



WITH NOTES

ANATOMY & DEVELOPMENT OF PITUITARY GLAND

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By

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M N U



Intended Learning Outcomes (ILOs)

1. Describe anatomy of pituitary gland (parts, relation & blood supply).
2. Describe development of pituitary gland.
3. Summarize congenital anomalies of pituitary gland.

أهم جزء في المحاضرة على الإطلاق

مهم جدا على غير العادة

* خلي بالكوا كل اللي مكتوب في المحاضرة دي بالذات بييجي في الامتحان



Agenda

1. Anatomy of pituitary gland (parts, relation & blood supply).
2. Development of pituitary gland.
3. Congenital anomalies of pituitary gland.



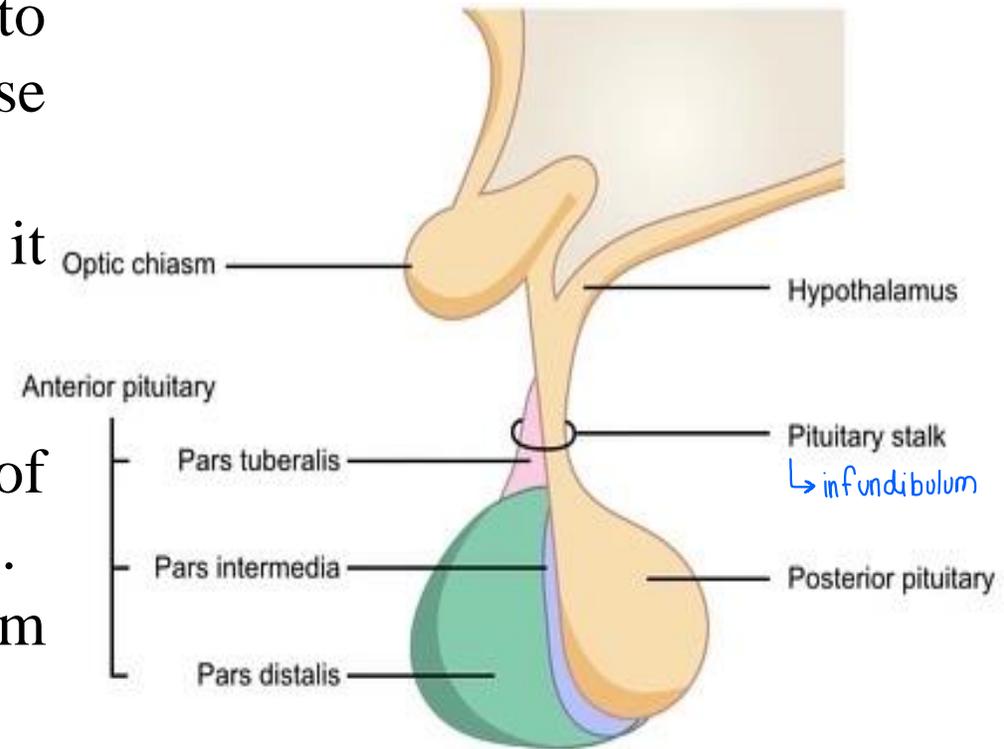


Anatomy of Pituitary Gland



Introduction

- The **pituitary gland** is an endocrine gland that works to maintain cellular **homeostasis** in the body by the release of different hormones.
- The pituitary gland is also called the **master gland** as it regulates the other endocrine glands.
- **Regulated by the secretions of the hypothalamus.**
- The pituitary gland is attached to the hypothalamus of the forebrain by a single stalk called the **infundibulum**.
- The term 'pituitary' is derived from the Latin term '**pituita**', meaning **phlegm** or **slime**.
- The gland is present posterior and superior to the sphenoidal sinus in the depression called the **Sella turcica**.



MCQ : Which of the following is considered the "master gland" : both hypothalamus & pituitary are master glands

MCQ : Which of the following responsible for homeostasis : pituitary gland & hypothalamus

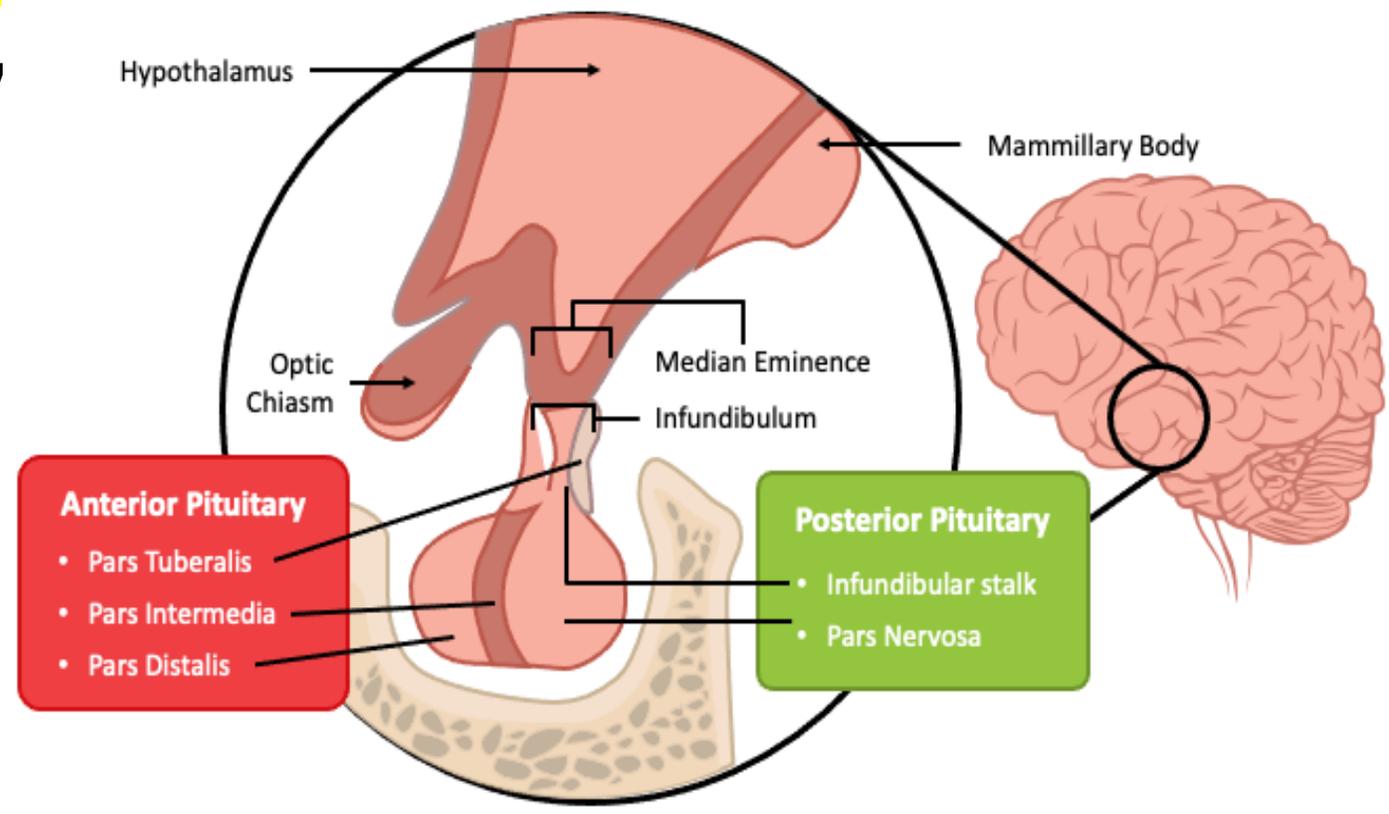
Site: Hypophyseal fossa

(**Sella turcica**) covered by Diaphragma Sella

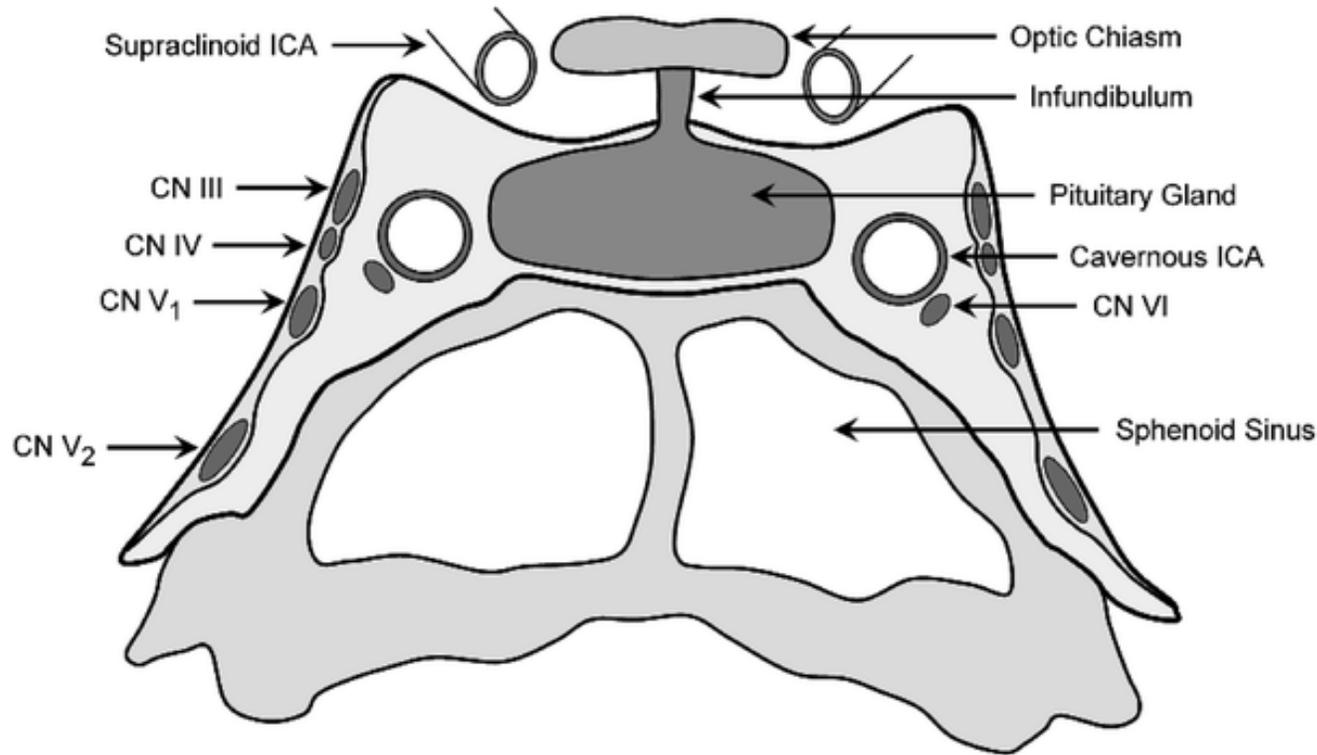
Shape & Size: oval in outline (12mm X 8mm)

Connected to hypothalamus by infundibulum

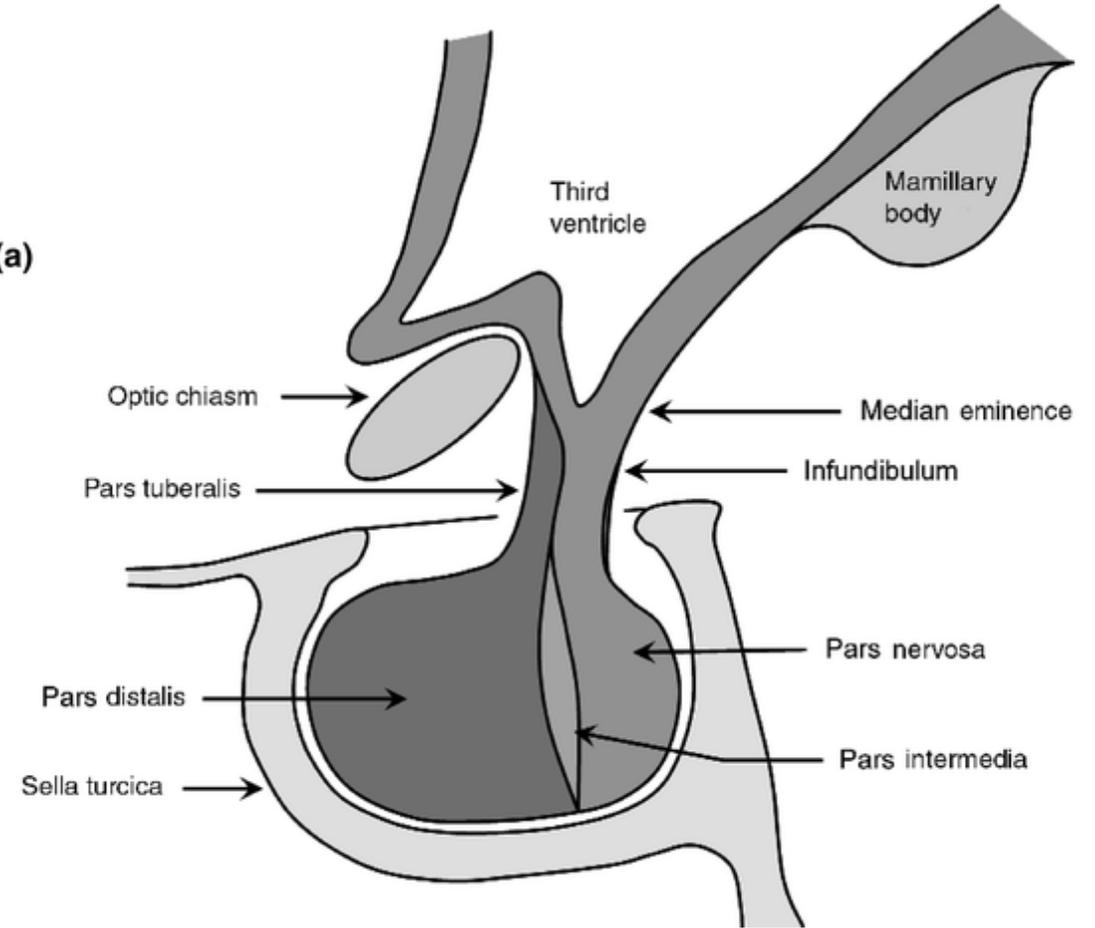
Site of hypophyseal fossa : middle cranial fossa
Hypophyseal fossa formed by : body of sphenoid



(b)



(a)



Lobes of pituitary gland

It is composed of two lobes: **SAQ + MCQ**

anterior and posterior

1. **Adenohypophysis (anterior lobe):**

composed of:

A. Pars tuberalis: upwards in front of the infundibulum

B. Pars intermedia: (at the back of the cleft)

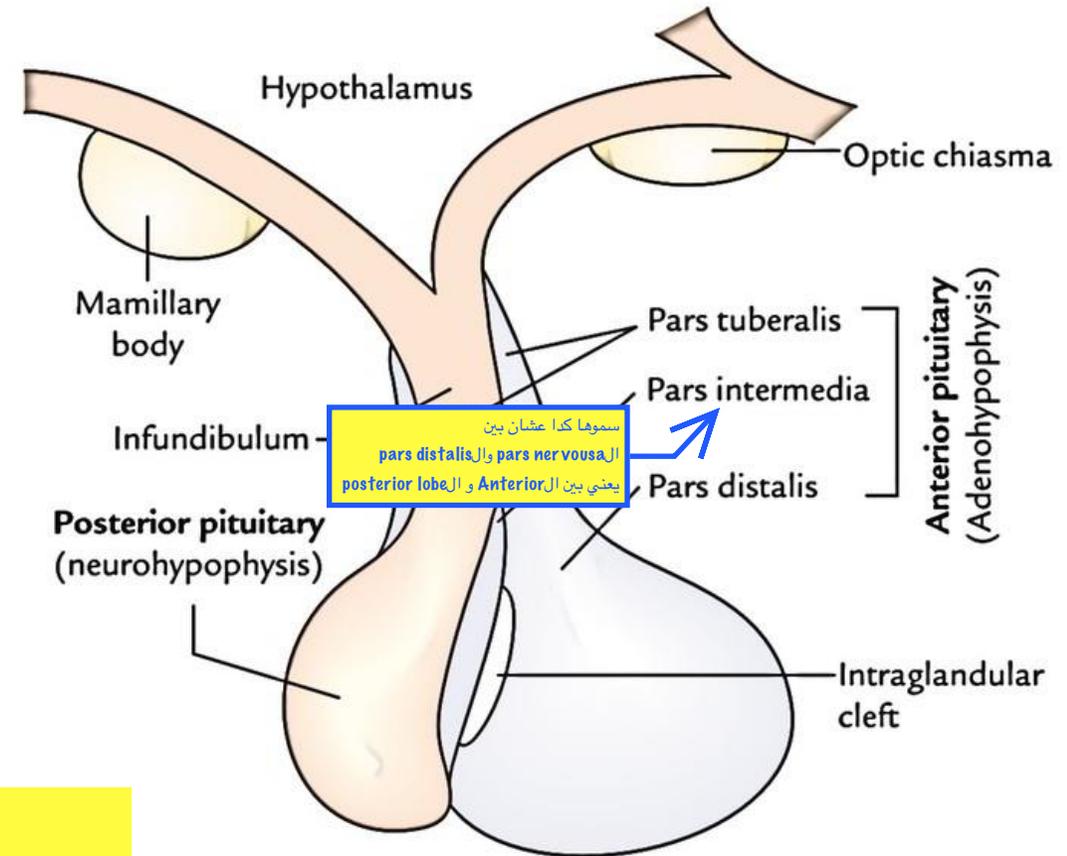
C. Pars distalis: (in front of the cleft)

SAQ : Enumerate components of adenohypophysis ?

MCQ : Which part of anterior lobe related to infundibulum : Pars tuberalis

MCQ : Which part located at the back of cleft : Pars intermedia

MCQ : Which part located at the front of cleft : Pars distalis

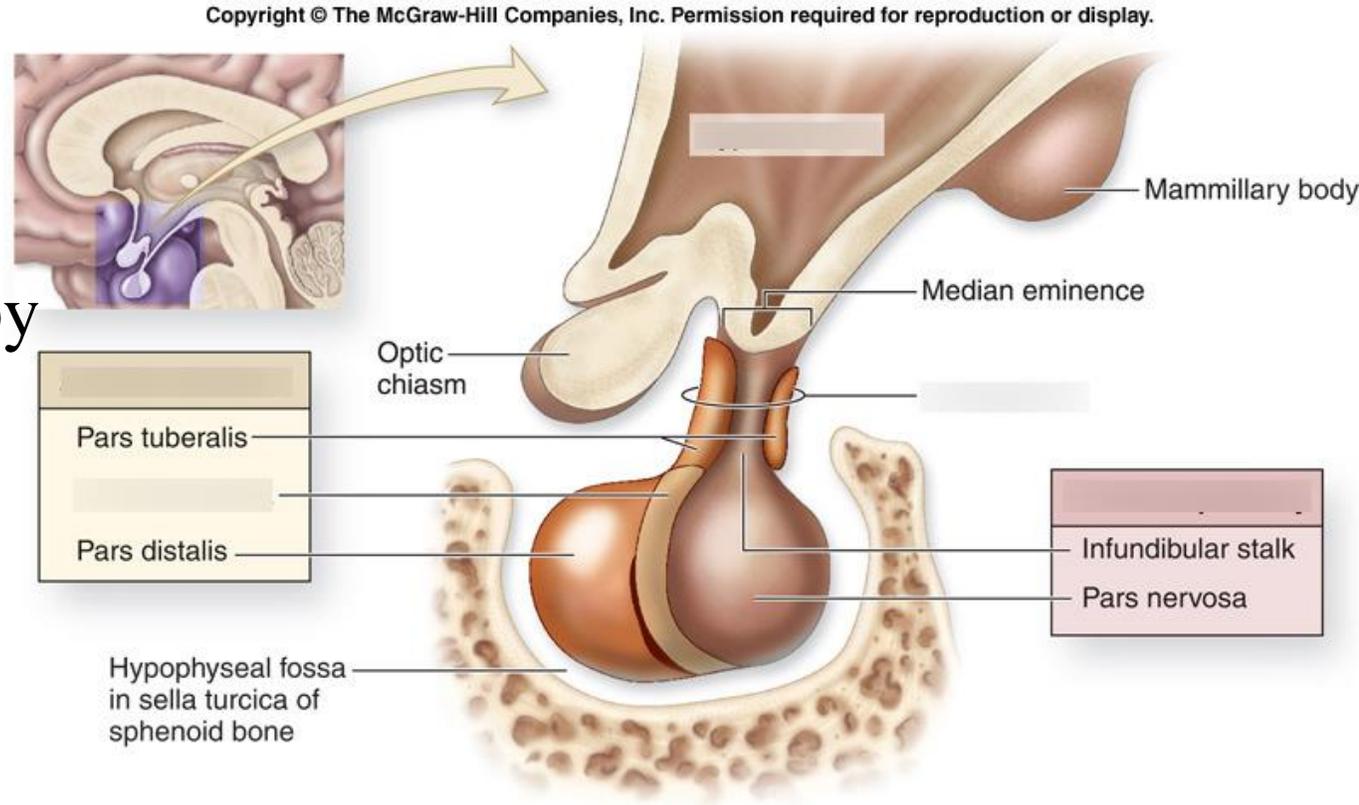


MCQ : Pars nervosa in which part of pituitary gland : posterior lobe

MCQ : Neurohypophysis composed of : infundibulum + pars nervosa

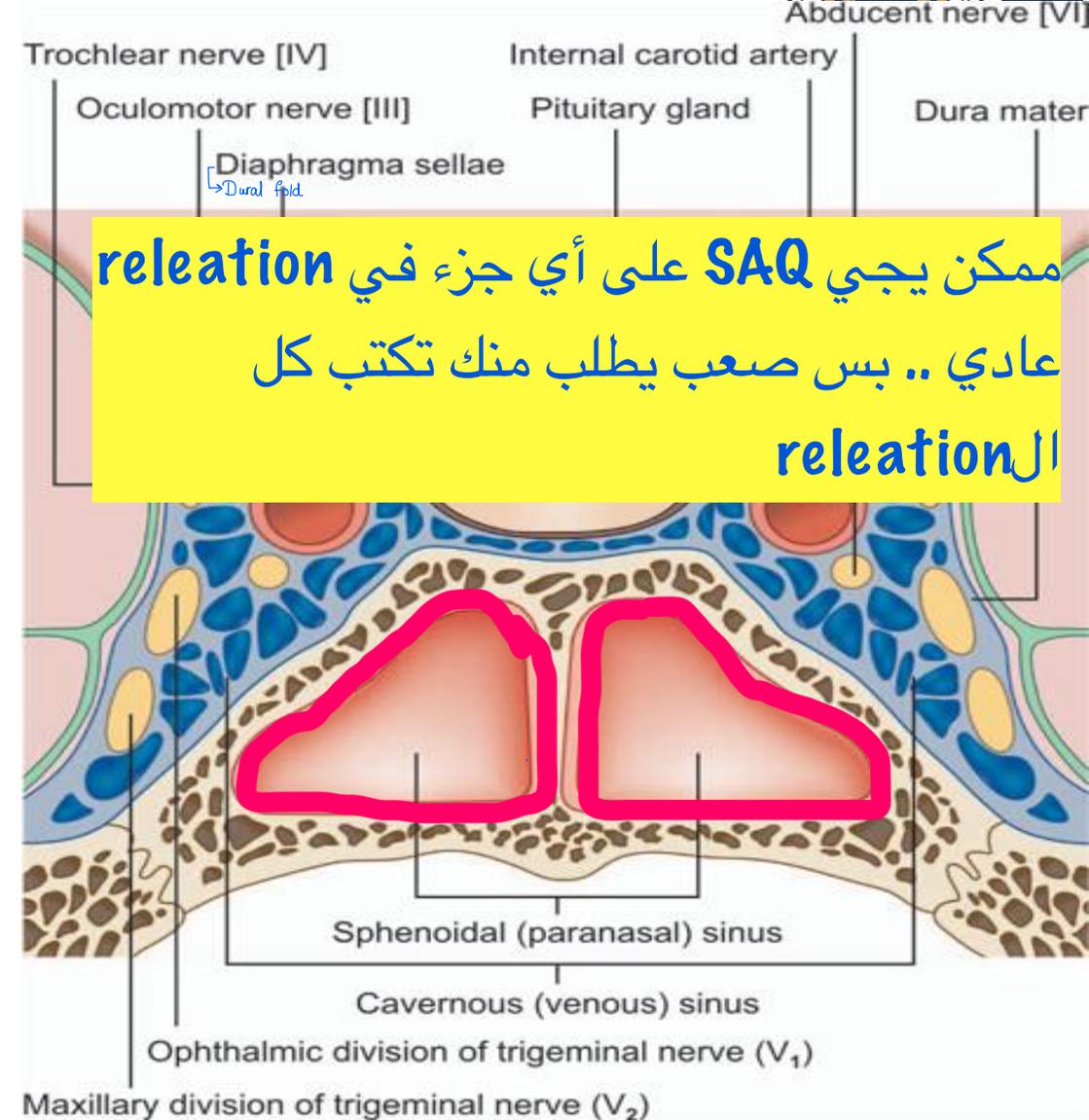
2. Neurohypophysis (posterior lobe) :

- ❖ Small and lies at the back of the anterior lobe.
- ❖ Connected with the hypothalamus by the **infundibulum** (stalk).
- ❖ The stalk pierces the central part of Diaphragma Sellae.
- ❖ Its lower end is called **pars nervosa**. MCQ



Relations

- **Superiorly:** **Diaphragma sellae** separating it from the **Optic chiasma**
- **Inferiorly:** body of the **sphenoid & sphenoidal air sinuses.** (separating it from the **nasopharynx**)



يمكن يجي SAQ على أي جزء في relation عادي .. بس صعب يطلب منك تكتب كل ال relation

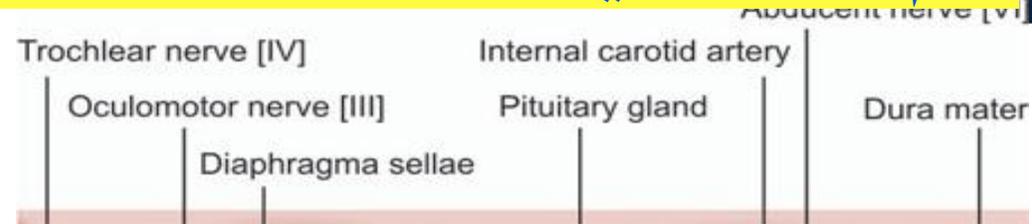
In each side = Lateral relation

Relations

• On each side: the **cavernous sinus** and its contents.

1. In its **lateral wall (Nerves)**:
oculomotor, trochlear, ~~abducent~~,
ophthalmic (V1) and maxillary (V2).

2. In the **floor (Artery & nerve)**:
internal carotid artery and abducent
nerve.



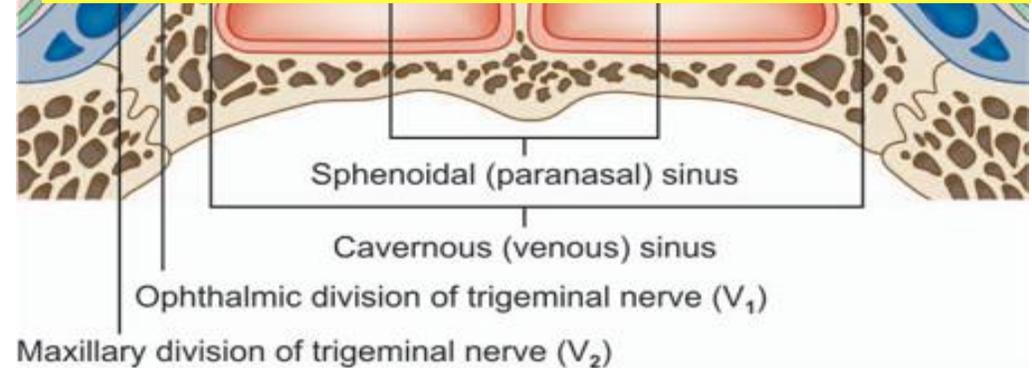
السلايد دي مهمة جدا!! ويمكن تيجي ريتن بأكثر من طريقة

SAQ : Enumerate relation of cavernous sinus to pituitary gland ?

SAQ : Enumerate content of cavernous sinus ?

SAQ : Describe lateral relation (= in each side "lateral wall + floor") of pituitary gland ?

MCQ : Which of the following NOT related to cavernous sinus ?



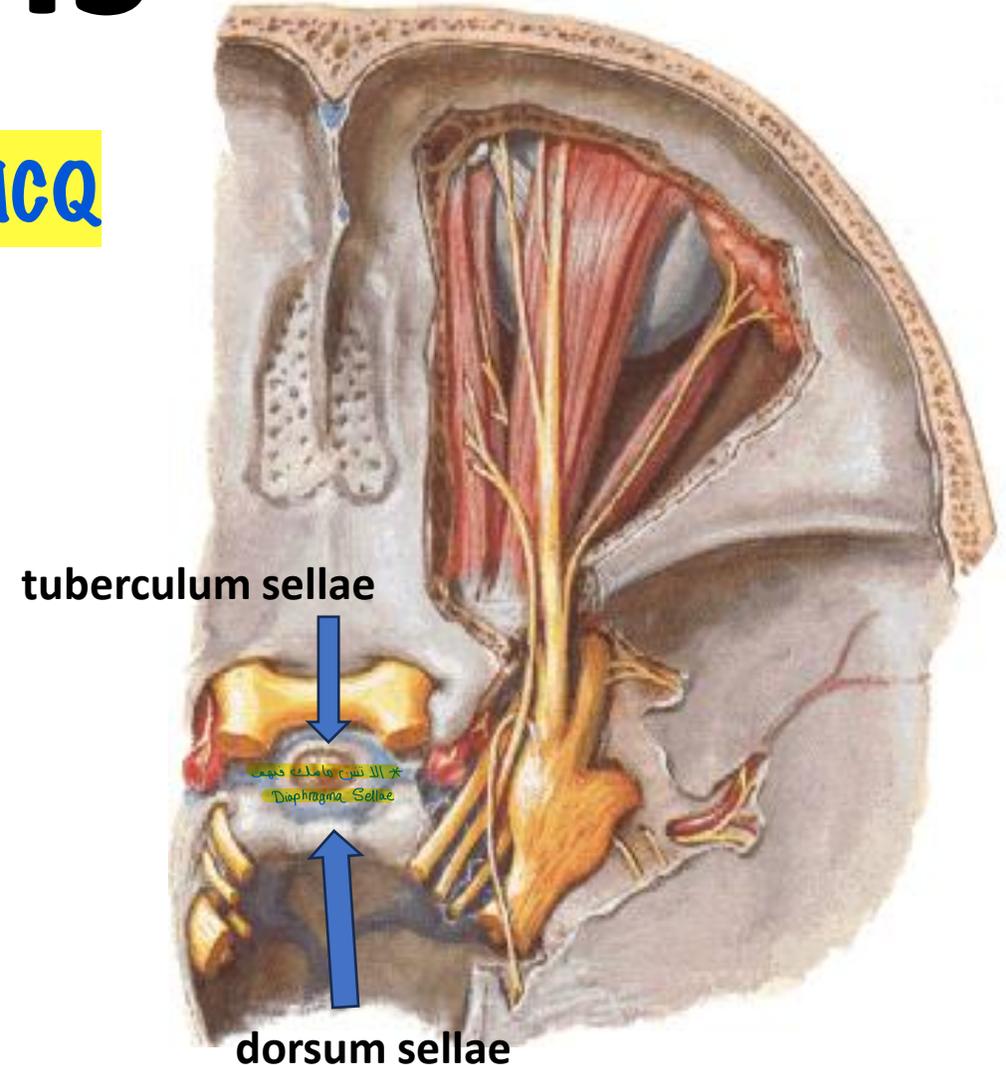
MCQ مهم : Abducent nerve lesion leads to: Nasal "medial - internal" squint & may caused by Pituitary tumor

MCQ : Oculomotor nerve lesion leads to: Lateral temporal squint + Ptosis



Relations

- **Anteriorly:** the **tuberculum sellae** (separating it from the optic chiasma)
- **Posteriorly:** the **dorsum sellae** (separating it from the pons)



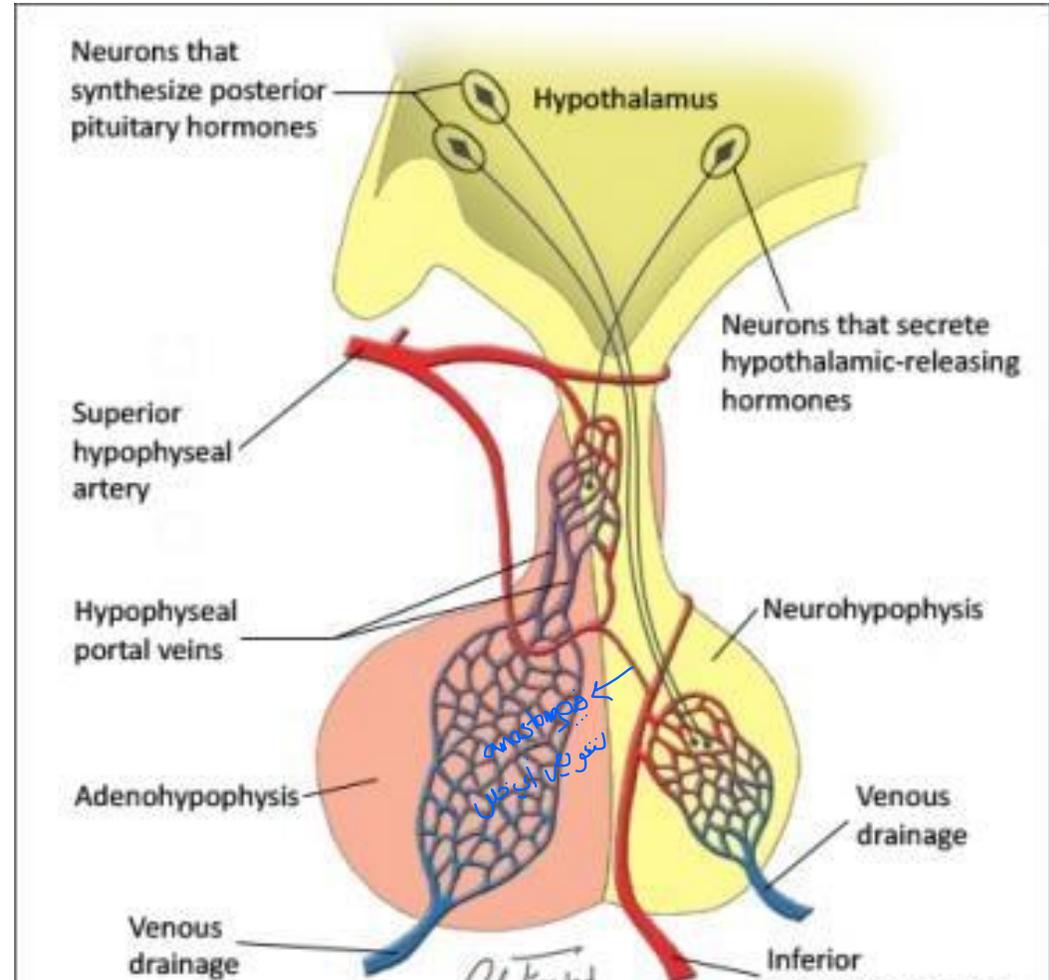
Arterial supply

1. **Superior hypophyseal artery:**

branches from the **internal carotid artery**, supplies the **anterior lobe**

2. **Inferior hypophyseal artery:**

branches from the **internal carotid artery**, supplies the **posterior lobe**.



MCQ : The only "main" blood supply in pituitary gland is : Internal carotid artery

MCQ : Superior & inferior hypophyseal artery arise from : ICA

MCQ : The arterial supply of pituitary gland is : ICA

بصمجة من الآخر : أي سؤال يطلب منك ال main blood supply

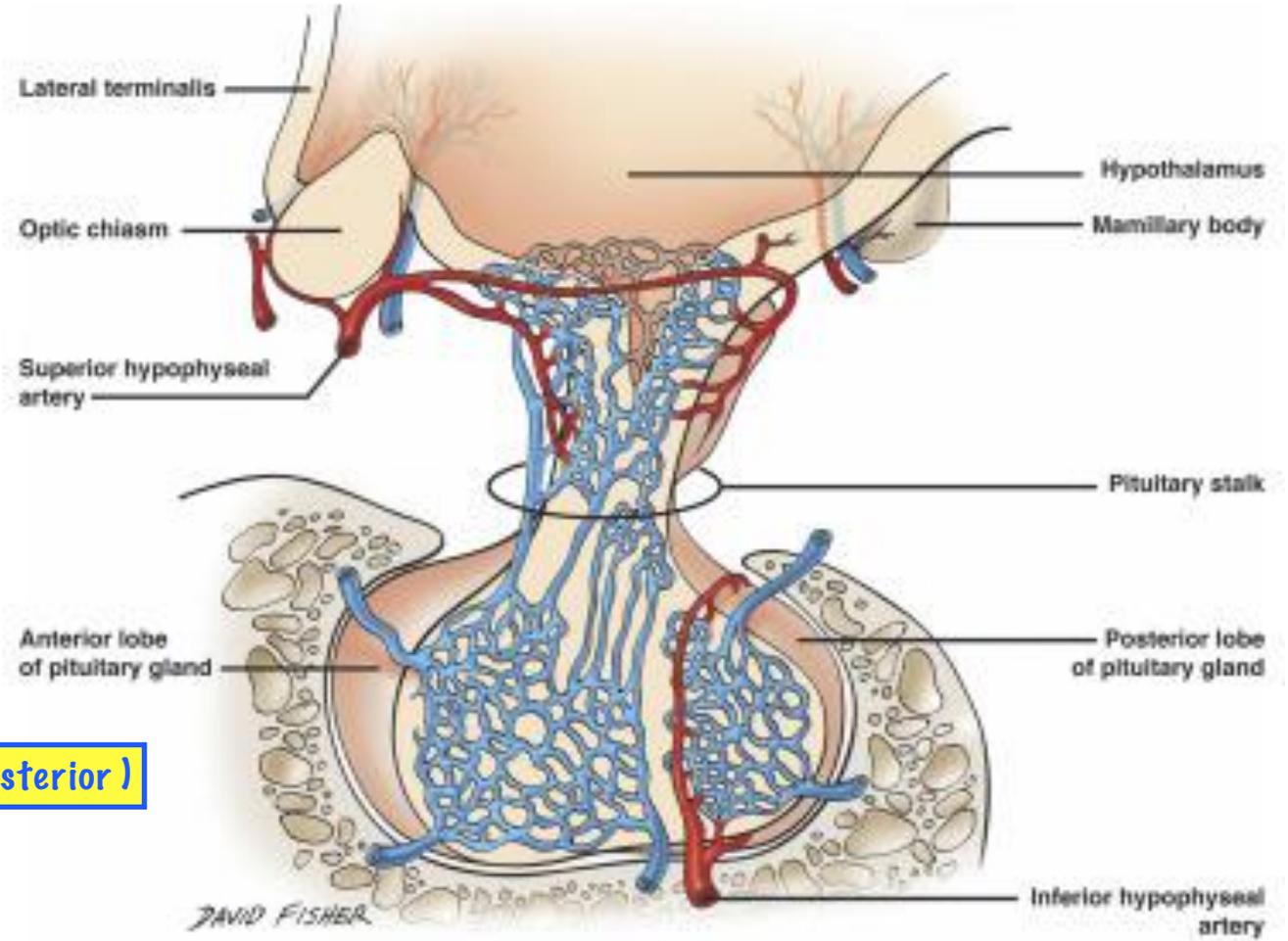
يبقى من محاضرة دكتور فكري .. ودور في

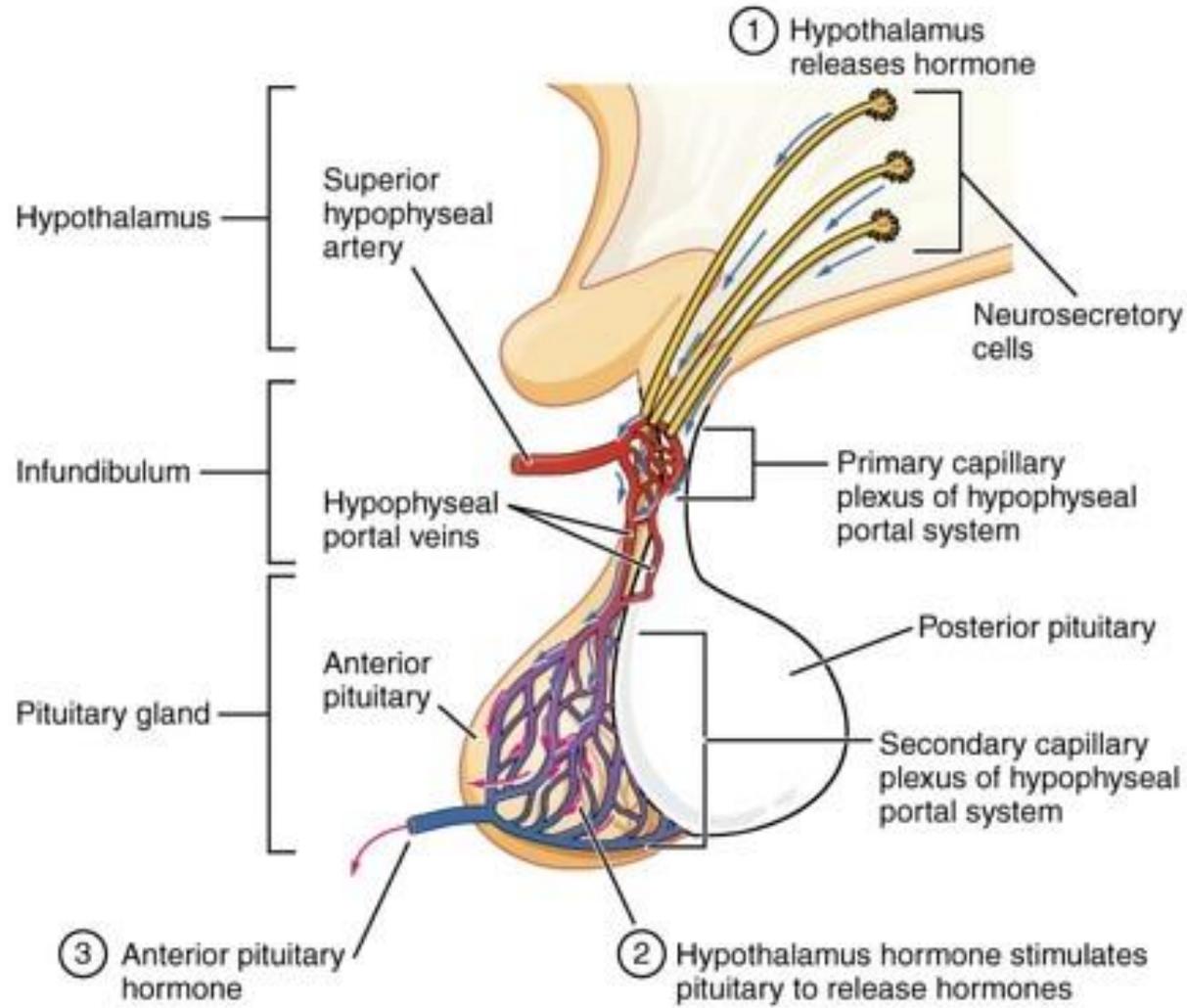
الاختيارات على internal carotid artery

Venous drainage:

Short veins drain in the surrounding venous sinuses (**cavernous and intercavernous sinuses**).

3 intercavernous sinus (Anterior - Middle - Posterior)

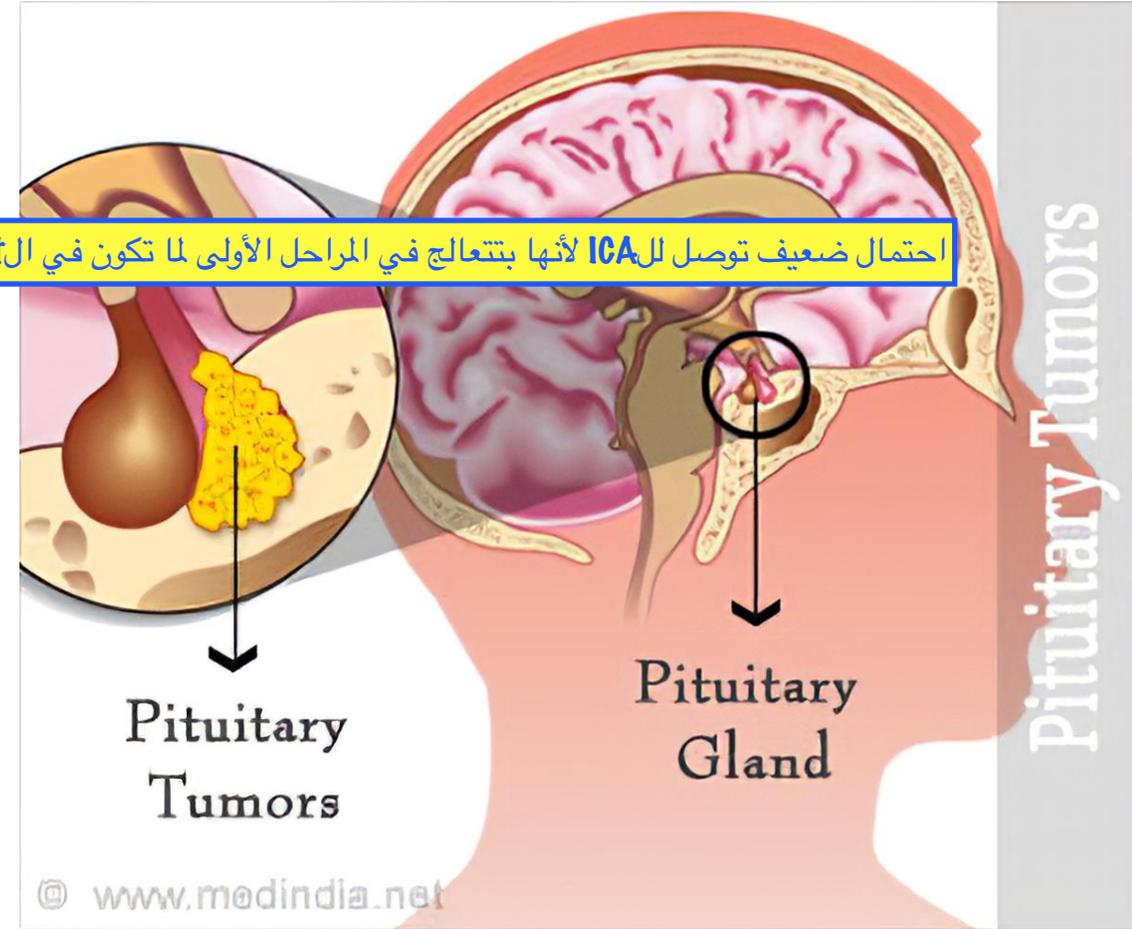




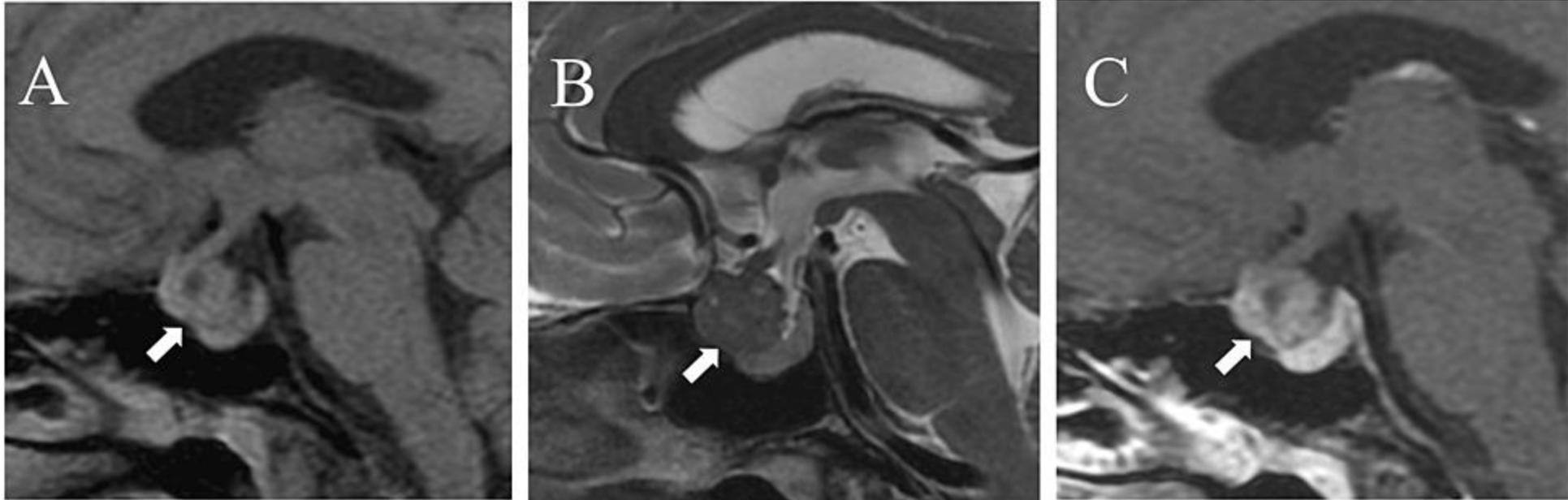
Clinical Note

Tumors of the pituitary gland tend to occlude the internal carotid artery and press the abducent nerve before affecting the other cranial nerves in the sinus.

احتمال ضعيف توصل للICA لأنها بتتعالج في المراحل الأولى لما تكون في الabducent



Ectopic Pituitary Neuroendocrine Tumor



Surgical Considerations

- A nonfunctioning adenoma only gets surgically resected when the tumor causes compression or mass effect to the adjacent structures like the **optic chiasm** causing **bitemporal hemianopsia** field defect.

بندخل من الNose

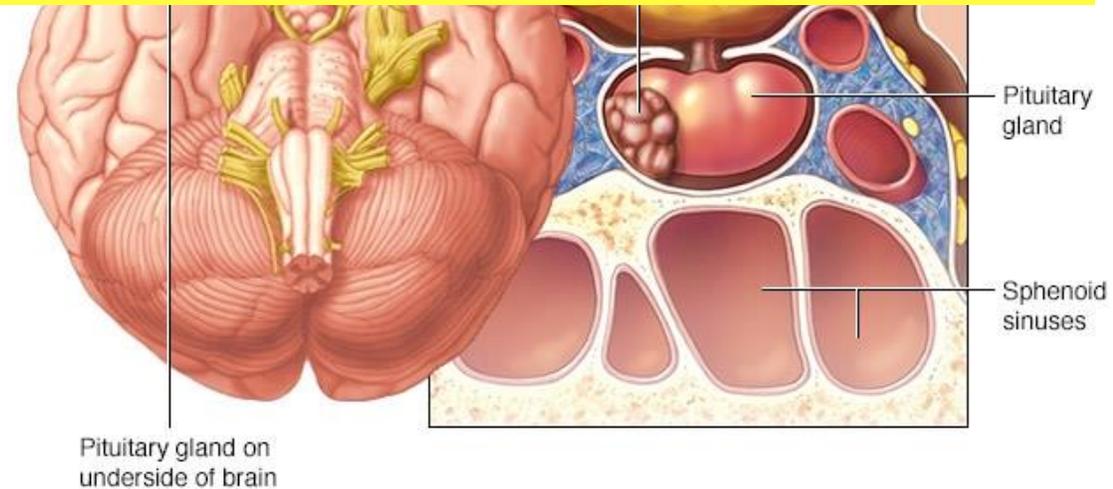
- **Transsphenoidal surgery** is a commonly chosen procedure for resection,

Pituitary surgery "Transsphenoidal surgery" :

بيعملوها دلوقتى عن طريق الNose والمسؤول عنها تخصص الأنف والأذن والحنجرة ENT

Pathway : Nose → Sphenoid bone → Diaphragma

sellae (Cover sella turcica) → Pituitary gland



MCQ : Transsphenoidal surgery used for which tumour : pituitary adenoma

MCQ لازم يجي Pituitary adenoma lead to : compression of optic chiasma (bitemporal hemianopsia)



Development of Pituitary Gland



Development of Pituitary Gland

Time: at the middle of the 4th week

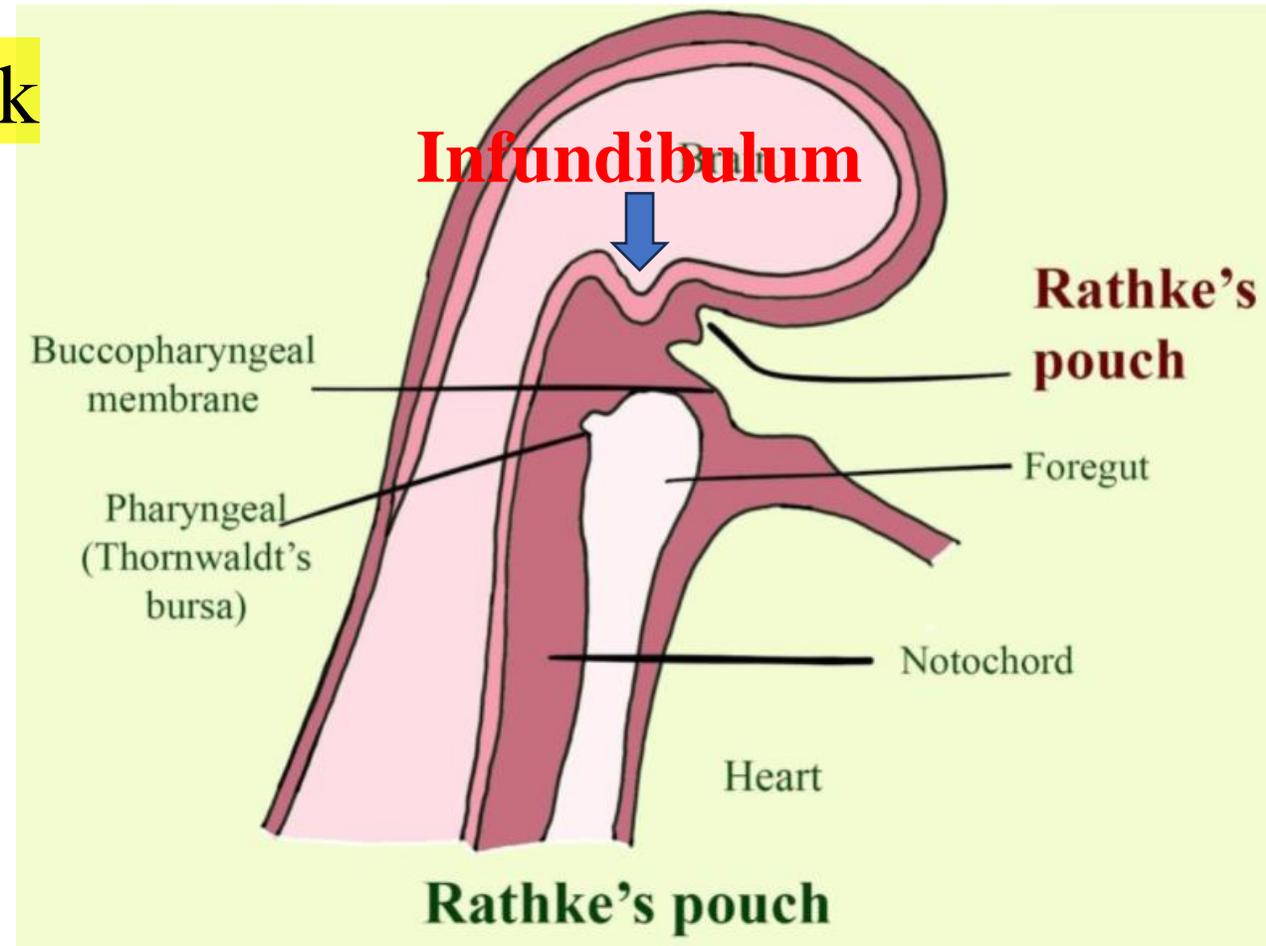
Sources: hypophysis cerebri develops from **two ectodermal sources:**

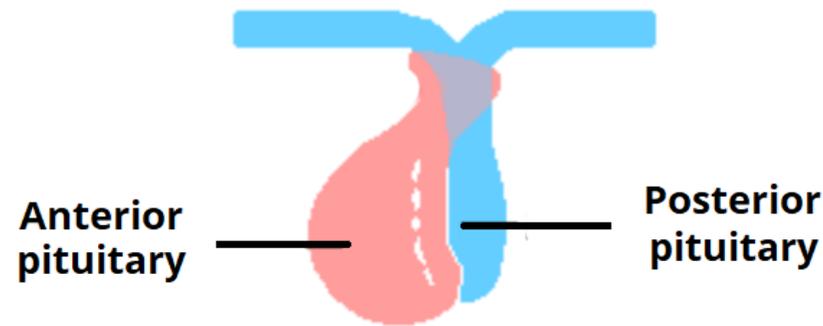
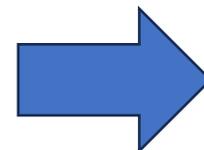
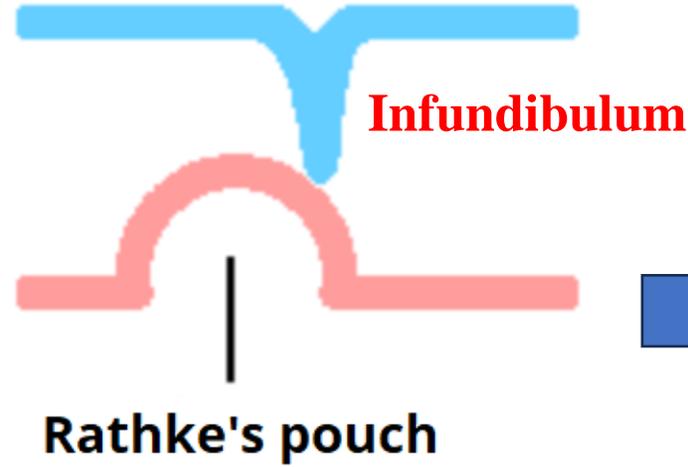
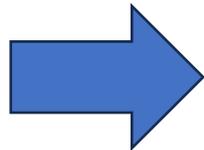
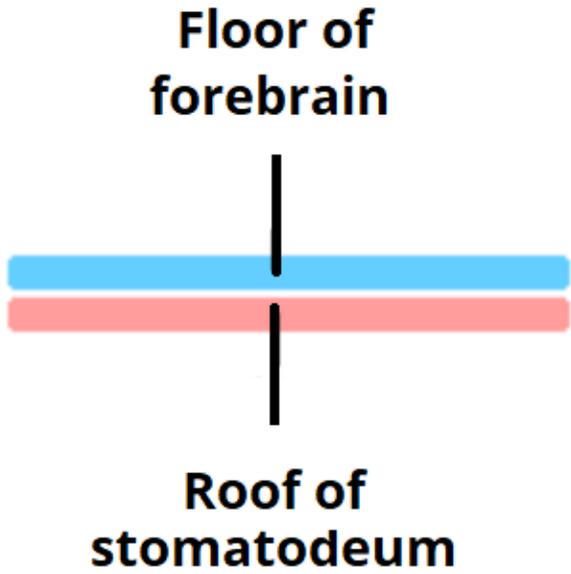
I. Adenohypophysis
(Rathke's pouch)

II. Neurohypophysis
(Infundibulum)

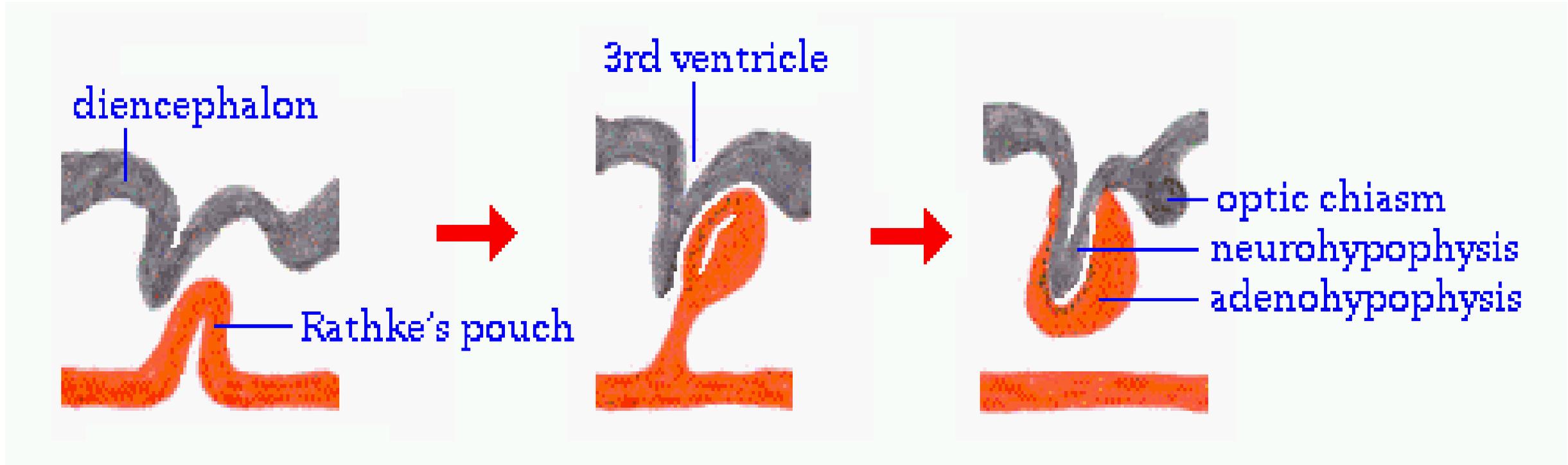
MCQ : Rathke's pouch form : Adeno (Anterior)

MCQ : Infundibulum form : posterior (neurohypophysis)

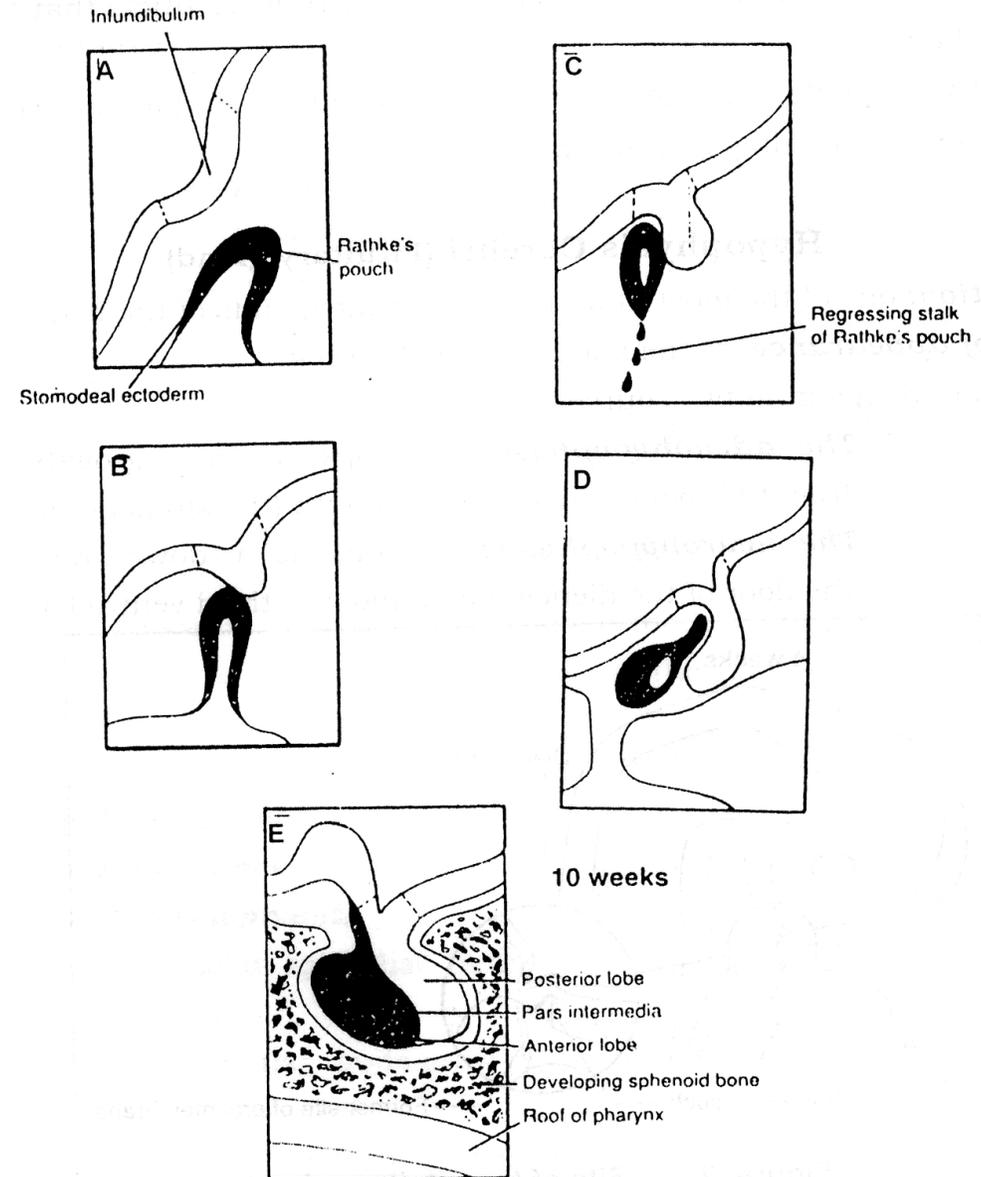




Stages of development of pituitary gland



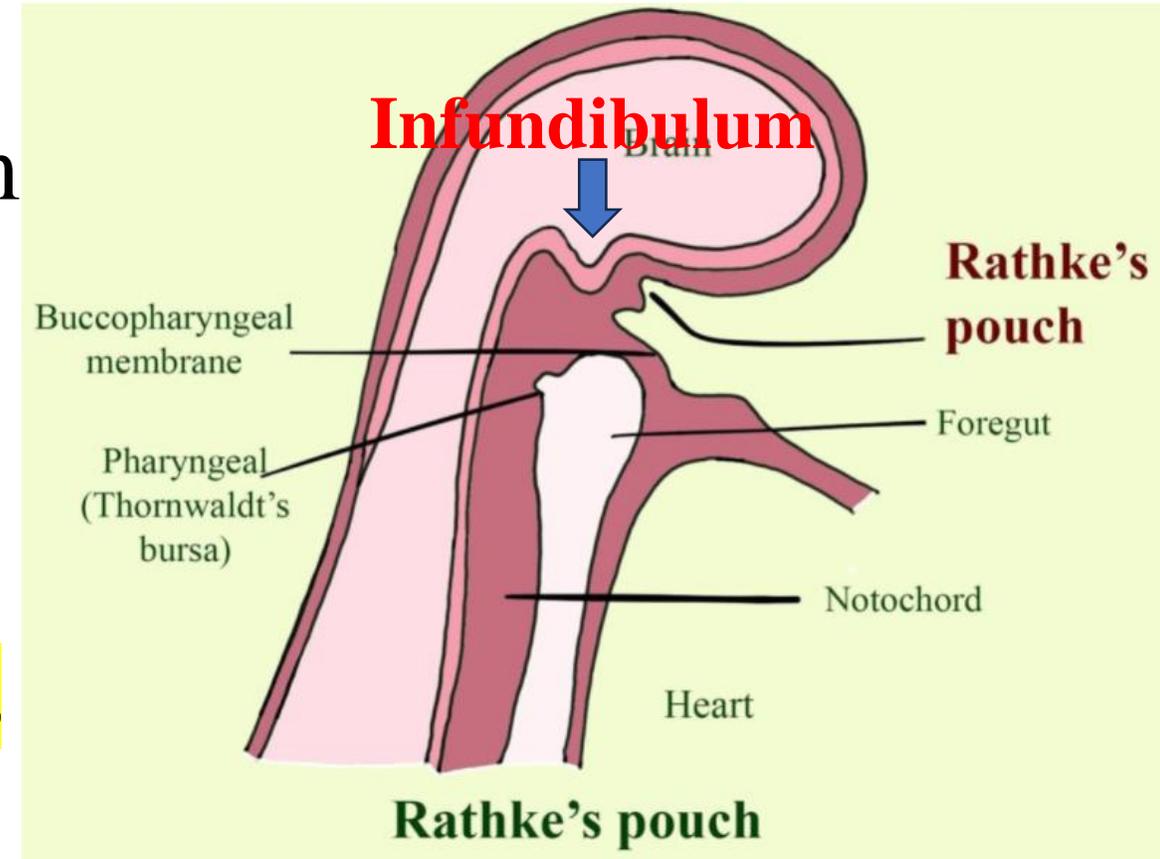
Stages of development of pituitary gland



Development of pituitary gland

I. Adenohypophysis :

- It is an **ectodermal** diverticulum (upgrowth), arises from the **roof of the stomodeum**. ← طالع منه الpalate
- It **ascends** towards the **floor of the diencephalon** where it **swells** to form a vesicle.



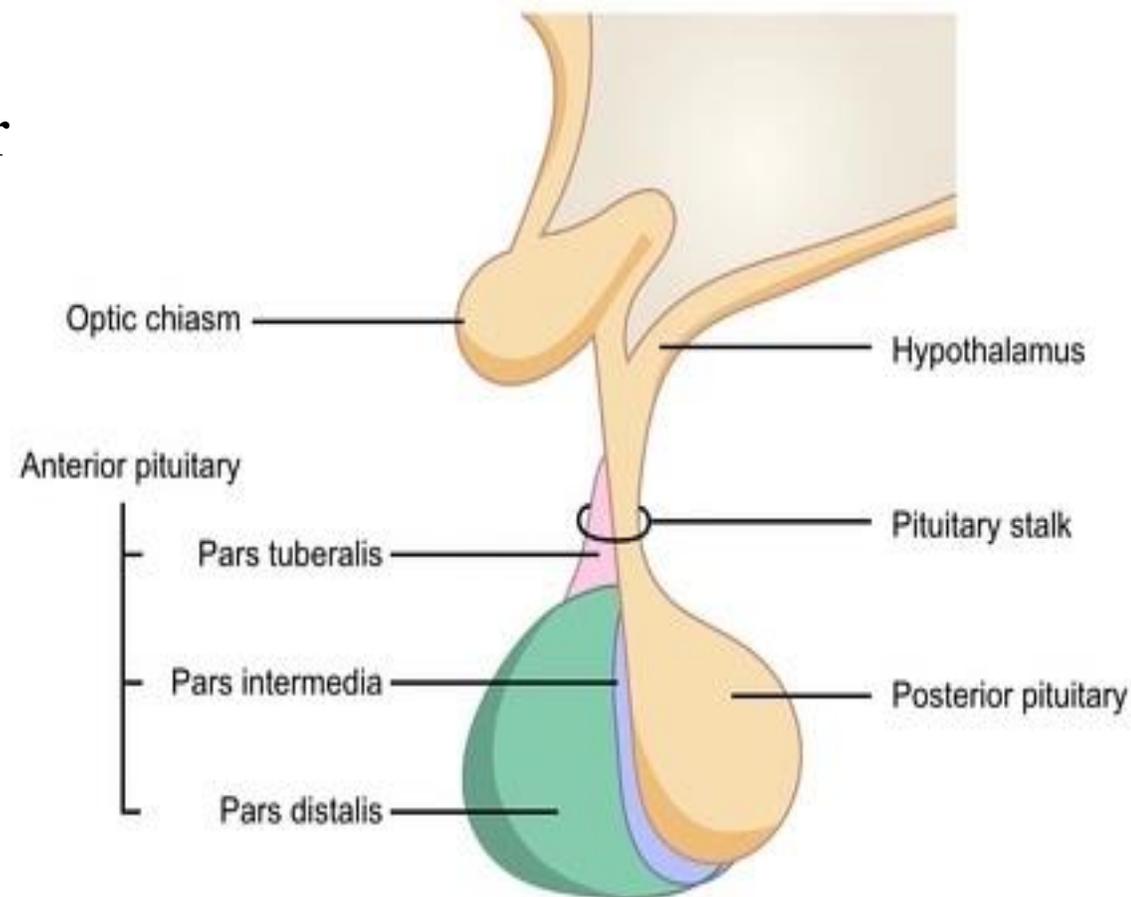
SAQ : Enumerate derivatives of Ratheks pouch ?

A) Adenohypophysis which is composed of (pars tuberalis , pars intermedia , pars anterior)

The **stem** connecting this vesicle to the roof of the stomodeum **degenerates**

The **vesicle** **differentiate** to form the anterior lobe of pituitary gland (adenohypophysis), as follows:

- Pars anterior (pars distalis)**: is derived from the anterior wall of the vesicle
- Pars intermedia**: is derived from the posterior wall of the vesicle
- Pars tuberalis**: is an upward extension of the wall of the vesicle to surround the stalk of the infundibulum which descends from the diencephalon.

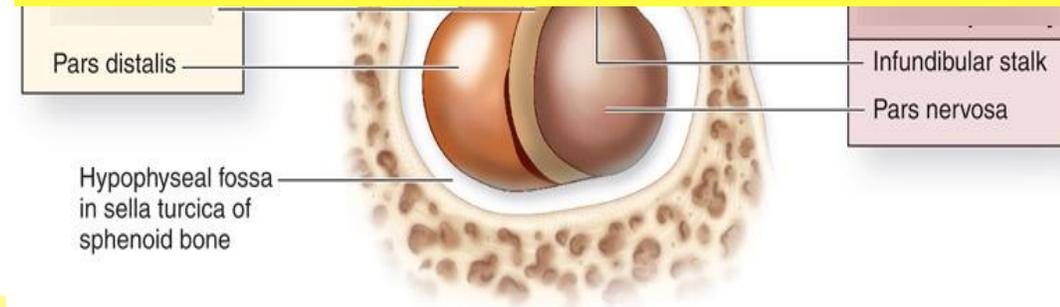


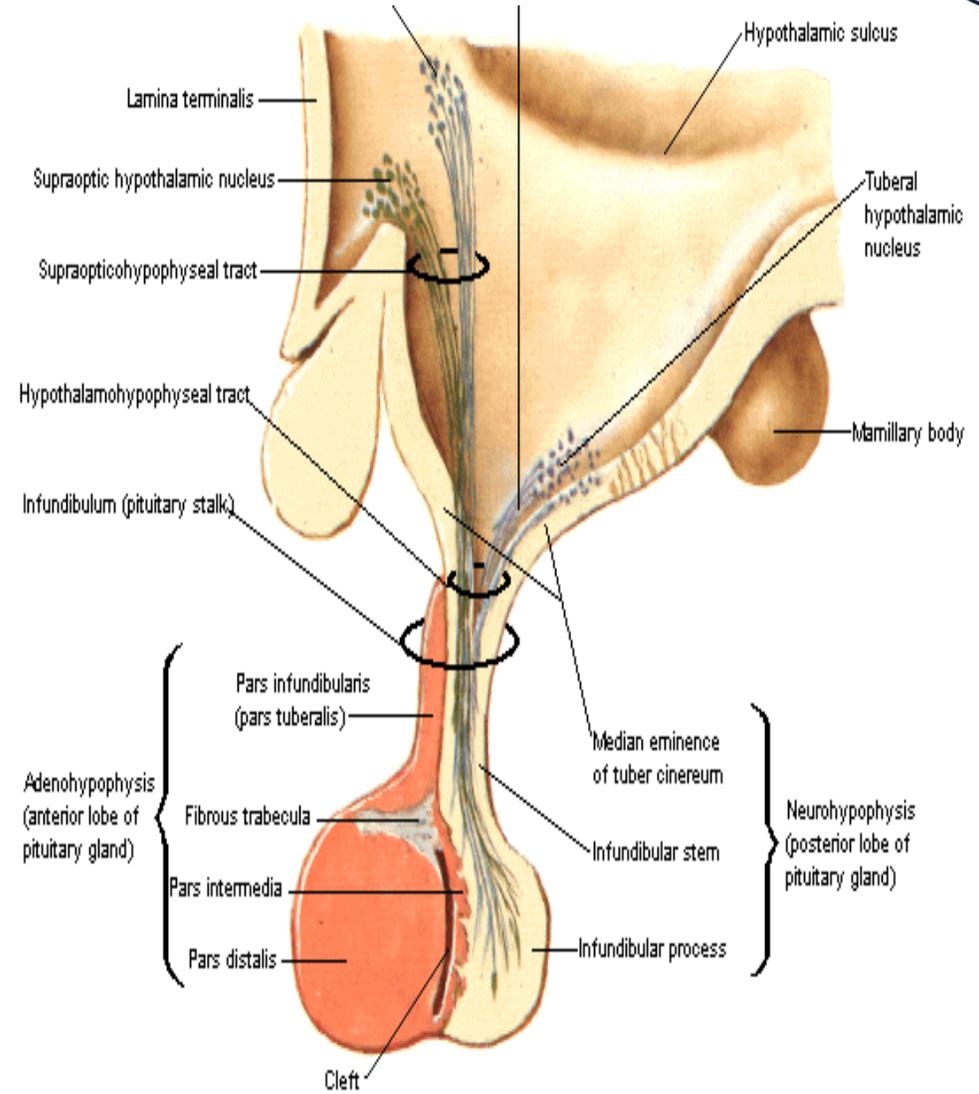
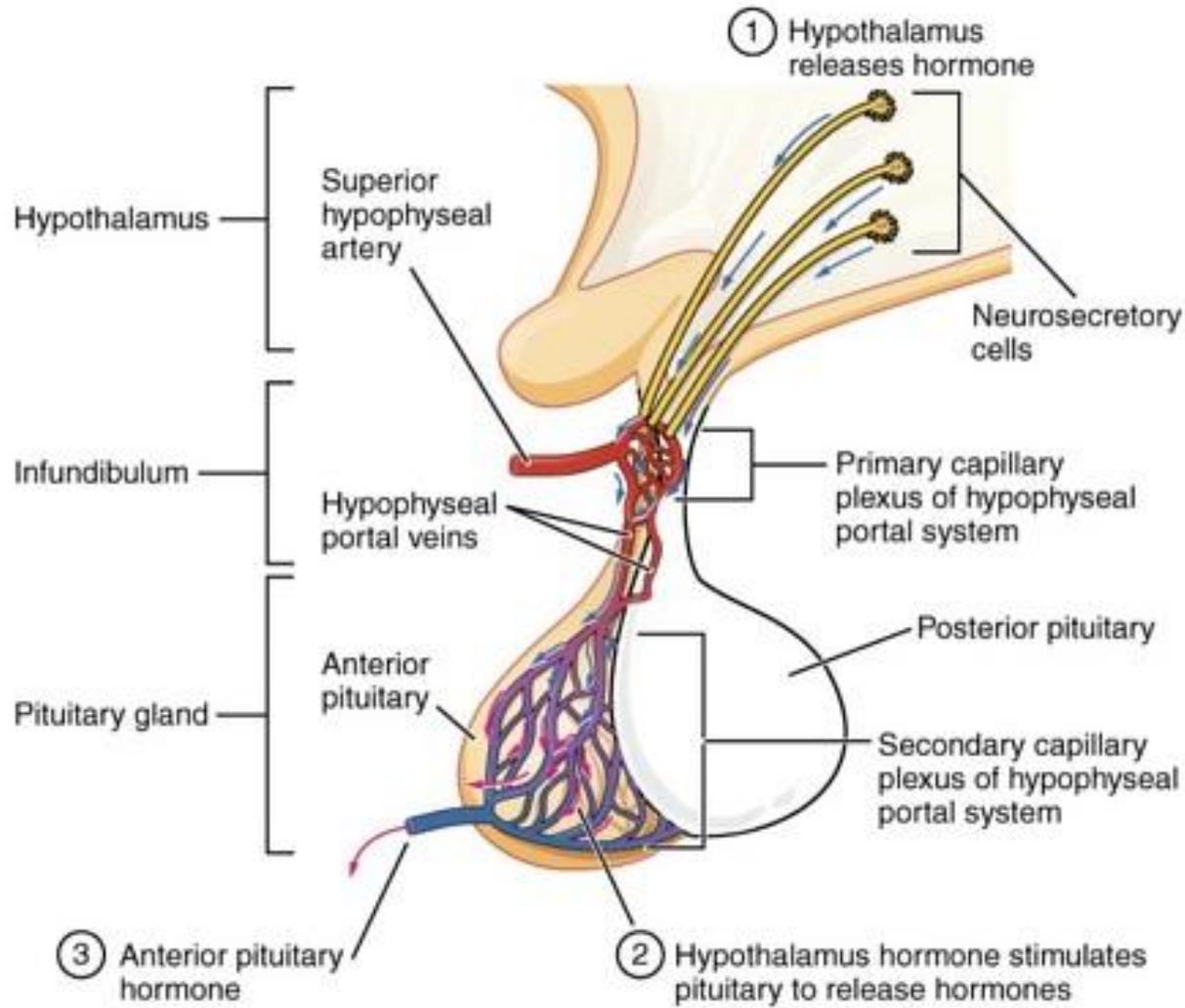
II. Neurohypophysis:

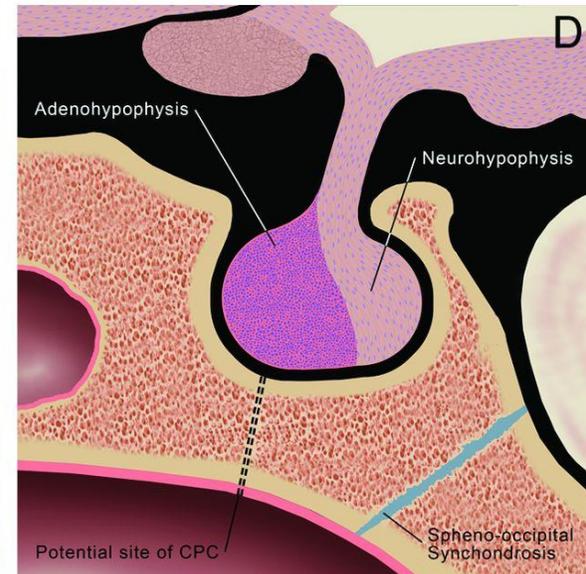
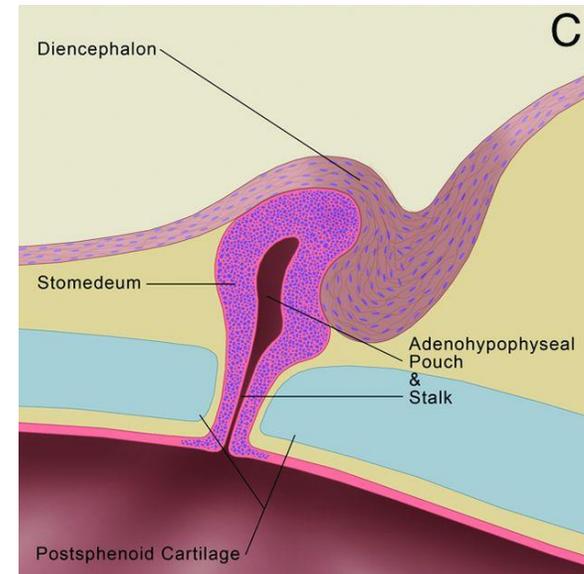
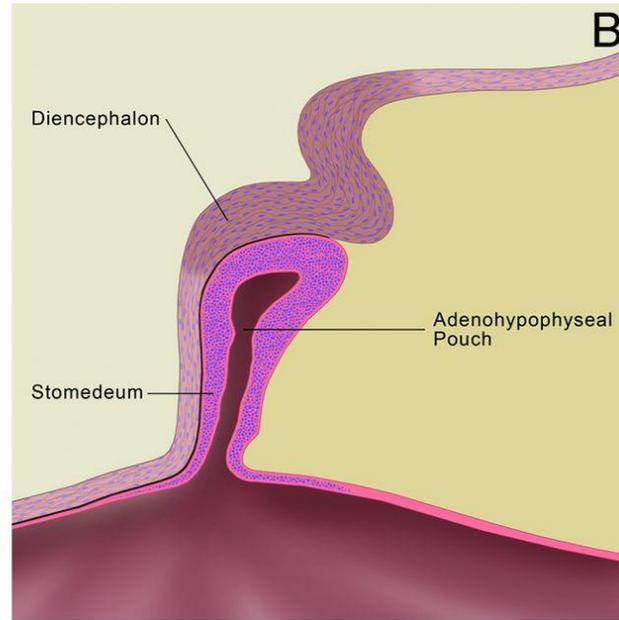
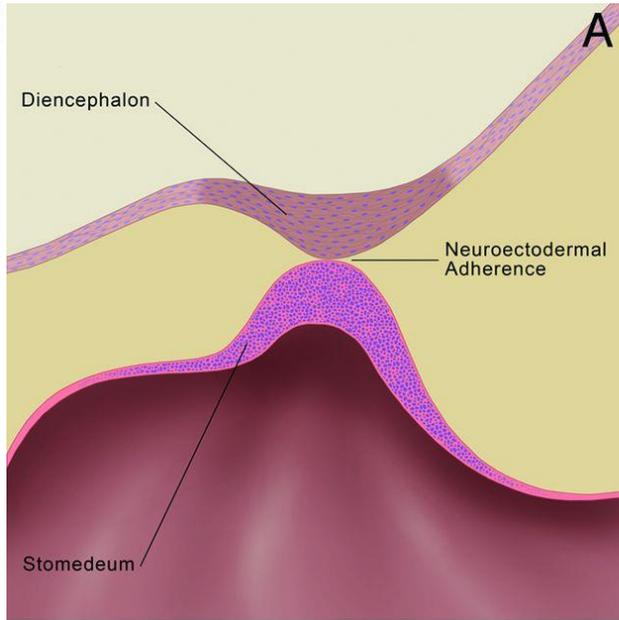
- It is an **ectodermal diverticulum (downgrowth)** which arises from the **floor of the diencephalon (future hypothalamus)**
- It descends caudal to the **Rathke`s pouch** and forms:
 - Infundibulum** (the infundibular recess of the 3rd ventricle)
 - Posterior lobe of the pituitary gland (pars nervosa)**
- Contains the **nerve cells** and **nerve fibers** which **belong to the nuclei of the hypothalamus**

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MCQ مهم : Which of the following derivatives of infundibulum : pars nervosa

MCQ : Pituitary gland develop from : Ectoderm







Congenital anomalies of pituitary gland

1-Pharyngeal pituitary gland:

بيكتشفوها غالبا لما يحصل لما يشيلوا ال tumour
Patient has pituitary tumor → surgery → gland removed
Expected: ↓ pituitary hormones , But: Hormonal function still present!
→ Clue: تاني شغال tissue وجود

Due to: persistence of a remnant of the stalk of Rathke`s pouch.

Features: accessory masses of the anterior lobe of the pituitary gland in the roof of oropharynx.

MCQ : accessory pituitary tissue present in : pharyngeal pituitary gland

Congenital anomalies of pituitary gland

وممكن نضيف Agenesis

2- Aplasia & hypoplasia of pituitary gland:

Due to: Failure or incomplete development of the anterior wall of Rathke's pouch.

Features: Hypofunction of pituitary gland.

Quiz 1

1- Which of the following NOT share in the development of pituitary gland

A- Rathke`s pouch

B- Infundibulum

C- Roof of the stomodeum

D- Buccopharyngeal membrane

ANSWER: D

Quiz 2

2- Which of the following **NOT** part of Rathke's pouch

A- Pars anterior

B- Pars intermedia

C- Pars tuberalis

D- Infundibulum

ANSWER: D

References for further readings

- Oxford Handbook of Clinical Medicine (3rd edition).
- Gray's anatomy for students
- Longman`s medical embryology 10th edition , T.W.Sadler
- Chen CJ (2001) Suprasellar and infrasellar craniopharyngioma with a persistent craniopharyngeal canal: Case report and review of the literature. Neuroradiology 43:760–762
- Chong BW, Newton TH (1993) Hypothalamic and pituitary pathology. Radiol Clin North Am 31:1147–1183

