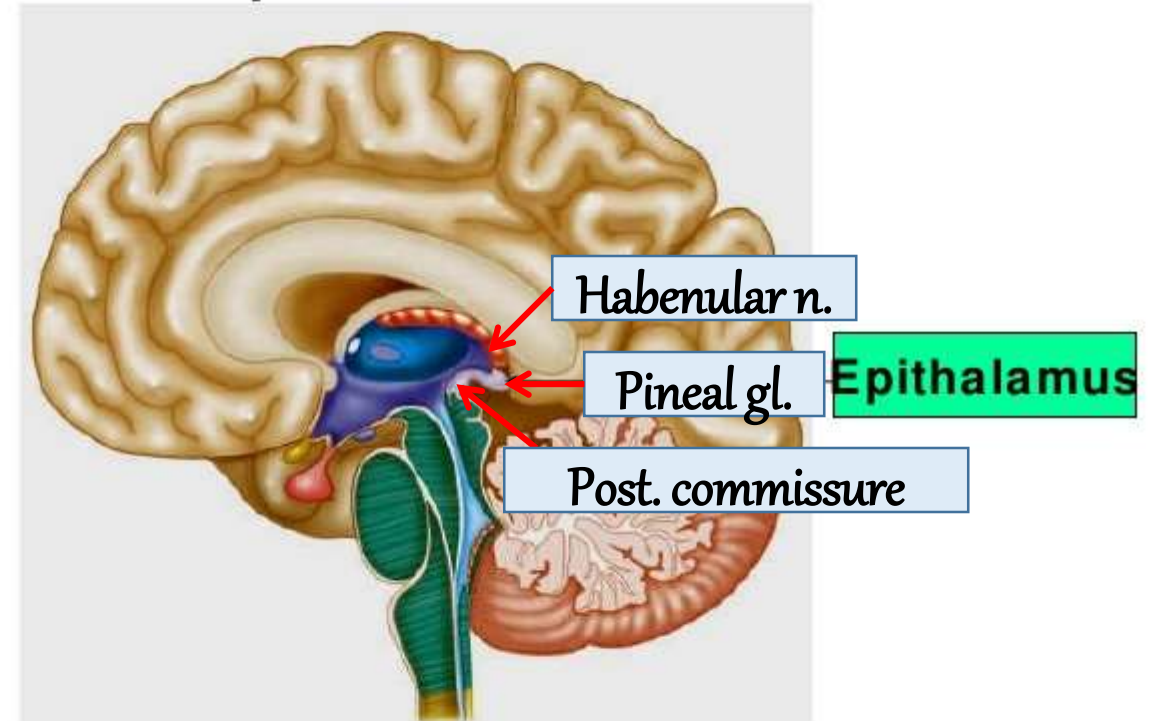
Epithalamus:

ما راح يجي بالامتحان

Epithalamus

It consists of:

- Pineal gland: endocrine gland secretes melatonin, activates in dark
- Habenular nucleus: connects olfactory input with cranial nerves nuclei
- Posterior commissure: (connects superior colliculus and pretectal nuclei)



- The epithalamus is the posterior portion of the diencephalon
- It forms the roof of the third ventricle

Third Ventricle

Boundaries:

Lateral wall: thalamus and hypothalamus

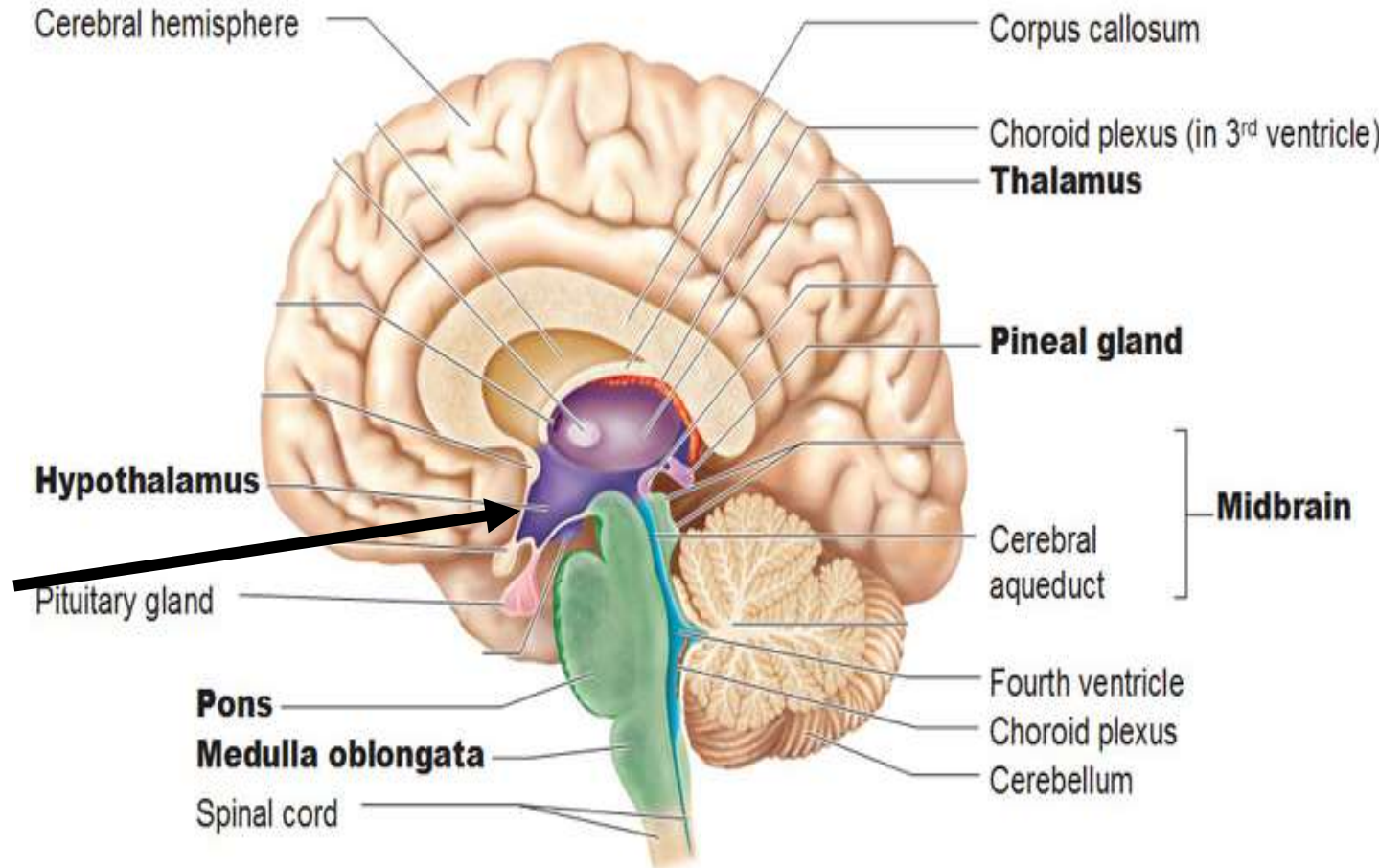
Roof: ependyma and choroid plexus

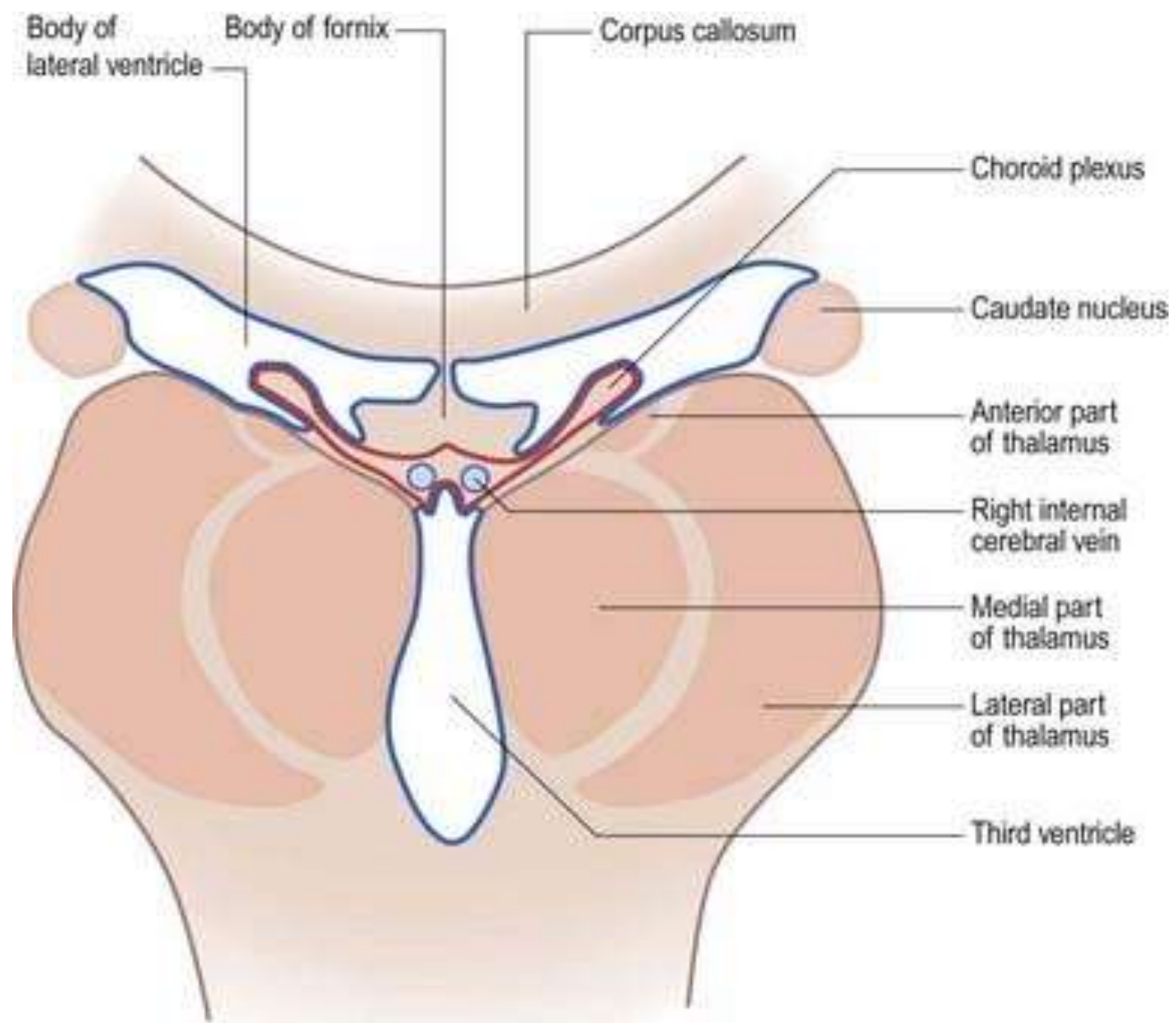
Floor: interpeduncular fossa

Anterior wall: fornix, lamina terminalis

Posterior wall: epithalamus (Pineal gland, posterior commissure)

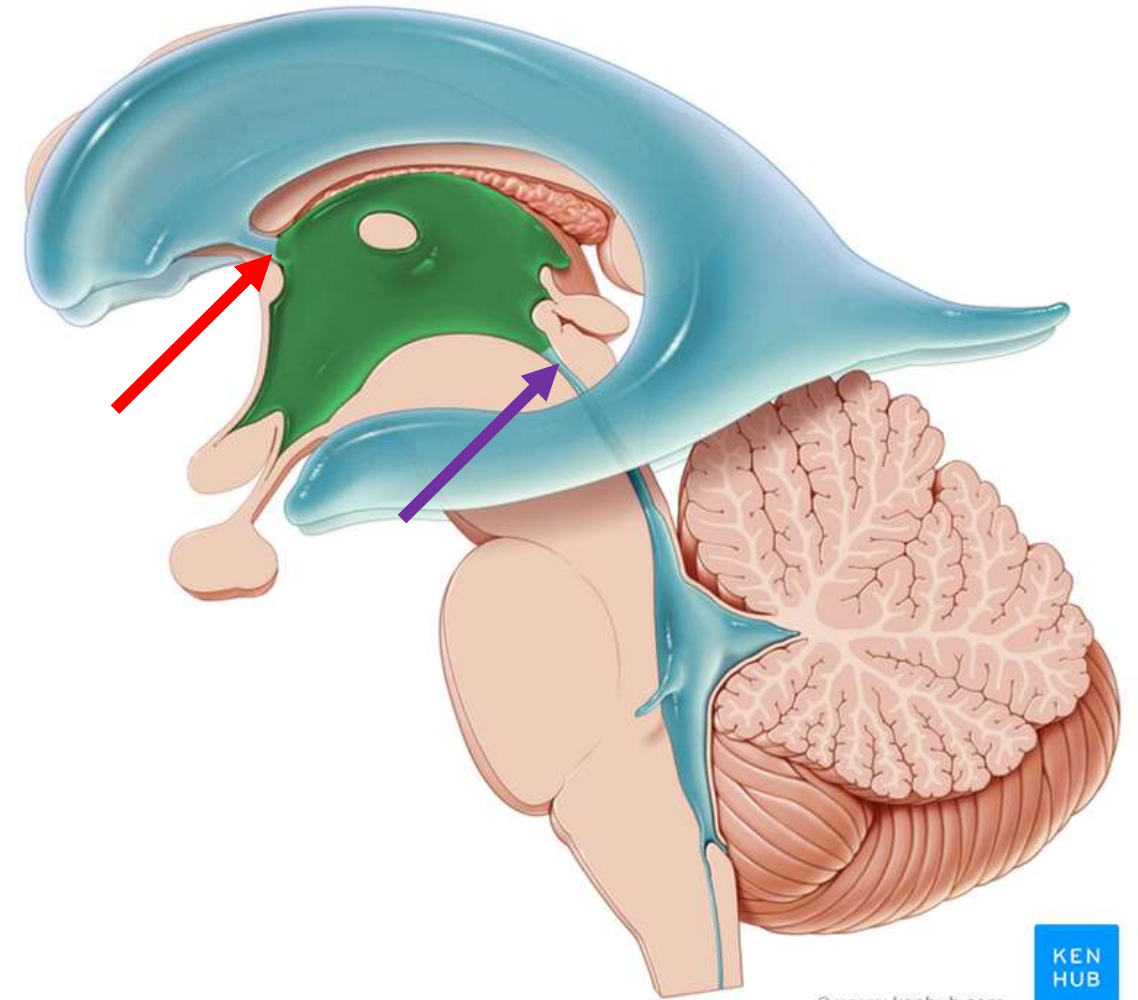
Ependyma: simple cuboidal epithelium which lines the ventricles.





Communications:

- With the lateral ventricle through **interventricular foramen of Monro**
- With the fourth ventricle with the **cerebral aqueduct of Sylvius**



Thank you