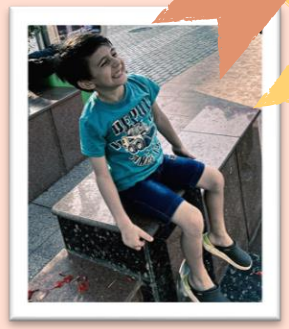

Hello Everyone

Hope You Are Having
A Wonderful Physiological Day
☺☺☺


ARE YOU
READY ?
LET'S GET STARTED!

Thyroid Gland 2

Sem 4

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Control of thyroid functions

(1) T.S.H:

a. Actions:

I. **Hyperplasia** of gland cells.

II. **↑ iodide uptake** from blood.

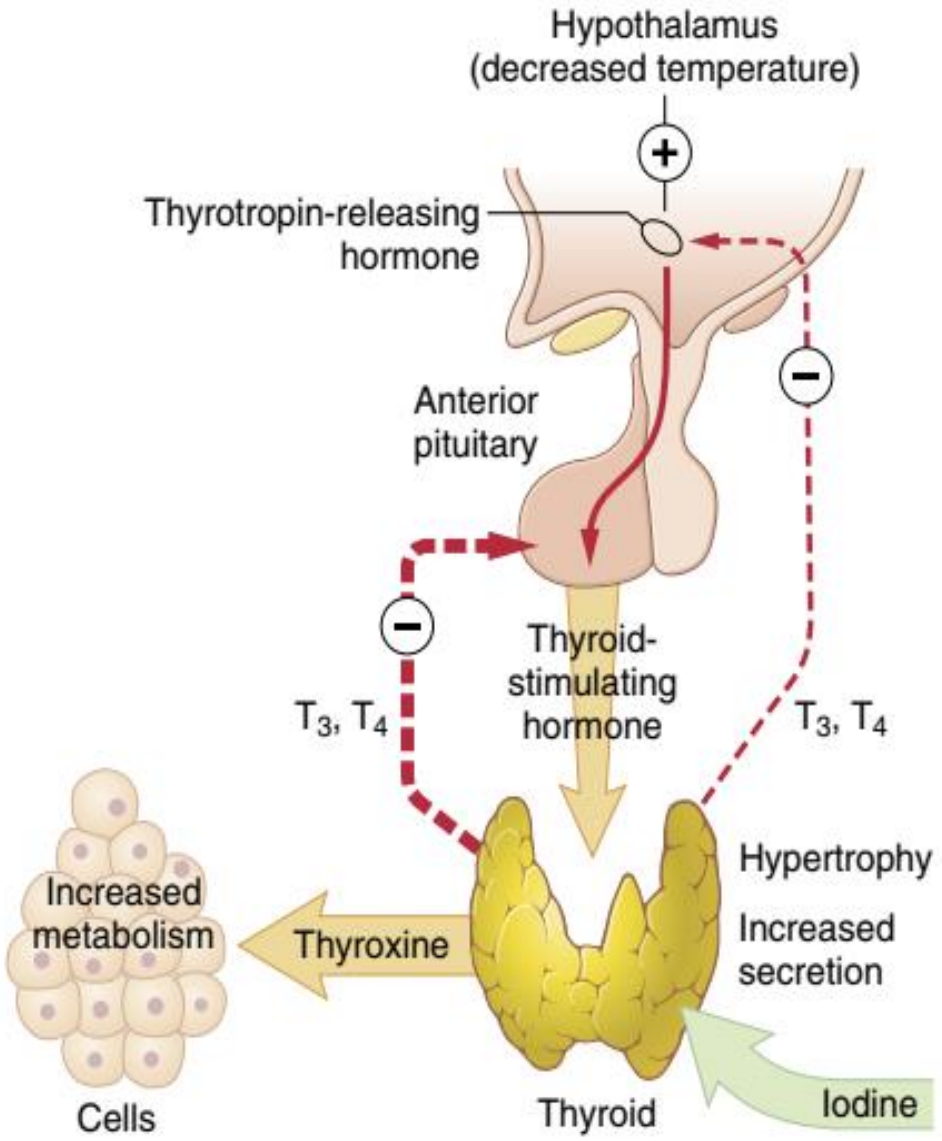
III. Stimulating **synthesis & release of T3 & T4.**

b. Control:

- **-ve feedback** mech **between thyroid Hormones & TSH**.
- **↑ T3 or T4 →↓ TSH** by acting:

  1. Directly **on** thyrotrope cells of **anterior pituitary** (mainly).

  2. **On** anterior **hypothalamus** (site of TRH release) **(to a lesser extent)**.



Control of thyroid functions

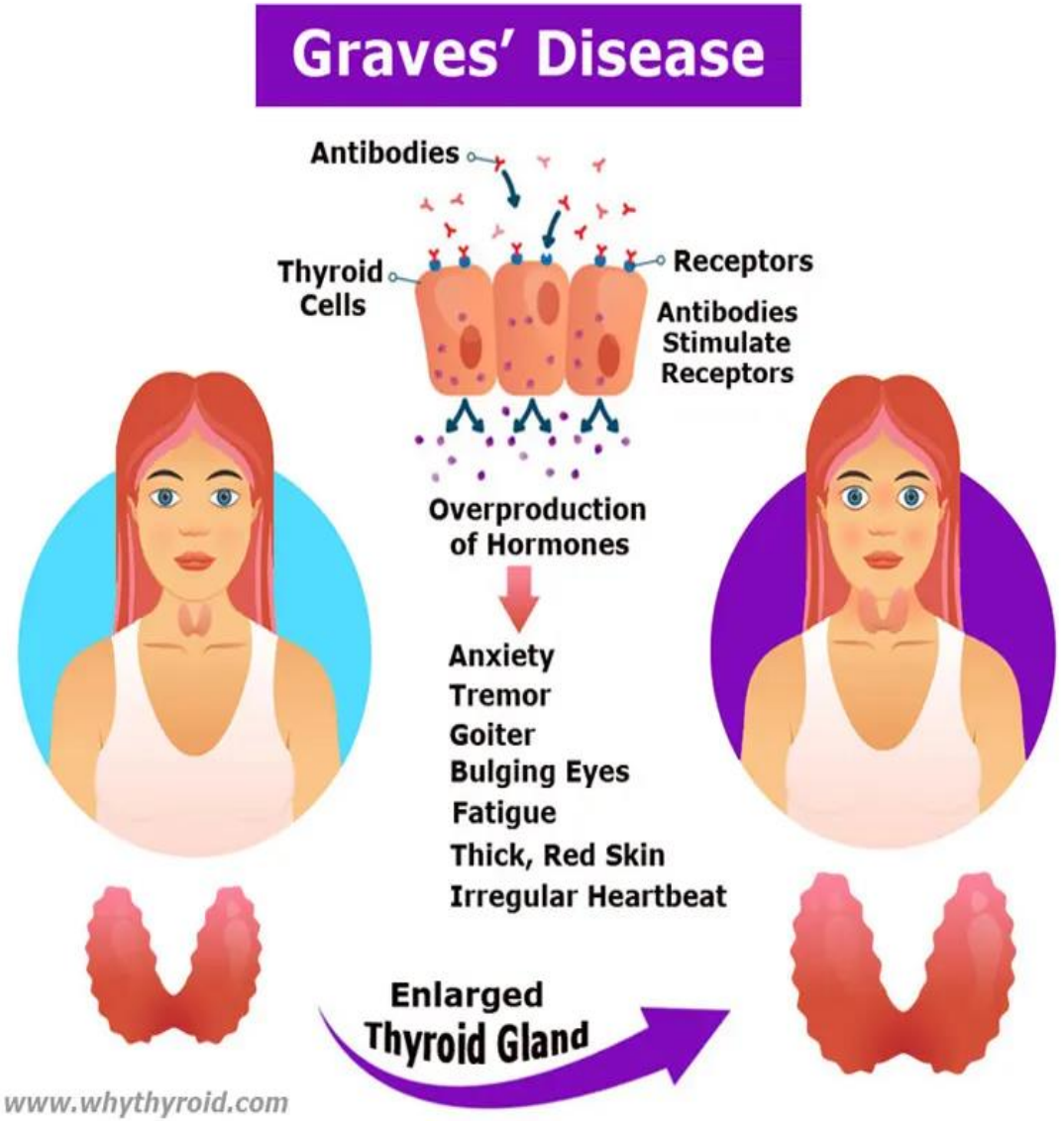
(2) Thyroid stimulating immunoglobulins (long-acting thyroid stimulator):

- Produced by lymphocytes in **Grave's disease**.
- **Autoimmune disease** → abnormal activation of the thyroid gland.
- **TSI act on thyroid as TSH** but not affected by blood T3 or T4 level **(no –ve FB)**

(3) Stress:

- e.g. **cold** → **stimulating thyroid** → **↑ MR** & heat production → counteract the effect of low temperature.

(4) Age: ↑ age ➔ ↓ thyroid activity



Control of thyroid functions

(5)Pregnancy: thyroid activity **increase** in pregnancy because **HCG is similar to TSH.**

(6) Anti thyroid agents (Goitrogens) :

- interfere with T3 and T4 synthesis → **↓ T3 and T4 → ↑ TSH → enlargement of thyroid gland (goiter)**.
- e.g. thiocyanate (in cabbage) → ↓ I^- uptake.

(7) blood iodine level:

a) **I_2 decrease → ↓ T3 and T4 → ↑ T.SH → Goiter**

b) **I_2 increase (Wolf Chaikoff effect)**

i- ↓ **organic binding** of I_2 in gland

ii- ↓ **proteolysis of thyroglobulin**.

iii- **Inhibiting TSH effect on the gland** (by ↓ cAMP response to it).

$I^{\downarrow}$

Hypothyroidism

Causes:

- primary (thyroid defect)
- secondary (defect in the pituitary gland).

Manifestations: **vary according to age:**

A) Cretinism: (hypothyroidism in infants).

B) Myxedema: (hypothyroidism in adults)

Cretinism

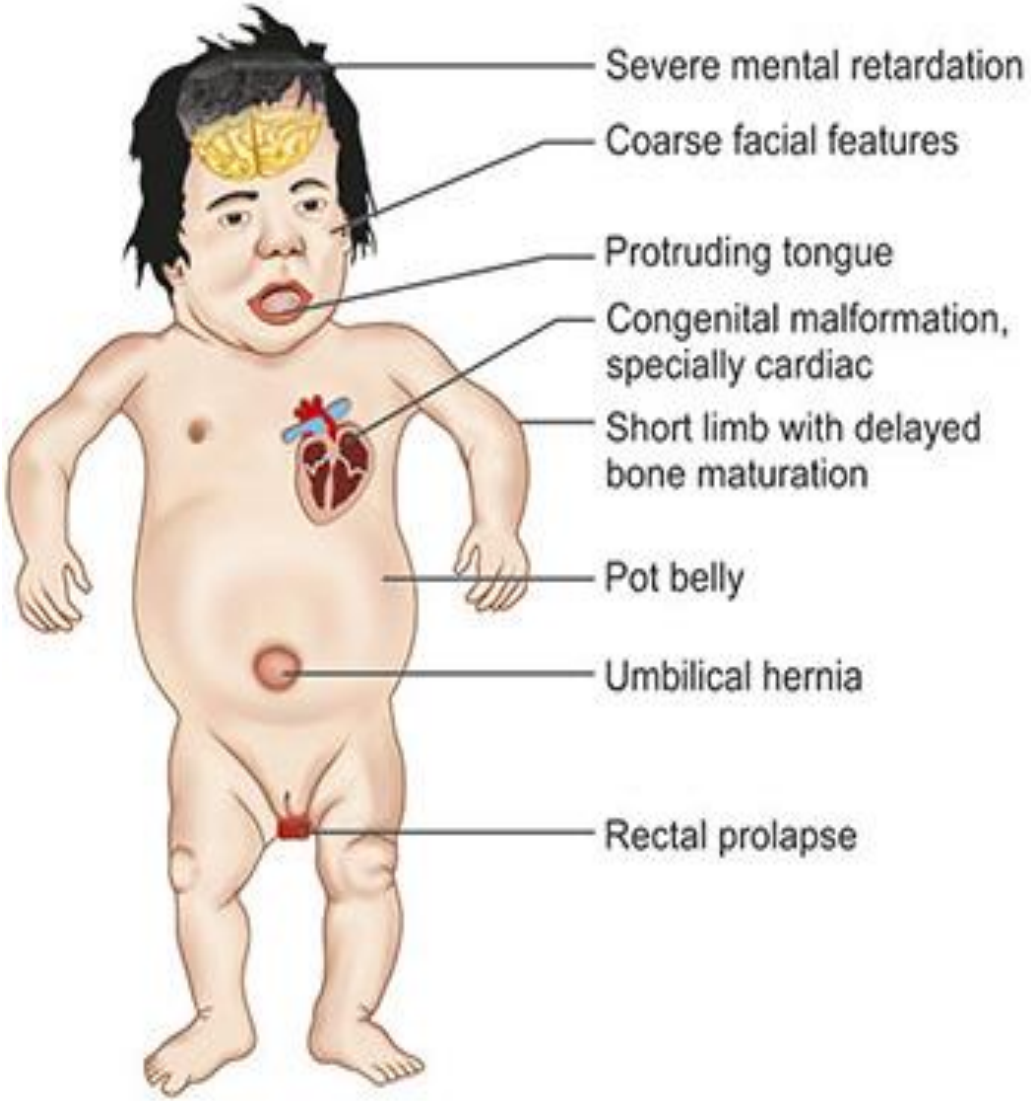
- **Not recognized until 5-6 months after birth** as some **thyroid hormones reach infant through milk from his mother**.

Manifestations:

1. **Retardation of physical, mental & sexual growth:** The cretin is dwarf.
2. **↓ BMR and O_2 consumption**.
3. **Skin ➔**

- **Yellow** due to **carotenemia** (failure of formation of vit A from carotin in liver).
- **Thick**.

4. **Scanty course hair** (due to ↓ vit A).



Cretinism

Manifestations:

5. Facial features:

- **Dull uninterested expression.**
- **Puffy eye lids.**
- **Thick lips.**
- **Swollen tongue** (macroglossia).

6. Protuberant abdomen with umbilical hernia.

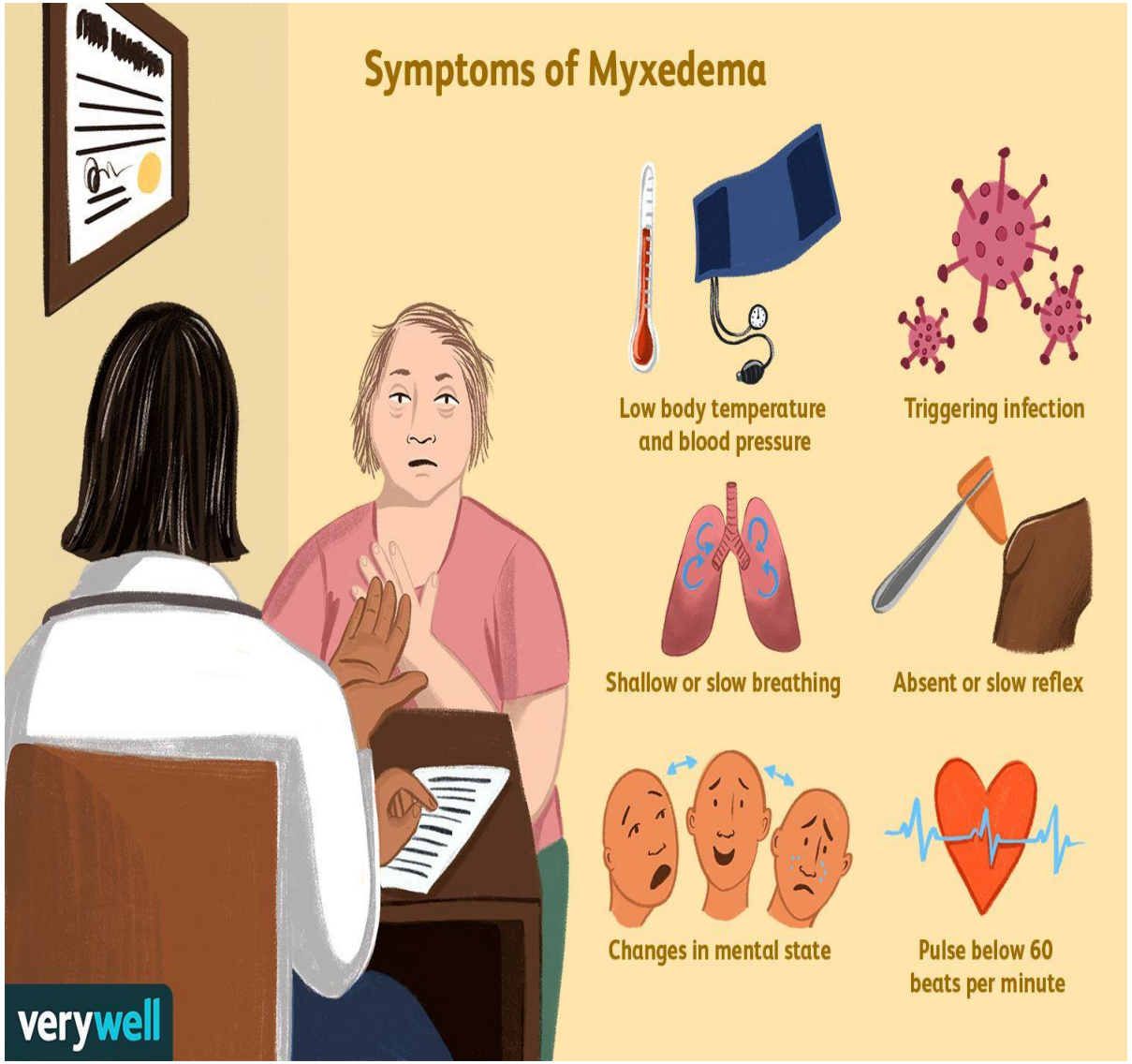
Treatment:

- By giving thyroid hormones.
- Should be as **early** possible because **mental retardation**, **once developed, is irreversible.**

Myxedema

Manifestations:

1. **Retardation of mental processes e.g.** lack of concentration, slow thinking and speech, sleepy, long reflex time.
2. **↓ BMR and O_2 consumption ➔**
   - Weight gain.
   - ↑ sensitivity to cold weather
3. **Increased level of cholesterol & triglycerides.**
4. **Decrease HR and ABP.**



Myxedema

Manifestations:

5. Skin ➔

- **Thick** ➔ due to protein deposition (myxoedematous tissue) subcutaneously.
- **Pale** ➔ due to:
  - ➢Fe deficiency anemia.
  - ➢Compression of cutaneous bv_s by deposited subcutaneous tissue.
- **Yellow** ➔ due to hypercarotenemia.
- **Cold** ➔ due to decrease BMR.
- **Dry scaly with brittle hair** ➔ due to ↓ vit A.

6. Failure of sexual functions ➔

- ♂ ➔ impotence. ♀ ➔ oligomenorrhea.

Hyperthyroidism (thyrotoxicosis)

Causes: Excess thyroid H secretion resulting from:

1. **Thyroid tumor.**
2. **Over stimulation** of thyroid by TSH or TSI **(Grave's disease).**

Manifestations:

1. **Excess nervousness, irritability, insomnia & tremors** of outstretched hand.
2. ↑ **appetite** but there is **weight loss** due to ↑ **catabolism of tissue protein & oxidation of stored fat**.
3. ↓ **serum cholesterol**.
4. ↑ **BMR & O_2 consumption** → patient is **susceptible to heat** but tolerates cold weather (body temp is not increased as extra heat is lost by VD & sweating).
5. **Skin** →

   Warm **Moist** **Hair** → **fine and silky**.

Hyperthyroidism (thyrotoxicosis)

Manifestations:

6. Ocular signs: ➔

a. **Characteristic staring look** with widened palpebral fissure due to upward retraction of upper eye lid.

b. **Lid lag phenomenon** ➔ a delay in the downward movement of upp lid on following a falling object.

c. **Infrequent blinking**.

d. **Failure of convergence**.

♦ All the above signs are due to **sympathetic over stimulation**.

Hyperthyroidism (thyrotoxicosis)

Manifestations:

6. Ocular signs: ➔

e. Exophthalmos:

- **Def:** Protrusion of one or both eyeballs.
- **Due to:**
  - **Accumulation** of fat, water and inflammatory cells **in the retro-orbital tissue** and in the extraocular muscle.
  - **Exophthalmos producing factor (EPS)** (a degradation product of TSH)

Hyperthyroidism (thyrotoxicosis)

Manifestations:

7. C.V.S:

i. ↑ heart rate.

ii.↑ SBP.

iii.DBP not increase due to peripheral VD.

iv.↑ Pulse pressure.

v.Atrial arrhythmia (AF).

8. Sexual disturbances →

i. ♂ → impotence.

ii.♀ →:

1.**polymenorrhea** (more frequent menstruation).

2.**menorrhagia** (excess menstrual bleeding).

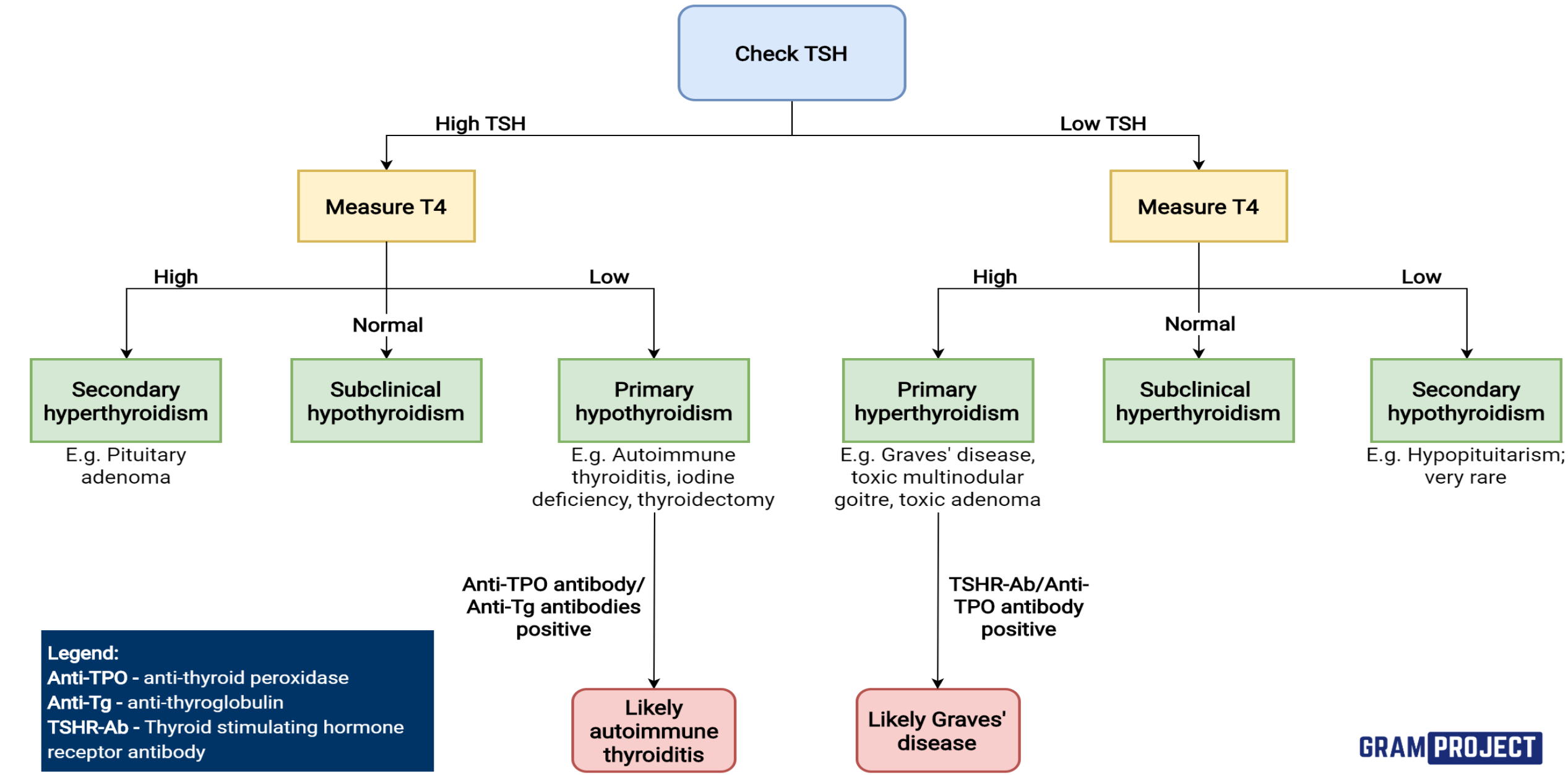
Goiter

Def: Enlargement of thyroid gland Accompanied by Hypofunction or Hyperfunction or Normal function

Causes:

1. **Goitrogens** (e.g. thiocyanate and thiocarbamides) ➔ block one or more of reactions involved in synthesis of thyroid hormones ➔ ↓ T_3 and T_4 ➔ ↑ TSH ➔ ↑ gland size.
2. **↓I_2** ➔ ↓ T_3 and T_4 ➔ ↑ TSH ➔ goiter (colloid goiter, as acini are distended with colloid).
3. **Physiological goiter** ➔ in: Adolescence & Pregnancy.
4. **Grave's disease** ➔ due to TSI which binds to TSH receptors on thyroid cells ➔ diffuse goiter.
5. **Nodular goiter:** irregular enlargement of thyroid with discrete nodules due to stress.

Thyroid function tests (TFTs)



Legend:
Anti-TPO - anti-thyroid peroxidase
Anti-Tg - anti-thyroglobulin
TSHR-Ab - Thyroid stimulating hormone receptor antibody

Any Questions

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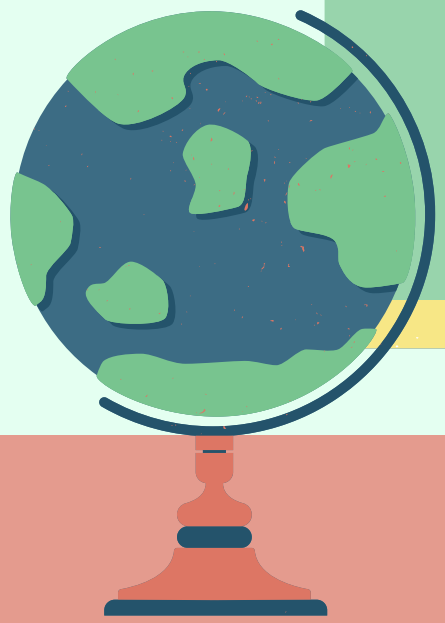


Thank
You