

Thyroid gland:

1- composed of cubical cell of epithelium surround the vesicle which contain colloid (glycoprotein) the storage form of thyroxin is thyroglubulin (thyroxin + globulin) in follicular cell the wight of gland is 25 g, it has two lobes connect by isthmus at upper part of trachea, supplied by sympathetic nerve fiber from middle cervical ganglia.

2- it secret thyroxin (T4) composed of 4 iodine atoms:

Tetra-iodothyronin which is converted to T3 3 iodine atoms triiodothyronin, thyroid contain 20% of total iodine in body.

////////////////////////////////////

3- Feed backmechanisim:

When T4 (thyroxin)decrease due to decrease iodine in diet or increase utilization of iodine in pregnancy and puberty
--

TRF: thyrotrophic releasing factor

Or TSH- RF: thyroid stimulating hormone releasing factor.

////////////////////////////////////

4- synthesis – made

Factors affecting thyroxin synthesis

I. Blood iodide level : Blood contain two form of iodine :-

a- inorganic iodide (0.5 $\mu\text{gm}\%$ present in plasma and RBC).

b- organic iodine (4.8 $\mu\text{gm}\%$ present in plasma only).

Hormone iodine, it is PBI (plasma protein bound iodine), usually T4 is more strongly bind with protein than T3 PBI is better index for thyroid activity than BMR. In myxedema (decrease thyroxin secretion) it is 2 $\mu\text{gm}\%$ and become zero after thyroidectomy. While in hyperthyroidism it is 14-30 $\mu\text{gm}\%$.

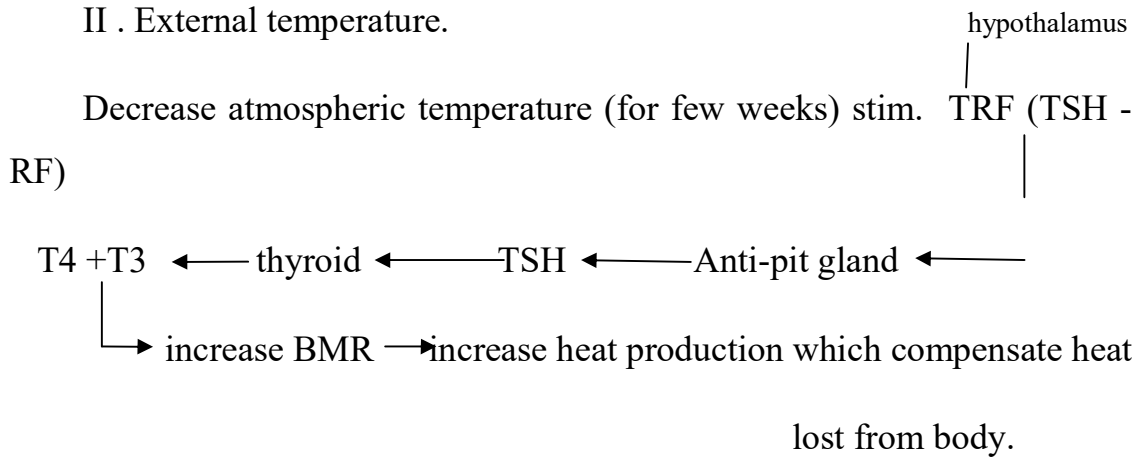
The high PBI is reduced by iodine therapy: (10-70 mg daily) due to:

1- increase storage of hormone in vesicles so decrease secretion to blood.

2- Diminish iodination of tyrosin.

3- Inactivation of TSH.

II . External temperature.



III. Autoimmune reaction :-

Over activity of thyroid – is due to autoimmune antibody (AB) called thyroid stimulating immunoglobulin (TSI) produced from lymphocyte (have TSH action) this AB act against body's own tissue.

IV. fate of thyroxin:

Extra amount of thyroxin conjugated in the liver with glucuronic acid and excreted with bile.

Action of thyroxin

1- Caloregenic effect: it increase O_2 (O_2 consumption), increase BMR and increase heat production occur by catalyzing oxidative enzyme e.g. carbohydrates, proteolases , transferases.

2- Effect on CHO (carbohydrate):-

Exert anabolic effect on carbohydrate when it is in normal amount, But when thyroxin secretion increase it will increase blood glucose concent. Due to:-

a- promote glucose absorption from intestine.

b- stimulate hepatic glycogenolysis (conversion of glycogen to glucose) and also promote gluconeogenesis (conversion of aminoacid to glucose) i.e. antagonistic to insulin which elevate blood glucose.

c- potentiate glycogenolytic action of other hormones as adrenaline therefore increase blood glucose.

3- Effect on fat metabolism :

Exert direct lipolytic action on fat store promote indirect lipolytic action of other hormones e.g. adrenaline, growth hormone, glucocorticoid and glucagen therefor decrease blood cholestrole.

4- Effect on protein: normally in normal concentration, stimulate synthesis of protein (anabolic effect), but in over secretion cause break down of protein (catabolic effect) result in

1- muscle weakness (thyroid myopathy) and increase relaxation period of tendon reflex.

2- increase creatin urea due to increase aminoacid concentration in blood .

3- decrease body weight.

5- promote growth and development of organs.

6- acceleration of heart (increase HR) by the following:

a-Direct stimulation of SA node.

b- Via increase metabolism which increase venous return to the heart (Bainbridge reflex).

c-Thyroxin sensitise the heart to action of adrenaline.

7- effect on GIT (digestive system) :-

Increase absorption of food and increase secretion of digestive juices, increase motility of intestine therefore increase appetite.

Usually increase thyroxin secretion cause diarrhea while decrease thyroxin secretion cause constipation .

8-Effect on CNS:-

Thyroxin is important for normal development of CNS at birth up to first year of life deficiency of thyroxin in first year of life cause mental retardation.

Over secretion of thyroxin in man cause hyperexcitability due to increase synaptic transmission and irritability and restlessness.

9- Effect on bone

It promote skeletal development, in congenital hypothyroidism – long bone remain infantile & closure of epiphysis is delayed, excessive demineralization of bone i.e. increase Ca^{++} excretion in urine and faeces. Cause rarefaction of bone and decrease serum level of Ca^{++} . this effect is not due to parathormone hormone but is due to catabolic effect of thyroid hormone have a feature similar to increase stimulation of Beta- adrenoceptor .

10- it keeps constant body temperature in cold weather.

Abnormal action of thyroid gland:

1- Decrease thyroxin (hypothyroidism).

a- Hypothyroidism in children known as cretinism.

b- Hypothyroidism in adult known as myxedema.

2- Increase thyroxin (hyperthyroidism) known as thyrotoxicosis.

Note: goiter mean enlargement of thyroid gland either due to hypoactive or hyperactive gland.