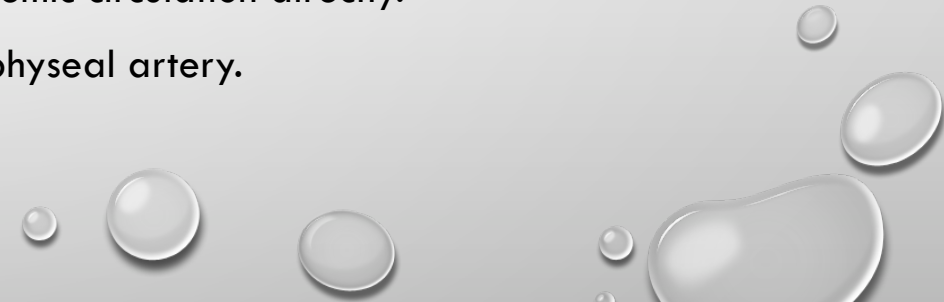


The background of the slide is a light gray gradient. It is decorated with several realistic water droplets of various sizes and shapes, scattered across the top and bottom edges. The droplets have highlights and shadows, giving them a three-dimensional appearance.

# THYROID GLAND

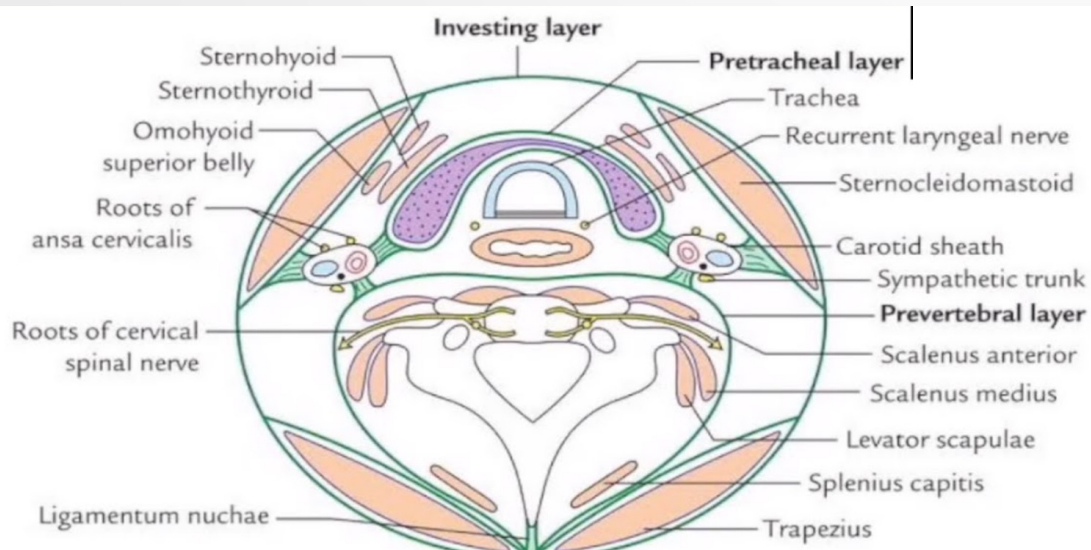
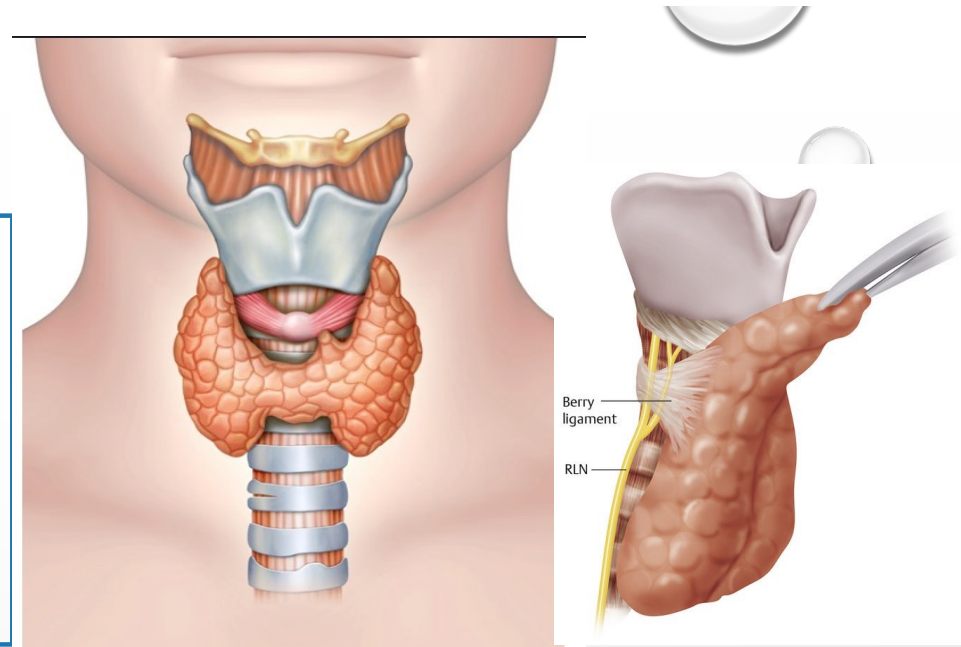


## TRUE OR FALSE? PRVIOUS LECTURES.

- Pituitary is bounded by the optic chiasm directly.
  - Adh is released from the adenohypophysis.
  - Neurohypophysis is rich with thyrotrophs.
  - Release of oxytocine is immediate.
  - Pituicytes are abundant in the pars distalis.
  - ACTH acts on adrenal medulla.
  - Hypothalamic releasing hormones reach the pg by the systemic circulation directly.
  - Posterior pituitray is supplied mainly by the superior hypophyseal artery.
- 

# ANATOMY

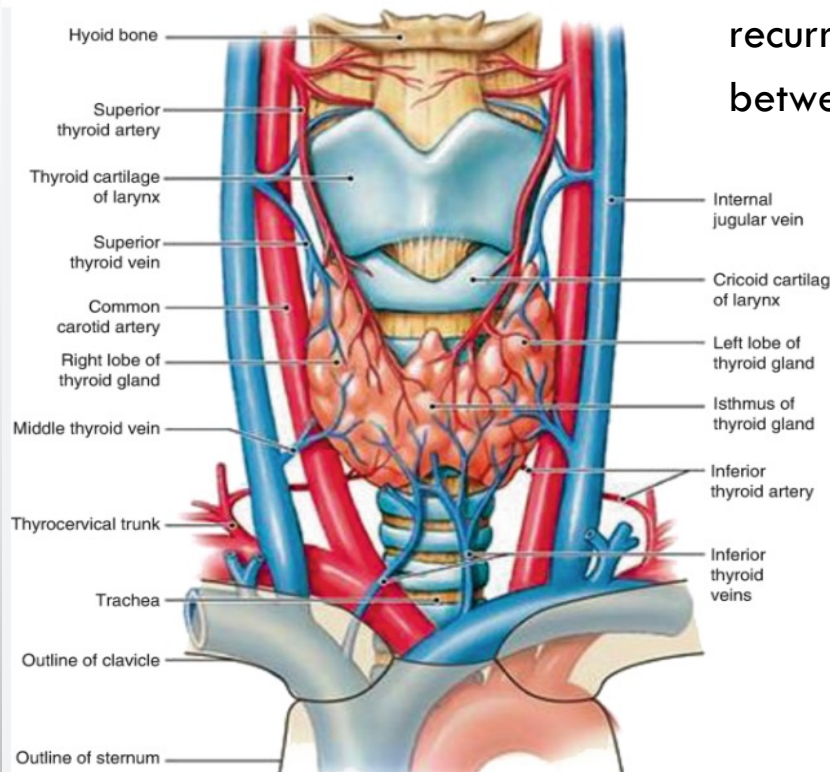
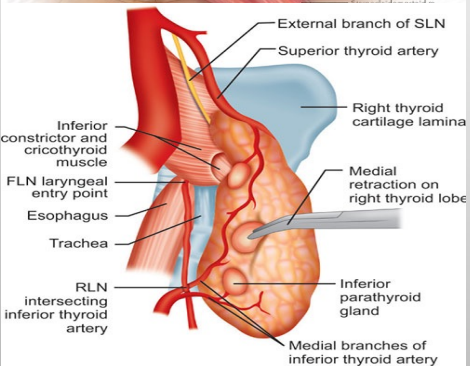
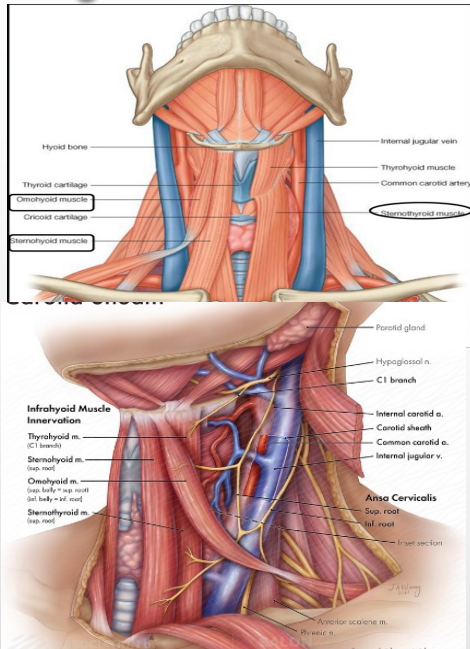
- Highly vascular, butterfly-shaped gland surrounding the anterior surface of the trachea just below the larynx
- located in the anterior neck and spans C5-T1 vertebrae
- Consists of right and left lobes connected by a narrow isthmus.
- Surrounded by a sheath derived from the pretracheal layer of the deep fascia ( attachment to larynx and the trachea).
- Berry ligament!!



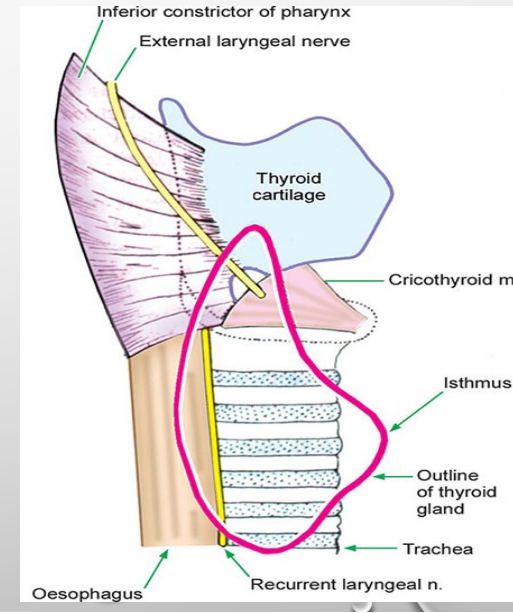
Each **lobe** is pear shaped--- apex being directed upward--- -- oblique line on the lamina of the thyroid cartilage. Base lies below at the level of the 4<sup>th</sup> or 5<sup>th</sup> tracheal ring. The **isthmus** extends across the midline in front of the 2<sup>nd</sup>-4<sup>th</sup> tracheal rings.

A **pyramidal lobe!!!** Is often present, and it projects upward from the isthmus (band connects it to the HB --- **levator glandulae thyroideae**)

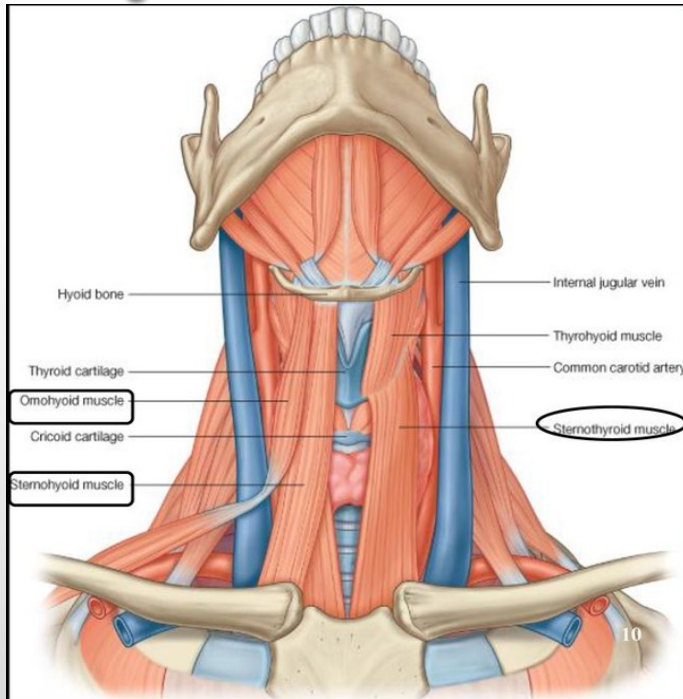
# RELATIONS OF LOBES



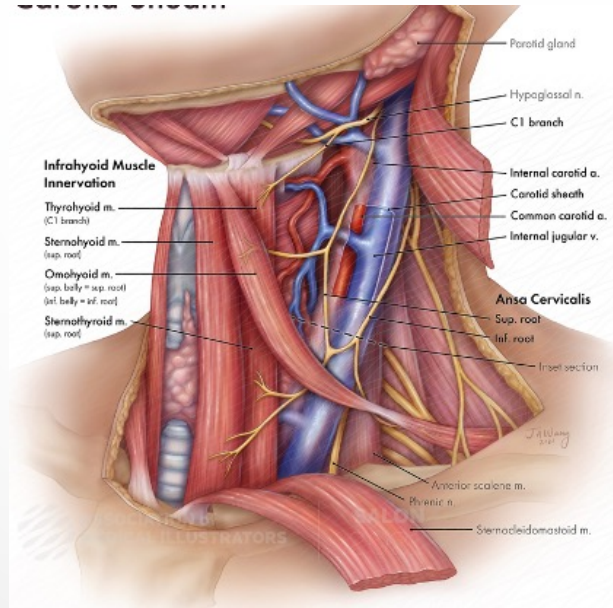
- **Medial:** the larynx, the trachea, the pharynx, and the esophagus (cricothyroid muscle and its nerve supply, the external laryngeal nerve. The recurrent laryngeal nerve is in the groove between the esophagus and the trachea.)



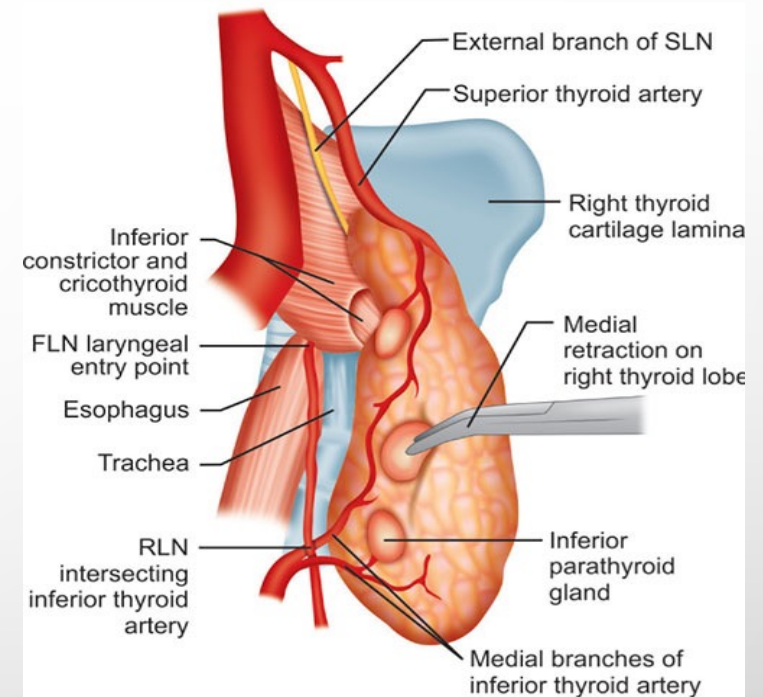
# RELATIONS OF LOBES



- **Anterolateral:** sternothyroid, the superior belly of the omohyoid, the sternohyoid, and the anterior border of the sternocleidomastoid



- **Posterolateral:** carotid sheath with the common carotid artery, the internal jugular vein, and the Vagus nerve



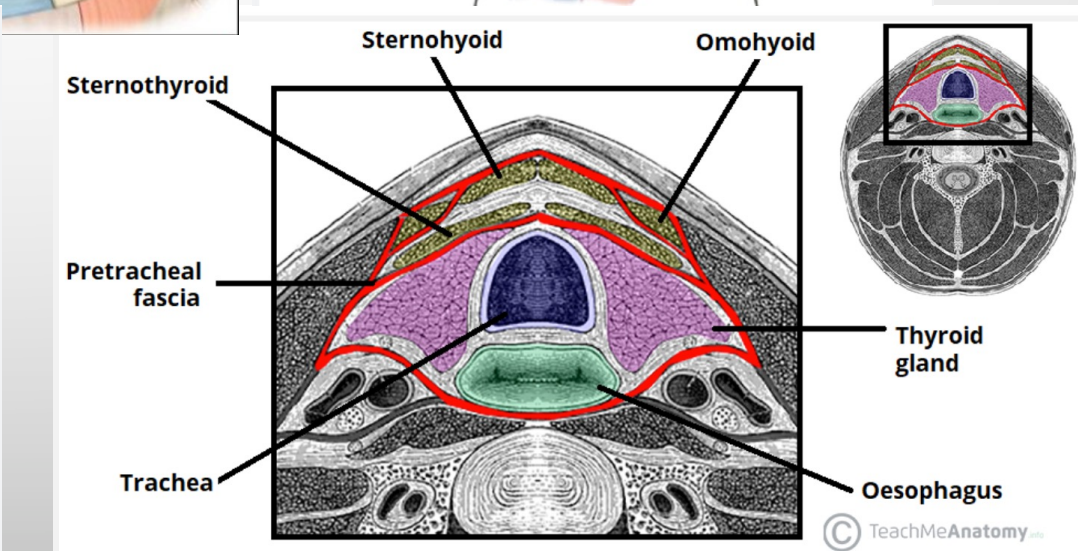
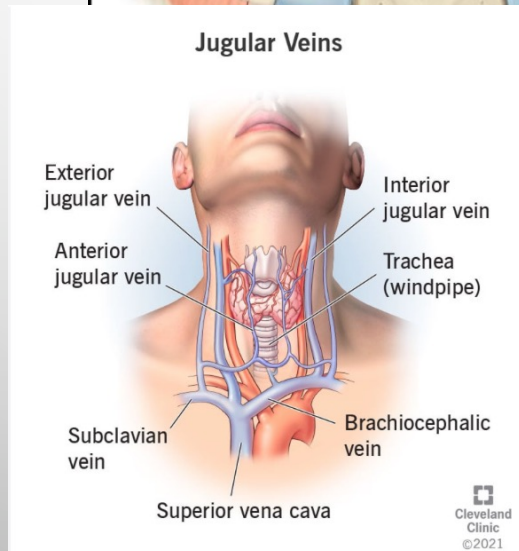
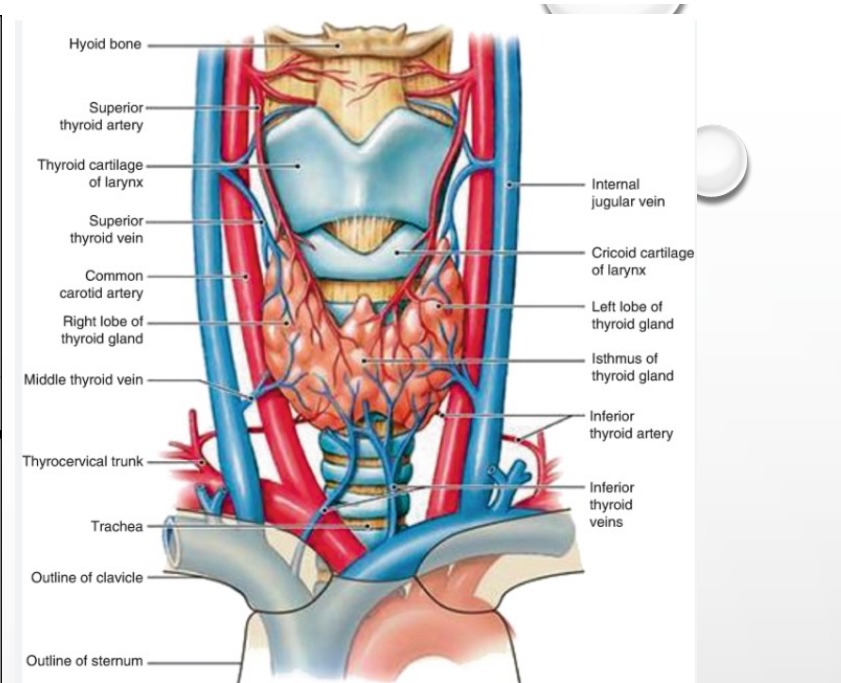
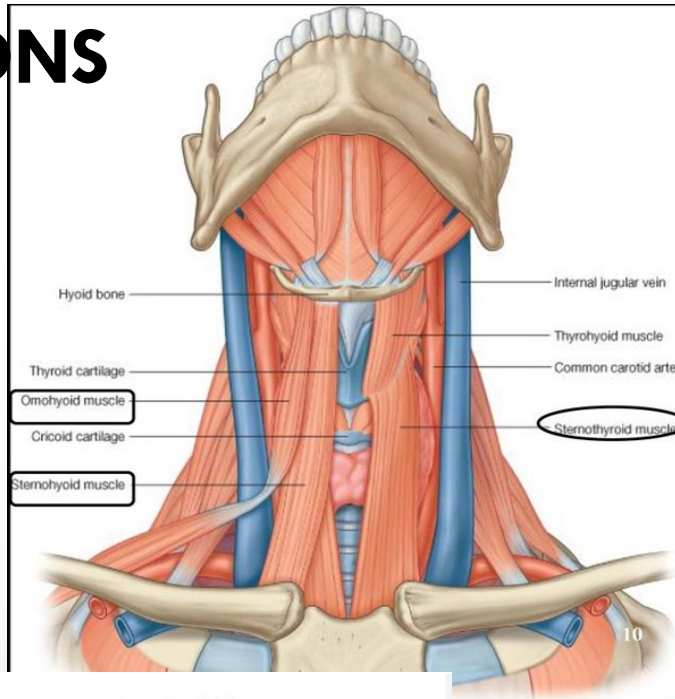
- **Posterior:** superior and inferior parathyroid glands and the anastomosis between the superior and inferior thyroid arteries

# ISTHMUS RELATIONS

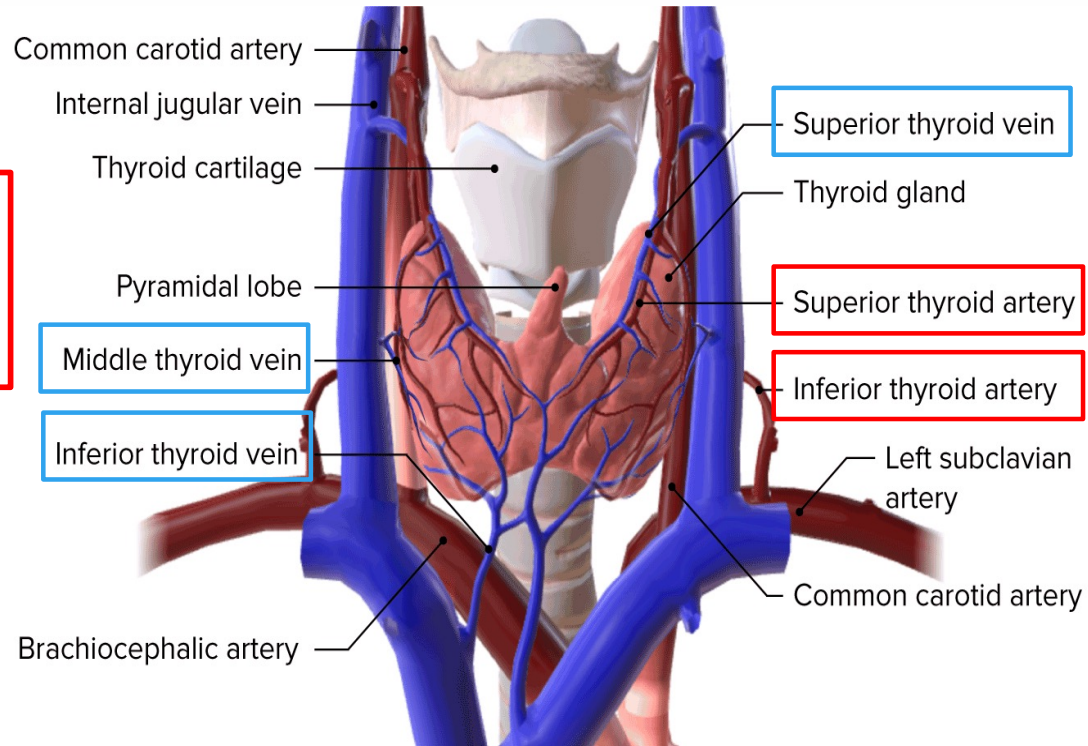
- **Anterior:** sternothyroid, the sternohyoid, anterior jugular veins, fascia, and skin

- **Superior:** terminal branches of the superior thyroid arteries anastomose along its upper border

- **Posterior:** second, third, and fourth rings of the trachea



# BLOOD SUPPLY/VENOUS D.



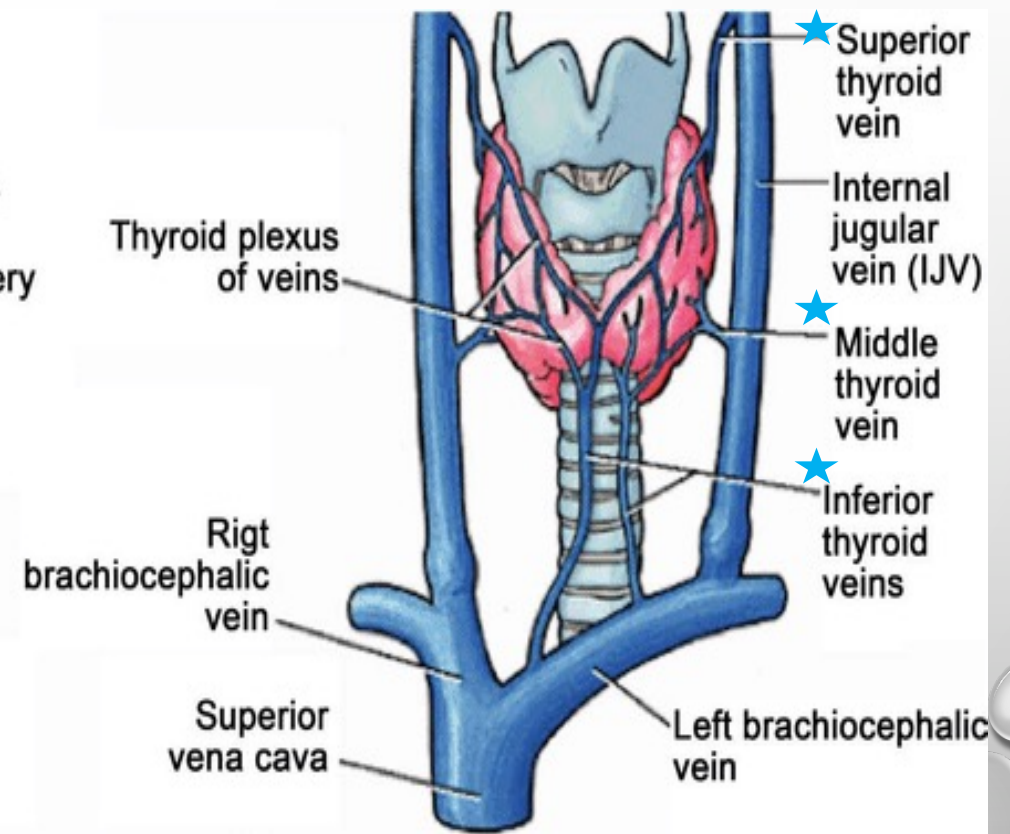
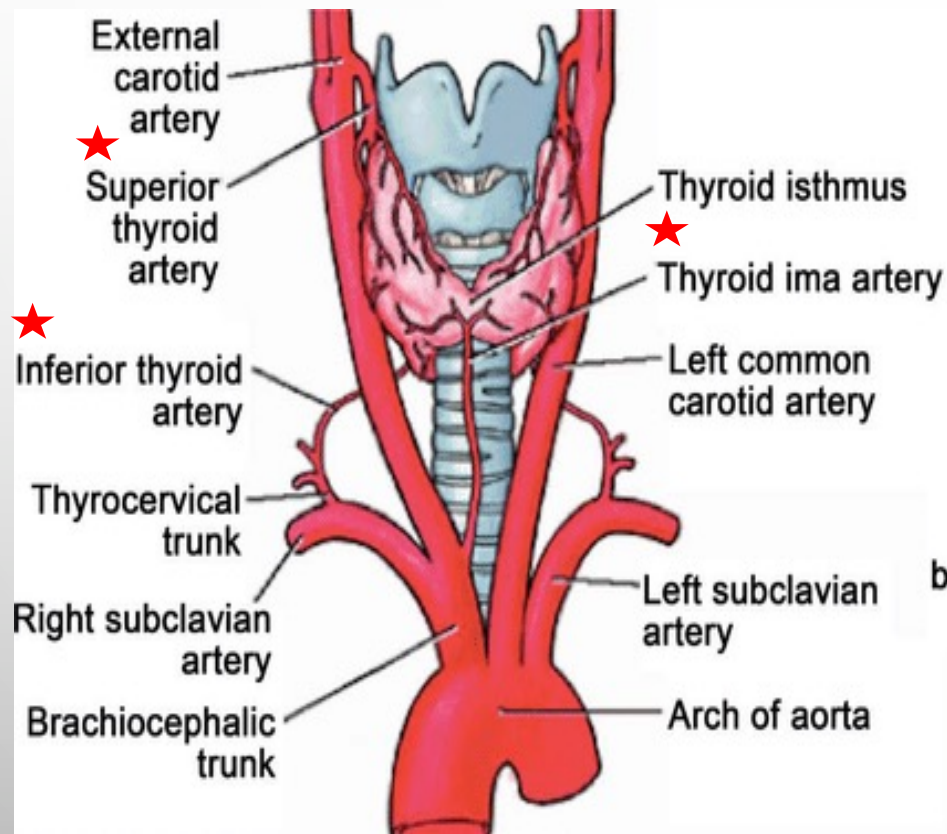
1. The **superior thyroid artery (ECA)**, accompanied by the external laryngeal nerve.

2. The **inferior thyroid artery (TCT)** reaches the posterior border of the gland. The recurrent laryngeal nerve crosses either in front of or behind the artery, or it may pass between its branches.

3. The **thyroidea ima (BCA)**, if present, It ascends in front of the trachea to the isthmus.

**Superior thyroid** → IJV.  
**Middle thyroid** → IJV.  
**Inferior thyroid** → Anastomosis → LBCV

# BLOOD SUPPLY/VENOUS D.





# LYMPH D./ NERVE SUPPLY

## Lymph drainage

- Drains mainly laterally into the **deep cervical lymph nodes**. A few lymph vessels to the paratracheal nodes (prelaryngeal, pretracheal!!).

## Nerve supply

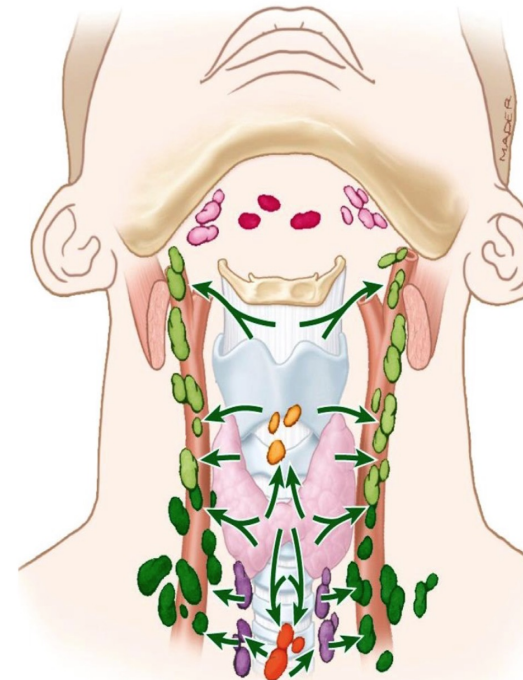
- Superior, middle, and inferior cervical sympathetic ganglia. The Vagus nerve provides the main parasympathetic fibers

•Lymph drains to

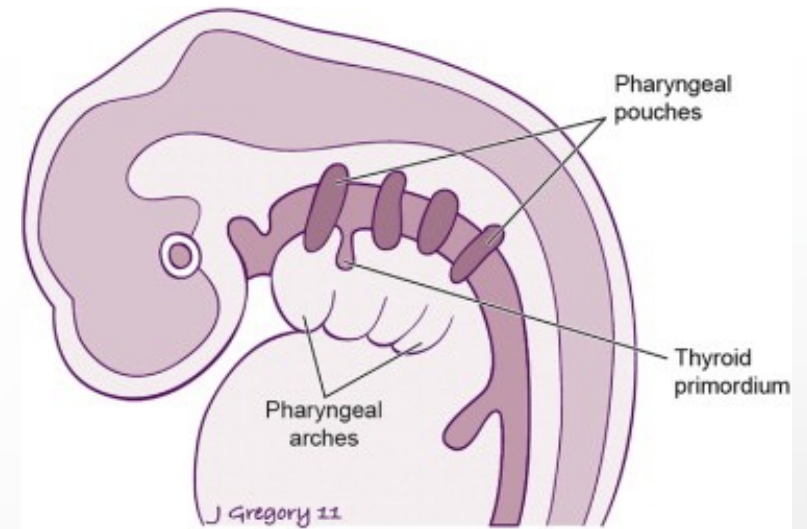
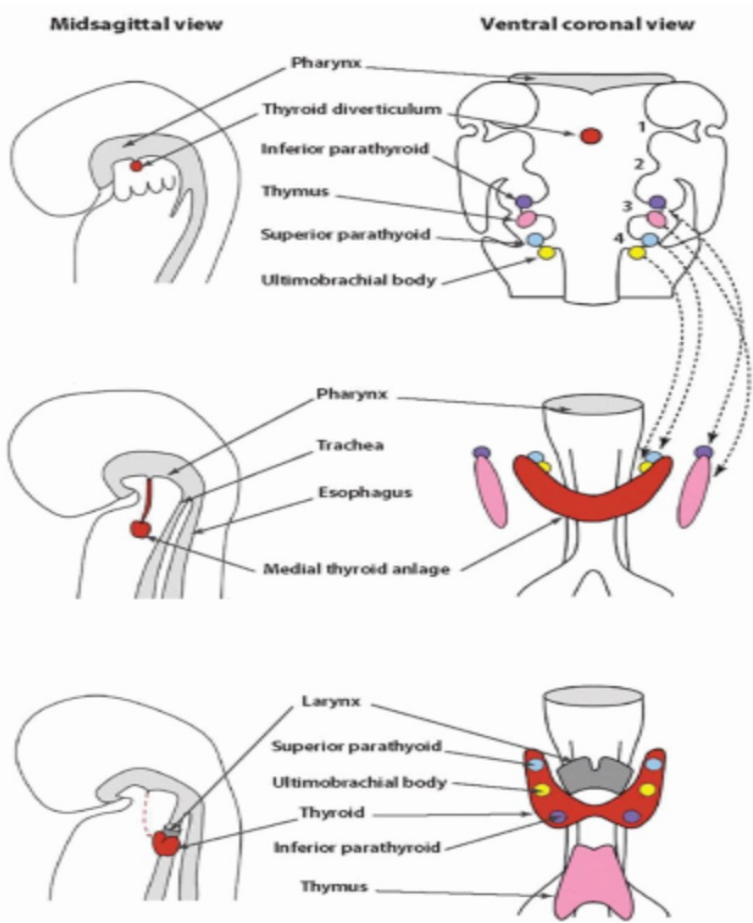
- **prelaryngeal nodes**
- **pretracheal nodes**
- **paratracheal nodes**

•Then to

- **superior deep cervical nodes**  
or  
**inferior deep cervical nodes**



# EMBRYOLOGY



- Development begins as a diverticular outgrowth from the primitive pharynx.
- The diverticulum then descends inferiorly to reach its final destination in the neck.
- The thyroid is located inferior to the thyroid cartilage (C5-T1).
- During its descent, the thyroid connects to the tongue by the thyroglossal duct

# EMBRYOLOGY

- Originates between the first and second pharyngeal pouches near the base of the tongue.
- Around day 20-24, endodermal cells of the primitive pharynx proliferate--- thyroid diverticulum.

## In the fifth week :

- The thyroid diverticulum migrates caudally along the midline---- remains attached to the tongue via the thyroglossal duct .
- In early descent, the thyroid is hollow but then solidifies during migration forming the follicular elements of the thyroid.
- Division of the thyroid into right and left lobes.
- Ultimobranchial bodies arise from the fourth/fifth pharyngeal pouches --- parafollicular c-cells.

## By the seventh week:

- The thyroid has reached its final destination in the neck

## By the tenth week :

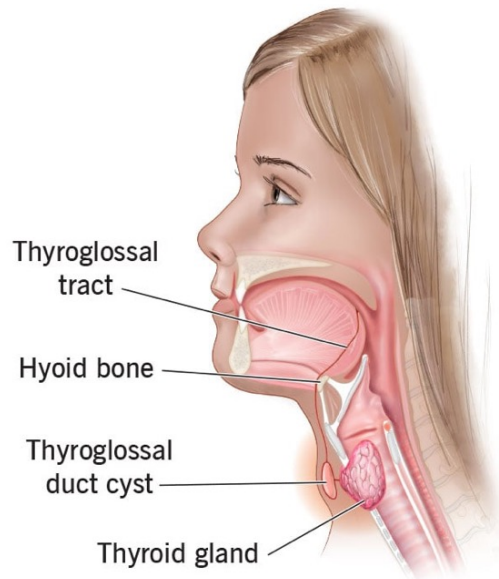
- The thyroglossal duct degenerates ---**incomplete** obliteration of the duct can lead to abnormalities, including thyroglossal duct cysts, or a pyramidal lobe. lingual thyroid!!!!

## By the twelfth week

- Functionally mature

# INCOMPLETE DEGENERATION OF THYROGLOSSAL DUCT

Thyroglossal Duct Cysts



Cleveland  
Clinic  
©2022



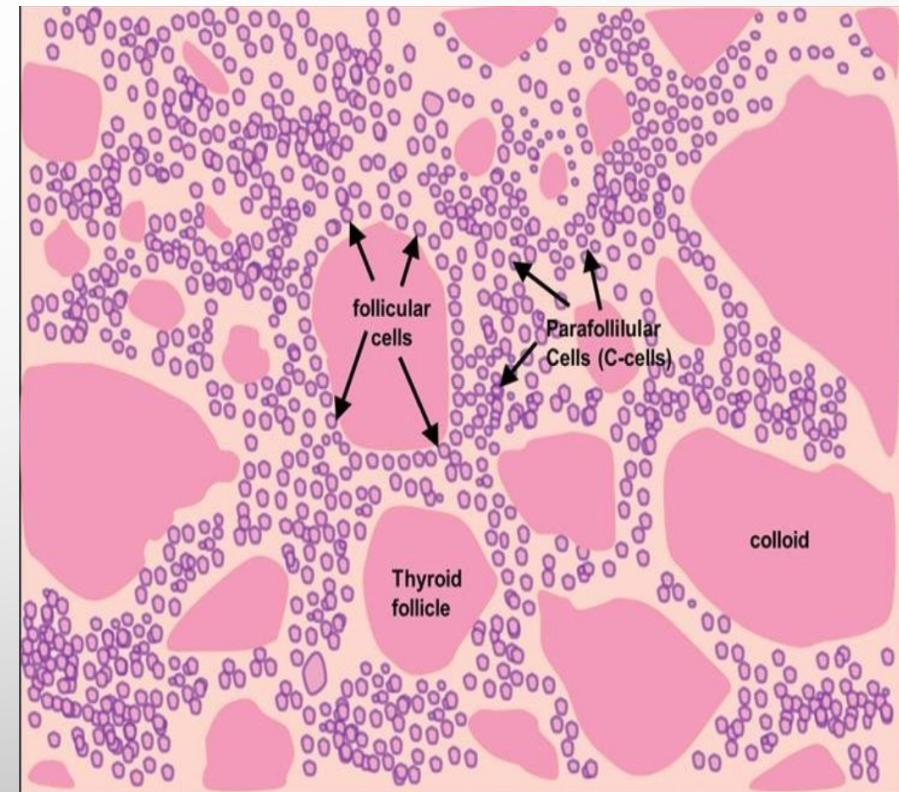
Pyramida lobe!!



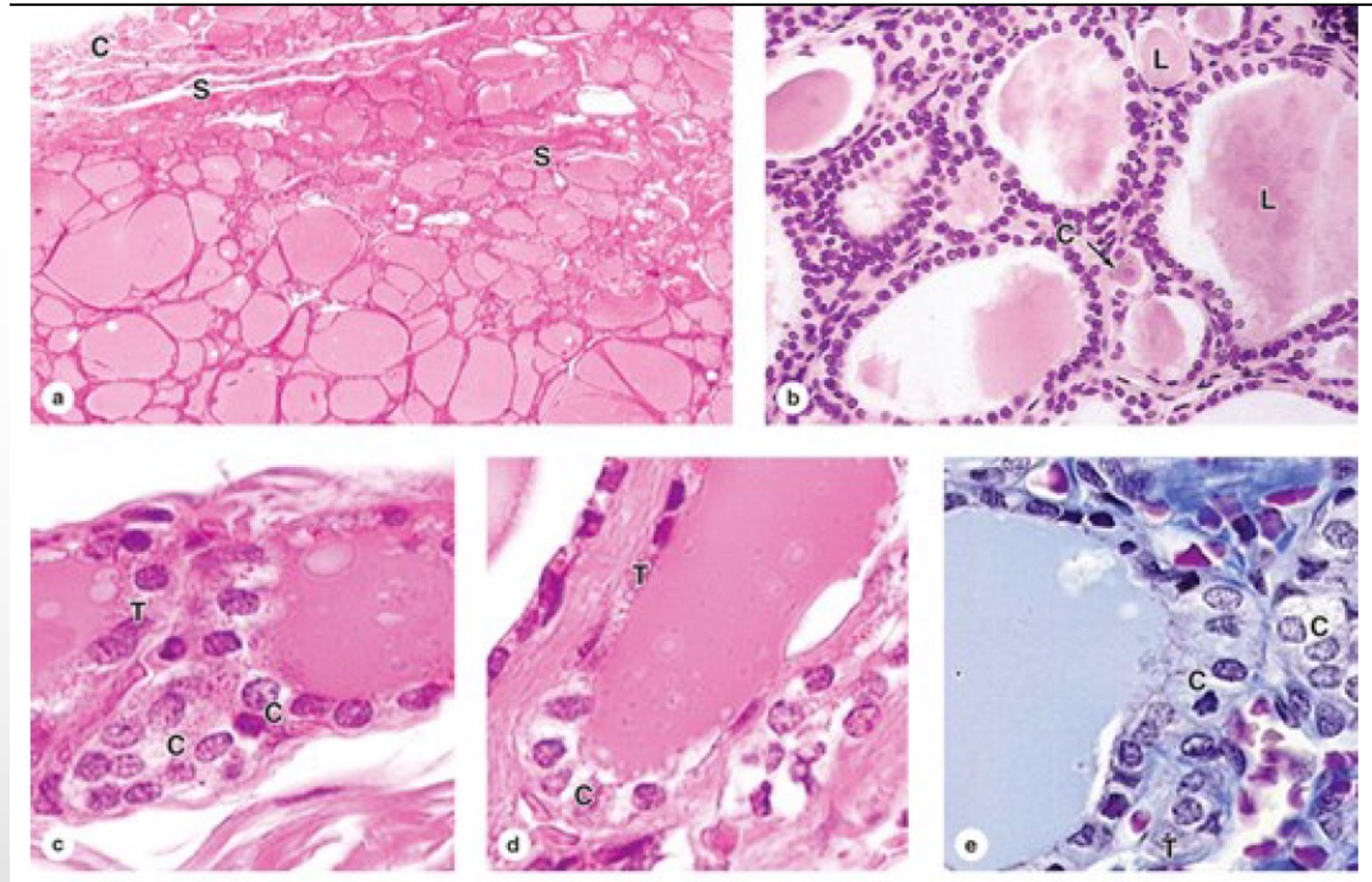
- LINGUAL  
THYROID!!!!!!???

# HISTOLOGY

- The parenchyma is composed of millions of rounded epithelial thyroid follicles of variable diameter, each with simple epithelium and
- A central lumen densely filled with gelatinous acidophilic colloid
- Only endocrine gland in which a large quantity of secretory product is stored.
- Storage is outside the cells, in the colloid of the follicle lumen.
- There is sufficient hormone in follicles to supply the body for up to 3 months.
- Thyroid colloid contains the large glycoprotein **thyroglobulin**---the precursor for the active thyroid hormones.



# THYROID HISTOLOGY



(a) thin capsule (C), septa (S).

(b) The lumen (L), present are large pale-staining parafollicular or C cells (C).

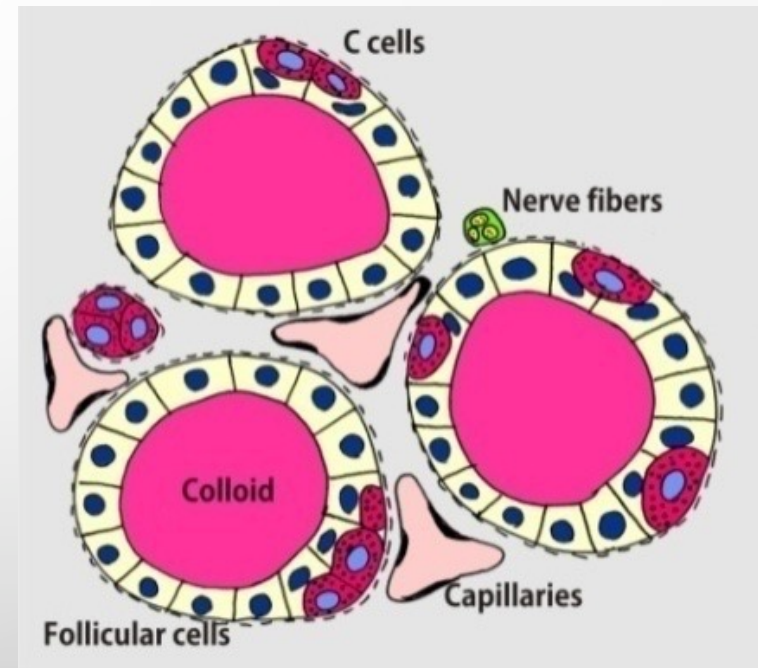
(c-e) Thyrocytes (T) from parafollicular C cells (C) by their smaller size and darker staining properties

# THYROID FOLLICULAR CELLS AND PARAFOLLICULAR CELLS.

- Is covered by a fibrous capsule--- septa.
- Follicles are densely packed together--- sparse reticular connective tissue.
- stroma is very well vascularized with fenestrated capillaries.
- The follicular cells, or thyrocytes, range in shape from squamous to low columnar (activity related—TSH).
- The cells exhibit organelles indicating active protein synthesis
- The nucleus is generally round and central, ER/Golgi basally.

# PARAFOLLICULAR CELLS.

- Parafollicular cell ( C cell), is also found inside the basal lamina of the follicular cells or as isolated clusters between follicles
- Derived from the neural crest or endoderm!!!!
- Somewhat larger than follicular cells and stain less intense.
- Smaller amount of rough ER, large golgi complexes, and numerous small granules containing calcitonin.
- Secretion of calcitonin is triggered by elevated blood  $ca^{+2}$  levels, and it inhibits osteoclast activity.



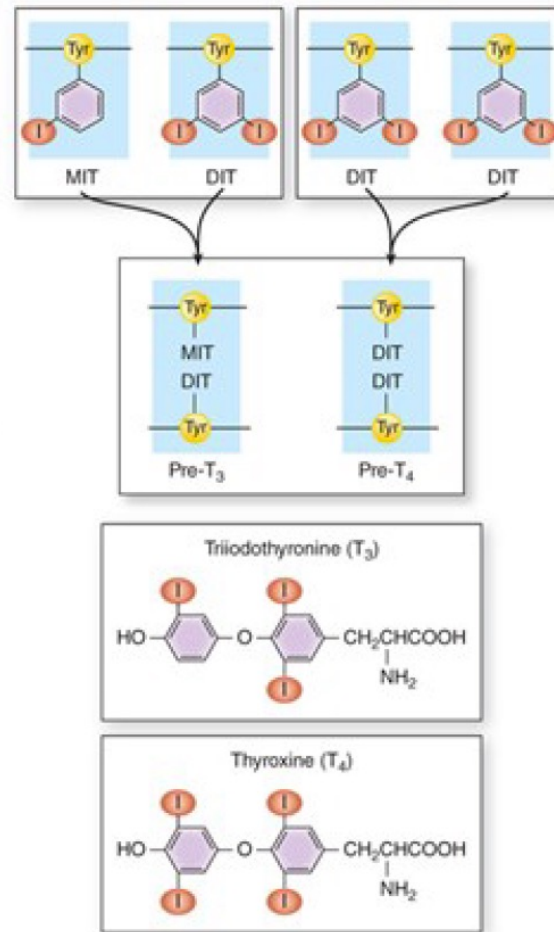
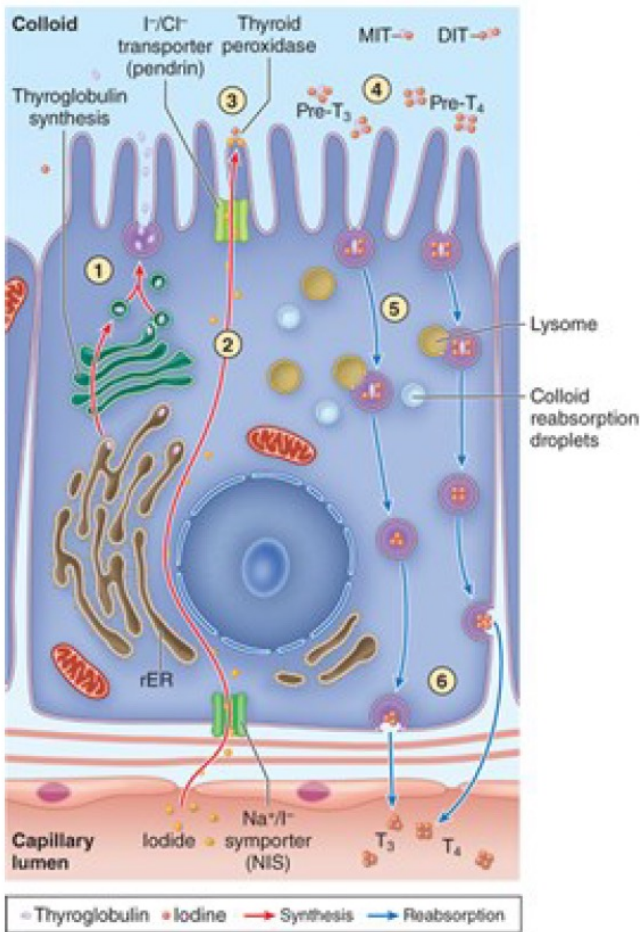


# Production of thyroid hormone & its control

## The major activities of this process

- The production of **thyroglobulin** (140 tyrosyl residues)
- The uptake of iodide (30-fold concentration)
- Iodination of tyrosyl residues (oxidation of iodide)
- Formation of T3 and T4
- Endocytosis of iodinated thyroglobulin (lysosomal proteases)
- Secretion of T4 and T3

# PRODUCTION OF THYROID HORMONES



Involve an unusual, multistage process in the thyrocytes---with both an exocrine/ endocrine phases promoted by TSH. and occur in the same cell.

- The diagram shows the multistep process by which thyroid hormones are produced via the stored thyroglobulin intermediate. In an exocrine phase of
- The process, (1) the glycoprotein thyroglobulin is made and secreted into the follicular lumen and (2) iodide is pumped across the cells into the lumen.
- In the lumen (3) iodide is converted to iodine by membrane-bound thyroid peroxidase and added to tyrosine residues of thyroglobulin (4) to form monoiodotyrosine (MIT) or diiodotyrosine (DIT), which are then covalently coupled to form t3 and t4 still within the glycoprotein. The iodinated
- Thyroglobulin is then (5) endocytosed by the thyrocytes and degraded by lysosomes, (6) releasing free active T3 and T4 to the adjacent capillaries in
- An endocrine manner. Detailed steps are given in the text. Both phases are promoted by TSH and may occur simultaneously in the same cell.

# NEGATIVE FEEDBACK LOOPS AFFECTING ANTERIOR PITUITARY SECRETION

## Relation of Thyroid & Pituitary

→ Stimulatory  
→ Inhibitory

