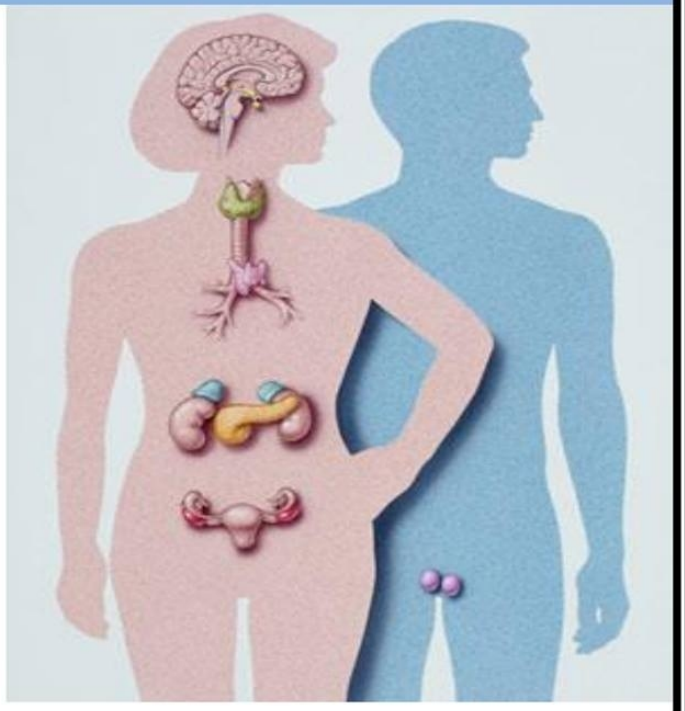
University of Jordan - Faculty of Medicine
(2013-19)

Medical Committee
The University of Jordan

Endocrine System



- ☐ Anatomy/Embryology/Histology
- ☐ Biochemistry
- ☐ Physiology
- ☐ Pharmacology
- ■ Pathology
- ☐ PBL

■ Slide ☐ Sheet ☐ Handout ☐ Other

Lecture #: **1**

Date:

Dr's Name: **Dr. Heyam**

Price:

Designed by: Zakaria W. Shkoukani

Diseases of the endocrine system

Dr Heyam Awad

FRCPath

- Lectures will be available on my university website on the same day they are given.
- Office hours: Wednesday and Thursday :10-12.
- Office: in the hospital.
- Email: h_awad@ju.edu.jo

Six lectures

- Pituitary gland.
- Thyroid gland 1
- Thyroid gland 2

Midterm exam

- Adrenal gland
- Parathyroid gland
- Endocrine pancreas & diabetes

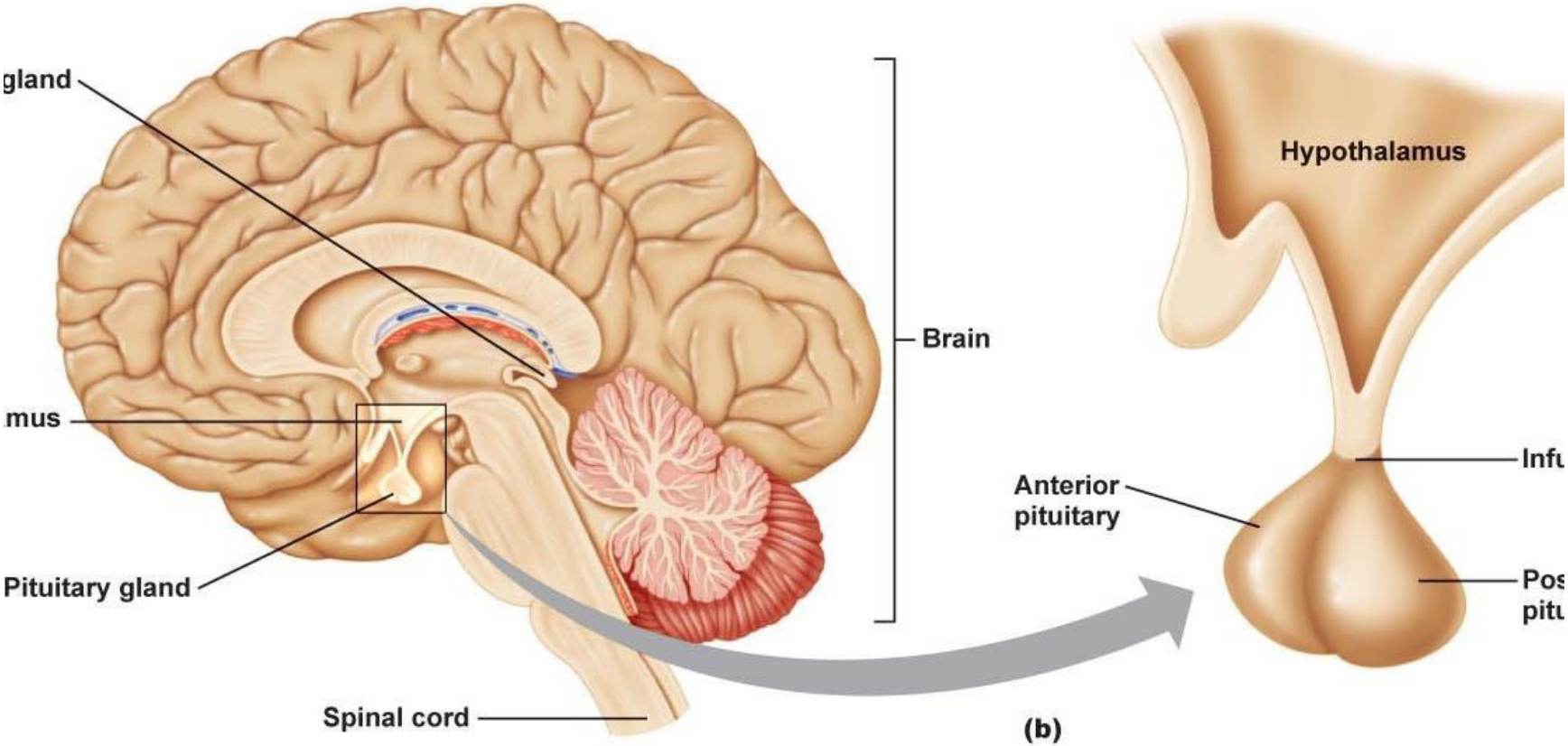
Endocrine system diseases general principles

- Mass effect.
- Disordered hormonal production…. Under or over production
- No relation between the above two.

Three conditions can affect all glands:

- Hyperplasia, non-neoplastic, can become autonomous
- Adenoma: benign neoplasm, functional or nonfunctional
- Carcinoma: malignant… infiltrative and potentially metastisizing

Pituitary gland



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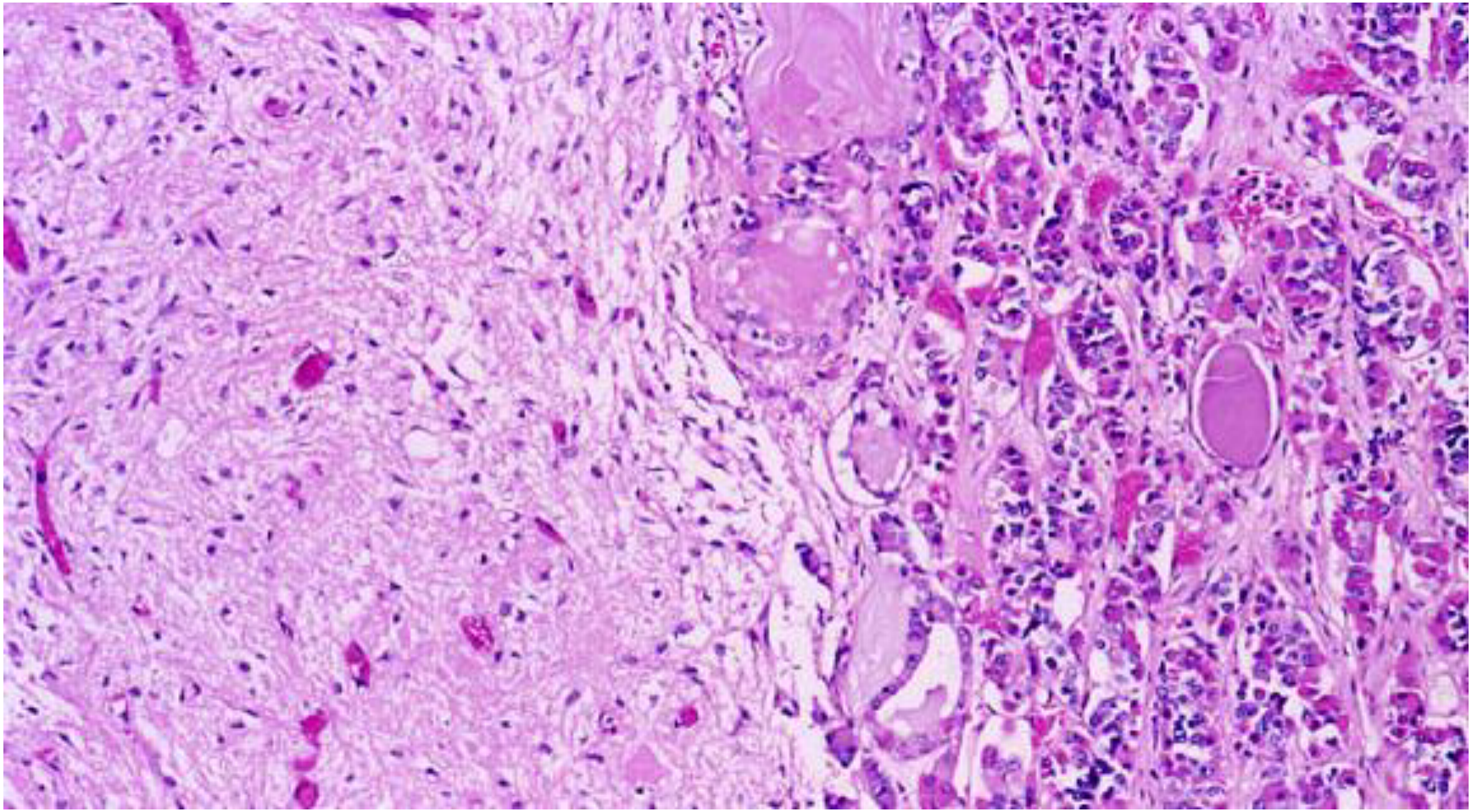
Anterior versus posterior pituitary



Anterior vs posterior

- Histology.. Adenohypophysis vs neurohypophysis; epithelial vs glial cells and neural axons
- Embryology: oral mucosa vs neural crest
- Hormones secreted: anterior.. TSH, PRL, ACTH, GH, FSH , LH. Posterior: ADH and oxytocin.

Diseases of the anterior pituitary

Mass effect:

*Radiographic abnormalities of sella turcica :sellar expansion, bony erosions.

*Compression of the optic chiasm: visual field abnormalities.

*elevated intracranial pressure: headache, nausea, vomiting.

*seizures.

*Cranial nerve palsies.

*pituitary apoplexy

Pituitary apoplexy

- Acute hemorrhage into an adenoma…. Rapid enlargement of the lesion… decreased consciousness.
- Neurosurgical emergency…. Can cause sudden death.

Hyperpituitarism

- MOST COMMON CAUSE: functional adenoma.
- Other causes:
- Hyperplasia
- Carcinoma
- Secretion of pituitary hormones by nonpituitary tumors.
- Hypothalamic disorders.

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%
- Null cell adenoma… 20%
- ACTH cell adenoma.. 10-15%
- Gonadotroph cell adenoma… 10-15%
- GH cell adenoma… 5%
- Mixed GH/Prolactn adenoma.. 5%
- TSH cell adenoma… 1%
- Other pleurihormonal… 15%

Pituitary adenomas

- 10% of intracranial neoplasms.. clinically
- Incidental finding in 25% of autopsies.
- Peak.. 4^{th} to 6^{th} decades.
- Mostly single lesions.
- Micro amd macro adenomas acording to size.. Cutoff point: 1cm.

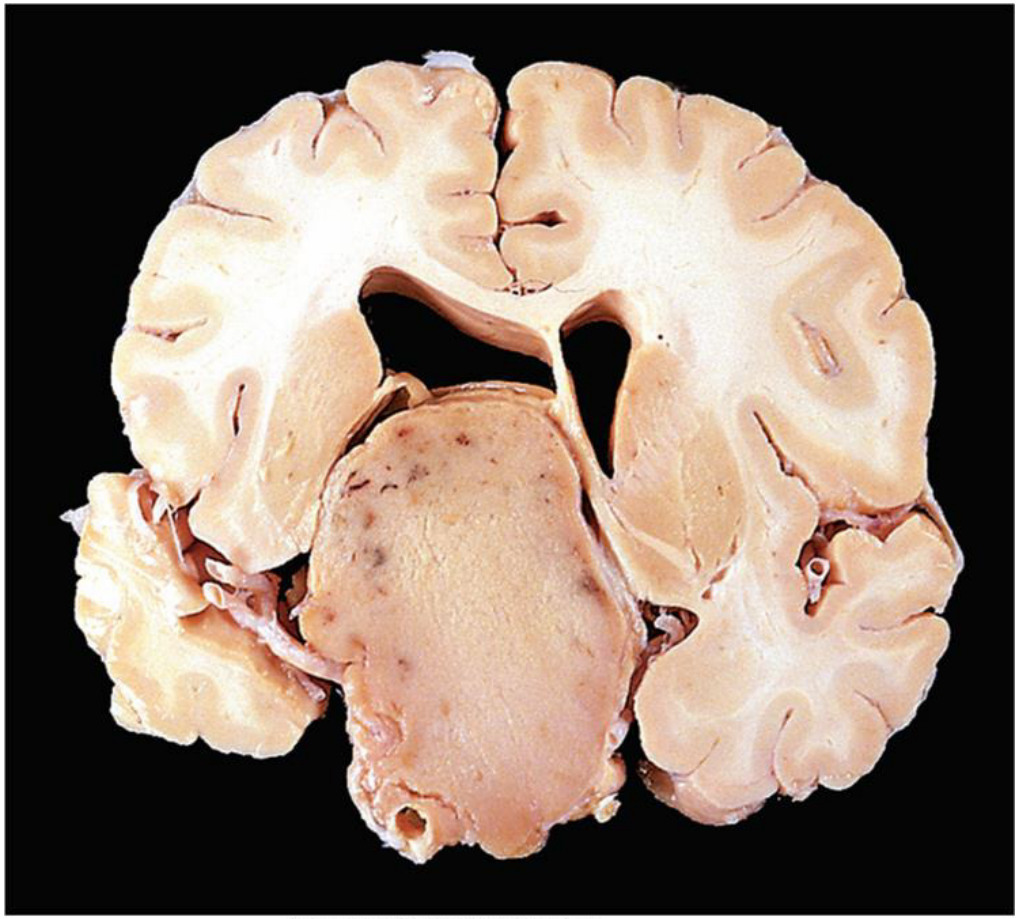
Macroscopic appearance

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.
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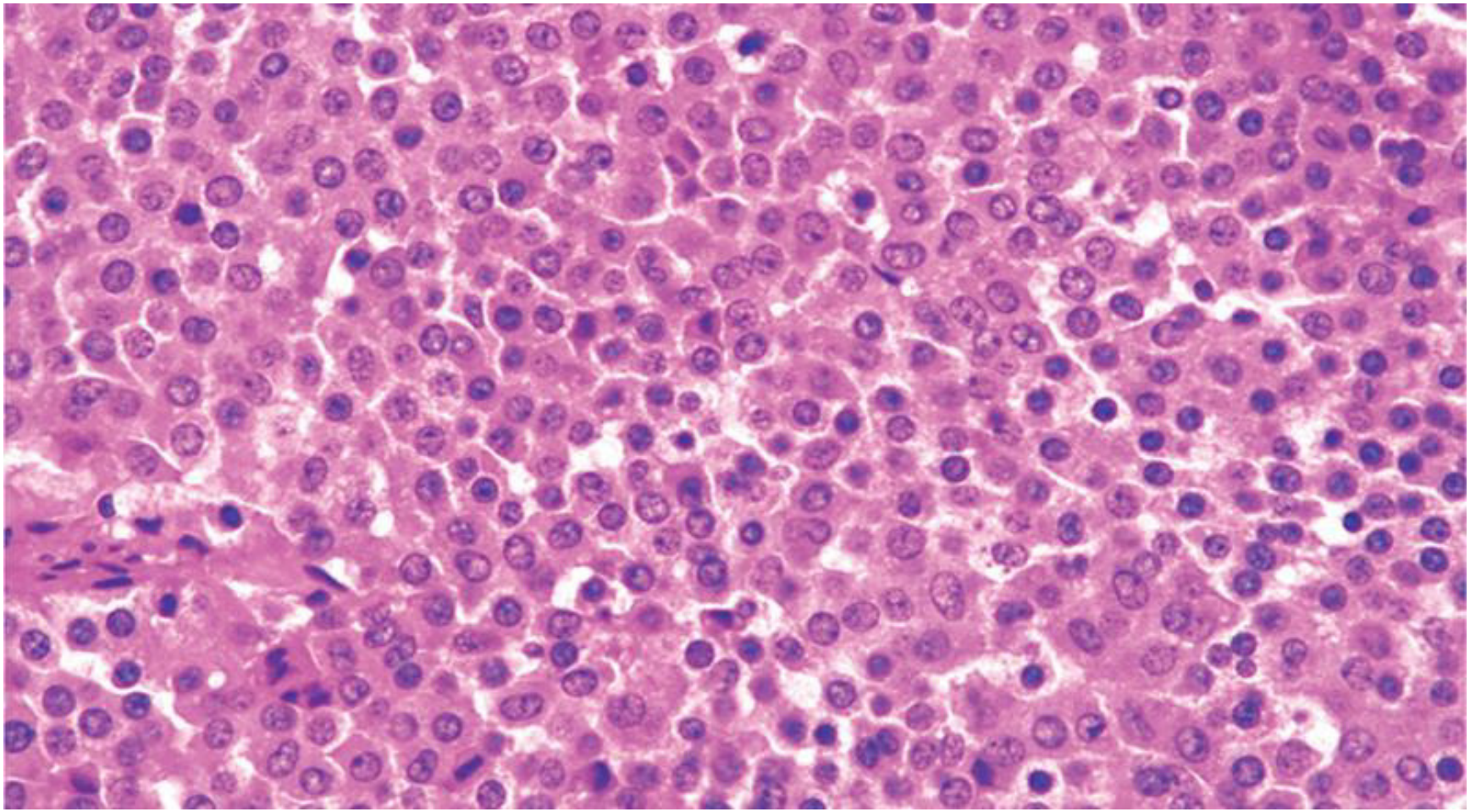
Pituitary adenoma



Notes

- This cellular monomorphism and the absence of a significant reticulin network distinguish pituitary adenomas from non-neoplastic anterior pituitary parenchyma
- The functional status of the adenoma cannot be reliably predicted from its histologic appearance.
- Adenomas that harbor *TP53* mutations demonstrate brisk mitotic activity and are designated atypical adenomas to reinforce their potential for aggressive behavior.

- *prolactinomas*

Hyperprolactinemia causes:

a. Amenorrhea and galactorrhea,
b. Loss of libido, and infertility

- prolactinomas usually are diagnosed at an earlier stage in women of reproductive age than in other persons

Other causes of hyperprolactinemia

a. Pregnancy, and high-dose estrogen therapy,
b. Dopamine-inhibiting drugs (e.g., reserpine).
c. Any mass in the suprasellar compartment may disturb the normal inhibitory influence of hypothalamus on prolactin secretion, resulting in hyperprolactinemia-a mechanism known as the *stalk effect.*

Growth Hormone-Producing (Somatotroph) Adenomas

- May be quite large at time of diagnosis because the clinical manifestations of excessive growth hormone may be subtle,

-- Small amounts of immunoreactive prolactin often are present as well.

clinical manifestations.

If a growth hormone-secreting adenoma occurs before the epiphyses closes: *gigantism.*

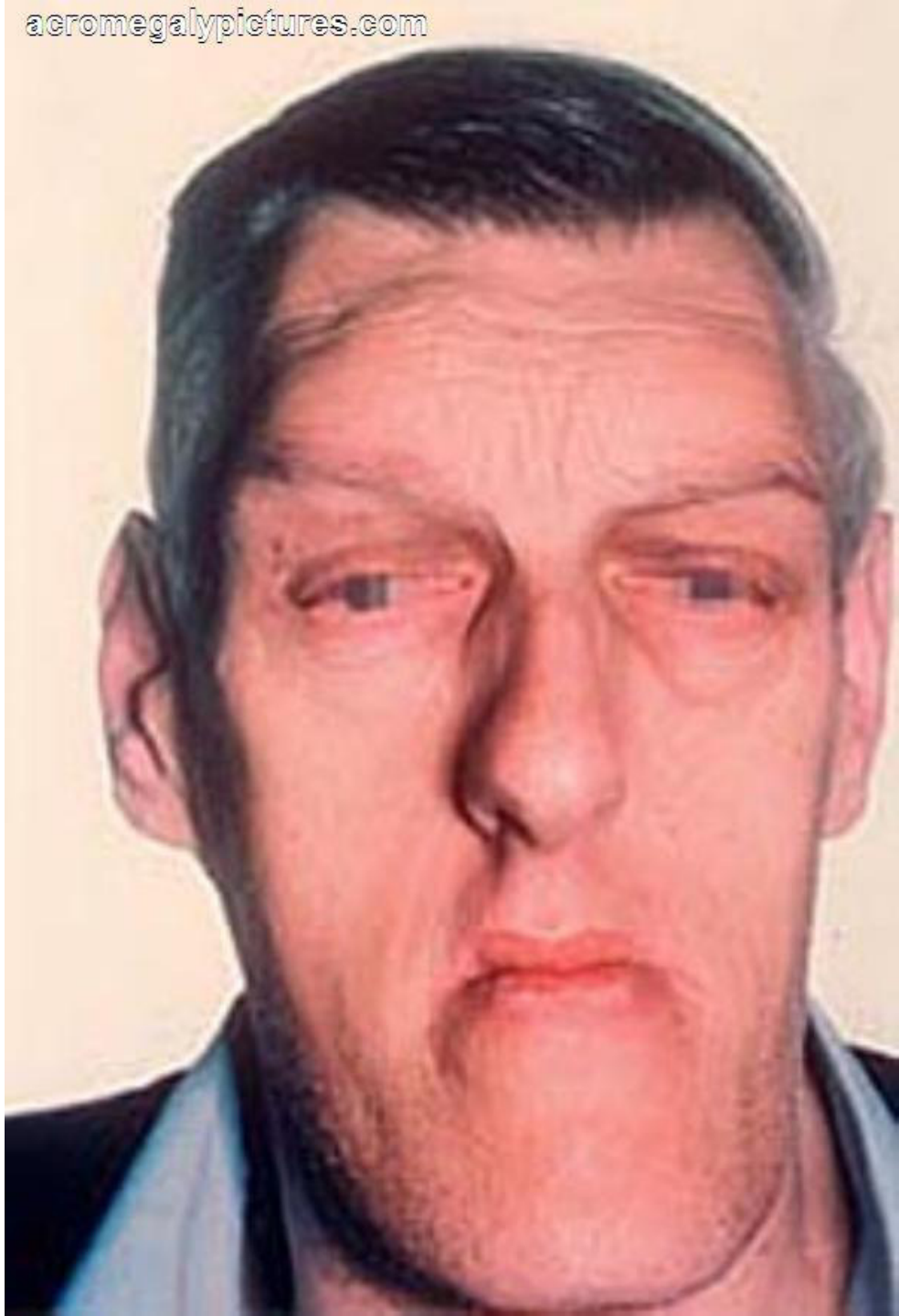
- gigantism: generalized increase in body size, with disproportionately long arms and legs.

acromegaly

If elevated levels of growth hormone persist, or develop after closure of the epiphyses, affected persons develop *acromegaly,* in which:

1. Growth is most conspicuous in soft tissues, skin, and viscera and in the bones of the face, hands, and feet
2. Enlargement of the jaw results in its protrusion with eparation of the teeth.
3. Enlarged hands and feet with broad, sausage-like fingers

- acromegaly



- Corticotroph cell adenomas may be:

*Clinically silent or

*May cause *hypercortisolism, m*anifested clinically as *Cushing syndrome*

*Large, clinically aggressive corticotroph cell adenomas may develop after surgical removal of the adrenal glands for treatment of Cushing syndrome, this condition is *Nelson syndrome.*

*Because ACTH is synthesized as part of a larger pro-hormone substance that includes melanocyte-stimulating hormone (MSH), hyperpigmentation may be a feature.

Gonadotroph LH]-producing and FSH adenomas

- Can be difficult to recognize, because they secrete hormones inefficiently, and the secretory products usually do not cause a recognizable clinical syndrome.

Pituitary carcinomas

- *are exceedingly rare and i*n addition to local extension beyond the sella turcica, these tumors virtually always demonstrate distant metastases.

Hypopituitarism:

Loss of 75% of anterior pituitary

Causes:

a. C*ongenital* absence(exceedingly rare)

b. Hypothalamic tumors, associated with posterior pituitary dysfunction.

C . Nonfunctioning pituitary adenomas .. Most common

d. Ischemic necrosis of the anterior pituitary, e;g Sheehan syndrome.

e. Ablation of the pituitary by surgery or irradiation

f. Inflammatory lesions such as sarcoidosis or tuberculosis

g. Trauma and Metastatic neoplasms involving the pituitary.

Sheehan syndrome, or postpartum necrosis of anterior pituitary, is the most common form of clinically significant ischemic necrosis of the anterior pituitary.

- During pregnancy, the anterior pituitary enlarges considerably, because of an increase in the size and number of prolactin-secreting cells and this physiologic enlargement is not accompanied by an increase in blood supply from the low-pressure portal venous system.
- The enlarged gland is thus vulnerable to ischemic injury, especially in women who experience significant hemorrhage and hypotension during the peripartal period

POSTERIOR PITUITARY SYNDROMES.

- Impairment of oxytocin synthesis and release has not been associated with significant clinical abnormalities.

- The clinically important posterior pituitary syndromes involve ADH.

I. ADH deficiency causes *diabetes insipidus,* characterized by excessive urination (polyuria) caused by an inability of the kidney to properly resorb water from the urine

- Diabetes insipidus can result from several causes,

a. Head trauma, Neoplasms,

b. Inflammatory disorders and surgical procedures of the hypothalamus and pituitary,

d. The condition may be idiopathic.

Note:- Diabetes insipidus from ADH deficiency is designated as *central,* to differentiate it from *nephrogenic DI*

- The clinical manifestations of DI include:

a. The excretion of large volumes of dilute urine with an inappropriately low specific gravity

b. Serum sodium and osmolality are increased as a result of excessive renal loss of free water resulting in thirst and polydipsia

- Patients who can drink water generally can compensate for urinary losses; patients who are obtunded, bedridden, or otherwise limited in their ability to obtain water may develop life threatening dehydration.

develop life-threatening dehydration

- In *(SIADH)* ADH excess is caused by several extracranial and intracranial disorders.
- This condition leads to resorption of excessive amounts of free water, with resultant hyponatremia.
- The most common causes of SIADH include;

a. The secretion of ectopic ADH by malignant neoplasms ,

b. Non-neoplastic diseases of the lung,

c. local injury to the hypothalamus or neurohypophysis.

- The clinical manifestations of SIADH are dominated by hyponatremia, cerebral edema, and resultant neurologic dysfunction.