

Diseases of the endocrine system 2020

lecture 1: Pituitary gland

Dr Fatima Obeidat



Endocrine system diseases

general principles

- Mass effect means an enlargement of the gland which can compress adjacent structures.
- Mass effect can be due to neoplastic or non-neoplastic conditions
- Neoplastic include: adenoma and carcinoma
- Non neoplastic= hyperplasia



Endocrine system diseases

general principles

- **End organ resistance** means that the gland is secreting the hormone but the target organ is not responding to it . This occurs in some types of diabetes.



PITUITARY GLAND: THE ORCHISTRA MAESTRO

- The hormones secreted from the pituitary gland control levels of hormones secreted from all other endocrine glands.

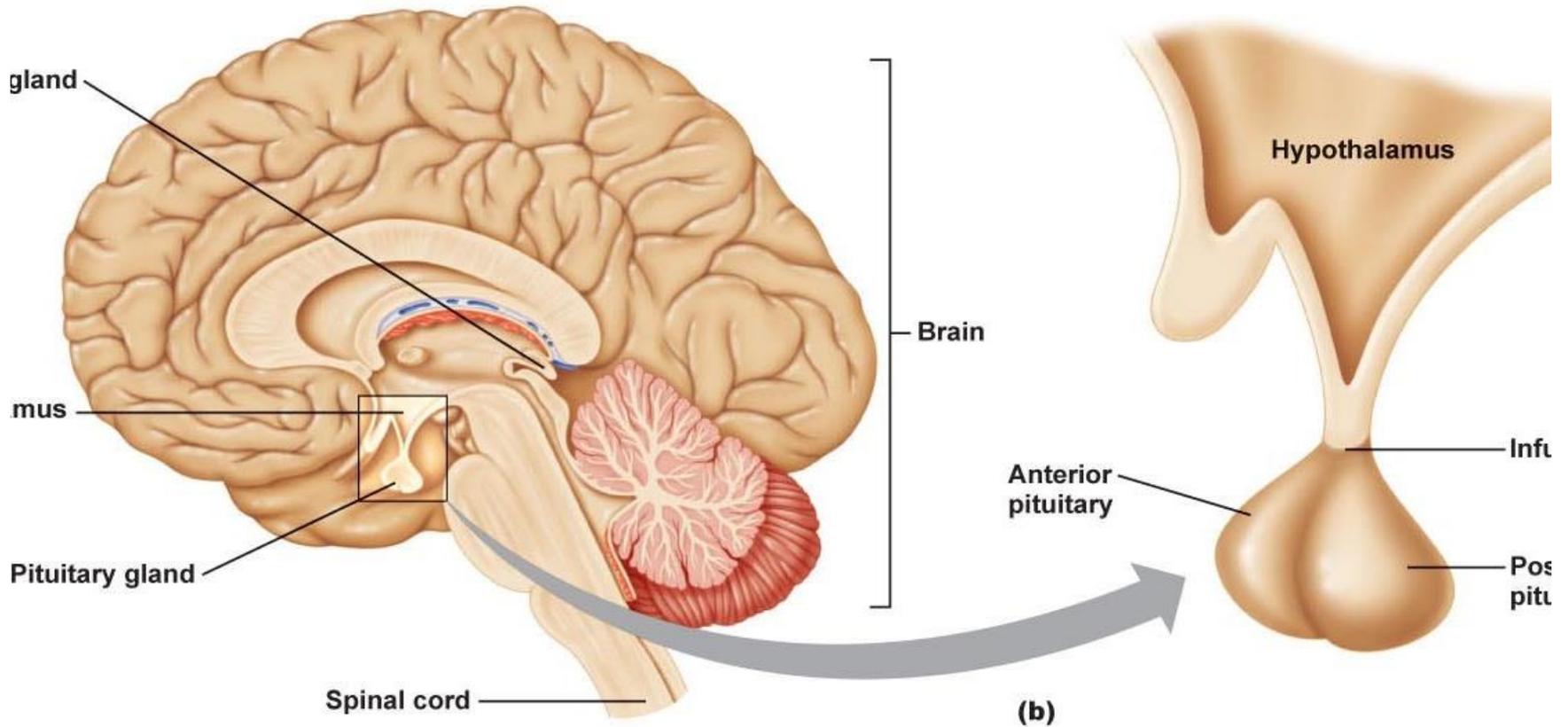


Pituitary gland

- Small, bean shaped structure that lies at the base of the brain within the sella turcica.



Pituitary gland

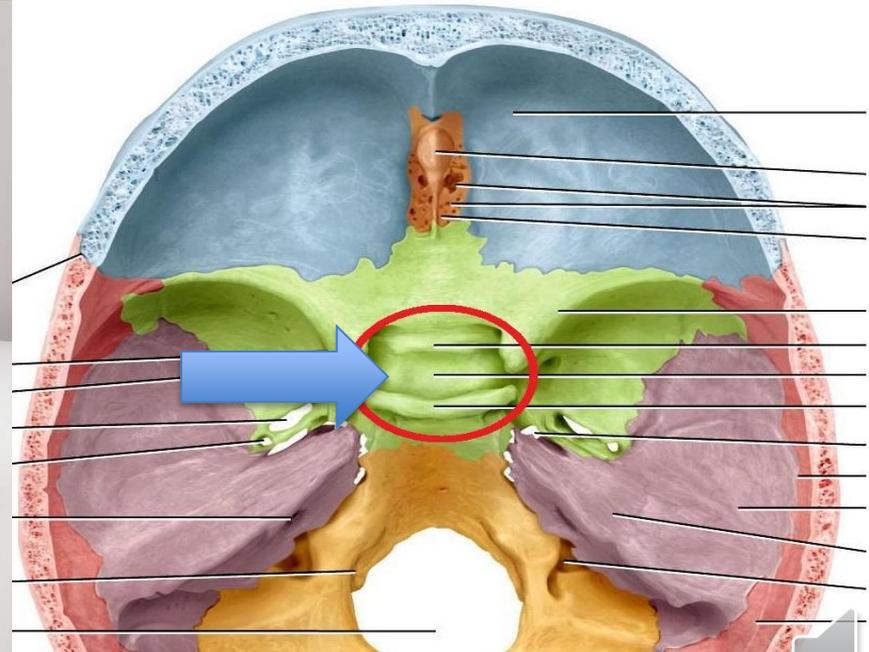


© 2011 Pearson Education, Inc.



السَّرَجُ التُّرْكِيُّ = Sella turcica = pituitary fossa

- The **sella turcica** (Latin for Turkish seat) is a saddle-shaped depression in the body of the sphenoid bone of the skull.



The hypothalamus (تحت المهاد) controls the pituitary (الغُدَّة النُّخَامِيَّة)

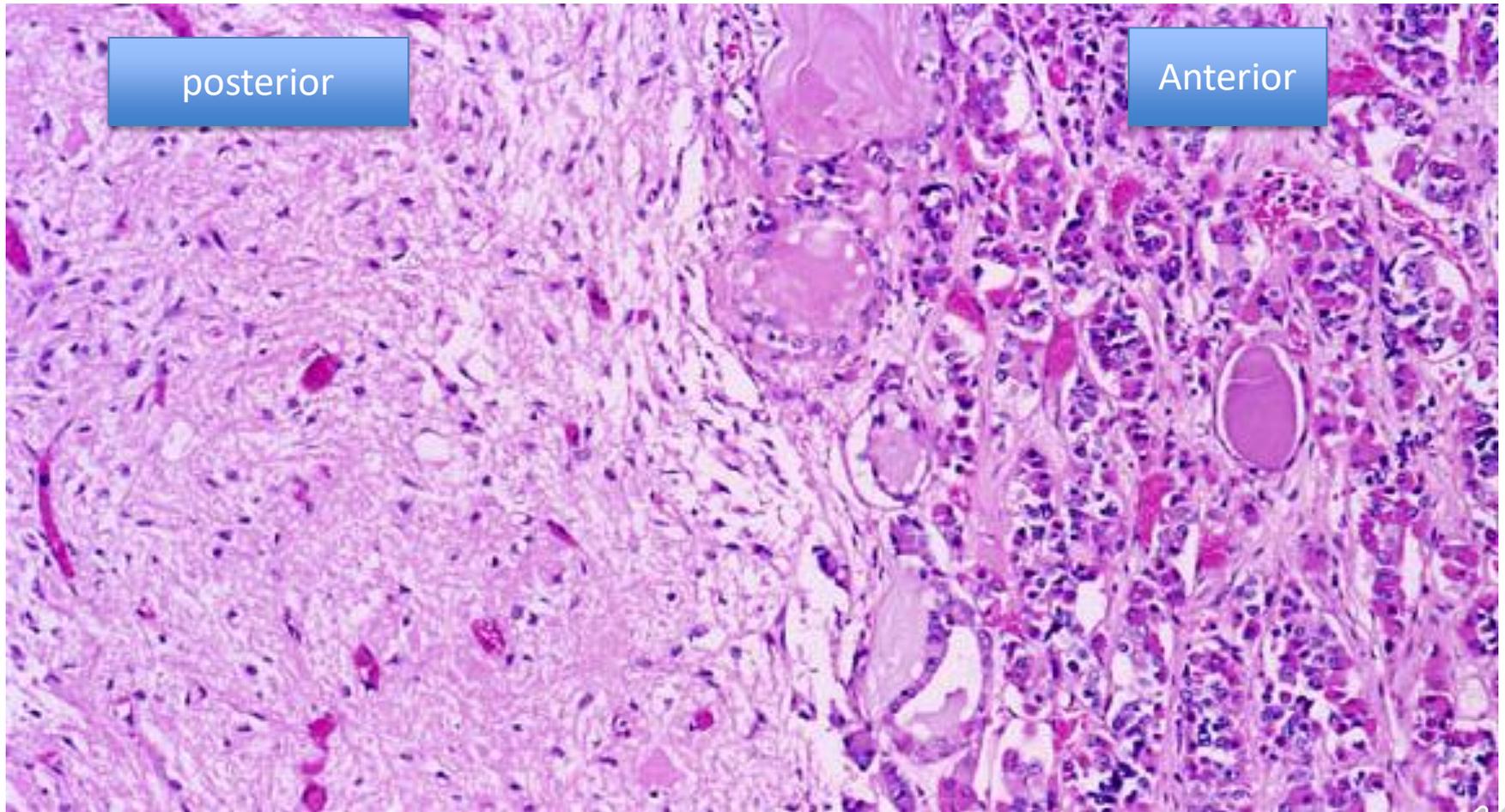
The production of most pituitary hormones is controlled by positively and negatively acting factors from the hypothalamus which are carried to the anterior pituitary by a **portal vascular system**.



- The pituitary gland is composed of two morphologically and functionally distinct components: the **anterior lobe (adenohypophysis)** and the **posterior lobe (neurohypophysis)**
- The *anterior pituitary* constitutes about 80% of the gland.



Anterior versus posterior pituitary



ANTERIOR VERSUS POSTERIOR PITUTARY LOBES

	ANTERIOR PITUITARY	POSTERIOR PITUITARY
histology	Epithelial cells	Glial cells and neuronal axons
Embryological origin	Oral mucosa	Neural crest
Hormones secreted	TSH, PRL, ACTH, GH, FSH , LH.	ADH and oxytocin <i>(synthesized in hypothalamus but stored in posterior pituitary)</i>

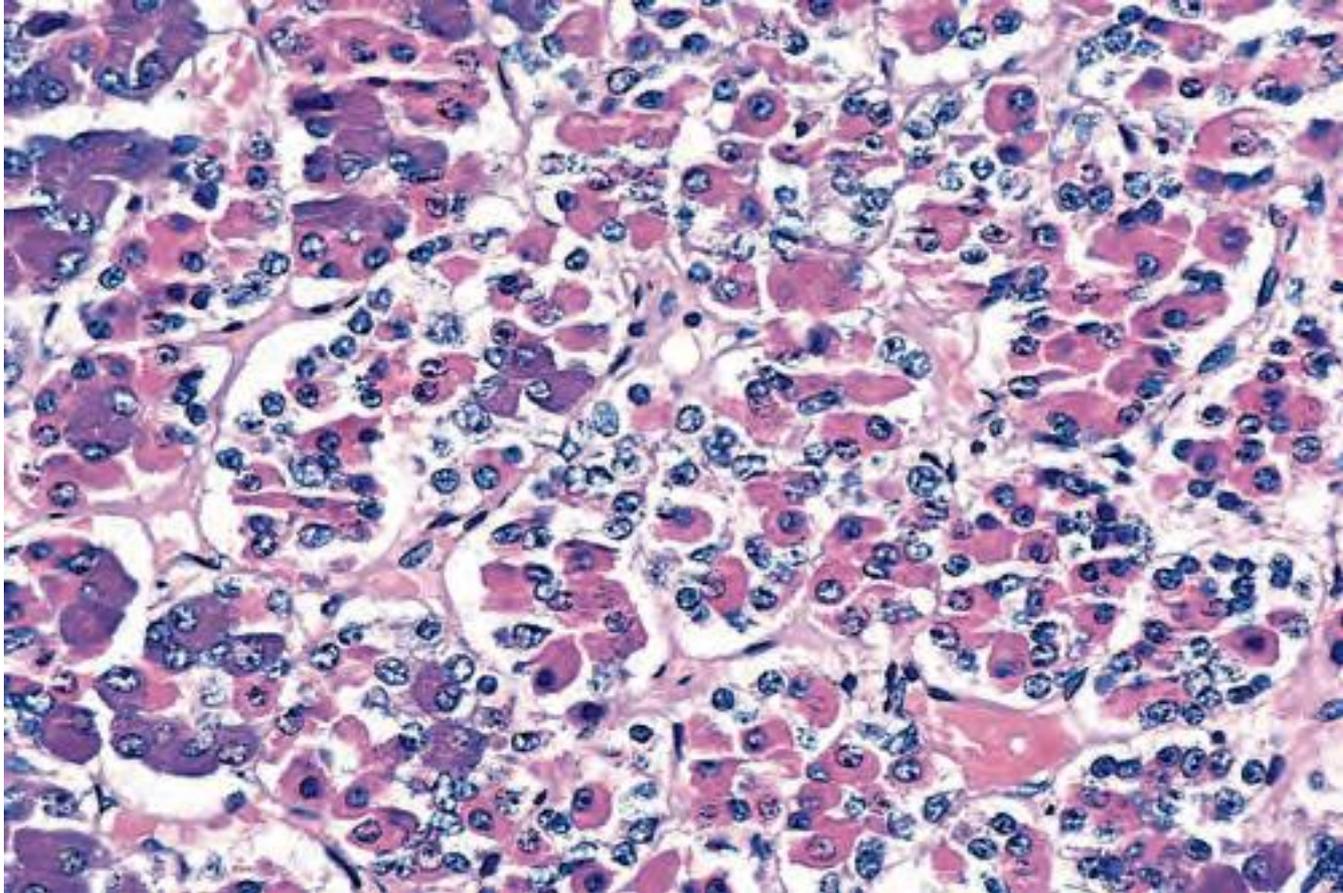


Anterior pituitary

- The anterior pituitary is composed of epithelial cells that secrete trophic hormones like: TSH, PRL, ACTH..



Anterior pituitary/ epithelial cells



Posterior pituitary

- The *posterior pituitary* consists of **modified glial cells** (*pituicytes*) and axonal processes extending from the hypothalamus through the pituitary stalk to the posterior lobe (*axon terminals*).
- The posterior pituitary secretes: *oxytocin* and *antidiuretic hormone* (ADH, also called *vasopressin*).
- These (*oxytosin* and ADH) are actually synthesized in the hypothalamus and stored within the axon terminals in the posterior pituitary



Diseases of the anterior pituitary gland

1. Mass effect

- Masses that can affect the pituitary: adenomas or carcinomas
- Adenomas can be **secretory** (secrete one of the pituitary hormones) in this case the level of that hormone will increase = **hyperpituitarism**
- OR adenomas can be **non secretory** so level of pituitary hormones unaffected = **normal hormonal levels**
- HOWEVER, if a non-secretory adenoma enlarges to the extent it **compresses** the surrounding normal pituitary tissue then level of hormone secretion from the normal tissue will be decreased resulting in **hypopituitarism**



- NOTE: pituitary carcinomas are rare and usually non-secretory.



Mass effects of pituitary adenomas or carcinomas

Signs and symptoms :

1. Radiographic abnormalities of sella turcica :
 - a. sellar expansion,
 - b. bony erosions.
2. Compression of the optic chiasm (the X-shaped structure formed at the point below the brain where the two optic nerves cross over each other) resulting in visual field abnormalities.
3. elevated intracranial pressure: headache, nausea, vomiting.



Note:

-any mass in the cranium (inside the skull) can cause increased intracranial pressure

4.seizures.

5.Cranial nerve palsies.

6.pituitary apoplexy

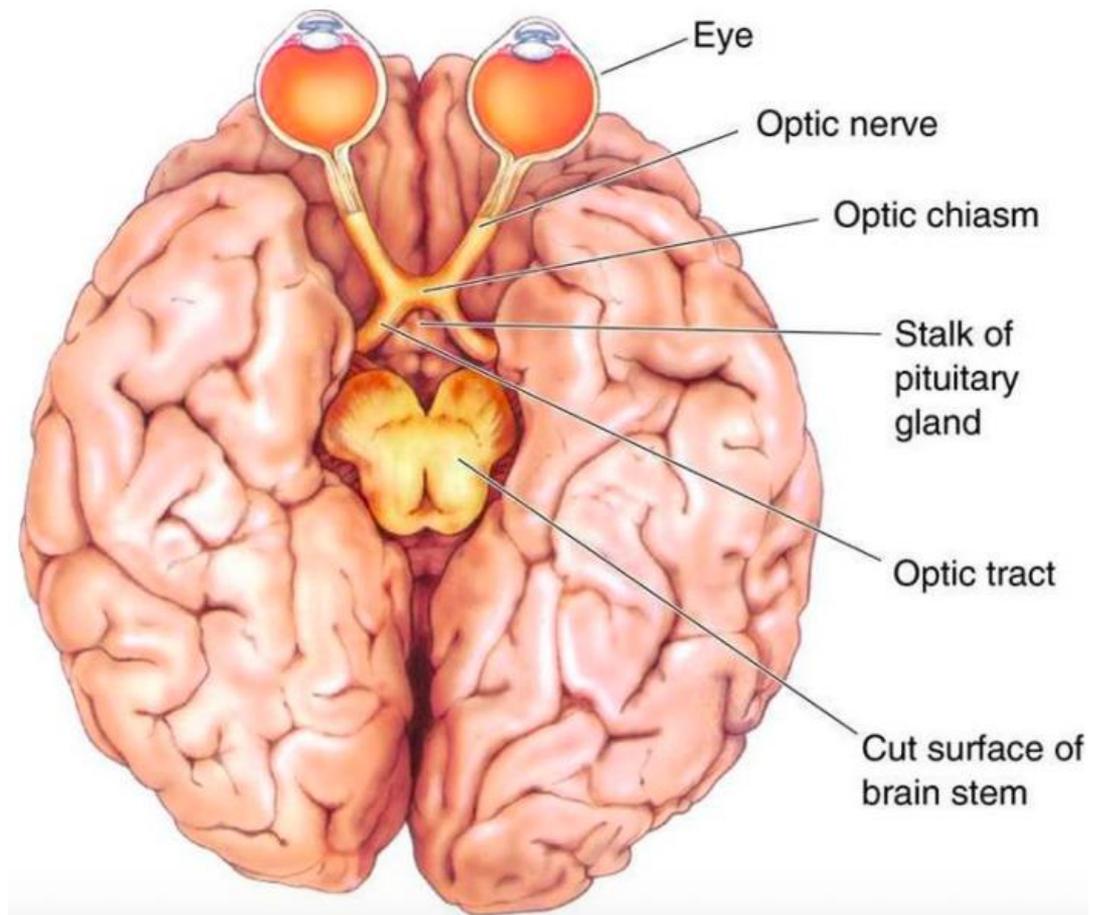


The optic chiasm is the X shaped structure formed by cross-over of the optic nerves.

The pituitary is very close to this chiasm

So: a mass in the pituitary can compress the chiasm.. This will affect vision.

Note: because of this cross over, the right optic nerve supplies the left eye and vice versa.. So a defect in the right optic nerve will cause visual field defect in the left eye (the contralateral eye)



Pituitary apoplexy=السكتة النخامية

- Acute hemorrhage into an adenoma, which causes **rapid enlargement** of the lesion. This will result in decreased consciousness.
- This is a neurosurgical emergency.... Can cause sudden death.
- The word apoplexy means anger or rage.



Pituitary adenomas

- Functional or nonfunctional.
- Functional: usually **one cell type** and one hormone produced.
- Classified according to the hormones they produce.



Types of pituitary adenomas

- Prolactinomas.. 20-30%.. The most common
- Null cell adenoma... 20%.. Non secretory
- ACTH cell adenoma.. 10-15%
- TSH cell adenoma... 1%.. Least common
- pleurihormonal... 15%



notes

1. TSH adenomas are rare.. So if you have a patient with hyperthyroidism it will be very rare that the cause of his disease is related to the pituitary.
2. pleuri-hormonal adenomas do exist.. So a pituitary adenoma, although usually produces one hormone, it might secrete more than one type of hormones and patients will have symptoms related to the hormones secreted.



Pituitary adenomas

- In clinical practice 10% of intracranial neoplasms are pituitary adenomas.
- But pituitary adenomas can be an incidental finding in 25% of autopsies.
- Peak.. 4th to 6th decades.
- Mostly **single** lesions= solitary
- Can be divided into micro and macro adenomas according to size.. Cutoff point: 1cm.



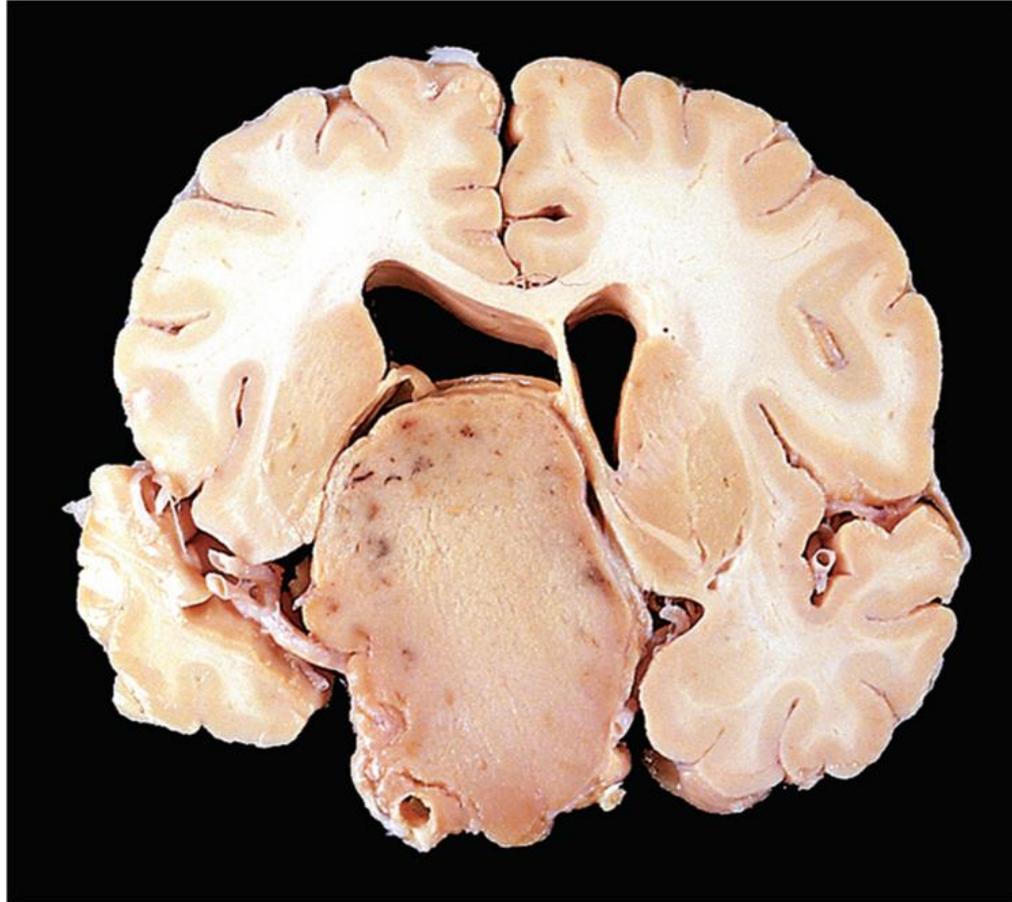
Macroscopic appearance

Gross features of adenomas

- The usual adenoma is a **well-circumscribed**, lesion that if small, is confined by the sella turcica
- In 30% of cases, the adenomas are non-encapsulated and infiltrate adjacent bone, dura and brain.



Pituitary adenoma



Kumar et al: Robbins Basic Pathology, 9e.
Copyright © 2013 by Saunders, an imprint of Elsevier Inc.

