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DEPARTMENT: MLT. 4TH SEMESTER
Course Title: Chemical Pathology
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Q No 1 Answer:

➤ **Thyroid Hormones:**

- Secreted by the thyroid gland.
- Glands secrete major hormones. (Tyrosine T4) (Triiodothyronine (T3))
- Controlled by the primarily TSH (Thyroid stimulating Hormones) Secreted by the Ant pituitary gland.
- Gland also secrete calcitonin (imp Hormones in calcium metabolism)

➤ **Mechanism Of action:**

❖ Action Mediated by:

- ___TSH _Camp (Secondary Messenger) mediated
- ___ Thyroxin _ intracellular receptor mediated

➤ **Objectives:**

❖ **Functional Anatomy:**

- Gross Anatomy
- Histological Structure

❖ **Thyroid Hormones:**

- Biosynthesis & Storage
- Secretion , Transport & Metabolism
- Regulation of thyroid hormone secretion

❖ **Applied Aspect:**

- Hyperthyroidism
- Hypothyroidism

➤ **Principle:**

- Tri-iodothyronine T3
- Thyroxin T4
- T3 __10% , Responsible for most of tissue actions.
- T4 __90%

❖ **Calcitonin:**

- Hormones secreted by par follicular cells , concerned with calcium homeostasis.

➤ **Biosynthesis & Storage:**

- Iodine trapping
- Coupling reaction
- Storage
- Oxidation of iodides

➤ **Effect of thyroid hormones:**

- Growth & development
- Intermediately metabolism
- Calorigenesis
- Cns
- Cvc
- Skeletal muscle
- Git
- Kidney
- Hemopoiesis
- Reproduction

➤ **Thyroid Function test:**

- ❖ Assay of Hormones:

___ T3 , T4 , TSH ,FT4 ,FT3 , RT3 , Anti-TPO , Anti-Tg

___ Assay by ELISA/CLIA/ECLIA

___ Normal reference interval

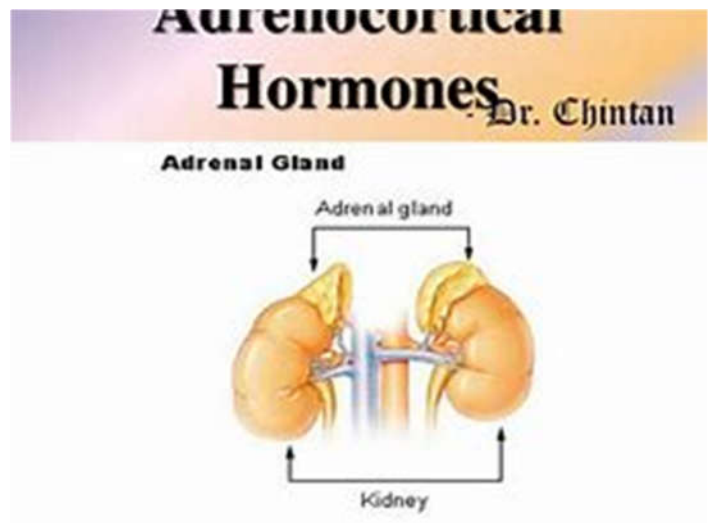
- T3_ 0.8-2.0ng/ml
- T4_ 5.1-14.1 micro litter G/dl
- FT4_ 0.93-1.7ng/dl
- FT3_ 3.5-7.8pmol/L
- TSH_ 0.27-4.1micro liter /ml
- Tg_ 3-40 ng/ml

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Q No 02 Answer:

➤ **Adrenocortical Hormones:**

- There are two adrenal gland
 - Adrenal medulla
 - Adrenal cortex
- ___ Each of which weights about 4grams
___ Superior poles of two kidneys



➤ **Types:**

❖ **Adrenal cortex:**

____Corticosteroid (Mineral corticoids , Glucocorticoids , Androgenic Hormones)

✓ **Androgenic Hormones:**

- Testosterone

✓ **Mineralocorticoides:**

- Electrolytes

✓ **Glucocorticoides:**

- Increase blood Glucose conc. , Protein And Fat metabolism

✓ **Aldosterone:**

- Mineralcorticoides

✓ **Cortical:**

- Glucocorticoides

❖ **Layers of adrenal cortex:**

- Zona Glomerulosa
- Zona Fasciculata
- Zona Reticularis

❖ **Regulation of secretion:**

✓ **Aldosterone:**

- Angiotensin 2 Cortical And Androgen : ACTH

➤ **Adrenal Medulla:**

- The adrenal medulla , the central 20 percent of the gland , is functionally related to the sympathetic nervous system.
- It secretes the hormones epinephrine and nor epinephrine in response to sympathetic stimulation.
- The adrenal cortex secretes an entirely different group of hormones , called Corticosteroids.

➤ **Transport:**

- Approximately 90 to 95 percent of the cortisol in the plasma binds to plasma proteins
- Cortisol has a relatively long half – Life of 60 to 90 minutes.

- **Adrenocortical Hormones are Metabolized in the liver:**
 - The adrenal steroids are degraded mainly in the liver and conjugated especially to glucuronic acid and to a lesser extent, sulfates.
 - About 25 percent of these conjugates are excreted in the bile and then in the feces.
 - Disease of the liver markedly depresses the rate of inactivation, and kidney disease reduces the excretion of the inactive conjugates.

- ❖ **Liver in blood:**
 - The concentration and secretion rate of cortisol fluctuate throughout the day, rising in the early morning and declining in the evening.

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Q No 03 Answer:

- **Hyperthyroidism:**
 - Hyper mean having too much
 - Thyroids' mean thyroid hormone

❖ **Definition:**

Disease process associated with increased thyroid secretion result in predictable hyper metabolic state.

Or

Hyperthyroidism is due to increased level of thyroid hormone diffuse toxic goiter (graves disease) Toxic multi nodular goiter (Plummer' disease) toxic edema.

➤ **Types:**

❖ **Primary thyrotoxicosis:**

- I. Diffuse toxic goiters –graves' disease

❖ **Secondary thyrotoxicosis:**

- II. Toxic nodular goiter
- III. Toxic nodules
- IV. Hyperthyroidism due to rare cause

➤ **Histology:**

❖ **Normal acne:**

- With flattened cubical epithelium and filled with homogenous colloid

❖ **Hyperthyroid:**

- Acne hyperplasia
- Lined by high columnar epic
- Empty or vacuolated colloid
- Characteristics scalloped pattern ad sent to tyro sites

➤ **Clinical features :**

❖ **Symptoms:**

- Tiredness
- Emotional liability
- Heat intolerance
- Weight loss
- Excessive appetite
- Palpitation
- Diarrhea
- Amenorrhea

➤ **Signs:**

- Tachycardia
- Hot moist forms
- Exophthalmoses
- Lid lag
- Agitation
- Thyroid swelling
- Bruit

➤ **Diagnosis:**

1. Clinical
2. Thyroid profile
3. Thyroid scan-autonomous nodules
4. Children with growth spurt

➤ **Treatment:**

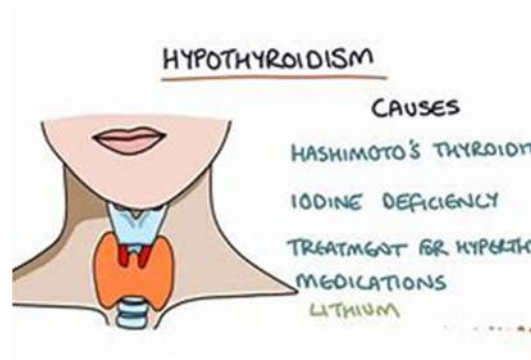
- Rest
- Sedation
- Ant thyroid drugs
- Surgery radio iodine

➤ **Advantages:**

- No surgery
- Rapid control of thyrotoxicosis

➤ **Disadvantages:**

- Treatment is prolonged
- Failure rate is 50%



➤ **Hypothyroidism:**

___Hypo mean less

___thyroids mean thyroid hormone

Definition:

Deficiency of thyroid hormones which is normally made by thyroid gland which is located in front of the neck.

Or

Failure of thyroid gland to produce sufficient thyroid hormones to meet the metabolic demands of the body.

❖ **Classification of hypothyroid gland:**

✓ **Primary:**

- Due to failure of thyroid gland itself

✓ **Secondary:**

- Due to hypopituitary

✓ **Tertiary:**

- Due to failure of hypothalamus

✓ **Quaternary:**

- Due to tissue insensitivity to action of thyroid hormones

➤ **Symptoms:**

- Weight gain
- Dry skin and hair
- Hoarse voice
- Fatigue
- Puffy facial feature
- Cold intolerance

➤ **Causes:**

❖ **Primary gland failure:**

- Congenital abnormalities
- Autoimmune destruction (hashimoto disease)
- Iodine deficiency
- Infiltrative diseases

➤ **Drug associated with thyroid dysfunction:**

- Lithium
- Amiodarone
- Interferon Alfa
- Interleukin -2
- Tyrosine kinase inhibitors

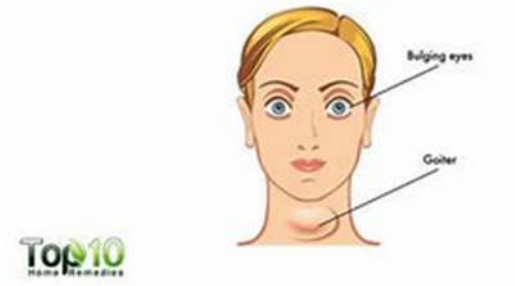
➤ **Treatment:**

- The starting dose of levothyroxine in young, healthy adult for complete replacement is 1.6 mcg per kg per day.

❖ **Instruction:**

- ✓ Taking in the morning 30 minutes before eating.
- ✓ Calcium and iron supplement should not be taken within four hours .

HYPERTHYROIDISM



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Q No 04 Answer:

➤ **Calcium regulation:**

- Normal calcium regulation depends on the complex interaction of several systems.
- The specific calcium regulating hormones, parathyroid hormones, calcitriol and calcitonin, affect calcium and phosphorous concentration and supplied by effecting on bone, kidney and intestine.
- The changing concentration supply on ions not on the regulate these hormones, but may also influence the function of the target organ, particularly bone, directly.

- Systemic hormones such as growth hormones and somatomedins, glucocorticoids, sex hormones and thyroid hormone are essential for skeletal growth and development and interact with calcium regulators.
- Prostaglandins and osteoclast activating factor maybe important in local regulation of bone.
- Disorders of calcium regulation are common, particularly hyper calcemia in malignancy have not been identified.
- The royal of calcium regulating hormones in the pathogenesis and treatment of osteoporoses is controversial.
- Solution of this problem may be dependent on the identification of additional factor which influence menrol metabolism.

➤ **Osteomalacia:**

_____means soft bones.

❖ **Definition:**

Bone is a living , active tissue that's continuously being removed and replaced , this process is known as bone turnover , bone consist of a hard outer shell (cortex) made up of minerals ,mainly of calcium and phosphorous and softer inner mesh (the matrix) made up of collegian fiber bone turnover.

Bone cc:L

consist of hard outer shell (the cortex) when normal bone is form these fiber are coated with mineral.

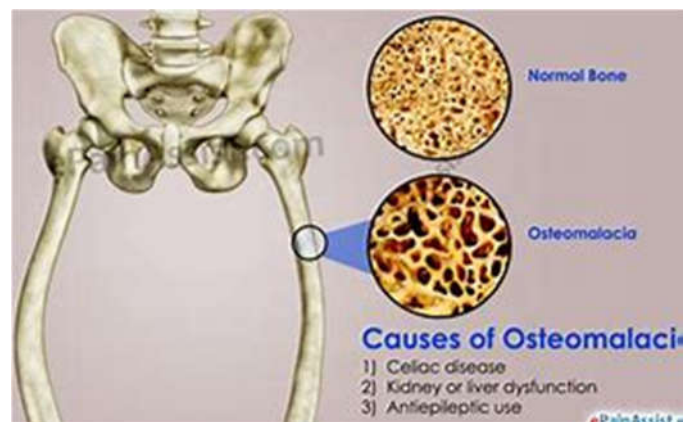
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Q No 05 Answer:

➤ **Sex Hormones:**

❖ **Introduction:**

- Steroid hormones
- BCOS of this, the sec hormones are , some time



are referred to as 2 .sex hormones of the adenohippophysis.

- Three types are sex hormones are recognized.
 - 01) The estrogen (female/ovarian/follicular hormones)
 - 02) The estrogen (male/testicular hormones)
 - 03) The estrogens (corpus lacteal hormones)

❖ **Ovarian Hormones (C18 Steroids):**

✓ **Structures:**

- Mammalian ovary contains ovarian follicles and corpus lutea.
- Hormones produced mainly in the follicles are known as estrogen.
- The important estrogen are:
 - 01)beta estradiol (C18,H24,O2)
 - 02) estrous (C18,H24,O3
 - 03) estrange(C18 , H22 , O2)

➤ **Function:**

- Effects on uterus
- Effects on fallopian tubes
- Effects on vegina
- Effect on the breast
- Effects on 2 sexual characteristics
- Effects on bones
- Effects on proteins and fats metabolism
- Effects on electrolytes balance

THE END

