

# PATHOLOGY LAB 1



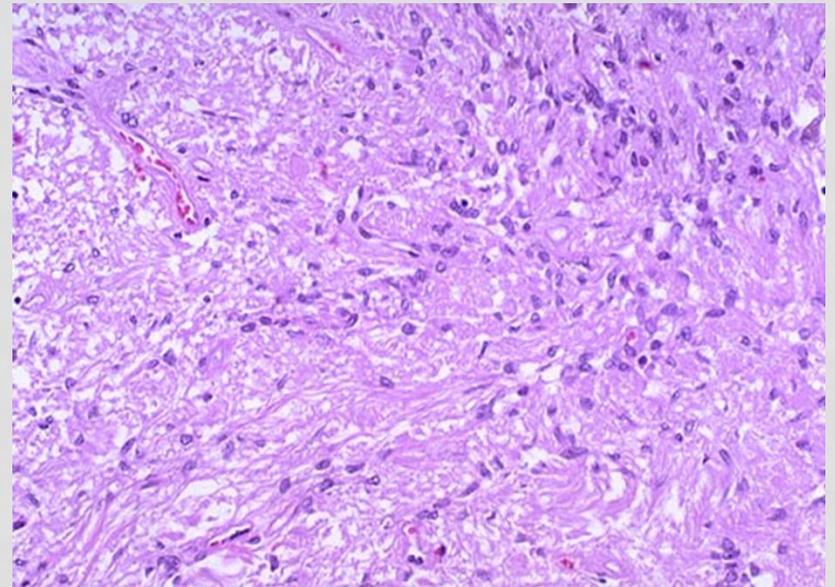
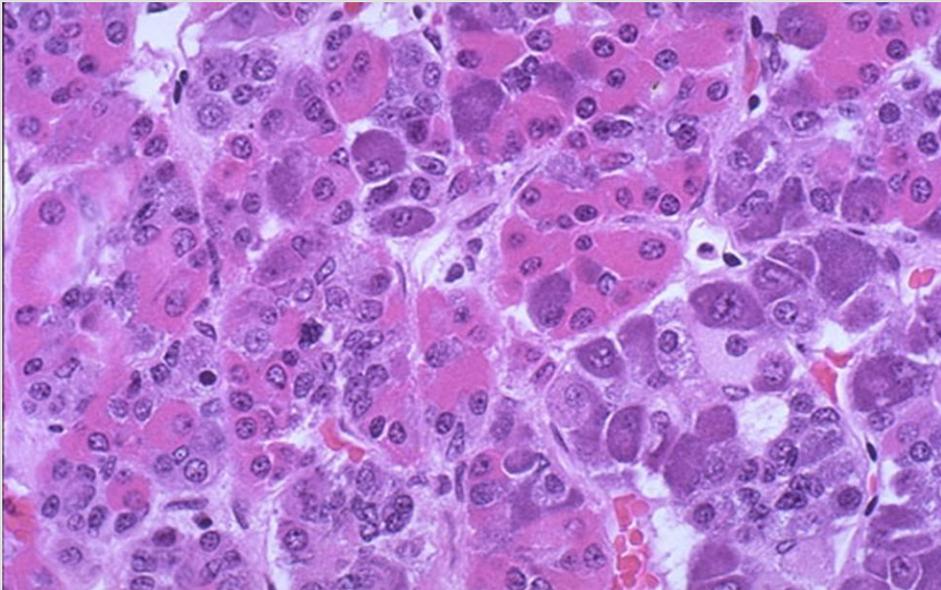
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**ENDOCRINE SYSTEM LECTURES 2022**

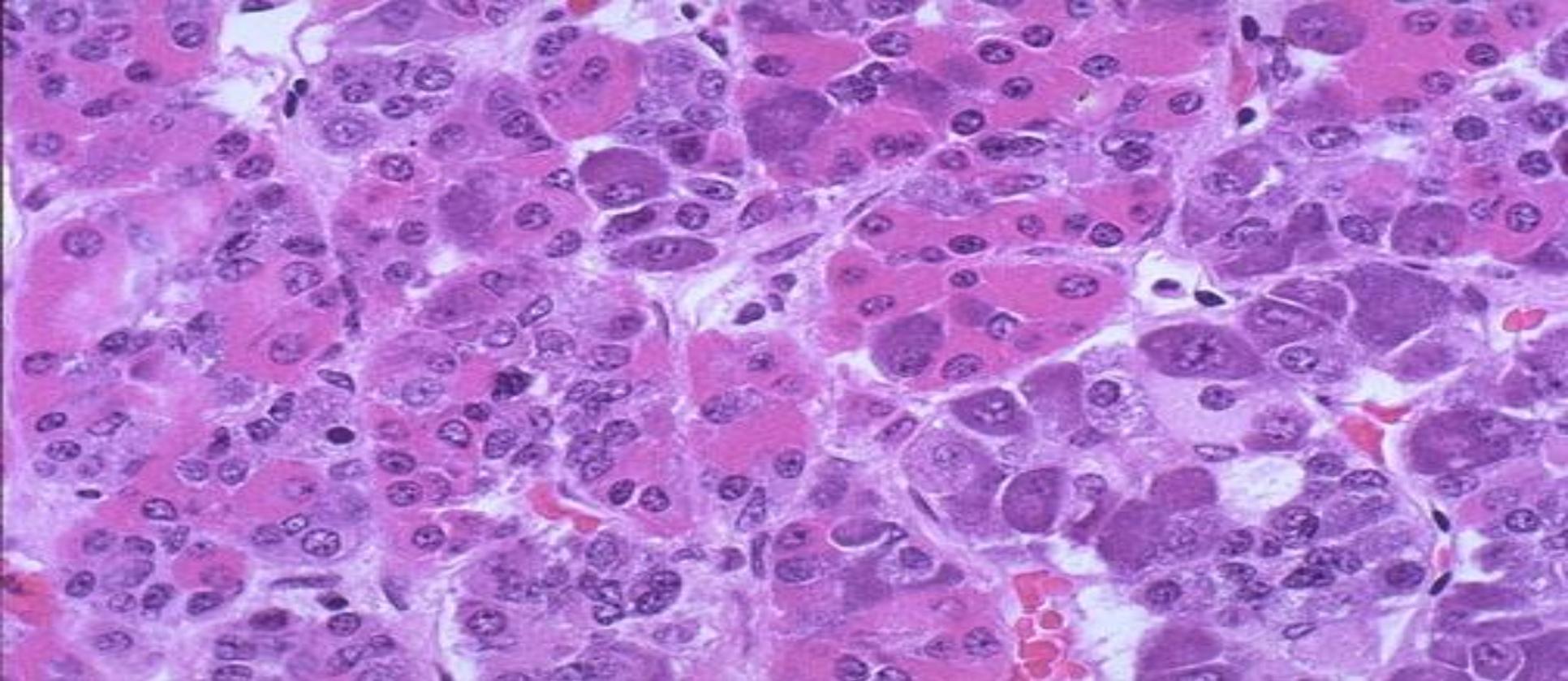
# CLASSIFICATION OF HORMONES

- A) Hormones that triggers biochemical signals upon interacting with the cell surface receptors.
- B) Hormones that diffuse across the plasma membrane and interact with intracellular receptors
- N.B: The size of the pituitary is DOUBLE during pregnancy.

# PITUITARY GLAND

## Normal Anterior pituirary Gland





This is Adenohypophysis

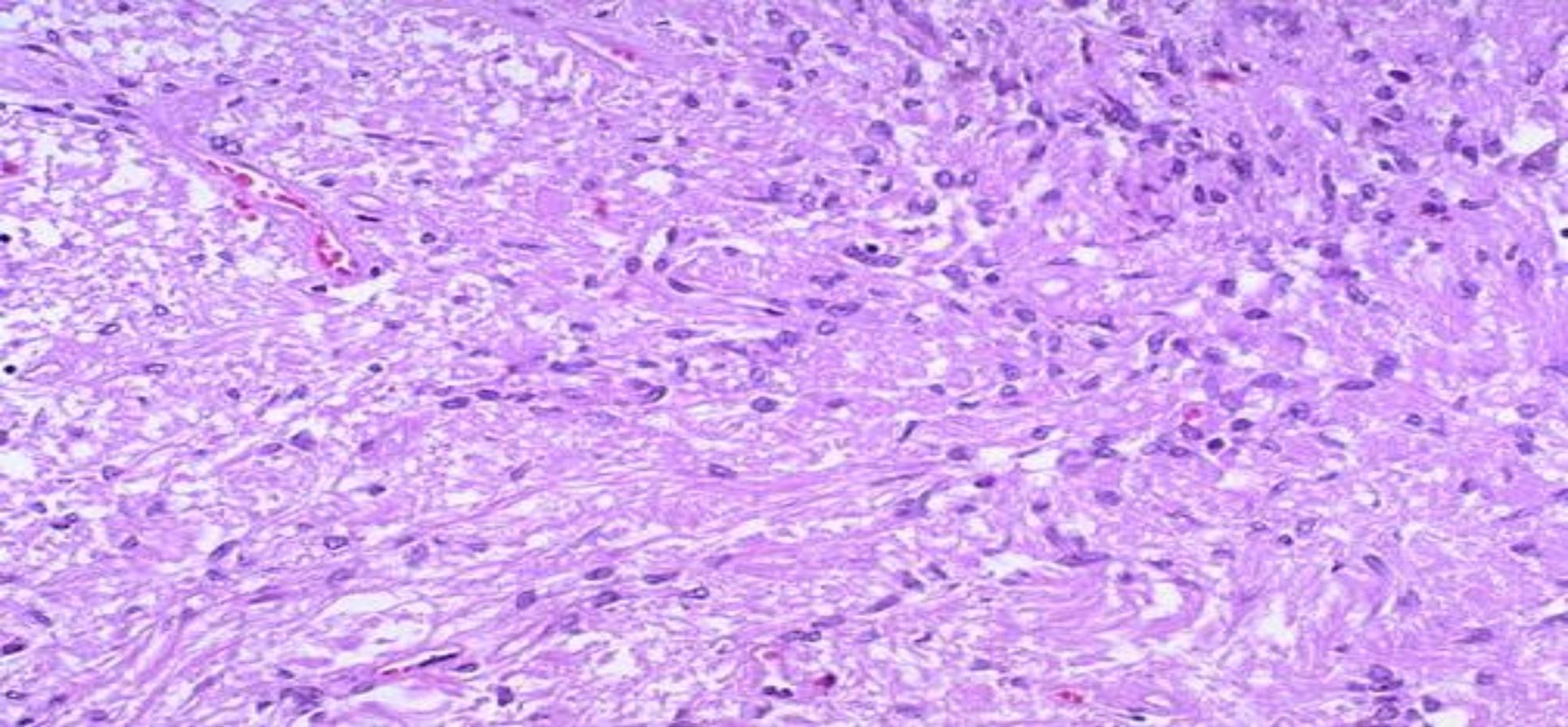
Mixture of cells. Clusters of cells that have variable colors

The **pink acidophils** secrete growth hormone (GH) and prolactin (PRL)

The **dark purple basophils** secrete corticotrophin (ACTH), thyroid stimulating hormone (TSH), and gonadotrophins follicle stimulating hormone-luteinizing hormone (FSH and LH) .

The **pale staining chromophobes** have few cytoplasmic granules, but may have secretory activity.

مش مهم نحفظ شو بتفرز الخلايا من هرمونات بس المهم نعرف انهم خليط من الخلايا ضروري نعرف انه ال prolactin و ال GH يتم إفرازهم من نفس الخلية و دائماً مع بعض



Neural cells composed of Axons.

The **neurohypophysis** shown here resembles neural tissue, with glial cells, nerve fibers, nerve endings, and intra-axonal neurosecretory granules.

The hormones **vasopressin** (antidiuretic hormone, or ADH) and **oxytocin** made in the **hypothalamus** (supraoptic and paraventricular nuclei) are transported into the intra-axonal neurosecretory granules where they are released.

# HYPERPITUITARISM & PITUITARY ADENOMA

- In most cases, excess is due to ADENOMA (Most common Presentation).
- arising in the anterior lobe. 10% of all intracranial neoplasms. Most occur between 30-50 yrs of age.
- Adenoma: single mass, well Circumscribed with well defined borders. Lined with capsule. Existance of the MITS (Metastasis) may indicate the Carcinoma type.
- The cut point between the benign and the malignant (Carcinoma) is the precence of distant mits. Usually it travells to the lungs.
- Less common causes include :
  - \* Hyperplasia (Due to the overworking of the gland)
  - \* Carcinoma
  - \* Ectopic hormone production
  - \* Some hypothalamic disorders

# REMEMBER THE ONE WITH ARROWS

Prevalence of Pituitary Adenoma	
Adenoma Type	Prevalence (%)
GH cell adenoma	15
PRL cell adenoma <b>MOST</b>	30 ←
GH and PRL cell adenoma <b>Compound</b>	7 ←
ACTH cell adenoma	10
Gonadotroph cell adenoma	10
Nonfunctioning adenoma	<b>20 -25</b> ←
TSH cell adenoma <b>LEAST</b>	1 ←
Unclassified adenoma	2

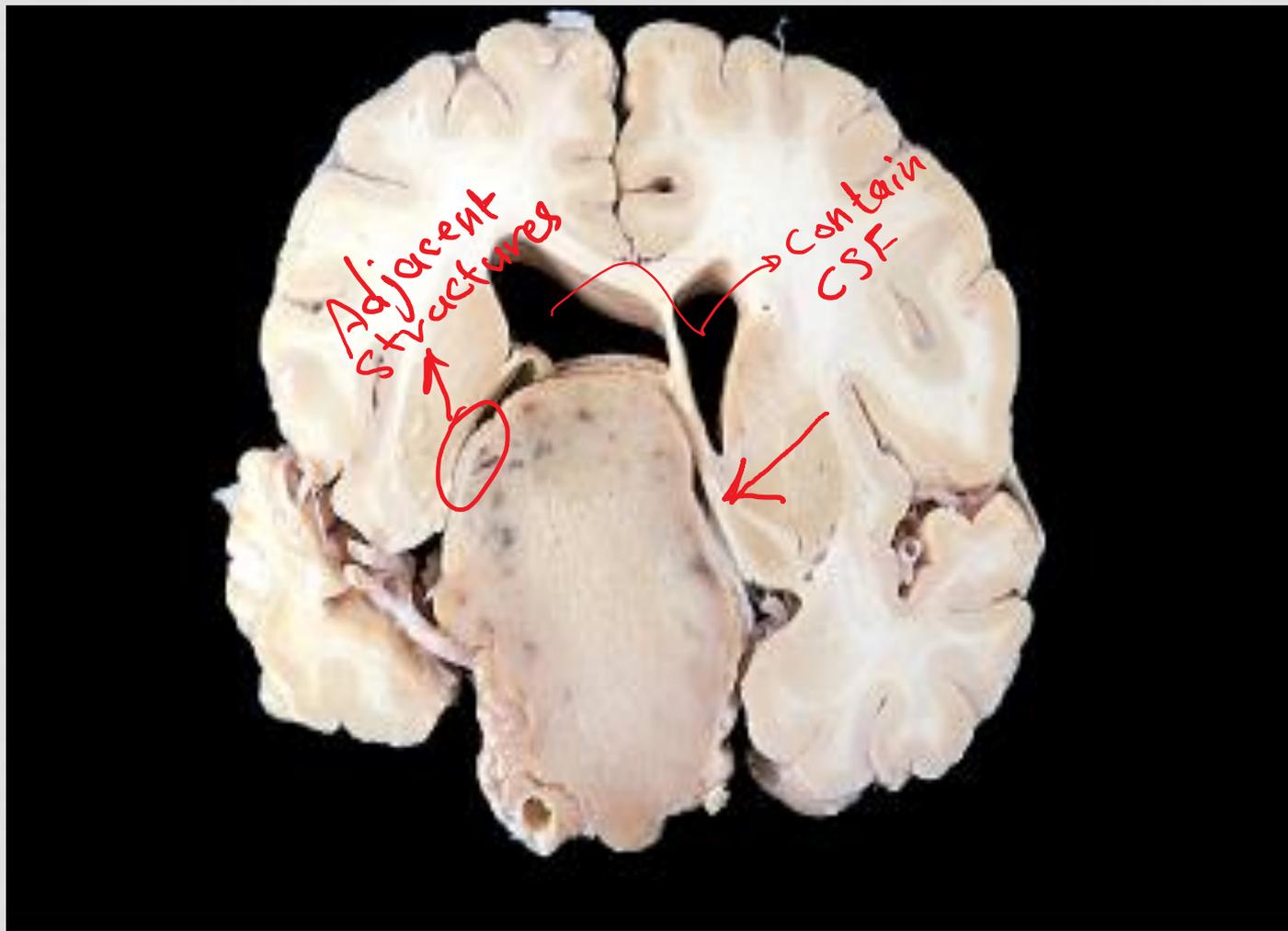
ACTH=Adrenocorticotrophic hormone;  
GH=Growth hormone; PRL=Prolactin;  
TSH=Thyroid-stimulating hormone

# BEHAVIOUR OF PITUITARY ADENOMAS :

- Primary pituitary adenomas usually **benign**.
- **Radiological changes in sella turcica.**
- Not functional (**20%**). (not associated with the release of hormones).
- If functional (**80%**), the clinical effects are secondary to the hormone produced.
- More than one hormone can be produced from the same cell ( monoclonal ).
- Local effects are due to pressure on optic chiasma (visual disturbance) , or pressure on adjacent normal pituitary cells (reduce hormone production).

# CLINICAL FEATURES OF PITUITARY ADENOMA:

- 1- Symptoms of hormone production.
- 2- Visual field abnormalities (pressure on optic chiasma above sella tursica). (MASS EFFECT)
- 3- Elevated intracranial pressure (blockage of CSF flow):  
Headache , nausea , vomiting. (MASS EFFECT)
- 4- Hypopituitarism (result from pressure on adjacent pituitary):  
Diabetes insipidus. (MASS EFFECT)
- 5-Cranial nerve palsy ( invasion to brain ). (MASS EFFECT)



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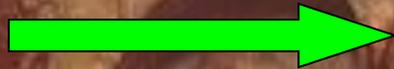
**Clinical presentation** is the Mass effect of pituitary adenoma

# MORPHOLOGY OF PITUITARY ADENOMAS :

- Well circumscribed, invasive in up to 30%
- Size **1cm**. or more, specially in nonfunctioning tumor. If more than 1cm it's mostly Functioning.
- **MicroAdenoma: less than 1cm or equal to it.**
- **MacroAdenoma: More than 1cm.**
- Hemorrhage & necrosis seen in large tumors (pituitary apoplexy).

## Microscopic picture:

- **Uniform cells, one cell type (monomorphism)**
- Absent reticulin network
- Rare or absent mitosis



**Sella turcica with pituitary adenoma**

# PROLACTINOMA

- 30% of all adenomas, chromophobe or w. **acidophilic**
- 
- Functional even if microadenoma , but amount of secretion is related to size
- Mild elevation of prolactin does NOT always indicate prolactin secreting adenoma!
- Other causes of ↑ prolactin include :
  - estrogen therapy
  - pregnancy
  - certain drugs, e.g reserpine (dopamin inhibitor).
  - hypothyroidism
  - mass in suprasellar region.

# PROLACTINOMA CONT.

- Other causes of ↑ prolactin include :
  - estrogen therapy
  - pregnancy
  - certain drugs, e.g reserpine (dopamine inhibitor): Dopamine inhibits the Basal Prolactin hormone release in the Pituitary.
  - hypothyroidism: So the pituitary is trying to make TSH in high amounts it will undergo Hyperplasia. So it will secrete Prolactin as added hormone due to the hyperplasia. So we need to test the TSH in this condition to rule out Hypothyroid.
  - mass in suprasellar region: (**Stalk Effect**): Any mass in the suprasellar region may interfere with normal prolactin inhibition which leads to increase in the Prolactin secretion

# SYMPTOMS OF PROLACTINOMA

- Female:

- 1) Galactorrhea
- 2) Amnorrhea
- 3) Decreased lipido (+male)
- 4) Infertility (+male)

- Treatment:

**Bromocriptine** (dopamine agonist), causes shrinkage of neoplasm & regression of hyperplasia in most causes.

So adenoma can be treated with drugs and without an invasive procedure

## 2- Growth hormone secreting adenoma :

40% Associated with GNAS 1 gene mutation

### Structure :

Composed of granular **ACIDOPHILIC** cells and may be mixed with prolactin secretion.

Persistent secretion of GH stimulates the hepatic secretion of insulin-like growth factor I (IGF-I) -> many of clinical effects

### Symptoms :

May be delayed so adenomas are usually large  
Produce **GIGANTISM (children) or ACROMEGALLY (adults)**.  
Diabetes, arthritis, large jaw & hands, osteoporosis, ↑BP, HF.....etc

# CORTICOTROPH CELL ADENOMA

- Usually microadenomas
- Higher chance of becoming malignant
- Chromophobe or basophilic cells
- Functionless (if it is small tumor) or Cushing 's Disease ( high ACTH in case of malignant tumor).
- **Nelson's syndrome**: Reduction of the feedback mechanism of the steroid hormone. Due to:  
Bilateral adrenalectomy or destruction may result in aggressive adenoma because of the receptors of ACTH would be gone, so there would a hyperplasia in the pituitary. that would result in an increase of the size of the pituitary.
- Increase in the ICP.

# CUSHING DISEASE AND SYNDROME

- The Difference between the Cushing Syndrome and the Cushing Disease is:
- Cushing Syndrome: Associated with a pathology matter with Adrenal gland.
- Cushing Disease: Associated with the Central causative agent and it's the piuitary.

# HYPOPITUITARISM: LOSS OF HORMONES

- Loss of → 75% of ant. Pituitary → Symptoms
- Congenital or acquired, intrinsic or extrinsic
- Acquired causes include:
  - 1) **Nonsecretory pituitary adenoma**: we have a mass that doesn't produce anything, but it has a mass effect on the adjacent structure
  - 2) **Pituitary apoplexy**: A condition where there is a spontaneous bleeding of hemorrhage due to tumor. Clinical presentation would be a headache, N+V, double vision or loss in vision. Along with changes in the mental status.

# HYPOPITUITARISM CONT.

- 3) **SHEEHAN'S SYNDROME**: Associated with pregnancy. And there would be a Post partum hemorrhage and therefore it would decrease the blood supply going to the pituitary causing necrosis of the gland, and the female would undergo this syndrome. The presentation would appear after 6-8 months with an inability to lactate due the necrosis (destruction) of the pituitary.
- 4) **Ischemic necrosis** e.g. sickle cell anemia, DIC

# HYPOPITUITARISM CONT.

- 5- Iatrogenic by radiation or surgery
- 6- Autoimmune (lymphocytic) hypophysitis
- 7- Hypothalamic mass
- 8- Inflammatory e.g sarcoidosis or TB
- 9- **Empty Sella Syndrome** : Radiological term for enlarged sella tursica, with atrophied or compressed pituitary. May be primary due to downward bulge of arachnoid into sella floor compressing pituitary. Secondary is usually surgical.
- 10- **Infiltrating diseases in adjacent bone causing compressoin** e.g. Hand Schuller – Christian Disease Metastatic tumors

# HYPOPITUITARISM CONT.

- 11- **Craniopharyngioma** (bonus): which is a benign tumor in the sella tursica.

1-5 % of intracranial neoplasms

Children or adolescents most affected

Symptoms may be delayed  $\geq 20$  yrs (50%)

Symptoms of hypofunction or hyperfunction of pituitary and /or visual disturbances, diabetes insipidus.

# SYMPTOMS OF HYPOPITUITARISM:

- Dwarfism (Pituitary Dwarf) in children: Due to improper release of Growth Hormone.
- Effect of individual hormone deficiencies.
- Amenorrhea & no lactation (Ex. Sheehan syndrome).
- Loss of Melanocyte Stimulating Hormone (MSH) → Decreased pigmentation

# POSTERIOR PITUITARY SYNDROMES

- A- ADH deficiency: Diabetes Insipidus:

Polyuria, polydipsia, hypernatremia & dehydration. Urine is dilute, due to **inability** to reabsorb water from the collecting tubules.

Treatment? Drink a lot of water along with drugs.

Causes :-

Head trauma, tumors & inflammations in pituitary or hypothalamus...etc.

# POSTERIOR PITUITARY SYNDROMES CONT.

- B- Syndrome of inappropriate ADH secretion (SIADH):

Part of paraneoplastic Syndrome (Most common cause): **Small Cell Carcinoma of Lung**

Causes:

excessive resorption of water -> hyponatremia

cerebral edema.

# POSTERIOR PITUITARY SYNDROMES CONT.

- C- Abnormal oxytocin secretion:
- Abnormalities of synthesis & release have **not** been associated with any significant abnormality.

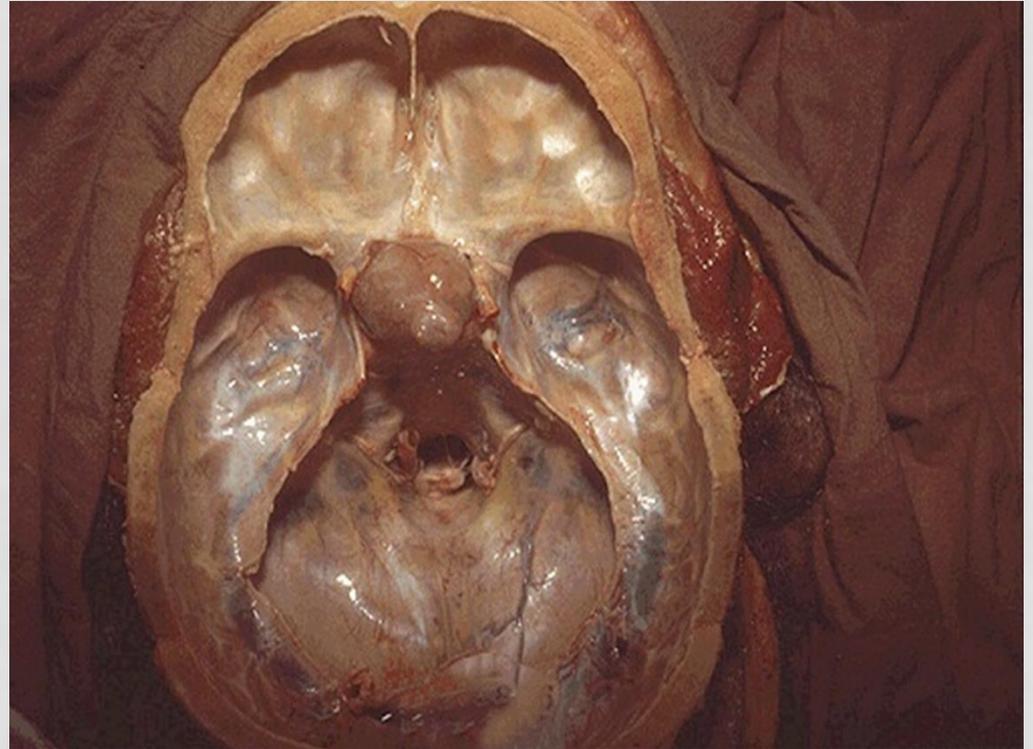
# ACROMEGALY VS. DWARFISM



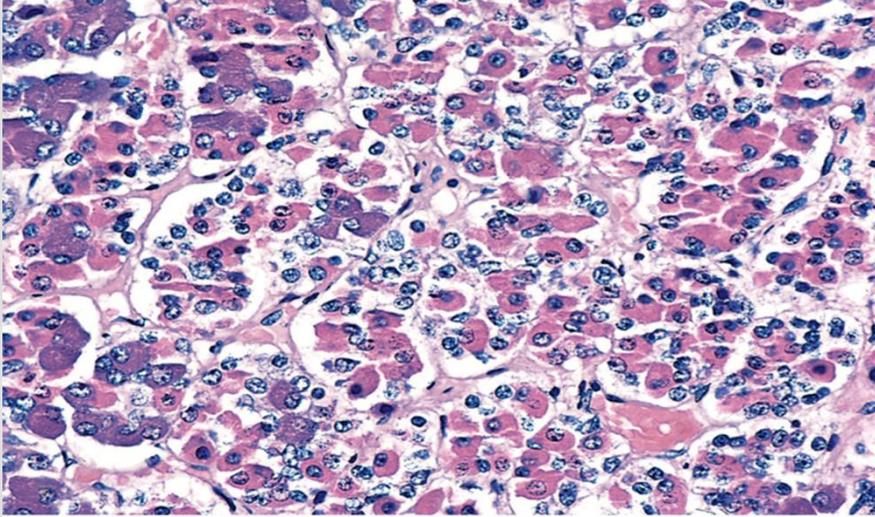
# GROSS SECTIONS OF PITUITARY ADNOMA



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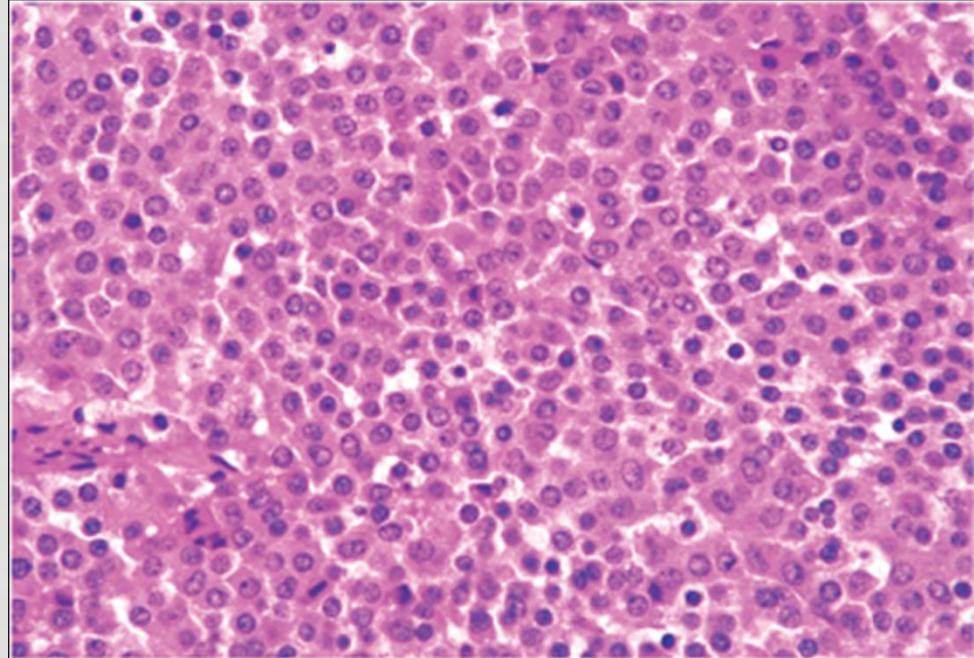


# NORMAL PITUITARY GLAND



Kumar et al: Robbins Basic Pathology, 9e.  
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## Pituitary adenoma



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