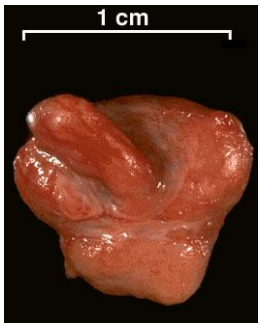
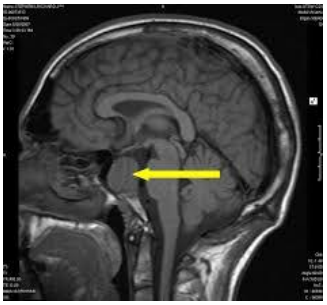
Unit IV – Problem 6 – Pathology of Pituitary Gland

- **Pituitary gland (introduction):**
  - It is small (1cm), bean-shaped structure which lies at the base of the brain in sella turcica.



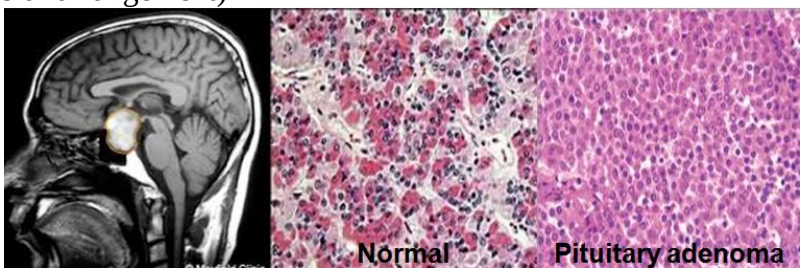
  - **The pituitary is connected to the hypothalamus through:**
    - ✓ Pituitary stalk: composed of axons extending from the hypothalamus to the posterior lobe of pituitary gland (neurohypophysis).
    - ✓ Rich venous plexus constituting a portal circulation and connecting the hypothalamus with the anterior lobe of pituitary gland (adenohypophysis).
  - **Signs and symptoms of pituitary disease can be grouped as follows:**
    - ✓ Hyperpituitarism-related effects:
      - ❖ Represented by excessive secretion of trophic hormones.
      - ❖ Mostly as a result from pituitary adenoma.
    - ✓ Hypopituitarism-related effects:
      - ❖ Represented by deficiency of trophic hormones.
      - ❖ Mostly as a result of destructive processes including: ischemic injury (SHEEHAN SYNDROME), surgery or radiation, and inflammatory reactions.
    - ✓ Local mass effects:
      - ❖ Radiographic abnormalities of sella turcica.
      - ❖ Bitemporal hemianopsia (a visual disturbance represented by loss of vision of temporal fileds at both sides due to compression on optic chiasma).
      - ❖ Elevated intracranial pressure.
      - ❖ Pituitary apoplexy (hemorrhage).
- **Hyperpituitarism and pituitary adenomas:**
  - **THE MOST COMMON CAUSE OF HYPERPITUITARISM IS AN ADENOMA ARISING IN THE ANTERIOR LOBE OF PITUITARY GLAND.**



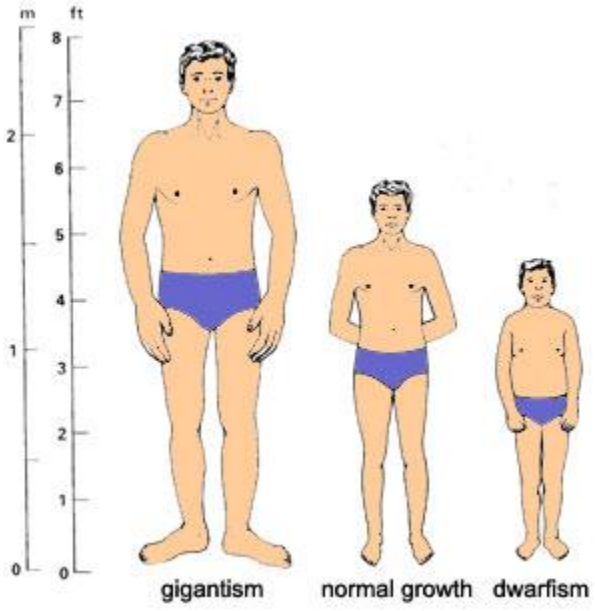
  - **Other causes include:**
    - ✓ Hyperplasia.
    - ✓ Carcinomas (rare and confirmed only by metastasis).
    - ✓ Secretion of hormones by some extra-pituitary tumors (ectopic secretion).
    - ✓ Certain hypothalamic disorders.
  - **Features of pituitary adenomas are as follows:**
    - ✓ Classified on the basis of hormones produced by the neoplastic cells.
    - ✓ They can be:
      - ❖ *Functional*: associated with clinical manifestations.
      - ❖ *Nonfunctional*: no clinical manifestations of hormone excess.
      - ❖ *Same adenoma secreting two different hormones*: mostly prolactin + growth hormone.
      - ❖ *Hormone negative.*
    - ✓ Most pituitary adenomas occur as sporadic (e.g. non-familial) lesions.

- ✓ Pituitary adenomas are designated:
  - ❖ *Microadenomas*: if they are less than 1 cm in diameter.
  - ❖ *Macroadenomas*: if they exceed 1 cm in diameter.
- ✓ Nonfunctioning adenomas may cause hypopituitarism as they encroach on and destroy adjacent anterior pituitary parenchyma.

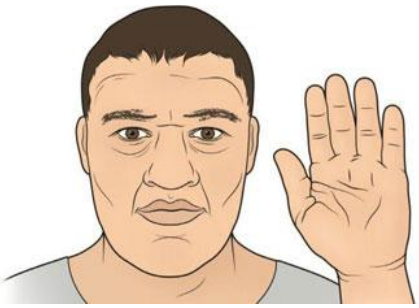
- **Morphology:**
  - ✓ Small adenomas: well-circumscribed, soft and confined by the sella turcica.
  - ✓ Large adenomas: compress the optic chiasma and adjacent structures. Foci of hemorrhage and/or necrosis are common.
  - ✓ Histological:
    - ❖ Relatively uniform, polygonal cells arrayed in sheets, cords or papillae.
    - ❖ The nuclei of the neoplastic cells may be uniform or pleomorphic.
    - ❖ Mitotic activity usually is scanty.
    - ❖ The two distinctive morphologic features of most adenomas are their cellular monomorphism and absence of a reticulin network (no alveolar arrangement)



- **Prolactinomas:**
  - Prolactinomas are the most common type of hyperfunctioning pituitary adenoma.
  - They range from small microadenomas to large expansile tumors.
  - **They cause**: amenorrhea – galactorrhea – loss of libido – infertility.
  - Prolactinomas are usually diagnosed at an earlier stage in women of reproductive age.
  - **Hyperprolactinemia can result from other causes:**
    - ✓ Pregnancy.
    - ✓ High-dose estrogen therapy.
    - ✓ Renal failure.
    - ✓ Hypothyroidism.
    - ✓ Hypothalamic lesions.
    - ✓ Dopamine-inhibiting drugs.
- **Growth hormone- producing (somatotroph cell) adenomas:**
  - They include those that produce a mixture of growth hormone and other hormones (usually prolactin).
  - Somatotroph cell adenomas may be quite large by the time they come to clinical attention (because clinical features develop gradually).
  - In prepubertal children, excessive levels of GH result in gigantism.
  - If elevated levels of growth hormone persist, or develop after closure of the epiphysis, affected persons develop acromegaly (characterized by protruding lower jaw/tongue, facial features, enlargement of hands



and feet, sausage-like fingers, enlargement of internal organs, diabetes and cardiac problems).



- **Adrenocorticotropic hormone- producing (corticotroph cell) adenomas:**
  - Most corticotroph cell adenomas are small (microadenomas) at the time of diagnosis.
  - They cause hypercortisolism (↑cortisol) manifested clinically as Cushing disease, because of the stimulatory effect of ACTH on the adrenal cortex.
  - Large, clinically aggressive corticotroph cell adenomas may develop after surgical removal of the adrenal glands for treatment of cushing syndrome (Nelson syndrome).
  - In addition, because ACTH is synthesized as part of a larger prohormone substance (POMC) that includes melanocyte-stimulating hormone (MSH), hyperpigmentation also may be a feature.
- **Other anterior pituitary neoplasms:**
  - **Gonadotroph (LH-producing & FSH-producing) adenomas**: secretory products usually do not cause a recognizable clinical syndrome.
  - **Thyrotroph (TSH-producing) adenomas**: account for about 1% of all pituitary adenomas and constitute a rare cause of hyperthyroidism.
  - **The typical presentation with nonfunctioning adenomas is one characterized by mass effects**. These lesions also may compromise the residual anterior pituitary sufficiently to produce hypopituitarism.
  - **Pituitary carcinomas** are exceedingly rare. In addition to local extension beyond the sella turcica, these tumors virtually always demonstrate distant metastasis.
- **Hypopituitarism:**
  - **Deficiency of trophic hormones especially when 75% of pituitary gland is destroyed.**
  - **Causes include the following:**
    - ✓ Ischemic necrosis (Sheehan's syndrome).
    - ✓ Pituitary apoplexy.
    - ✓ Ablation by radiation or surgery.
    - ✓ Pressure effect of non-functioning pituitary adenoma.
    - ✓ Hypothalamic causes: disorders that interfere with delivery of pituitary releasing hormones from hypothalamus.
  - **Clinical manifestations:**
    - ✓ ↓ GH: children-pituitary dwarfism.
    - ✓ ↓ Gonadotropin: hypogonadism.
    - ✓ ↓ TSH: hypothyroidism.
    - ✓ ↓ ACTH: hypoadrenalism.
- **Posterior pituitary syndromes:**
  - **ADH deficiency** causes: diabetes insipidus which is characterized by:
    - ✓ Excessive urination.
    - ✓ Dilute urine (due to inability to reabsorb water from collecting tubules).

    Note: causes of this condition include: head trauma, tumors or inflammation in pituitary or hypothalamus.
  - **Syndrome of inappropriate ADH secretion (SIADH):**
    - ✓ Resulting in excessive reabsorption of water which leads to hyponatermia.

- ✓ Commonest cause of this condition is: ectopic ADH secretion (in small cell lung cancer).

- **Cranipharyngioma:**
  - It is a cystic mass with calcification which is derived from Rathke's pouch.
  - Mostly affecting children/ adolescents.
  - It is benign and slowly growing but sometimes can erode the bone and infiltrate into surrounding structures. Diabetes inspidus is a common manifestation of its local pressure effect.
  - Symptoms include hypofunction of pituitary gland and/or visual disturbances.
  - **Histological features:**
    - ✓ Cords of squamous epithelium in spongy reticulum with compact layers of keratin.
    - ✓ Squamous and columnar epithelium lining cystic spaces filled with oily fluid.
    - ✓ Cyst fluid contains cholesterol crystals and clefts.