Thyroid Diseases

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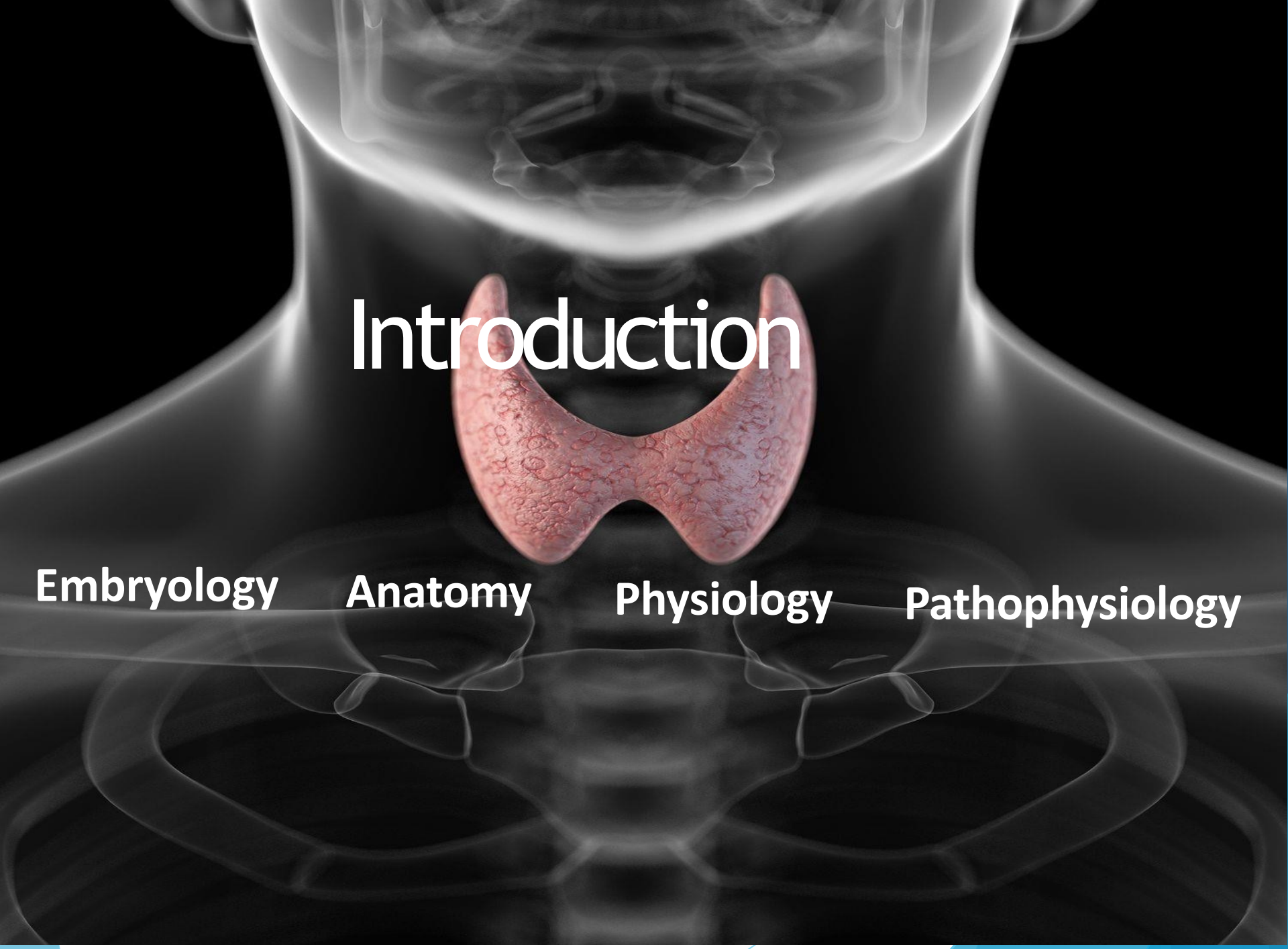
Surgical Diseases of the Thyroid

- **Congenital**
- **Inflammatory**
- **Goiter**
- **Thyroid hormones disorders**
- **Thyroid nodule**
- **Neoplastic**

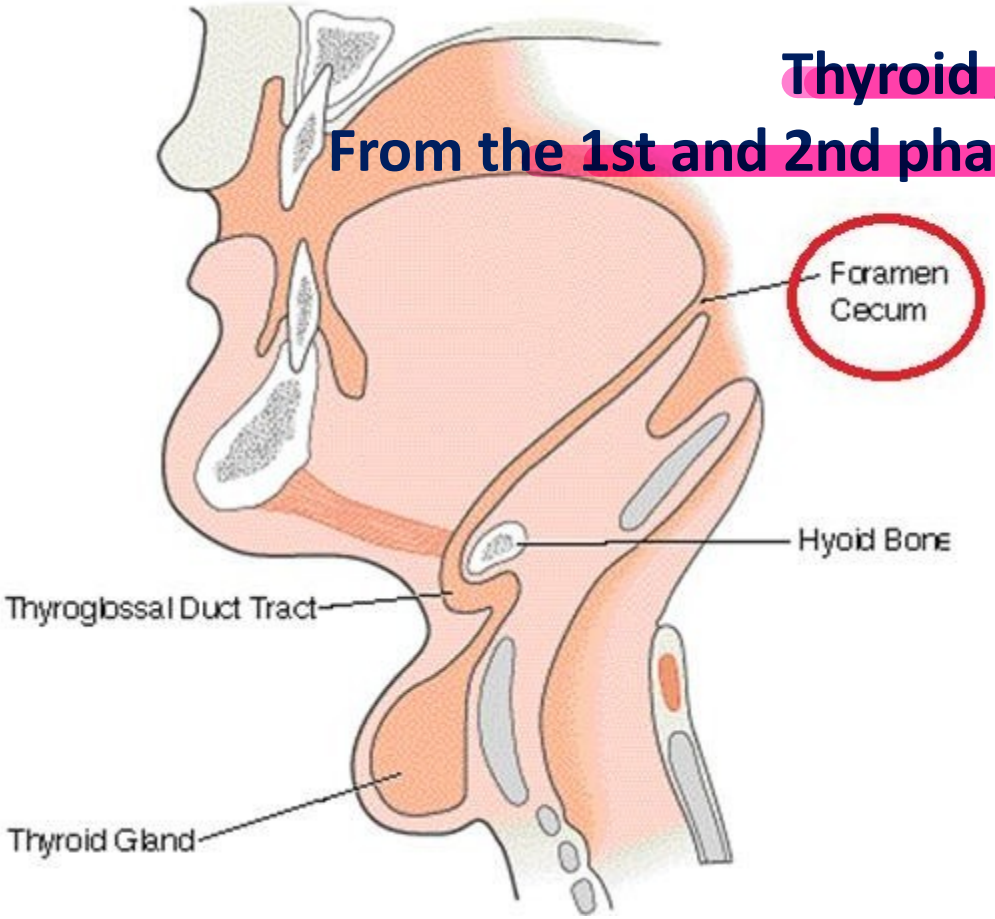

Introduction
Embryology
Anatomy
Physiology
Pathophysiology

Embryology

First of the body's endocrine glands to develop around the third week (24th day) of gestation

Thyroid gland develops

From the 1st and 2nd pharyngeal arches

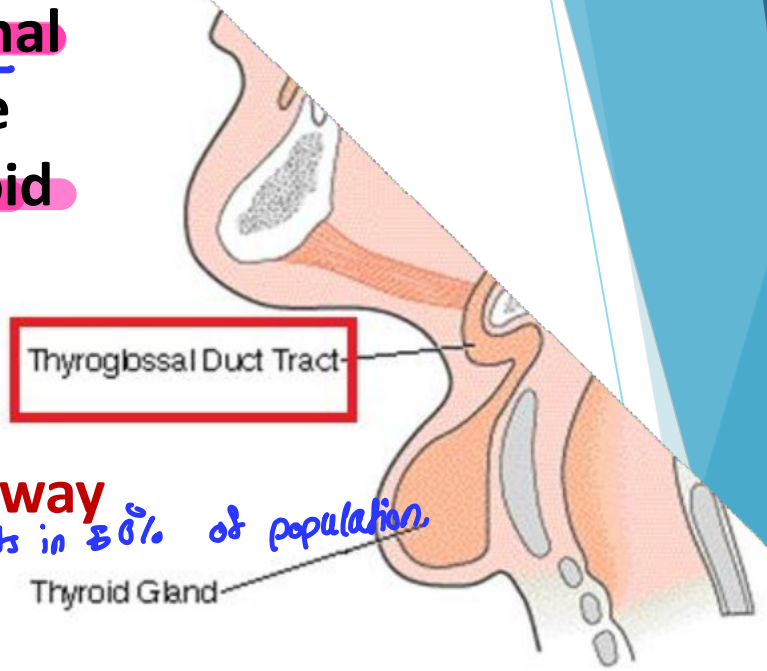


It begins as an endodermal thickening on the floor of the median bud of the pharynx at the site of the foramen cecum on the adult tongue.

Thyroglossal duct (the endodermal thickening) passes ventral to the embryonic hyoid bone and thyroid cartilage.

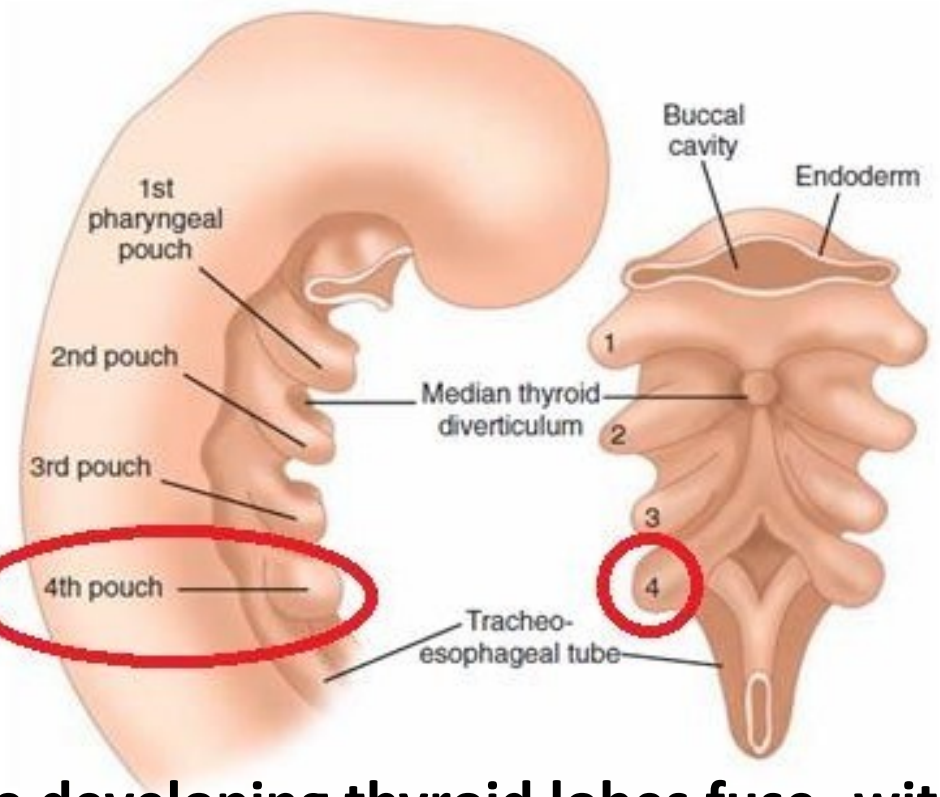
Disappears by the 50th day of gestation

May persist any way in that pathway as the pyramidal lobe or thyroglossal duct cyst

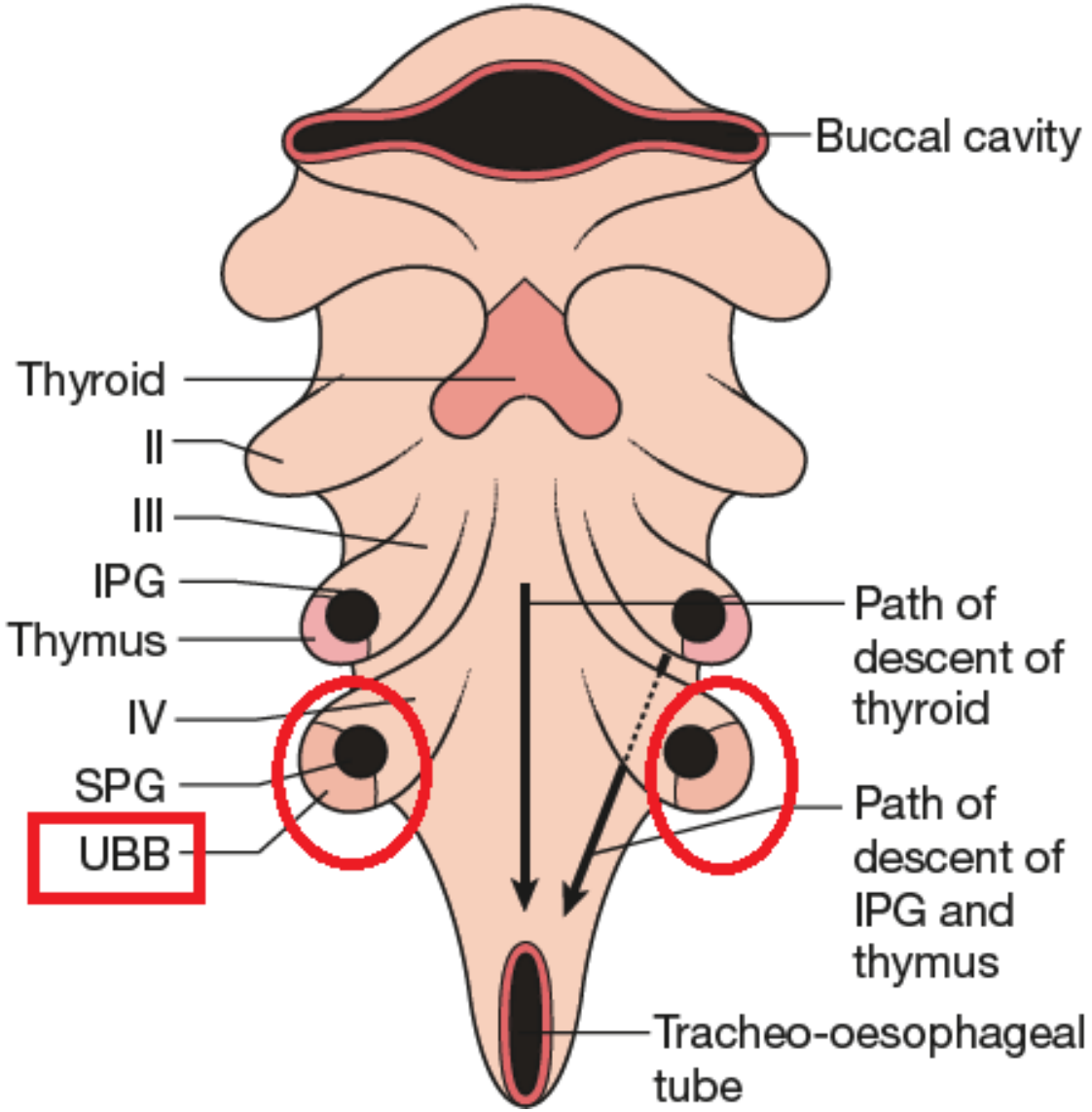


1 → presents in 50% of population

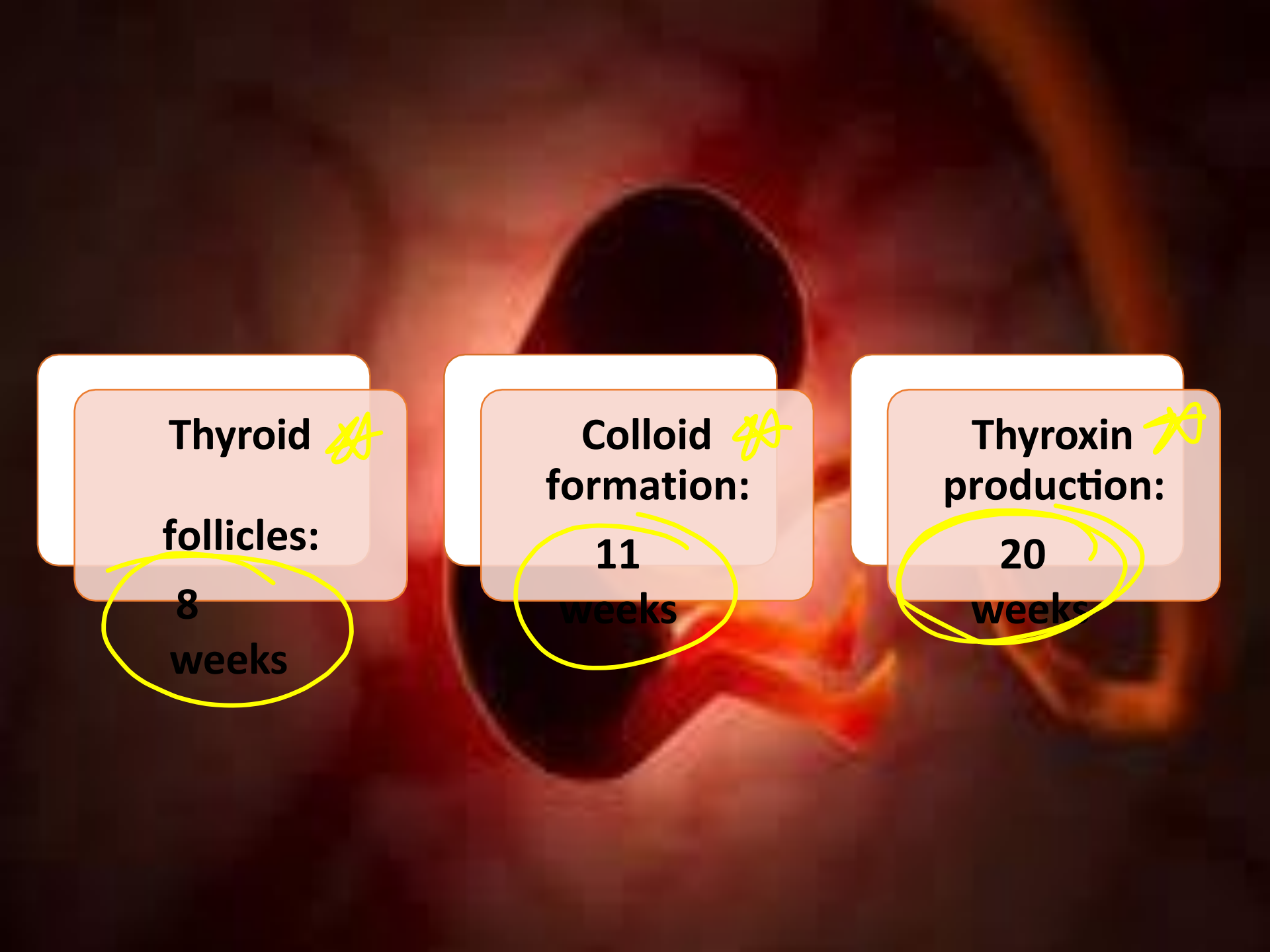
2 → most common congenital anomaly in neck



The developing thyroid lobes fuse with the structures that arise in the fourth pharyngeal pouch, i.e., the superior parathyroid gland and the ultimobranchial body.



The lateral anlages are neuroectodermal in origin (ultimobranchial bodies) and provide the calcitonin producing parafollicular or C cells, which thus come to lie in the superoposterior region of the gland.

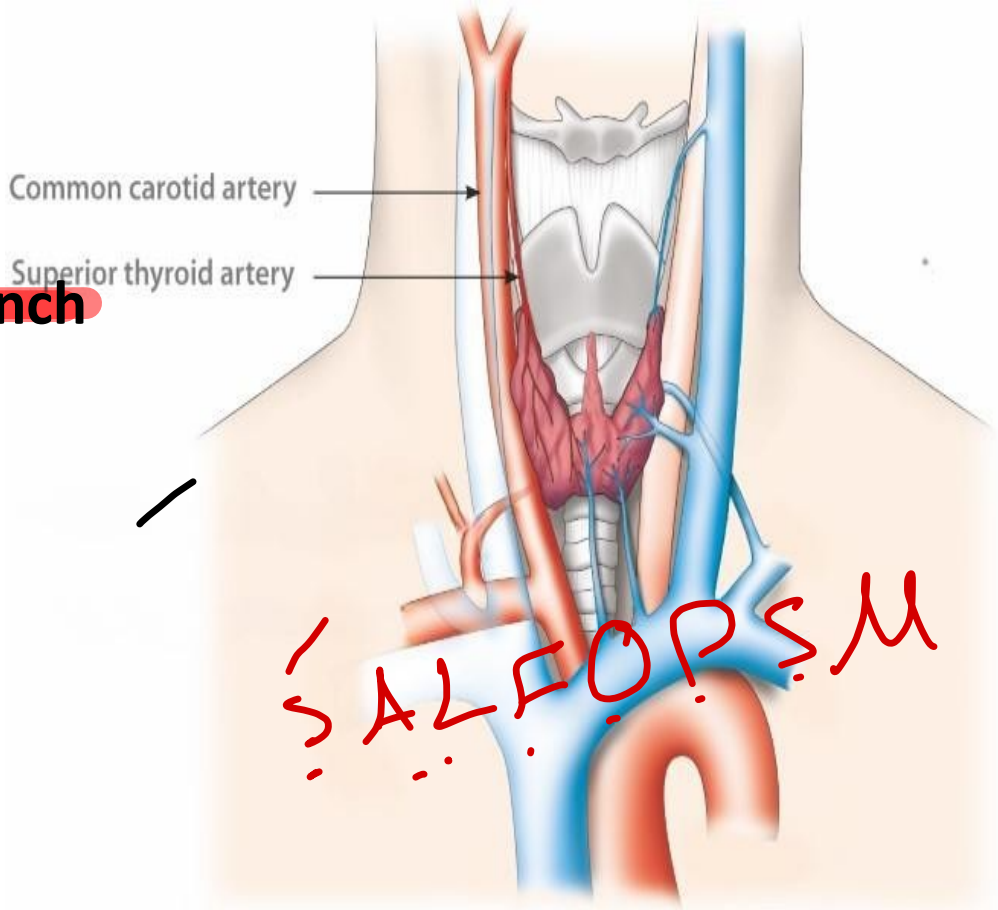

Thyroid follicles:
8 weeks
Colloid formation:
11 weeks
Thyroxin production:
20 weeks

Functions of thyroxine

1. Not involved in fight or flight response
2. Control basal metabolic rate (BMR).
3. Heat generation
4. Potentiation of action of catecholamines (+ inotropic, chronotropic)
5. Participate In the main respiratory drive
6. Fetal neurological development
7. GI motility
   - Hypo → constipation
   - Hyper → Diarrhea
8. Intrauterine deficiency of thyroxine lead to congenital hypothyroidism (cretinism)

- Macroglossia, mental retardation, umbilical hernia

Arterial supply



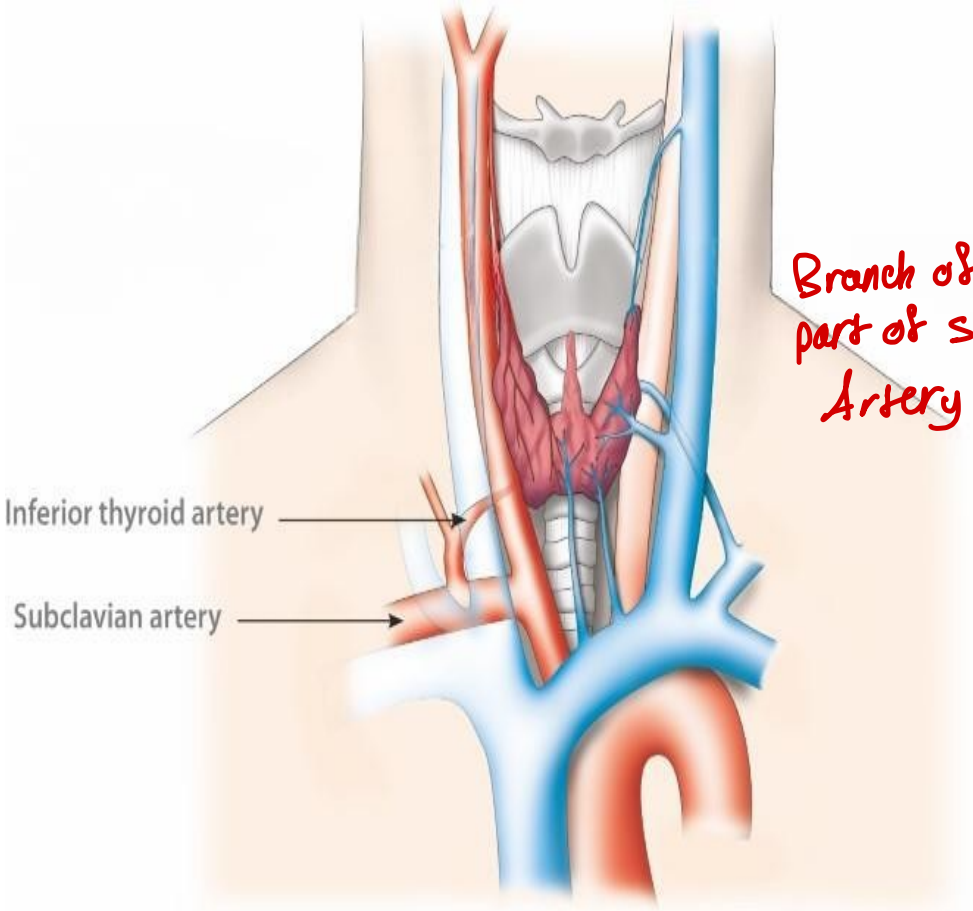
Superior thyroid artery 1st branch of external carotid artery

Other branches of ECA:

- **Ascending pharyngeal** ①
- **Lingual** ②
- **Facial** ③
- **Occipital** ④
- **Post. Auricular** ⑤
- **Superficial temporal** ⑥
- **Maxillary** ⑦

The Bifurcation (End branches).

(Sóme Ámerican Lády Found Our Pyramids So Magnificent)



Branch of 1st part of subclavian Artery.

- Inferior thyroid artery from the thyrocervical trunk
- Also supplies the 4 parathyroid glands
- Thyroid IMA artery In 1-3% of the population , from the aortic arch or brachiocephalic artery

- During thyroidectomy , always Ligate close to thyroid to avoid devascularization of parathyroid glands

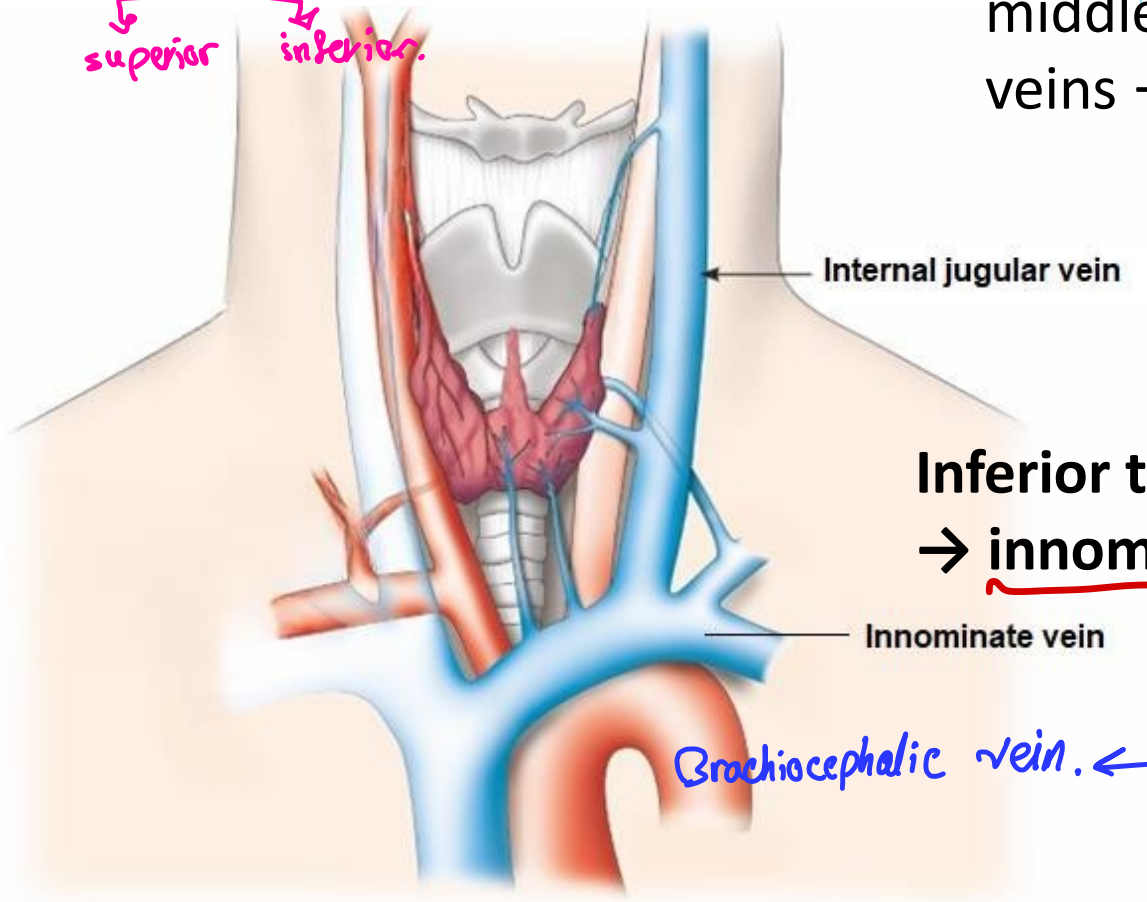
Venous drainage

Venous drainage ≠ Arterial supply

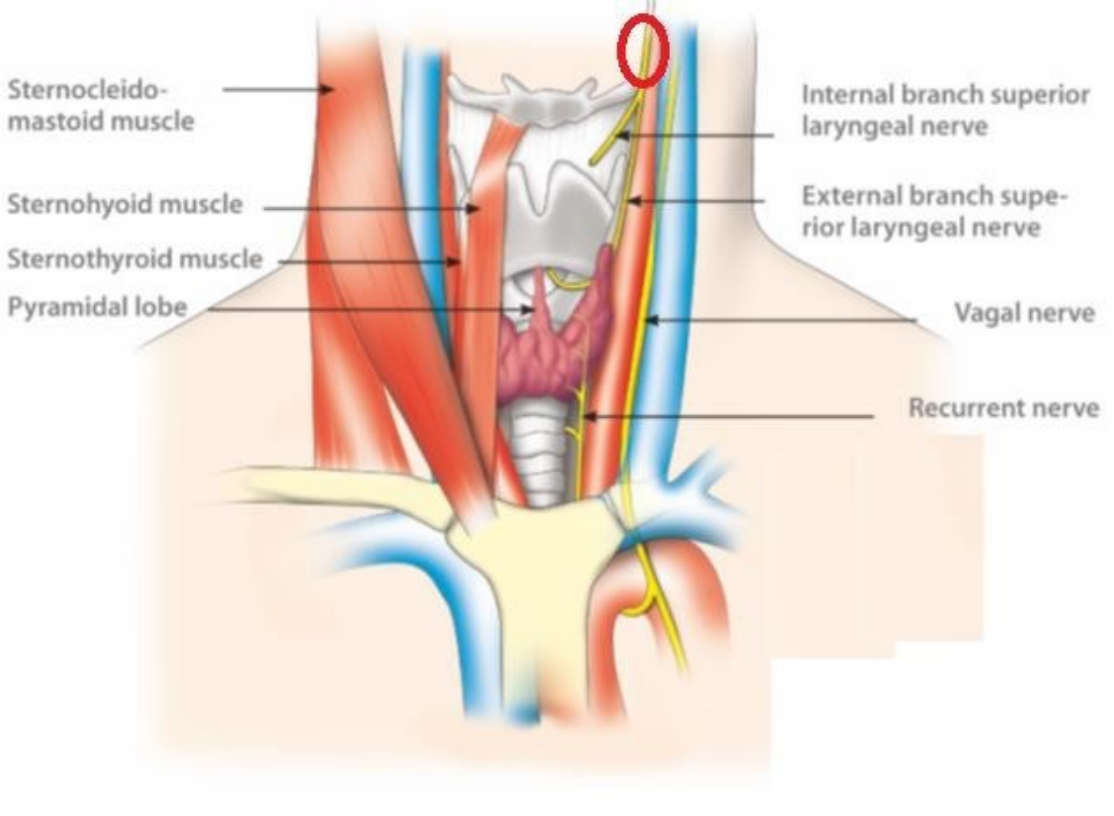
Venous drainage: Superior, Middle, Inferior

Arterial supply: superior, inferior.

Superior and middle thyroid veins → IJV



Inferior thyroid vein → innominate vein



Superior laryngeal nerve (external branch) :

- Motor to cricothyroid muscle
- Close to Superior thyroid artery . → so SLN suspected to injury during superior artery ligation..
- Most common nerve injured with thyroidectomy → easy voice fatigability , loss of high pitched tone

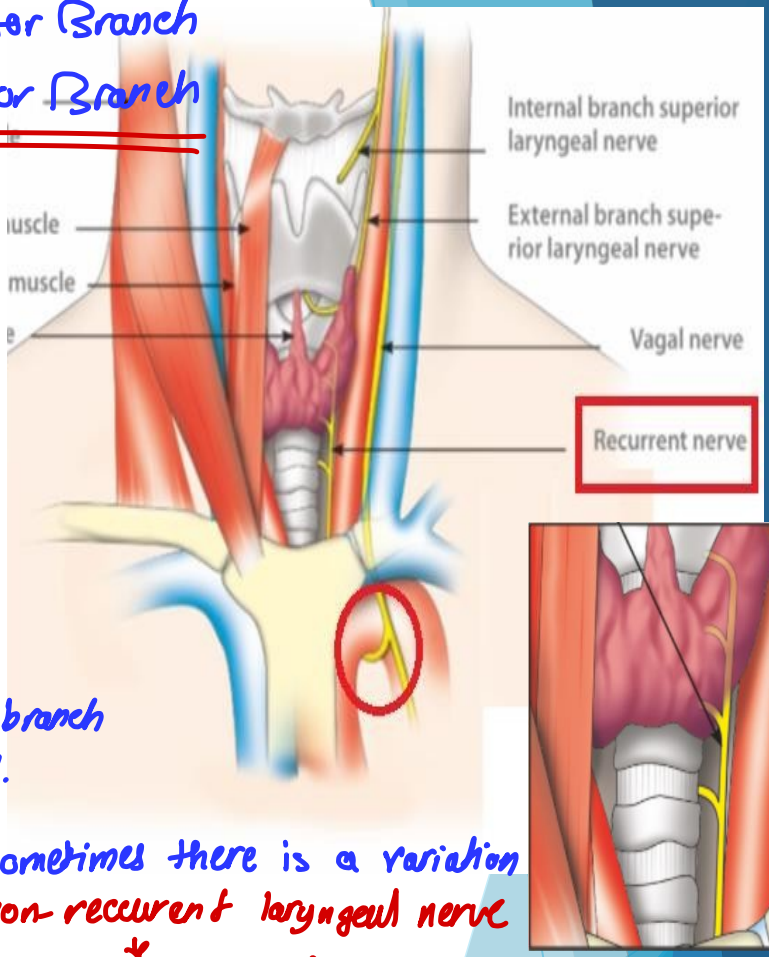
Recurrent laryngeal nerve :

→ Abductor Branch
→ Adductor Branch

so injury has variable Manifestations.

- Posterior and medial to thyroid lobes in the tracheoesophageal groove
- From Vagus X , Lt→aorta , Rt→ innominate
- Motor function for vocal cord abduction and adduction
- Supplies all the muscles of larynx except the cricothyroid muscle → supplied by External branch of superior laryngeal.
- Injury → Asymptomatic Hoarseness if unilateral
- Bilateral→ airway obstruction, profound aspiration (both need tracheostomy if occurred)

(depending on the final location of the cords) (abductor/adductor) branches injury



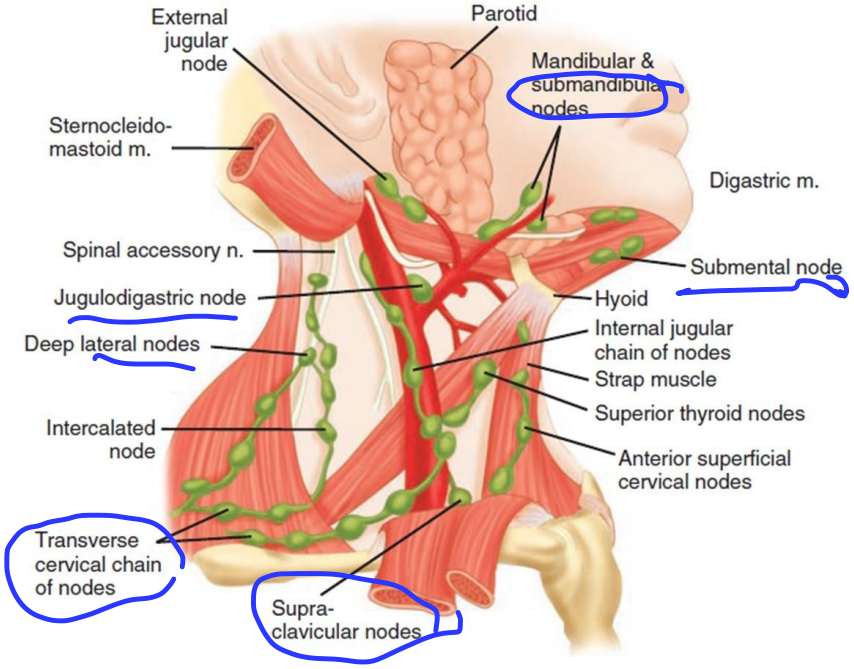
* sometimes there is a variation → non-recurrent laryngeal nerve → more suspected to injury.

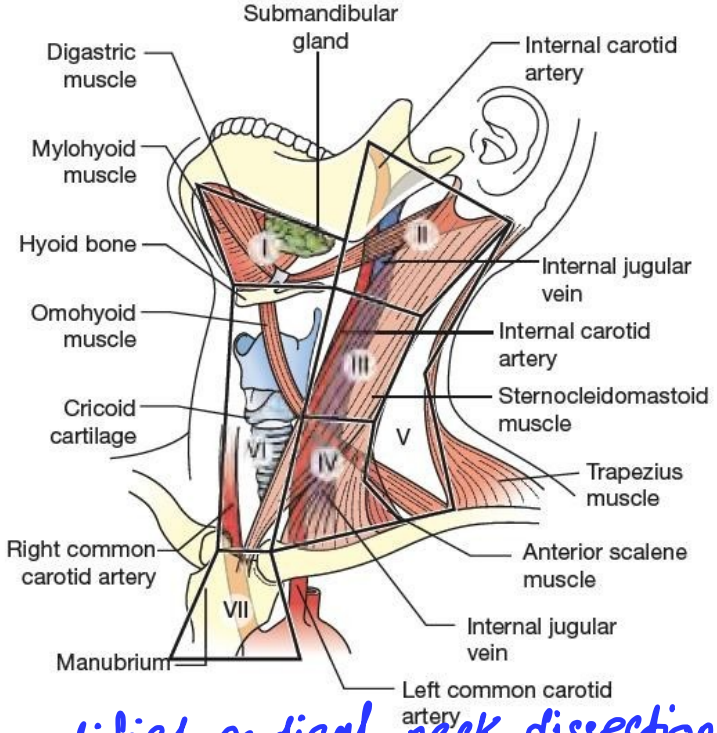
* injury may be transient by traction by cotary or forceps.

* or may be permenant by nerve cut

Lymphatic drainage

important for neck dissection.





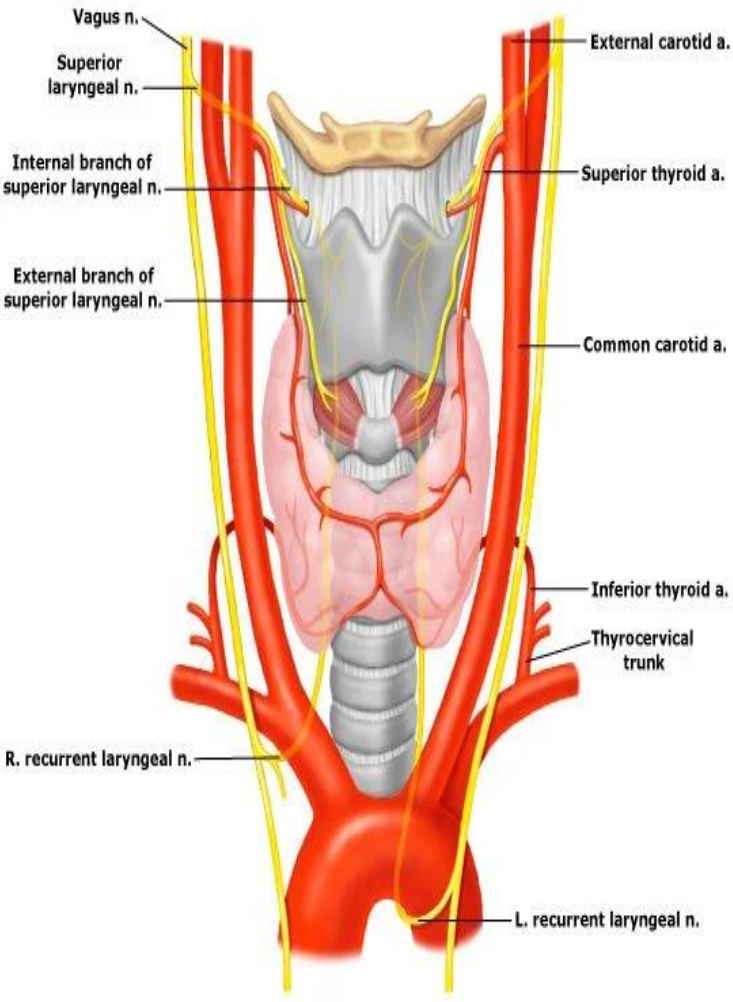
* removal of one side → named (modified radical neck dissection).

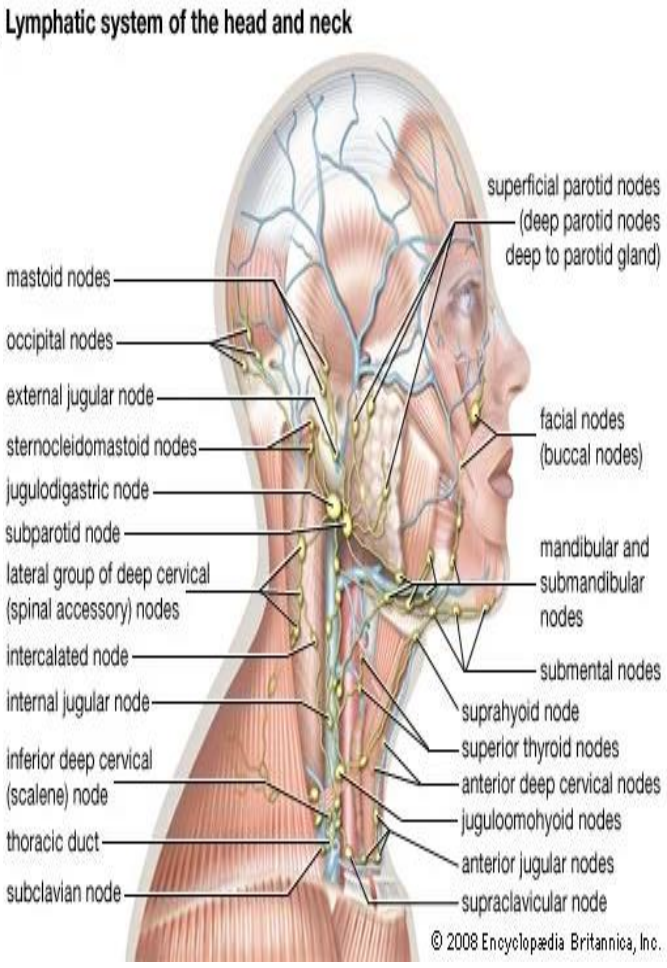
Lymphatics

- Paratracheal nodes
- Deep cervical nodes

Innervation

- Vagus nerve (parasympathetic)
- Superior, middle, and inferior cervical ganglia of the sympathetic trunk





- Removal of neck lymph nodes is called NECK DISSECTION)
- Might be warranted in thyroid cancer and other head/neck malignancies
- Can be selective or complete (all levels)
- Prophylactic vs. therapeutic
- The standard neck dissection surgery is termed **Modified radical neck dissection (MRND)**
- Preserve spinal accessory nerve, IJV , Sternocleidomastoid muscle (unless directly involved by tumor
- The term Central Neck Dissection entails removing only Level VI lymph nodes

- Different thyroid surgeries:

-hemithyroidectomy(lobectomy), near total (subtotal), total

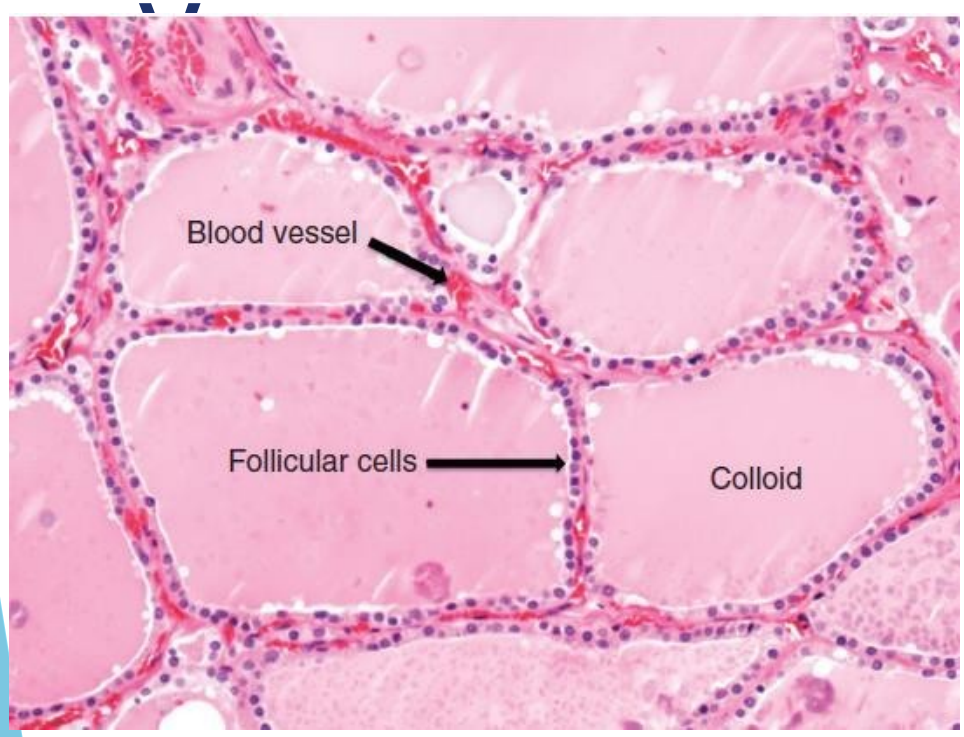
Post thyroidectomy complications :

1. RLN injury (recurrent laryngeal)
2. Parathyroid devascularization
   - Can be permanent or transient (traction/manipulation/thermal injury)
   - Present with post op hypocalcemia (circumoral numbness usually first sign, muscle twitching, +Chvostek sign, +troussou sign, seizures , arrythmia, cardiac arrest)
   - Treated with oral ca++/vitD OR IV ca++ gluconate if severe.
3. Hematoma: can be emergency (airway compromise) , stridor
   - Treatment evacuation in OR or bedside if causing airway compromise
4. Vascular injury (carotid/IJV/innominate V)
5. Tracheal inj.
6. Spinal accessory N injury (only in MRND)
- Thoracic duct injury (only in left MRND) – chyle in drain

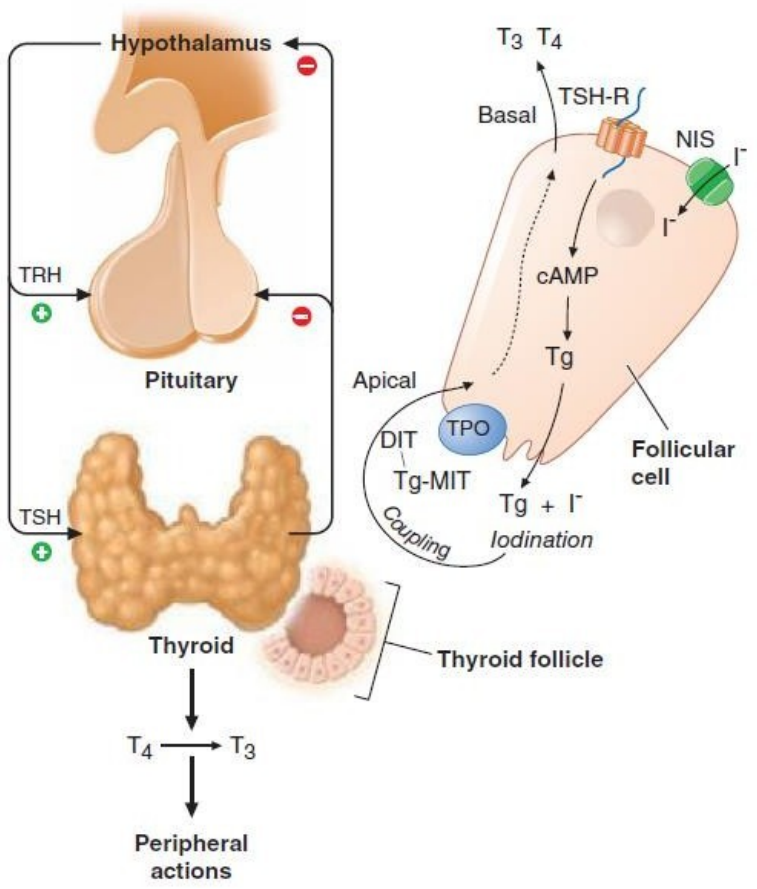
may be Accidental or due to reduce blood supply to parathyroid gland during surgery.

milky.

Physiolog



- **10-20g .**
- **The functioning unit is the lobule, which consists of 24-40 follicles .**



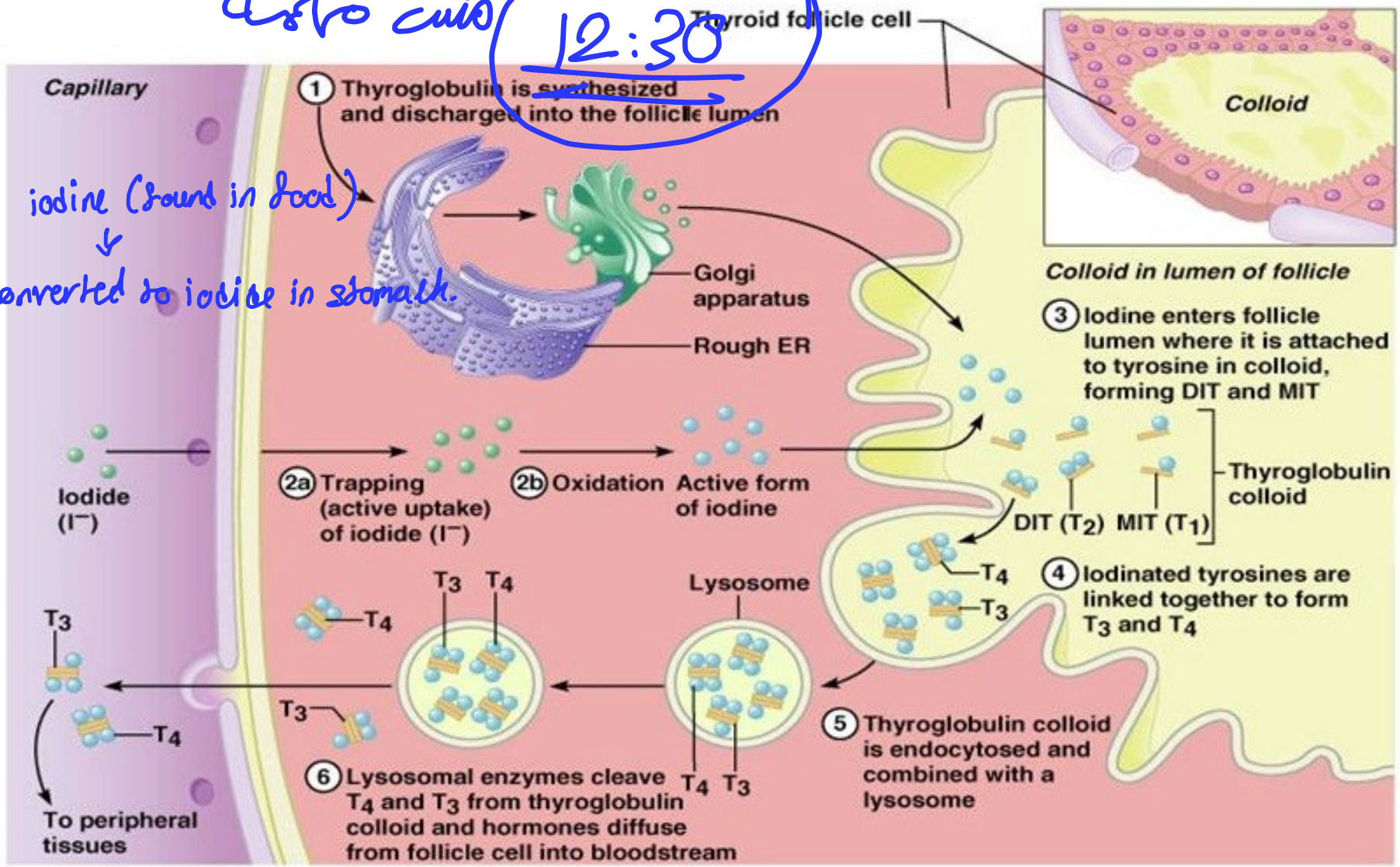
- Hypothalamus (TRH)→ant. Pituitary (TSH) →Thyroid (T3 , T4)

main regulator.

- Negative feedback

SYNTHESIS OF THYROID HORMONES

Tuyến giáp 12:30



iodine (found in food)
↓
converted to iodide in stomach.

- The main steps are :

1- IODIDE **TRAPPING** (uptake)

2- **ORGANIFICATION** (linking iodine to tyrosine – MIT and DIT (by TPO)

3- **COUPLING** (MIT+DIT =**T3**, DIT+DIT=**T4**) (by TPO)

  - STORAGE (in colloid , bound to Thyroglobulin)

  - Then thyroxine released when needed

  - All steps are affected by TSH

  - Thyroid gland mainly produce T4

  - TSH is the most sensitive indicator of thyroid function (hyper or hypo)

1. Only free T3 and free T4 are active 1% (protein bound not active 99%)
2. Most T3 (from T4>T3 conversion in periphery) by deiodinase

T3 → (Peripheral deiodenase) T4

T4:T3 serum ratio 20:1

*Site of action is in nucleus.

3. T3 more potent (4X)
4. Thyroid binding globulin : transport majority of T3 and T4 in blood stream

Thyroglobulin : stores T3 and T4 in colloid.

Pathophysiology

Goiter

- Enlargement of the thyroid gland

Hyperthyroidism

- Hyperactivity in the entire or part of the thyroid

Thyrotoxicosis

- The clinical condition due to high T3 and T4 in extra thyroidal tissue without regard to origin

→ Exophthalamos (Peritibial Myxedema.

The Diagnosis of Thyroid Disease

Triple Assessment

like Breast.

- Clinical
- TSH,T3,T4
  the most important.
- Thyroid scan or US with or without FNA

هو اللي بفرق بين انواع ال Enlargment.

History

1

Neck Mass

- Obstructive symptoms (dysphagia, dyspnea, dysphonia)

2

Hypothyroidism

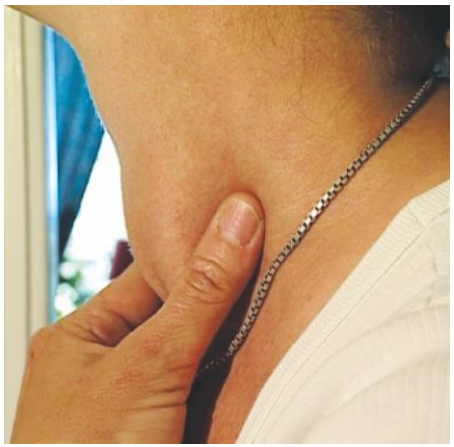
- Slow speech and action
- Fatigue
- Cold intolerance
- Constipation

3

Hyperthyroidism

- Irritability
- Insomnia
- Palpitations
- Heat intolerance
- Diarrhea

Physical Examination



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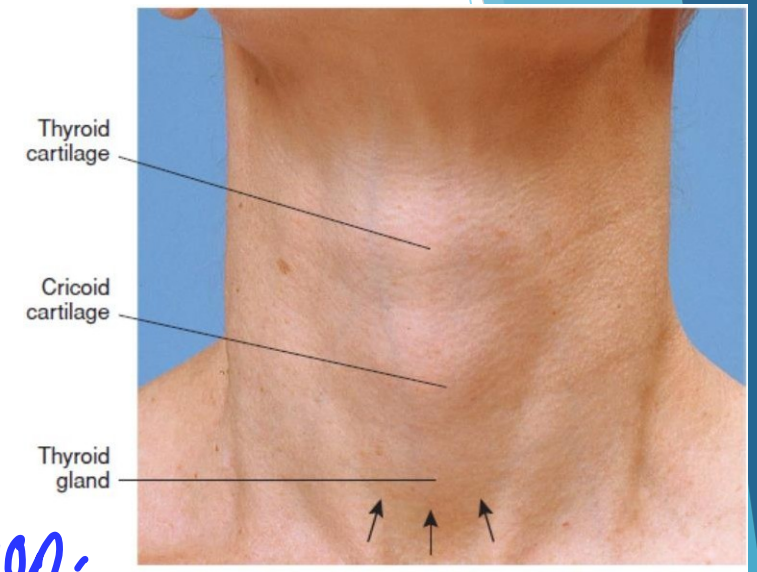
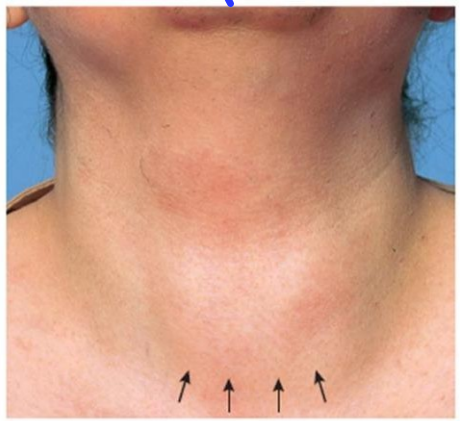
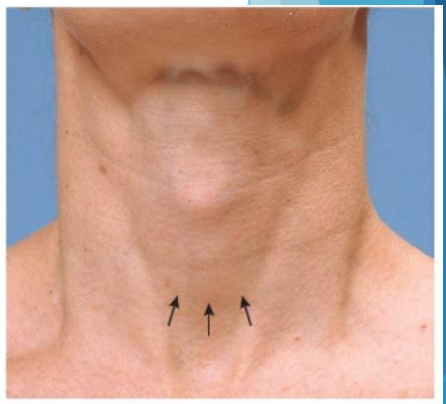


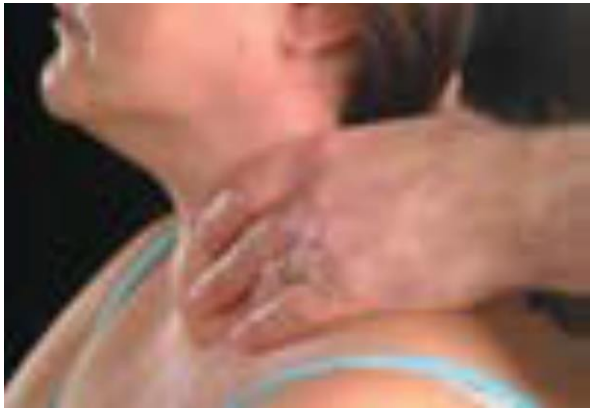
inspection.

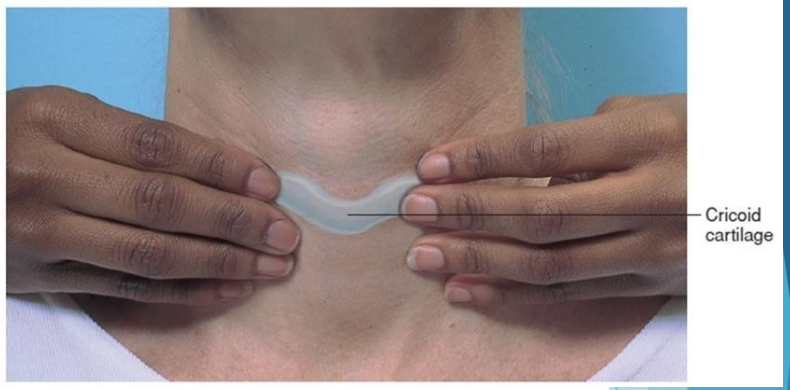




Physical Examination

*Bimanual palpation.

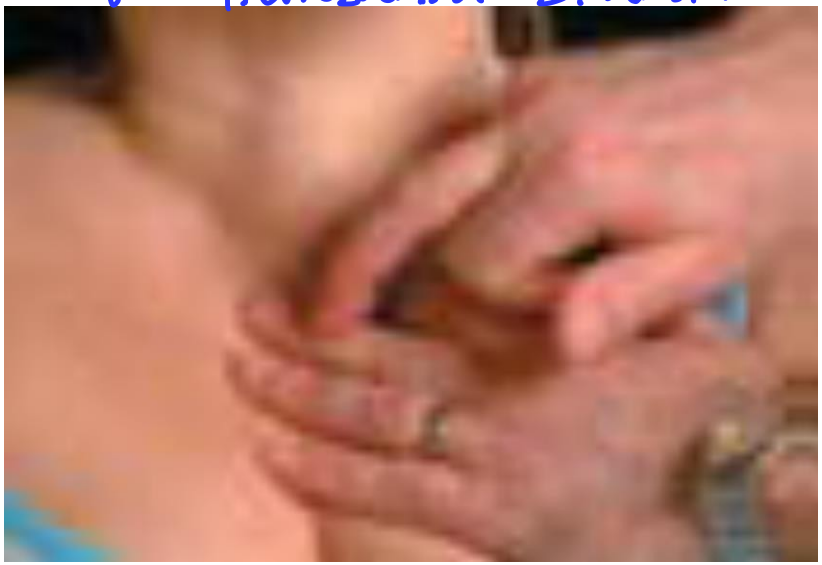




*suprasternal notch palpation.

Physical Examination

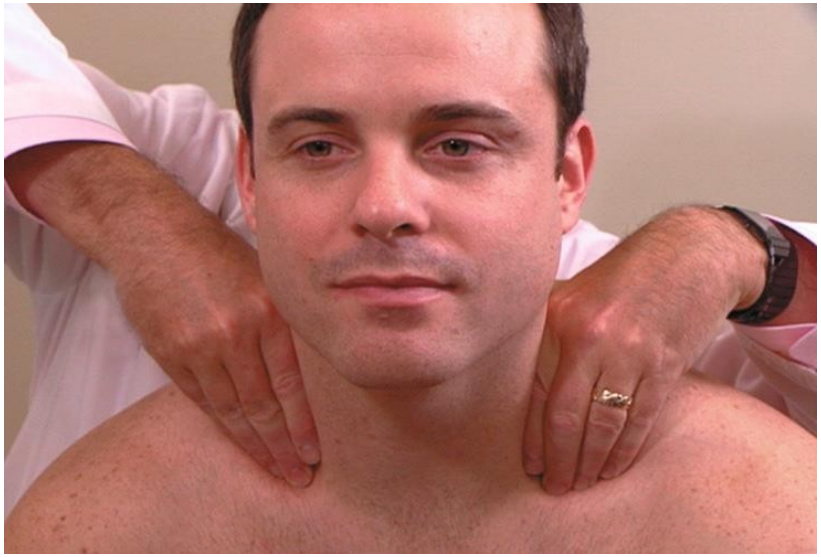
for Retrosternal Extension.



Thyroid Artery Bruit.

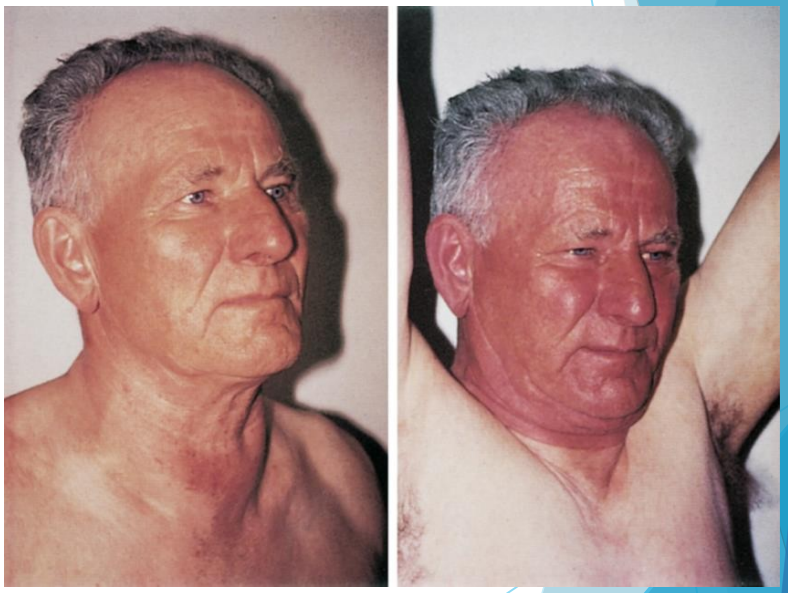
Physical Examination

Supraclavicular LNs



SVC obstruction due to Goiter.

Pemberton's sign

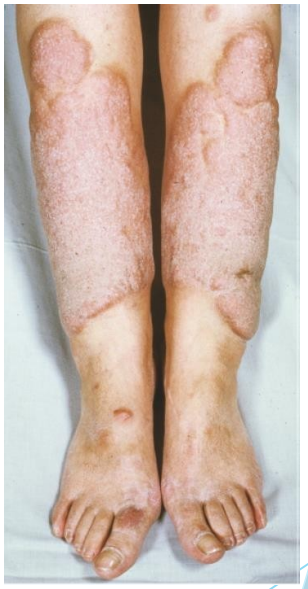


Physical Examination

Thyrotoxicosis

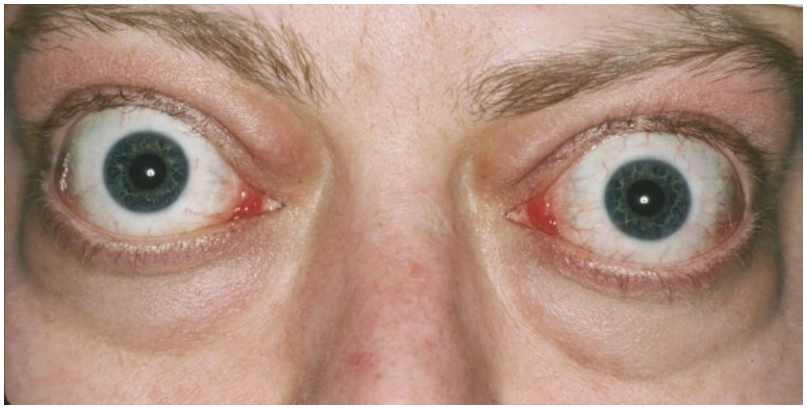
Graves' disease

Pretibial myxedema



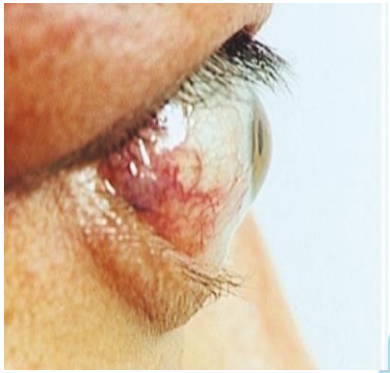
Physical Examination

Exophthalmos/ Lid retraction

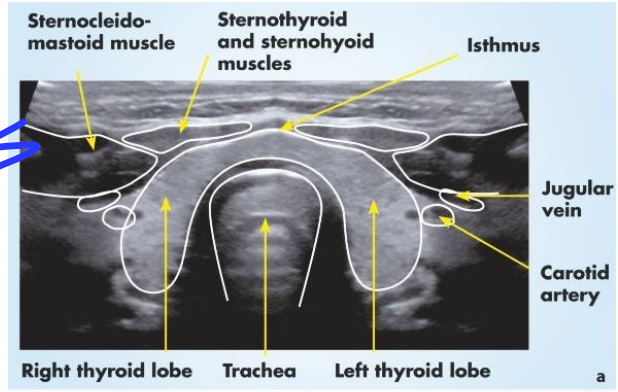


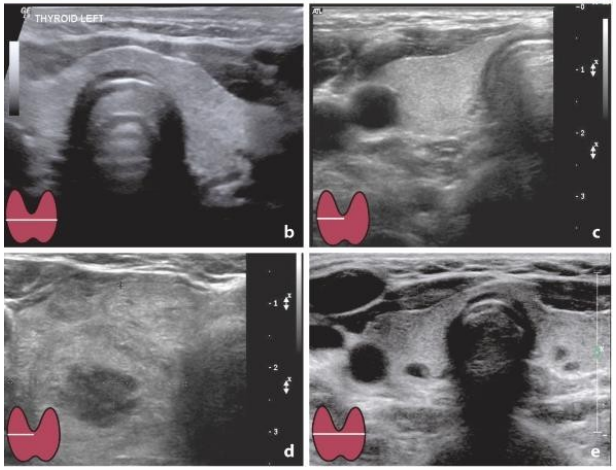
Proptosis/chemosis

swelling of Eye surface Membrane
Bcz of accumulation of fluids.

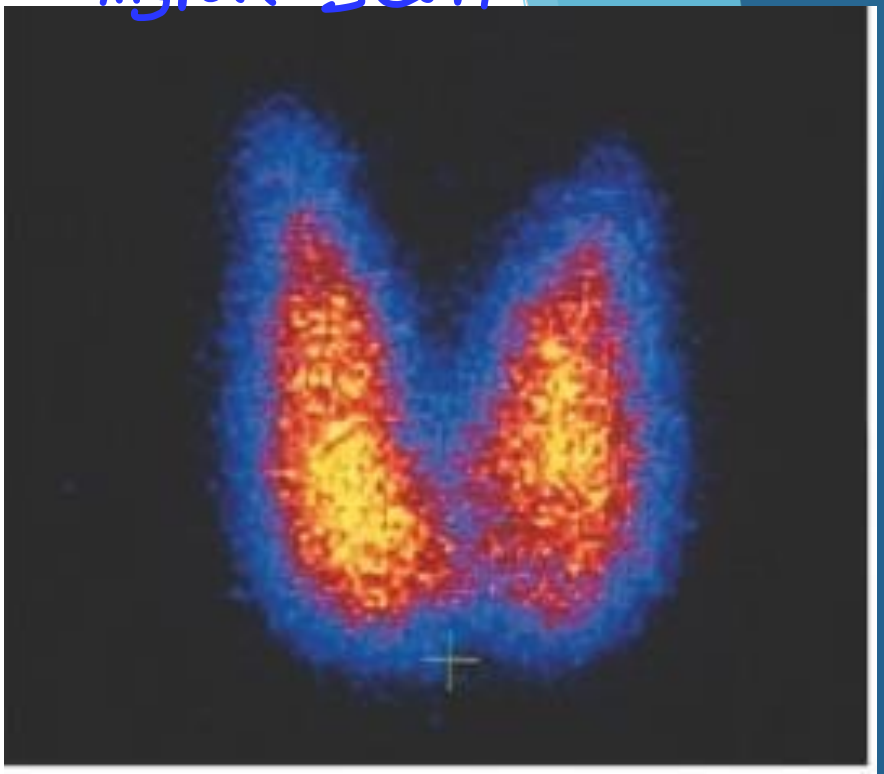


US





Thyroid scan.



Imaging

Developmental Abnormalities of the Thyroid

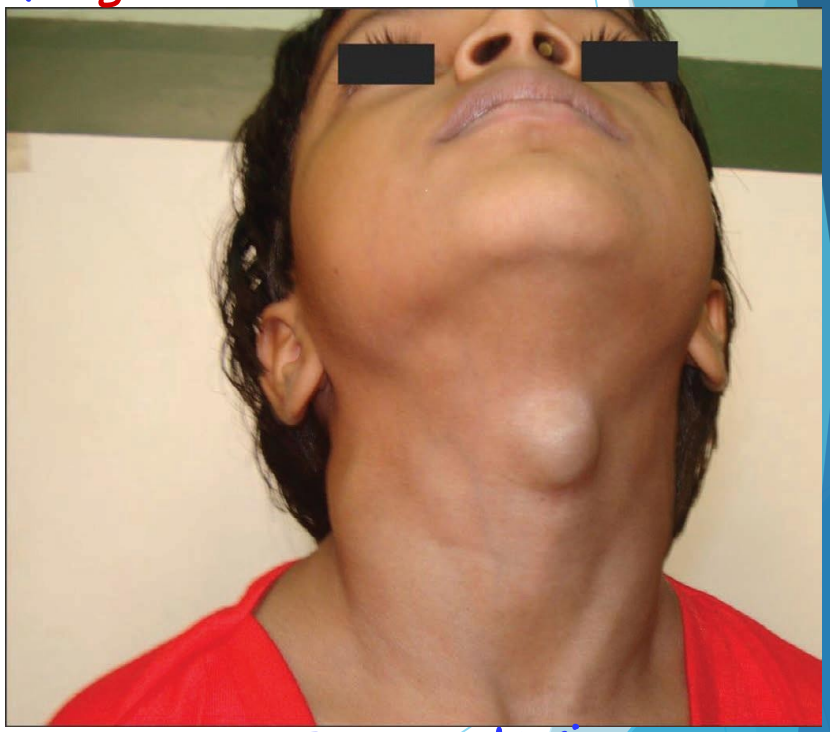
Thyroglossal Duct Cyst

↳most common complication :- infection **

The most common congenital cervical anomalies ***

80% are found in near the hyoid bone

Tx: cyst removal + Hyoidectomy.

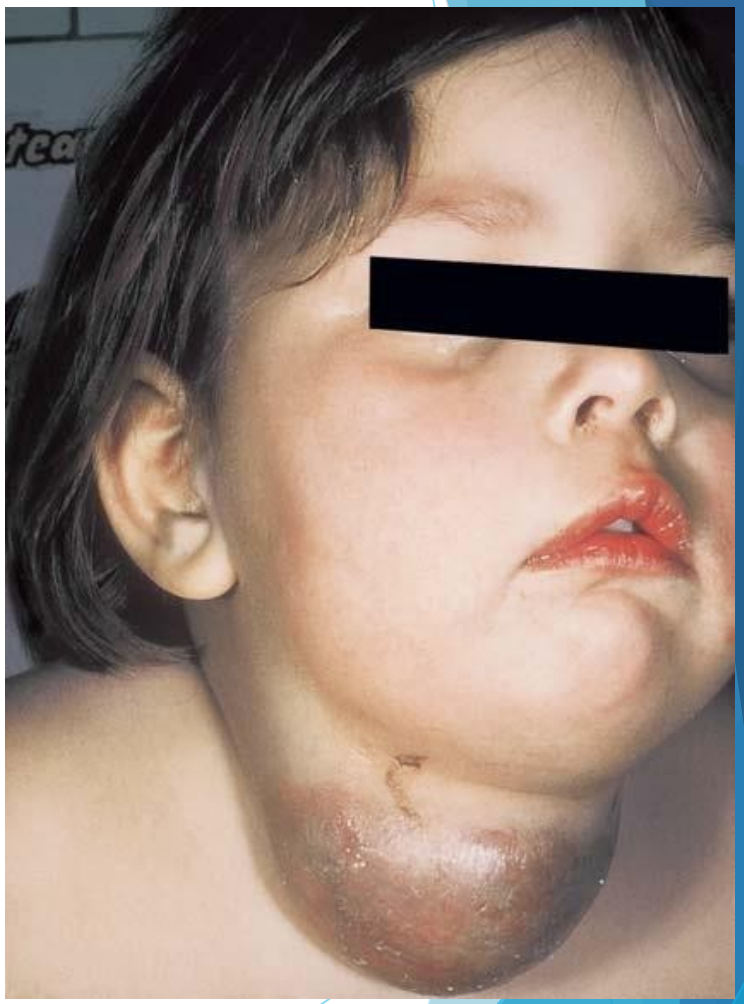


*Examine by Tounge protrusion.
↓
Elevated while Tounge is protruded.

Most common age: (15 - 30)

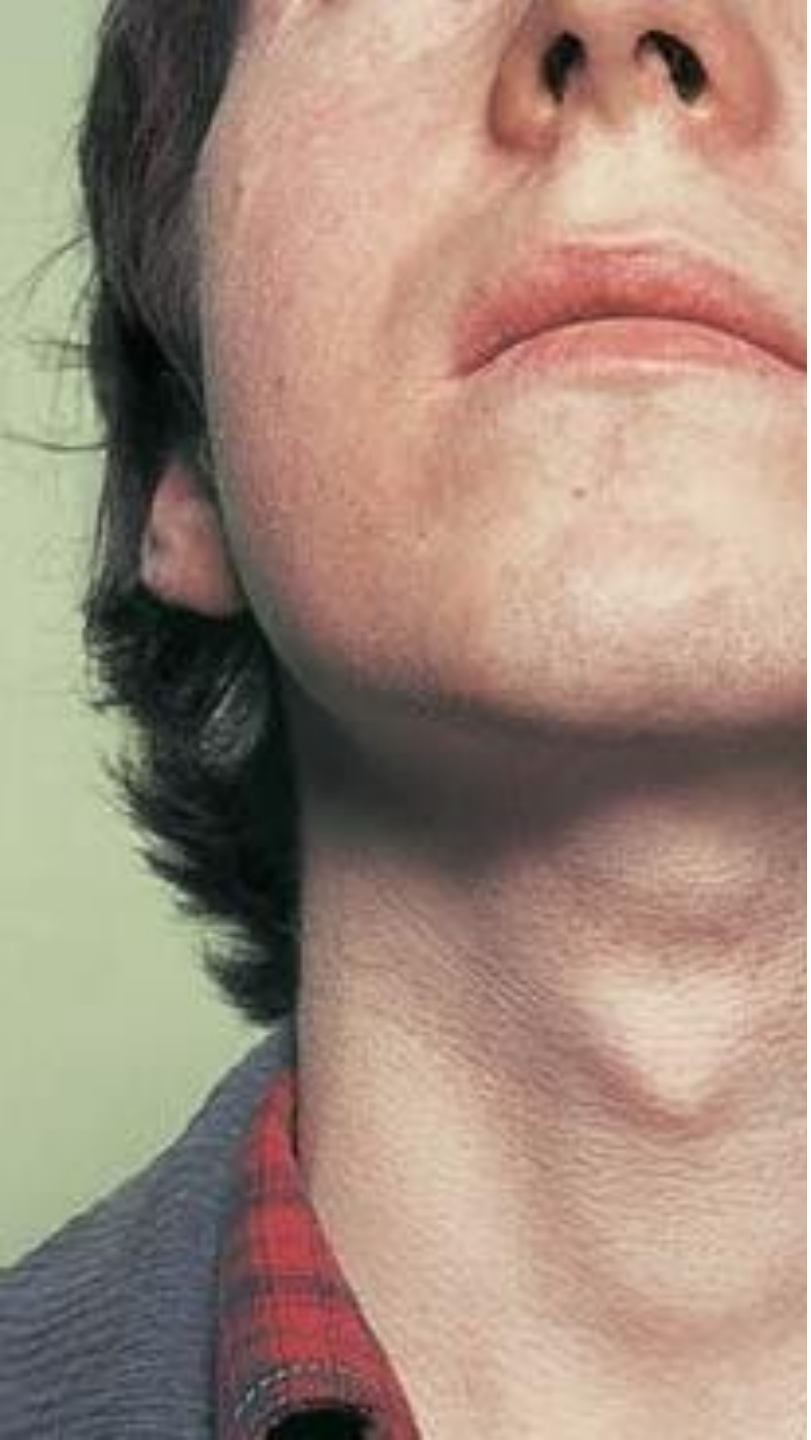
- Usually asymptomatic but occasionally become infected by oral bacteria

Most common complication.



Complications:-

1. infection
2. Malignant Transformation.
3. Fistula.



Diagnosis

A 1- to 2-cm, smooth, well-defined midline neck mass that moves upward with protrusion of the tongue and swallowing

- **Routine thyroid imaging is not necessary**

Treatment

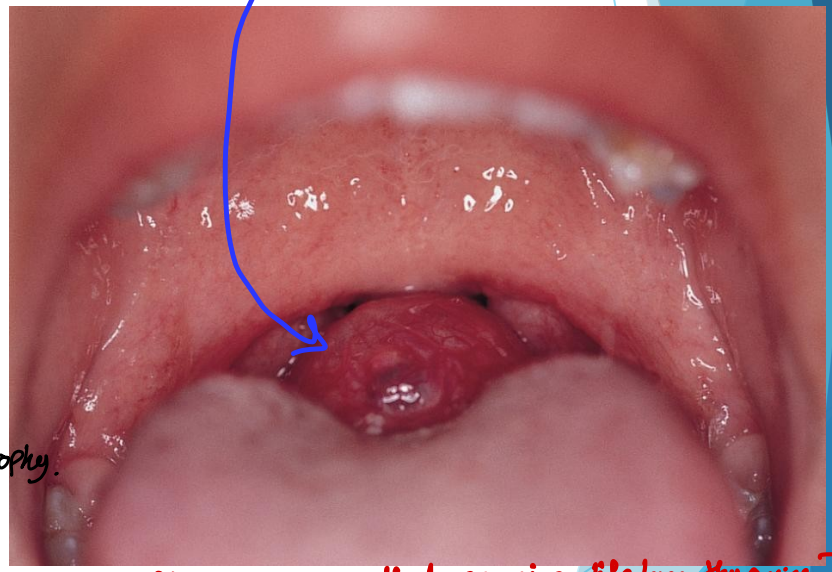
- **The "Sistrunk operation," which consists of en bloc cystectomy and excision of the central hyoid bone to minimize recurrence**

Lingual Thyroid

↳ 2nd Most common Anomaly.

complete failure in thyroglossal canal

1. fail to descend and remain located in the posterior aspect of the tongue
2. respiratory and swallowing difficulties and hemorrhage.
3. Diagnosis is confirmed by radionuclide scanning
4. Treatment with thyroxine (→ high dose → gland suppression → Atrophy.) or radioactive iodine (destroy the gland) or surgery
5. 2% risk of malignancy (papillary thyroid cancer



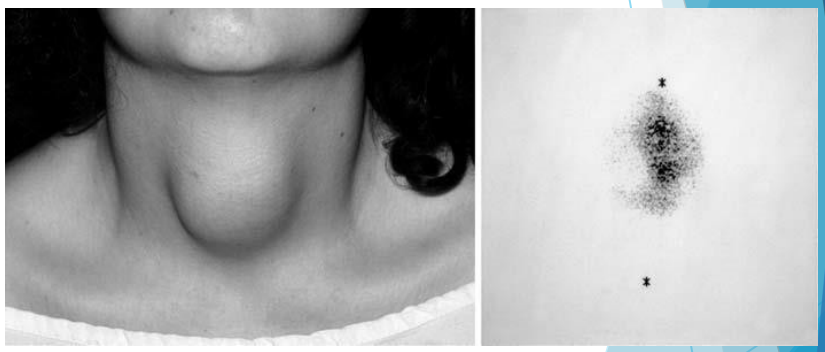
so after surgery patient require life long thyroxine Therapy.

Could be the only thyroid tissue in 70% of cases (do U/S)

Ectopic Thyroid

can be located at any point along the line of the thyroglossal tract,

may be the only thyroid tissue present



Can be rarely located in mediastinum, near heart or esophagus

Thyroiditis

Thyroiditis

- **Hashimoto's thyroiditis (autoimmune)**
  - **MC thyroiditis**
  - **MC cause of hypothyroidism in adults**
  - **Anti-TG abx , anti-Microsomal Abx**
  - **Enlarged, painless gland**
  - **More in females**
  - **Tx: only thyroxine replacement**
  - **Surgery if enlarging goitre or suspicious nodule**
  - **Risk factor for thyroid lymphoma**

Thyroiditis

2. **Subacute thyroiditis (de Quervain's thyroiditis, viral)**
   - URTI, tender thyroid, sore throat, mass, weakness, fatigue; women
   - Elevated ESR , hyperthyroidism initially
   - Tx: steroids and NSAID → But mainly it is self limited.

3. **Acute suppurative thyroiditis (bacterial)**
   1. (URTI) usual precursor (staph/strep) or pharyngeal infection
   2. Normal thyroid function tests, fever, dysphagia, tenderness
   3. Tx: antibiotics

Higher ESR
اعلى من اللي قبلها

Thyroiditis

- **Riedel's thyroiditis (scar):**

-Woody, fibrous thyroid that can involve adjacent strap muscles and carotid sheath

- Can resemble thyroid CA or lymphoma (need biopsy)
- Disease frequently results in hypothyroidism and compression symptoms → Treated by isthmectomy → to relief compression symptoms
- Associated with sclerosing cholangitis, fibrotic diseases, methysergide Tx, and retroperitoneal fibrosis
- Tx: steroids and thyroxine
- May need isthmectomy or tracheostomy for airway symptoms

Goiter

Term of Enlargment.

Goiter

Latin word ⇒ throat

♀ > ♂

severe hyper ↔ vascularity / plasia / trophy

↳ toxic dose of T_3 & T_4

* commonest goiter

Simple

Causes:-

- relative iodine ↓
  - endemic → absolute ↓ (أماكن بعيدة عن البحر)
  - sporadic → relative ↓ (pregnancy, menarche...)
- Goitrogenic substances (T_3, T_4 تمنع تكوين)
- Dietary → cabbage, cauliflower, ↑ (Cl^-, Fl^-, Ca) (يتعارضون مع امتصاص الـiodine)
- Drugs
- Genetic defects ⇒ Pendred's syndrome
  - ↓ dehalogenase.
  - ↓ thyroid peroxidase.
  - → Goiter
  - → Deafness
  - → mutism

① physiological or diffuse hyperplastic

♀ > ♂ (10-20)

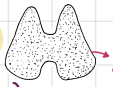
- → menarche
- → Puberty
- → Pregnancy
- → lactation

C/P

uniform, small, smooth, soft, diffuse goiter with normal thyroid function.

* treatment only medical.

② Colloid



diffuse, symmetrical, smooth, soft or firm moderate or large goiter.

♀ > ♂ (20-30)

prolonged iodine ↓ ⇝ try to store more colloid for time & need.

③ Simple nodular

nodular, firm, asymmetrical & irregular

commonest (30-40) Variable. * euthyroid.

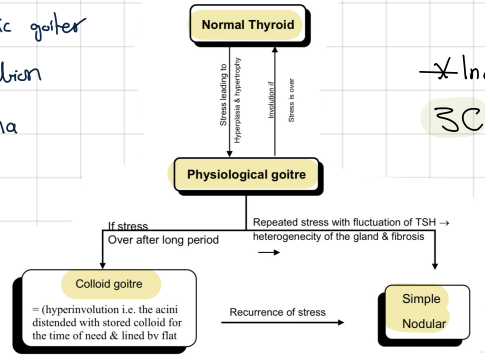
most of nodules → colloid (pale brown gelatinous) or cellular (solid).

Hge, fibrous

- Painless neck swelling
- diagnosed accidently
- sudden enlargement & pain (due to hge)

Complications:-

- 2ry toxic goiter
- calcification
- Carcinoma
- cyst.
- Hge
- retrosternal extension.



* Indication for surgery

3C ↔ cosmetic, compression, complications.

Thyrotoxicosis vs Hyperthyroidism

Thyrotoxicosis: ↑ thyroid Hormones in blood due to ↳ thyroid source or ↳ extrathyroid source.

Hyperthyroidism: ↑ thyroid Hormones in blood due thyroid hyperfunction.

Causes

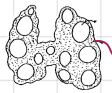
① Toxic goiter

1ry (Commonest 75%)
- ↳ = Diffuse toxic goiter
- = exophthalmus goiter (Bulging eyes)
- = Graves' disease

2ry (15%)
- ↳ = toxic nodular goiter
- = plummers disease

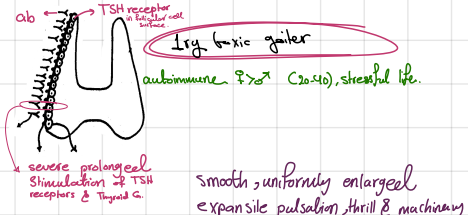
Solitary toxic nodule (5%)
- Single active autonomes nodule
- Hemithyroidectomy to remove overactive tissues

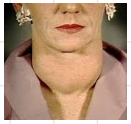
Treatment: only surgical (subtotal thyroidectomy)
- the internodular tissue is the site of hyperactivity.
- 2ry to simple nodular goiter



② Rare Causes (5%)

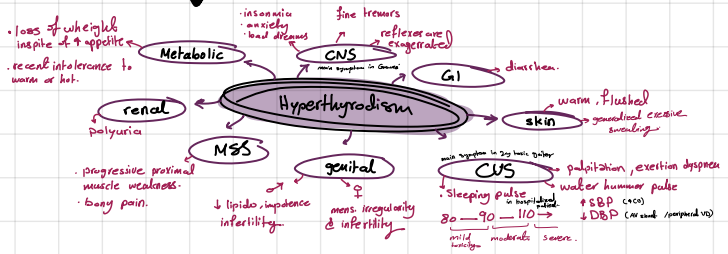
- early stages of ↳ subacute thyroditis
  Hashimoto's disease
- Thyrotoxicosis factitia (Exogenous L-thyroxine)
- Neonatal thyrotoxicosis (subside spontaneously within 3-4 weeks.)
- Jod basedow thyrotoxicosis. (when large doses of iodine given to hyperplastic euthroid goiter. It is usually temporary (-ve feed back mechanism).)
- Functioning thyroid carcinoma /mets.
- TSH secreting pituitary tumor (all causes of thyrotoxicosis are associated with low TSH level except this cause)
- Ovarian or placental tumors (ectopic hormone production).

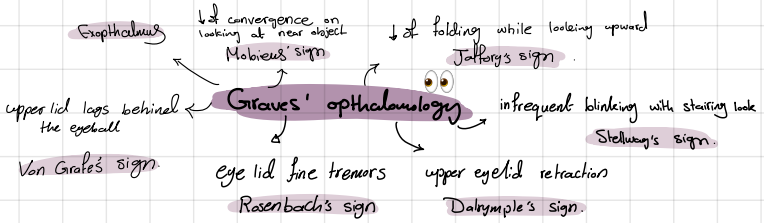




Smooth, uniformly enlarged expansile pulsation, thrill & machinary bruit

Thyroid manifestations



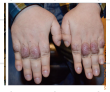


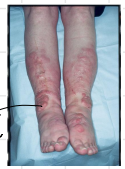
	Primary thyrotoxicosis	Secondary thyrotoxicosis
1. Age	♦ Usually in young below **40 years .**	♦ Usually above 40 years.
2. Onset (characteristic)	♦ Usually **rapid** & occurs **on top** of normal gland.	♦ Usually **inciduous** & occurs on top of nodular goiter .
	♦ **Simultaneous** appearance of goiter & thyrotoxicosis .	♦ Goiter appears many years before thyrotoxicosis .
3. Course	♦ **Remissions & excerbations**	♦ No remissions.
4. Severity	♦ Usually severe	♦ Usually mild or moderate.
5. Metabolic & C.N.S.	♦ More Marked & usually main presentations.	♦ Less marked.
7. C.V.S.	♦ Less marked(young age)	♦ More marked (old age)
8. Eye signs	♦ Common, all eye signs are present & **exophthalmos is true.**	♦ Rare , limited eye signs & exophthalmos is **apparent.**
9. Thyroid	♦ smooth and diffuse goiter.	♦ Nodular & irregular goiter.
10.Autoimmunity	♦ Severe	♦ Mild or moderate .
11.Thyroid dermopathy & achropachy	♦ Occur only in Graves' disease .	♦ Not occur .

Graves' dermopathy : pretibial myxoedema

(autoimmunity)

Thyroid acropachy





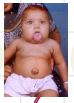
Hypothyroidism

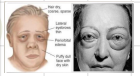
↓ thyroid Hormones in blood due thyroid hypofunction.

Complications ⇒ : coronary thrombosis.
: cornea
: carpal tunnel syndrome

↑ TSH ↓ T_3, T_4

Clinical picture
- In children → Cretinism
- In adults → Myxoedema
- Goiter





Cretinism: impairment of development & growth with delay ⇒ teeth development, walking

Findings	Hypothyroidism	Hyperthyroidism
Metabolic	Intolerance to cold Weight gain Decreased appetite	Intolerance to heat Weight loss Increased appetite
Neuropsychiatric	Excessive fatigue	Irritability, restlessness
Periorbital findings	Periorbital edema (due to generalized myxedema)	Periorbital edema, lid lag, and exophthalmus (in Graves ophtalmopathy)
Cardiovascular	Bradycardia, decreased cardiac output	Tachycardia, palpitations, hypertension
Skin	Cold, dry	Warm, moist
Gastrointestinal	Constipation	Hyperdefecation
Musculoskeletal	Cramps	Osteopathy
Edema	Generalized myxedema (initially pretibial)	Pretibial myxedema (in Graves disease)
Myopathy	Proximal	
Reproduction	♀ Menstrual disorders ♂ Decreased libido, infertility	
Hair	Hair loss	

Goiter

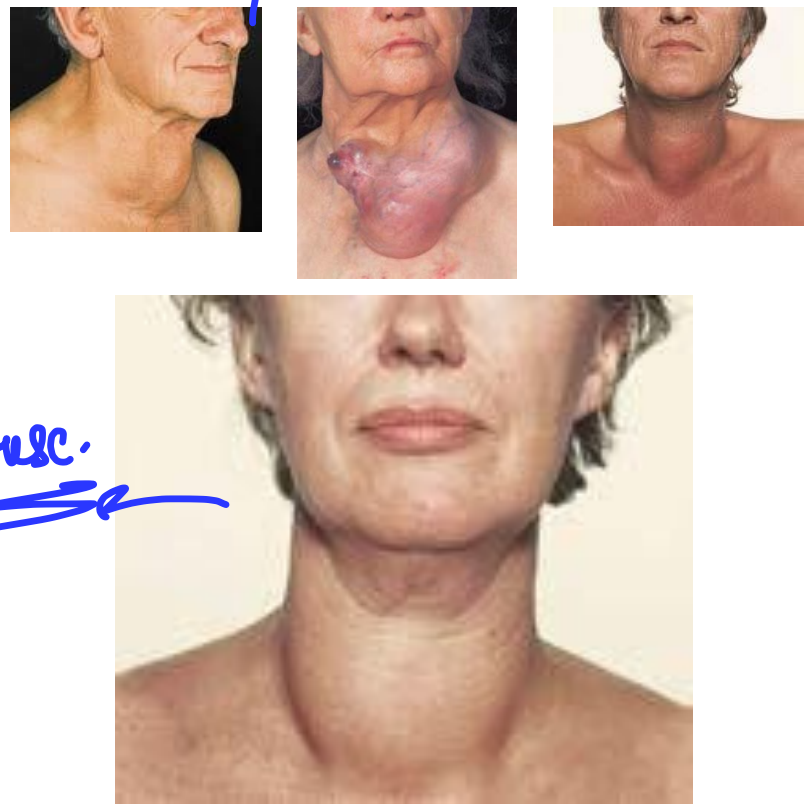
- Any abnormal enlargement of thyroid gland
- Most identifiable cause is iodine deficiency → Hypothyroidic goiter.

Tx: iodine replacement

- Diffuse enlargement without evidence of functional abnormality = nontoxic colloid goiter
- Unusual to need surgery unless goiter is causing airway compression or there is a suspicious nodule
- Tx: subtotal or total thyroidectomy for symptoms or if suspicious nodule;
- Retrosternal thyroid extension : Mediastinal thyroid tissue – most likely from acquired disease with inferior extensions of a normally placed gland

Goiter

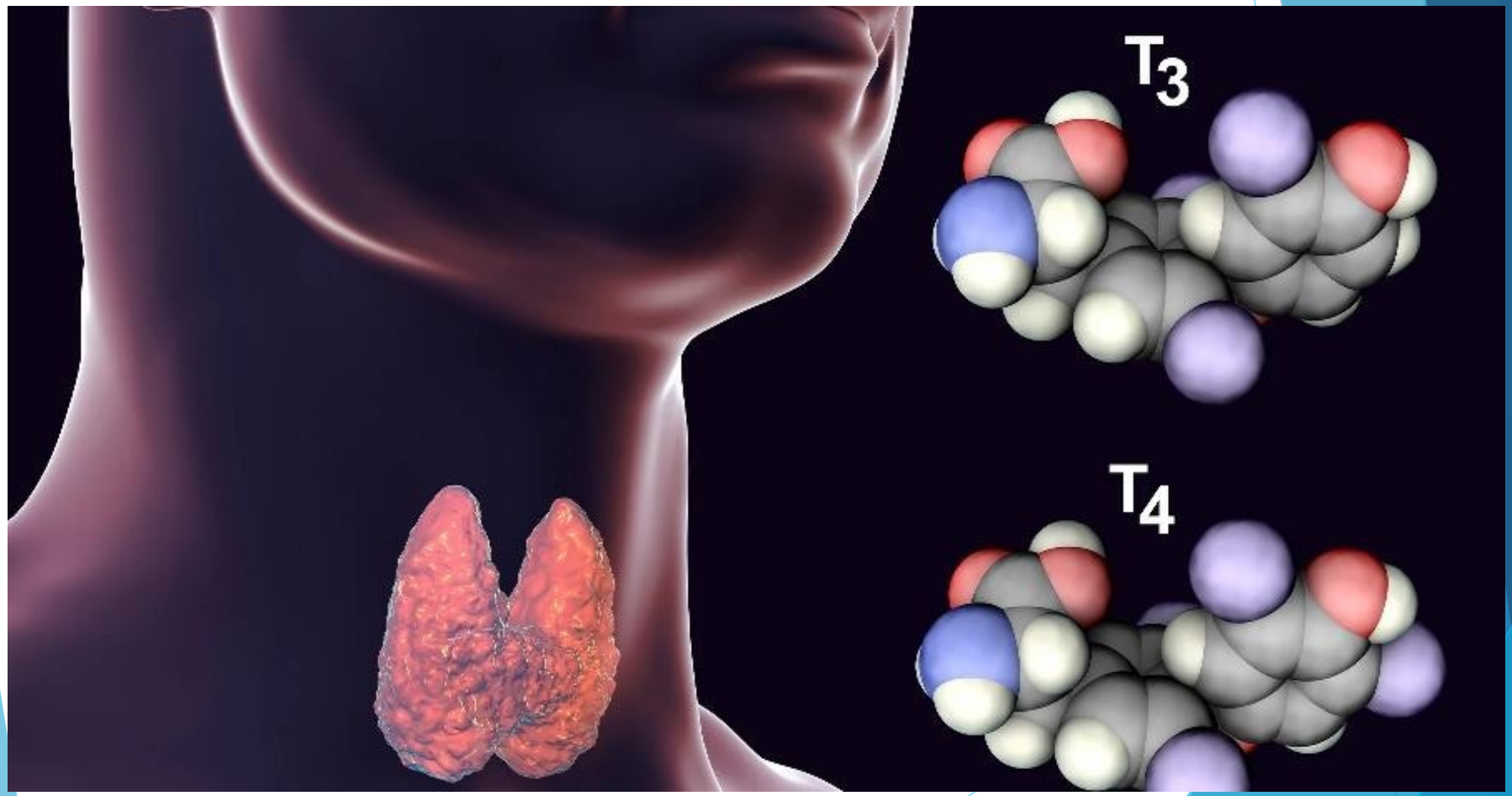
- Diffuse goiter: the entire gland is symmetrically enlarged
- multinodular goiter: are one or more distinct lumps can be distinguished from the rest of the gland



Types of Goiter

Hypothyroid Goiter	Euthyroid Goiter	Thyrotoxic Goiters
• Endemic Goiter: due to iodine deficiency • Hashimoto's Thyroiditis	• Euthyroid Diffuse Goiters • Euthyroid Multinodular Goiters	• Graves' Disease • Toxic Multinodular Goiter (TMNG)

Thyroid Hormones Disorders



Definitions

Thyrotoxicosis

- The clinical condition that covers symptoms following high concentrations of the thyroid hormones, T4 and T3, in extrathyroidal tissues, but without regard to the origin of these elevated hormone concentrations

Hyperthyroidism

- Hyperactivity in the entire or part of the thyroid that results in synthesis and release of thyroid hormones in excess of that required by the body to maintain euthyroidism

* Graves (diffuse)
* MNG
* Toxic single Adenoma.

Hyperthyroidism is the main cause of thyrotoxicosis

Causes of Thyrotoxicosis

Primary Hyperthyroidism	Thyrotoxicosis Without Hyperthyroidism	Secondary Hyperthyroidism
• Graves' disease • Toxic multinodular goiter • Toxic adenoma • Functioning thyroid carcinoma metastases • Activating mutation of the TSH receptor • Activating mutation of GSα (McCune-Albright syndrome) • Struma ovarii	• Subacute thyroiditis • Silent thyroiditis • Other causes of thyroid destruction: amiodarone, radiation, infarction of adenoma • Ingestion of excess thyroid hormone (thyrotoxicosis factitia)	• TSH-secreting pituitary adenoma • Thyroid hormone resistance syndrome • Chorionic gonadotropin-secreting tumors • Gestational thyrotoxicosis

How? use Radioactive iodine uptake (RAIU)

Differential Diagnosis of Hyperthyroidism

Increased Hormone Synthesis (Increased RAIU)

1. Graves' disease (diffuse toxic goiter)
2. Toxic multinodular goiter
3. Toxic adenoma
4. Drug induced—amiodarone, iodine
5. Thyroid cancer
6. Struma ovarii → ovarian Tumor that secrete T_3, T_4.

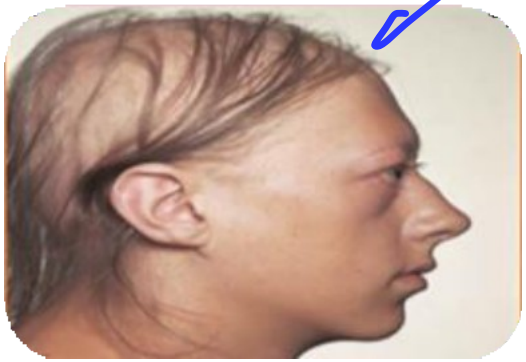
Hydatidiform mole

TSH-secreting pituitary adenoma

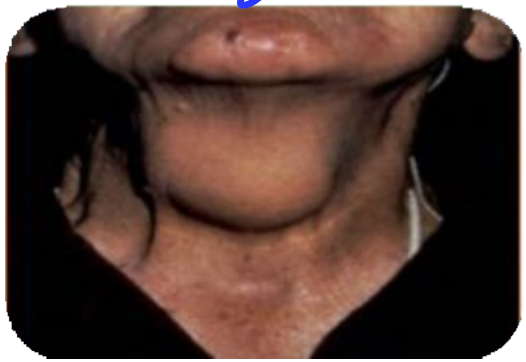
Release of Preformed Hormone (Decreased RAIU)

- Thyroiditis—acute phase of Hashimoto's thyroiditis, subacute thyroiditis
- Factitious (iatrogenic) thyrotoxicosis

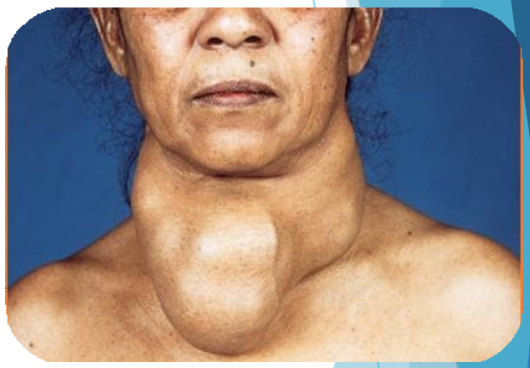
Hyperthyroidism The Most Common Causes



Graves' disease (diffuse toxic goiter)



Toxic adenoma



Toxic multinodular goiter

Clinical Picture

- Heat intolerance
- Weight loss despite good appetite
- diarrhea
- Palpitation, sweating
- Menstrual irregularities
- Insomnia, anxiety
- Mood changes

Signs

- **Tachycardia; atrial fibrillation in the elderly**
- **Tremor**
- **Goiter**
- **Warm, moist skin**
- **Muscle weakness, proximal myopathy**
- **Lid retraction or lag**
- **Gynecomastia**

Plus, ophthalmopathy and dermopathy specific for Graves' disease

Differentiation

- **History**
  - **P/E**
- **Radionuclide scan**
  - **Thyroid ultrasound**

Graves' disease (toxic diffuse goiter)

- Most common cause of hyperthyroidism (80%)
- Diffusely enlarged, soft gland
- Homogeneous increased radionuclide uptake
- No nodules
- Caused by IgG antibodies to TSH receptor thyroid stimulating immunoglobulin [TSI])
- Dx: low TSH, increased T3 and T4; abx level; diffuse uptake on thyroid scan
- Tx:
  - antithyroid drugs,
  - radioactive iodine ablation
  - thyroidectomy → Indications for surgery: noncompliant patient, failed medical therapy, children, pregnant women not controlled with medical therapy, or suspicious thyroid nodule

Toxic multinodular goiter (Plummers disease)

- Diffusely multinodular gland
- Heterogeneous radionuclide uptake
- Multiple nodules of varying sizes on ultrasonography
- Caused by hyperplasia secondary to chronic low-grade TSH stimulation
- Tx: surgery (subtotal or total thyroidectomy) a trial of radioactive iodine might be considered
- If compression or a suspicious nodule is present, need to go with surgery

Toxic adenoma

- Solitary nodule (hot nodule)
- Increased uptake against a background of suppressed uptake in the remaining thyroid
- Tx: medical , RAI ablation (95% effective); lobectomy if medical Tx ineffective

HYPERTHYROIDISM TREATMENT

- **Medical** :

* this Therapy need CBC monitoring

- Propylthiouracil (PTU) – safe with pregnancy

- Inhibits peroxidases and prevents iodine–tyrosine coupling
- Side effects: aplastic anemia, agranulocytosis (rare)

Methimazole

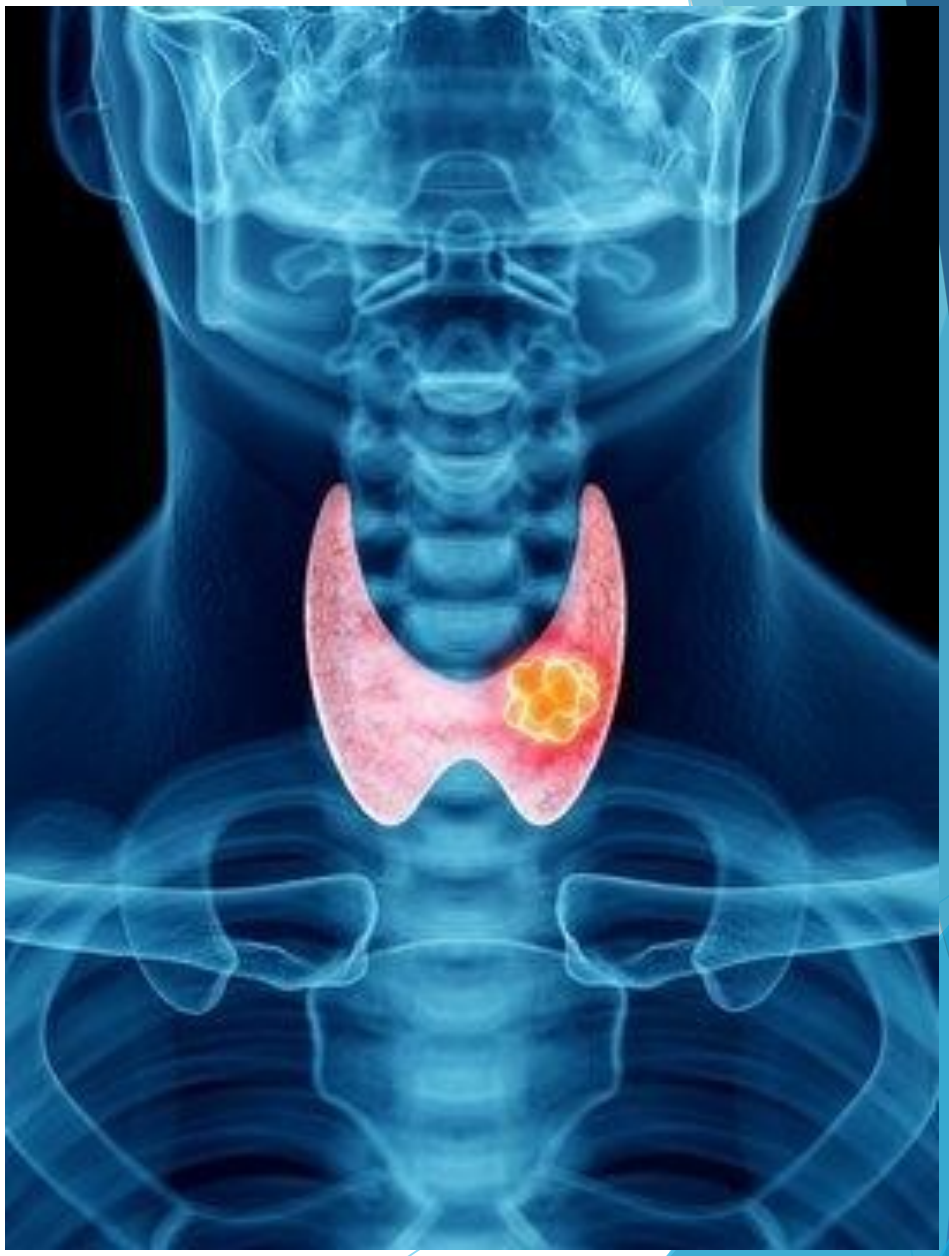
• Inhibits peroxidases and prevents iodine–tyrosine coupling

• Side effects: cretinism in newborns (crosses placenta), aplastic anemia, agranulocytosis (rare)

- **Radioactive iodine** (131 I) contraindicated in children or pregnancy → can traverse placenta

- **Thyroidectomy**

Thyroid Nodule



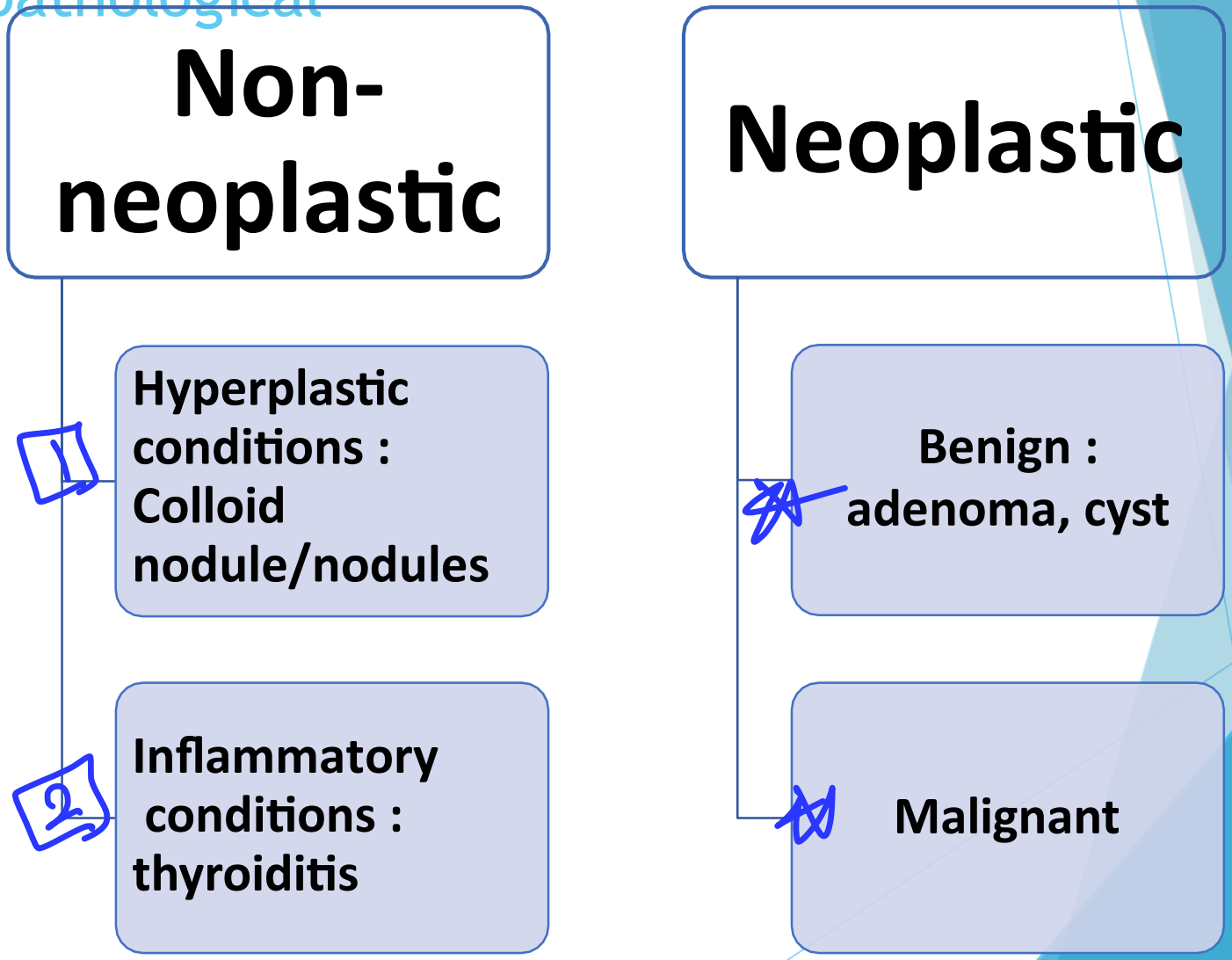
Thyroid Nodule

Not a pathological entity in themselves but are clinical manifestations of a wide range of thyroid diseases.

Classified as multiple or solitary lumps

- The most common lump in the thyroid comprises a dominant part of a multinodular goiter
- More common in females
- 90% are benign
- Thyroid cancer accounts for 4 to 6.5% of all thyroid nodules.

Classification- clinical and histopathological



Features of thyroid nodule worrisome for malignancy

solid,hard nodule

solitary,

cold

slow growing

1. History of head and neck irradiation for lymphoma , leukemia .. Etc
2. Exposure to ionizing radiation
3. Age <20 or >50 years

Risk Factors for Malignancy.

4. Large nodule size (>4 cm)
5. New or enlarging neck mass
6. Male gender — Bcz Thyroid nodule mostly found in Female so if it is found in Male this suspect Malignancy.
7. Vocal cord paralysis, hoarse voice
8. Nodule fixed to adjacent structures

Family history of thyroid cancer, **MEN 2**, or other genetic syndromes associated with thyroid malignancy (e.g., Cowden's syndrome, familial polyposis, Carney complex)

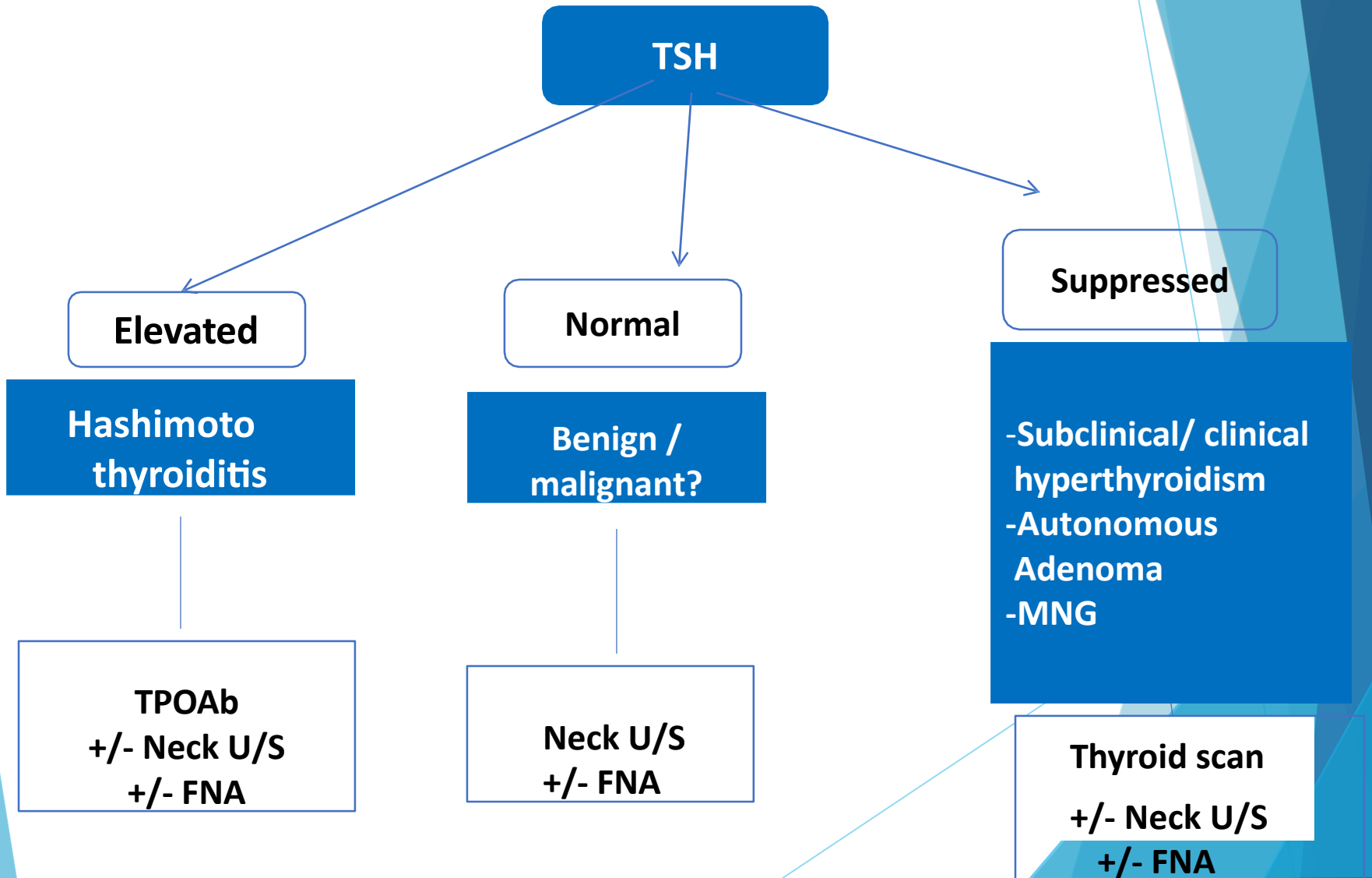
Extrathyroidal extension (invasion)

cervical lymphadenopathy

Approach to thyroid Nodule

- **Full history** focusing on all the risk factors and symptoms of thyroid function (hyper/hypothyroidism)
- **Full physical examination** (thyroid/extrathyroid)
- **Thyroid function test (TSH)** most importantly
  - TSH ↓ → Thyrotoxicosis.
  - TSH ↑/↔ → Euthyroid or Hypothyroid.
- At that point you should be able to determine whether to do **thyroid scan / neck Ultrasound**
  - → Benign or Malignant
  - → need for FNA or not
- Then you will decide the need for further invasive testing **(fine-needle aspiration)**
  - → cytology (fluid cytology → cells not tissue)

Investigation

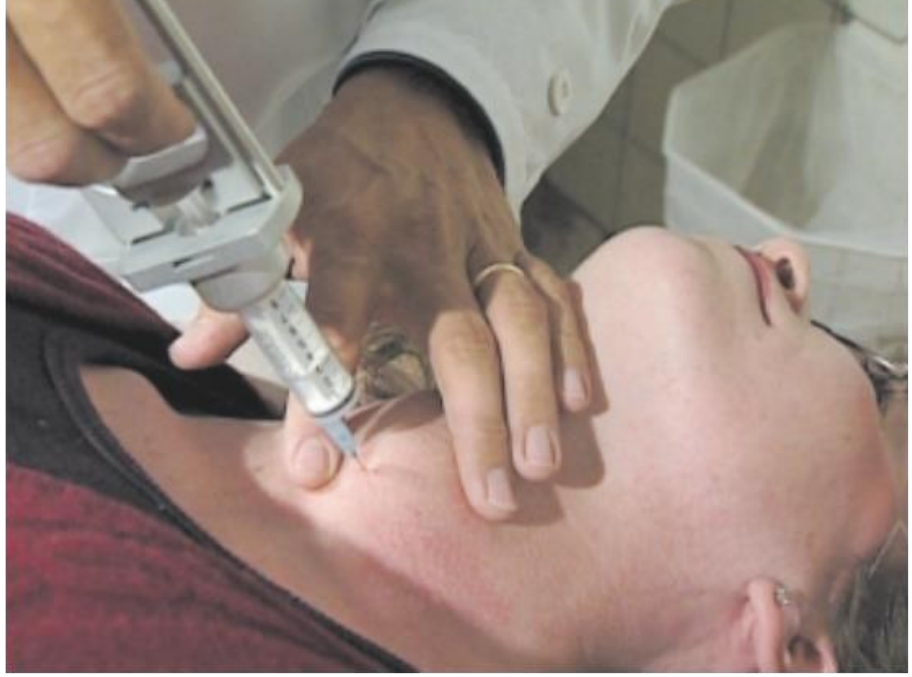


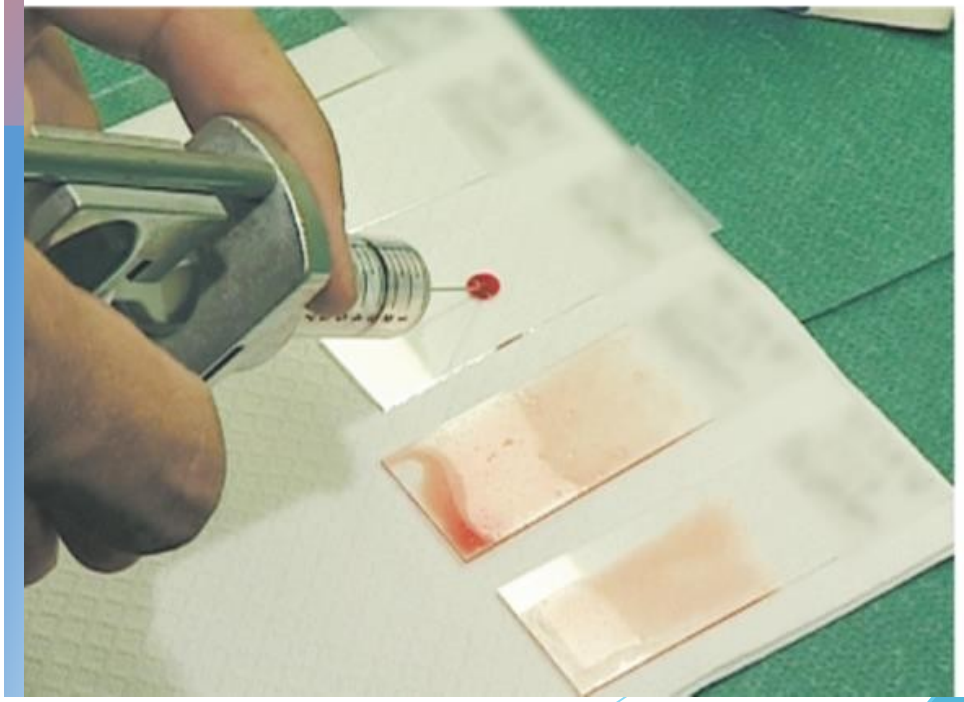
Benign, malignant and indeterminate features of thyroid nodules on ultrasonography

	BENIGN	MALIGNANT	INDETERMINATE
US FEATURES	• Isoechoic with a spongiform appearance/hyper echogenicity • Peripheral egg shell calcifications • Completely cystic nodules • Regular margins / halo • Wider than tall shape	• Hypoechoic • Micro calcifications • Partially cystic nodule with eccentric location of the fluid portion and lobulation of the solid component • Irregular margins / No halo • Peri-nodular thyroid parenchyma invasion • Taller-than-wide shape • Intra-nodular vascularity	• Isoechoic or hyperechoic • Mildly hypoechoic (relative to surrounding parenchyma) with smooth margin • Peripheral vascularity • Intra-nodular macro-calcifications

FNA

no need for Analgesia.



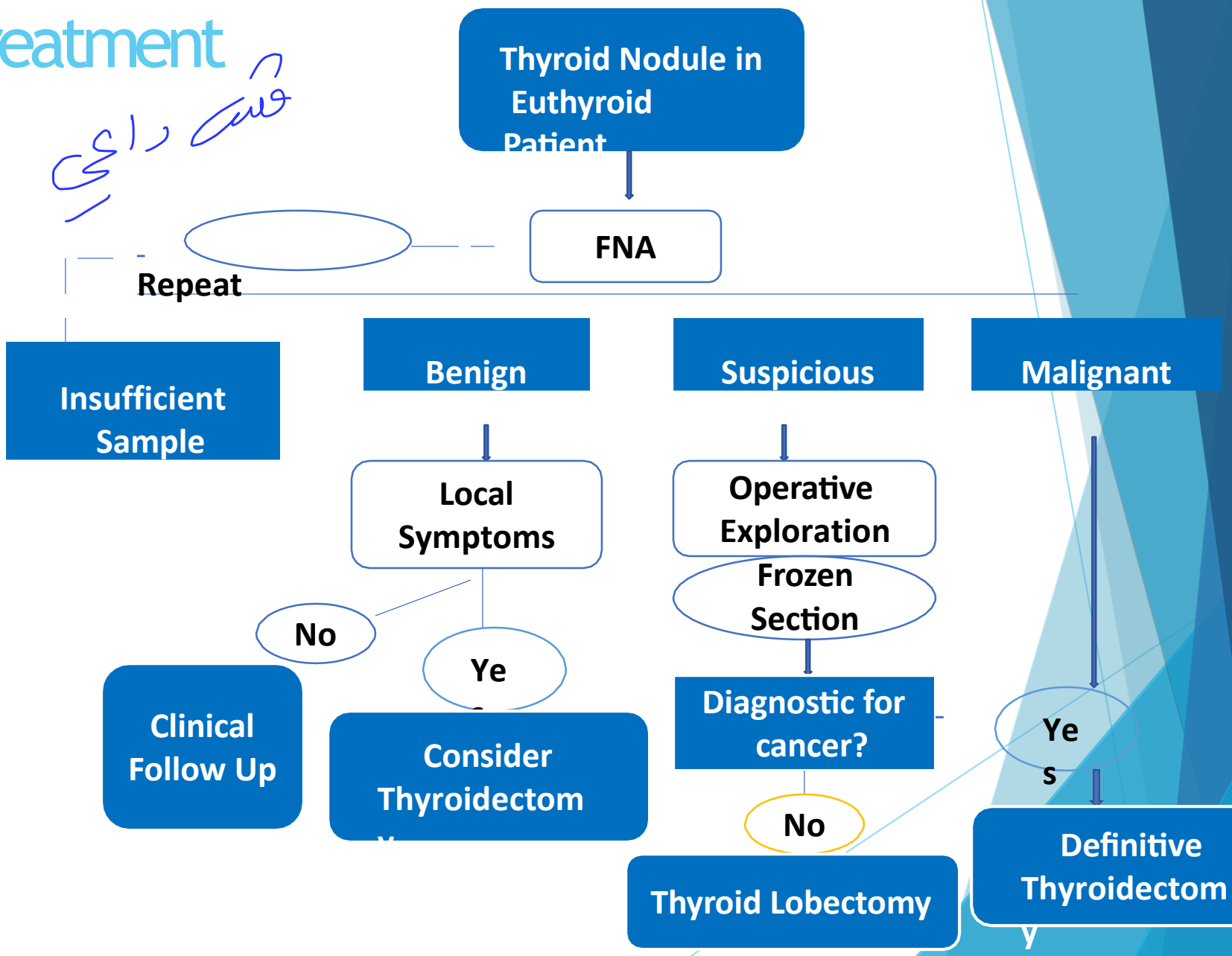


Bethesda reporting system*

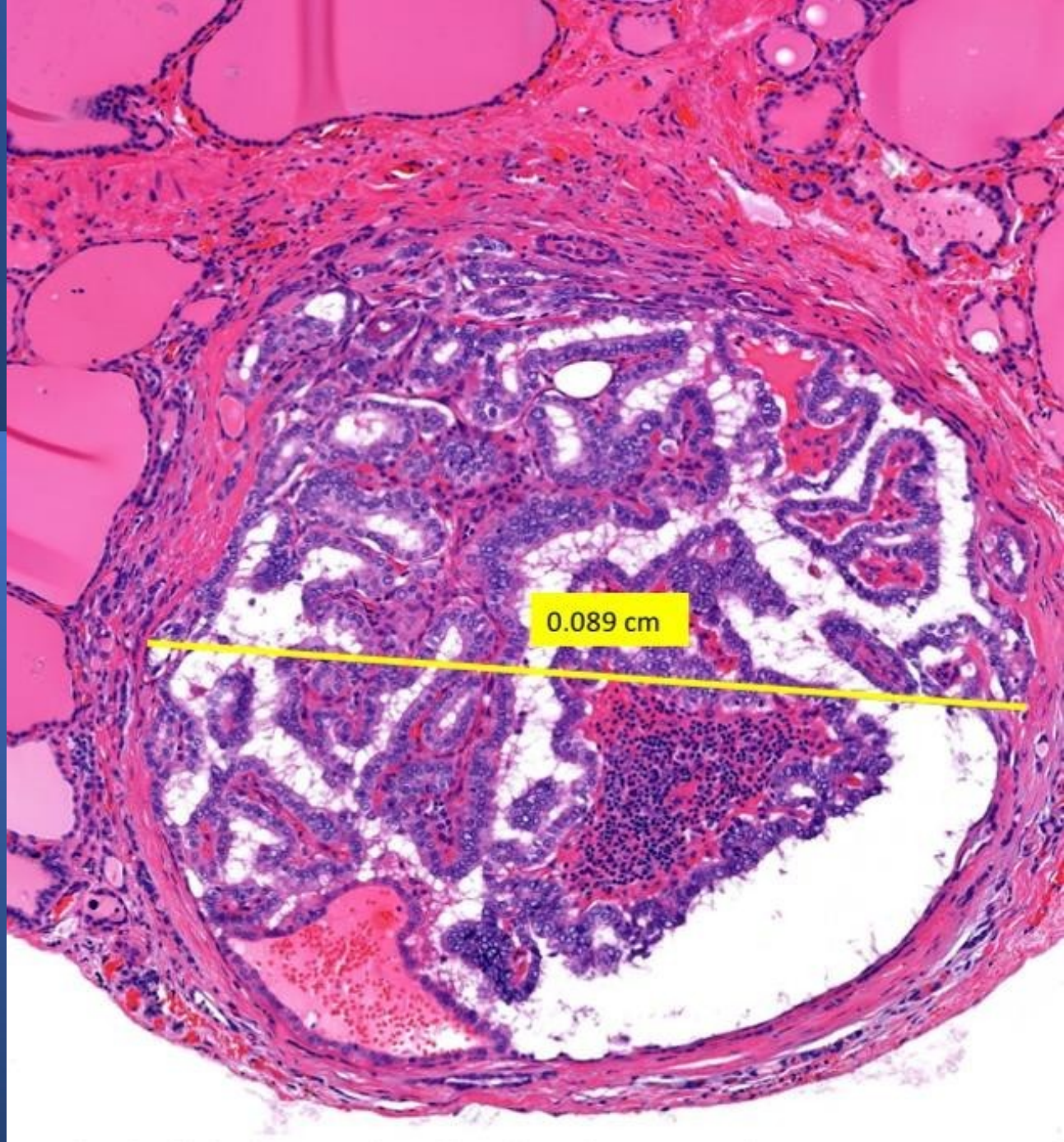
	Diagnostic category	Risk of malignancy (%)	Usual management
1	Nondiagnostic or unsatisfactory	1-4	Repeat FNA with ultrasound guidance
2	Benign	0-3	Clinical follow-up
3	Atypia of undetermined significance or follicular lesion of undetermined significance	5-15	Repeat FNA
4	Follicular neoplasm or suspicious for a follicular neoplasm	15-30	Surgical lobectomy
5	Suspicious for malignancy *FNA cannot differentiate between follicular cancer & follicular Adenoma	60-75	Near-total thyroidectomy or surgical lobectomy
6	Malignant	97-99	Near-total

Follicular/Hurthle adenoma vs carcinoma cannot be diagnosed with FNA , thus you need surgical lobectomy to confirm diagnosis

Treatment


Thyroid Nodule in Euthyroid Patient
FNA
Repeat
Insufficient Sample
Benign
Suspicious
Malignant
Local Symptoms
No
Ye
Clinical Follow Up
Consider Thyroidectom
Operative Exploration
Frozen Section
Diagnostic for cancer?
No
Thyroid Lobectomy
Ye
s
Definitive Thyroidectom

Thyroid Cancer



ectural and cellular features of papillary thyroid carcinoma, but measuring < 1 cm in d

Epidemiology

- the most common malignant endocrine tumors
- Annual incidence of about 4/100,000
- Is 2–4 times more common in women than in men.
- However, the probability that a solitary palpable lump in the thyroid is malignant is higher in men.

Risk Factors

Well-documented risk factors

- Familial/genitic
- Radiation exposure

Less well-documented RF

- Iodine deficiency (follicular)
- Graves' disease
- Thyroiditis
- Pregnancy and other hormonal conditions

Types

Epithelial cancers originating in the follicular epithelium

- Papillary cancer
- Follicular cancer
- Poorly differentiated cancer
- Anaplastic cancer

Variants of epithelial cancer originating in the follicular epithelium

- Oncocytic cancer (Hürthle cell cancer)
- Clear cell, mucinous and squamous differentiated cancer

Epithelial cancer originating in the C cells

- Medullary Thyroid Cancer (MTC)

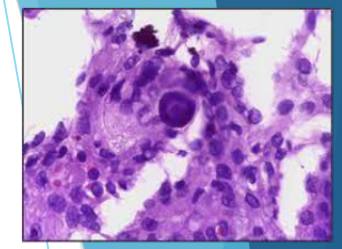
Non epithelial cancers

- Sarcoma
- Lymphoma
- Metastasis

Classification according to clinical aggressiveness

Well – Differentiated (Least aggressive)	• **papillary carcinoma** • **follicular carcinoma**	They are similar to normal cells thus they uptake iodine and can be treated with radioactive iodine post-op
Intermediate forms	• **medullary thyroid carcinoma** • **Hürthle cell carcinoma** • **some rare variants of papillary carcinoma**	
Undifferentiated	• **Anaplastic carcinoma**	No radioactive iodine

Papillary thyroid cancer PTC :

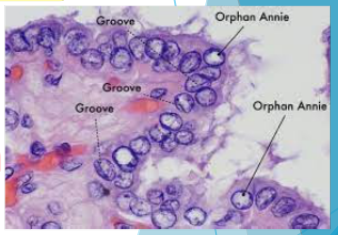


- Most common (85%)
- Least aggressive, has the best prognosis;
- More in women, children → most common Thyroid cancer in children.
- most common tumor following neck XRT
- Lymphatic spread 1st
- Rare metastases (lung, brain)
- Pathology – **psammoma bodies** (calcium) and **Orphan Annie nuclei**
- prognosis based on local invasion
- **Treatment:**
  - **Lobectomy** (if small <1-2cm)
  - **Total thyroidectomy :** if large, bilateral, +ve LN, metastatic, +extrathyroidal invasion, or history of neck XRT.
  - MRND if +ve LN
  - Post op radioactive iodine ablation (same indications above)
  - High dose thyroxine suppression lifelong

worse prognosis in elderly, males

Most common thyroid cancer in Children

A *psammoma body* is a round collection of calcium, seen microscopically.



a large, optically clear nucleus, devoid of chromatin strands, with sharp chromatin rim

Modified radical Neck dissection

All total thyroidectomy to control micro metastasis

Suppressing TSH, decreases growth of new tumor cells

Follicular thyroid carcinoma

- 2nd most common (10%)
- More aggressive than PTC, but less than other thyroid cancers
- older age of presentation (50–60s), women
- Hematogenous spread (bone most common)
- Cannot be diagnosed on FNA, if FNA showed follicular cells → need diagnostic lobectomy and send for pathology-→
- if follicular adenoma nothing to do
- If follicular carcinoma → completion total thyroidectomy
- Treatment:
- total thyroidectomy
- Rarely need MRND if +ve LN (usually hematogenous mets not LN)
- ++RAI ablation
- Thyroxine post op

lymph nodes aren't usually involved

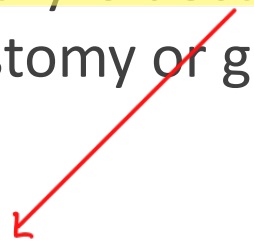
- Hürthle cell carcinoma is a variant of follicular carcinoma but more aggressive with less radioactive iodine uptake

Medullary thyroid carcinoma

- Can be associated with **MEN IIa, IIb** or **sporadic**
- from **parafollicular C cells** (calcitonin)- flushing and diarrhea
- Pathology – shows **amyloid** deposition
- More aggressive than previous cancers
- **Lymphatic** spread – most have involved nodes at time of diagnosis
- Early **hematogenous** metastases to lung, liver, and bone (if mets , non curable)
- Treatment:
- total thyroidectomy with central neck node dissection
- MRND if +ve or large tumor even if neck LN negative (prophylactic)
- No RAI uptake
- Monitor calcitonin post op for recurrence

Anaplastic thyroid cancer

- the most aggressive thyroid CA
- Elderly patients >70 yrs
- Rapidly lethal (0% 5-year survival rate); usually beyond surgical management at diagnosis
- Can perform palliative debulking thyroidectomy for compressive symptoms , tracheostomy or give palliative chemo-XRT



Removal of part of the thyroid

Treatment

Papillary or follicular	• Total thyroidectomy • Radioactive iodine
Medullary	• Total thyroidectomy • +Cervical LNs dissection
Anaplastic	• No effective treatment

THANK YOU