

Thyroid Gland

- ⇒ Largest endocrine gland
- ⇒ weighing 15-25 grams.
- ⇒ Only endocrine gland which is visible
- ⇒ stored extracellularly
- ⇒ vascular structure
- ⇒ Rate of BF - 400-600 ml/100 gm.
- ⇒ Reabsorption lacuna → Active stage
- Active → Follicle is smaller in size, amount in centre is less.
- lining cuboid/columnar, show small Reabsorption lacunae
- ⇒ Major constituent of colloid is - Thyroglobulin (glycoprotein)

INACTIVE: The follicles will be large with flat ep cells. & amount of colloid is more.

- Hormones secreted:
- ⇒ Tetraiodothyronine - T_4 (Thyroxine)
 - ⇒ Triiodothyronine - T_3
 - ⇒ RT_3 (Reverse)
 - ⇒ Iodinated derivative of Tyrosine
 - ⇒ Iodine is the raw material for Hsyn. Ingested Iodine is converted to I^- & absorbed.

DAILY REQUIREMENT - 100-200 mg/dy
Normal plasma level is 0.3 mg/dL

Steps in Thyroid hormone synthesis.

1) IODIDE TRAPPING.

- Transfer of Iodine from ECF into follicular ep cells.

- This Active transport mechanism is called Iodide pump which occurs at the basal membrane of ep cells.

⇒ It occurs against electrochemical gradient.

⇒ NIS (Na^+/I^- symporter) produce I^- conc even up to 20-40 times greater than plasma.

⇒ This process is stimulated by TSH

⇒ Antithyroid drugs like Thiocyanate, perchlorate inhibit Iodide Trapping.

2) Synthesis & secretion of T_6I .

⇒ T_6I is a glycoprotein.

3) Iodination of tyrosine molecule or organization of T_6I .

⇒ Iodide should be oxidized to I_2 in presence of the enzyme Thyroperoxidase.

⇒ H_2O_2 is present for accepting electrons.

- In the process of accepting electron. of TP binding of Iodine
- with Ti occur at the apical border of ep cell
- MIT formed

4) COUPLING REACTIONS

- 2 molecules MIT by oxidative condensation form Tu (3,5,3',5' tetraiodo thyronine)
- T_3 ~~MIT~~ condense with 1 mol of MIT T_3 & T_4 are stored in the colloid of the follicle
- In normal human thyroid MIT-23%, DIT -33%, Tu -35%, T_3 -75% & trace of RT_3 .

Secretion

- small droplets of colloid containing I_4 and taken up at the apical border of epithelial cell by pinocytosis
- The cell droplet fuse with lysosome vesicle which contain proteolytic enzyme
- Ti mol release I into cytoplasm of ep. cells from where they diffuse into blood capillaries.
- DEIODINASE Remove Iodine from MIT & DIT.

Mechanism of Action of thyroid hormones:

- ^{Receptor} H are seen in nucleus. two types:

α & β action is through gene is by transcription & translation effect.

- Calorigenic action is due to increased Na^+ K^+ ATPase ACTION

T_3 & T_4 are bound to plasma P.

- TBG - Thyroxine binding Globulin
- TBPA - Thyroxine binding prealbumin
- Albumin.

Small fr. circulates as free T_3 & T_4

- T_4 - 99.98% bound from 0.02% free from

- T_3 - 99.98% bound from 0.2% free from.

- T_3 is more Active & with short than T_4

- Most common.