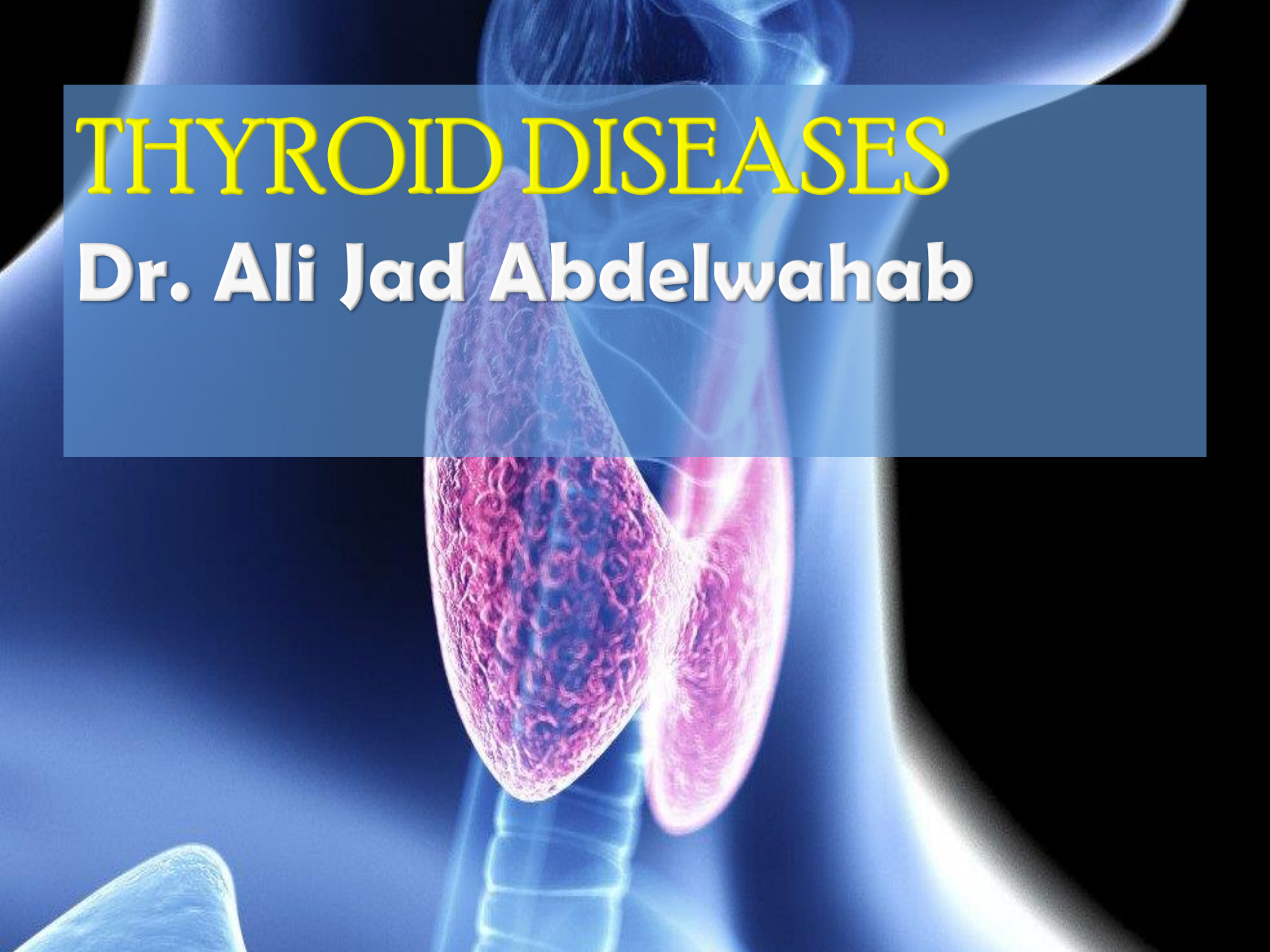
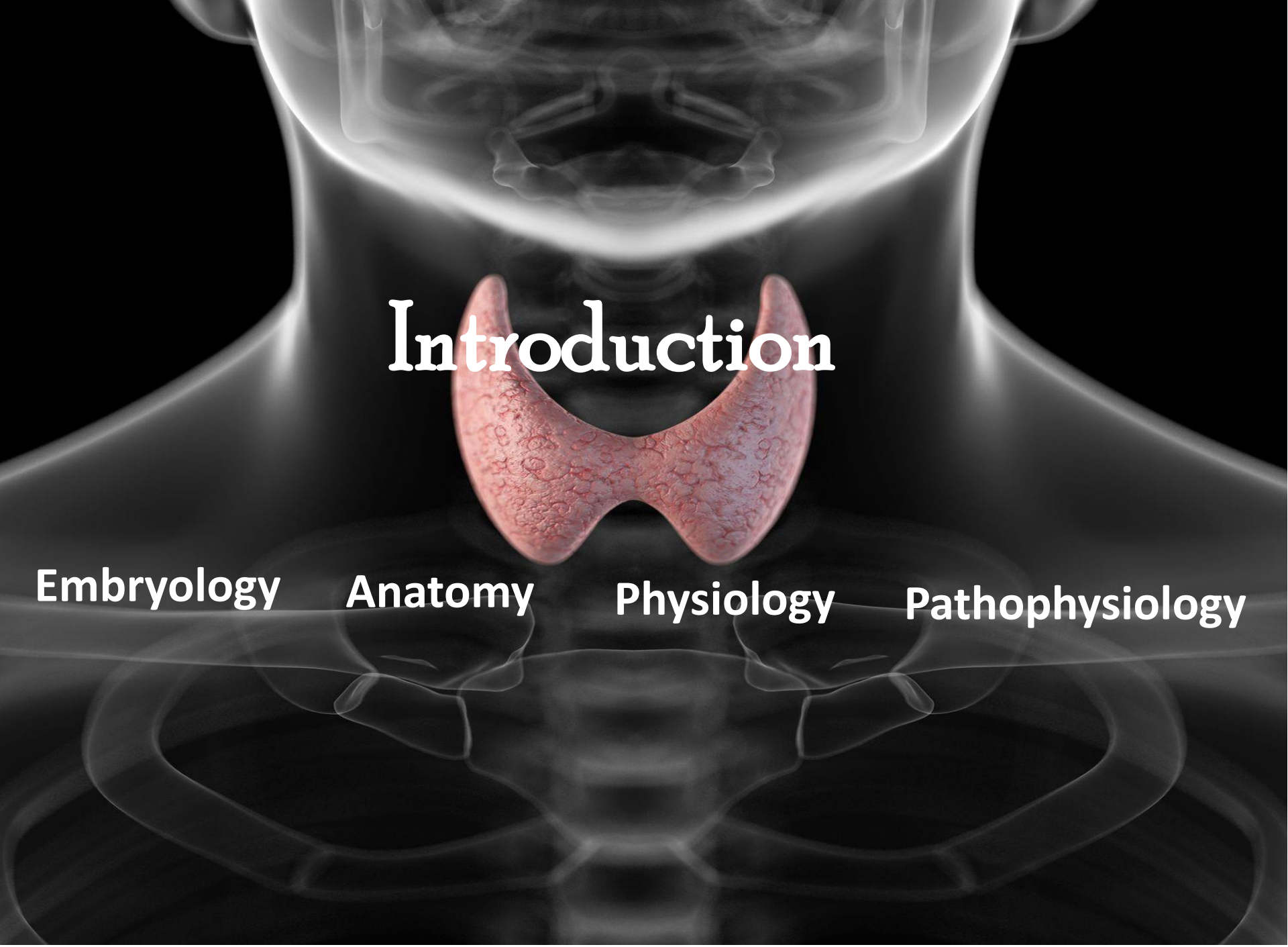


THYROID DISEASES

Dr. Ali Jad Abdelwahab

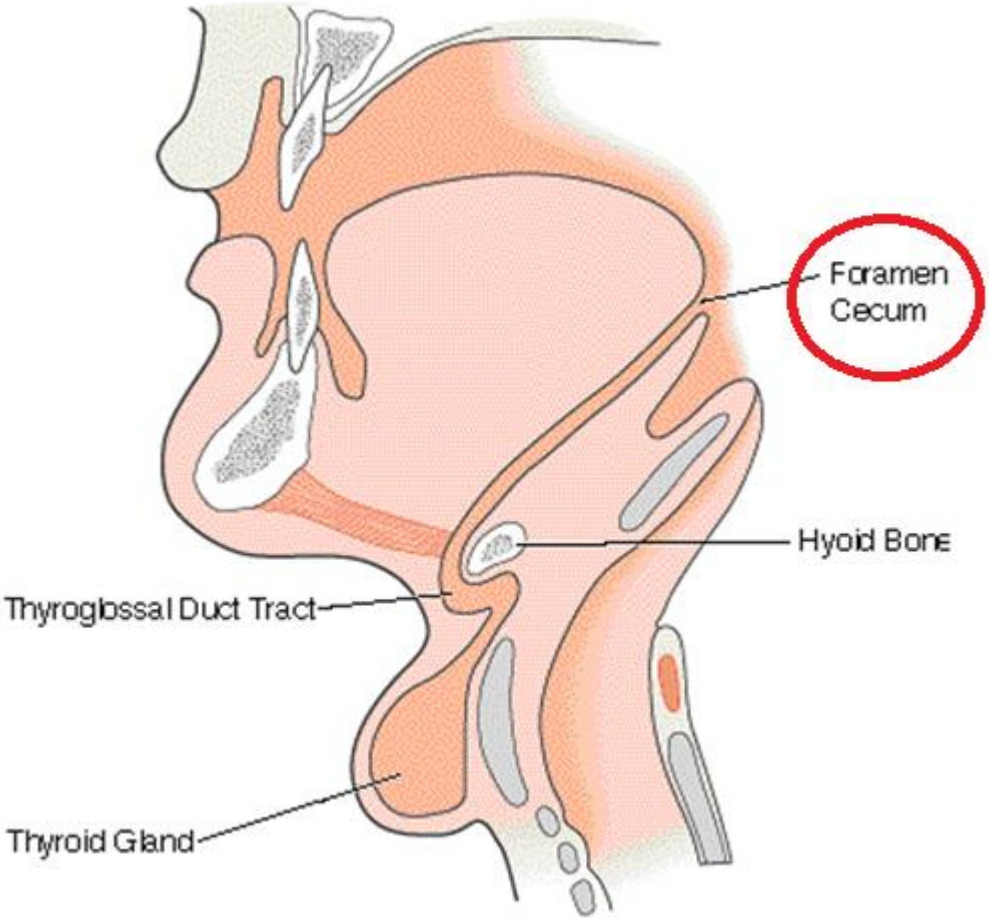
Surgical Diseases of the Thyroid

- **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

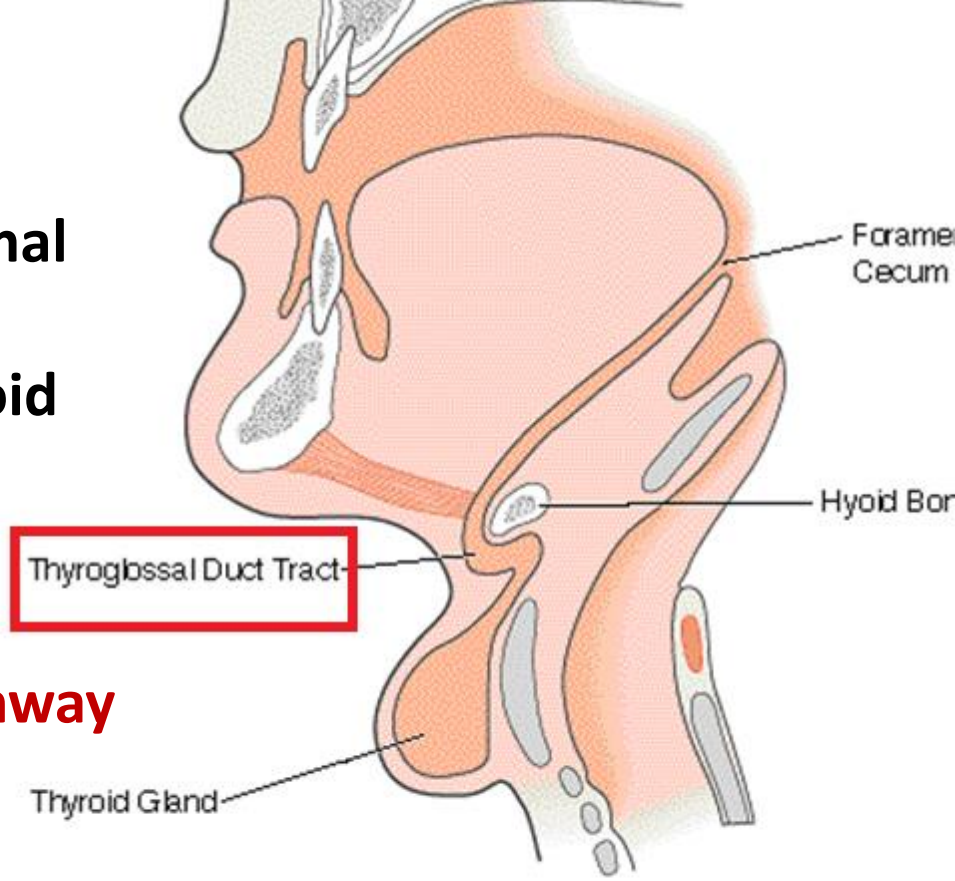


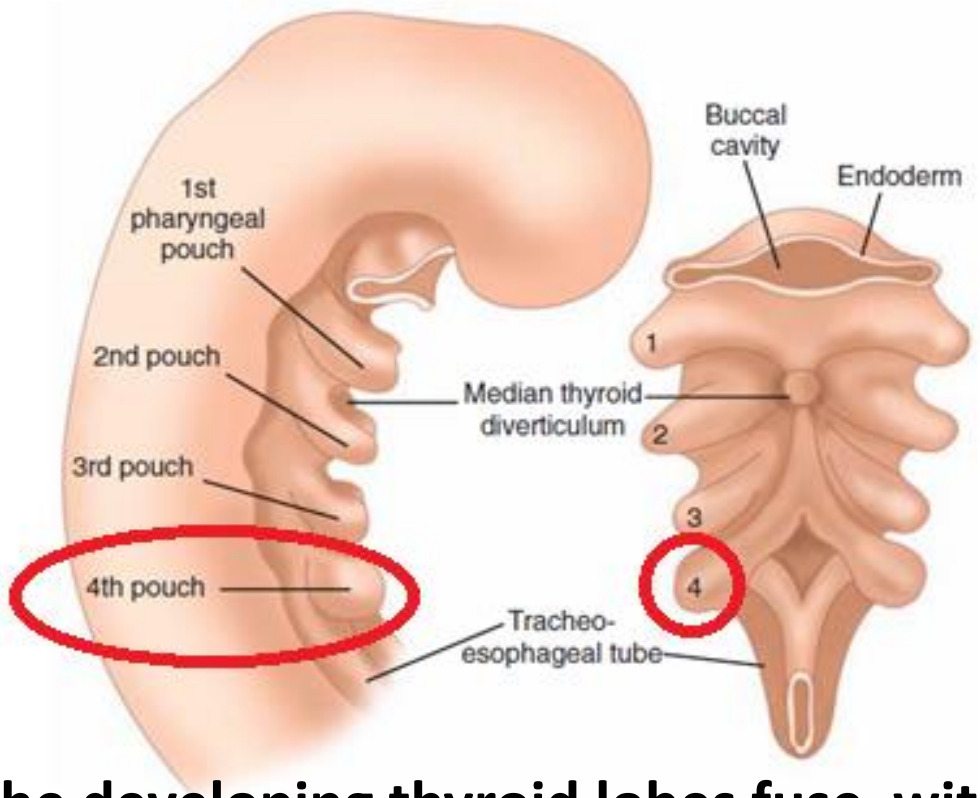
It begins as an endodermal thickening on the floor of the median bud of the pharynx at the site of the foramen cecum on the adult tongue.

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

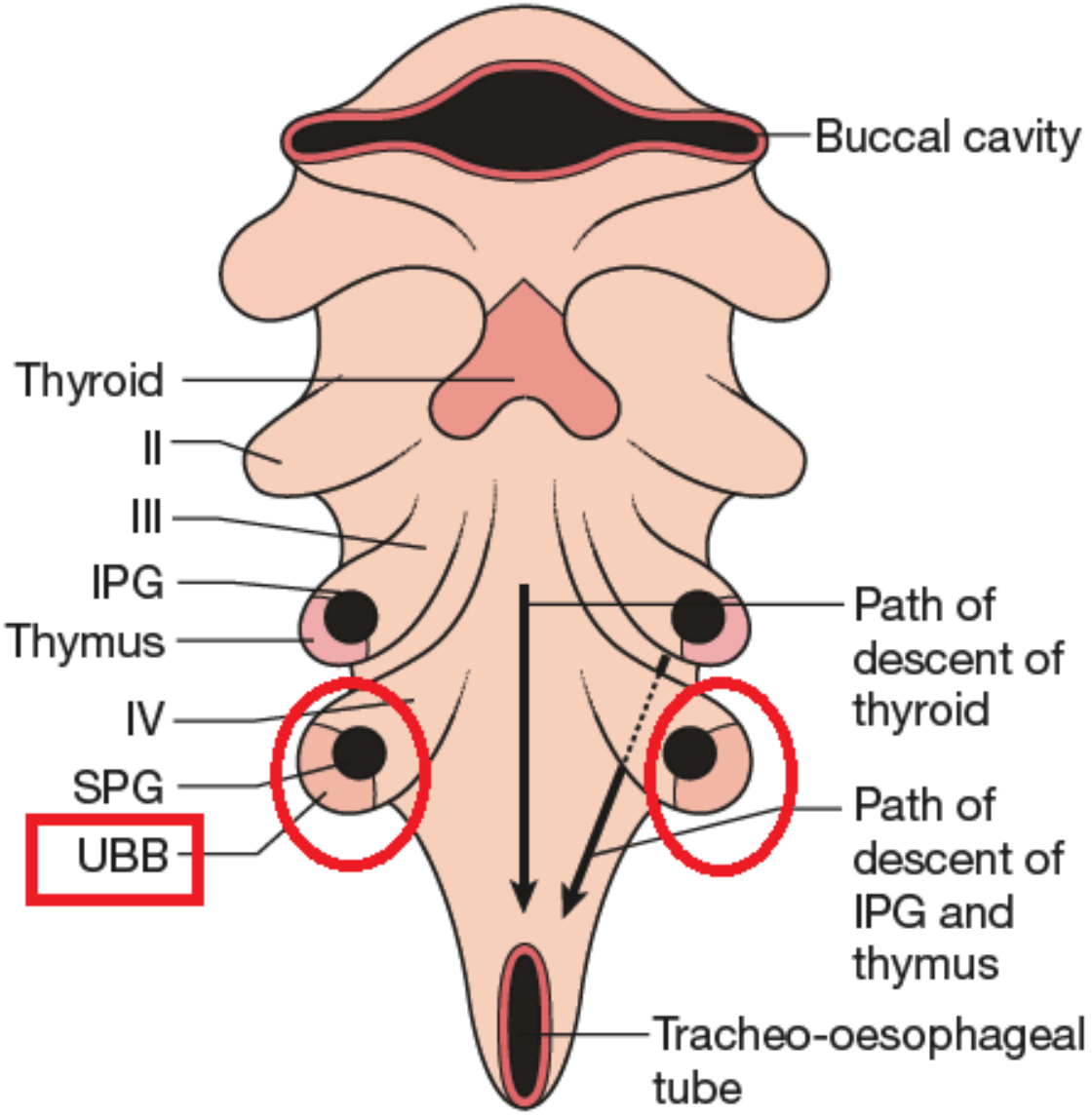
Disappears by the 50th day of gestation

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

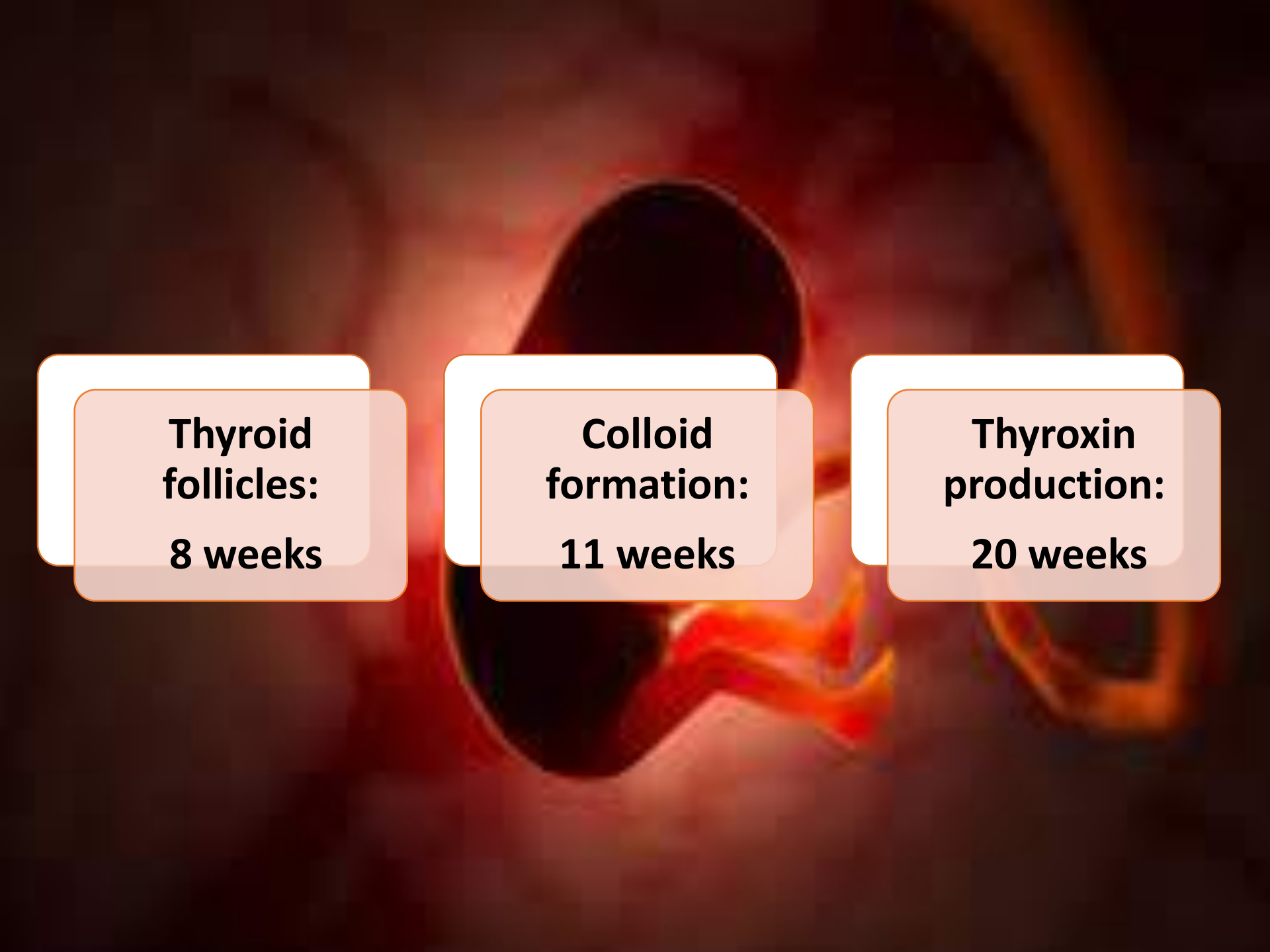




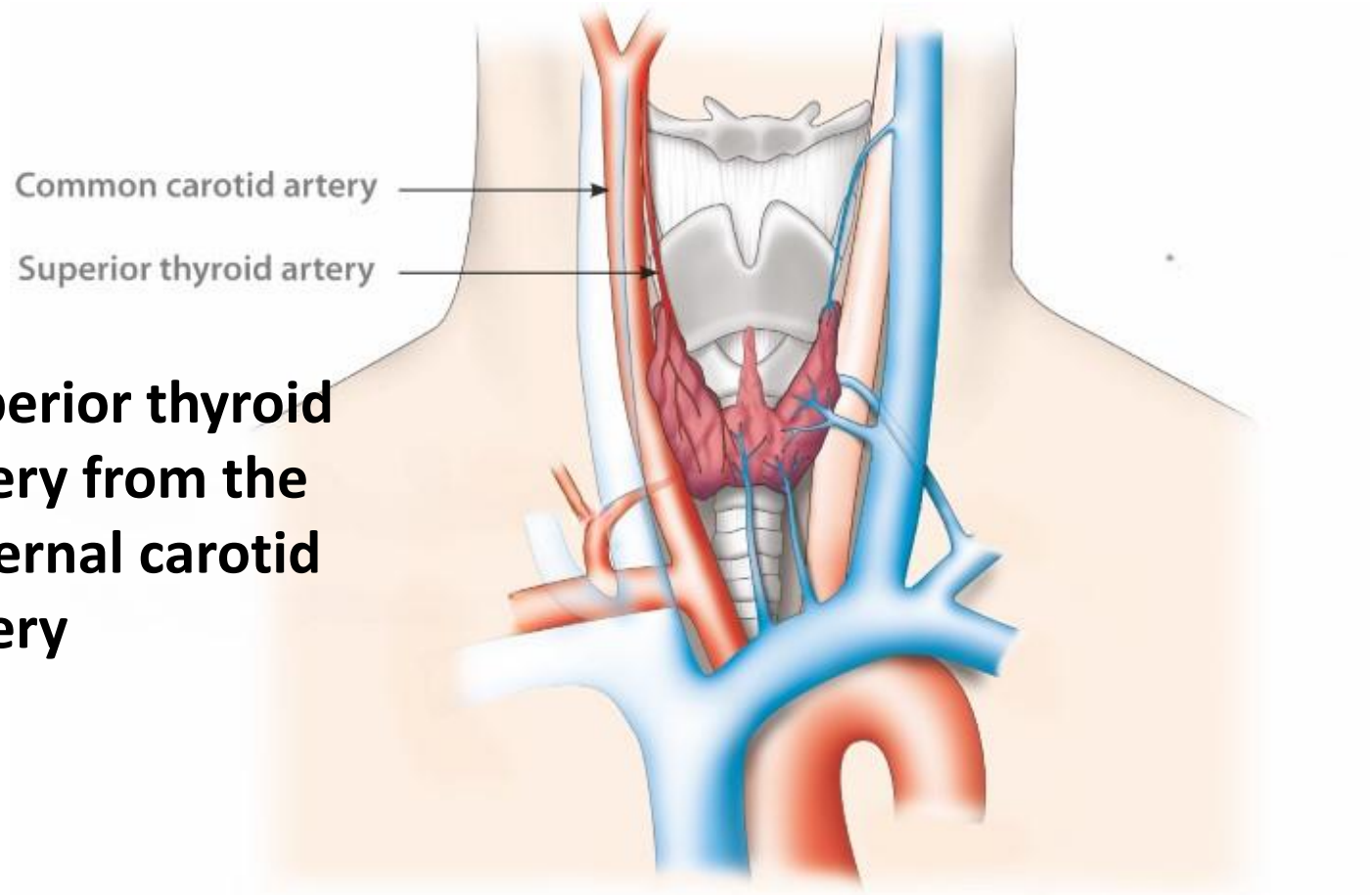
The developing thyroid lobes fuse with the structures that arise in the fourth pharyngeal pouch, i.e., the superior parathyroid gland and the ultimobranchial body.



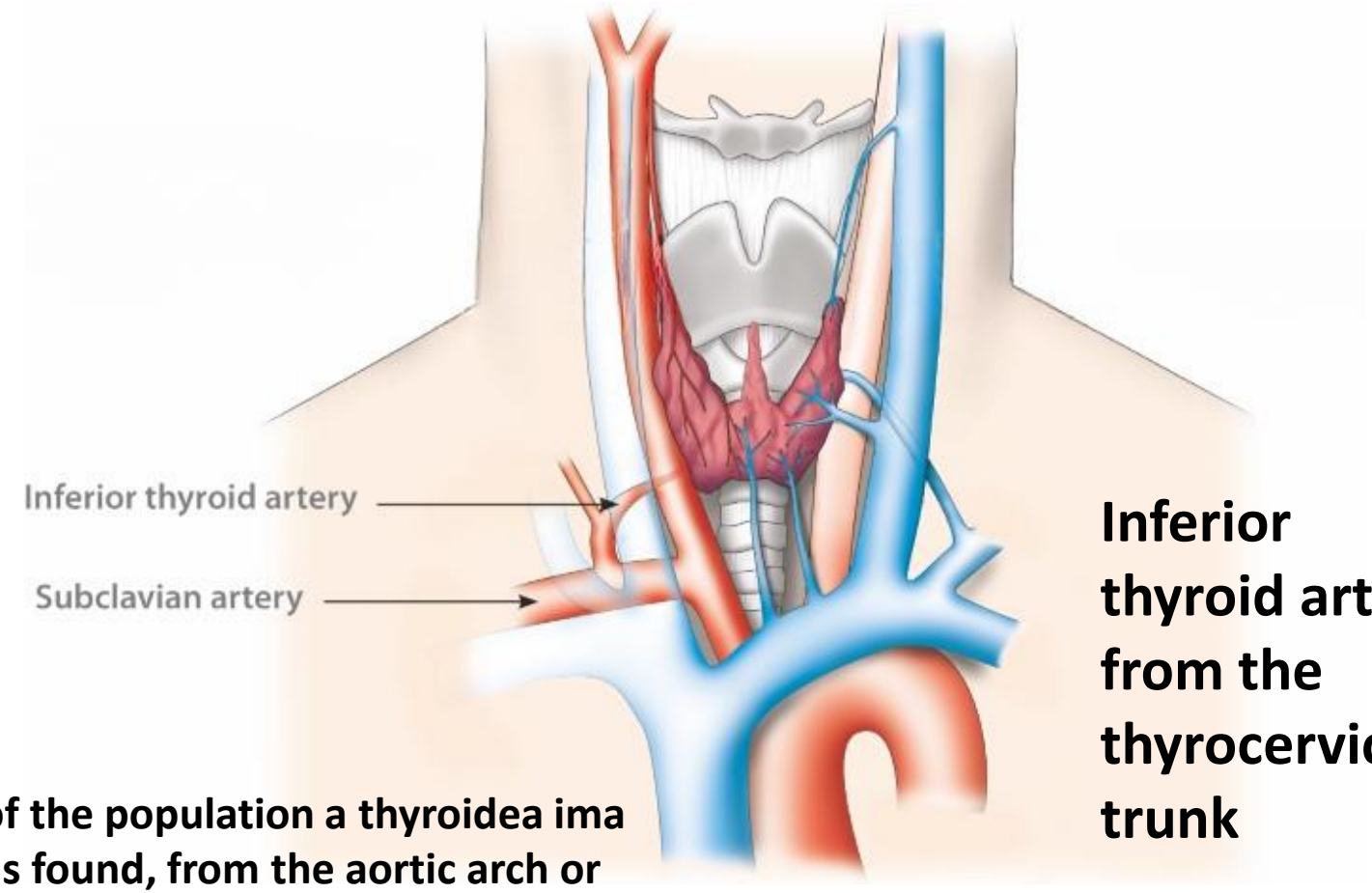
The lateral anlages are neuroectodermal in origin (ultimobranchial bodies) and provide the calcitonin producing parafollicular or C cells, which thus come to lie in the superoposterior region of the gland.


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

Anatomy

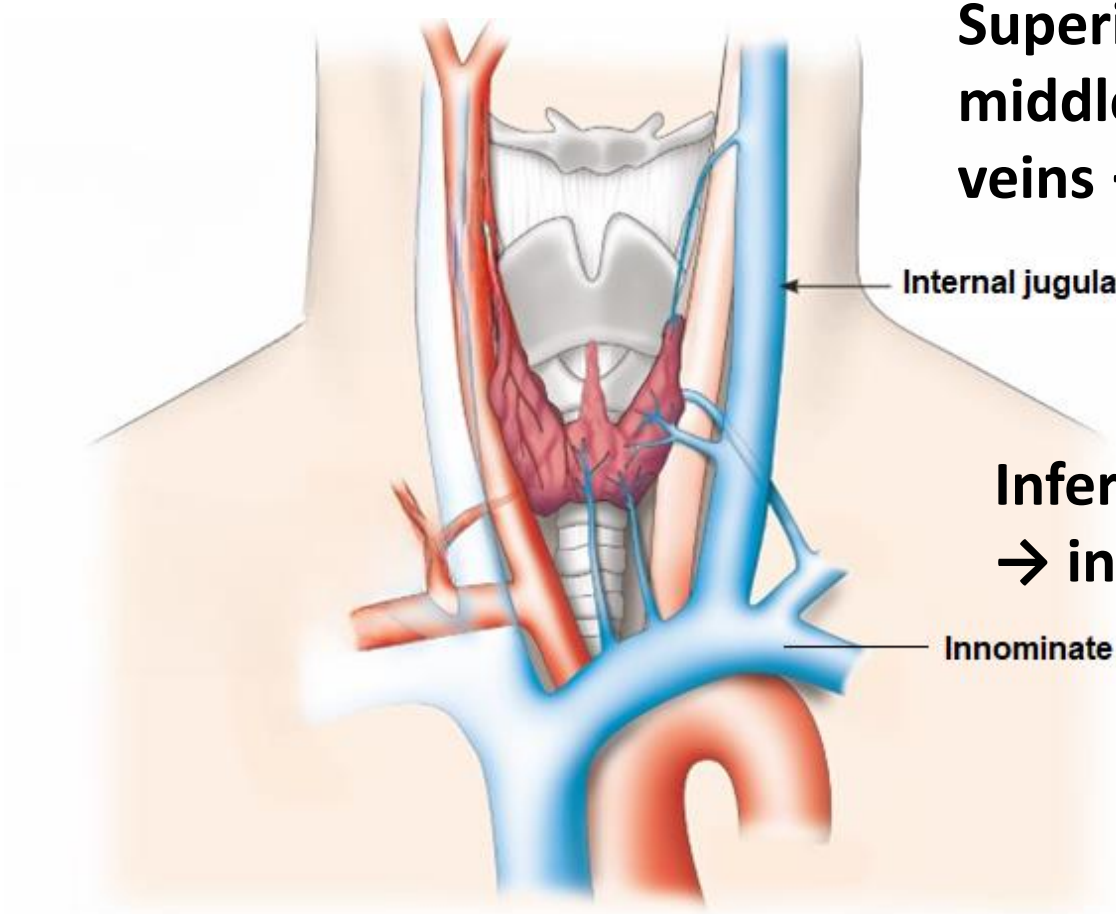


Superior thyroid artery from the external carotid artery



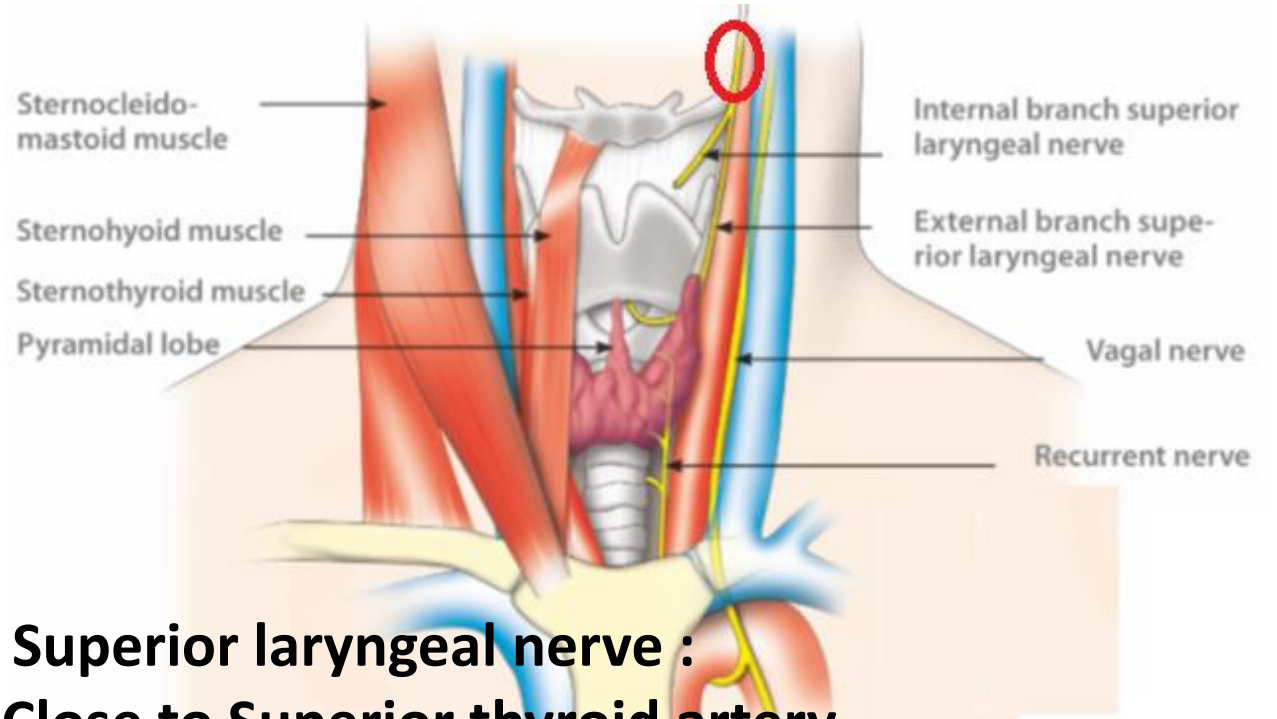
Inferior thyroid artery from the thyrocervical trunk

In 3% of the population a thyroidea ima artery is found, from the aortic arch or brachiocephalic artery



Superior and middle thyroid veins → IJV

Inferior thyroid vein → innominate vein

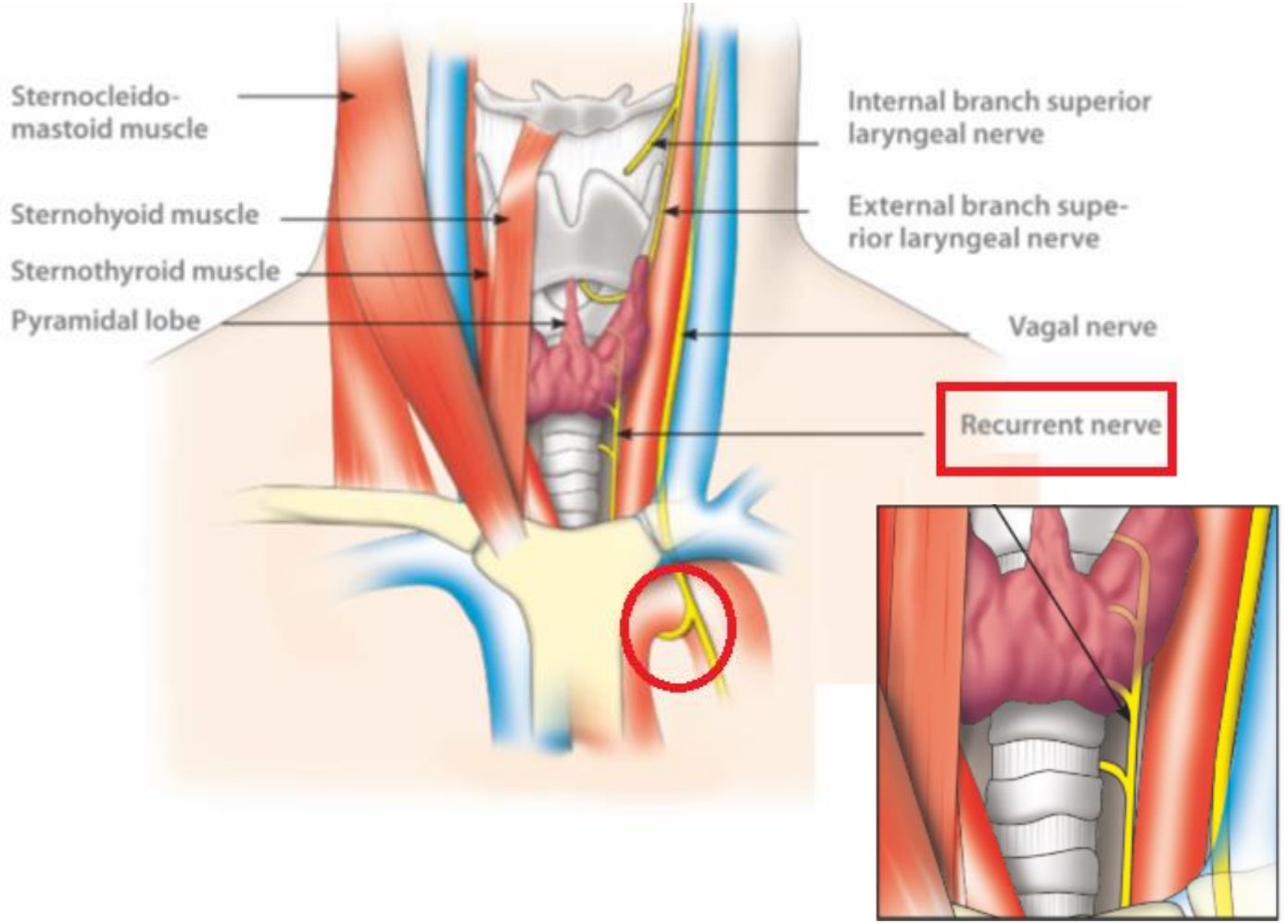


Superior laryngeal nerve :

Close to Superior thyroid artery .

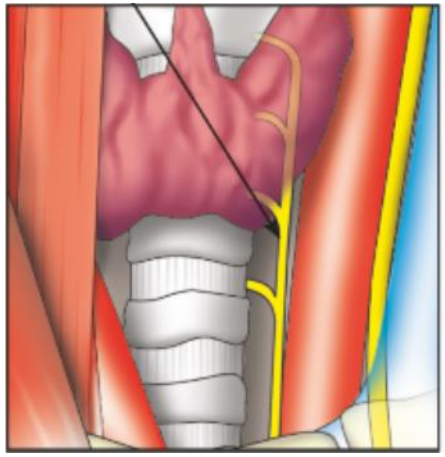
Most common nerve injured with thyroidectomy →easy voice fatigability .

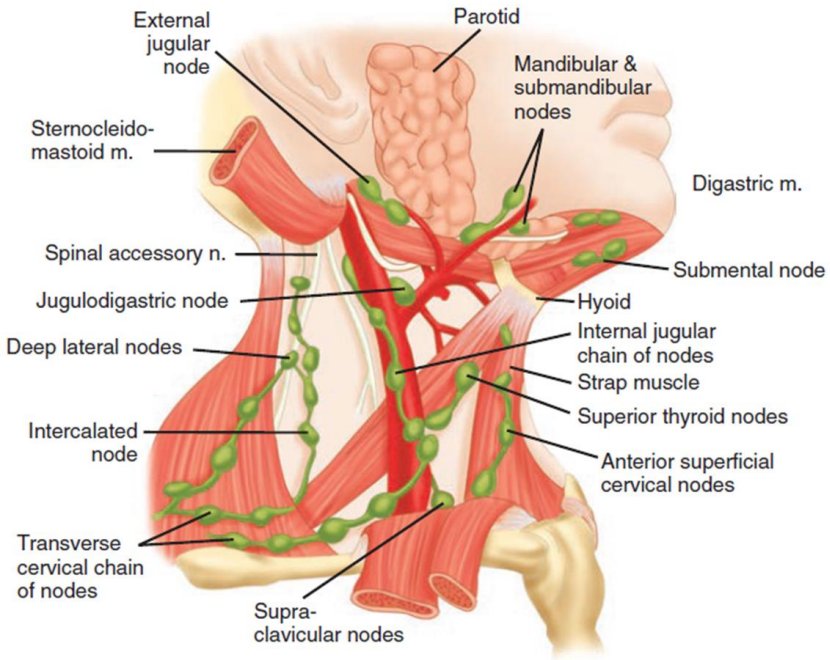
Internal sensory and external motor branches

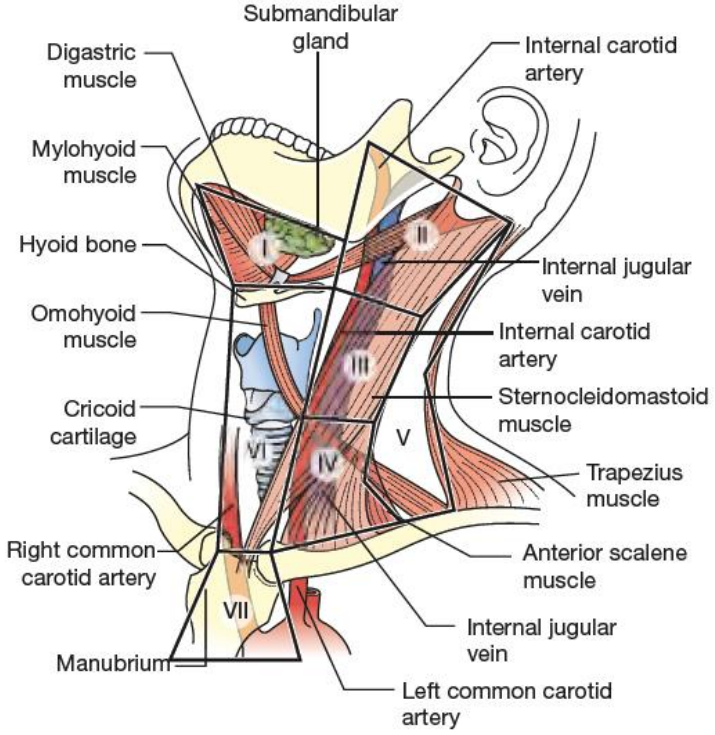

Sternocleido-
mastoid muscle
Sternohyoid muscle
Sternothyroid muscle
Pyramidal lobe
Internal branch superior
laryngeal nerve
External branch supe-
rior laryngeal nerve
Vagal nerve
Recurrent nerve

Recurrent laryngeal nerve :

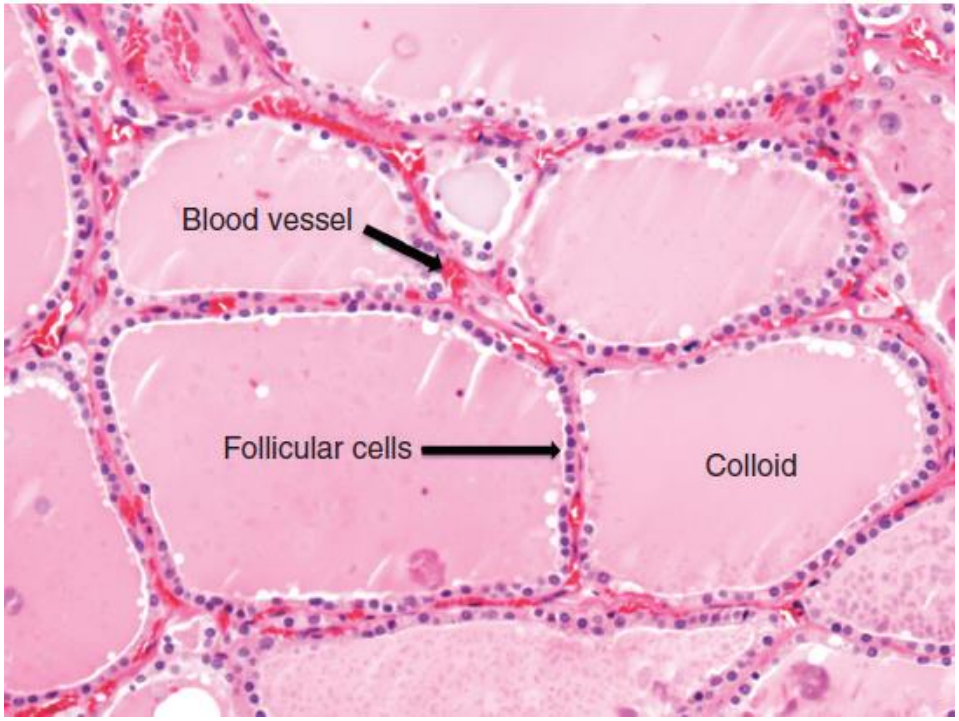
- **Posterior and medial to thyroid lobes in the tracheoesophageal groove**
- **Motor function for vocal cord abduction and adduction except the cricothyroid muscle**
- **Injury → Asymptomatic …. Hoarseness if unilateral**
- **Bilateral→ airway obstruction, profound aspiration**



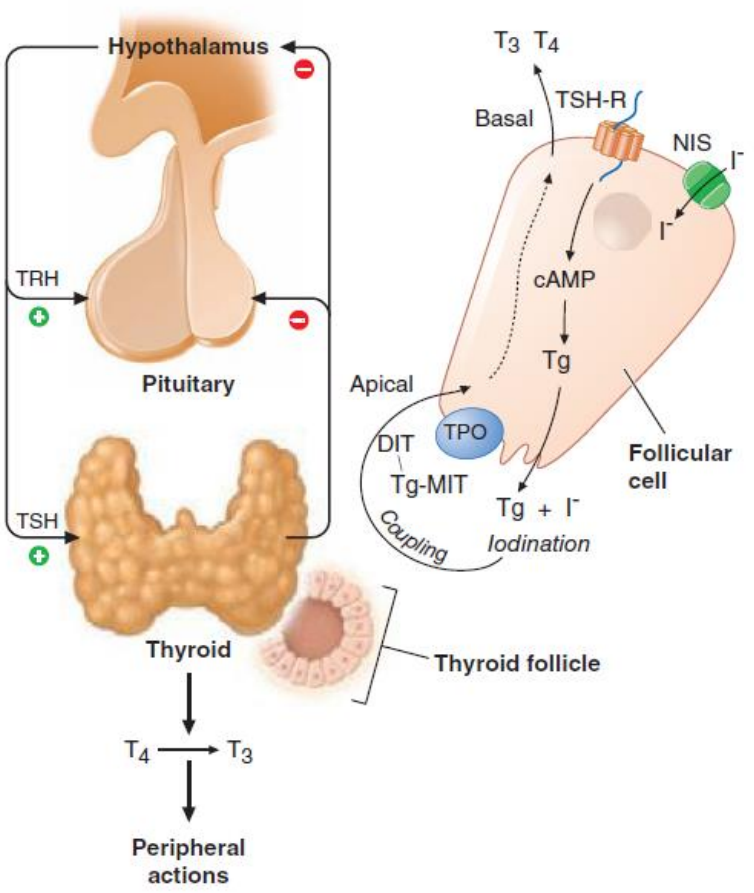

External jugular node
Parotid
Mandibular & submandibular nodes
Sternocleido-mastoid m.
Digastric m.
Spinal accessory n.
Submental node
Jugulodigastric node
Hyoid
Deep lateral nodes
Internal jugular chain of nodes
Strap muscle
Superior thyroid nodes
Intercalated node
Anterior superficial cervical nodes
Transverse cervical chain of nodes
Supra-clavicular nodes


Submandibular gland
Digastric muscle
Internal carotid artery
Mylohyoid muscle
Hyoid bone
Internal jugular vein
Omohyoid muscle
Internal carotid artery
Sternocleidomastoid muscle
Cricoid cartilage
Trapezius muscle
Right common carotid artery
Anterior scalene muscle
Internal jugular vein
Manubrium
Left common carotid artery
I
II
III
IV
V
VI
VII

Physiology



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



- **Hypothalamus (TRH)→Pituitary (TSH) →Thyroid (T3 , T4)**
- **Negative feedback**

Only free T3 and free T4 are active (protein bound not active)

Most T3 (from T4>T3 conversion in periphery) by deiodinase

T4:T3 serum ratio 20:1

T3 more active (4X)

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

The Diagnosis of Thyroid Disease

Triple Assessment

Clinical

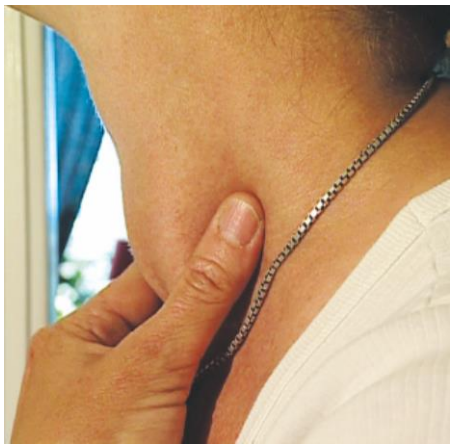
TSH

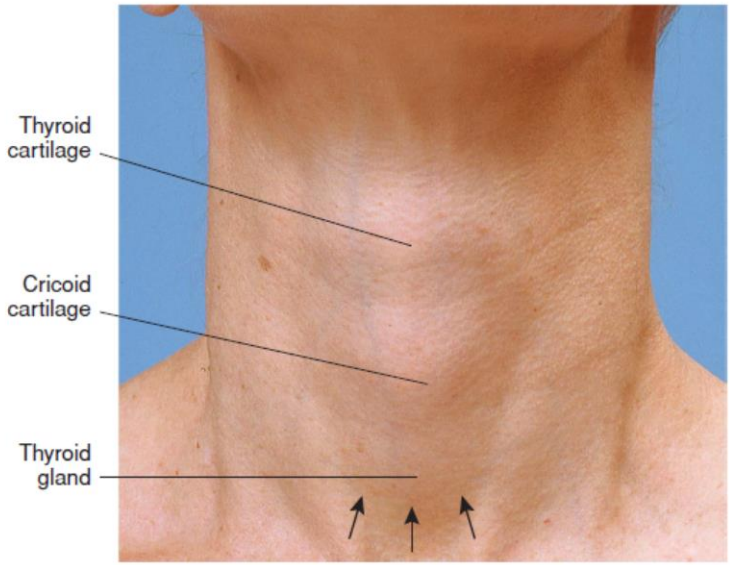
US with or without FNA

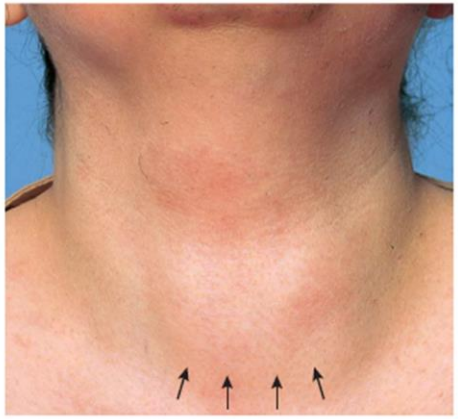
History

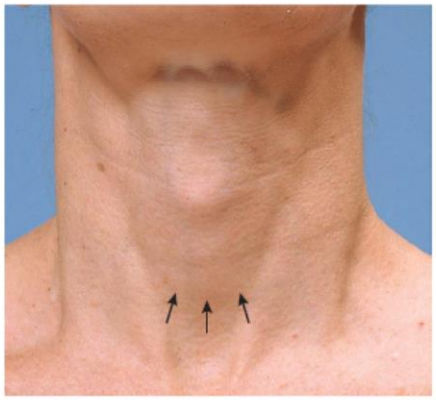
Neck Mass	Hypothyroidism	Hyperthyroidism
• Obstructive symptoms (dysphagia, dyspnea, dysphonia) • Disfiguring • Eye symptoms	• Slow speech and action • Fatigue • Cold intolerance • Constipation	• Irritability • Insomnia • Palpitations • Heat intolerance • Diarrhea

Physical Examination

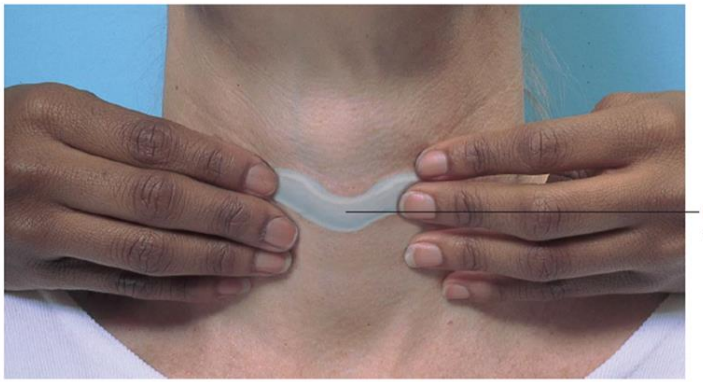








Physical Examination



Physical Examination

Physical Examination

Supraclavicular LNs

Pemberton's sign

Physical Examination

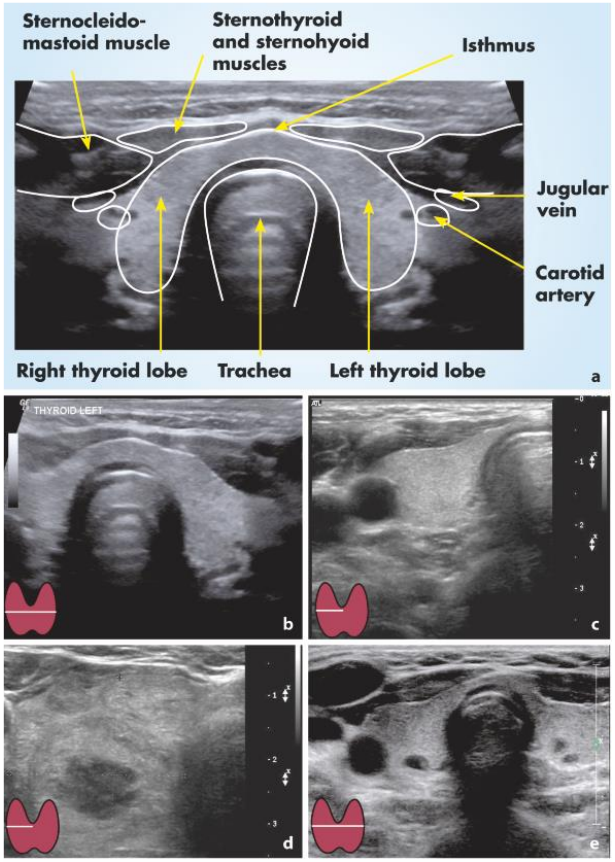
Graves' disease

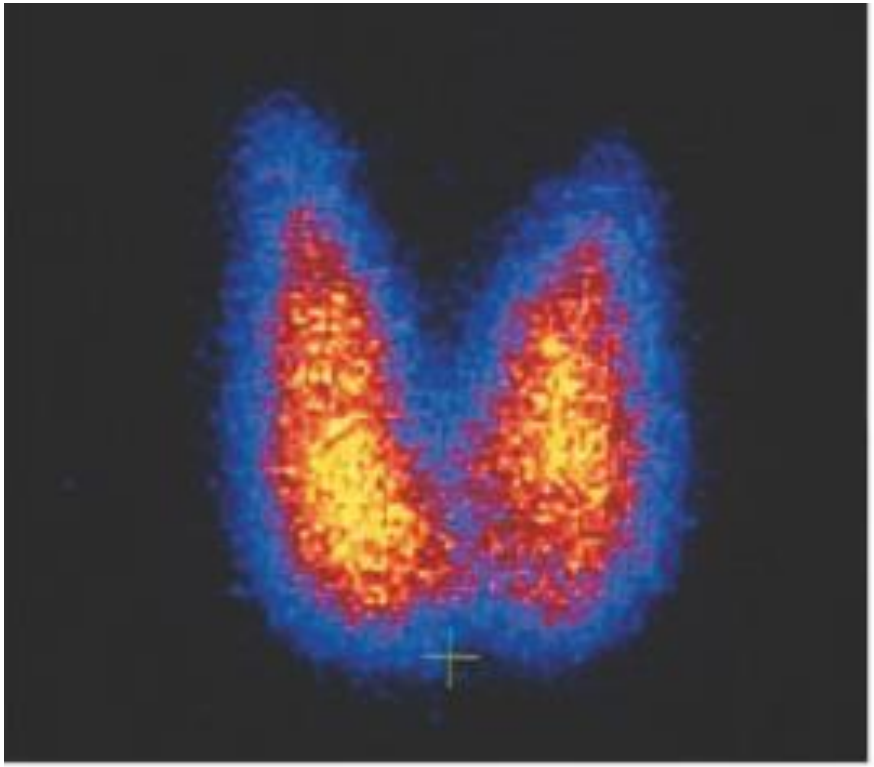
Pretibial myxedema

Physical Examination

Exophthalmos/ Lid retraction

Proptosis/chemosis


Sternocleido-
mastoid muscle
Sternothyroid
and sternohyoid
muscles
Isthmus
Jugular
vein
Carotid
artery
Right thyroid lobe
Trachea
Left thyroid lobe
a
THYROID LEFT
b
c
d
e



Imaging

FNAB

The Bethesda System for Reporting Thyroid Cytopathology (TBSRTC)

- Nondiagnostic
- Benign
- Atypia of undetermined significance
- Follicular neoplasm
- Suspicious for malignancy
- Malignant

Developmental Abnormalities of the Thyroid

Thyroglossal Duct Cyst

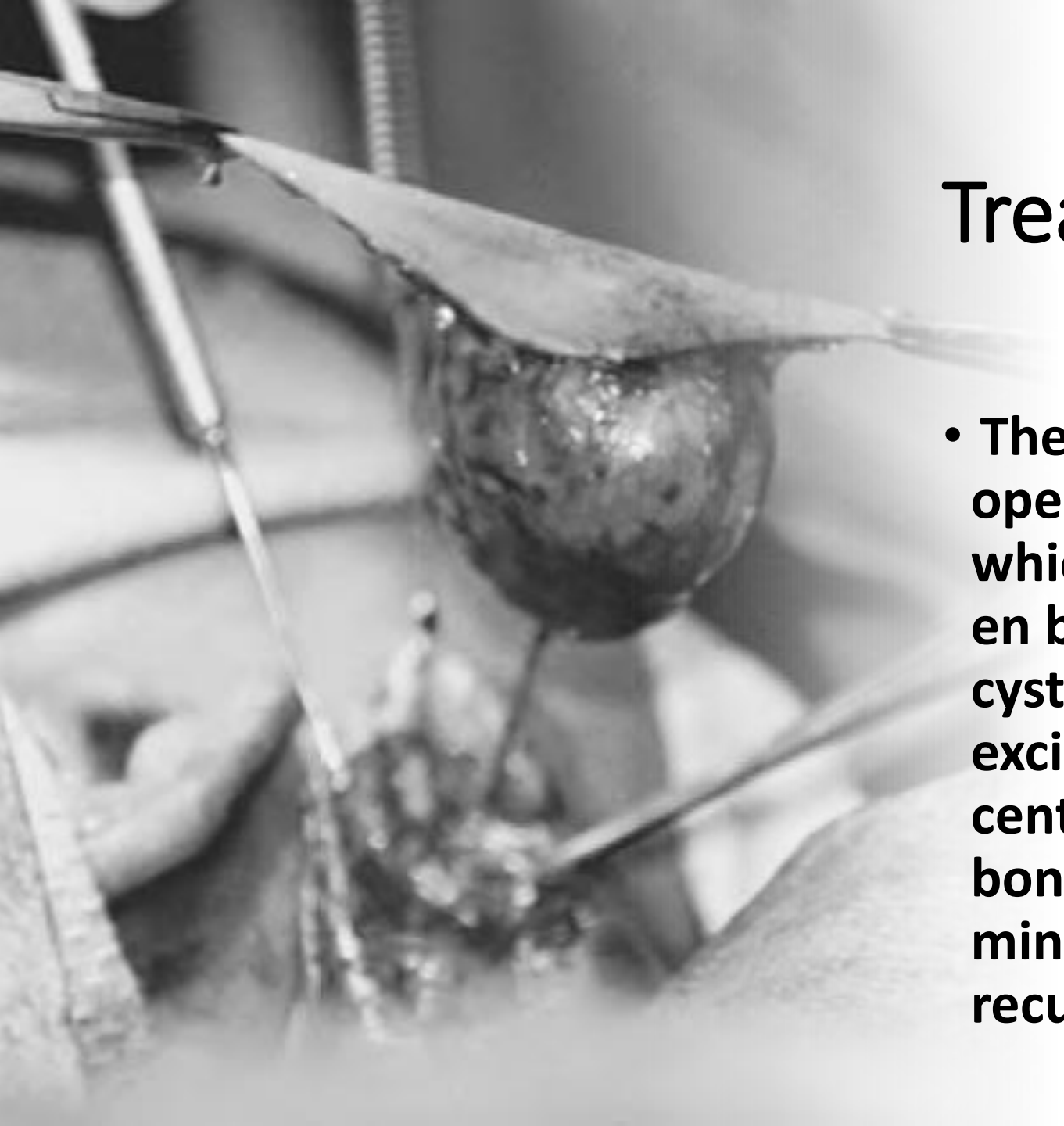
The most common congenital cervical anomalies

80% are found in juxtaposition to the hyoid bone

- **Usually asymptomatic but occasionally become infected by oral bacteria**

Diagnosis

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

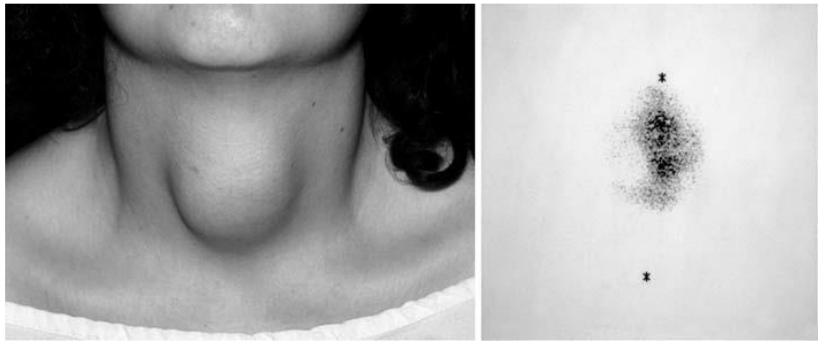
Lingual Thyroid

- fail to descend and remain located in the posterior aspect of the tongue
- respiratory and swallowing difficulties and hemorrhage.
- Diagnosis is confirmed by radionuclide scanning
- Treatment with thyroxine or radioactive iodine

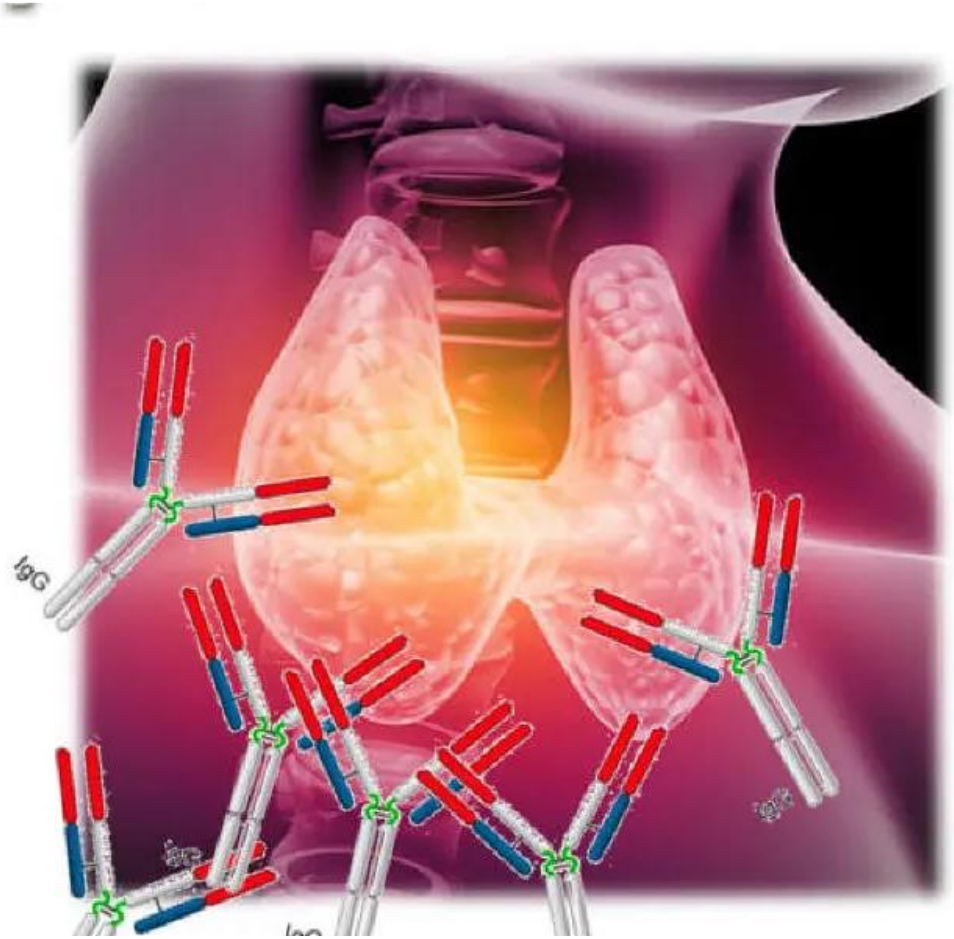
Ectopic Thyroid

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

may be the only thyroid tissue present



Thyroiditis



Thyroiditis

- Hashimoto's thyroiditis (autoimmune)
- Subacute thyroiditis (de Quervain's thyroiditis, viral)
- Acute suppurative thyroiditis (bacterial)
- Riedel's thyroiditis (scar)

Goiter

Goiter

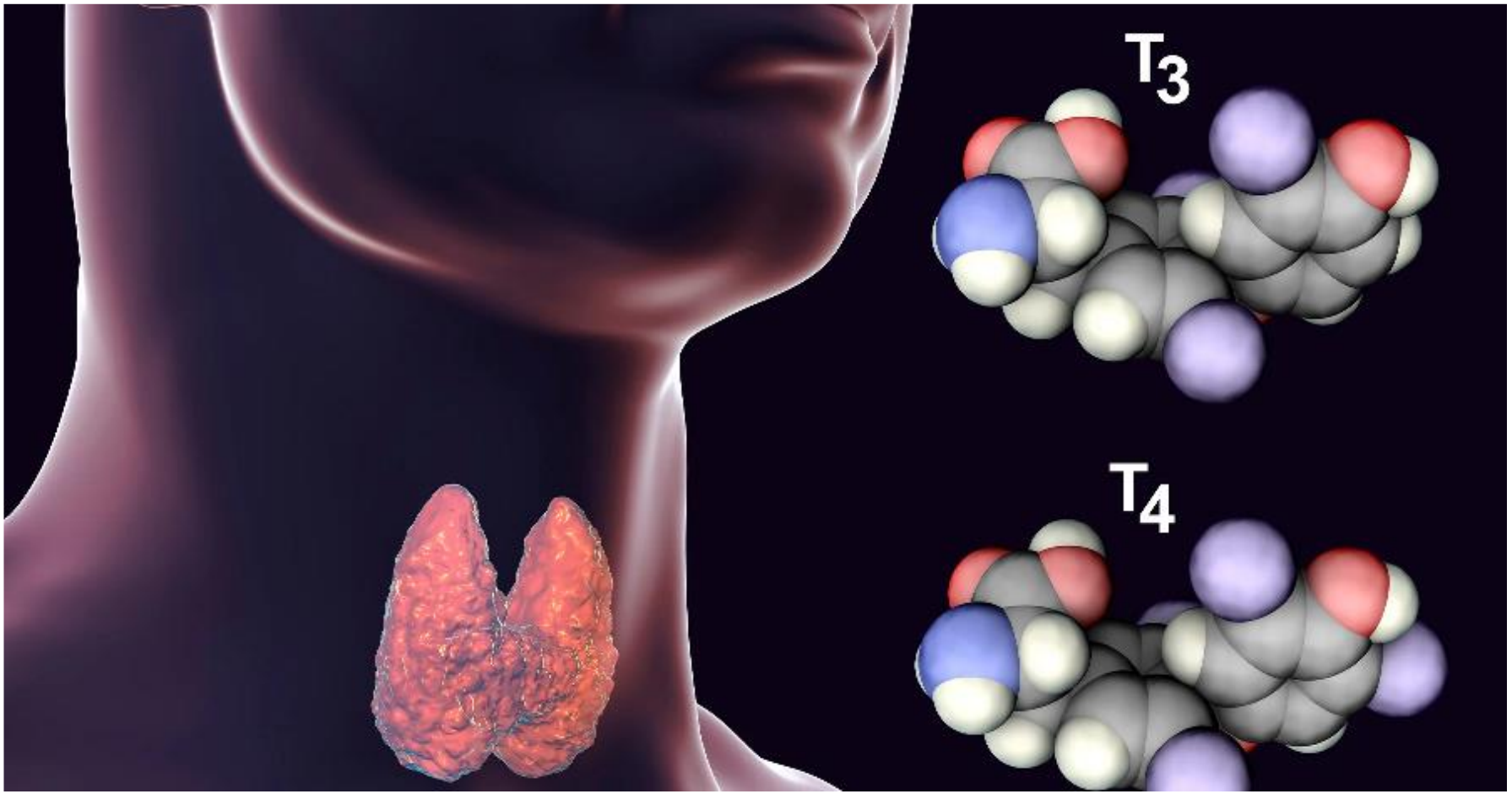
- Diffuse goiter: the entire gland is symmetrically enlarged
- Nodular goiter: are one or more distinct lumps can be distinguished from the rest of the gland




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**

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 • Drugs: iodine excess (Jod-Basedow phenomenon)	• Subacute thyroiditis • Silent thyroiditis • Other causes of thyroid destruction: amiodarone, radiation, infarction of adenoma • Ingestion of excess thyroid hormone (thyrotoxicosis factitia) or thyroid tissue	• TSH-secreting pituitary adenoma • Thyroid hormone resistance syndrome • Chorionic gonadotropin-secreting tumors • Gestational thyrotoxicosis

Differential Diagnosis of Hyperthyroidism

Increased Hormone Synthesis (Increased RAIU)
Graves' disease (diffuse toxic goiter)
Toxic multinodular goiter
Toxic adenoma
Drug induced—amiodarone, iodine
Thyroid cancer
Struma ovarii
Hydatidiform mole
TSH-secreting pituitary adenoma

Release of Preformed Hormone (Decreased RAIU)

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

Hyperthyroidism
The Most Common Causes

Graves' disease (diffuse toxic goiter)

Toxic adenoma

Toxic multinodular goiter

Clinical Picture

Symptoms

- Hyperactivity, irritability, dysphoria
- Heat intolerance and sweating
- Palpitations
- Fatigue and weakness
- Weight loss with increased appetite
- Diarrhea
- Polyuria
- Oligomenorrhea, loss of libido

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

- Diffusely enlarged, soft gland
- Homogeneous increased radionuclide uptake
- No nodules

Toxic adenoma

- Solitary nodule
- Increased uptake against a background of suppressed uptake in the remaining thyroid

Toxic multinodular goiter

- Diffusely multinodular gland
- Heterogeneous radionuclide uptake
- Multiple nodules of varying sizes on ultrasonography

Thyroid Nodule

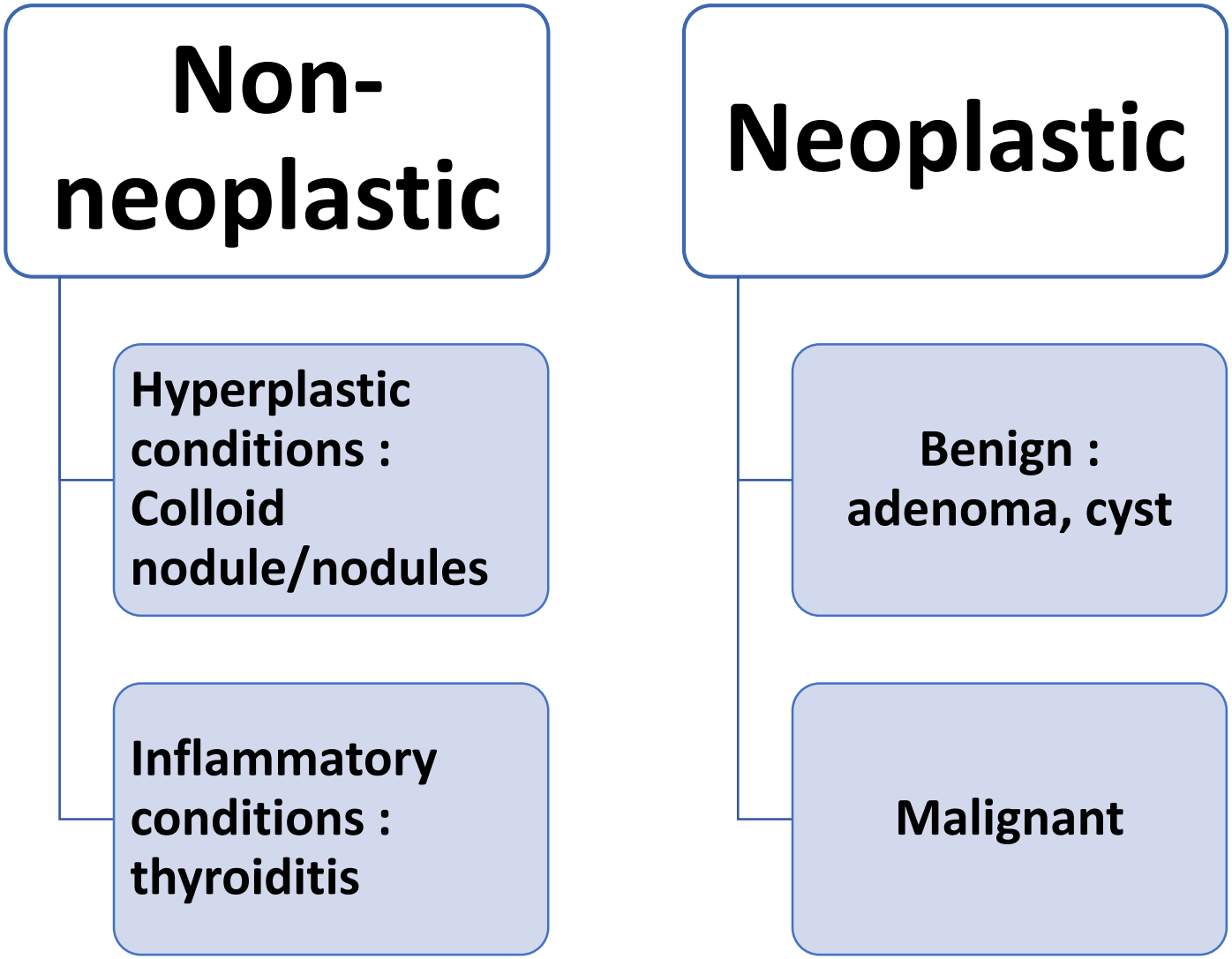
Thyroid Nodule

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
- Found in about 5% of the general population.
- Thyroid cancer accounts for 4 to 6.5% of all thyroid nodules.

Classification- clinical and histopathological



Risk Factors For Thyroid Cancer in a Nodule

- History of head and neck irradiation, including total-body irradiation for bone marrow transplant and brain radiation for childhood leukemia
- Exposure to ionizing radiation from fallout in childhood or adolescence
- Age <20 or >65 years

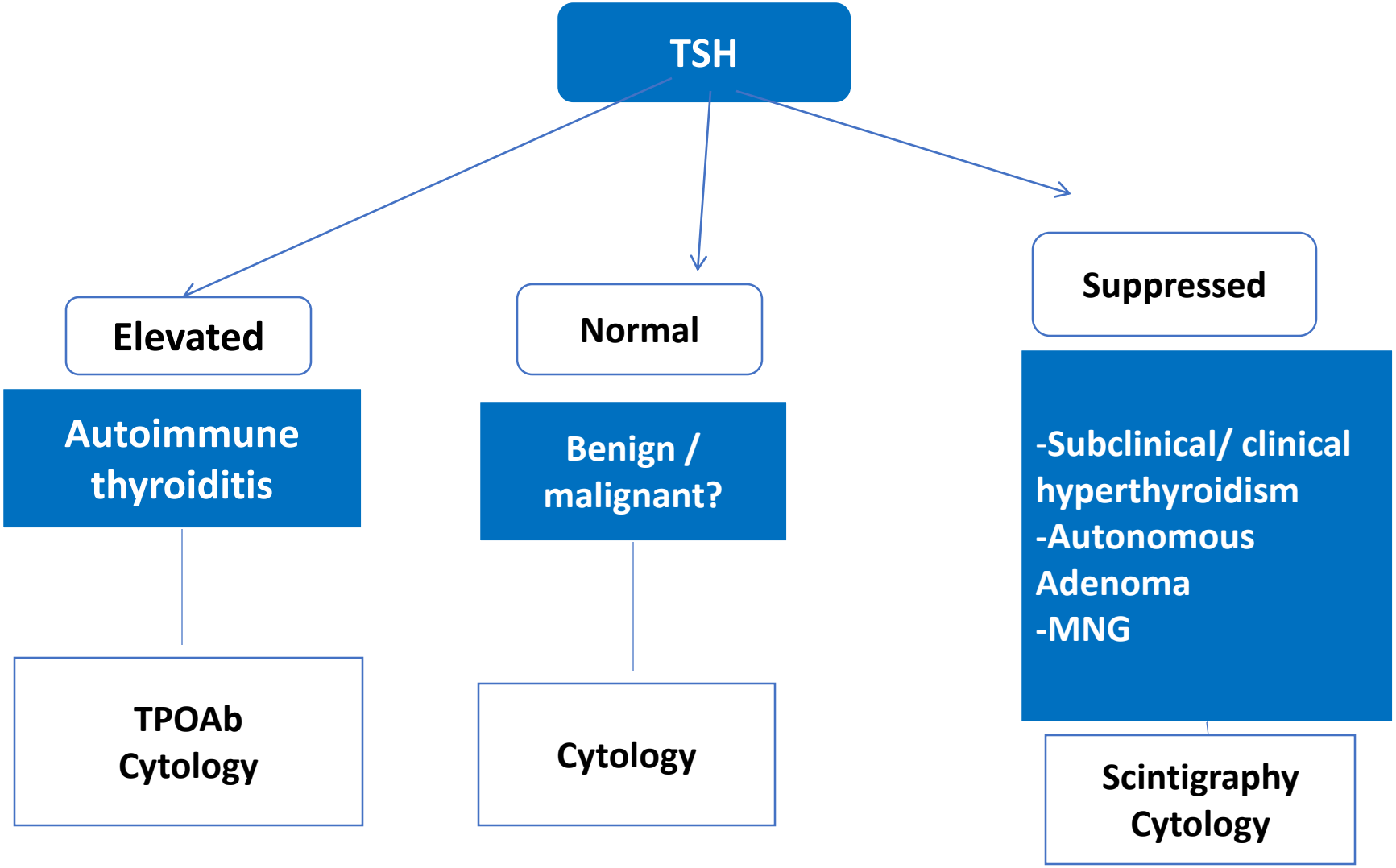
- Increased nodule size (>4 cm)
- New or enlarging neck mass
- Male gender
- Vocal cord paralysis, hoarse voice
- Nodule fixed to adjacent structures

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

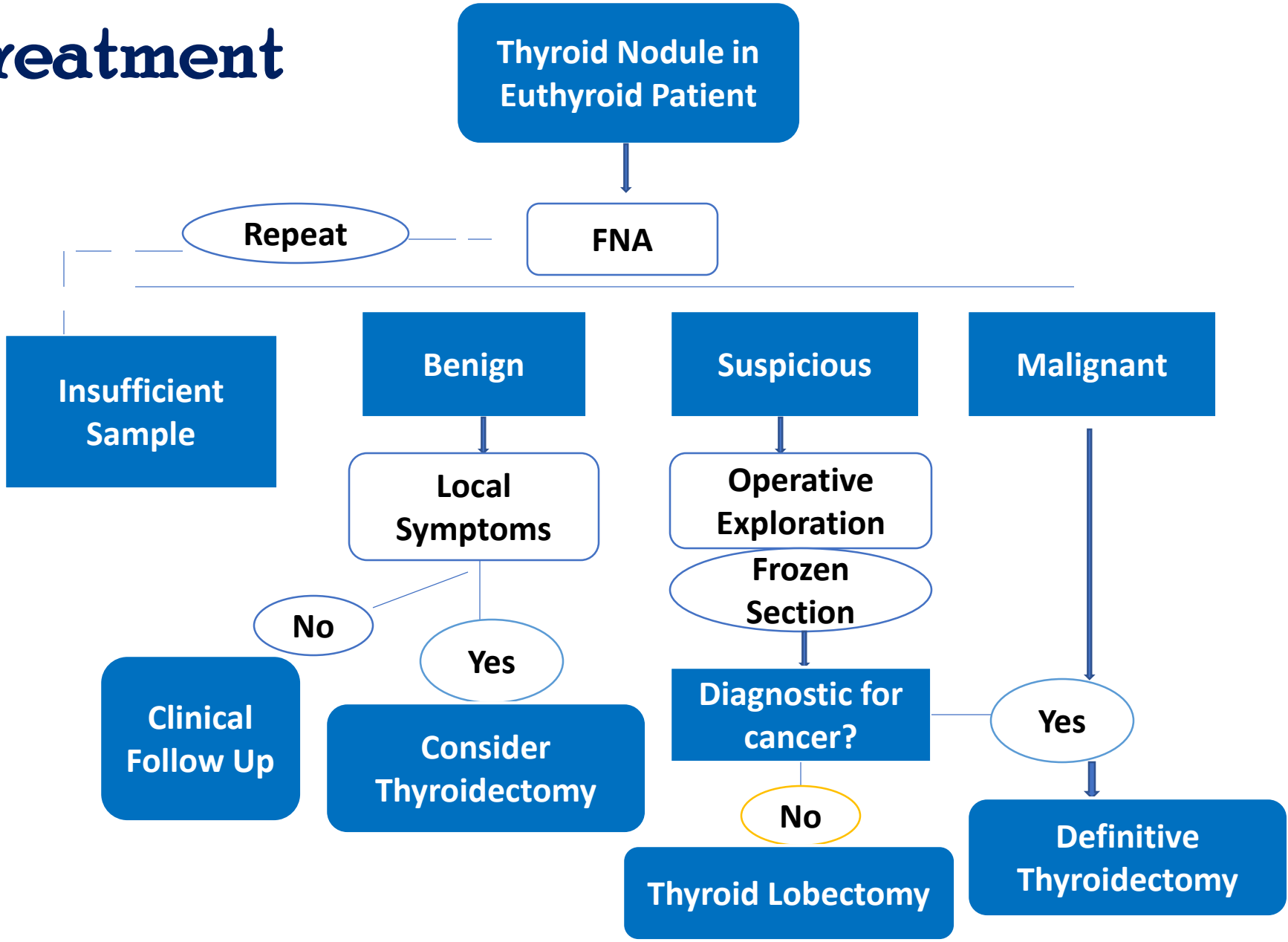
Extrathyroidal extension

Lateral cervical lymphadenopathy

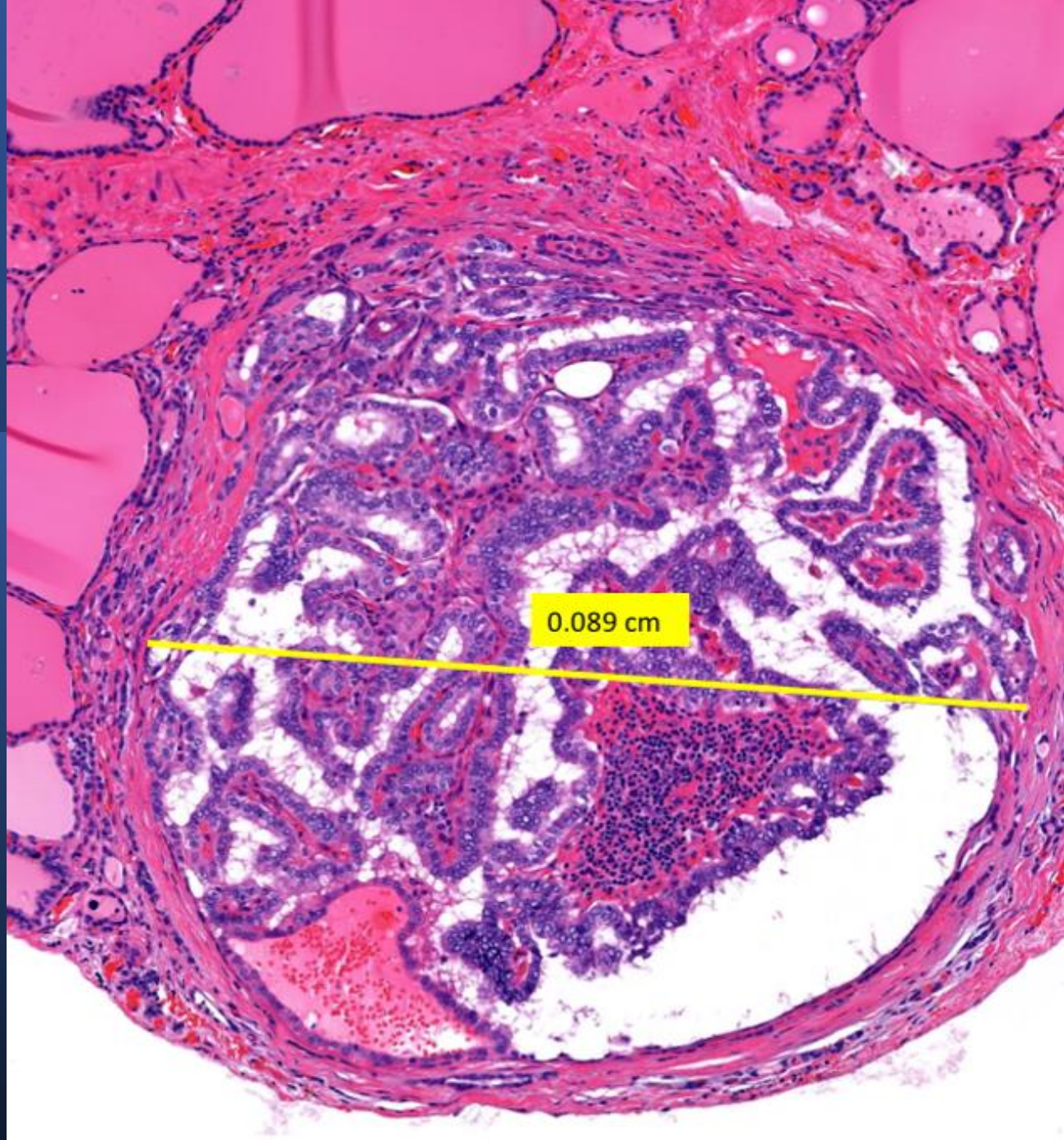
Investigation



Treatment


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

Thyroid Cancer



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

Epidemiology

- **One of 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

- Heredity
- Radiation exposure

Less well-documented RF

- Iodine intake
- 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
Intermediate forms	• medullary thyroid carcinoma • Hürthle cell carcinoma • some rare variants of papillary carcinoma
Undifferentiated (Incurable)	• Anaplastic carcinoma

Treatment

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

THANK YOU