

# ACTION OF THYROID HORMONES.

## (i) metabolic actions

### (a) on Basal metabolic rate:-

↑ BMR by → ↑  $O_2$  consumption & ↑ Basal metabolism except brain, ant. pit.

↑  $Na^+K^+$  ATPase.

↑ synthesis of cytochromes & cytochrome oxidase activity.

• ↑ heat production.

↑ BMR → ↑  $Na^+$ ,  $K^+$  excretion.

↑ vitamin deficiency.

### (b) Carbohydrate metabolism - Hyperglycemic.

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## (c) Fat metabolism.

- lipolysis: mobilisation of fat from adipose tissue.
- ↑ FFA → oxidation of FFA ↑.
- cholesterol synthesis ↑ promotes cholesterol ox. & biliary excretion.
- Hepatic uptake ↑ due to ↑ expression of LDL receptors in liver.
- Net effect → ↓ cholesterol in plasma.

of tissues  
↑ spleen, testes, adrenal,

**(D) protein metabolism.**

- physiological doses → protein anabolism.
- ↑ RNA & protein synthesis → +ve N<sub>2</sub> balance.

Hyperthyroidism → protein catabolism.

Hypothyroidism → ↓ protein synthesis

**(E) Vitamin Metabolism.**

β carotene → vitamin A.

Hypo → β carotene accum → yellow skin.

**(F) Electrolyte & water metabolism.**

→ TH help in uniform distribution of water & electrolyte.

→ Hypo → retention of H<sub>2</sub>O & E

→ Hyper → ↑ phosphate excretion, Ca<sup>2+</sup>.



## GI T

(4)

↑ appetite & motility & secretions.

∴ hypo → ↓ appetite ↓ food intake ↓ motility → constipation.

hyper → ↑ ap ↑ ↑ → diarrhoea.

## Skeletal muscle.

muscle weakness in both hypo & hyperthyroidism.

Hypo → general depression of metabolism.

hyper → due to protein catabolism.

Thyrotoxic myopathy.

## On sleep.

Hyper → constant tiredness & difficulty to sleep.

Hypo → Extreme somnolence with sleep of 12-14 hours.

## Reproduction.

men → lack of TH → low of libido, oligospermia, sterility.

Excess TH → sometimes impotency.

women →

lack → loss of libido, ↓ fertility, menorrhagia.  
polymenorrhoea.

Excess → oligomen / amenorrhoea.

helps in maintenance of milk secretion during lactation.

(h) on CNS.

for → branching of dendrites.  
myelination.

↑ no. of synapse.

• essential for neuronal development especially in.  
Cerebral cortex, basal ganglia & Cochlea.

So TH ↓ during development

→ mental retardation.

→ motor rigidity.

→ deafness.

TH ↓ reaction time.

∴ Hyper → reflex time ↓

hypo → reflex time ↑

• Some functions in brain are secondary to ↑ responsiveness to catecholamines.

hyperthyroidism → ↑ response to Reticular activating system ↑ irritability sleep & restlessness.

hypo → sluggish mental activity.  
sleep is increased.

(h) skin.

• maintains normal skin teshure.

Hyper:

cutaneous vasodilation.  
↑ sweat : soft warm & wet

Hypo:

• coarse, dry, scaly, cold, puffy.  
Hypersensitivity to cold.

• normal TH → necessary to remove proteins.

in hypo → mucopolysacch like Hyaluronic acid binds to.

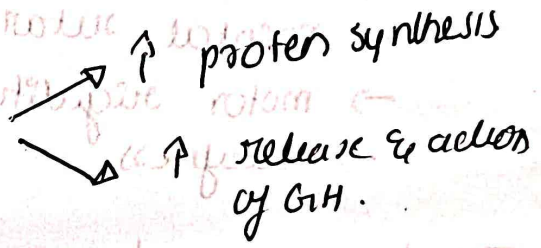
protein → excess tissue gel → interstitial space under

skin → ISF ↑ (Oedema) → ↑ osmotic pressure.

↑ Na<sub>2</sub>SO<sub>4</sub> water retention → dry skin.

## GROWTH & DEVELOPMENT.

TH → 4 normal body growth & skeletal maturation.



TH absence → GH secretion ↓  
growth ↓

def. of TH on foetal, infancy / childhood → cretinism.

## Relation WITH catecholamines.

• ↑ affinity of β<sub>1</sub> adrenergic receptor.

• ↑ sensitivity of β receptors to catecholamines.

propafenolol → block β receptors.

used in thyrotoxicosis.

metabolic → Basal ✓  
carb ✓  
fats ✓  
protein ✓  
vit. ✓

water & electrolyte.

other → Blood ✓  
CVS. ✓  
respiration. ✓  
CNS ✓  
GIT. ✓

• Skeletal muscle ✓

• growth & dev. ✓

• reproduction ✓

• sleep ✓

• sin. ✓

• reaction with  
catecholamines. ✓