

THYROID DISORDERS

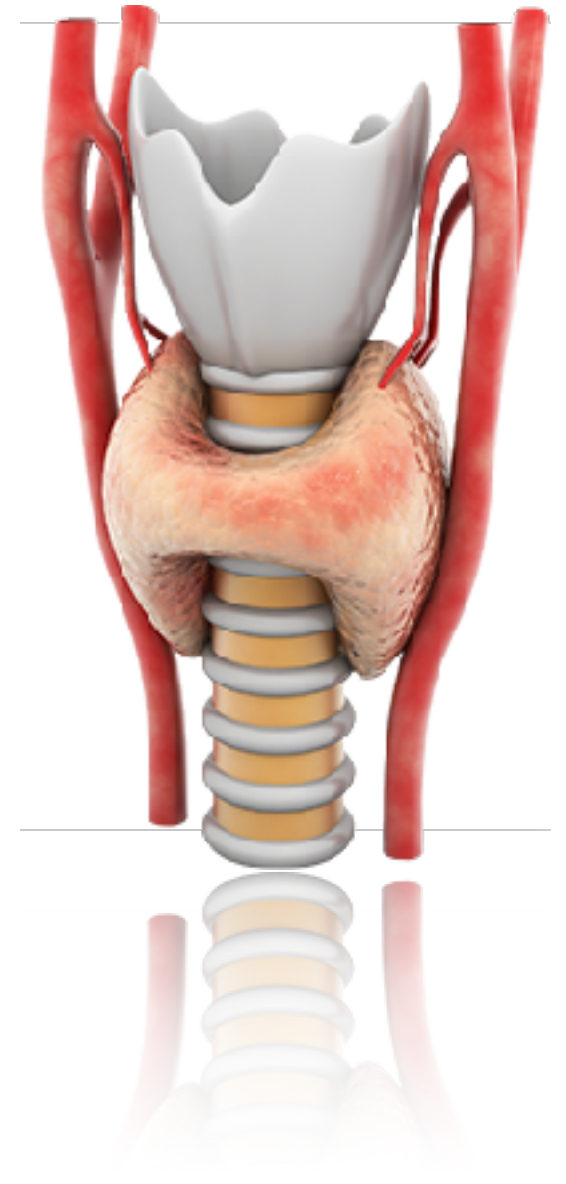
Shadin S. Al Katari MD, FACE

Consultant Endocrinology & Diabetes

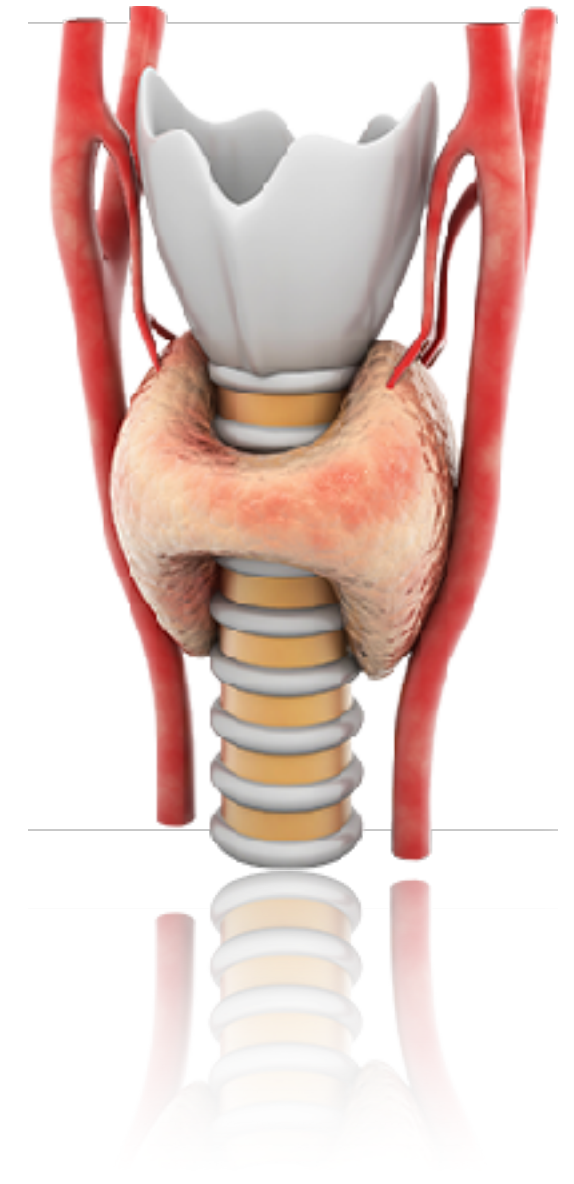
Endocrine & Diabetes Division - IM Department at KKUH, KSUMC

AGENDA:

- ➔ Introduction of thyroid gland & neck anatomy
- ➔ Thyroid hormone physiology
- ➔ Thyroid disorders, clinical, biochemical, & management



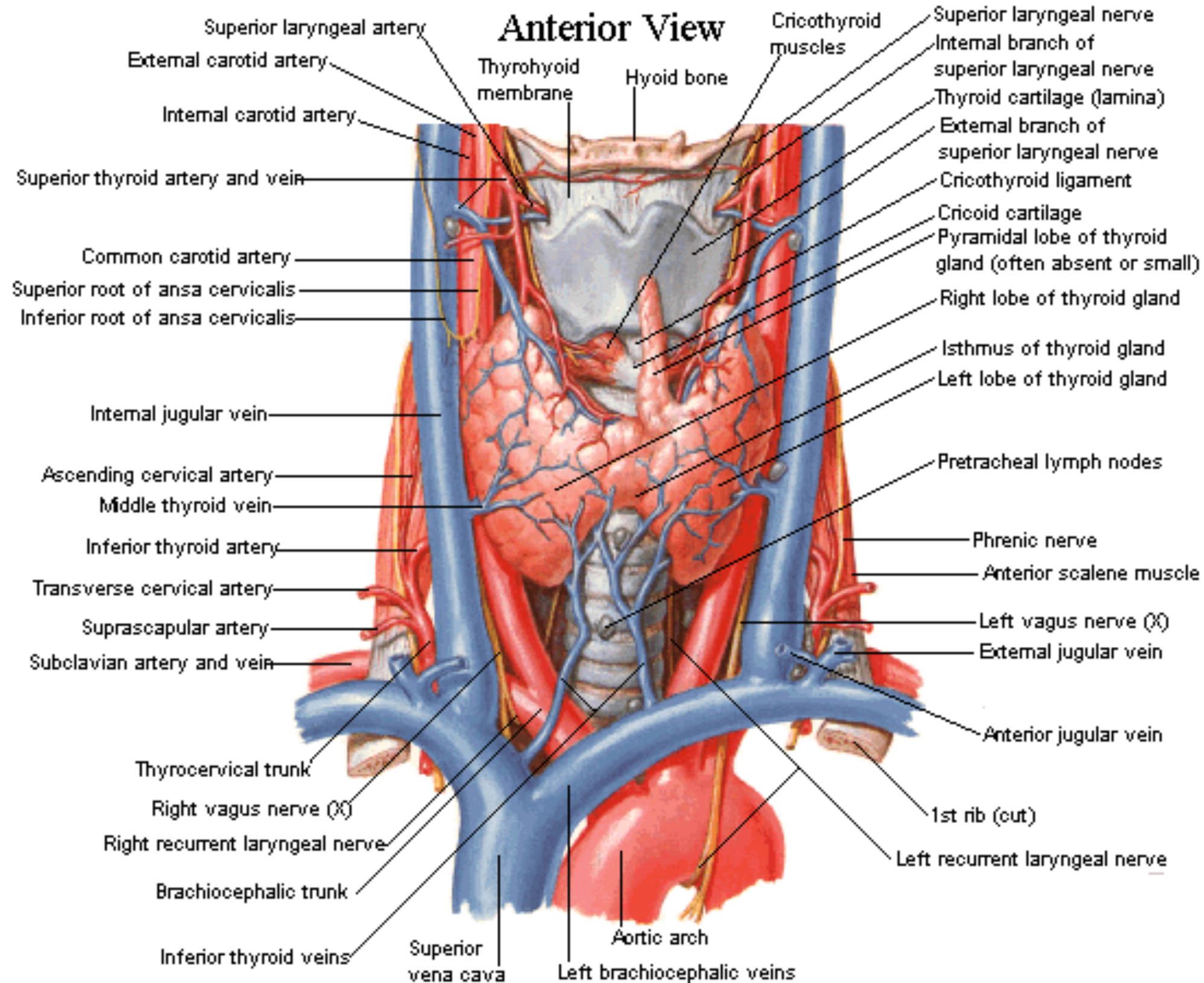
Anatomy of Thyroid gland & Neck

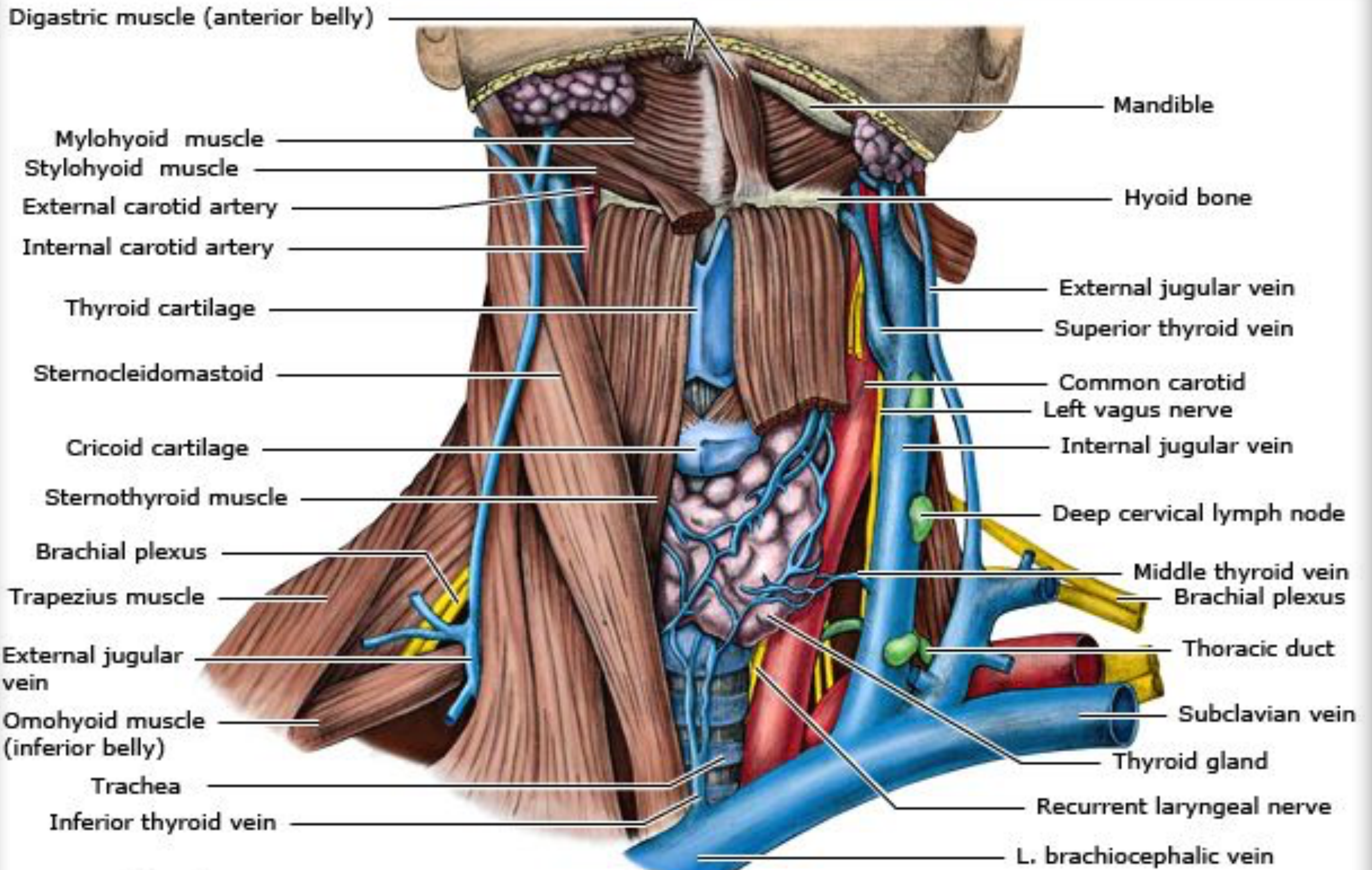


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Thyroid Gland

Anterior View

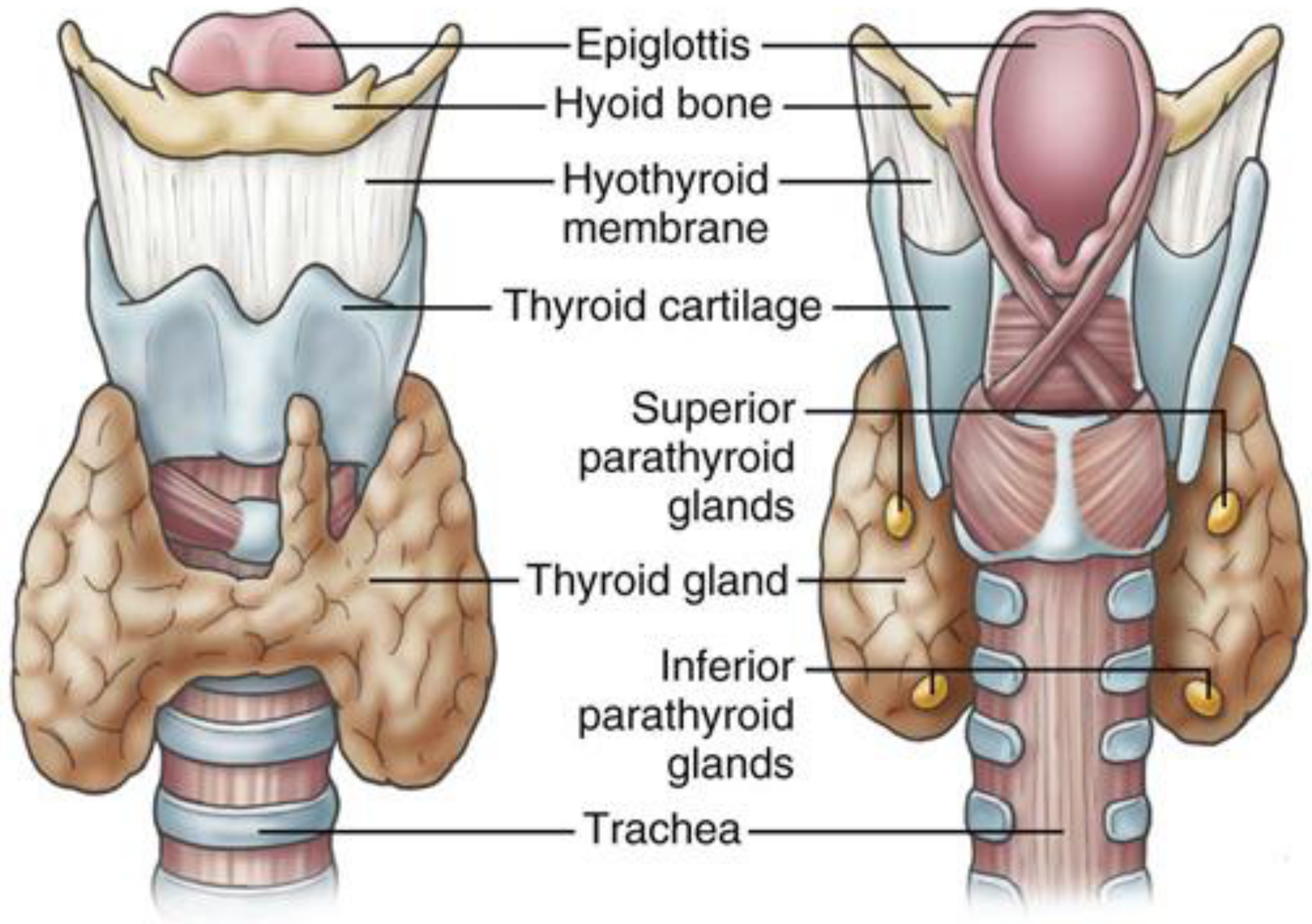




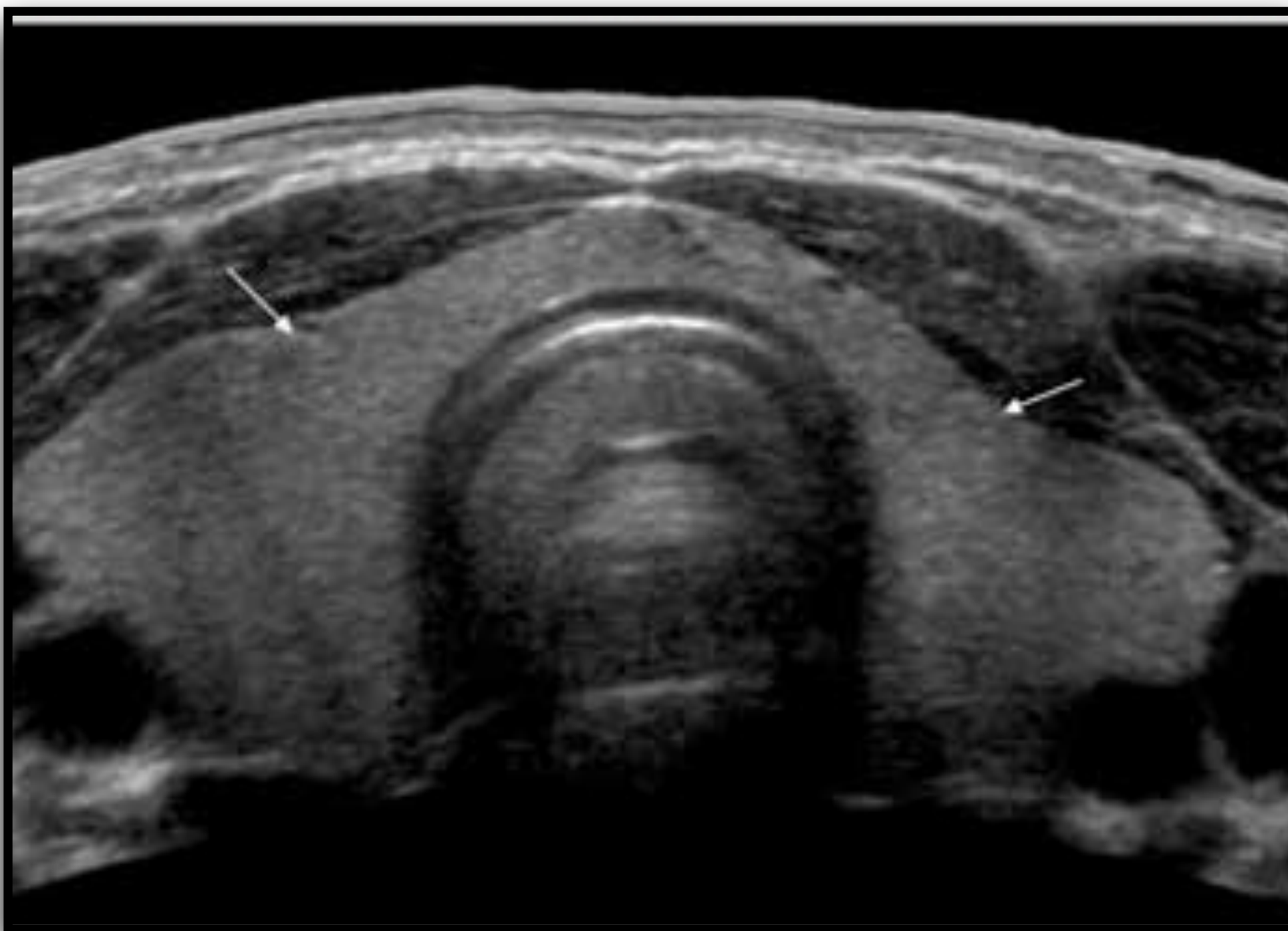
Anterior view

ANTERIOR

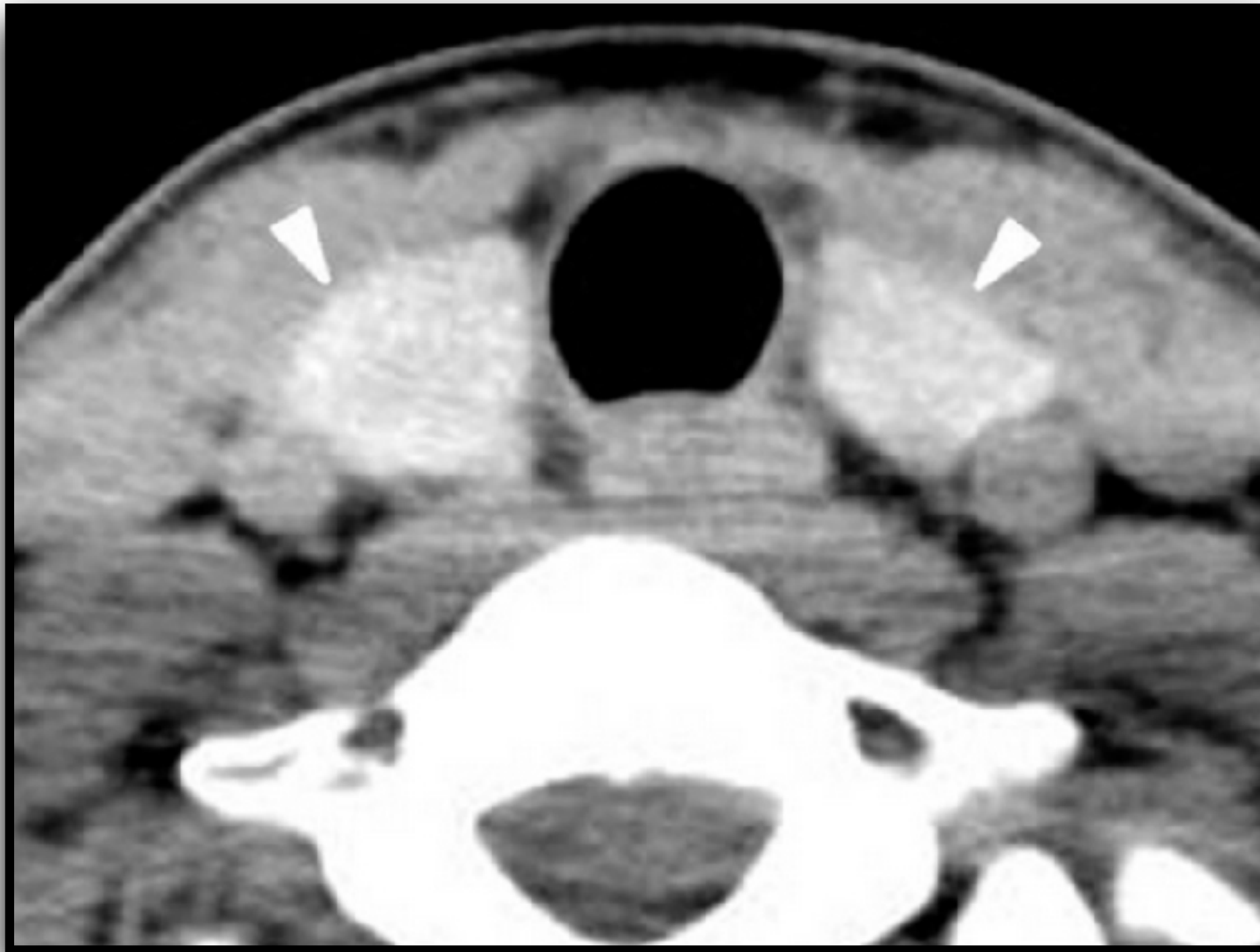
POSTERIOR



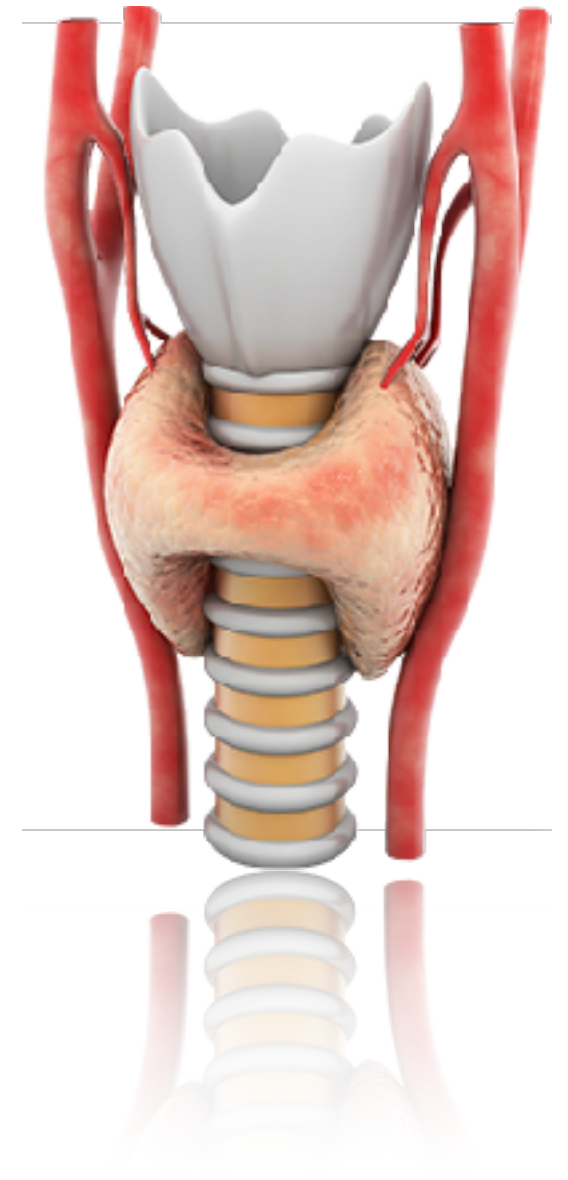
Thyroid Ultrasound



Thyroid CT Neck



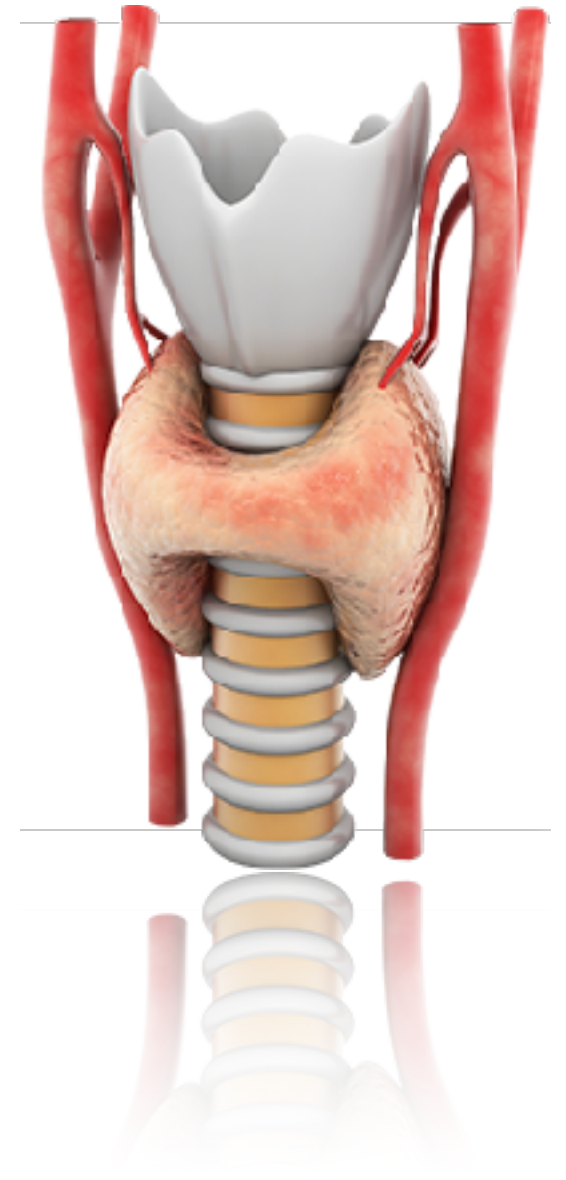
Thyroid Hormone Physiology



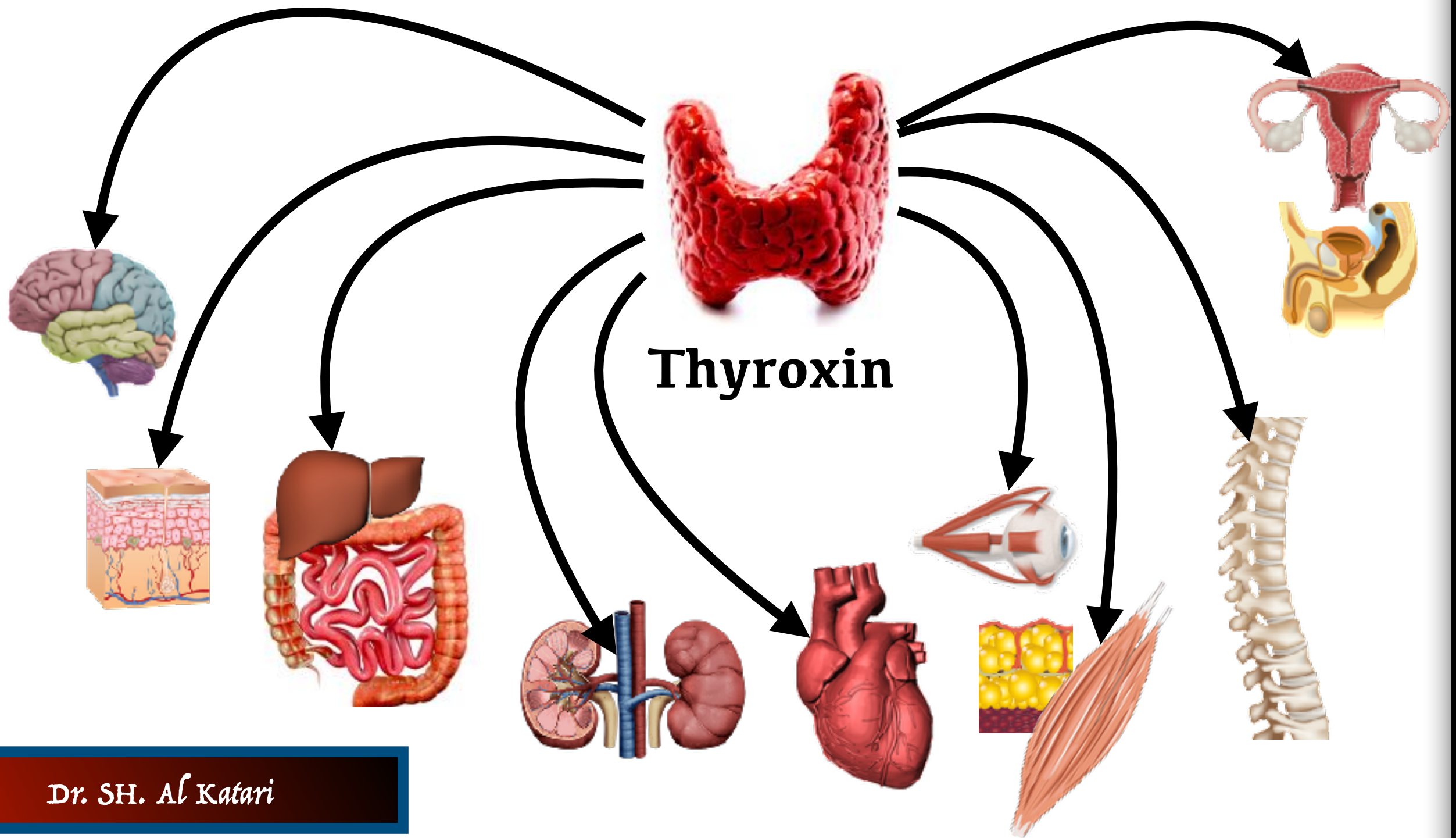
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THYROID HORMONE FUNCTION

Thyroid hormones are critical determinants of brain and somatic development in infants and of metabolic activity in adults.



THYROID HORMONE FUNCTION



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THYROID HORMONE

Large stores of
thyroid
hormone



A regulatory
mechanism

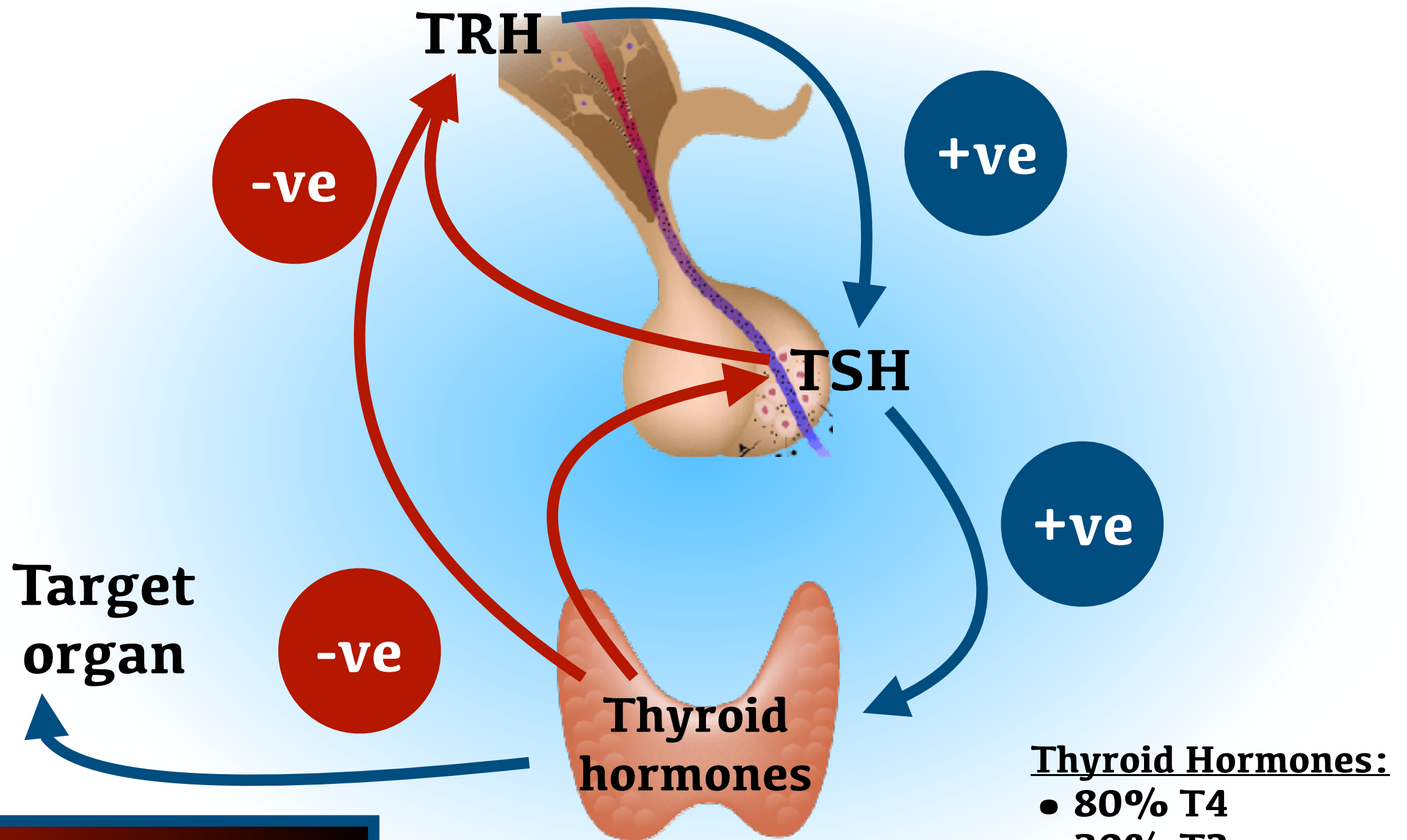
Sensitive
mechanism

Intact
organs &
factors

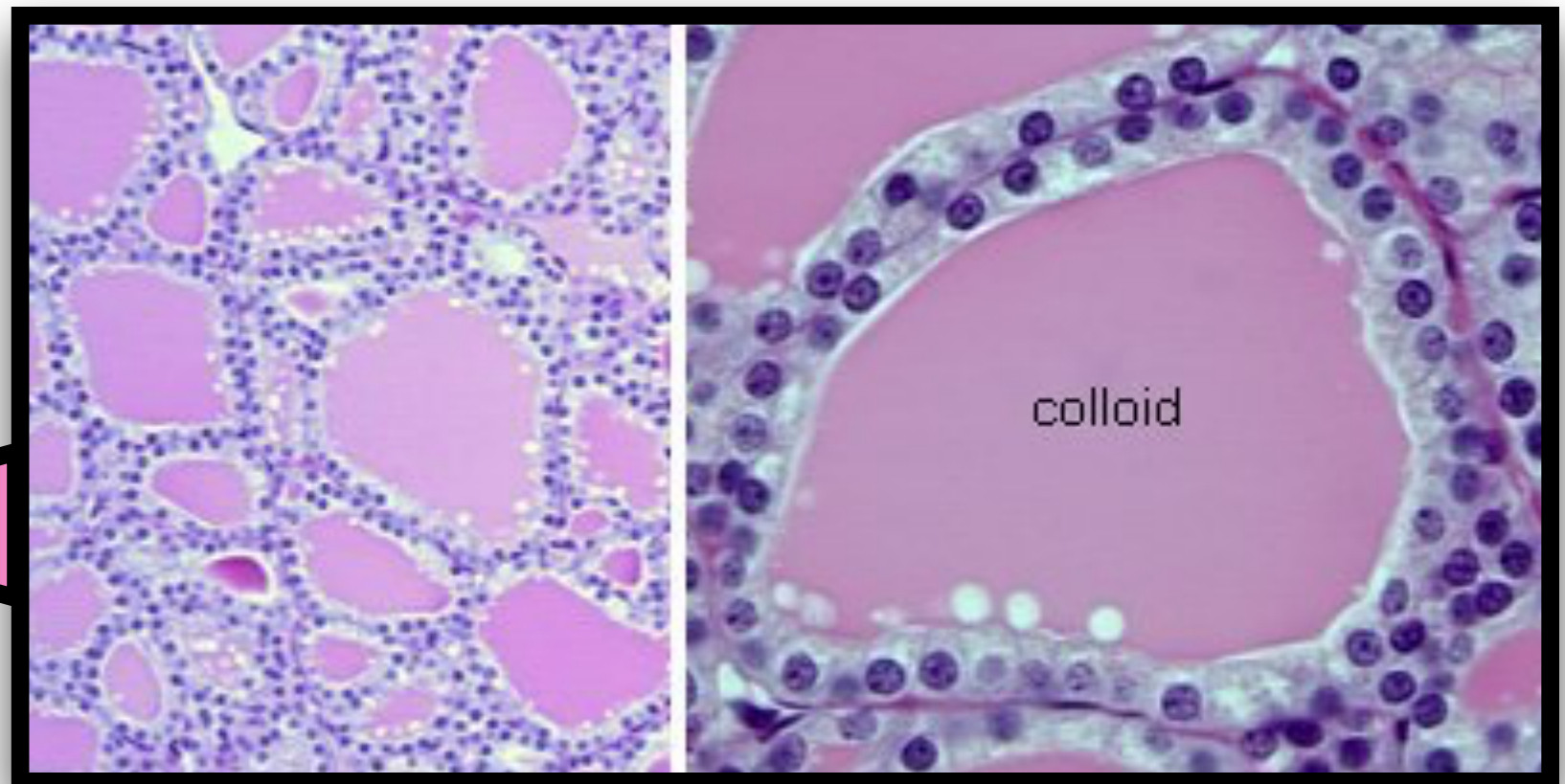
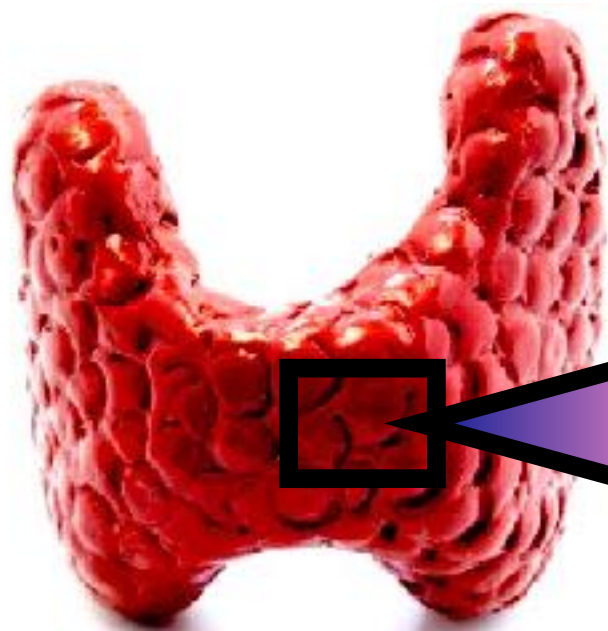
Intact
receptors

Intact
interaction

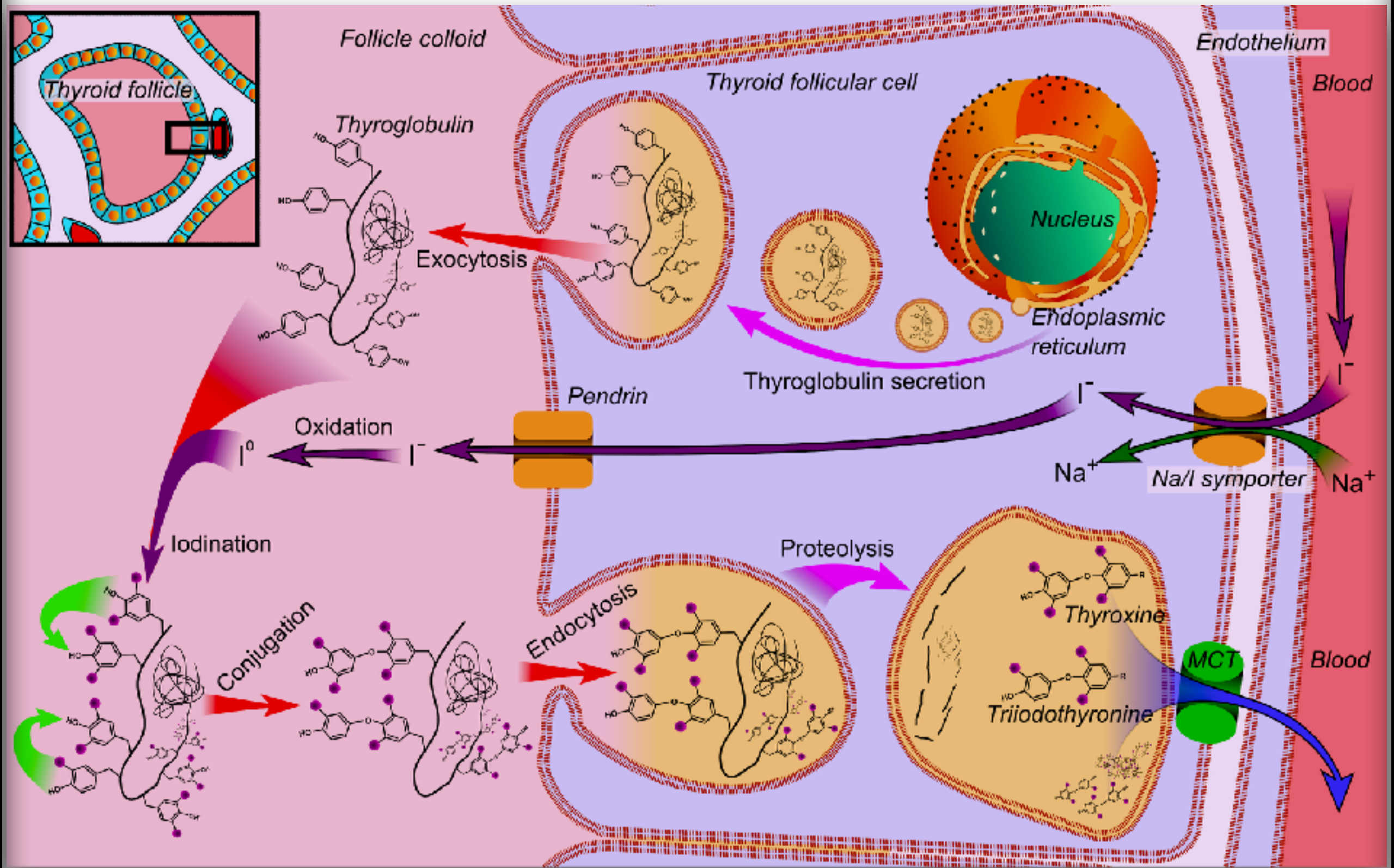
Hypothalamus-Pituitary-Thyroid Axis



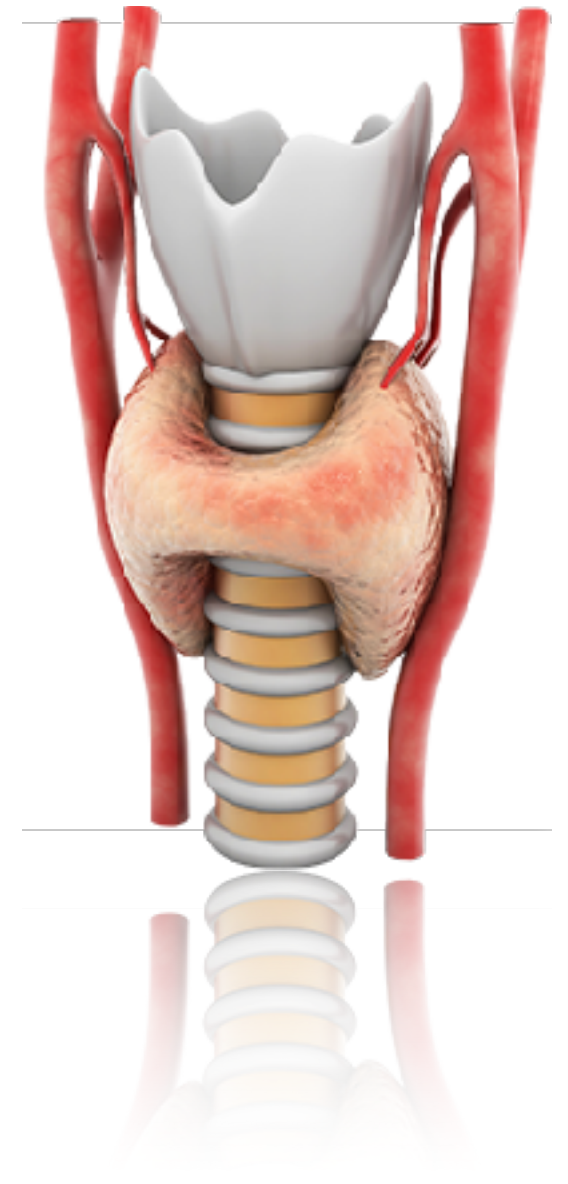
THYROID PATHOLOGY



THYROID HORMONE SYNTHESIS



Thyroid Disorders



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Thyroid Disorders

- ➔ **HYPERTHYROIDISM**
- ➔ **HYPOTHYROIDISM**
- ➔ **SUBACUTE THYROIDITIS**
- ➔ **MULTIPLE THYROID NODULES**
- ➔ **THYROID CANCER**



➔ HYPERTHYROIDISM

Hyperthyroidism: Overproduction of thyroid hormone, secondary to primary disorder in the thyroid gland

Thyrotoxicosis: is a metabolic state caused by elevated circulating FT4 & FT3

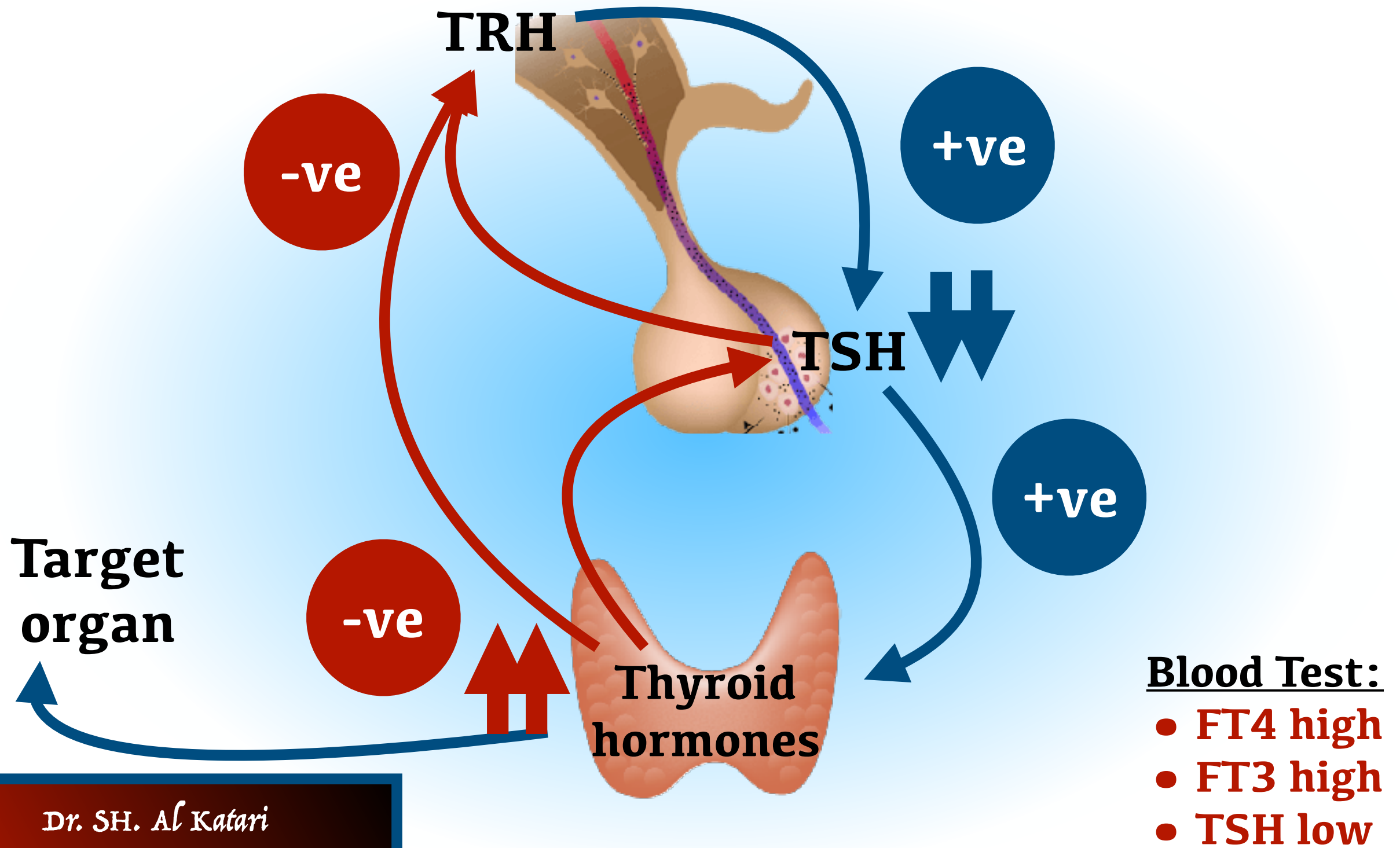
Subclinical Hyperthyroidism: Asymptomatic/symptomatic patient with low TSH & normal FT4

Apathetic Hyperthyroidism: Symptoms of hyperthyroidism are blunted in elderly people

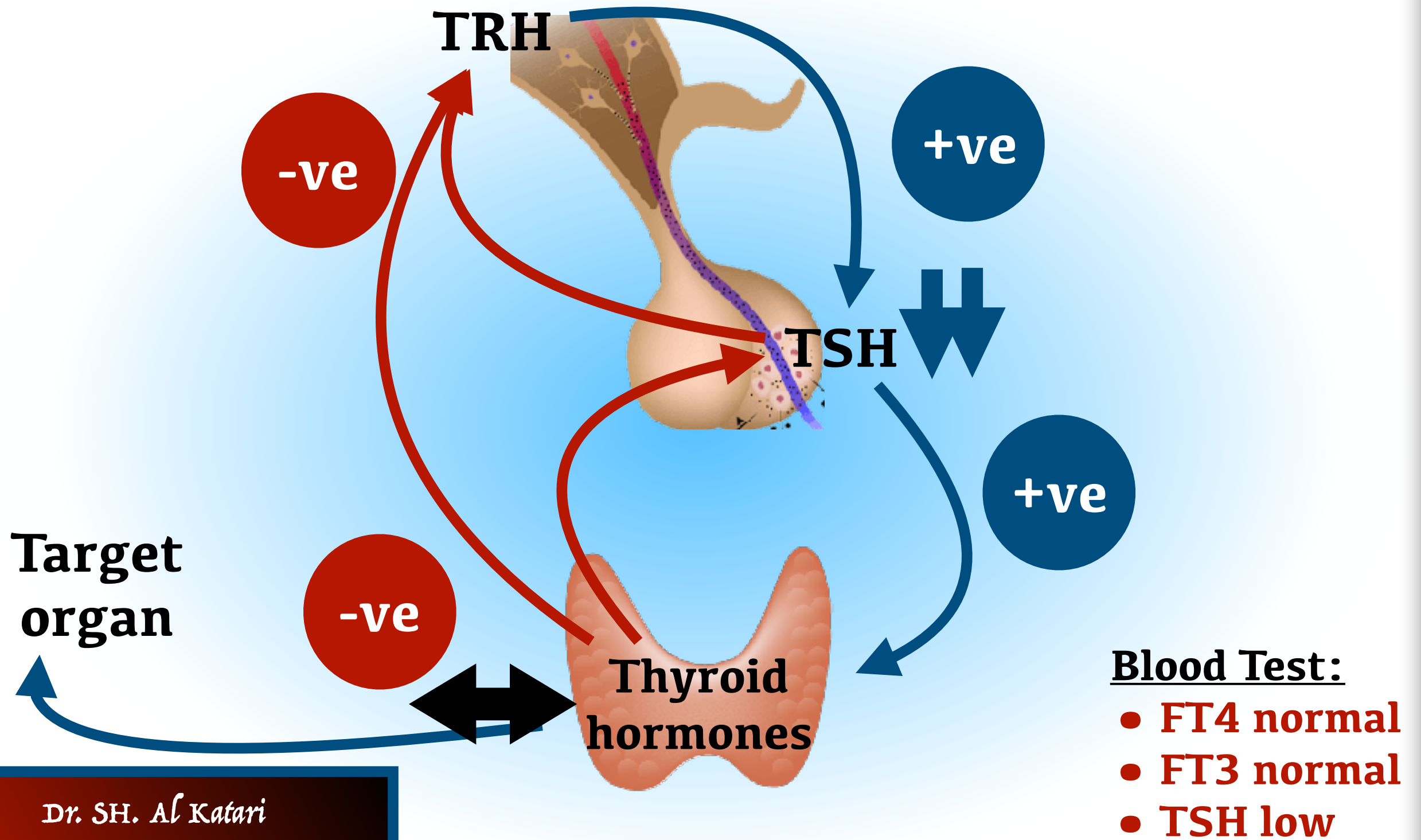
Thyroid storm: abrupt onset of thyrotoxicosis (Emergency endocrine)



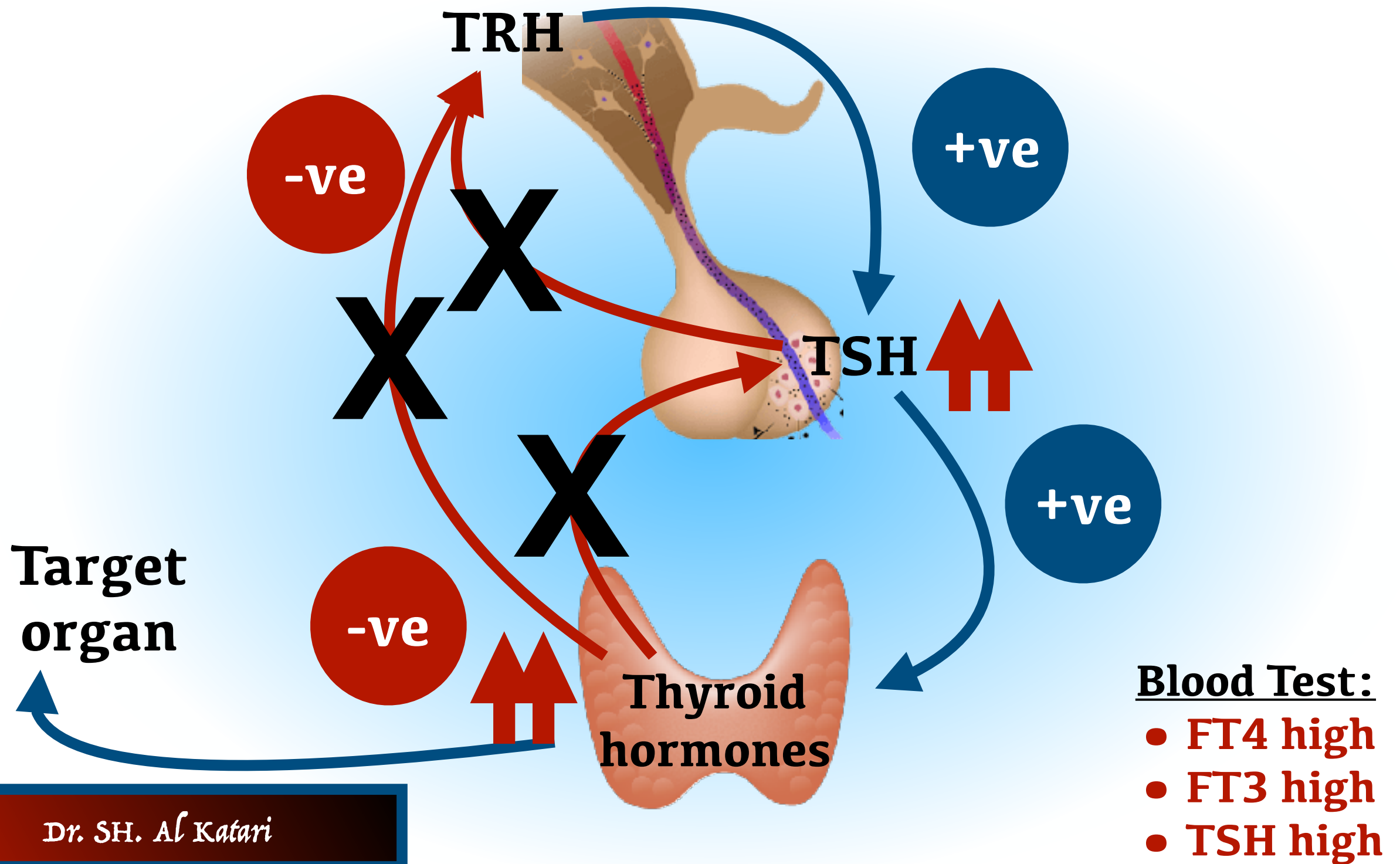
CLINICAL HYPERTHYROIDISM



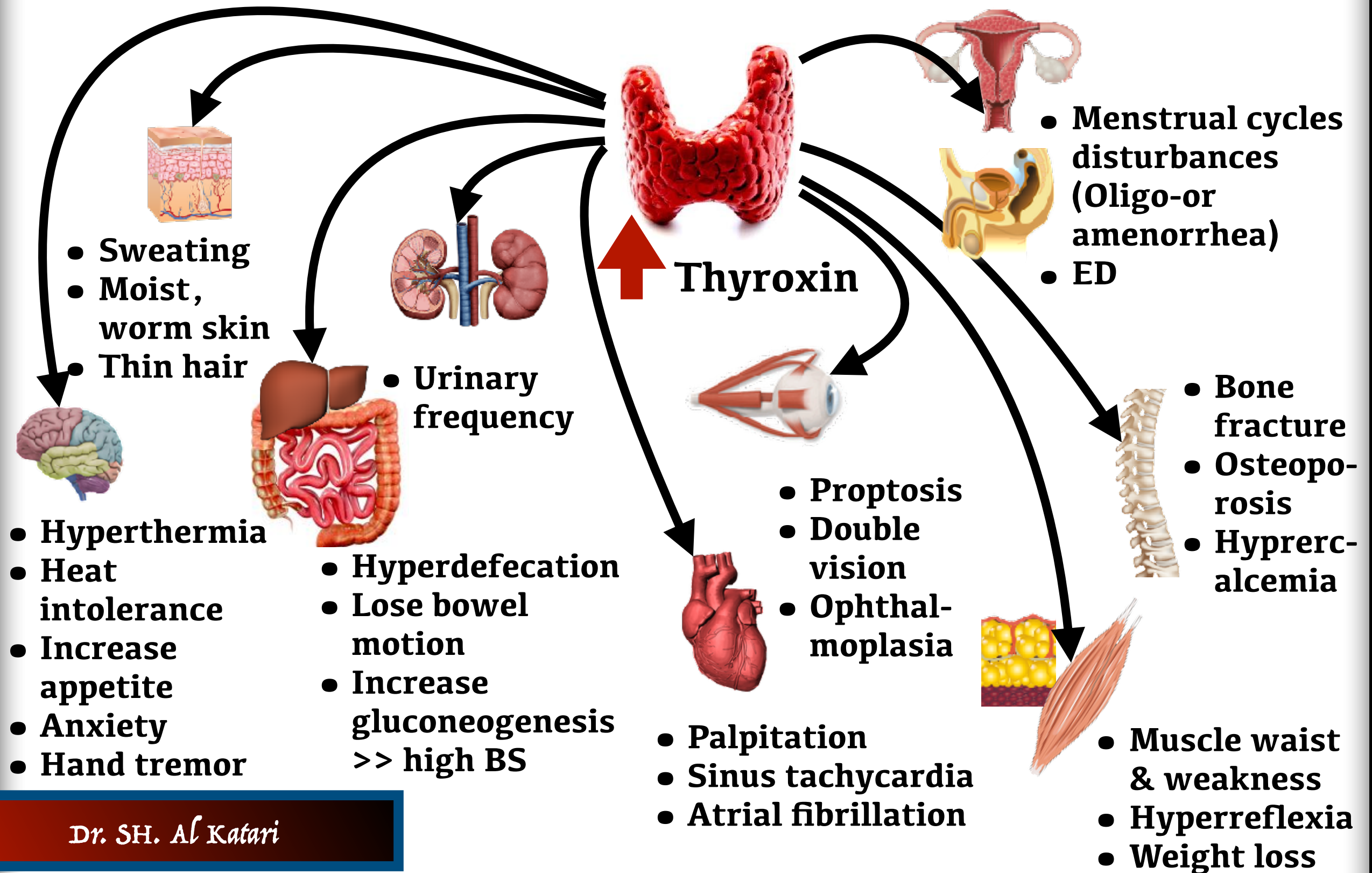
SUBCLINICAL HYPERTHYROIDISM



TSH Mediated HYPERTHYROIDISM



Clinical manifestations Hyperthyroidism :



Etiology of Hyperthyroidism:

NORMAL OR HIGH RADIOIODINE UPTAKE

- ➔ Graves Disease
- ➔ Hashitoxicosis
- ➔ Toxic adenoma & toxic multinodular goiter
- ➔ Iodine-induced hyperthyroidism
- ➔ Trophoblastic disease & germ cell tumors
- ➔ TSH-mediated hyperthyroidism (TSH secreting Tumor)
- ➔ Epoprostenol

LOW RADIOIODINE UPTAKE

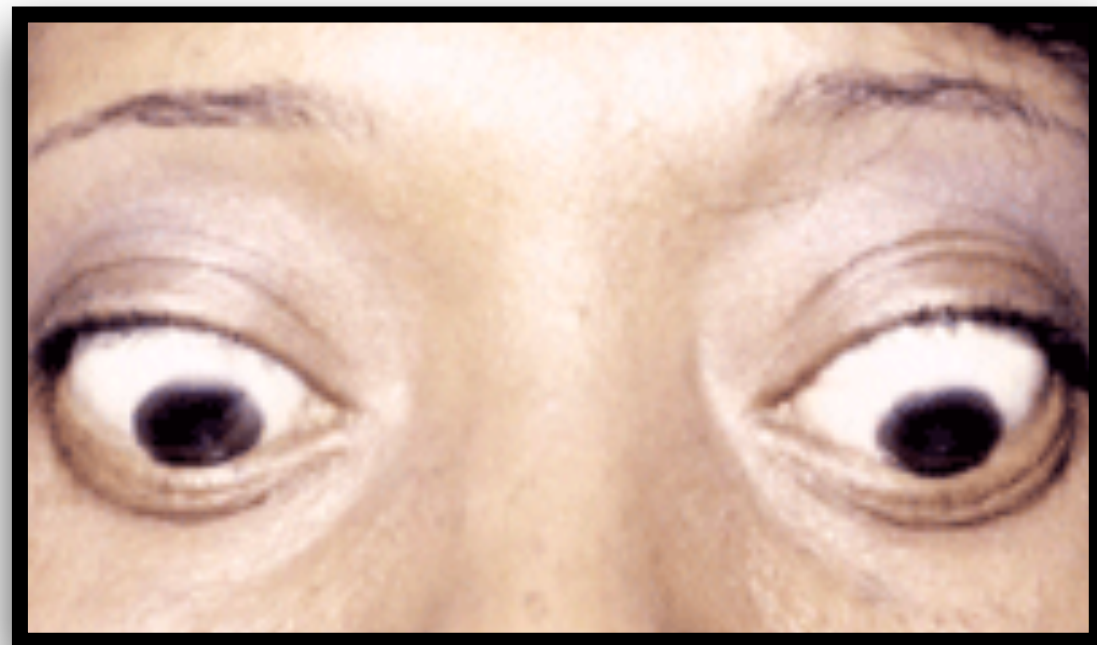
- ➔ Thyroiditis
- ➔ Exogenous and ectopic hyperthyroidism



Clinical signs:



Proptosis, Chemosis



Lid Lag

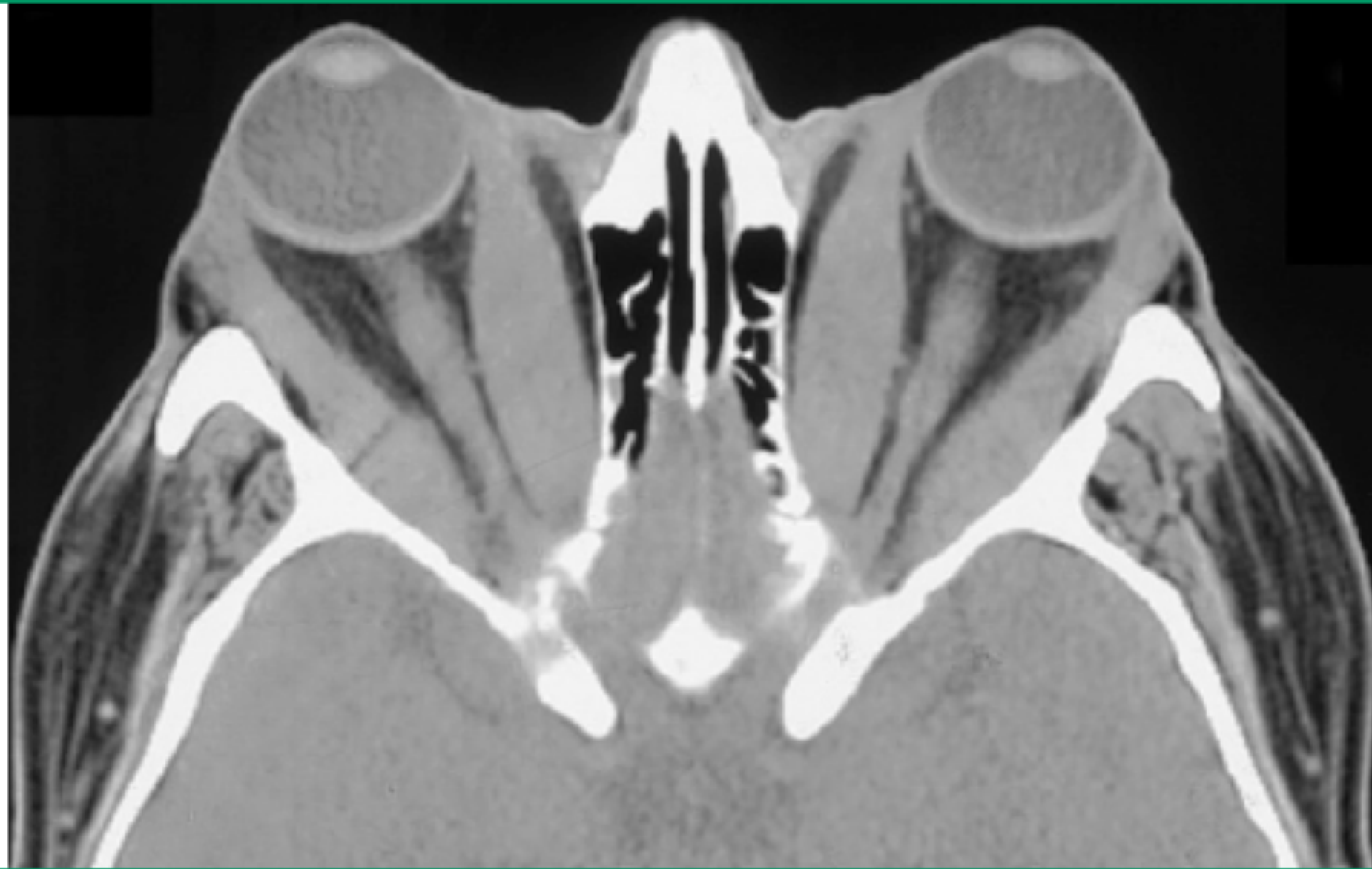


conjunctival injection, eyelid erythema, eyelid edema, caruncle swelling

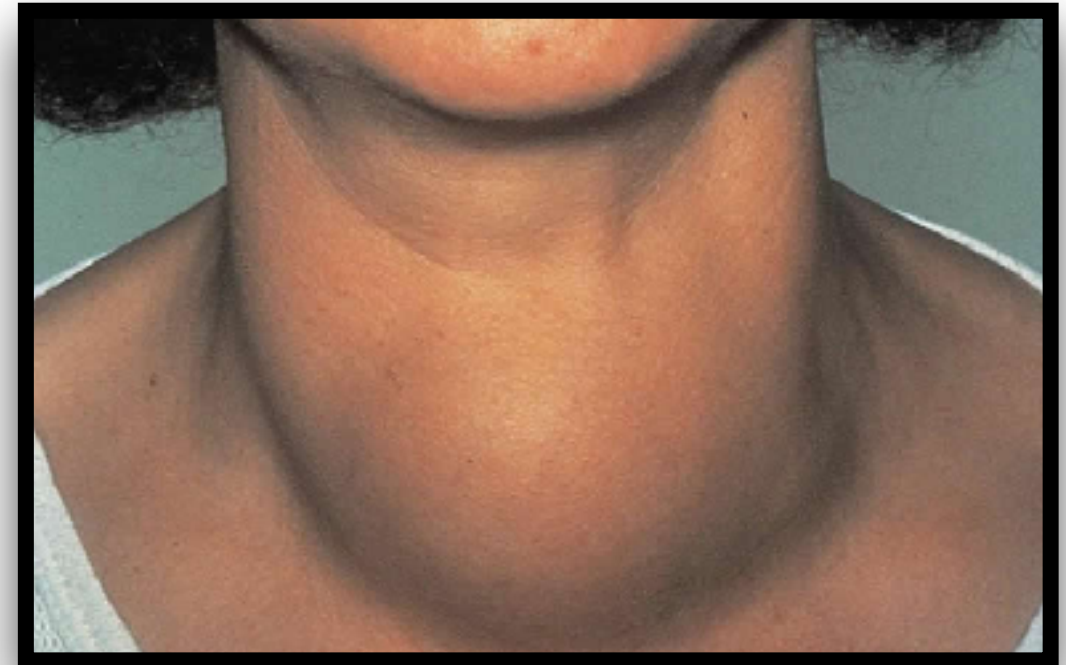
Graves Disease, (Graves Ophthalmopathy, Orbitopathy)

Clinical signs:

Graves' orbitopathy: Findings on CT scan



Clinical signs:

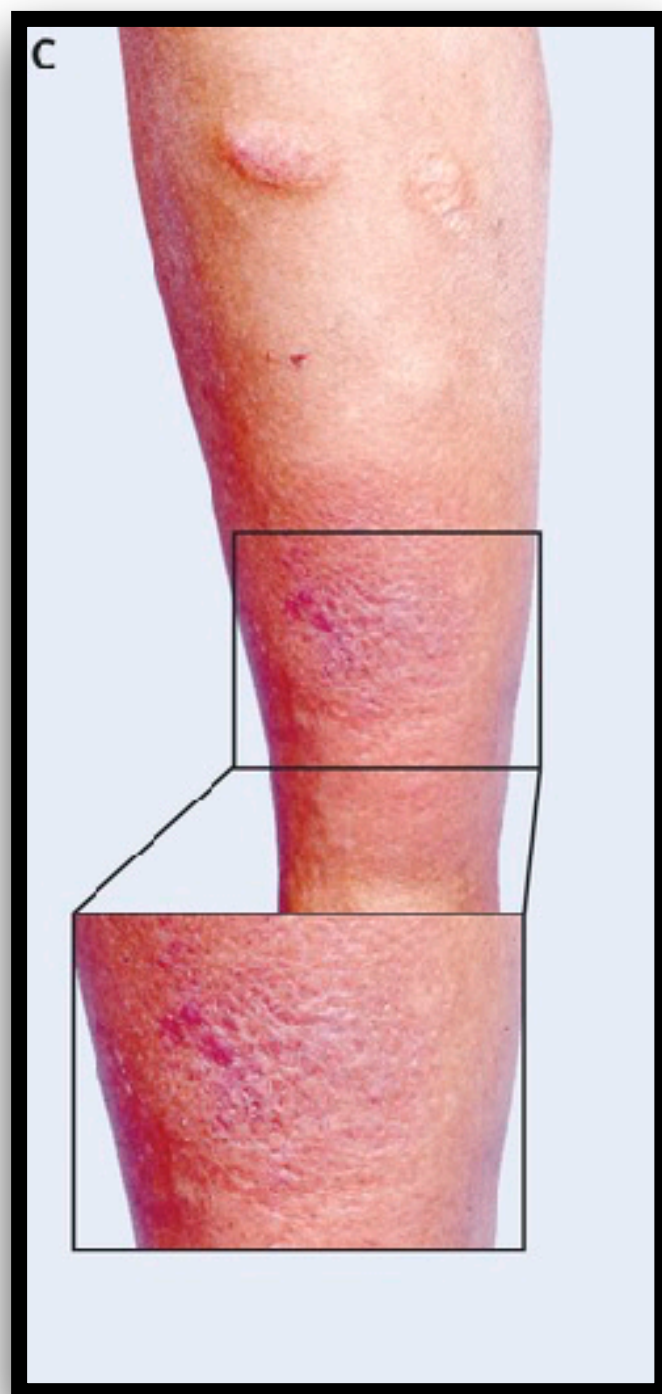


Thyroid Goiter:

- Diffuse or nodular
- Bruit



Clinical signs:



Pretibial Myxedema



Acropathy

Clinical signs:



Diagnostic approach of Hyperthyroidism:

Clinically

- History, clinical symptoms, & signs
- History of anemia, other autoimmune diseases
- History of recent pregnancy
- Family history

Biochemically

Clinical Hyperthyroidism:

- FT4 high
- FT3 high
- TSH low

Subclinical Hyperthyroidism:

- FT4 normal
- FT3 normal
- TSH low

TSH secreting Hyperthyroidism:

- FT4 high
- FT3 high
- TSH high

- Thyroid antibodies TPO, Anti TG
- TSH Receptor antibodies (Specific for Graves)
- Other blood test; CBC, LFT, ESR

Radiologically

Images

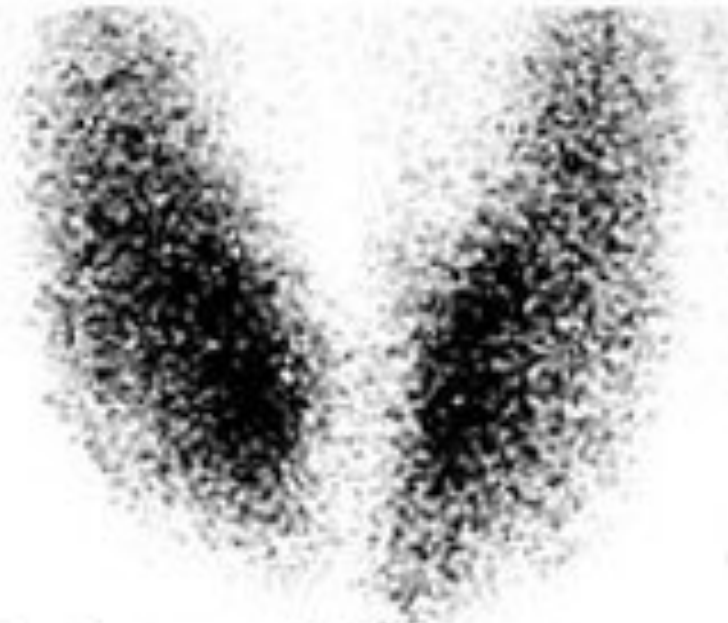
- Thyroid Scan
- Thyroid Ultrasound with doplar, high flow (Graves)

**NORMAL OR HIGH
RADIOIODINE UPTAKE**

Thyroid Uptake SCAN



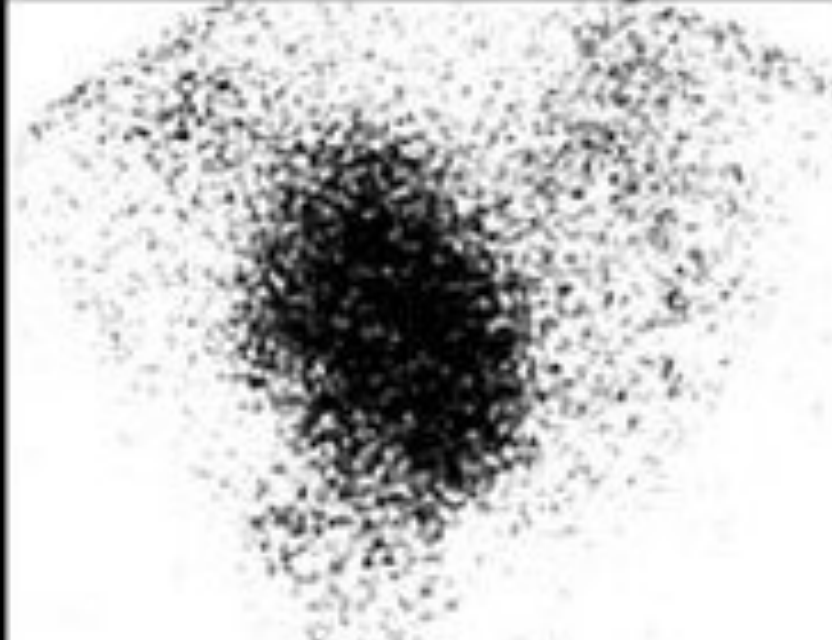
A. Normal



B. Graves' disease



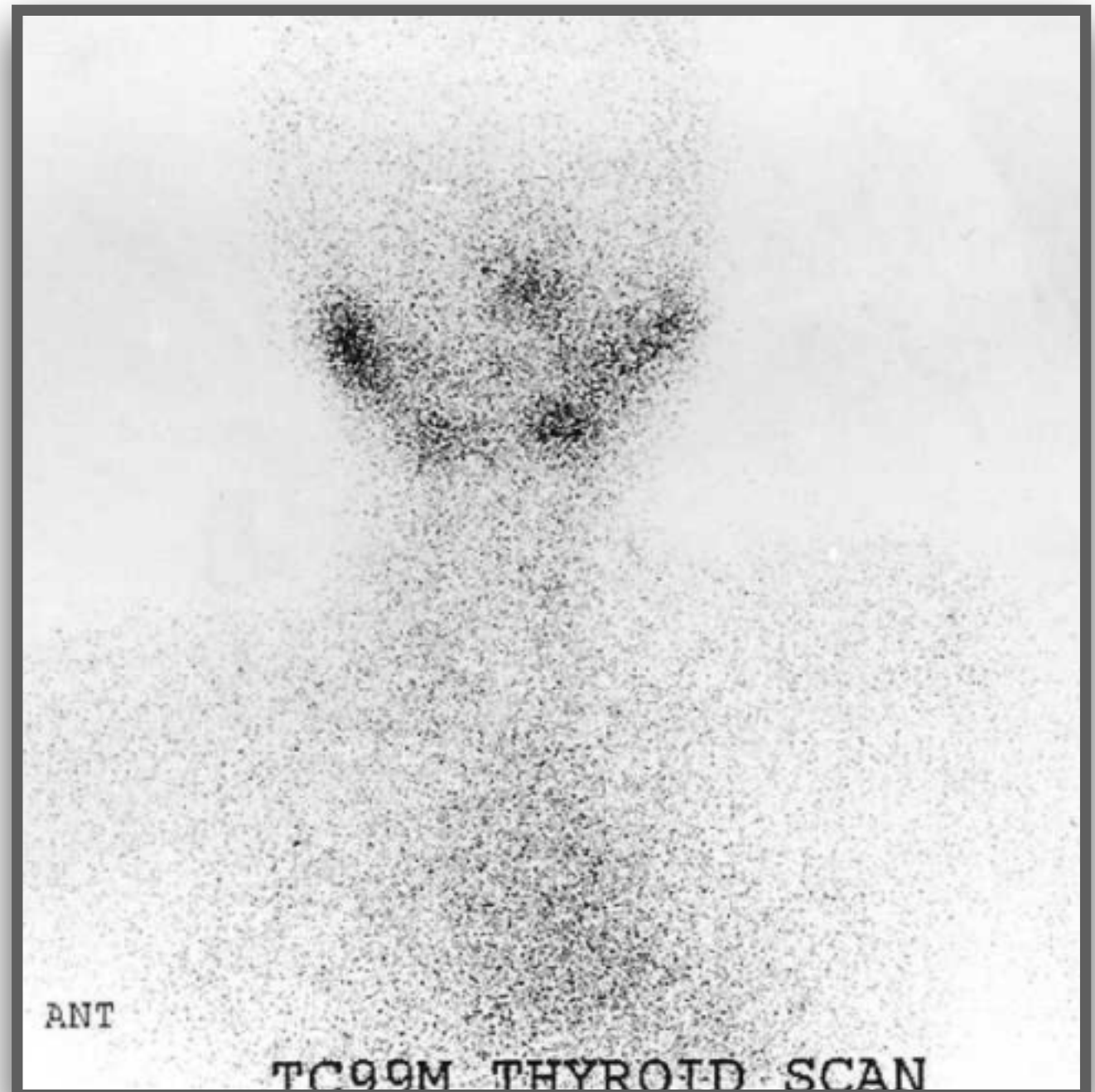
C. Toxic mng



D. Toxic adenoma

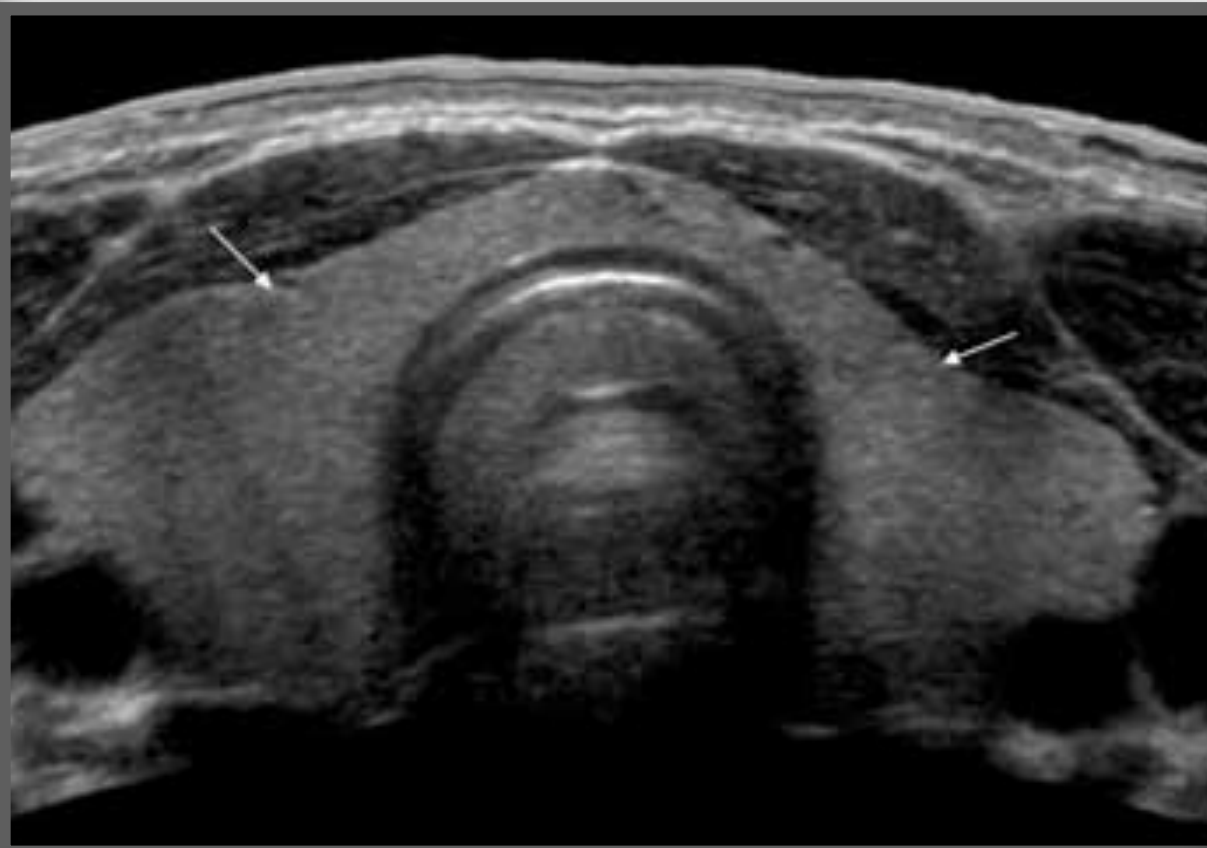
LOW RADIOIODINE UPTAKE

- ➔ Thyroiditis
- ➔ Exogenous and ectopic hyperthyroidism

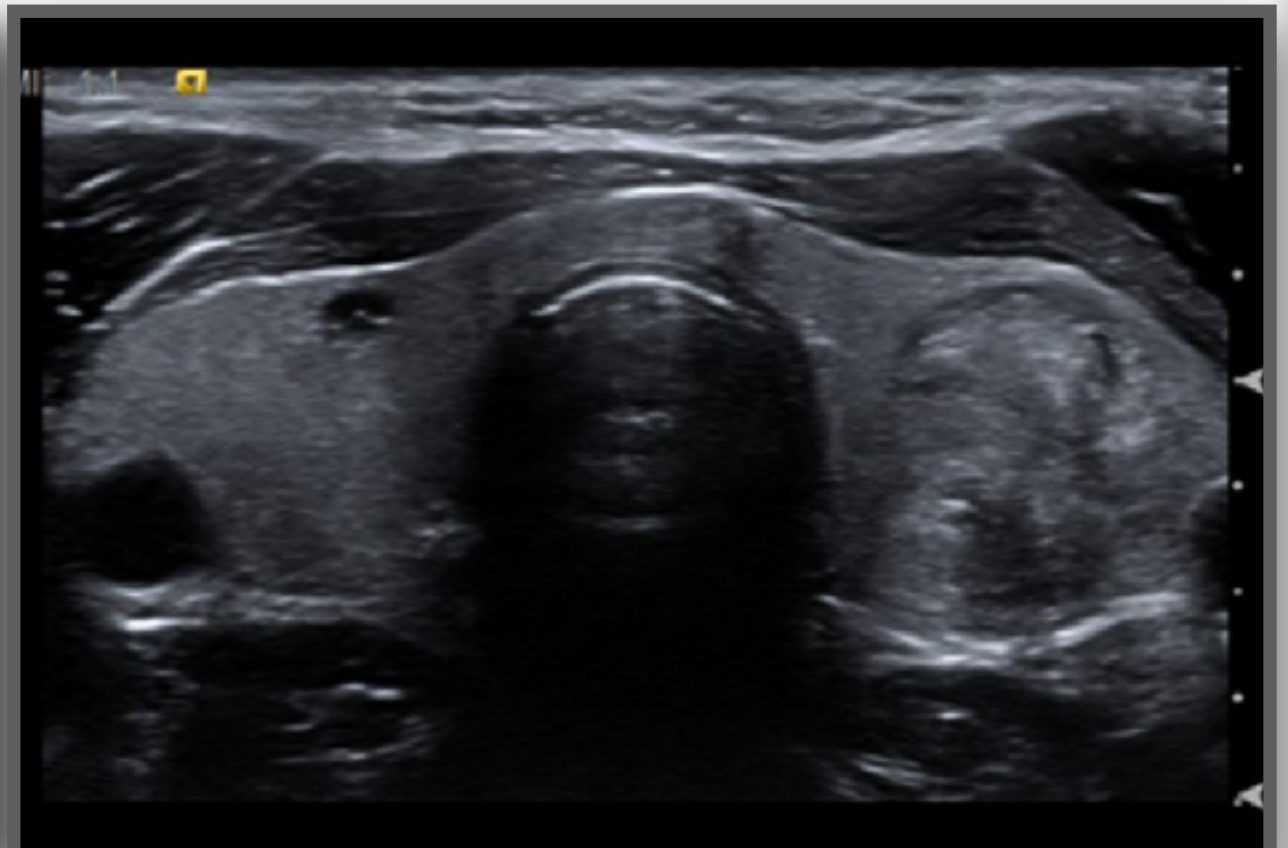


Thyroid Ultrasound ...

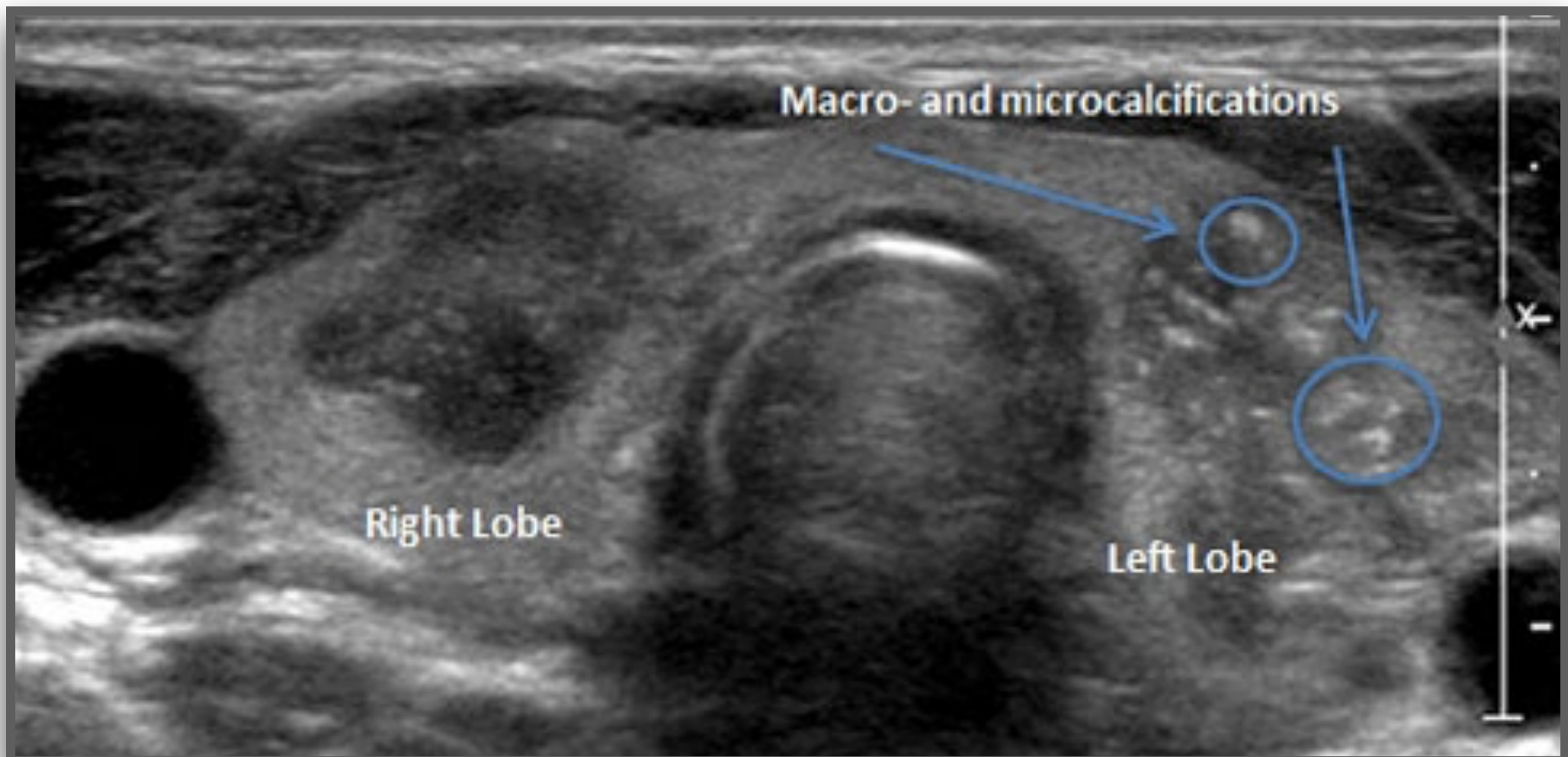
Normal



Thyroid Nodule



Thyroid Ultrasound ... Thyroid nodule



Treatment of Hyperthyroidism:

**NORMAL OR HIGH
RADIOIODINE UPTAKE**

Anti Thyroid medications

- ➔ **Methimazole**
- ➔ **PTU Propylthiouracil**

Beta Blockers

- ➔ **Propranolol**
- ➔ **Metoprolol**

RAIRx

Thyroidectomy

**LOW RADIOIODINE
UPTAKE**

Stop exogenous intake

Beta Blockers

- ➔ **Propranolol**
- ➔ **Metoprolol**

Monitor



➔ HYPOTHYROIDISM

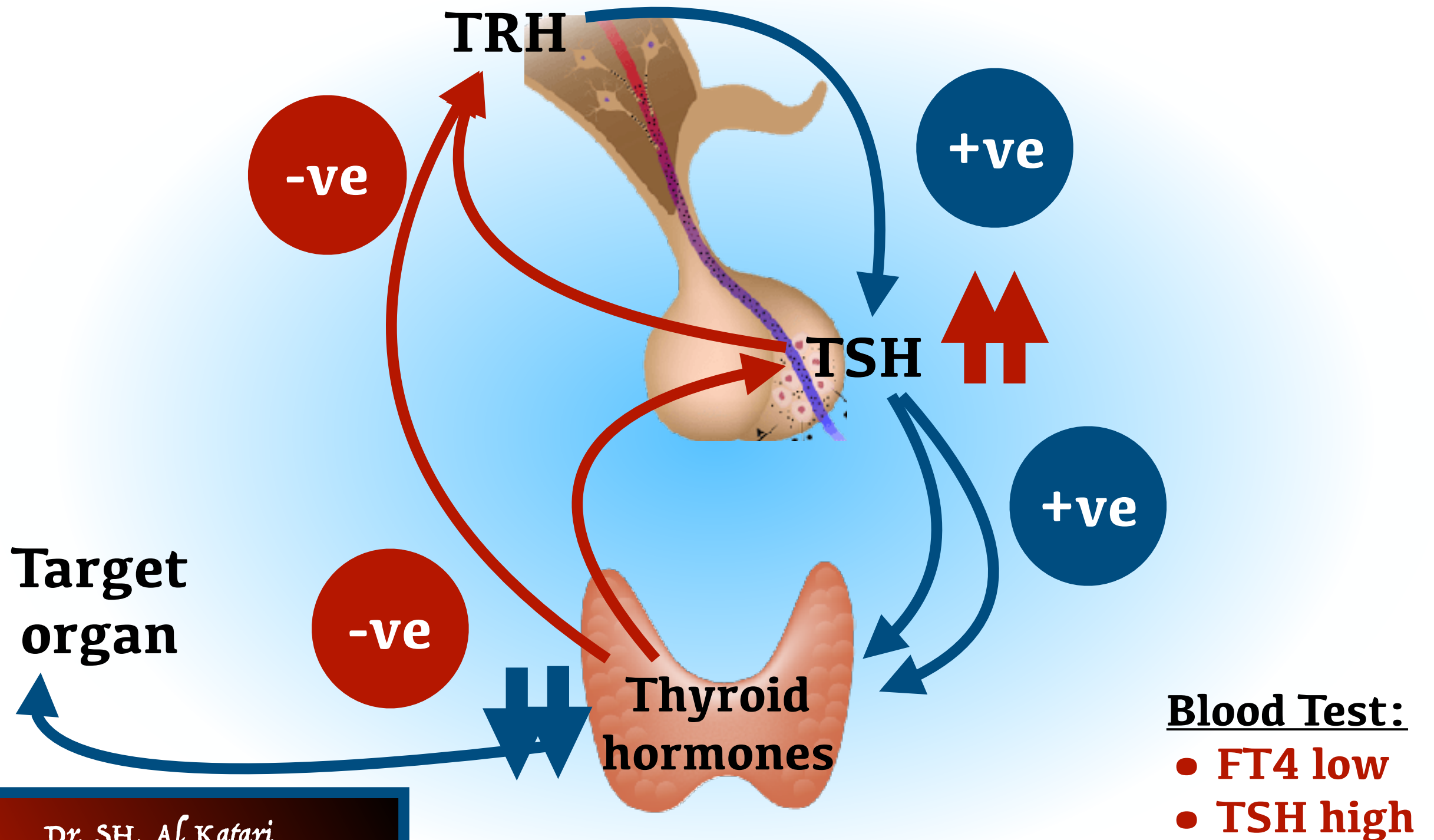
Hypothyroidism: Under-active thyroid or low thyroid, is a disorder of the endocrine system in which the thyroid gland does not produce enough thyroid hormone.

Subclinical Hypothyroidism: Asymptomatic/symptomatic patient with high TSH & normal FT4

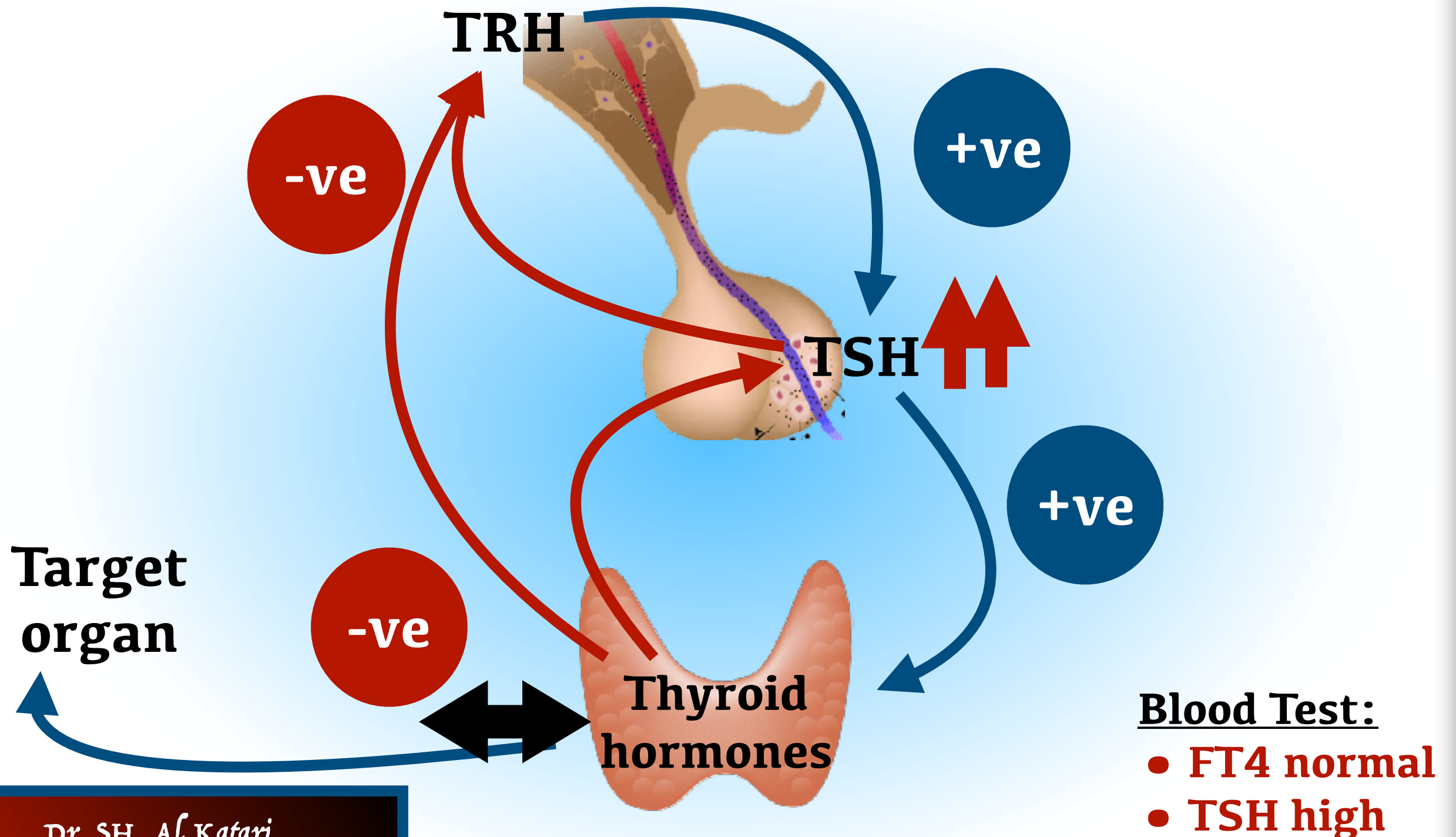
Central Hypothyroidism: Secondary hypothyroidism to hypothalamus or pituitary disease



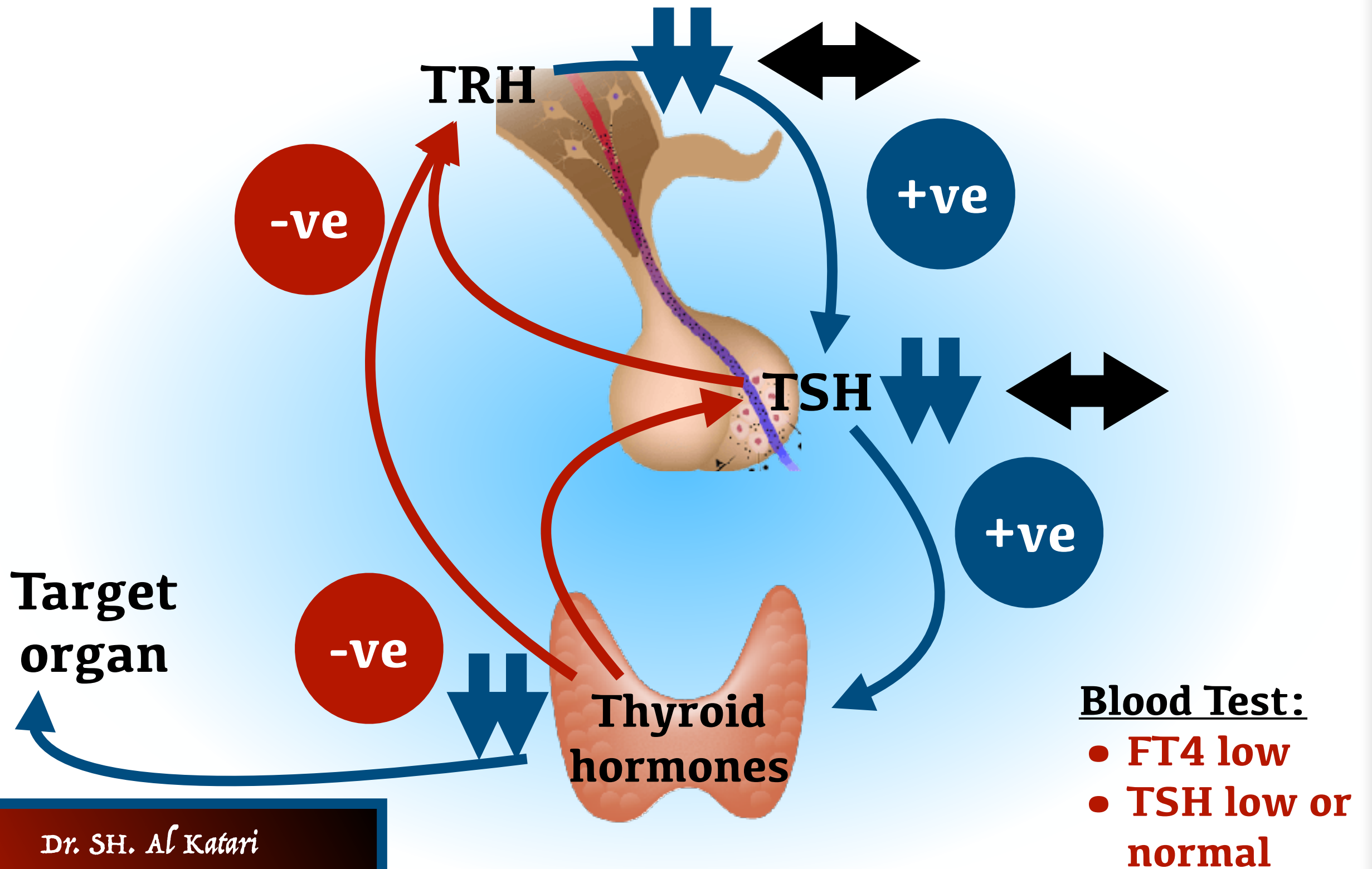
CLINICAL HYPOTHYROIDISM



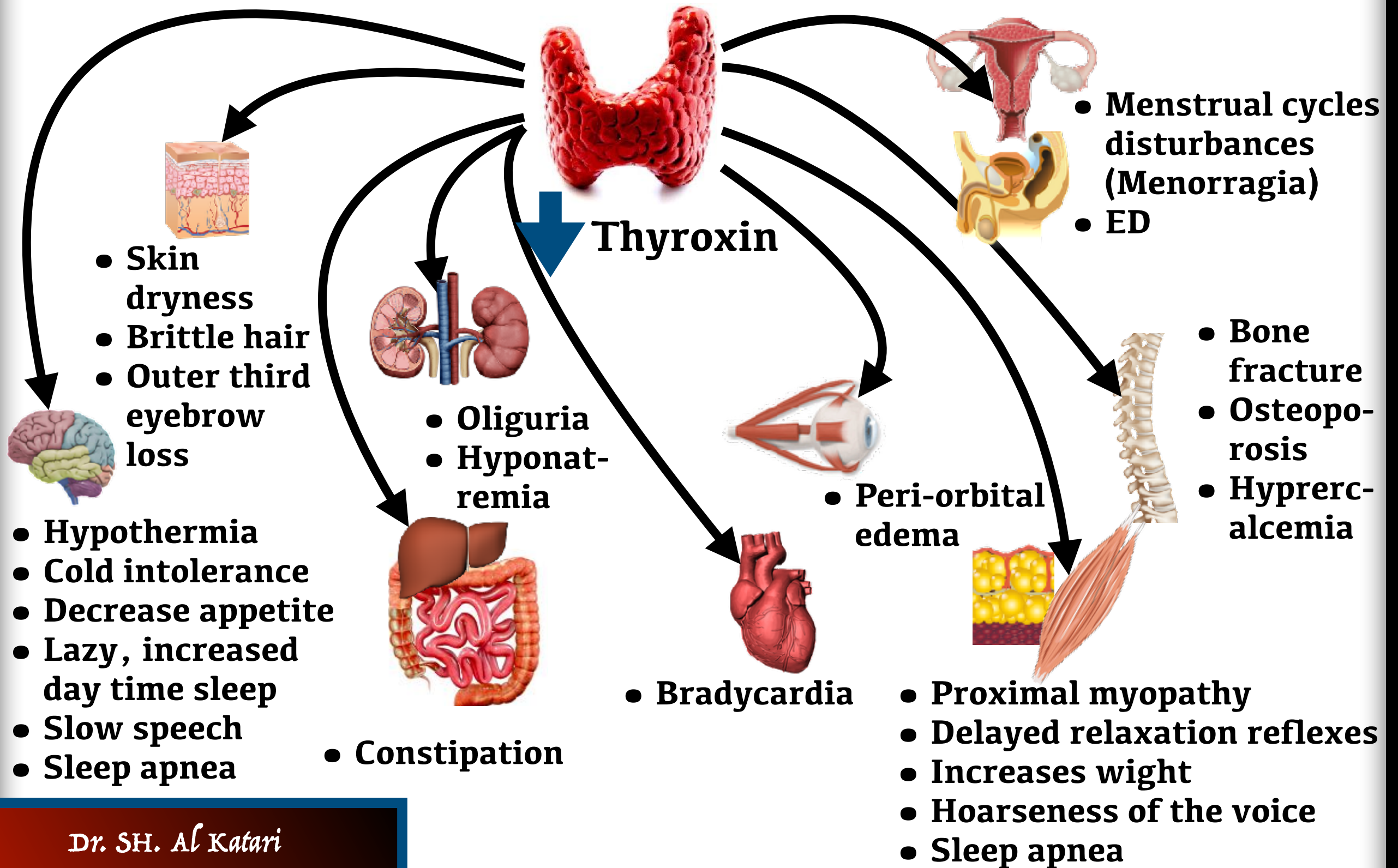
SUBCLINICAL HYPOTHYROIDISM



CENTRAL HYPOTHYROIDISM



Clinical manifestations Hypothyroidism :



Clinical signs:

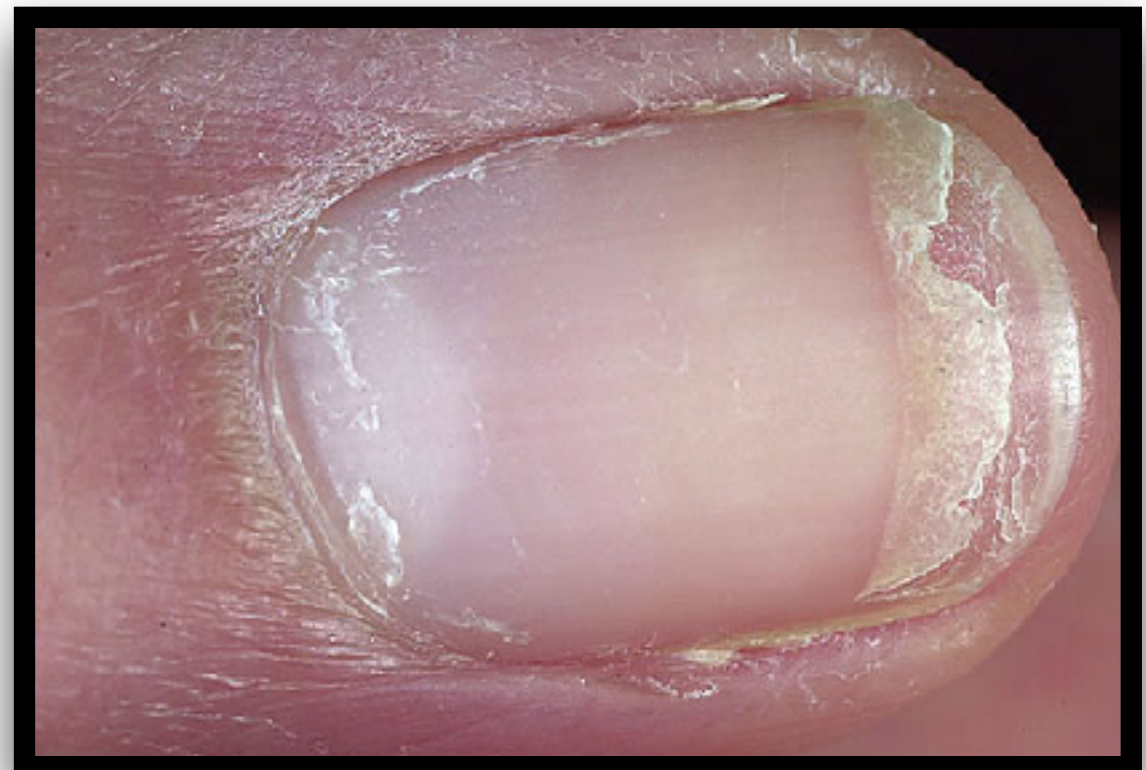


Myxedema

Dry skin



Brittle nail (Onycholysis)



Clinical signs:



Lateral eyebrow loss

Clinical signs:



Goiter



Cretinism

Diagnostic approach of Hypothyroidism:

Clinically

- History, clinical symptoms, & signs
- History of anemia, other autoimmune diseases
- History of recent pregnancy
- History of thyroidectomy
- Family history

Biochemically

Clinical Hypothyroidism:

- FT4 low
- TSH high

Subclinical Hypothyroidism:

- FT4 normal
- TSH high

Central Hypothyroidism:

- FT4 low
- TSH low/normal

- Thyroid antibodies TPO, Anti TG
- Other blood test; CBC, LFT, ESR

Radiologically

- If clinically palpable goiter
- If pressure symptoms & signs

Images

- Thyroid Ultrasound
- CT Scan Neck & Mediastinum/Chest

Treatment of Hypothyroidism:

CLINICAL HYPOTHYROIDISM

➔ Thyroxin replacement
1.6mcg/kg

SUBLINICAL HYPOTHYROIDISM

Indication for treatment

- ➔ Symptomatic patient
- ➔ Dyslipidemia
- ➔ TSH level > 10 mIU/L
- ➔ Pregnant
- ➔ Infertility

CENTRAL HYPOTHYROIDISM

Caution

➔ Assess cortisol & other
pituitary hormones,
before treatment



Hypothyroidism

Before

After



Hypothyroidism

Before



After



➔ SUBACUTE THYROIDITIS (De Quervain)

Subacute granulomatous thyroiditis: is characterized by neck pain or discomfort, a tender diffuse goiter, and a predictable course of thyroid function evolution.

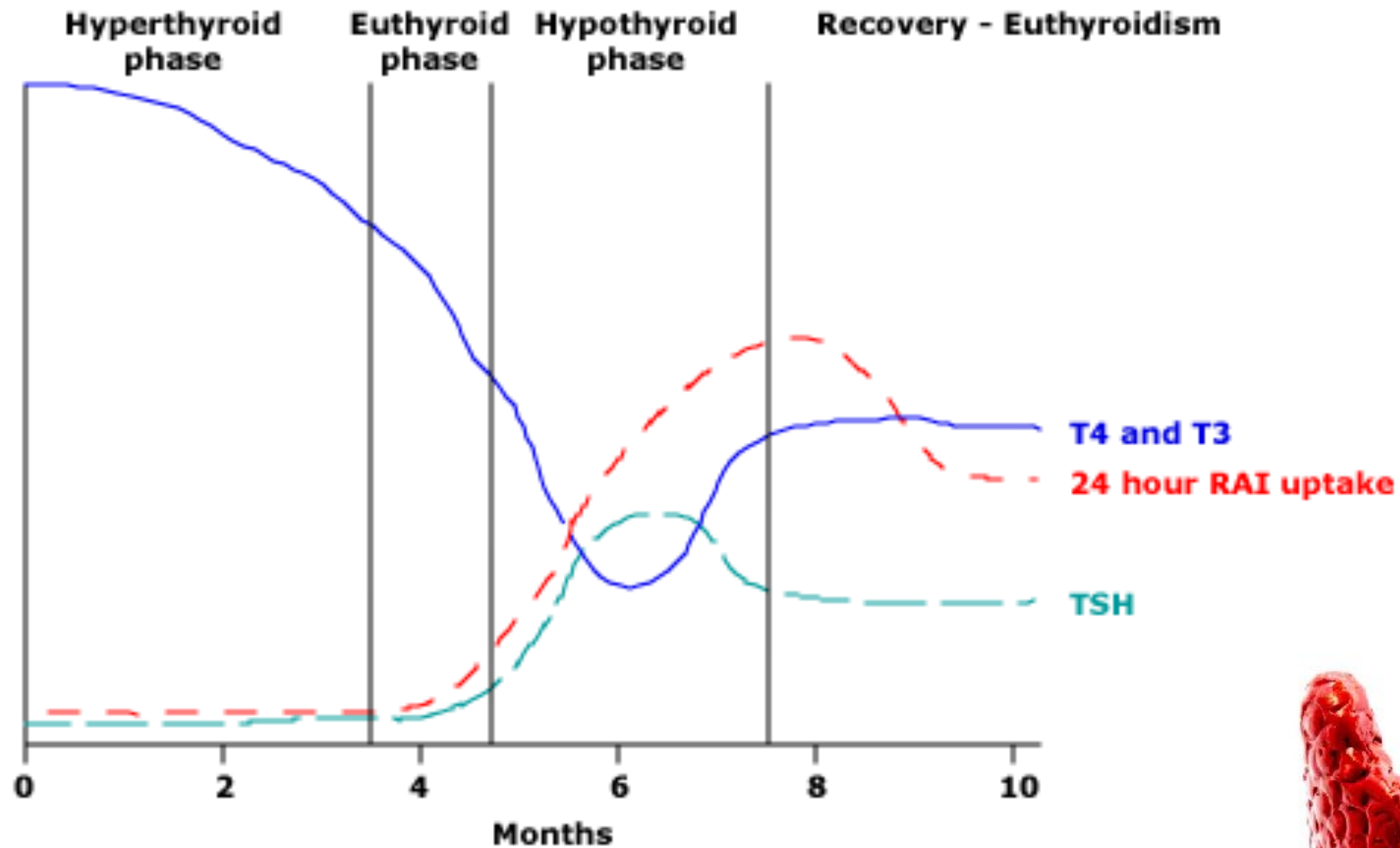
Etiology: viral infection

Clinical Presentation:

- ➔ Painful, tender and swollen gland
- ➔ Malaise, fever, chills, and night sweats
- ➔ On Examination: tender, warm, goiter
- ➔ Hyperthyroidism is typically the presentation followed by euthyroidism, hypothyroidism, and ultimately restoration of normal thyroid function



Characteristic course of thyroiditis (painless, postpartum, or subacute)



Diagnostic approach of Subacute Thyroiditis:

Clinically

- History, clinical symptoms, & signs.

Biochemically

Hyperthyroidism:

- FT4 high
- TSH low

Hypothyroidism:

- FT4 low
- TSH high

- Other blood test; CBC, LFT, ESR, C-RP

Radiologically

Images

- Thyroid Ultrasound with **dollar** low flow
- Thyroid scan, low uptake

Treatment of Subacute Thyroiditis:

Pain control

➔ Aspirin, other anti-inflammatory drugs NSIDS, or Glucocorticoids

Hyperthyroidism

➔ Beta-adrenergic blockers for thyrotoxic symptoms

Hypothyroidism

➔ L-thyroxine for hypothyroidism



➔ MULTIPLE THYROID NODULES:

➔ Needs clinical attention when noted:

- by the patient
- by a clinician during routine physical examination
- or during a radiologic procedure

➔ Their clinical importance:

- The need to exclude thyroid cancer, which accounts for 4- 6.5 % of all thyroid nodules in nonsurgical series
- The presence of pressure symptoms.

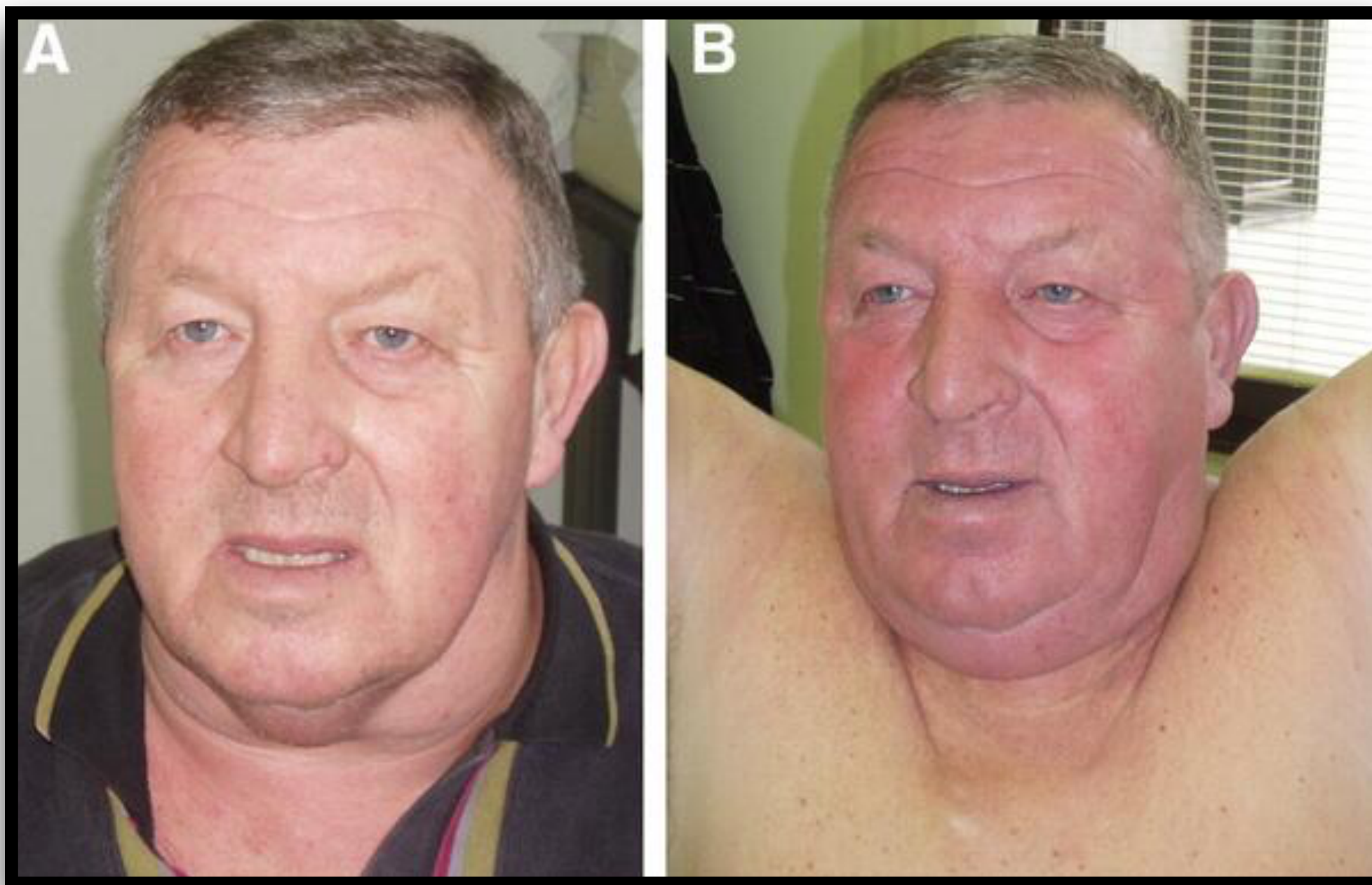


Clinical history and signs:

- ➔ Neck mass, the onset, the growth of the mass, how fast?
- ➔ Change in the skin over it
- ➔ Pressure Symptoms:
 - Chocking symptoms
 - Swallowing difficulties
 - Hoarseness of the voice
 - Stridor
- ➔ History of head & neck irradiation during childhood, whole body irradiation for bone marrow transplant
- ➔ Family history of thyroid nodules or thyroid cancer, family history of other endocrine tumor; MEN1,2



Clinical signs:



Pemberton sign



Endemic Iodine deficiency area

Biochemical & Radiological Assessment:

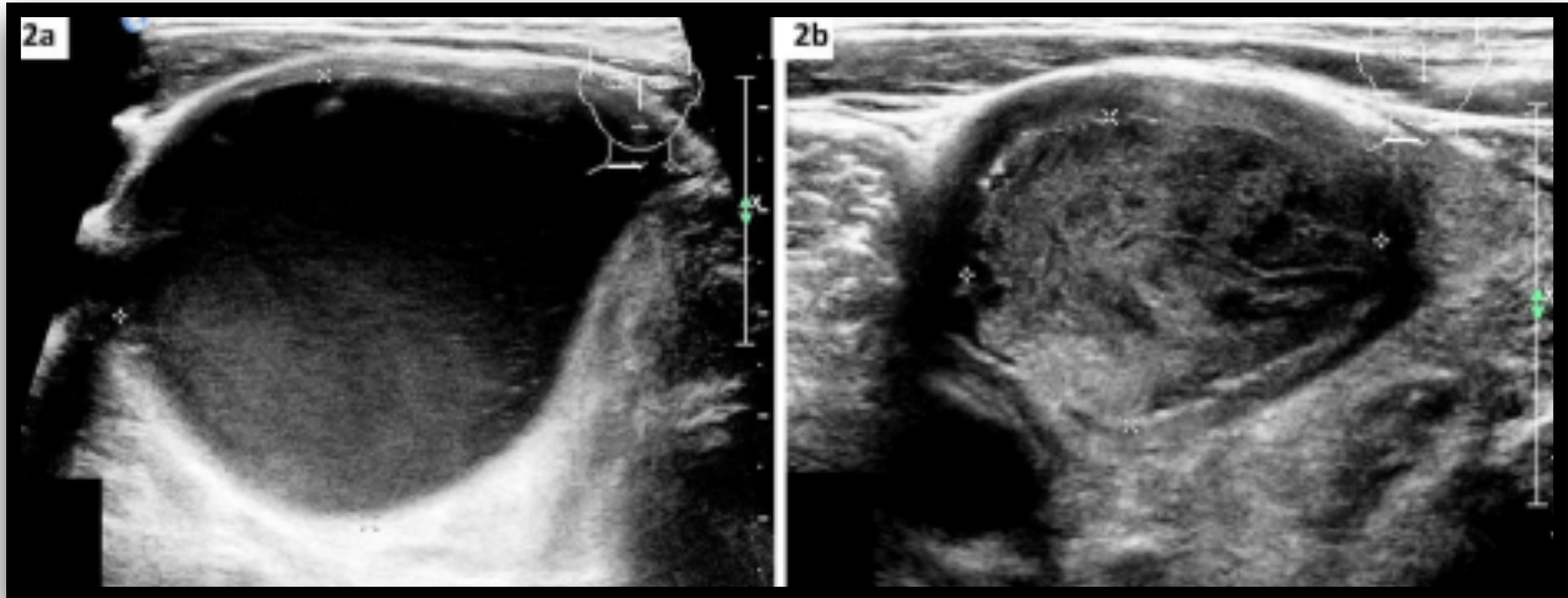
- ➔ **TFT**
- ➔ **Neck US: thyroid & lymph nodes**
- ➔ **Thyroid Scan**
- ➔ **CT Scan of Neck & chest**
- ➔ **Fine-needle aspiration biopsy**
- ➔ **Sonographic criteria for FNA**



Thyroid US, Thyroid Nodule & risk of malignancy:

Thyroid Cyst

Thyroid Nodule



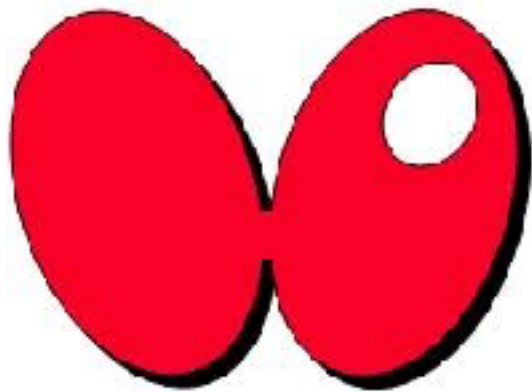
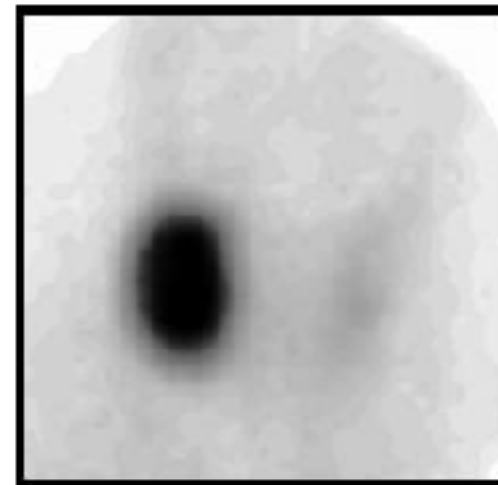
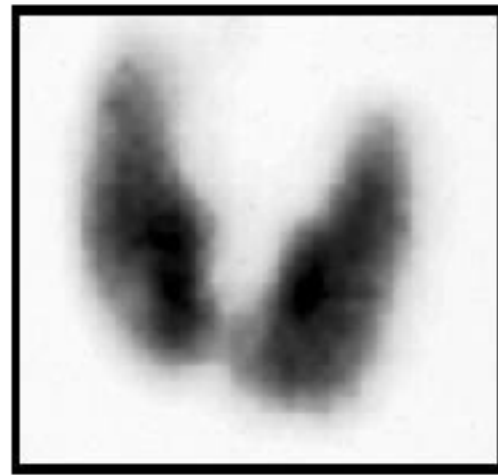
Thyroid US, Thyroid Nodule & risk of malignancy:



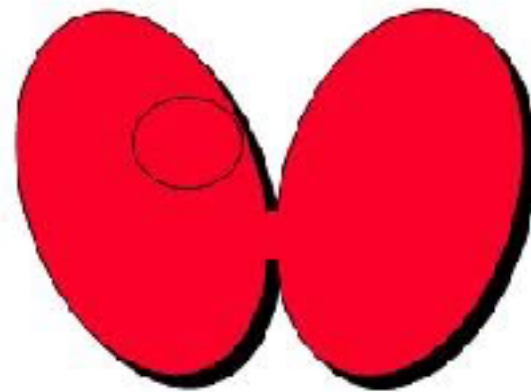
Sonographic patterns, estimated risk of malignancy, and I NA guidance for thyroid nodules

Sonographic pattern	Ultrasound features	Estimated risk of malignancy	Consider biopsy (FNA size cutoff, largest dimension)
High suspicion	Solid hypoechoic nodule or solid hypoechoic component of a partially cystic nodule WITH one or more of the following features: irregular margins (infiltrative, microlobulated), microcalcifications, taller than wide shape, rim calcifications with small extrusive soft tissue component, evidence of extrathyroidal extension	>70 to 90%*	Recommend FNA at >1 cm
Intermediate suspicion	Hypoechoic solid nodule with smooth margins WITHOUT microcalcifications, extrathyroidal extension, or taller than wide shape	10 to 20%	Recommend FNA at >1 cm
Low suspicion	Isoechoic or hyperechoic solid nodule, or partially cystic nodule with eccentric solid areas, WITHOUT microcalcification, irregular margin or extrathyroidal extension, or taller than wide shape	5 to 10%	Recommend FNA at >1.5 cm
Very low suspicion	Spongiform or partially cystic nodules WITHOUT any of the sonographic features described in low, intermediate, or high suspicion patterns	<3%	Consider FNA at >2 cm Observation without I NA is also a reasonable option
Benign	Purely cystic nodules (no solid component)	<1%	No biopsy [†]

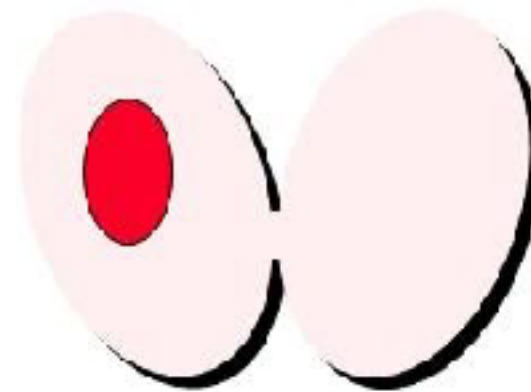
Thyroid Scan of thyroid nodules:



Cold



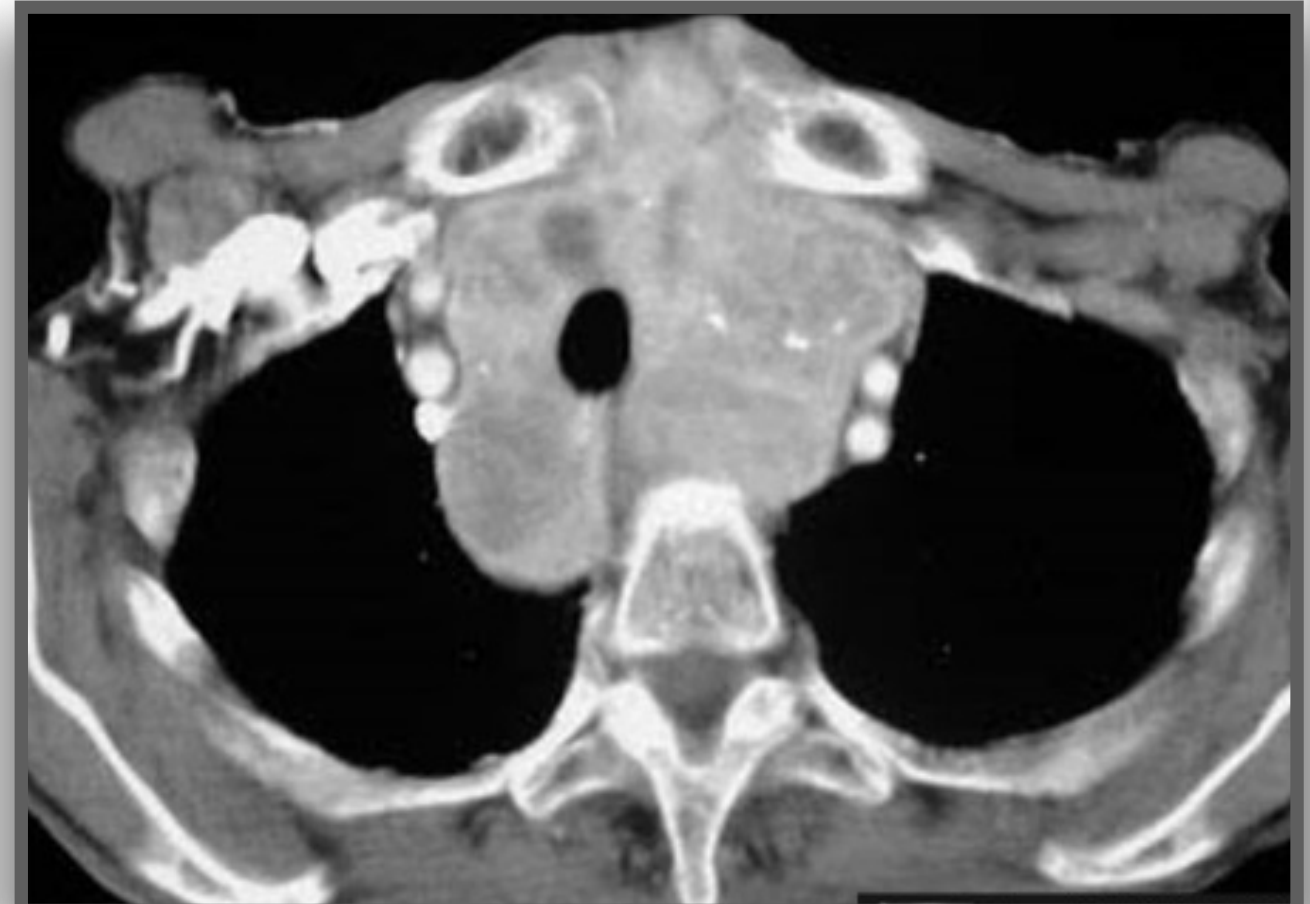
Warm



Hot



CT Neck/Chest ... MNG, Retrosternal extension



Treatment of Thyroid Nodule:

Subcm Thyroid Nodules

➔ **Observation**

**>1cm , suspicious
radiologically**

➔ **FNA**

Benign

➔ **Observation, US f/u**

**Suspicious /
Malignant**

➔ **Consider surgery**

**MNG with pressure
symptoms**

➔ **Consider FNA and surgery**

**Hypothyroidism/
Hyperthyroidism**

➔ **Managed accordingly**



TYPES OF THYROID CANCER:



Papillary Thyroid CA (PTC)

➔ **Most common, best prognosis,
Total thyroidectomy, RAI Rx**

Follicular Carcinoma

➔ **Good prognosis, Total thyroidectomy,
RAI Rx**

Medullary Thyroid CA (MTC)

➔ **Bad prognosis, Total thyroidectomy,
risk of lymph vascular invasion, &
distant metastasis, Chemotherapy**

Anaplastic Thyroid CA

➔ **Worst prognosis, rapid progression,
high risk of lymph vascular invasion,
and distant metastasis**
➔ **No surgery is advised**

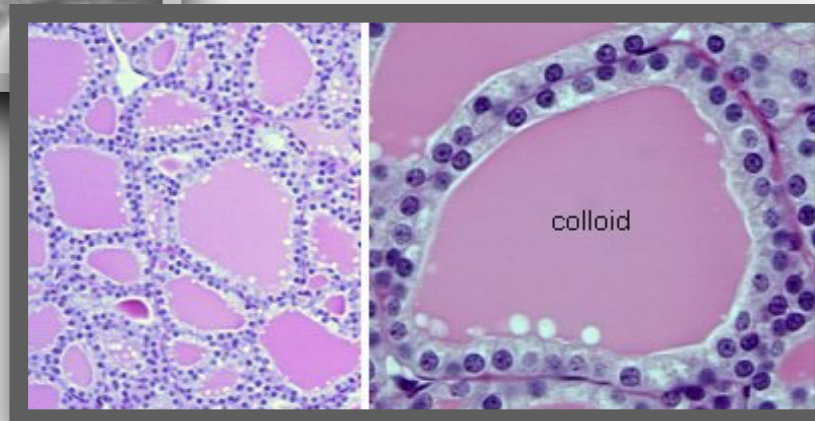
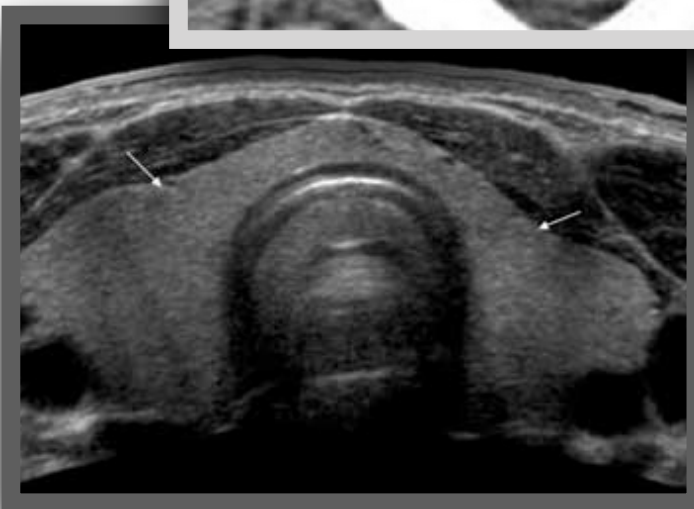
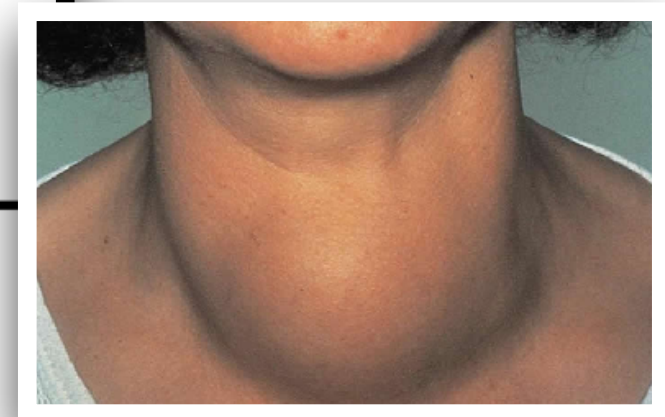
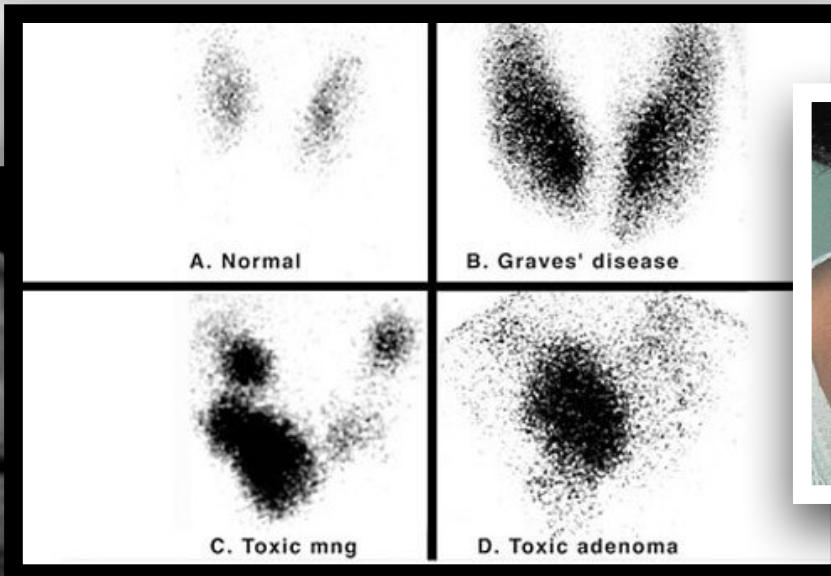
Complications post Thyroidectomy:

- ➔ **Hypothyroidism , needs for hormone replacement**
- ➔ **Hypocalcemia , secondary to parathyroidectomy**
- ➔ **Recurrent laryngeal nerve injury, leads to hoarseness**
- ➔ **Bleeding**
- ➔ **Infection**
- ➔ **Needs for tracheostomy**

**Always
remember**

➔ **The more expert surgeon,
less complications**





THANK YOU

Shadin S. Al Katari MD, FACE

Consultant Endocrinology & Diabetes

Endocrine & Diabetes Division - IM Department at KKUH, KSUMC