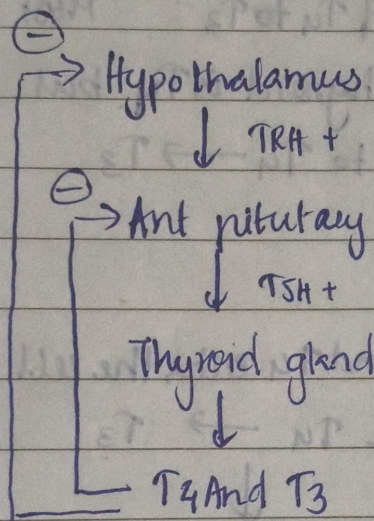


THYROID AND ANTITHYROID DRUGS

- Hormones secreted by thyroid gland are thyroxine (T_4), T_3 , calcitonin.
- It is Regulated by TSH secreted by Ant. pituitary.
- The 'C' cell of thyroid secretes - calcitonin.



SYNTHESIS OF THYROID HORMONES:

- 1) Iodide Trapping: Active transport of iodide ions into follicular cells of thyroid gland is known as Iodide trapping.
- 2) Oxidation And iodination: The iodide is oxidized to iodine by peroxidase enzyme. Iodine combine with tyrosine to form MIT And DIT.

3) Coupling: Two molecule of $DIT \rightarrow T_4$
 $HIT + DIT \rightarrow T_3$

4) Hormone Release: under the control of TSH.
Release T_3, T_4, HIT, DIT .

5) Peripheral conversion of T_4 to T_3 : Most hormone Released from thyroid is T_4 but it is less potent than T_3 so converted to $T_4 \rightarrow T_3$.

MOA:

T_3 And T_4 enter the cell
where $T_4 \rightarrow T_3$
↓

T_3 combine with nuclear Receptor

↓
Activation of diff gene

↓
Syn of various proteins

↓
Physic effect

Drug: thyroxine (T_4)

thyronine (T_3)

combination of T_4, T_3 (4:1)

Uses: therapy in hypothyroid state.

- 1) Goiterism: f/t of new should be started immediately to ensure normal growth
- 2) Adult hypothyroidism (Myxoedema): due to Autoimmune thyroiditis or thyroidectomy
- 3) Myxoedema coma: emergency characterized by
↓
profound mental Retardation
seen in untreated myxoedema cases
C.F - Hypothermia, Bradycardia, pleural effusion
- 4) Nontoxic goiter - enlargement of thyroid with eut thyroid status.
- 5) Thyroid nodule: therapy with T_4 suppress TSH level
- 6) Thyroid carcinoma: full dose of T_4 suppress endogenous TSH production. And may induce temporary Regression.

THYROID INHIBITORS:

CLASSIFICATION:

⇒ INHIBIT HORMONE SYNTHESIS: (Thioamides)

- ~~Both~~ Propylthiouracil
- Methimazole
- Carbimazole

⇒ INHIBIT HORMONE RELEASE:

- Iodine
- Iodides of Na, K⁺
- Organic Iodide

⇒ DESTROY THYROID TISSUE:

- Radioactive iodine I¹³¹

⇒ INHIBIT IODIDE TRAPPING

- Thiocyanates
- Nitrates
- Perchlorates

THIOAMIDES

HOA: they Inhibit

- Thyroid peroxidase enzyme, which convert iodide to Iodine
- Iodination of tyrosine Residue in thyroglobulin
- coupling of iodotyrosines (MIT And DIT)

Propylthiouracil Also Inhibit peripheral conversion of T₄ to T₃.

PTU — orally, cross placenta → cause fetal hypothyroidism
checked in urine

Pro.

ADR:

- Hypo thyroidism
- Skin Rashes
- Aggranulocytosis
- joint pain, hepatitis.

Uses:

- For long term $\pm$ hyperthyroidism due to Graves disease.
- Preoperatively in hyperthyroid patients.
- For $\pm$ of thyrotoxic crisis.
- Along with ^{131}I

Q/b propylthiouracil & Carbimazole

- | | |
|--|---------------------------------|
| ⇒ less potent | more potent |
| ⇒ High bound to PB | less bound |
| ⇒ No Active Metabolite | Active Metabolite - Methimazole |
| ⇒ Inhibit T_4 to T_3 | Does not Inhibit |
| ⇒ Multiple dose | single dose |

IODINE AND IODIDES:

Iodine Inhibits T_3, T_4 Release by (Thyroid conjugation)

Rapidly Acting

high conc of iodide appears to Inhibit Almost all steps in the synthesis of thyroid hormone

when the Receptor become down - Regulate

↓
Halt thyroid escape

→ Wolff-Chaikoff effect

→ All the Thyroid Accumulated will be Released

∴ They are not perfect

Uses:

- ⇒ Preoperative preparation
- ⇒ Thyroid storm
- ⇒ Prophylaxis of endemic goitre
- ⇒ Antithyroid

ADIR → Angiodema, hyperaemia, lymphadenopathy

RADIOACTIVE IODINE

- ⇒ Therapeutically used is ^{131}I
- ⇒ They get concentrated and emits gamma rays & β particles
- ⇒ β particle cause destruction of the follicular cell leading to fibrosis and correction of hyperthyroid state

PK → absorbed & taken orally (20-100 $\mu\text{g}/\text{m}^2$)

Uses: hyperthyroidism due to Graves' disease
due to Adenoma or carcinoma

C/I is pregnancy & children.

Ad → Not-exposed, No Risk of surgery, simple t/t

Dis → cause local soreness in neck.

Prevalence of hyperthy.

not suitable for preg women Ad children.

ADRENOCEPTOR BLOCKERS (β Blockers)

- $\Rightarrow$ They produce improvement in symptoms of thyrotoxicosis like tachycardia, palpitation, tremor
- $\Rightarrow$ Propranolol has an inhibitory effect on conversion of T_4 to T_3 .

Uses:

- $\Rightarrow$ Thyrotoxicosis.
- $\Rightarrow$ Pre operatively before thyroid surgery.

* THYROTOXIC CRISIS (THYROID STORM)

- This is an emergency due to decompensated hyperthyroidism.
- hyperpyrexia, cardiac Arrhythmia, rhabdomyolysis, muscle weakness, dehydration.

t/t

- $\Rightarrow$ Hospitalization: 2mg IV
- $\Rightarrow$ Propranolol $\rightarrow$ They Reduce peripheral conversion of T_4 to T_3 withdrawn when T_4 level normalise
- 46 (C/I $\rightarrow$ Dilated cardiomyopathy)
 $\Rightarrow$ Propylthiouracil $\rightarrow$ 200-300mg oral 6h Reduce hormone synthesis as well as conversion.
- $\Rightarrow$ Dexamethasone $\rightarrow$ Same Action
- $\Rightarrow$ Corticosteroids $\rightarrow$ Hydrocortisone 100mg IV stat
- $\Rightarrow$ Rehydration, Antipyretics, external cooling, Antibiotics.