



THE ENDOCRINE SYSTEM

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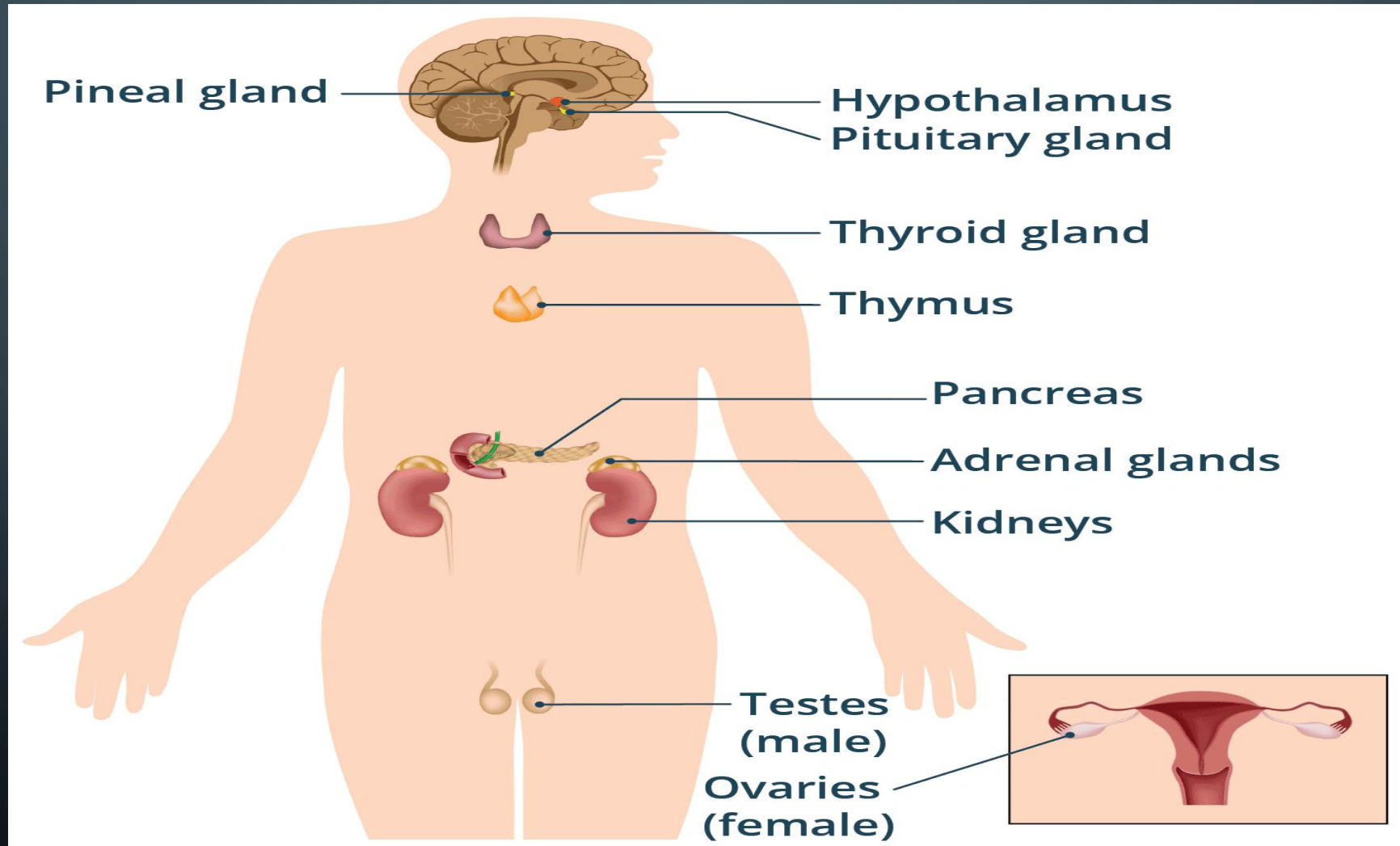
FUNCTIONAL ANATOMY & PHYSIOLOGY

- **The endocrine system is responsible for synthesis, secretion & action of hormones on the cells in different organs of the body.**
- **The hormones are chemical messengers released from these glands to orchestrate the function of different cells in the body.**
- **Some endocrine diseases are common , such as Type 1 Diabetes Mellitus, in which there is dysfunction of Beta cells of the pancreas, & Thyroid diseases, while other disorders are relatively uncommon or rare (Cushing's disease).**
- **Diseases of the endocrine system could occur either excess hormone production, or deficiency in certain hormones & sometimes a functional tumor can lead to excess hormone production with pressure effects on the rest of the gland leading to deficiency of other hormones.**
- **Some endocrine diseases manifest as a result of end organ resistance to the effect of specific hormone. In these patients we can find excess hormone production , with features of deficiency .**

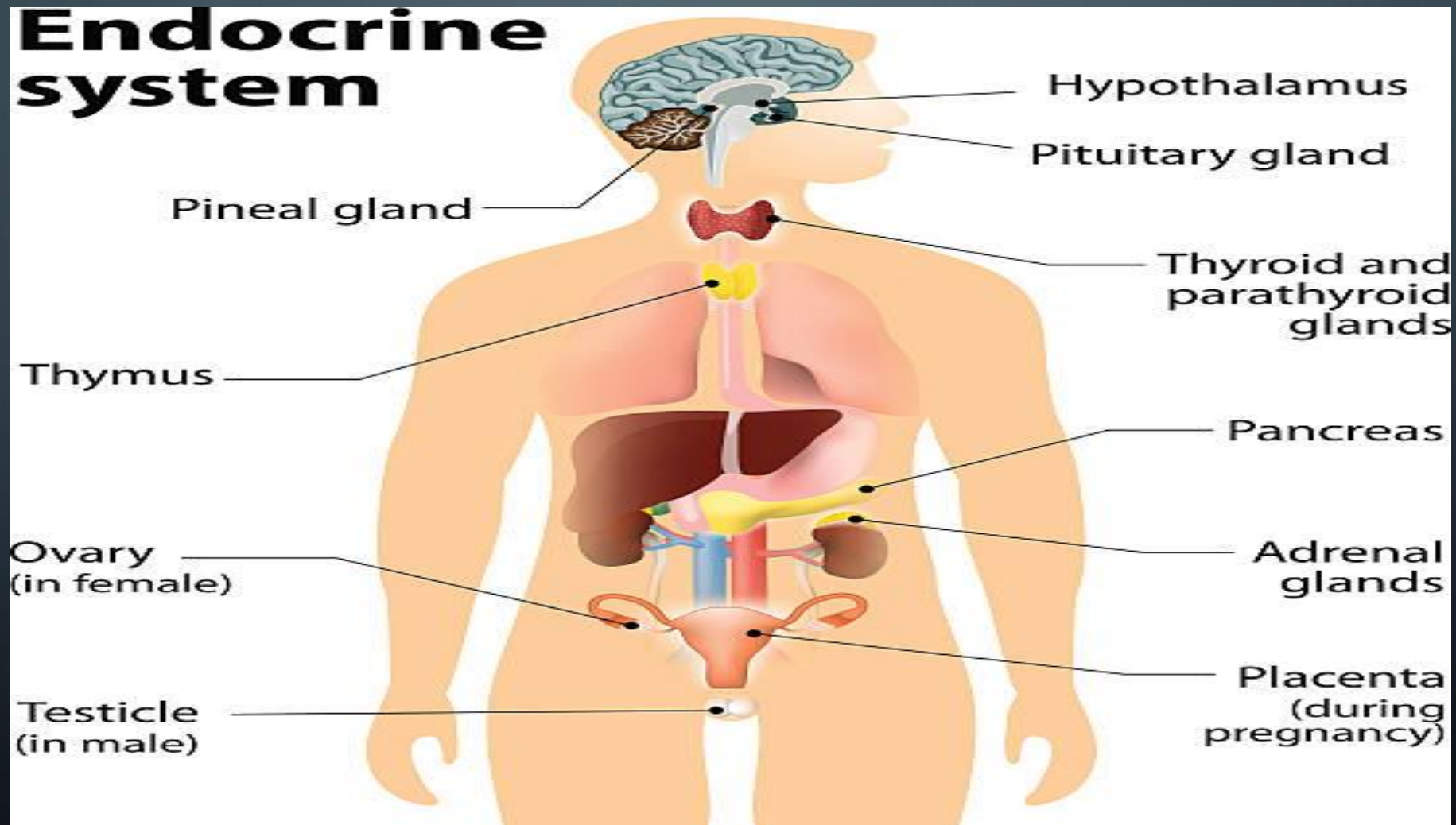
FUNCTIONAL ANATOMY & PHYSIOLOGY

- A part from some endocrine glands such as parathyroid & pancreas, all other endocrine system is under control of the pituitary gland through feed back mechanism by hormones produced in the target organs (thyroid, adrenals).
- The hormone production of the pituitary & hypothalamus is also controlled by other stimuli .
- The pituitary gland is composed of the anterior pituitary , which is controlled by substances (hormones) produced in the hypothalamus , which are released in the portal blood directed to the anterior portion through the pituitary stalk.
- The posterior pituitary gland is composed of the nerve terminal of the hypothalamus carrying the hormones of the hypothalamus into the gland.

ENDOCRINE GLANDS



ENDOCRINE SYSTEM



HORMONES PRODUCED BY PITUITARY GLAND

- The anterior pituitary gland produces the following hormones:
 - 1- FSH & LH under the effect of GnRH from the hypothalamus, act on gonads.
 - 2-TSH under the effect of TRH from the hypothalamus , act on the thyroid glands.
 - 3- GH under the control of GHRH from the hypothalamus , act on different targets in the body.
 - 4- Prolactin under inhibitory effect of Dopamine from the hypothalamus, act on female breast
 - 5- ACTH under control of CRH from the hypothalamus, act on adrenal glands.
- The posterior pituitary gland produces only 2 hormones :
 - 1-ADH (antidiuretic hormone , act on renal tubules.
 - 2-Oxytocin which is responsible for milk production in lactating female, also act on the uterus.

THE PRINCIPAL ENDOCRINE GLANDS

- 1- Hypothalamus/ Pituitary .
- 2-Thyroid gland.
- 3-Parathyroid gland.
- 4-Pancrease. The endocrine portion consists of α , β and δ cells .
- 5-Adrenal glands.
- 6- Gonads (ovaries & testes).

DISEASES OF ENDOCRINE GLANDS

- The diseases which affect the endocrine glands arise either in the gland itself (Primary) , or arise from other gland controlling it (Secondary).
- In any disease which affects a specific gland , there may be either overproduction (overactivity \ toxicosis) of the hormone , or under \ absent hormone production (deficiency \ failure).
- The effects of overproduction or deficiency can affect either single target organ , or multiple targets in the body. For example , deficiency or excess of TSH will affect mainly the thyroid gland function leading to hypothyroid state or hyperthyroid state in the body , respectively . While deficiency of growth hormone (GH) affect almost all body tissues (bone , muscle , heart , skin).
- Some diseases of endocrine system can affect single gland , such in cases of organ specific autoimmune diseases (Hashimoto thyroiditis), which are relatively common , or affect different endocrine gland types such in (MEN) , multiple endocrine neoplasia, which are rare.

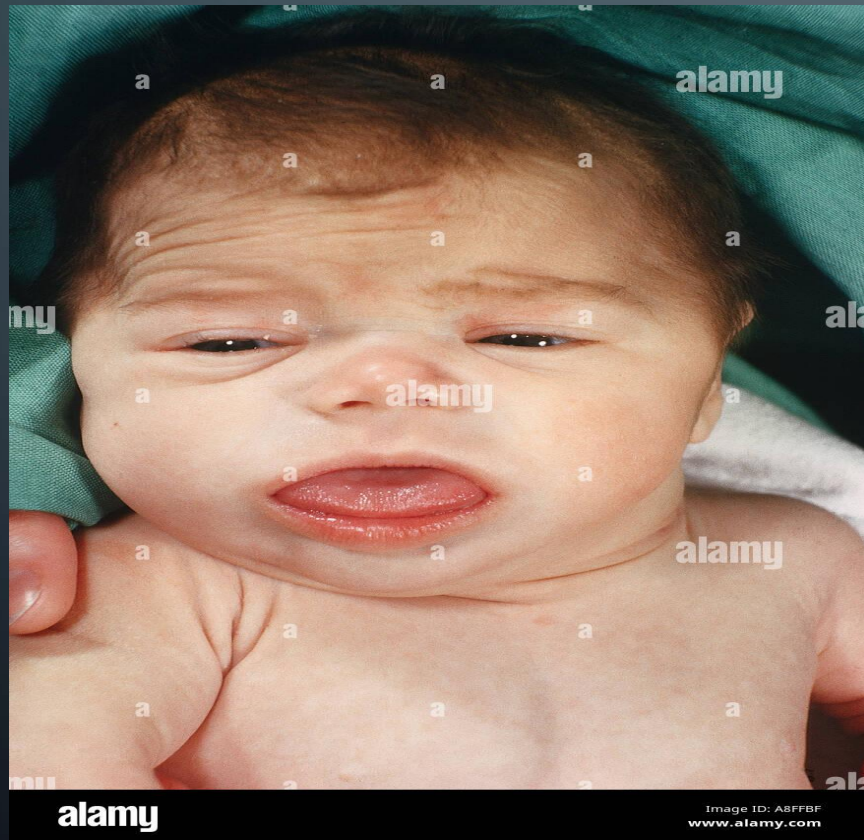
DISEASES OF THE ENDOCRINE GLANDS

- The endocrine disease are classified broadly into:
- 1- Excess hormone production. Whether primary or secondary.
- 2- Inadequate or absent hormone production. Primary or secondary .
- 3- Hormone insensitivity states , due to failure of inactivation or target organ over- responsiveness.
- 4-Hormone resistant states, due to failure of hormone activation or target organ resistance.
- 5- Presence of non- functioning tumors in the gland , compressing the tissue & leading to hypofunction or dysfunction of the gland.

INVESTIGATIONS OF ENDOCRINE DISEASES

- As a principle , whenever there is gland hypofunction , the tests rely on stimulation of hormone production to estimate the gland reserve, & vice versa.
- Simple hormone level estimation is sometimes not useful , as the hormone production have diurnal variation , pulsatile secretion & monthly variation, beside other effects on gland function. (stress).
- Hormone level estimation is the main method for investigation , by measuring the hormone level in the blood mainly , but also in saliva or urine.
- The patient should be well instructed & prepared , as hormone level estimation could be affect by many factors , such as drugs , stress, food intake & exercise .
- In certain conditions , loss of diurnal variation is a clue to gland dysfunction.
- Imaging studies will usually follow the hormonal level estimation , to find the site , the type & accurate size & activity of the gland (Ultrasound , C.T, MRI. Radio- isotope studies).
- Sometimes biopsy is needed for endocrine tumors for histological classification.

HYPOTHYROIDISM IN NEWBORN



Hypothyroidism

THYROID

CAUSES

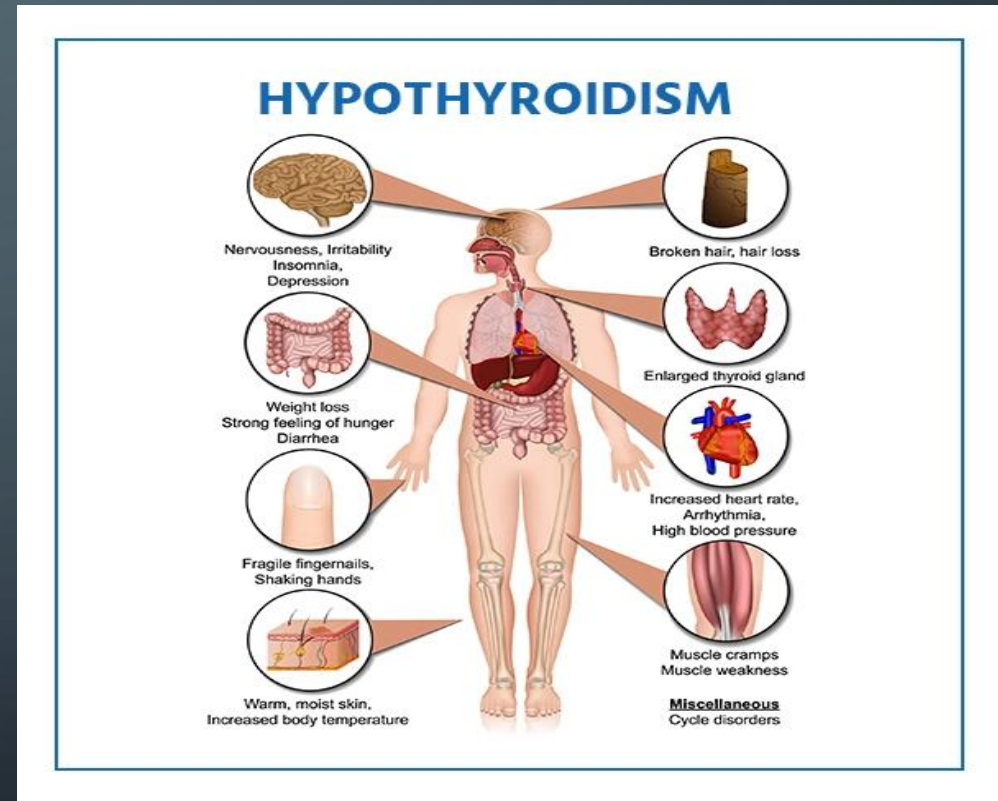
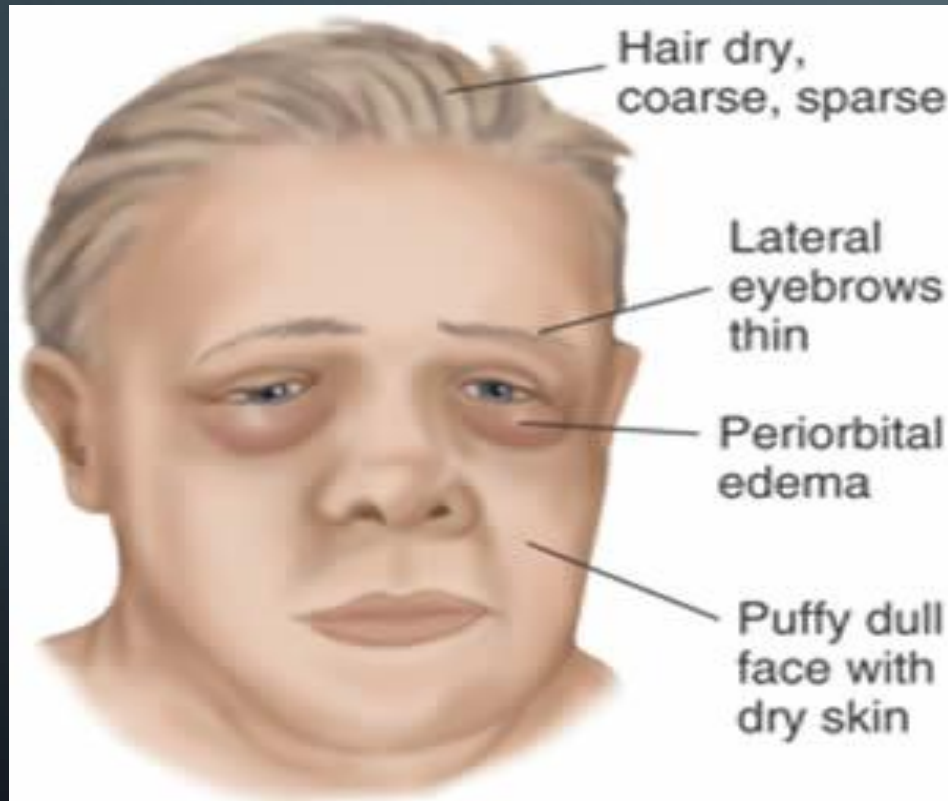
SYMPTOMS

TREATMENT

DIAGNOSIS



HYPOTHYROIDISM IN ADULTS

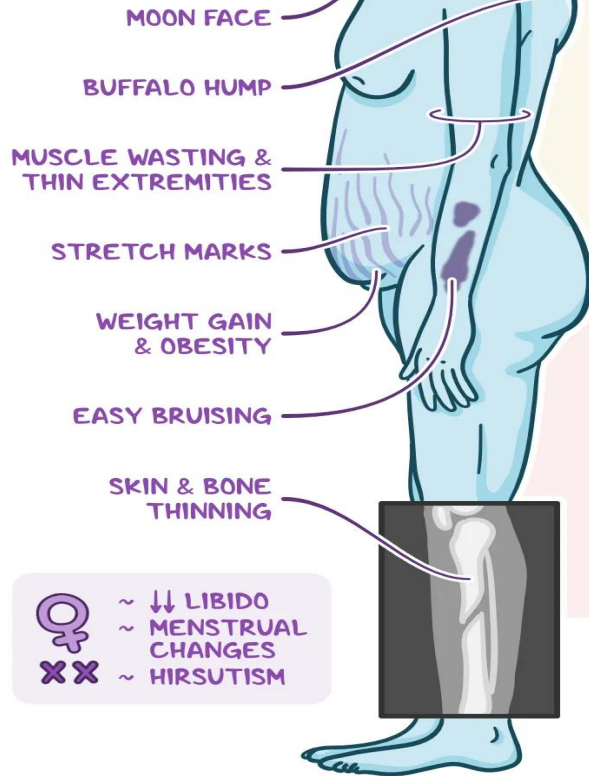


THYROTOXICOSIS



CUSHING DISEASE

SYMPTOMS of CUSHING SYNDROME

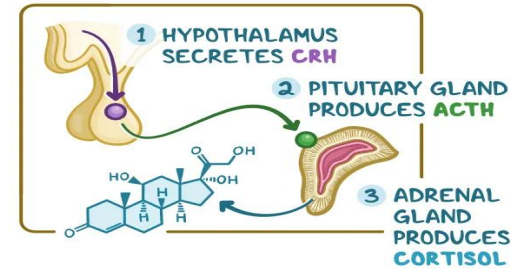


BACKGROUND

- * SET of SYMPTOMS RESULTING from EXPOSURE to ↑↑ LEVELS of CORTISOL ~ aka HYPERCORTISOLISM
- * ENDOGENOUS or EXOGENOUS SOURCES of EXCESS CORTISOL

CAUSES

- * LONG-TERM USE of GLUCOCORTICOID MEDICATIONS
- * PITUITARY TUMOR ~ CUSHING DISEASE
- * ECTOPIC ACTH-PRODUCING TUMOR
- * ADRENAL TUMOR



DIAGNOSIS

- * MEDICAL HISTORY
- * PHYSICAL EXAM
- * LAB TESTS
 - ~ 24-HOUR URINARY FREE CORTISOL TEST
 - ~ LATE-NIGHT SALIVARY CORTISOL
 - ~ LOW- or HIGH-DOSE DEXAMETHASONE TEST
- * IMAGING



CUSHING DISEASE



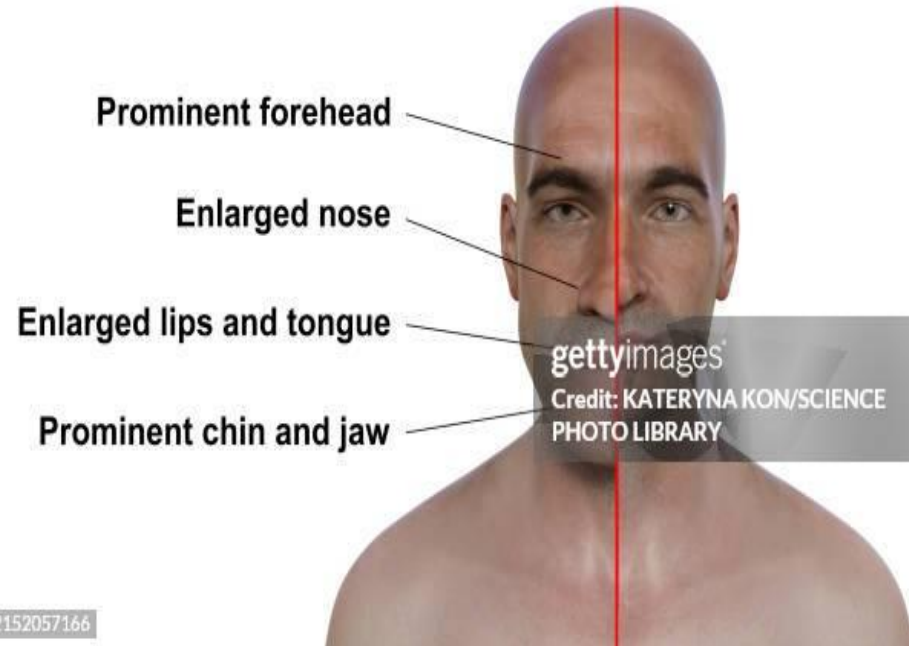
CUSHING DISEASE



ACROMEGALY



ACROMEGALY



GIGANTISM

