

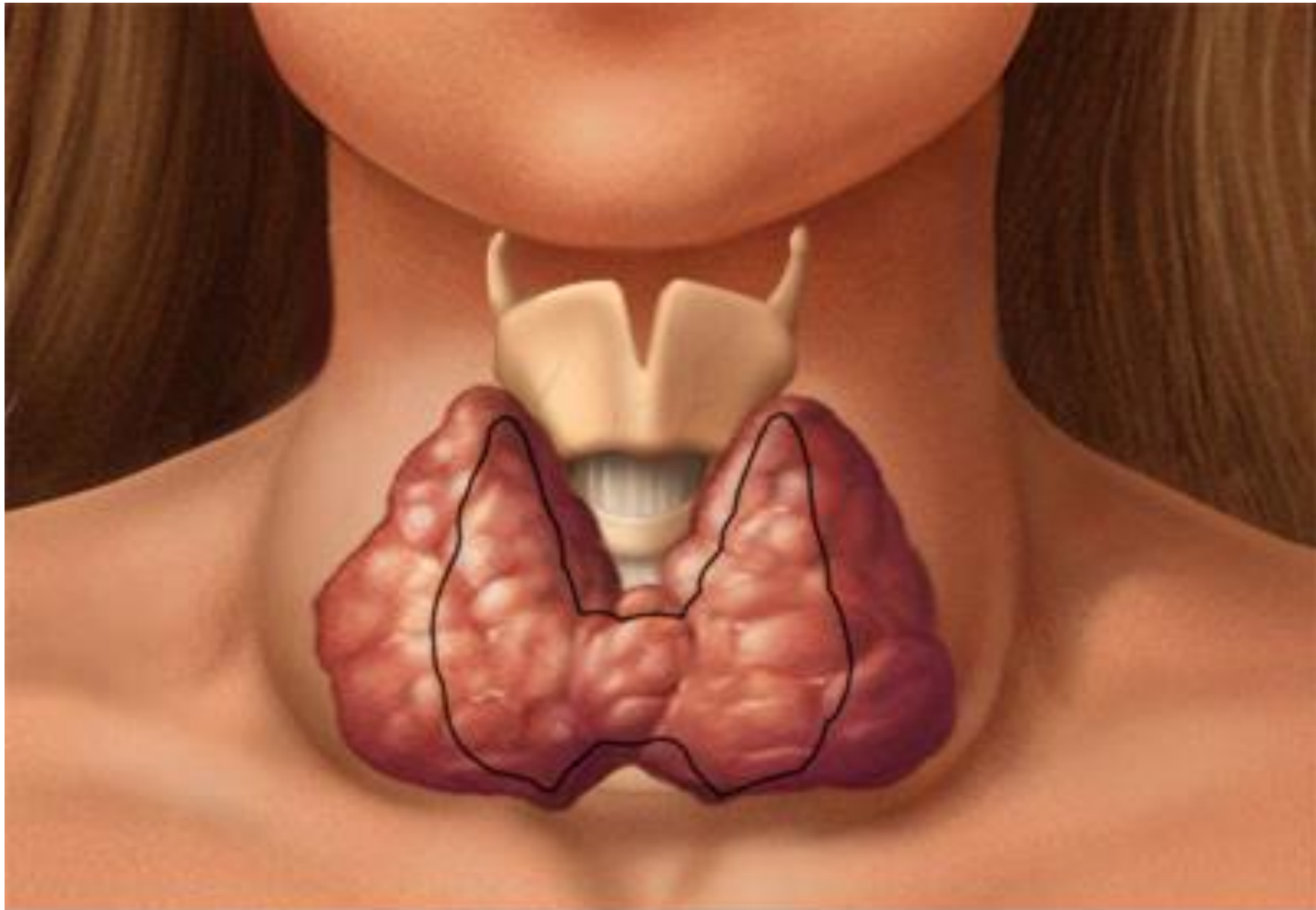


The Thyroid Lecture

Introductory Course

2023

The Thyroid



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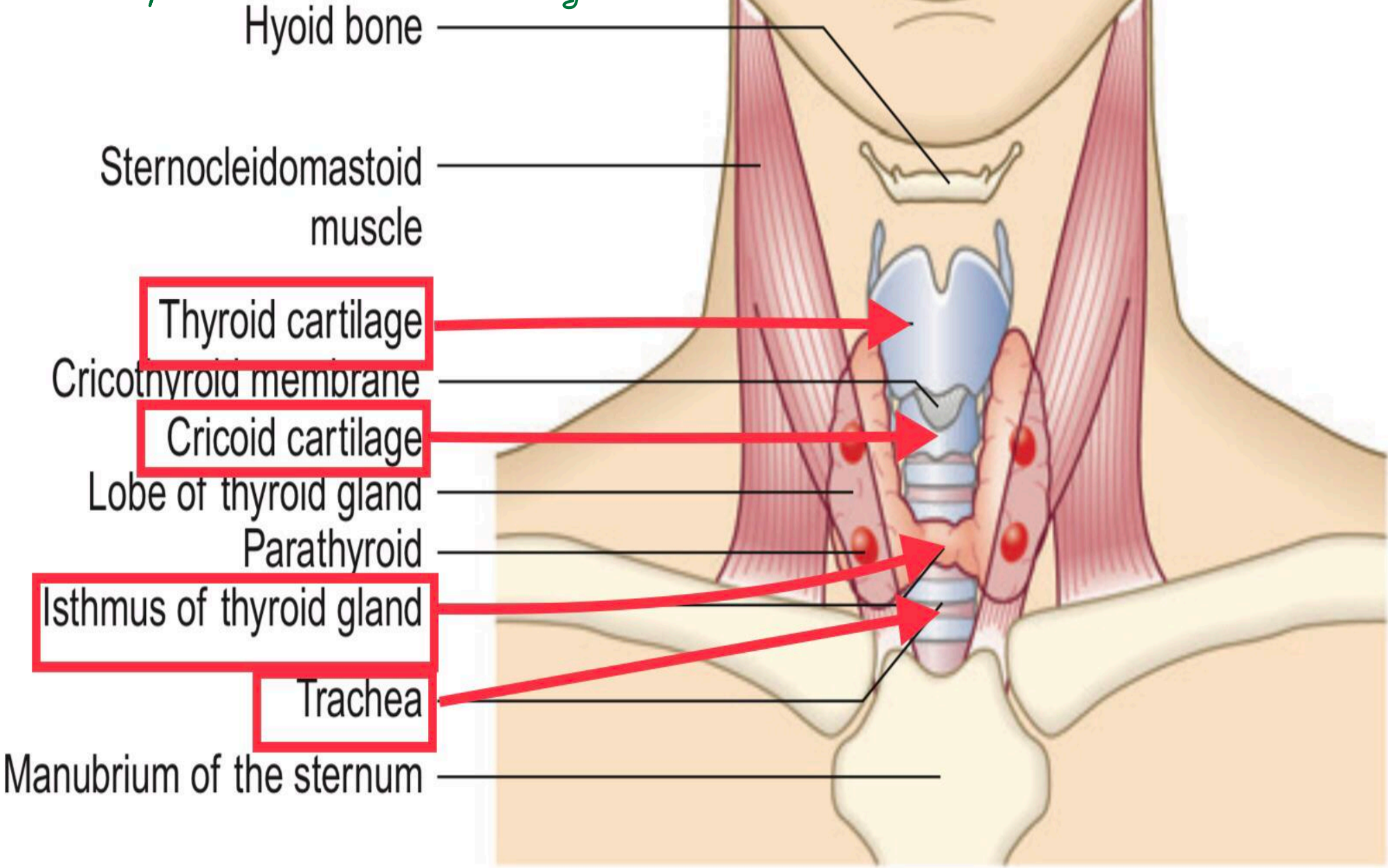
Topics

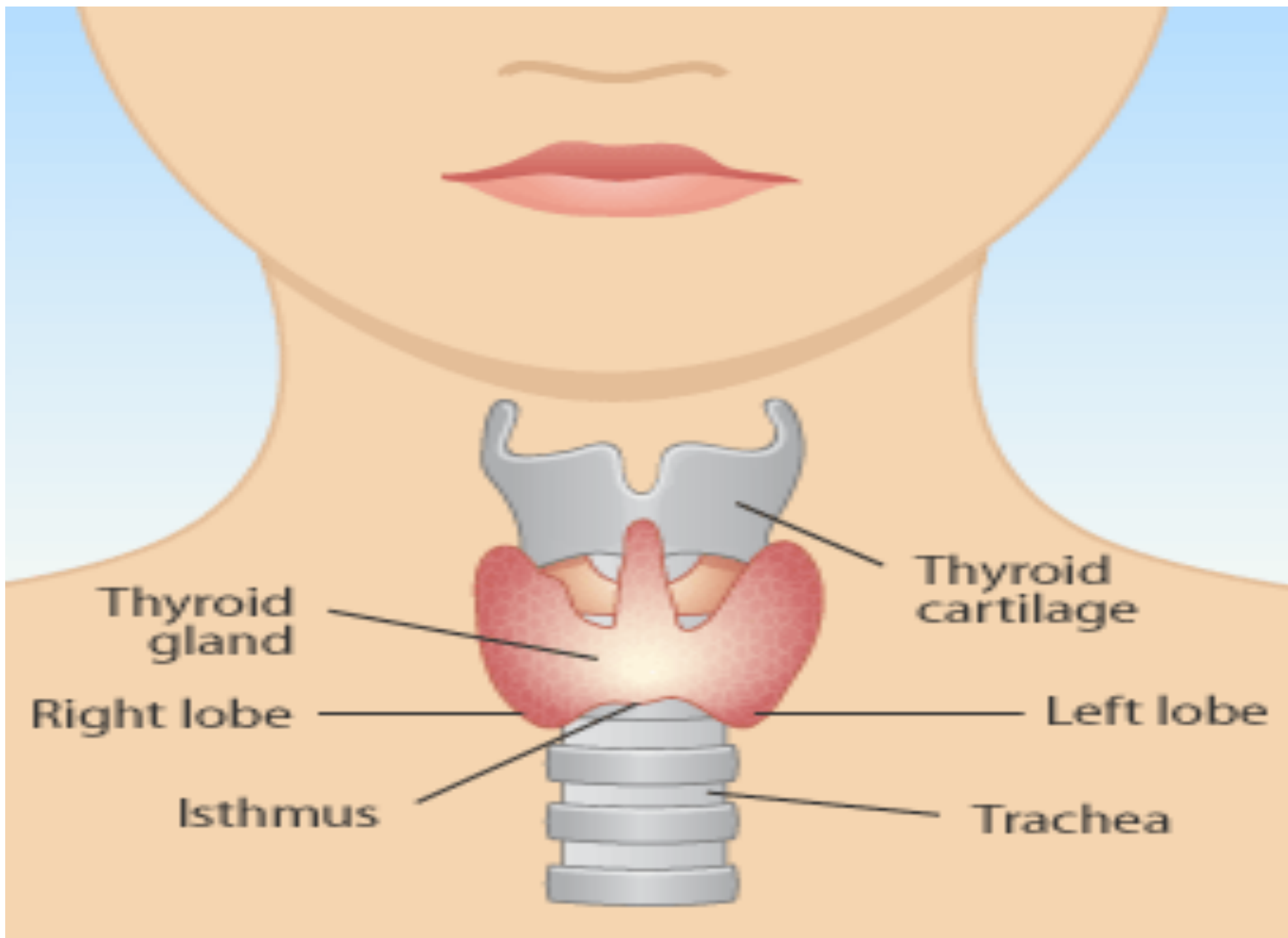
- Thyroid Anatomy
- Thyroid dysfunction symptoms and signs
- History taking
- physical examination

Thyroid Anatomy

- The thyroid is a butterfly shaped gland with two symmetrical lobes joined by the isthmus covering the 2nd to 4th tracheal rings.
- It lies inferior to the cricoid cartilage, approximately 4cm below superior notch of thyroid cartilage.
- It may extend into the superior mediastinum and be entirely retrosternal or may be situated at the back of the tongue & visible with mouth opening. *Rarely along the line of thyroglossal duct*
- It is normally palpable in 50% of women and 25% of men.

Start palpation from the suprasternal notch, then proceed to locate the thyroid.





Extra:

The Thyroglossal Duct

From ChatGPT:

How is the thyroglossal duct formed?

The thyroglossal duct forms during the embryonic development of the thyroid gland. It begins as a canal connecting the developing thyroid tissue in the base of the tongue (foramen cecum) to its final location in the neck. As the thyroid gland descends to its proper position in the front of the neck, the duct normally regresses and disappears. However, in some abnormal cases, remnants of the thyroglossal duct can persist, leading to the development of cysts or fistulas in the neck later in life.

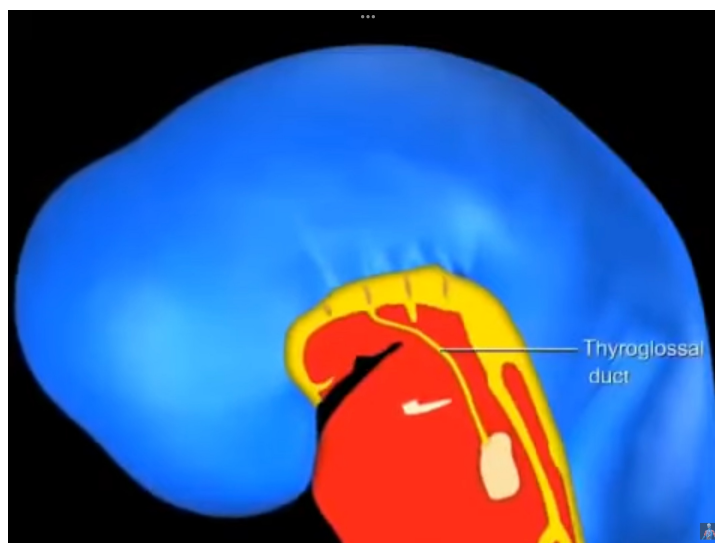
Where is the thyroglossal duct in normal people?

In normal individuals, the thyroglossal duct exists during embryonic development and follows the path from the base of the tongue to the front of the neck. As the thyroid gland descends to its final location in the neck, the duct typically regresses and disappears. In adults, there is no recognizable or functional thyroglossal duct. However, remnants of the duct can sometimes give rise to cysts, sinuses, or fistulas in the neck region.

Watch this animation:

https://youtu.be/_439TAdcRjM?si=SCAZVx9urnk2ACIN

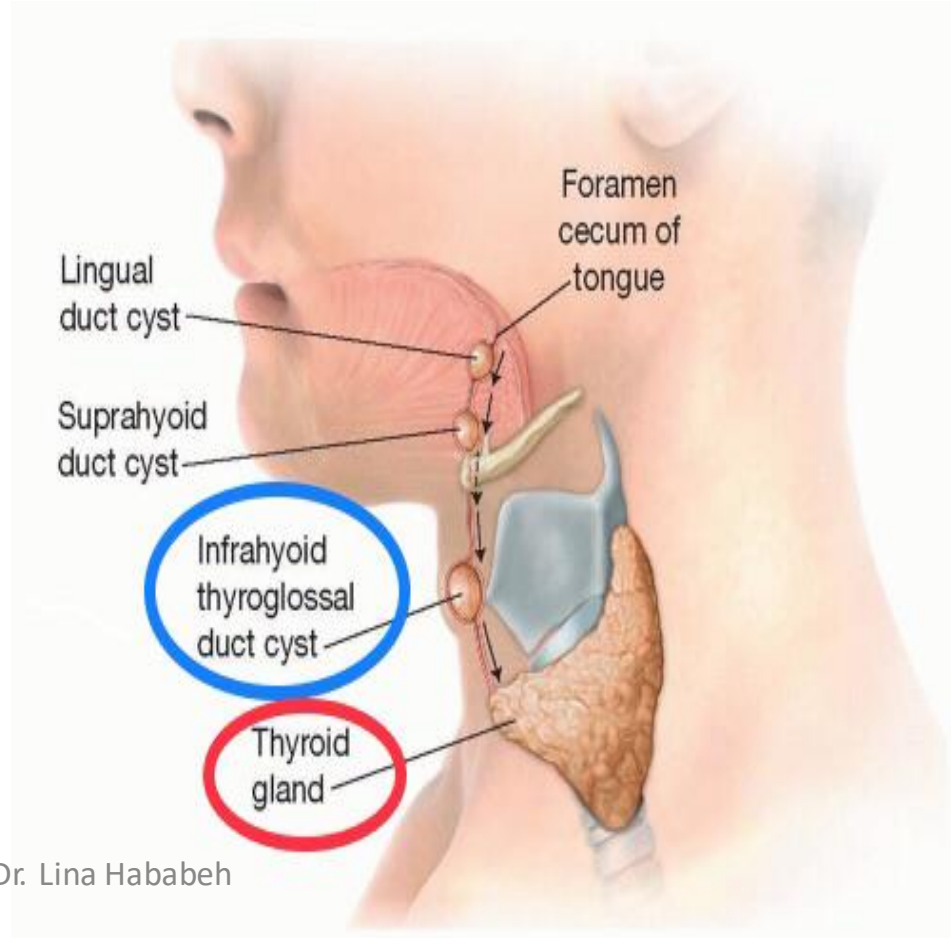
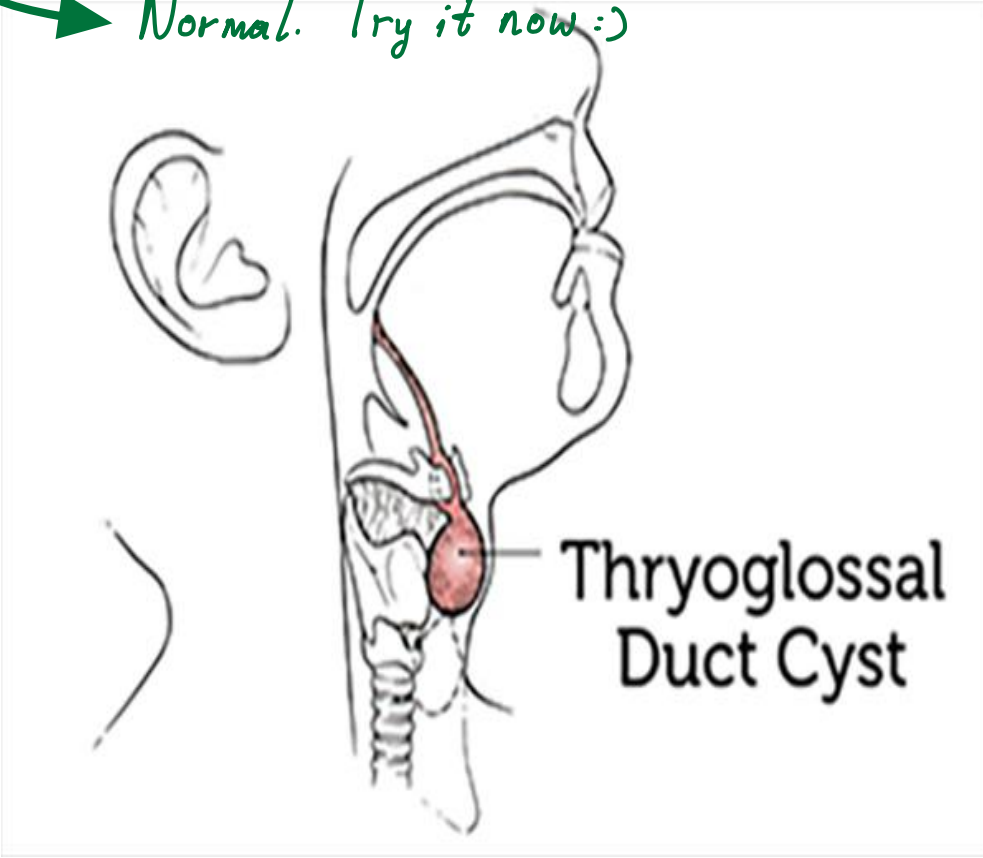
From 2:14 to 2:38



■ **Thyroglossal cyst** may arise from thyroglossal duct at the level of hyoid bone, and **it moves upwards with tongue protrusion.** → *Abnormal*

■ **Thyroid gland** “**moves superiorly on swallowing**” or neck extension as it is attached to pretracheal fascia

Normal. Try it now :)



Thyroid Dysfunction

```
graph TD; A[Thyroid Dysfunction] --> B[Hyperthyroidism (Thyrotoxicosis)]; A --> C[Goitre]; A --> D[Hypothyroidism];
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*Hyperthyroidism
(Thyrotoxicosis)*

Goitre

Hypothyroidism

Signs and Symptoms

↑ T_3, T_4 ↓ TSH

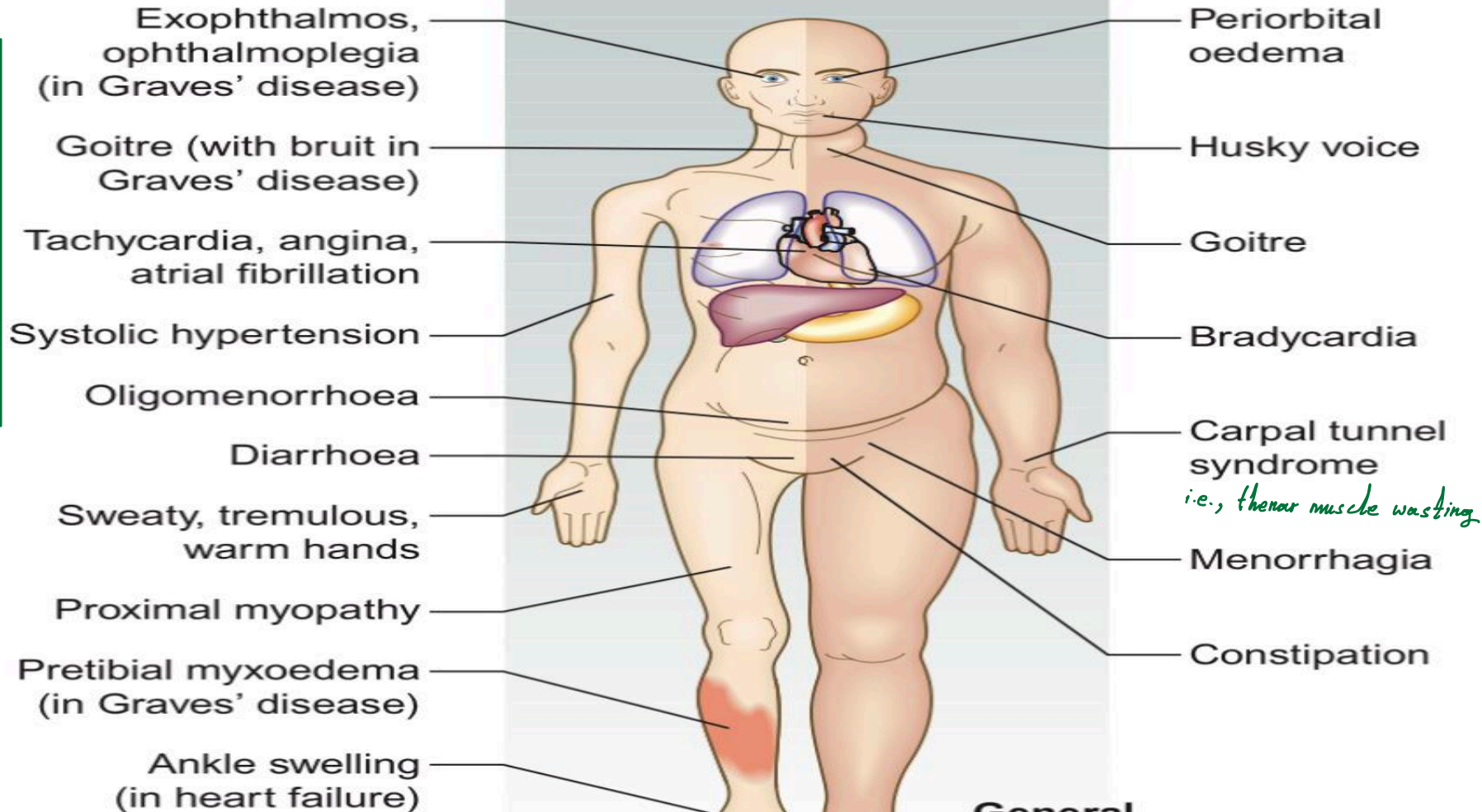
Hyperthyroidism

↑ Metabolism

↓ Metabolism

↓ T_3, T_4 ↑ TSH

Hypothyroidism



General

- Weight loss despite increased appetite
- Heat intolerance
- Anxiety, irritability
- Fast, fine tremor

General

- Low metabolic rate, weight gain
- Dry skin and hair loss
- Sensitivity to cold
- Lethargy, mental impairment, depression

-Goitre is present in both (non-specific)

-Its direction of enlargement is anteroinferior.

Hyperthyroidism : *Almost everything is increasing, except*

- Dyspnea, palpitation and ankle swelling

① and ②

- Tachycardia - Atrial fibrillation

- Systolic HTN - Angina

↑ HR, BP, metabolism, etc.

① - Oligo-menorrhoea or amenorrhoea.

- Sweaty tremulous warm hands - Proximal myopathy

② - weight loss, increased appetite, Diarrhea

- Heat intolerance

- Fine tremor

- Anxiety and irritability.

- Eye symptoms.

Hypothyroidism : *Almost everything is decreasing, except*

↓HR, metabolism, etc.

①, ②, and ③

- Goiter
- Husky (hoarse) voice
- Carpal tunnel syndrome
- Constipation
- weight gain ②
- Depression
- Mental impairment
- Lethargy or apathy
- cold intolerance
- Cold dry skin
- Delayed DTR
- Periorbital edema
- Bradycardia
- Menorrhagia ①

③ *Hypertension*



Causes of Hyperthyroidism

- **Graves Disease (MOST COMMON)**
- Toxic multi nodular goiter
- Solitary toxic nodule
- Thyroiditis
- Excessive thyroid hormone ingestion → *Drugs!*

GRAVES DISEASE

- Graves disease is the **most common cause** of hyperthyroidism.
- Graves disease is an **autoimmune disease** with **familial component**.
- Occurs more commonly **in females** .
- Usually present between **20-50 year of age** .

GRAVES DISEASE

THERE ARE 3 EXTRATHYROIDAL SYMPTOMS **SPECIFIC**
FOR GRAVES DISEASE:

Anyone of these 4 is pathognomonic i.e., if found, the patient has Grave's:

1) Graves Ophthalmopathy: **EXOPHTHALMOS (PROPTOSIS)**

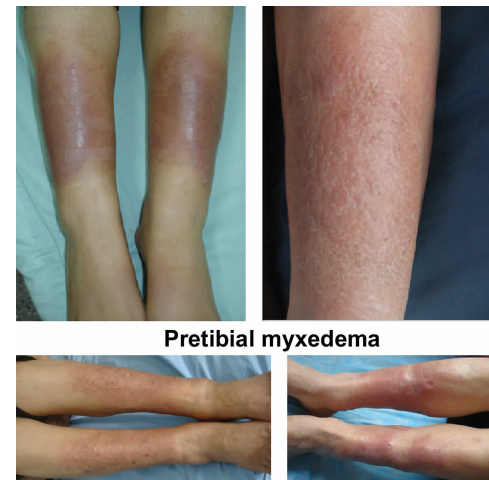
2) Infiltrative Dermopathy: **Pretibial myxedema**

3) **Thyroid Acropachy**

4) *Goitre with bruit*



Thyroid acropachy



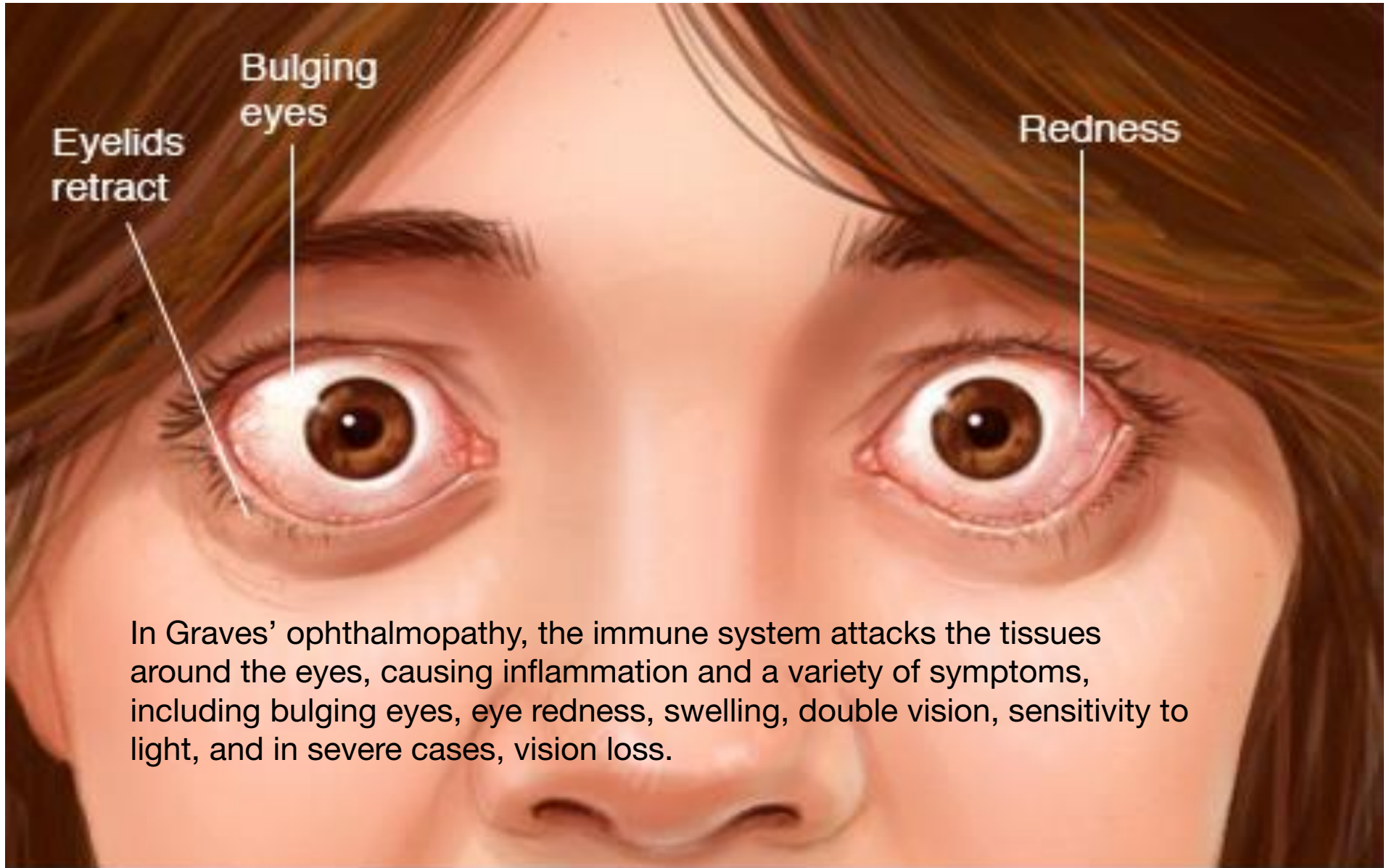
10.2 Features suggestive of Graves' hyperthyroidism

History

- Female sex
- Prior episode of hyperthyroidism requiring treatment
- Family history of thyroid or other autoimmune disease
- Ocular symptoms ('grittiness', redness, pain, periorbital swelling)

Physical examination

- Vitiligo
- Thyroid acropachy
- Diffuse thyroid enlargement (can be nodular)
- Thyroid bruit
- Pretibial myxoedema
- Signs of Graves' ophthalmopathy (proptosis, redness, oedema)



In Graves' ophthalmopathy, the immune system attacks the tissues around the eyes, causing inflammation and a variety of symptoms, including bulging eyes, eye redness, swelling, double vision, sensitivity to light, and in severe cases, vision loss.

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Exophthalmos



Exophthalmos. It is seen more accurately
laterally & superiorly.





Grave's Ophthalmopathy



Normal





Thyroid Eye Disease

Thyroid eye disease, also called Graves' disease, is caused by a complex interaction between the thyroid gland and the orbital tissue.

*Pretibial
myxedema*



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Thyroid acropachy:

- Swollen fingers
- Clubbing
- Tense skin



Done with hyperthyroidism

Causes Of Hypothyroidism

- **Hashimoto's Thyroiditis** (MOST COMMON):
its an autoimmune disease , more common in females
Hypothyroidism then Euthyroidism then Hypothyroidism

For infectious thyroiditis: Hypothyroidism then Hypothyroidism then Euthyroidism

- **Radio-iodine therapy** *(transient)*
- **Surgery for Graves Disease** *e.g., viral, bacterial*

Goiter

- ❖ Enlarged thyroid gland
- ❖ **most** patients with goiter are **euthyroid**
- ❖ Large or retrosternal goiters may cause **compressive symptoms** (stridor ,
breathlessness, dysphagia)







History taking

- **Patient profile** : Name , Age , Occupation
- **Chief complaint** : Neck lump or symptoms of hypo/hyper/*goitre*
- **History of presenting illness**: if it was a **lump** ask about :

Extra: Hoarseness in thyroid diseases, particularly when accompanied by other symptoms, can be a red flag because it might indicate the involvement or compression of the recurrent laryngeal nerve. This nerve is responsible for controlling the muscles that move the vocal cords, and it runs very close to the thyroid gland.

- 1) **Duration**
- 2) **3S**(site , size , shape)
- 3) **3p**(progression, persistence, previous Hx of same symptom)
- 4) **Other symptoms** (dysphagia , dyspnea , pain , hoarseness)

→ *Red Flag*

- Ask about signs and symptoms of hypo/hyperthyroidism as previously mentioned
- **Drug Hx :**
 - 1) **Amiodarone** may cause **either** hypo/hyperthyroidism
 - 2) **Lithium** may cause **hypothyroidism**
 - 3) **Antithyroid drugs** → *Given to hyperthyroidism patient*
- **Family Hx:** family Hx of thyroid or autoimmune disease
- **Social Hx :**
 - living in **areas of iodine deficiency** can cause **goiter** and rarely hypothyroidism. *e.g., the Andes, Himalayas, Central Africa*
 - Smoking** → *Increases risk of Grave's ophthalmopathy*
 - Prior neck irradiation** → *Increases risk of thyroid malignancy*

Physical Examination

POSITION AND EXPOSURE

Ideally: Neck, Superior Mediastinum, Hands, Lower limbs ←



GENERAL APPEARANCE

- 1) Conscious, alert , oriented
- 2) Agitated, restless, depressed, apathy, slow motion.
- 3) Heat /cold intolerance
- 4) Weight loss/gain (BMI)
- 5) Speech(pressure of speech, hoarseness)

Patient's clothes can give a clue.

② found in malignancy

found in hyperT

③ Slow & deep speech



found in hypot



VITAL SIGNS

- Blood pressure (systolic/diastolic HTN)

Both hypo & hyper T can lead to HTN!

- Pulse (brady/tachycardia, afib)

HypoT

HyperT

- BMI

Wt. loss: HyperT

Wt. gain: HypoT

HAND EXAM

- Temperature (^{hypo T} dry cold, ^{hyper-T} sweaty warm and moist)
- Nail changes (onycholysis, clubbing and thyroid acropachy) → *Grave's*
- Fine tremor *hyper-T*
- Palmar erythema *hyper T*
- Vitiligo → *Autoimmune condition*
- Signs of CTS

Carpal Tunnel Syndrome, could occur due to myxedema of hypo T.

Features of thyrotoxicosis include warm, moist skin, proximal muscle weakness (due to a catabolic energy state), tremor and brisk deep tendon reflexes. Hyperthyroidism may also be associated with tachycardia or atrial fibrillation, and a midsystolic cardiac flow murmur due to increased cardiac output.

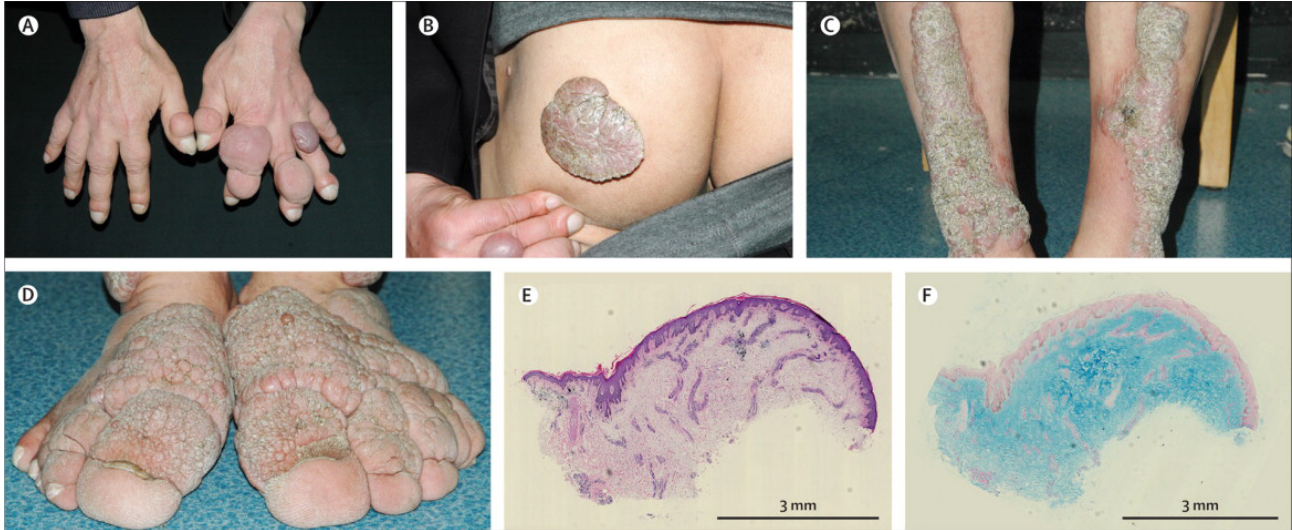
Thyroid acropachy is an extrathyroidal manifestation of autoimmune thyroid disease. It is characterised by soft-tissue swelling and periosteal hypertrophy of the distal phalanges, and mimics finger clubbing (see Fig. 10.2C). It is often associated with dermatopathy and ophthalmopathy. Pretibial myxoedema is a raised, discoloured (usually pink or brown), indurated appearance over the anterior shins; despite its name, it is specifically associated with Graves' disease and not hypothyroidism (see Fig. 10.2D).

Many clinical features of hypothyroidism are produced by myxoedema (non-pitting oedema caused by tissue infiltration by mucopolysaccharides, chondroitin and hyaluronic acid; Figs 10.4 and 10.5). Other common findings in hypothyroidism include goitre, cool, dry or coarse skin, bradycardia, delayed ankle reflexes and a slowing of movement.

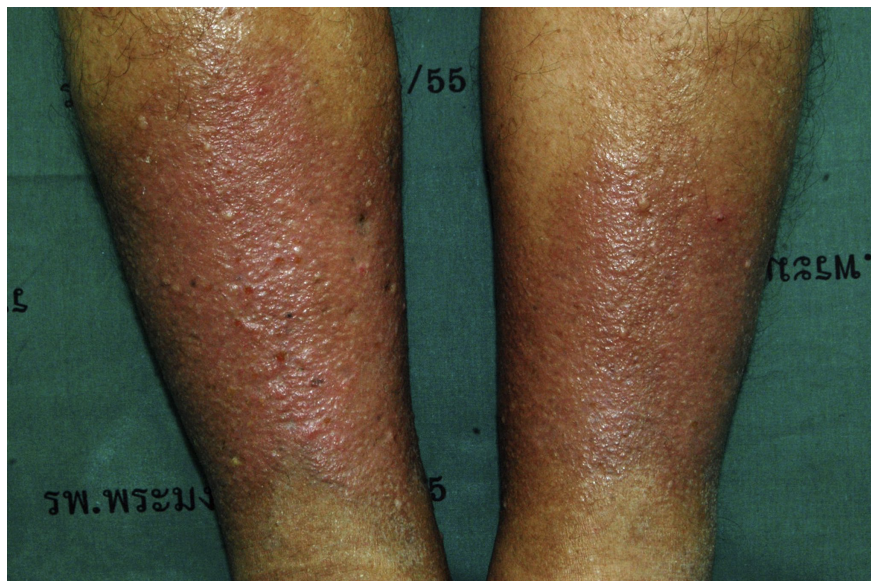
Extra:

Myxedema vs Pretibial Myxedema

Myxedema is a term used to describe a severe form of hypothyroidism in which there is an accumulation of mucinous material (a type of connective tissue substance) under the skin. It is a rare and serious condition that can affect various parts of the body and lead to a range of symptoms.



Pretibial myxedema, also known as thyroid dermopathy, is a rare skin condition that is typically associated with autoimmune thyroid disorders, especially Graves' disease. It is characterized by the accumulation of mucinous material under the skin, leading to thickening, swelling, and a lumpy or waxy appearance, usually on the front of the lower legs (shins) and sometimes on the feet.



Head , Neck and chest

- Dry coarse hair *hypot*
- Hair loss from distal third of eyebrows *hypot*
- Auscultate the heart for mid systolic murmur due to increased CO in hyperthyroidism
cardiac output

EYE EXAMINATION

Grave's
↑

- 1) Exophthalmos (from above and behind the patient)
- 2) Conjunctival redness (chemosis) → Grave's
- 3) Ophthalmoplegia (H^{test:} shape) → Grave's
- 4) Periorbital puffiness *hypot*
- 5) **lid lag**: upper eyelid lags behind the eyeball when patient looks downward.
- 6) **lid retraction**: sclera is visible above the iris.

→ In all cases of thyrotoxicosis

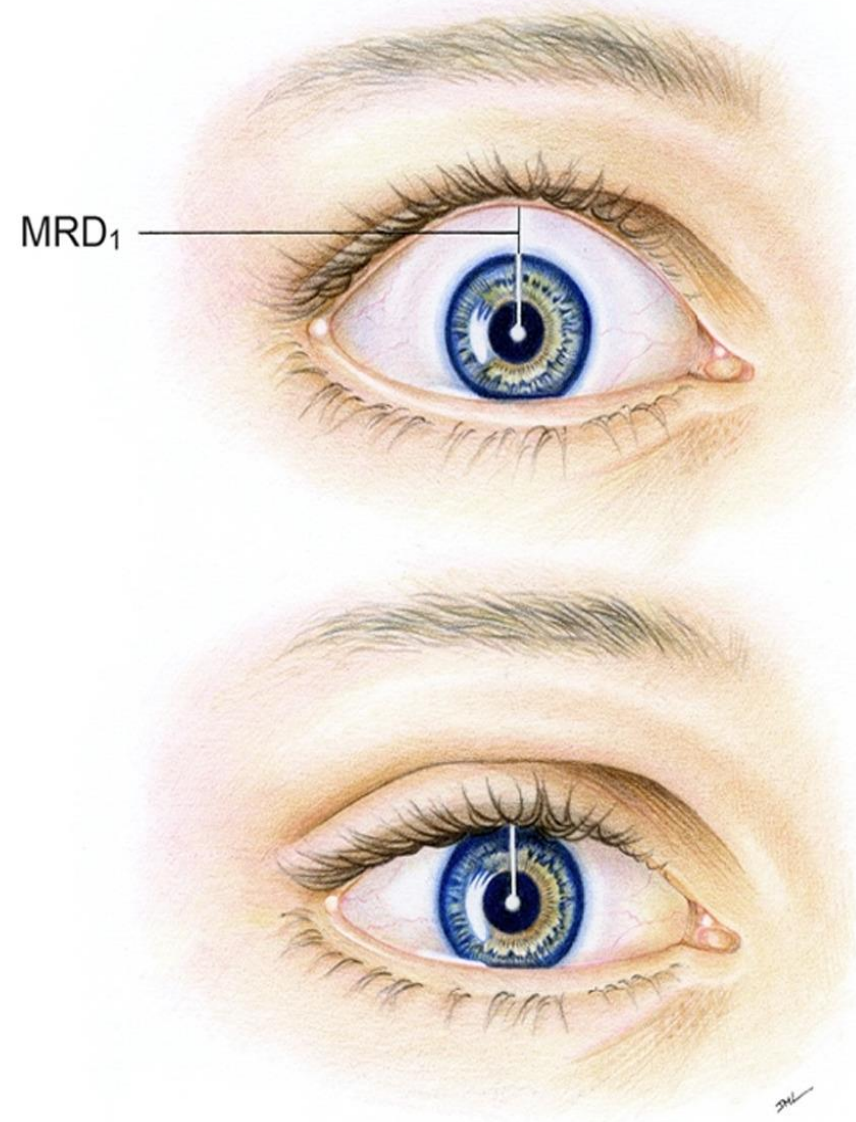
Lid retraction (a staring appearance due to widening of the palpebral fissure) and lid lag (see earlier) are common eye signs associated with hyperthyroidism. Both are thought to be due to contraction of the levator muscles as a result of sympathetic hyperactivity. Periorbital puffiness (myxoedema) is sometimes seen in hypothyroidism.

Graves' ophthalmopathy occurs in around 20% of patients and is caused by an inflammatory infiltration of the soft tissues and extraocular muscles (see [Fig. 10.2A,B](#)). Features suggestive of active inflammation include spontaneous or gaze-evoked eye pain, and redness or swelling of the lids or conjunctiva. Proptosis (protrusion of the globe with respect to the orbit) may occur in both active and inactive Graves' ophthalmopathy and is often referred to as exophthalmos. Inflammation of the orbital soft tissues may lead to other more severe features, including corneal ulceration, diplopia, ophthalmoplegia and compressive optic neuropathy (see [Fig. 8.8D](#)).

Lid lag



Lid retraction



THYROID EXAM

1) INSPECTION (Neck hyperextended)

- Symmetry → *Abnormality: One lobe may be larger!*
- Scars "Neck collar" scar of partial/full thyroidectomy
→ *Could be also of surgical treatment of ranula, cystic hygroma, and congenital branchial cysts.*
- Masses
- Vein engorgement
- Ask the patient to swallow → *Normal thyroid rises up.*
- Ask the patient to protrude his tongue
- Ask the patient to open his mouth (lingual thyroid)
if exists, you will see it.

2) palpation(neck slightly flexed) *From behind the patient*

- Tenderness
- Size , consistency, shape , surface
- Masses or abnormal swelling
- Thrills → *Grave's*
- Lymph nodes (cervical, supraclavicular)
- Mediastinum (tracheal tug, deviation, cricosternal distance)

3) percussion: on clavicles

- Percuss the manubrium to assess for dullness due to retrosternal extension of goitre.

4) Auscultation: for bruits in Graves disease

- Auscultate with your stethoscope for a thyroid bruit. A thyroid bruit (sometimes associated with a palpable thrill) indicates abnormally high blood flow and is most commonly associated with Graves' disease. It may be confused with other sounds: bruits from the carotid artery or those transmitted from the aorta are louder along the line of the artery.

Lower limb exam

- Coarse dry skin
- Pretibial myxedema (brown/pink thick scar)
- Myxedema (nonpitting edema)
- Deep tendon reflexes (if delayed, hypo)
- Proximal myopathy → *Mostly axial muscles*
- Ankle edema in HF *Due to hypoT and hyperT*

Distal myopathy occurs in hyperT only.

THANK YOU