

The Endocrine System

Anatomy Lectures 3 & 4

Thyroid & parathyroid glands

By

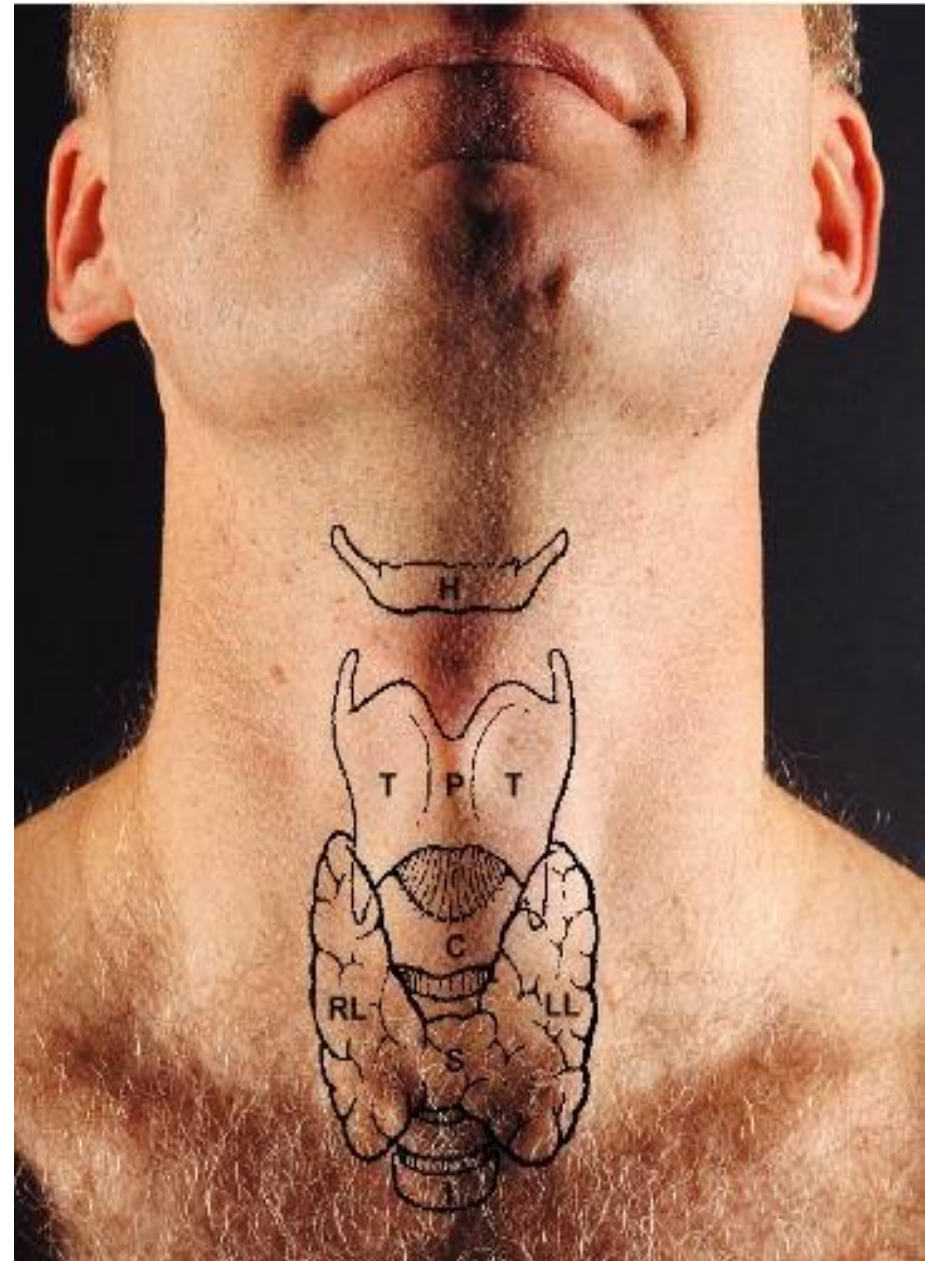
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By the end of this lectures we must know

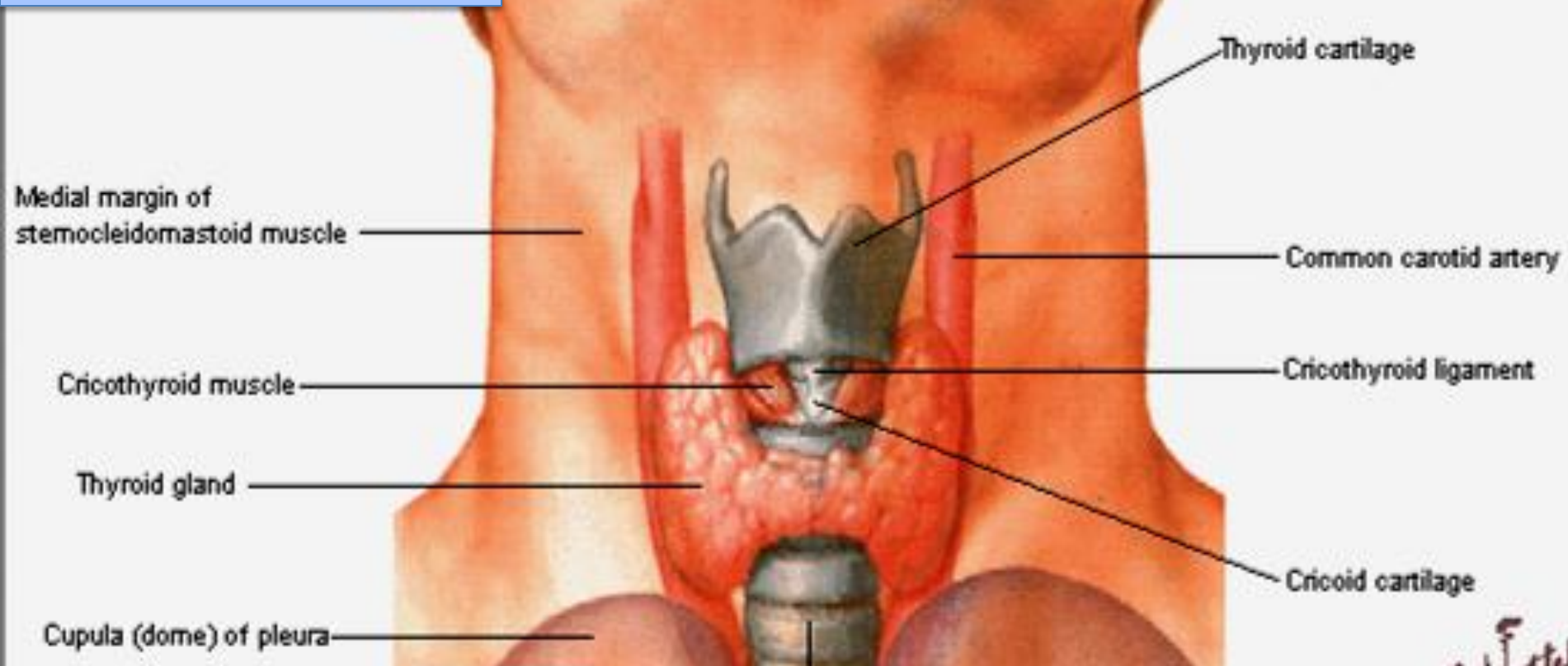
- *Anatomical position, shape ,weight and capsule of thyroid gland.**
- *Relation of thyroid gland.**
- *Blood supply, lymphatic drainage and nerve supply of thyroid gland.**
- *Histological features of thyroid gland.**
- *Development of thyroid gland.**
- *Applied anatomy of thyroid gland.**
- *Anatomy, histology and development of parathyroid gland**

The thyroid gland is the largest endocrine gland in the body.

Weight:
the average is 25 gm.



Position: It lies in lower part of the front & sides of the neck.

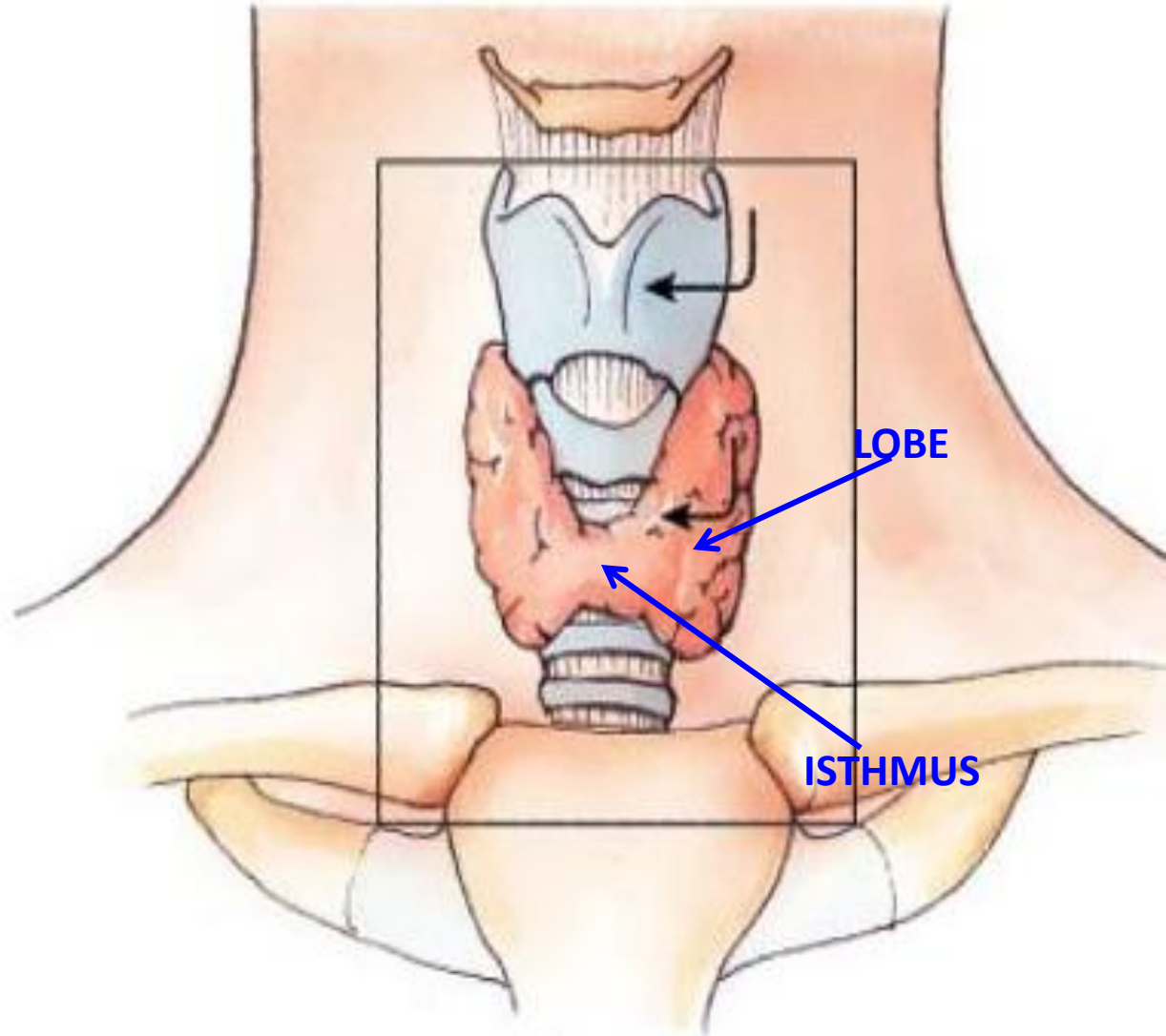


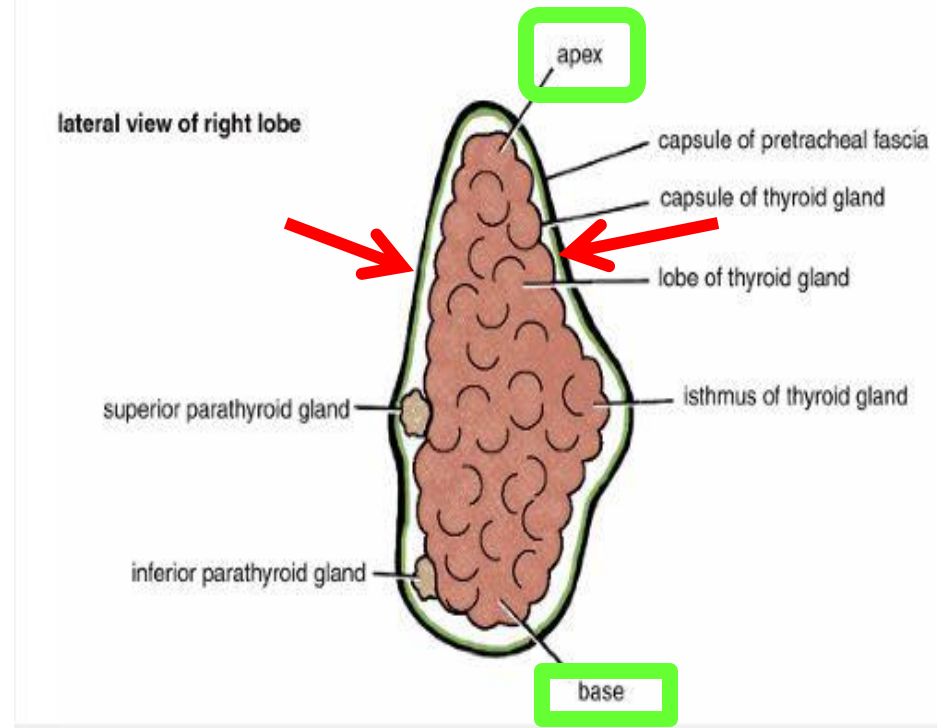
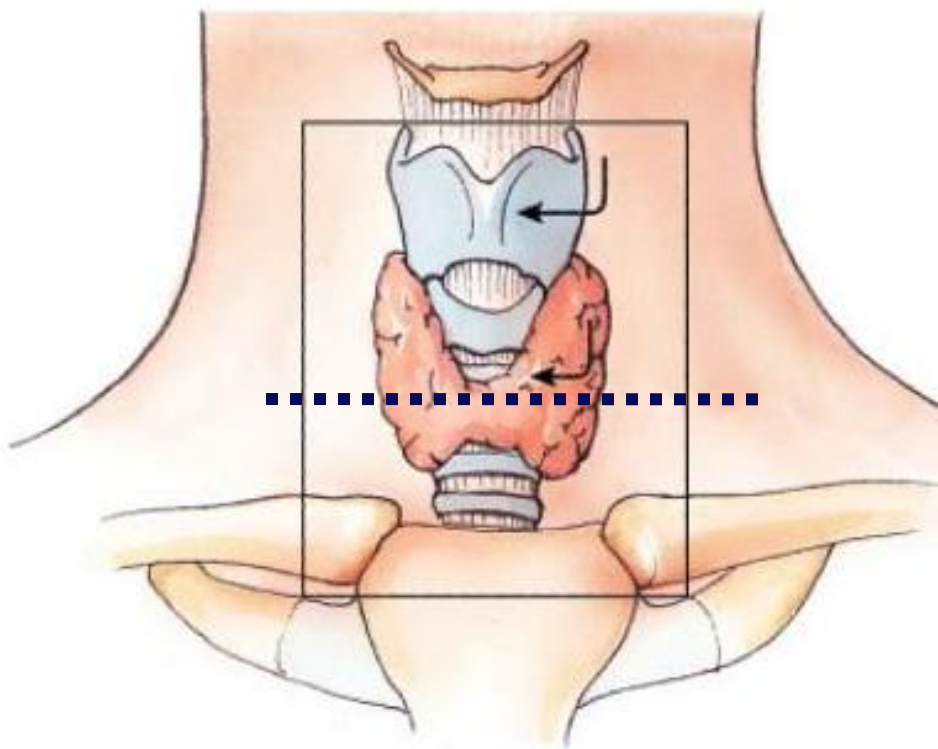
Shape:

Butterfly or

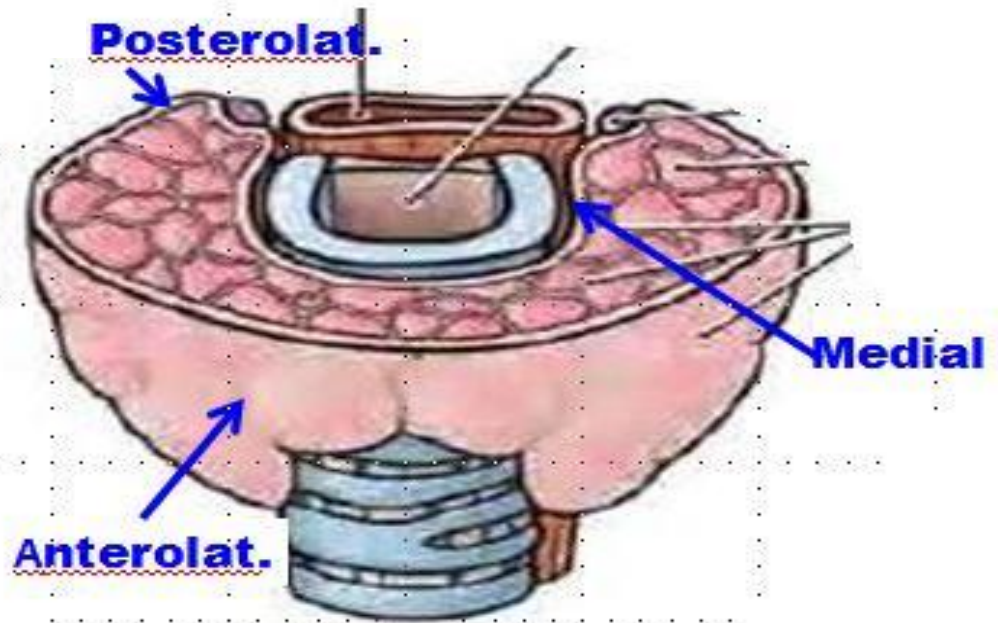
H shaped having

- 2 lateral (cone shaped) **lobes** connected by a narrow **isthmus**.



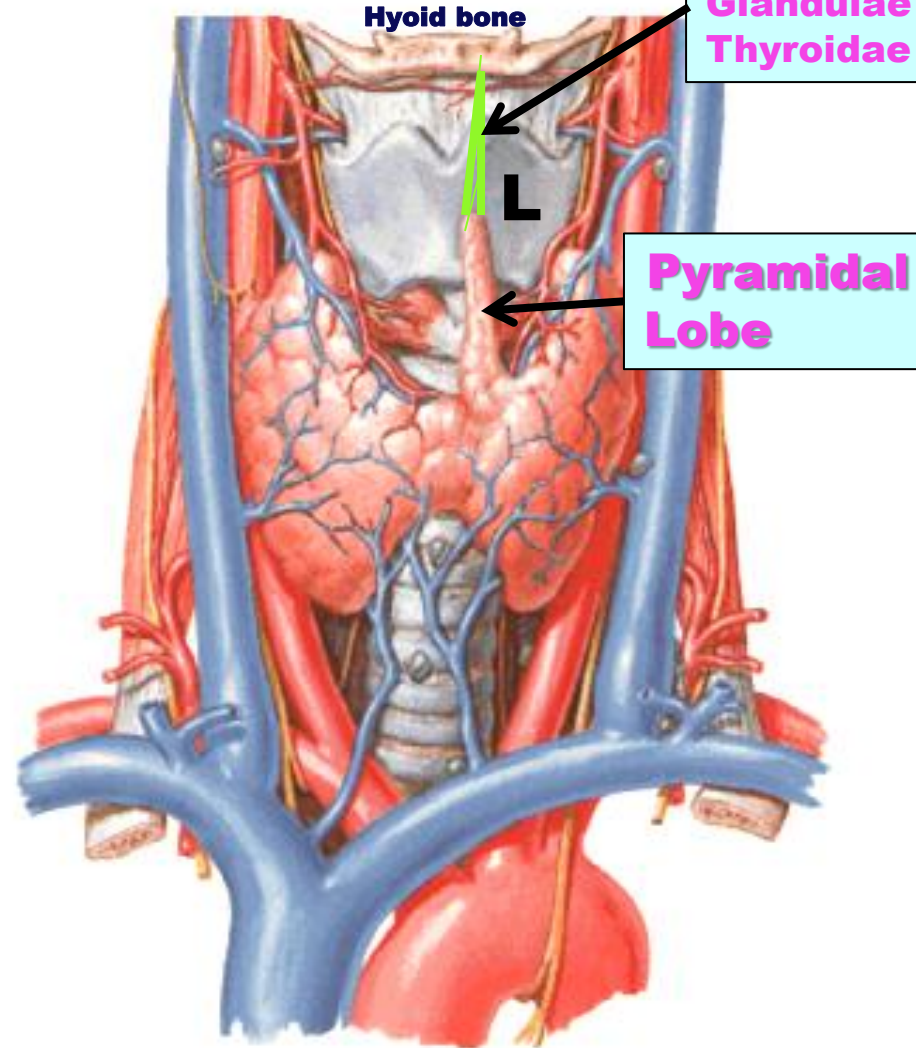


- Each lobe has:
 - an apex above,
 - a base below,
 - 3 surfaces and
 - 2 borders



-The narrow median isthmus may show a small **pyramidal lobe** which may be connected to the body of hyoid bone by a fibrous or fibromuscular band called "**levator glandulae thyroidea**".

The isthmus

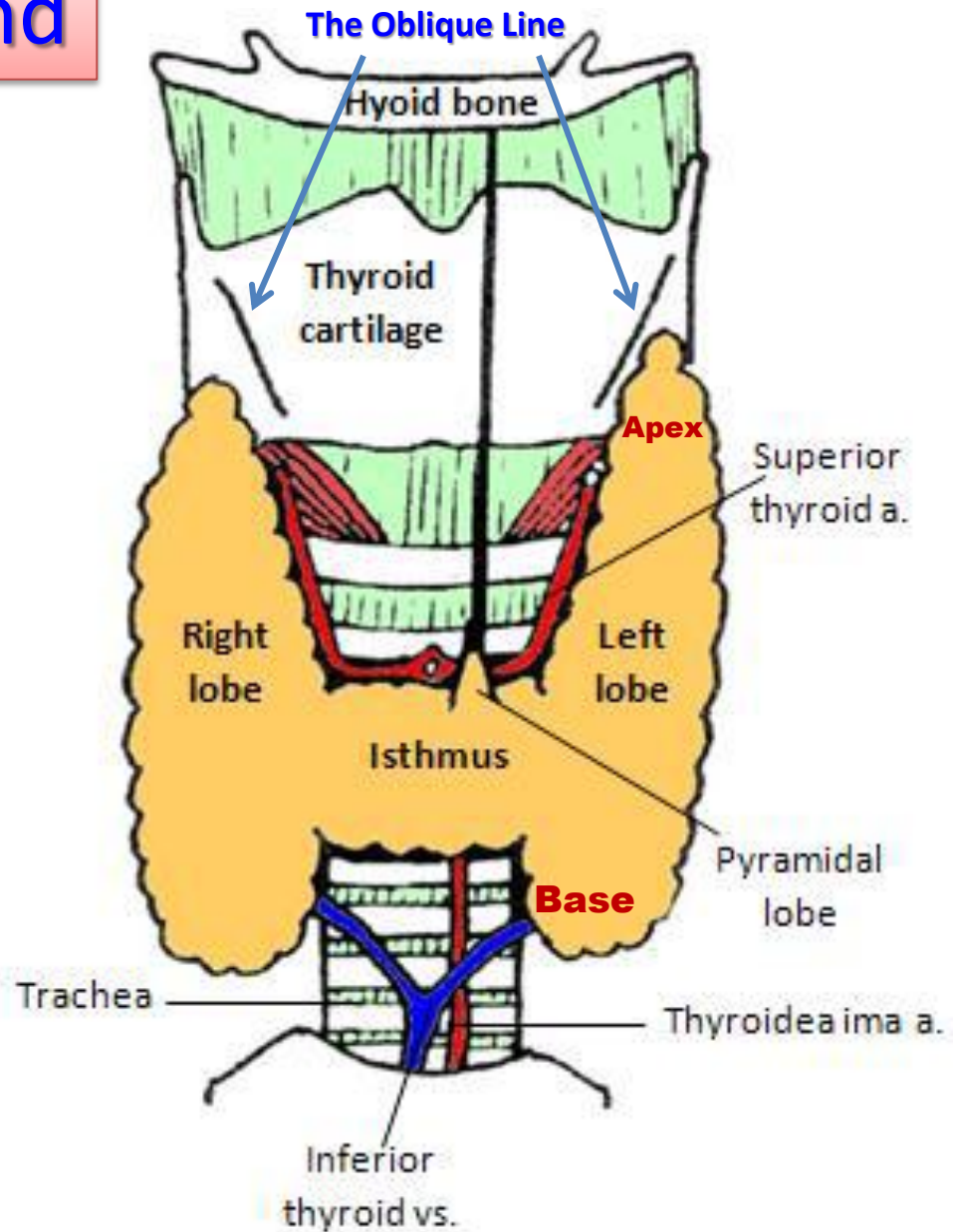


Extensions Of The Gland

The apex of each lat. lobe reaches the oblique line of thyroid cartilage.

The base of each lat. Lobe reaches the level of the 5th or 6th tracheal rings.

The isthmus crosses the trachea opposite the rings 2,3,4.



It has two capsules

1-Inner true fibrous capsule: condensation of connective tissue.

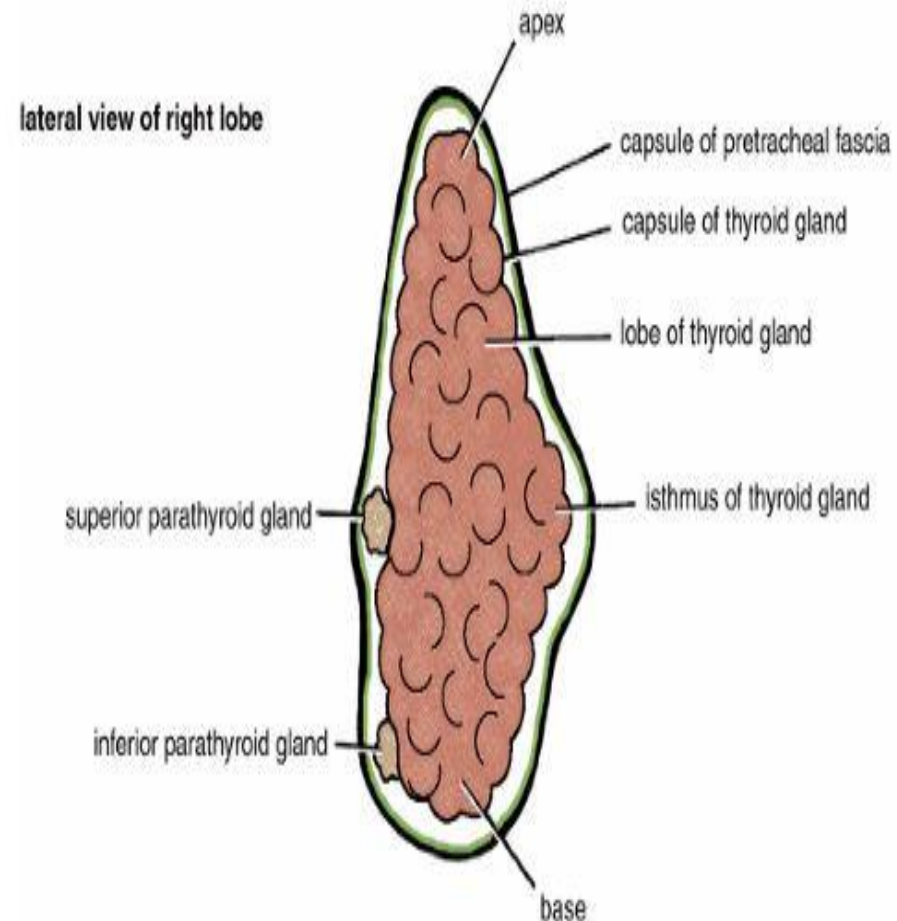
2-Outer false fascial capsule:

Derived from the pretracheal layer of deep cervical fascia.

N.B.

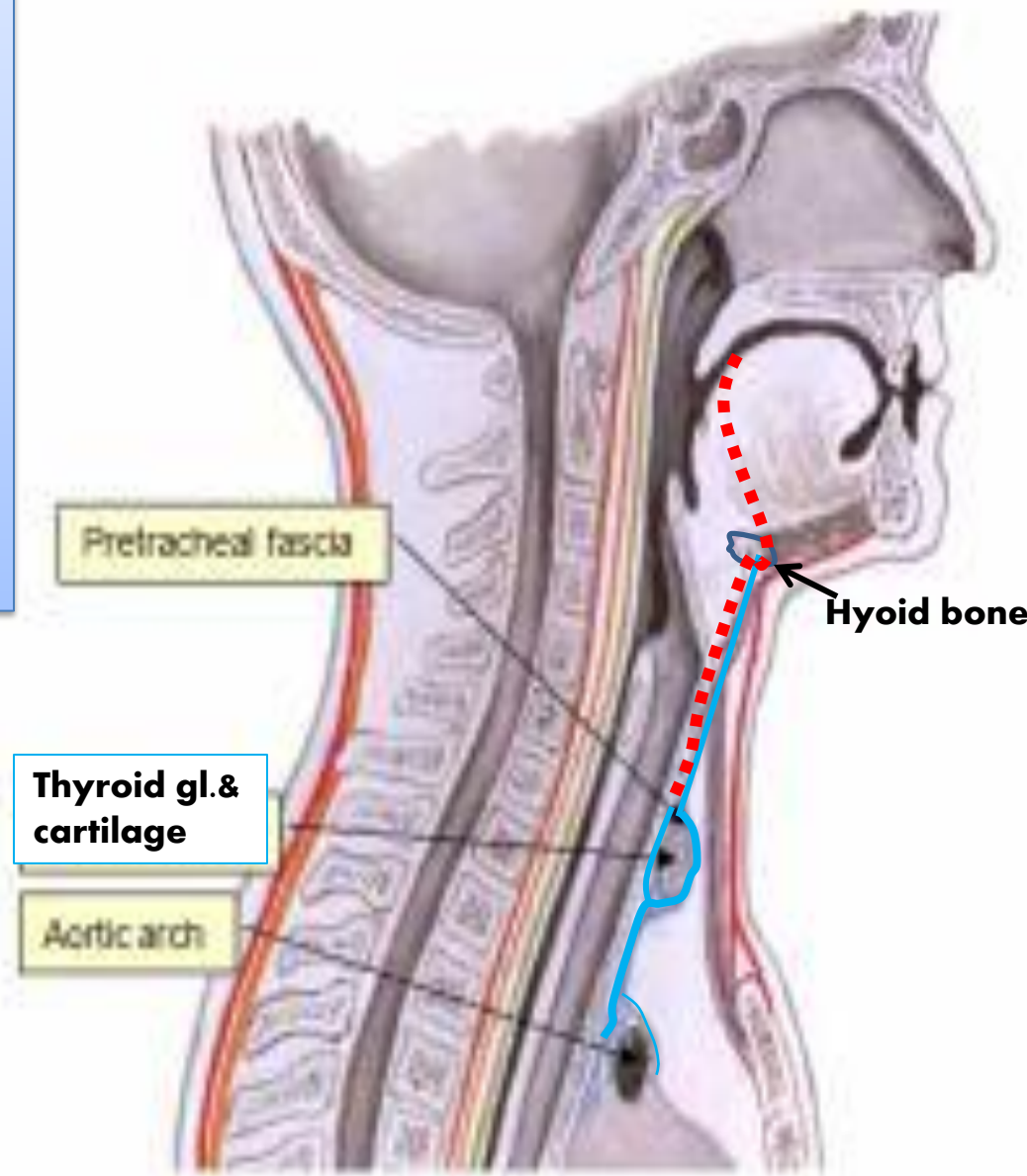
- The vessels of the gland run betw. the 2 capsules.***

Capsules Of The Gland



N.B.

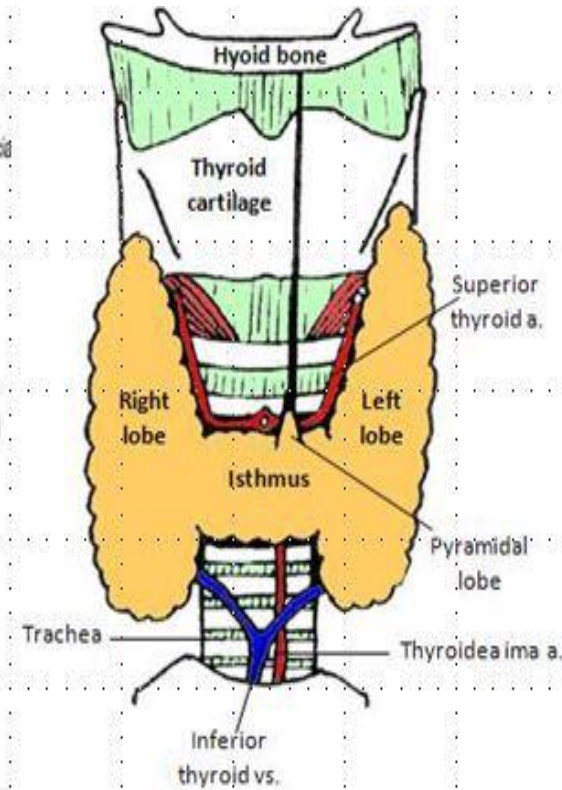
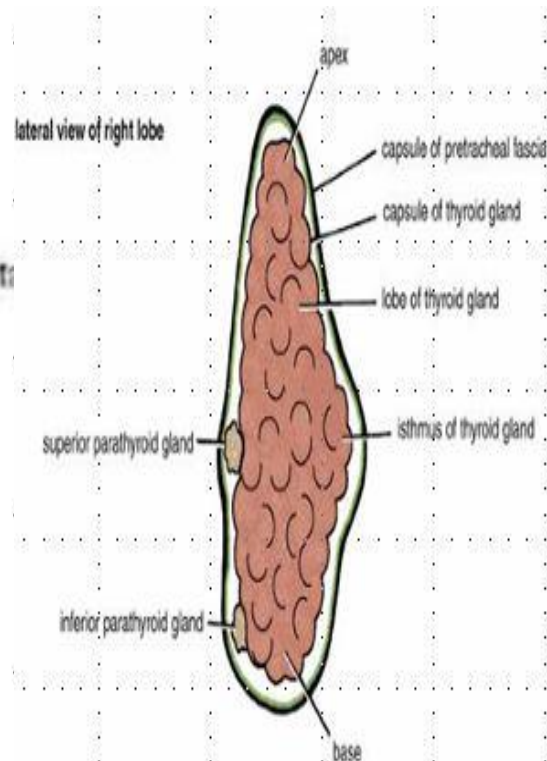
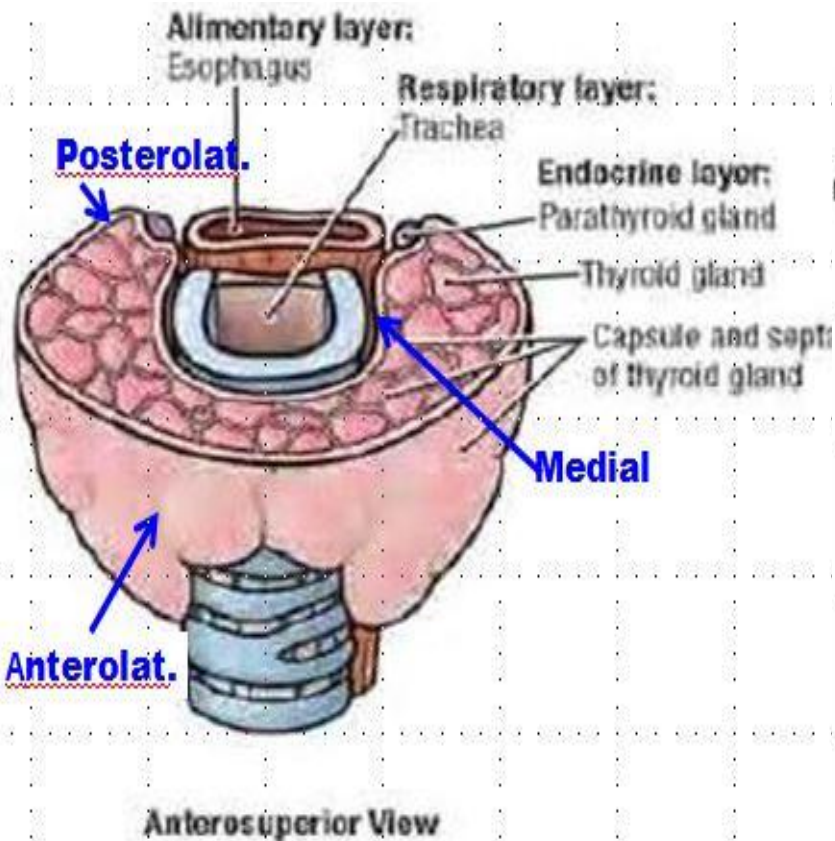
•The attachment of the pretracheal fascia to the larynx above is responsible for movement of the gland up & down with swallowing.



Relations of the Lobes

Each Lobe Has 3 Surfaces:
Anterolateral, posterolateral, medial

Each lobe has 2 borders:
Anterior & posterior



Relations of anterolateral surface

5

Mentalis
Depressor labii inferioris
Depressor anguli oris
Platysma

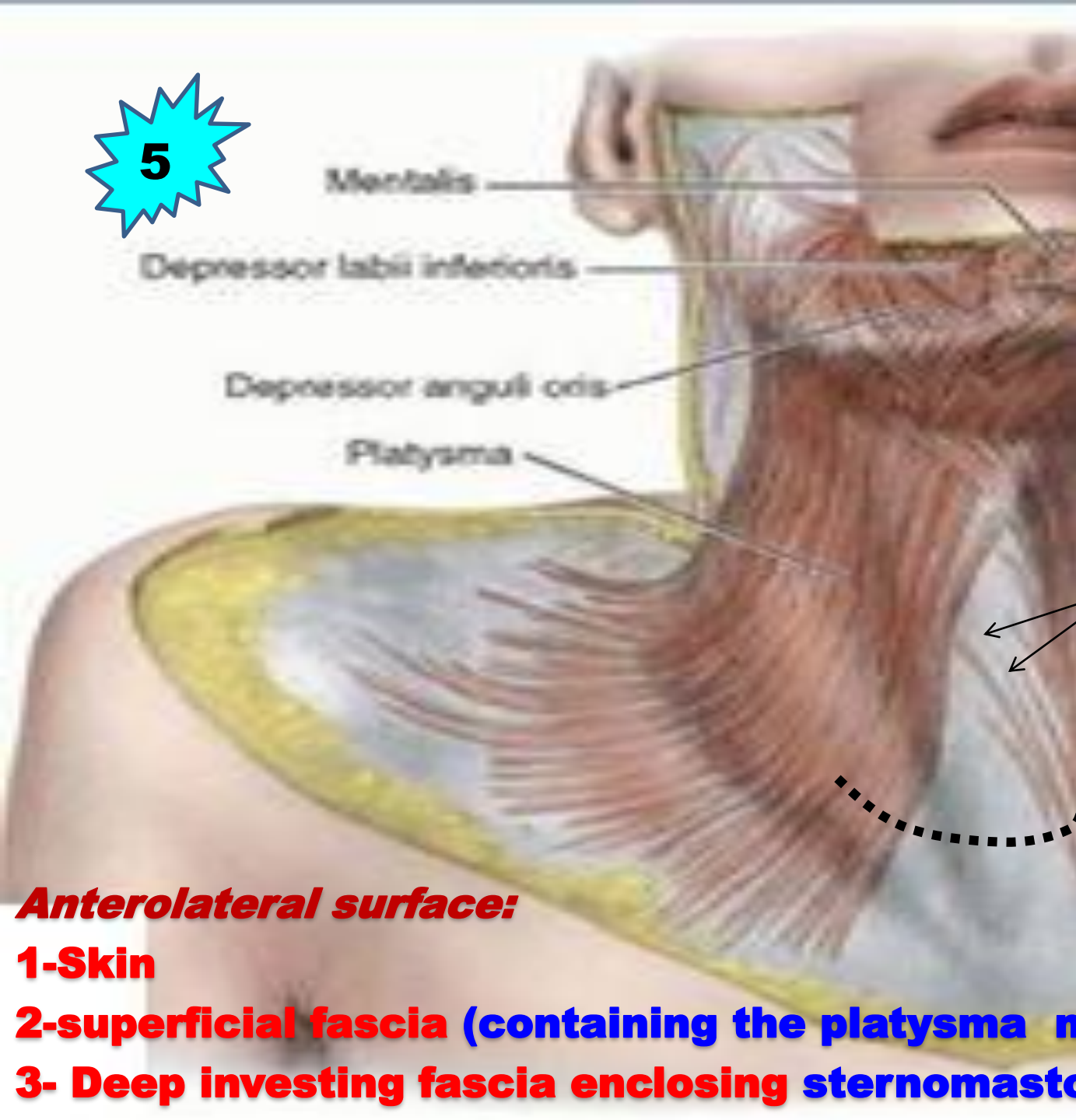
Ant. Jug. Vs.

Anterolateral surface:

1-Skin

2-superficial fascia (containing the platysma ms. & AJVs)

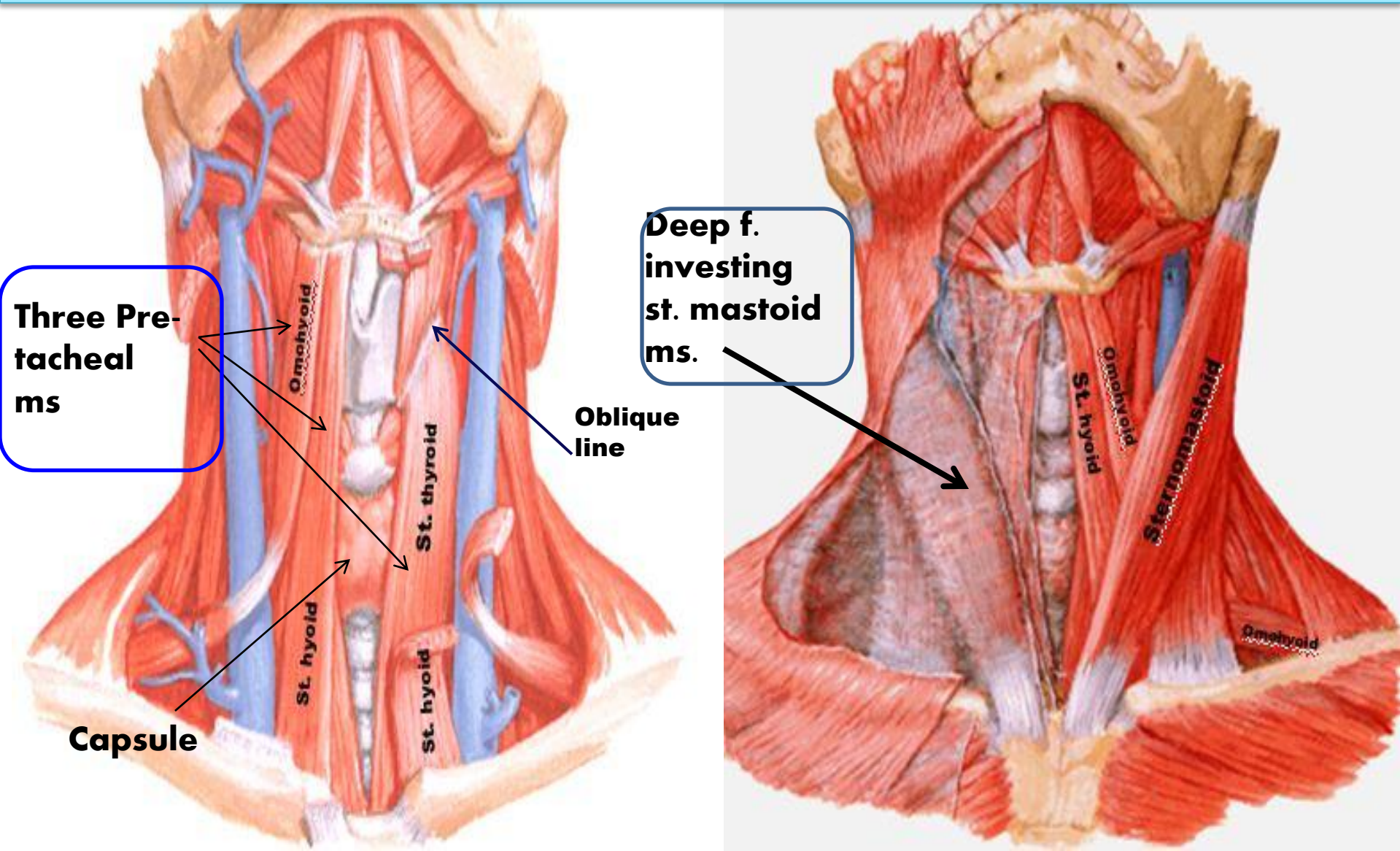
3- Deep investing fascia enclosing sternomastoid ms.



4- Three pretacheal ms (infrahyoid ms.)

Superior belly of omohyoid, Sternohyoid, Sternothyroid .

5- Pretacheal fascia (false capsule)



Posterolateral surface:

1- The carotid sheath (CCA, IJV, & vagus nerve).

2- Along the rounded posterior border.

Parathyroid glands

Anastomosis

betw. Sup. & inf. thyroid vessels.



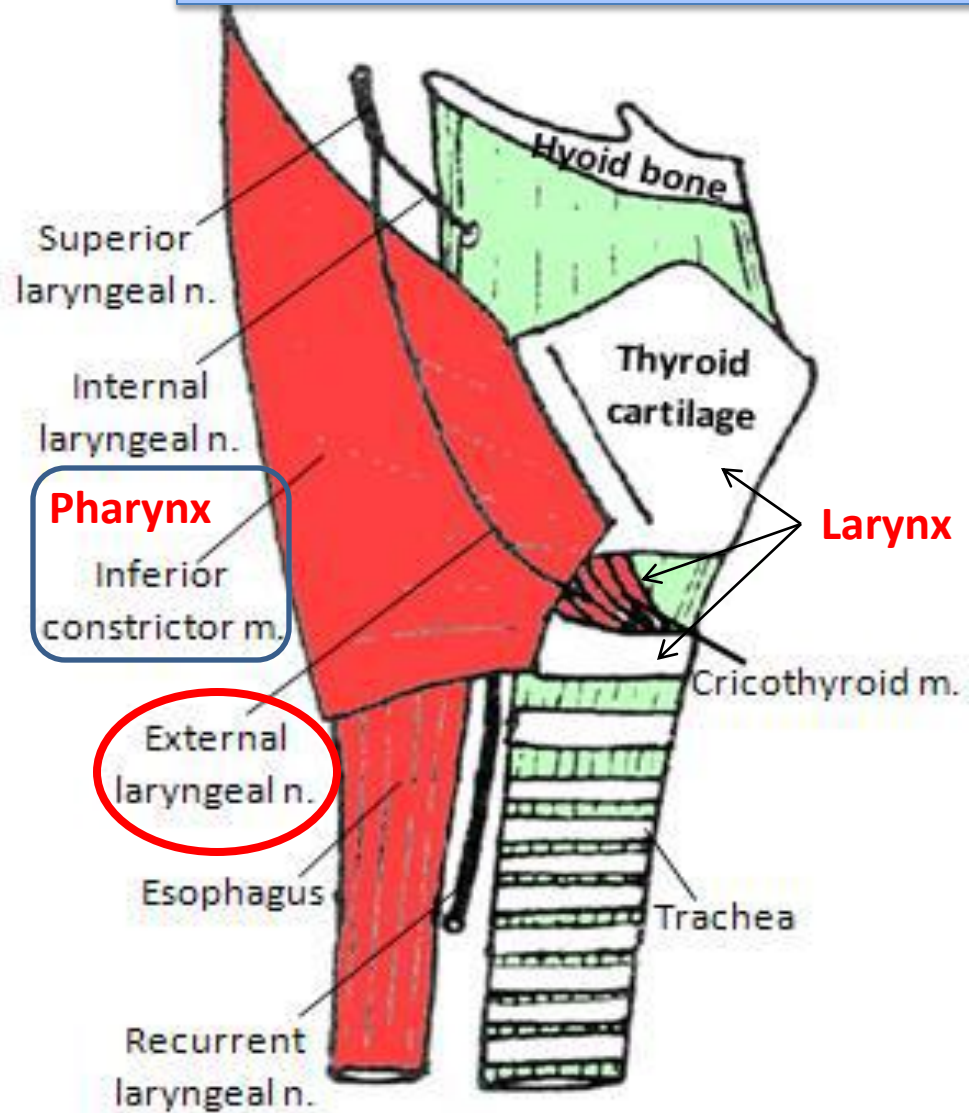
b) Medial surface

*upper part related to
2 tubes & nerve.*

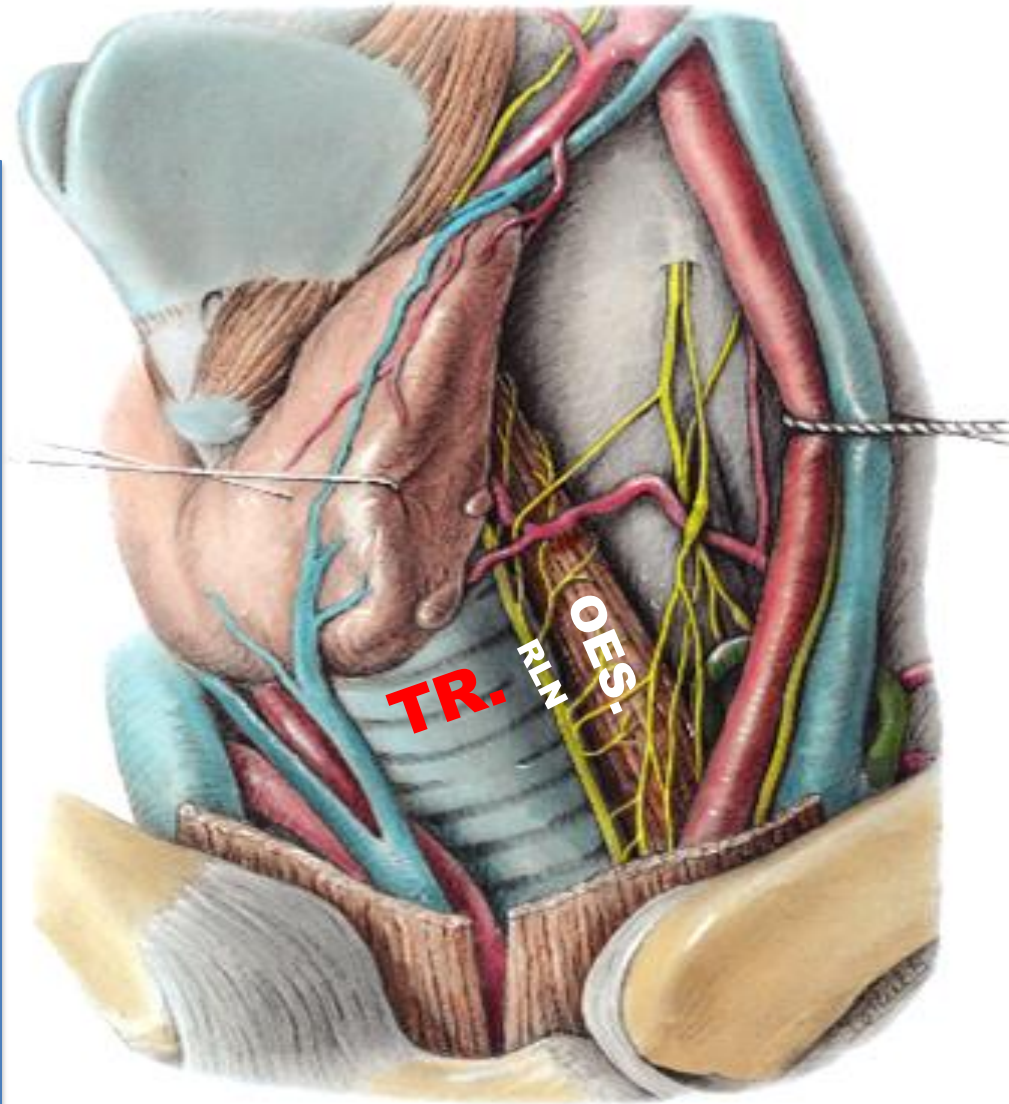
1-Larynx (*thyroid, cricoid
cartilages & cricothyroid ms.*)

2-Pharynx (*inferior
constrictor ms.*)

**3-External laryngeal
nerve of SLN of vagus.**



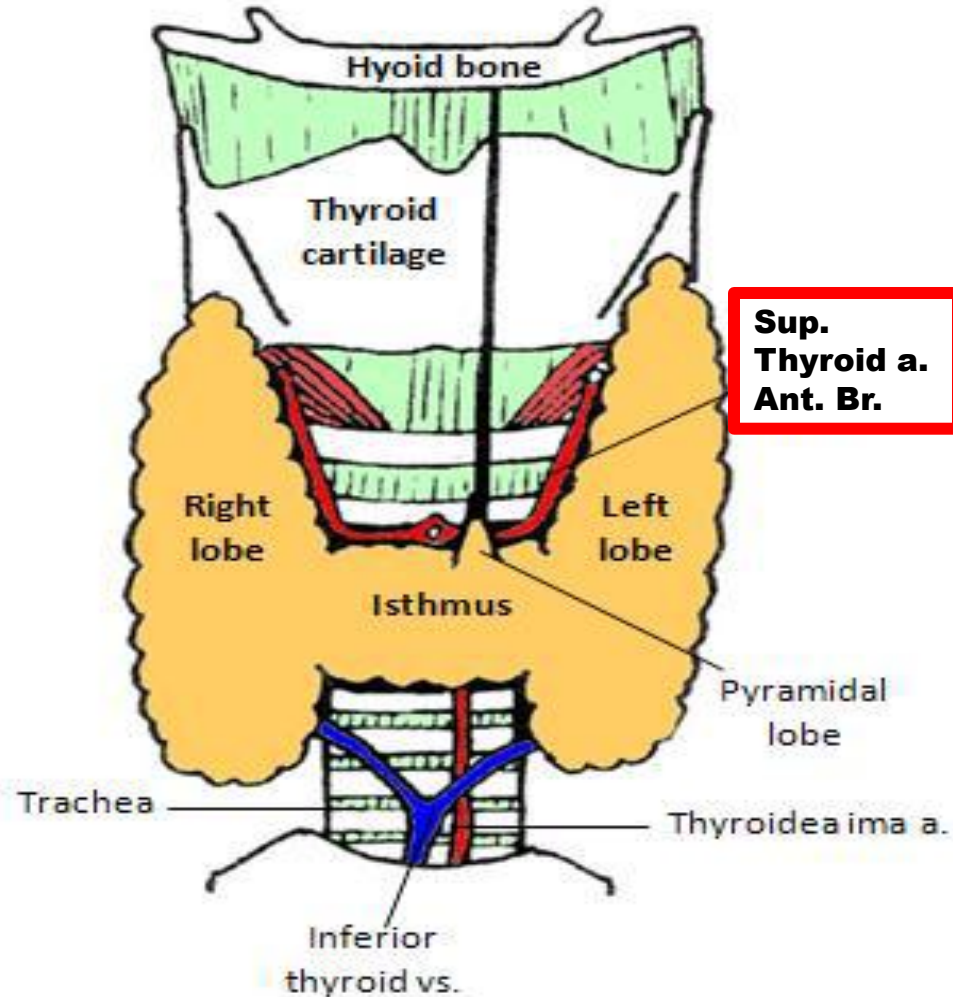
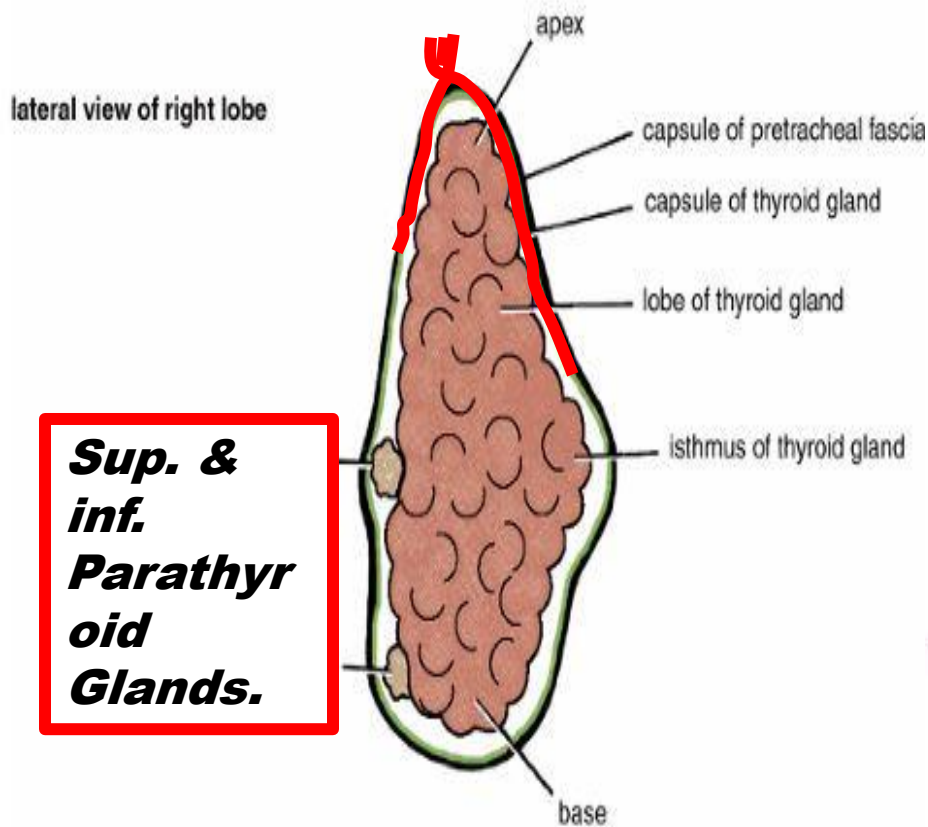
*Lower part
related to
2 tubes & nerve.
1-trachea.
2-oesophagus.
3-recurrent laryngeal
nerve in the groove
betw. the two tubes.*



Each lobe has 2 borders

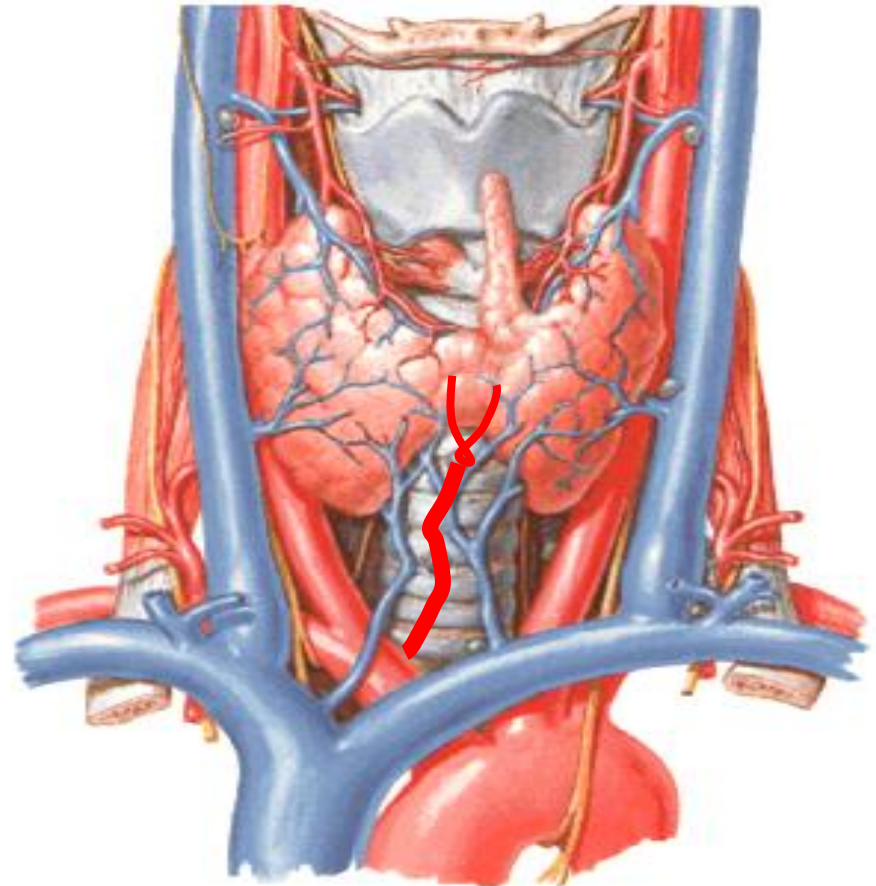
Anterior thin border: *related to ant. branch of superior thyroid a.*

Posterior thick border: *rounded related to parathyroid glands.*



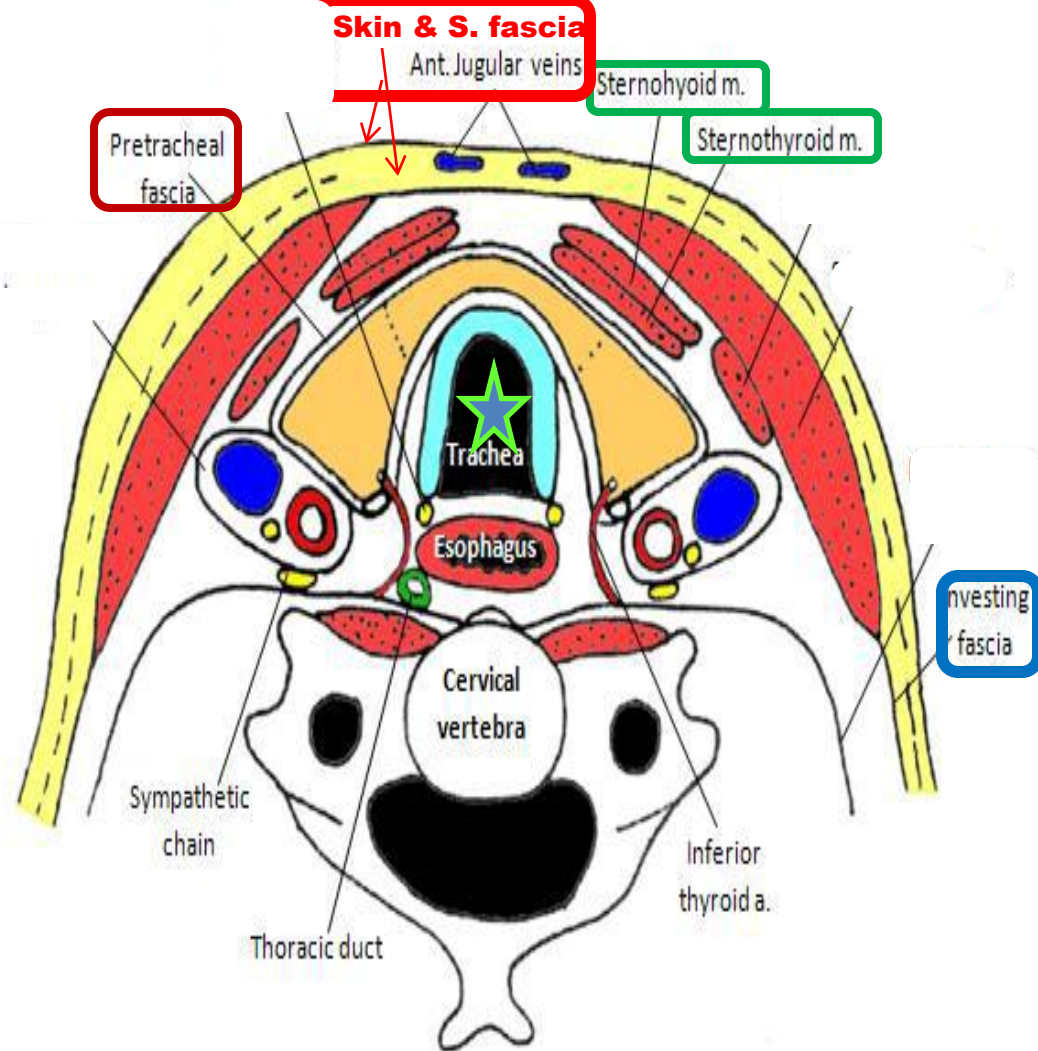
Relations of the isthmus

Thyroid Gland
Anterior View



It has:
**2 surfaces (ant.+
post.)**
**2 borders (upper
& lower).**

ISTHMUS, surfaces



- Anterior surface: related to**
- 5**
- 1. Skin**
 - 2. Superficial fascia (with ant. Jugular veins).**
 - 3- Deep investing fascia.**
 - 4. 2 pretracheal ms. (Sternohyoid & Sternothyroid).**
 - 4. Pretracheal fascia**

- Posterior surface: related to**
- 1. trachea (2nd & 3rd & 4th rings).**

ISTHMUS, borders

a. Upper border:
related to

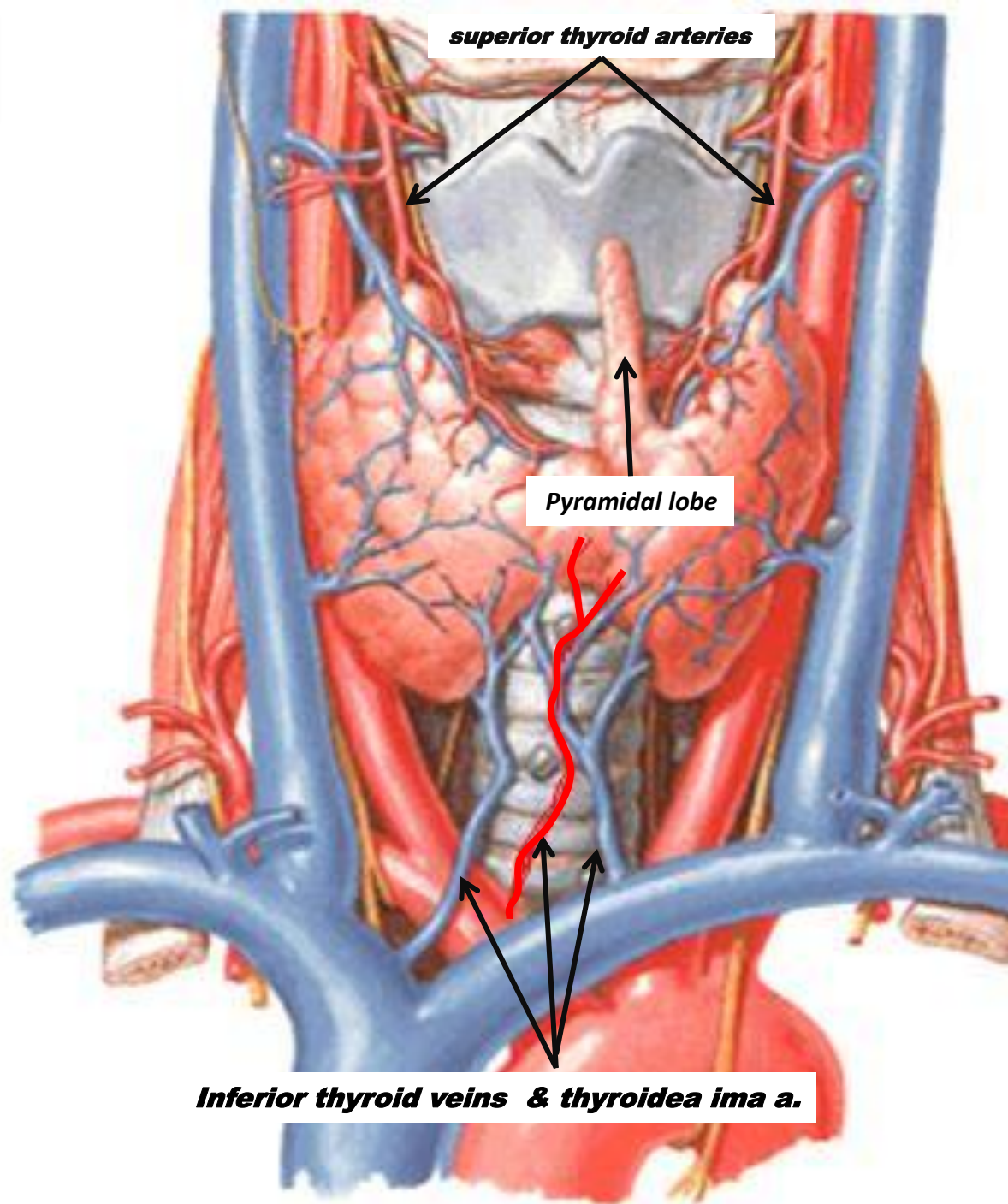
**1-Anastomosing
branches of both
superior thyroid
arteries**

2-Pyramidal lobe.

b. Lower border:
related to

**1-inferior thyroid
veins &**

2-thyroidea ima a.



ARTERIAL SUPPLY

The gland is highly vascular

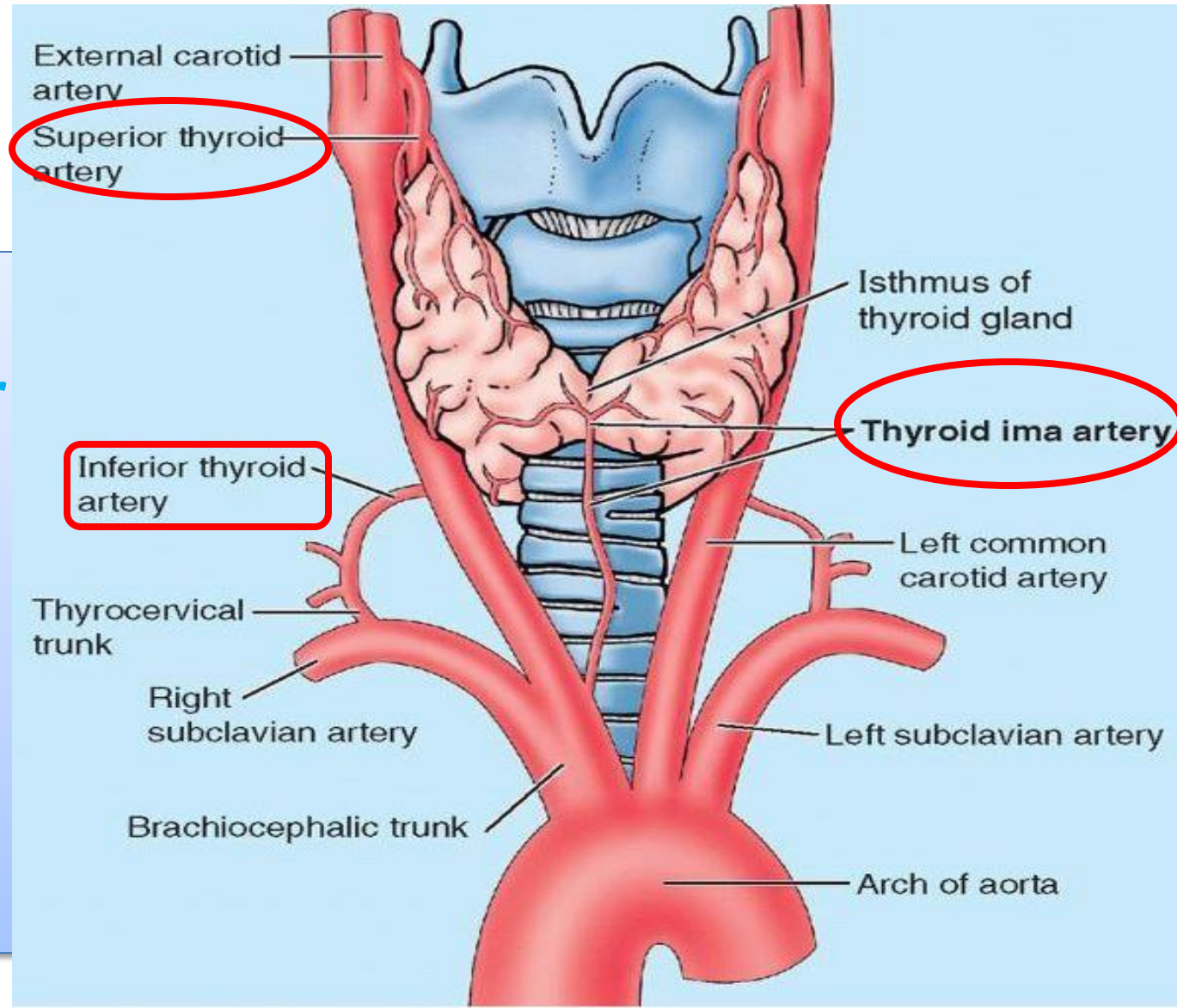
It is supplied by

3 arteries

a. Superior thyroid

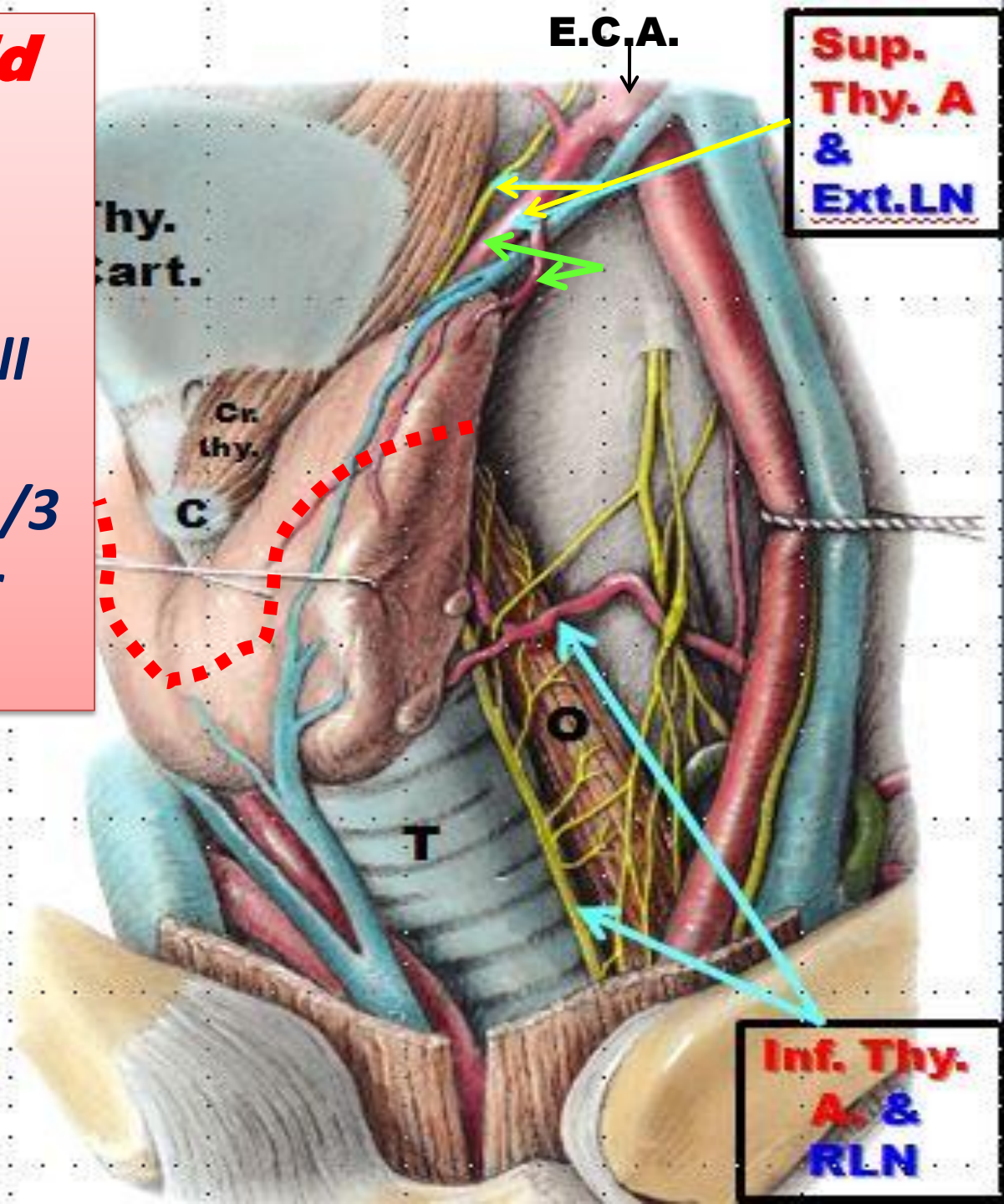
b. Inferior thyroid

c. Thyroidae ima



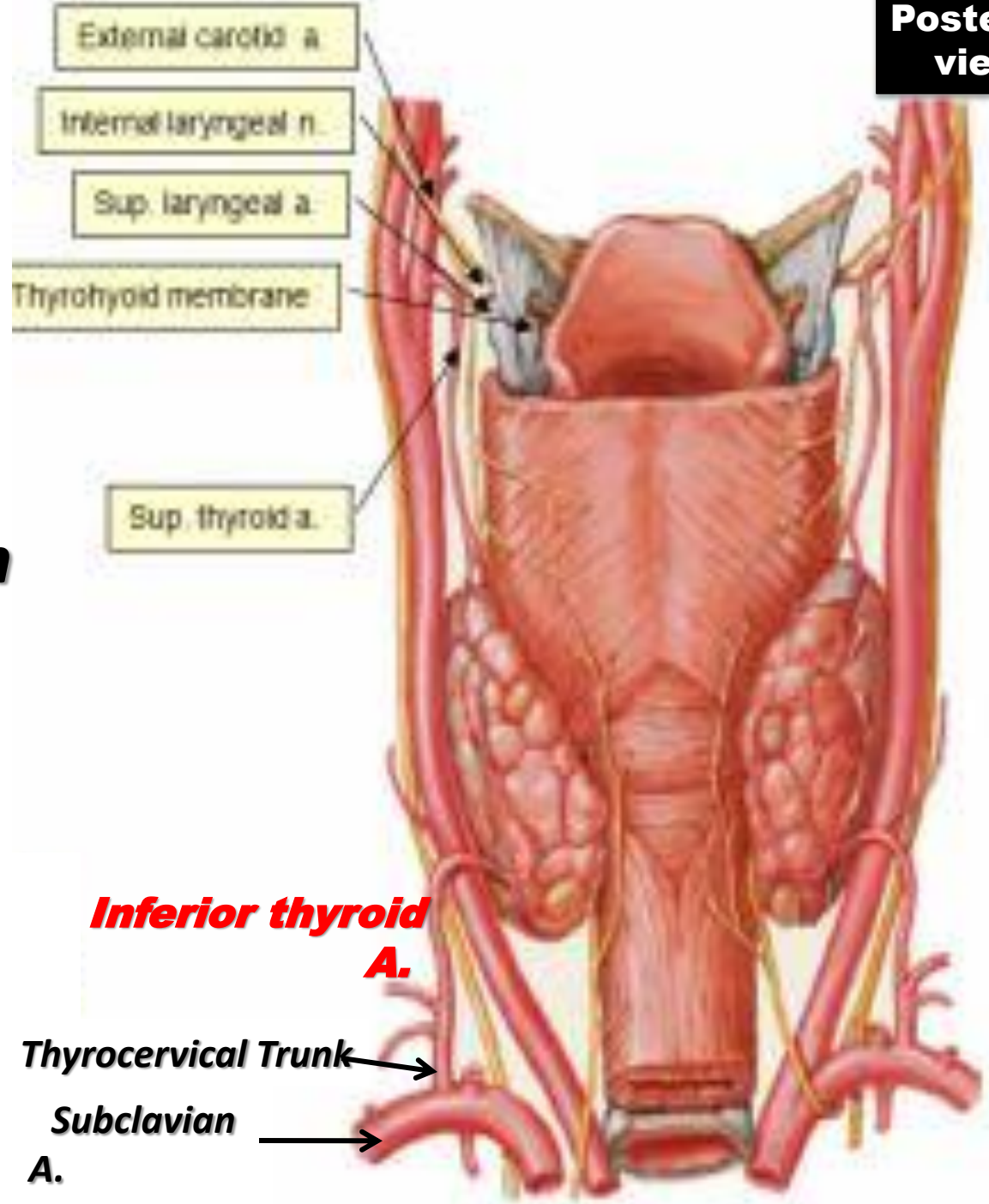
a. Superior thyroid a.:

- From the E.C.A.
- Descends down & medially with ext. LN till the apex of the lobe.
- It supplies the upper 1/3 of the lobe & the upper 1/2 of the isthmus.



b. Inferior thyroid artery:

➤ From the thyrocervical trunk of the 1st part of subclavian artery.

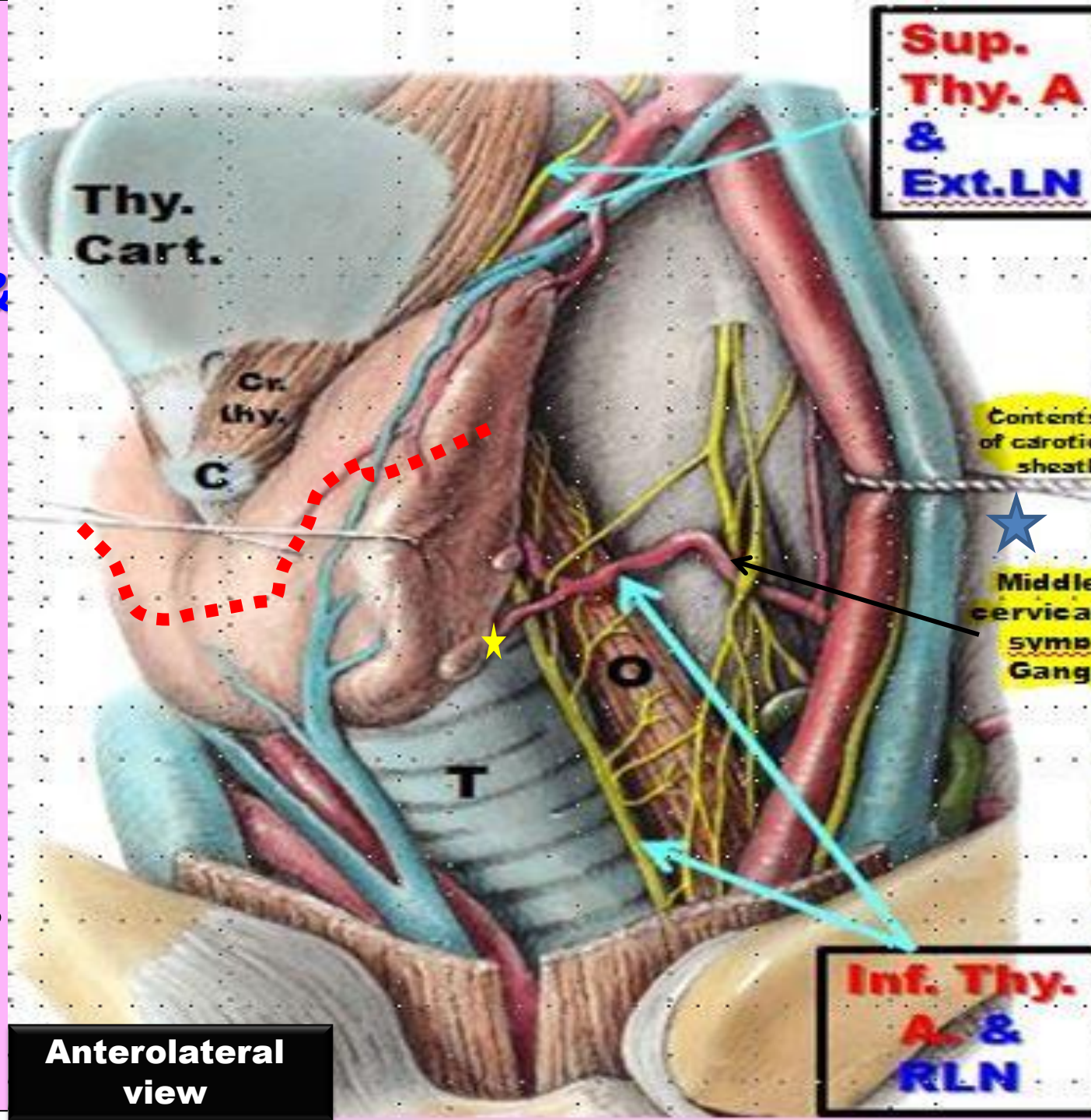


b. Inferior thyroid a.:

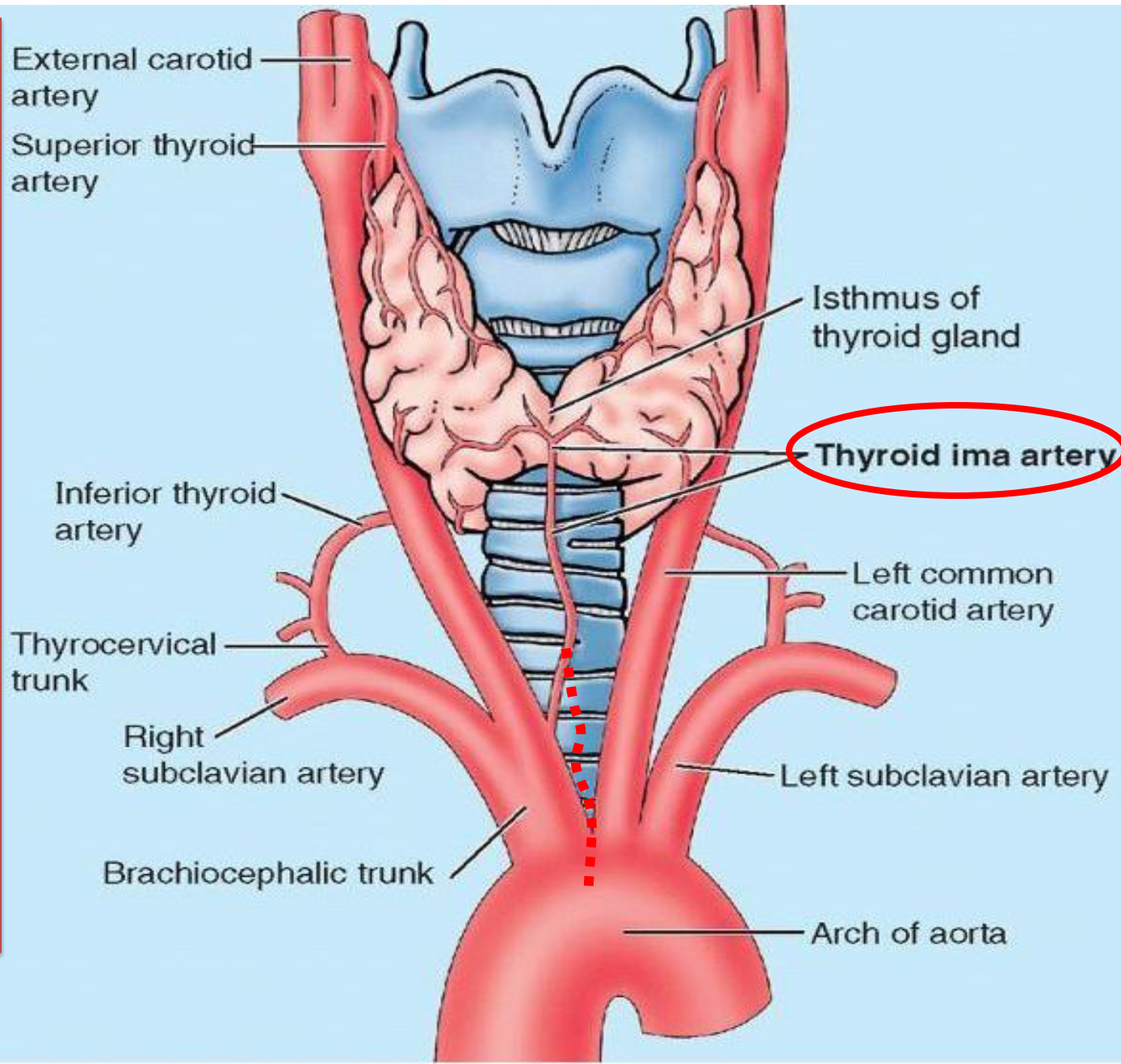
passes behind carotid sheath & middle cervical ganglion.

Near the gland it is closely related to the RECURRENT LARYNGEAL N.

It supplies the lower 2/3 of the lobe & lower 1/2 of the isthmus.



***c.Thyroidae
ima a.:***
***present in 3-
10 %, arises
form brachio-
cephalic
trunk or
aortic arch
supplying
lower part of
the isthmus.***



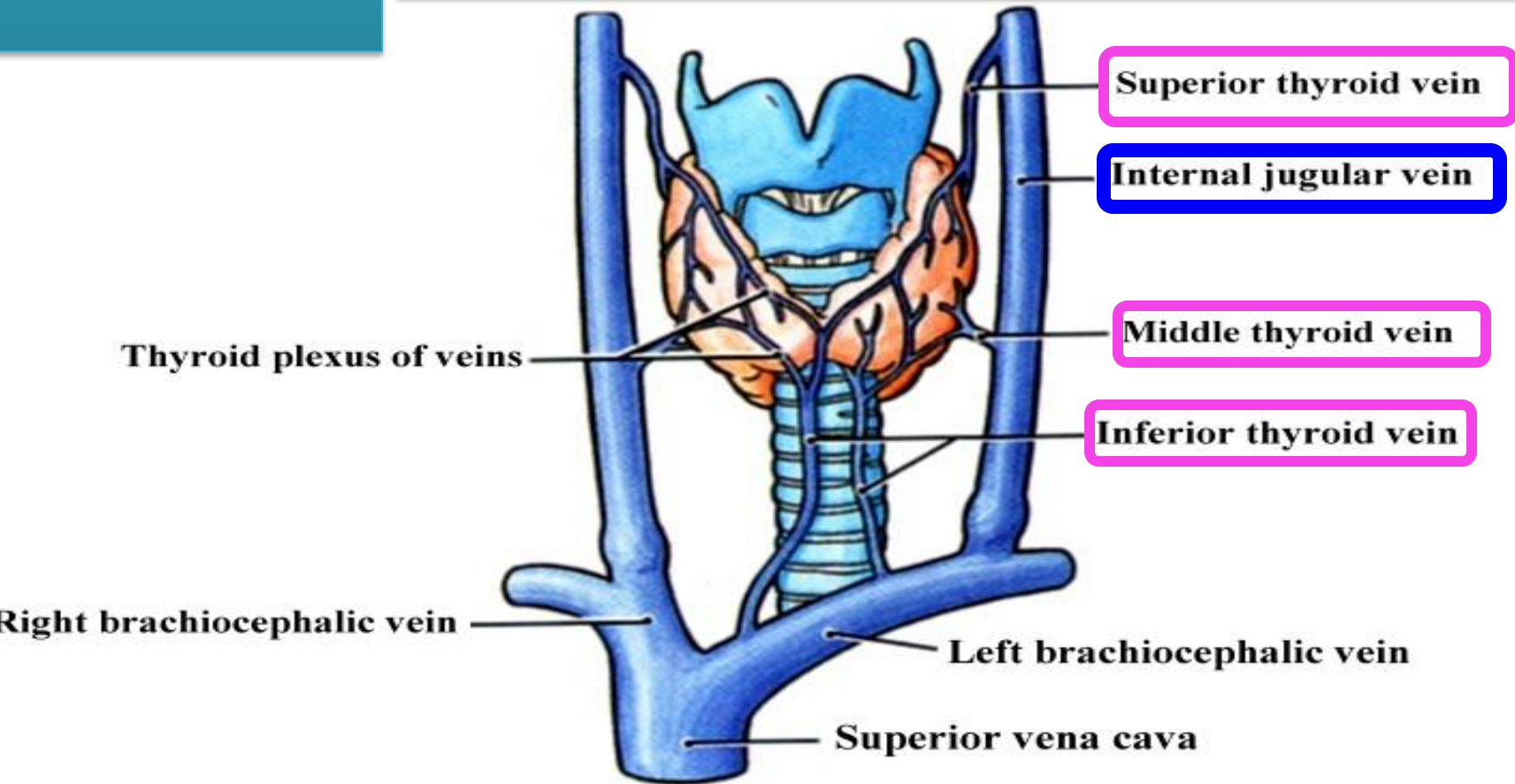
VENOUS DRAINAGE

By 3 veins

1. Superior thyroid: ends in IJV.

2. Middle thyroid : **Short & Wide**. It ends in IJV.

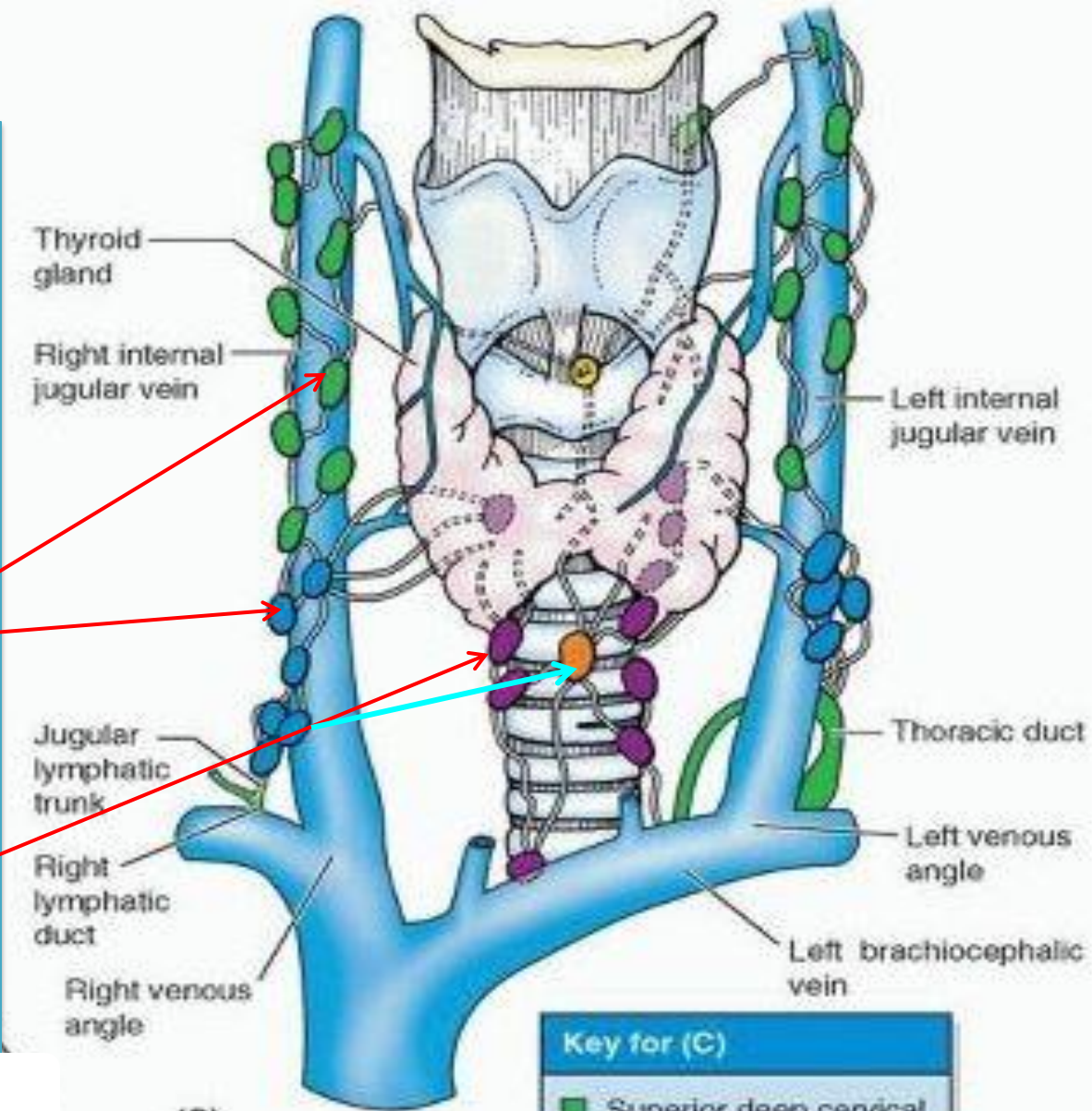
3. Inferior thyroid: ends in brachiocephalic v. specially the left .



Venous Drainage of Thyroid Gland

LYMPH DRAINAGE

Lymph vessels accompany the arteries & drain into deep cervical L.N. & Pre & paratracheal L.N.

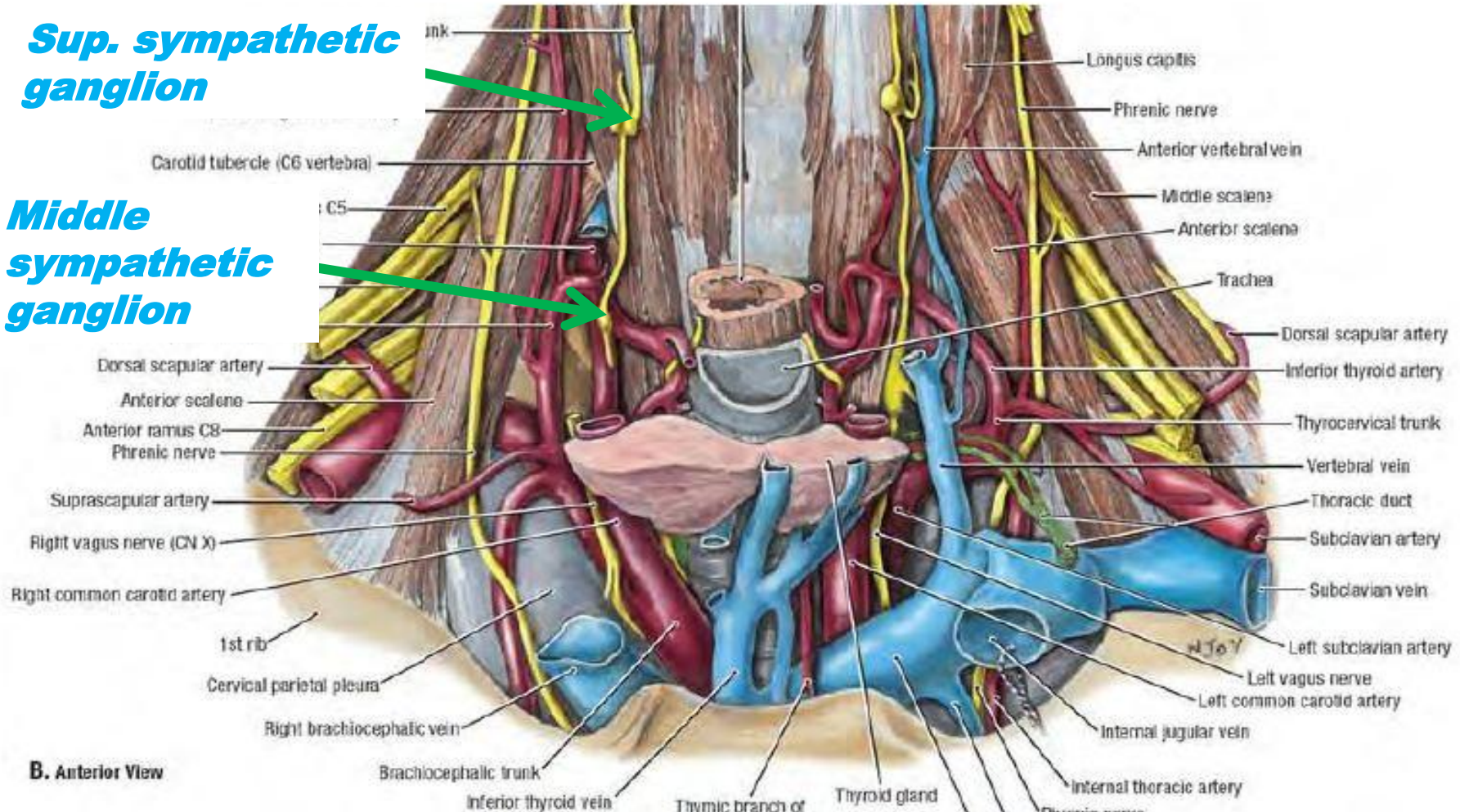


**Nerve supply: sympathetic fibers*

through the plexuses that accompany the thyroid arteries. They are vasomotor, not secretomotor.

Sup. sympathetic ganglion

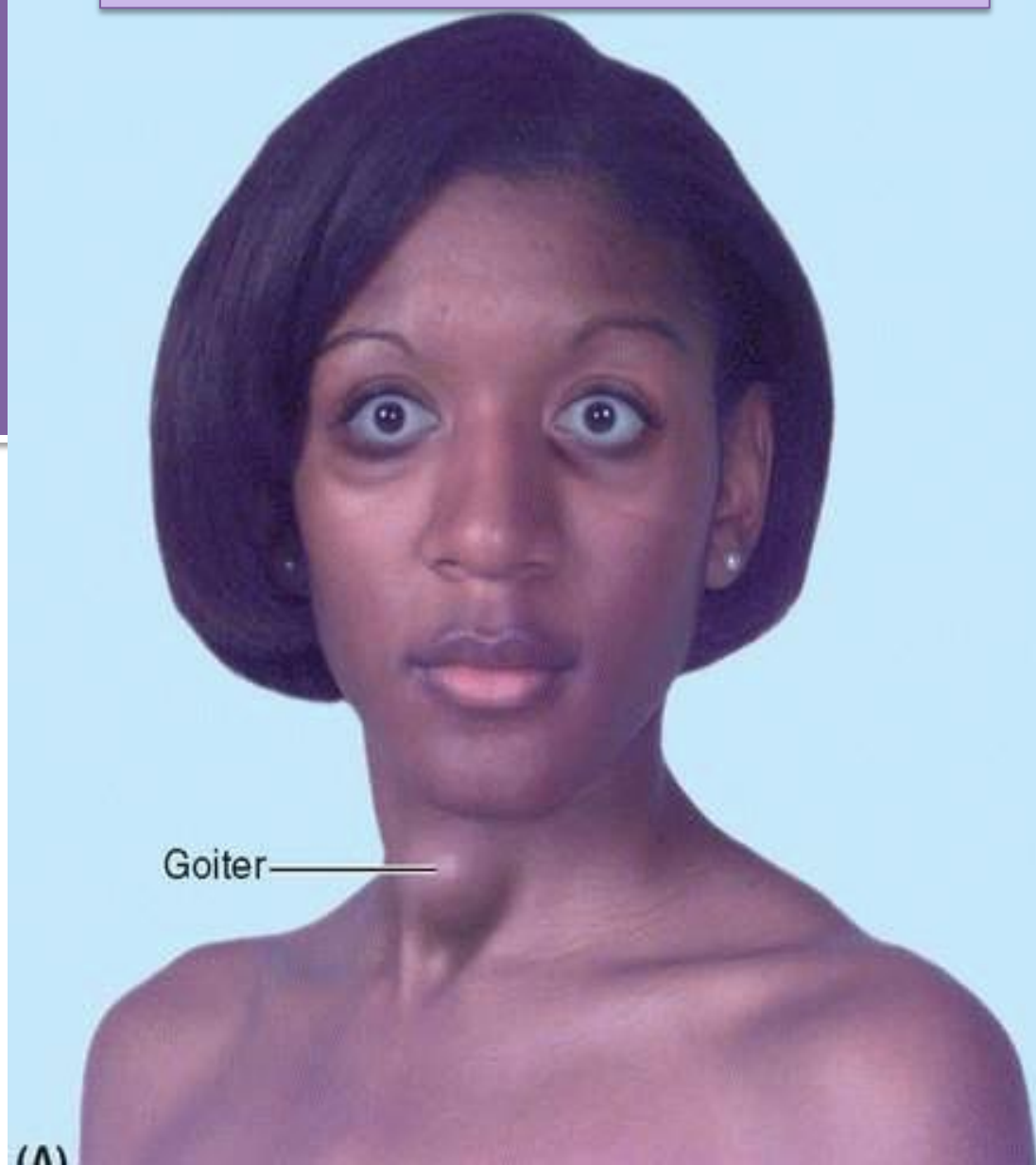
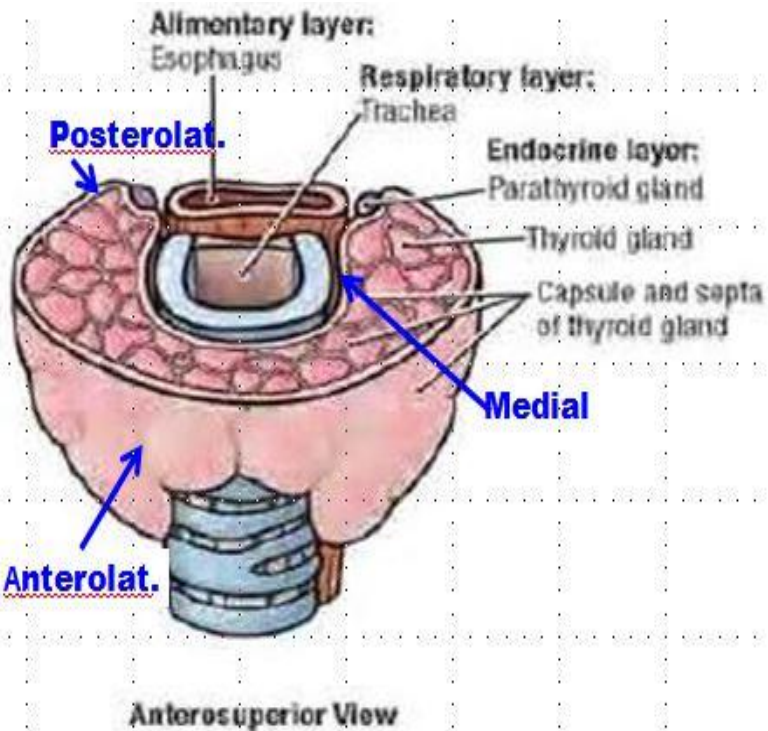
Middle sympathetic ganglion



Applied Anatomy

Enlarged thyroid gland
may compress the
trachea > dyspnea
Or esophagus >
dysphagia.

**Enlarged thyroid is called
*GOITER***



Swellings of the Thyroid Gland and Movement on Swallowing

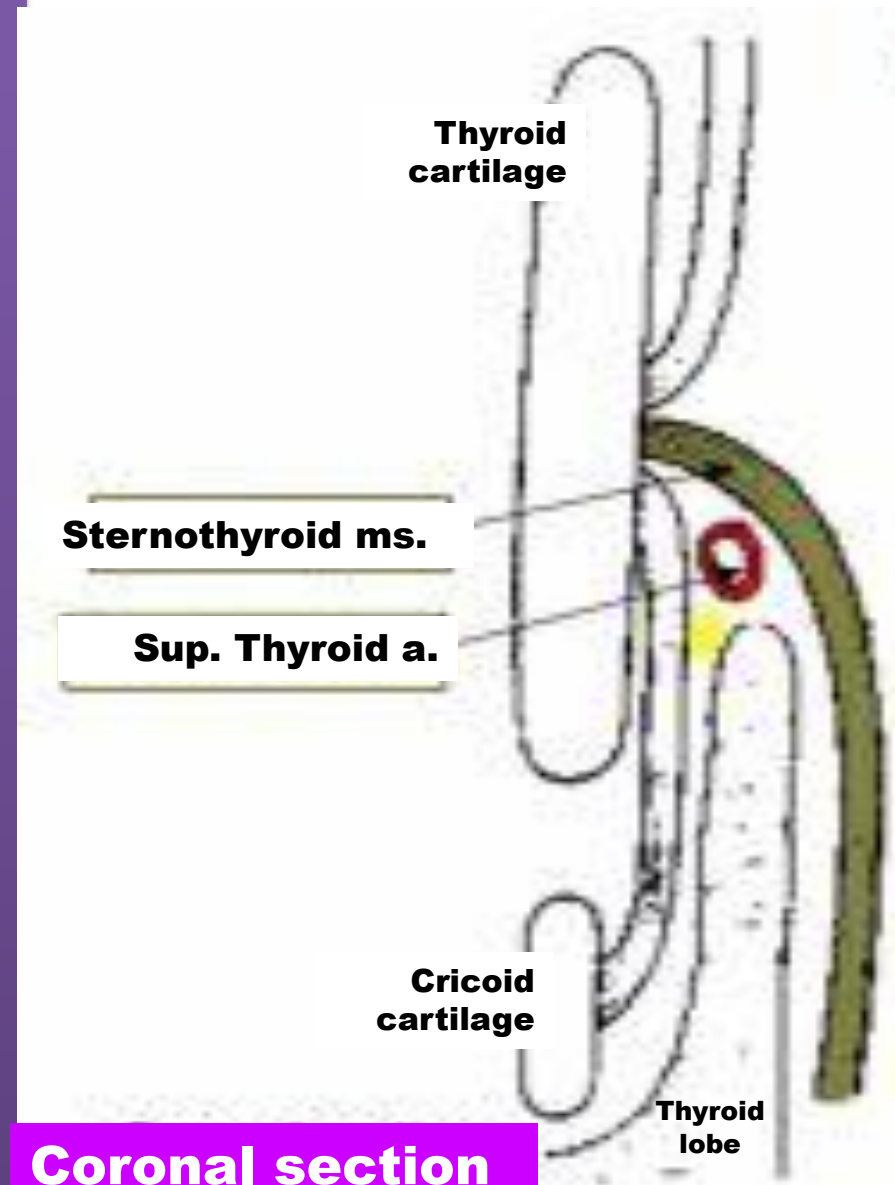
The thyroid gland is invested in a sheath derived from the **PRETRACHEAL FASCIA**. This tethers the gland to the larynx and the trachea.

so any pathologic neck swelling that is part of the thyroid gland will **MOVE UPWARD** when the patient is asked to **swallow**.

Why does a thyroid swelling grow downward & not upward?

The attachment of the **Sternothyroid Muscles** to the thyroid cartilage binds down the thyroid gland to the larynx and prevents upward expansion of the gland.

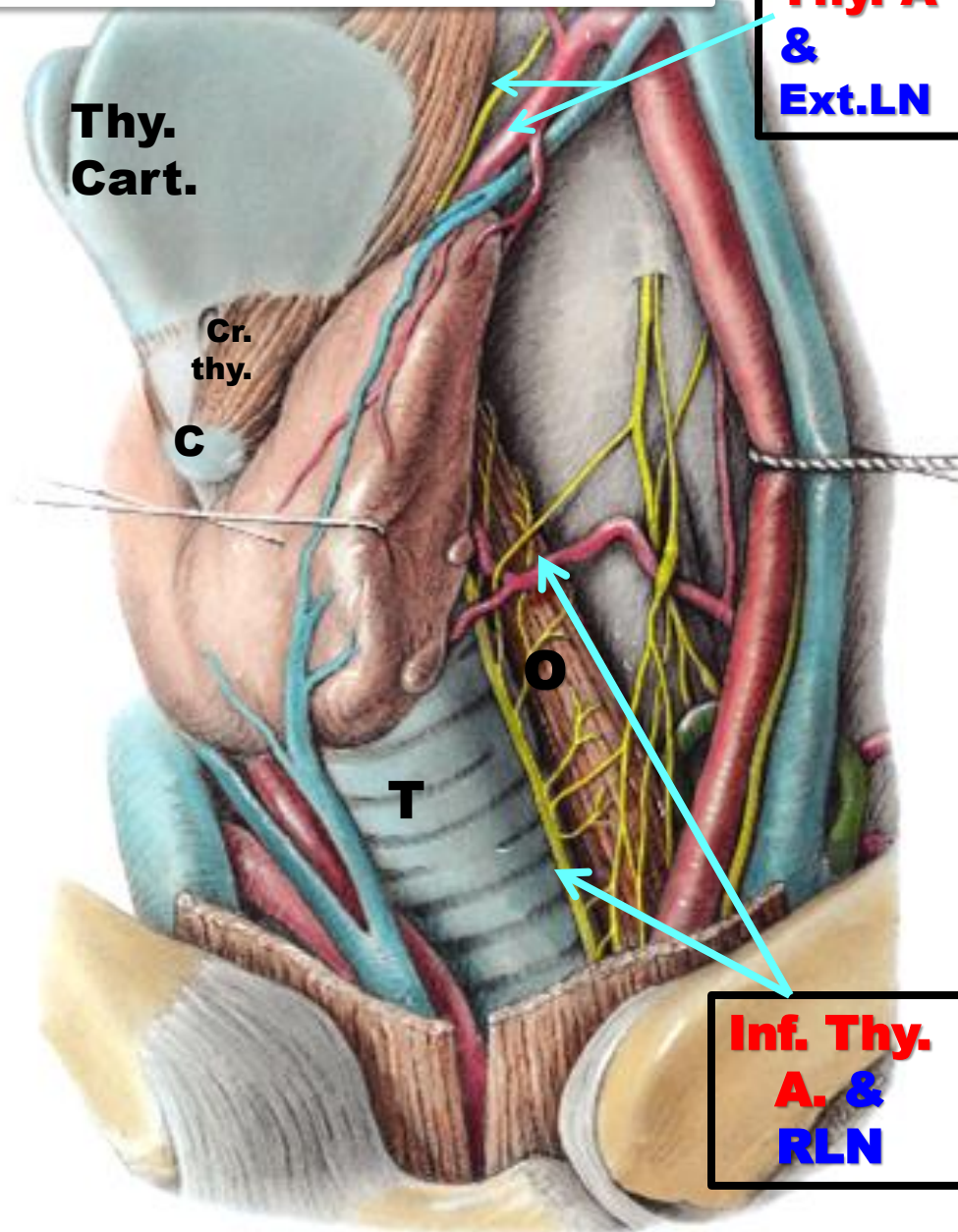
An enlarged thyroid gland can extend downward behind the sternum (retrosternal goiter).



Thyroid Arteries And Laryngeal Nerves

To avoid injury of the external laryngeal nerve during thyroidectomy

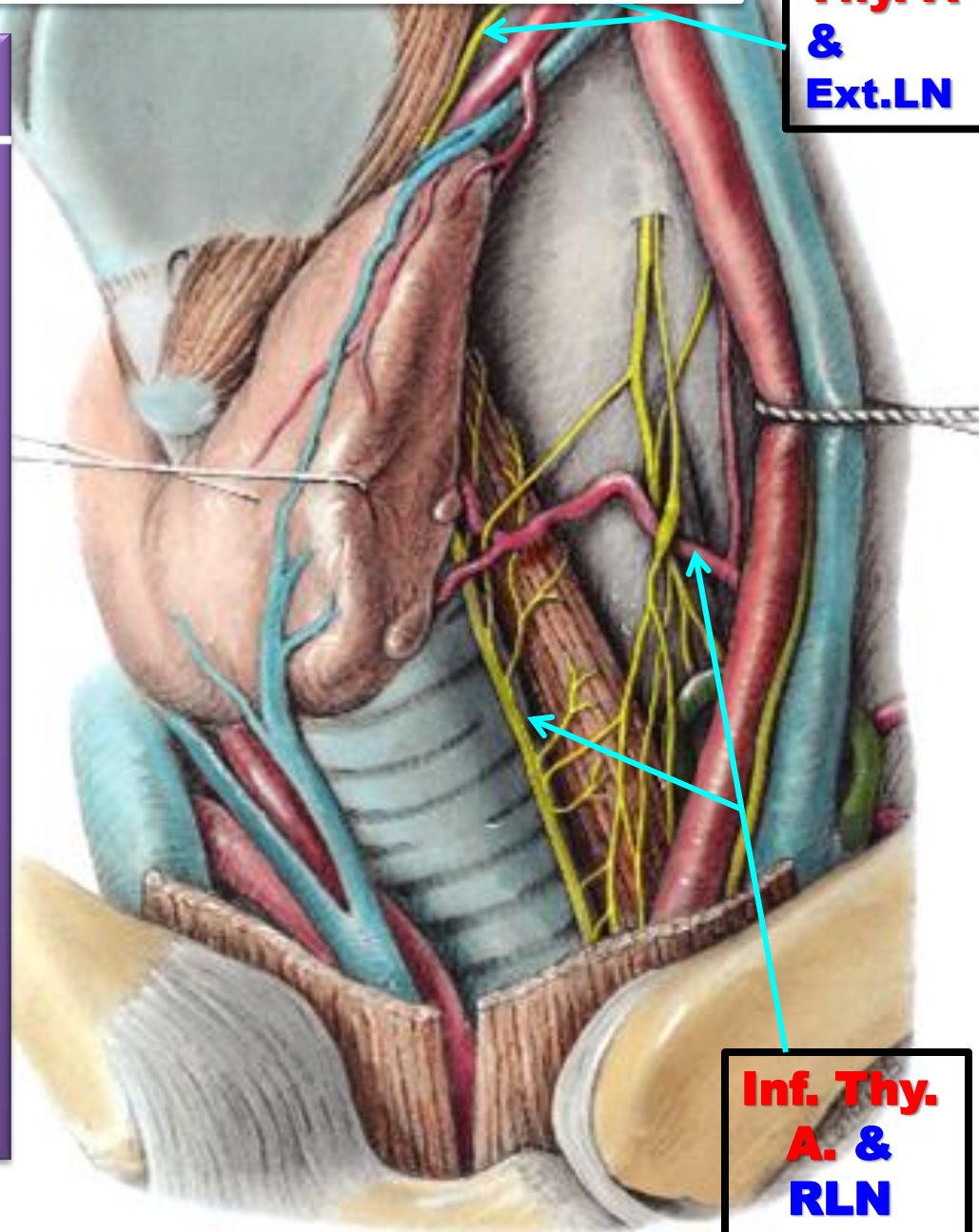
The superior thyroid artery should be ligated as near as possible to the gland or even within the apex of the gland.



Thyroid Arteries And Laryngeal Nerves

To avoid injury of the recurrent laryngeal nerve during thyroidectomy.

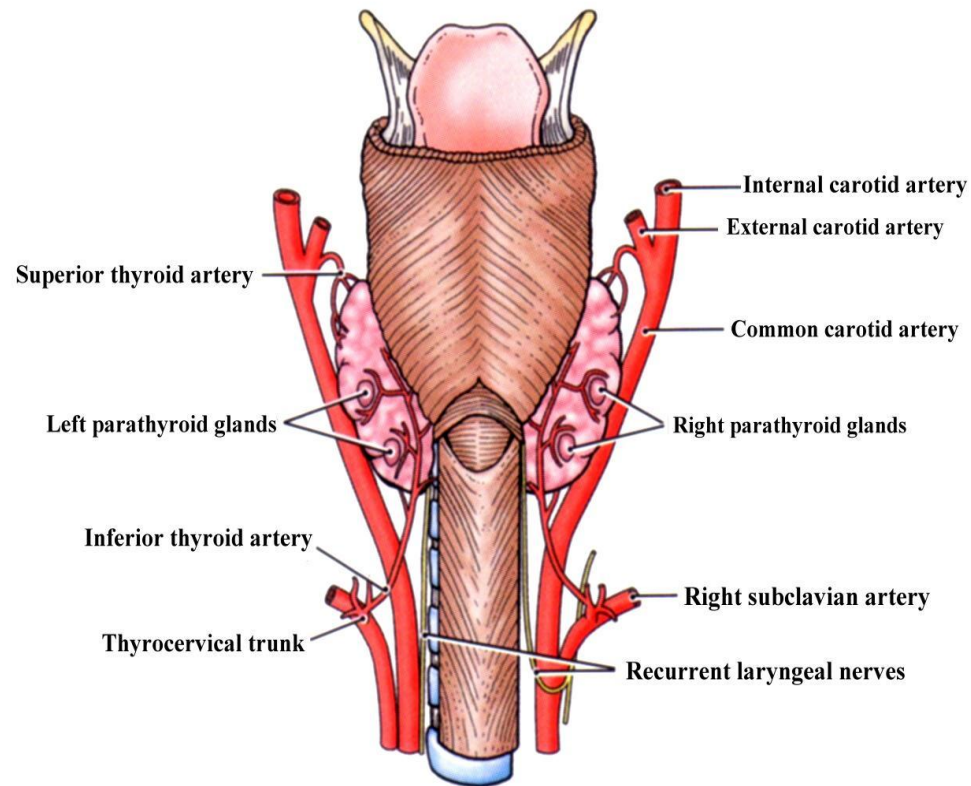
Ligation of the inferior thyroid artery should be as far as possible from the base of the gland.



Thyroidectomy and the Parathyroid Glands

In partial thyroidectomy, the posterior part of the thyroid gland is left undisturbed so that the parathyroid glands are not damaged.

Removal of the parathyroid glands during the surgery may lead to hypocalcemia and tetany.



Thyroid Gland:
Posterior Relations and Blood Supply

Histological structure of thyroid gland

- **The gland is formed of stroma and parenchyma.**

A-Stroma:

***The gland is covered by capsule.**

***Septa: divide the gland into ill-defined lobules and carry bl.vs and ns.**

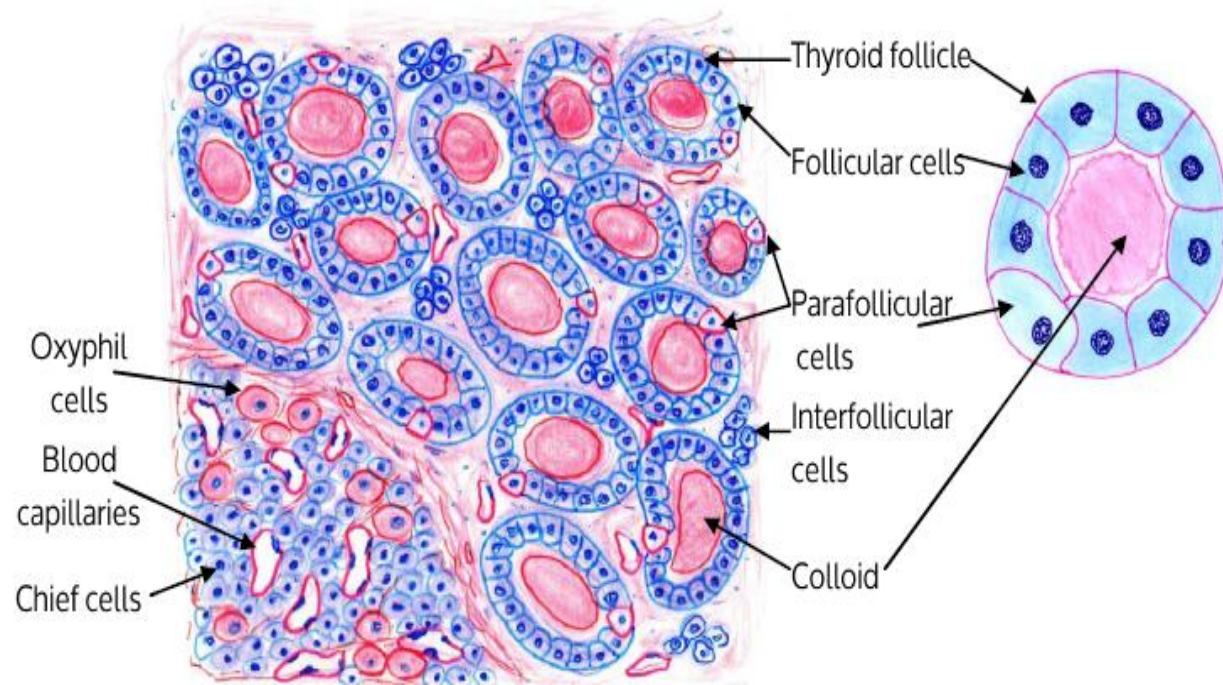
B-Parynchema:

***Formed of epithelial cells which form the thyroid follicle which is the functional unit of thyroid gland.**

***The follicles is spherical shape filled with colloid (formed of thyroglobulin protein)which is acidophilic and PAS positive.**

***The lining of follicles is :**

- Follicular cells 98%**
- Parafollicular cells 2%**



1-Follicular cells:

In normal functioning gland : cuboidal cells (basophilic cytoplasm and central, prominent and rounded nucleus).

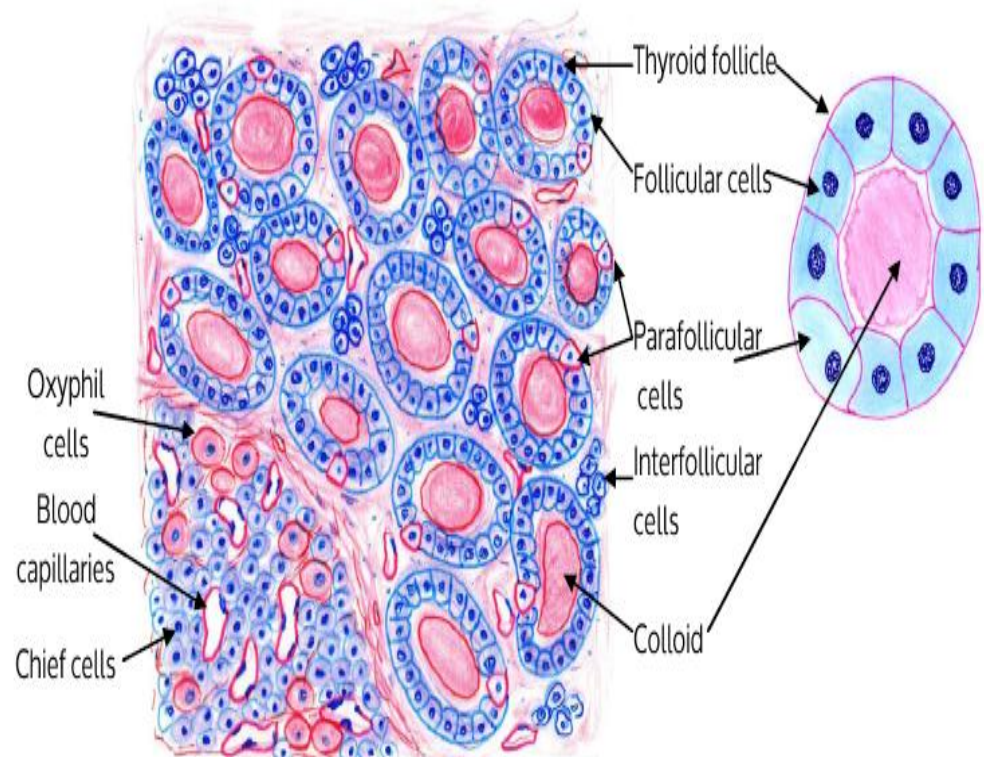
Function: synthesis of thyroid hormone.

2- parafollicular cells:

Larger and paler than follicular cells.

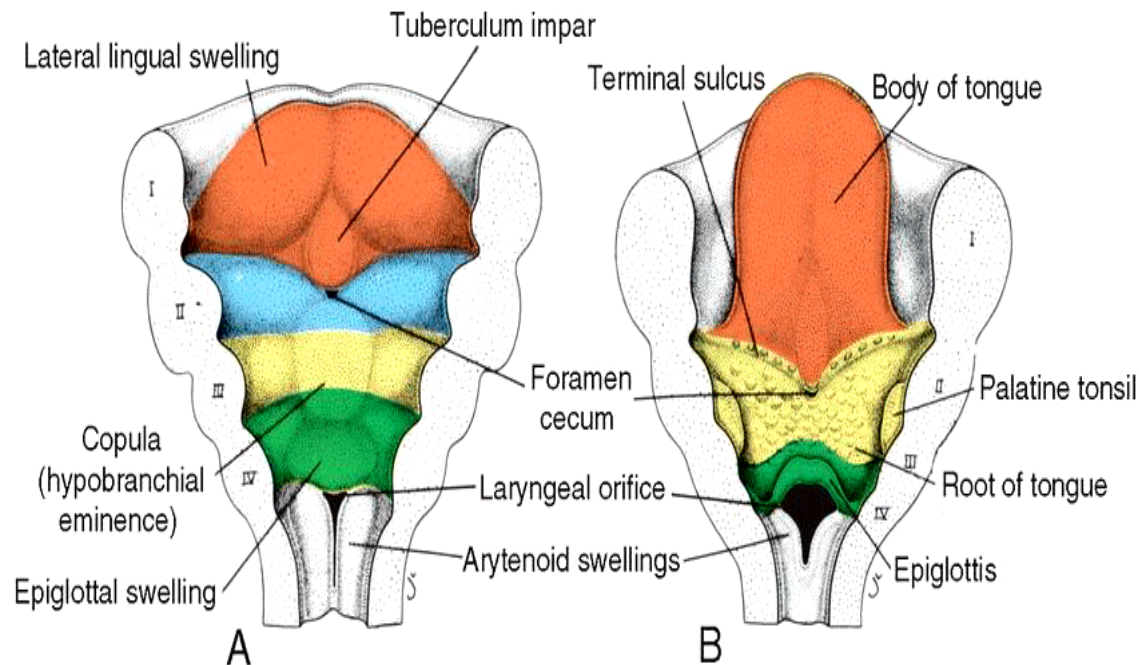
Large rounded cells with spherical nucleus.

Function: synthesis of calcitonin (antagonize the parathyroid hormone) as it decrease the Ca^{+} level if exceed than normal level.



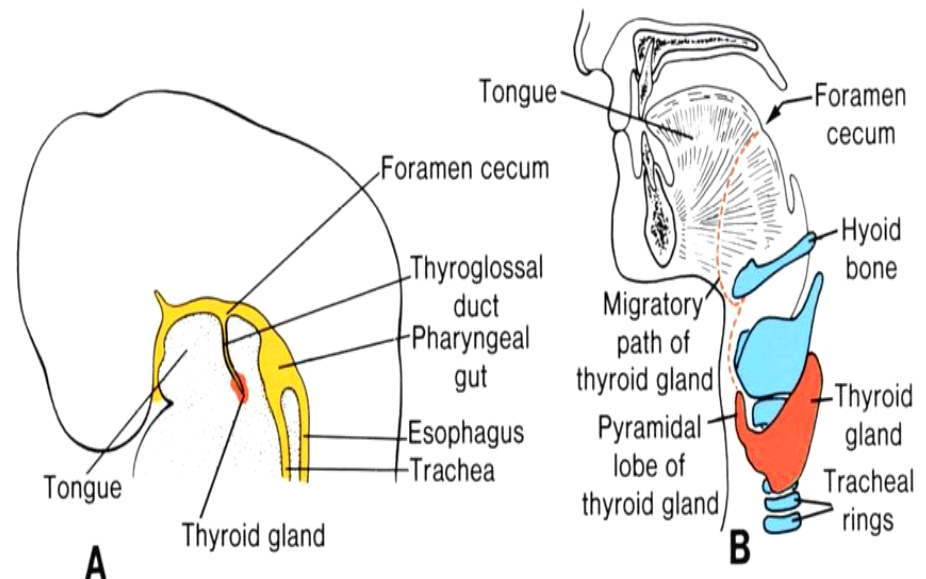
Development of the Thyroid Gland

- * Time: during the 3rd week of development.
- * It appears as an epithelial thickening in the floor of the pharynx at a point later indicated by the foramen cecum (which lies between tuberculum impar & hypobranchial eminence or between anterior 2/3 & posterior 1/3 of tongue).



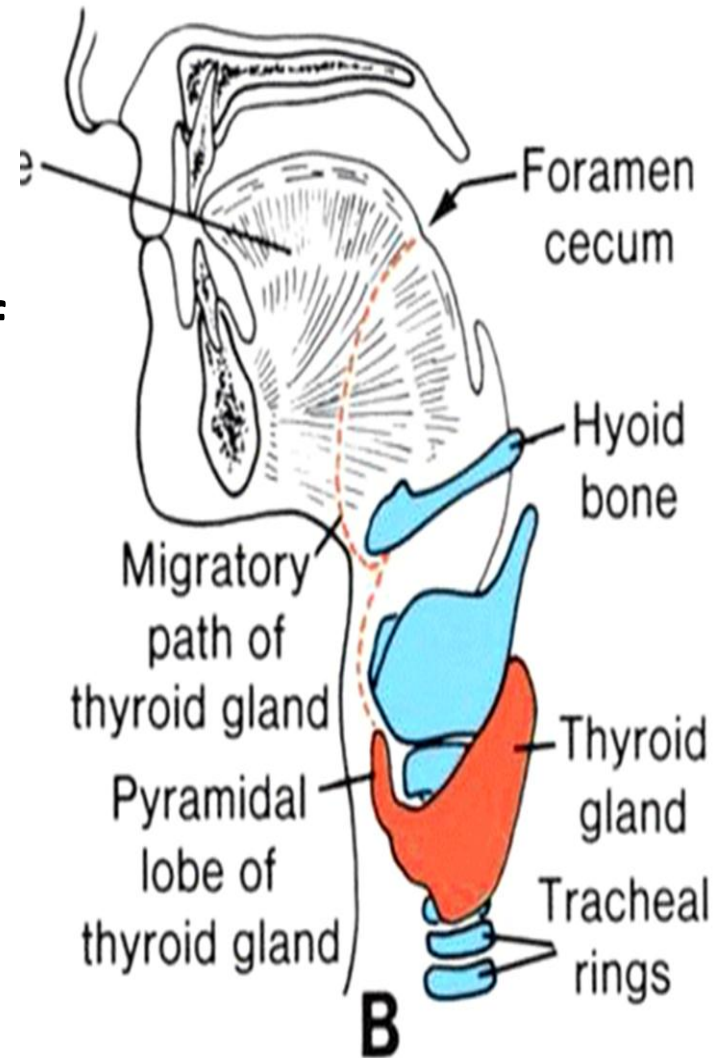
Development of the Thyroid Gland

- * This thickening becomes a diverticulum.
- * Subsequently the thyroid descends in front of the pharynx as a bilobed diverticulum.
- * During this migration the thyroid remains connected to the tongue by a narrow canal, the **thyroglossal duct**. This duct later disappears.



Development of the Thyroid Gland

- * With further development, the thyroid gland descends in front of the hyoid bone and the laryngeal cartilages.
- * It reaches its final position in front of the trachea in the 7th week of development.
- * By then, it has acquired a small median isthmus and two lateral lobes.
- * The thyroid gland begins to function at approximately the end of the 3rd month, at which time the first follicles containing colloid become visible.



Development of the Thyroid Gland

* Cells at the lower end of the thyroglossal duct proliferate into 1ry and 2ry thyroid follicles which start to function at the end of the 3rd month.

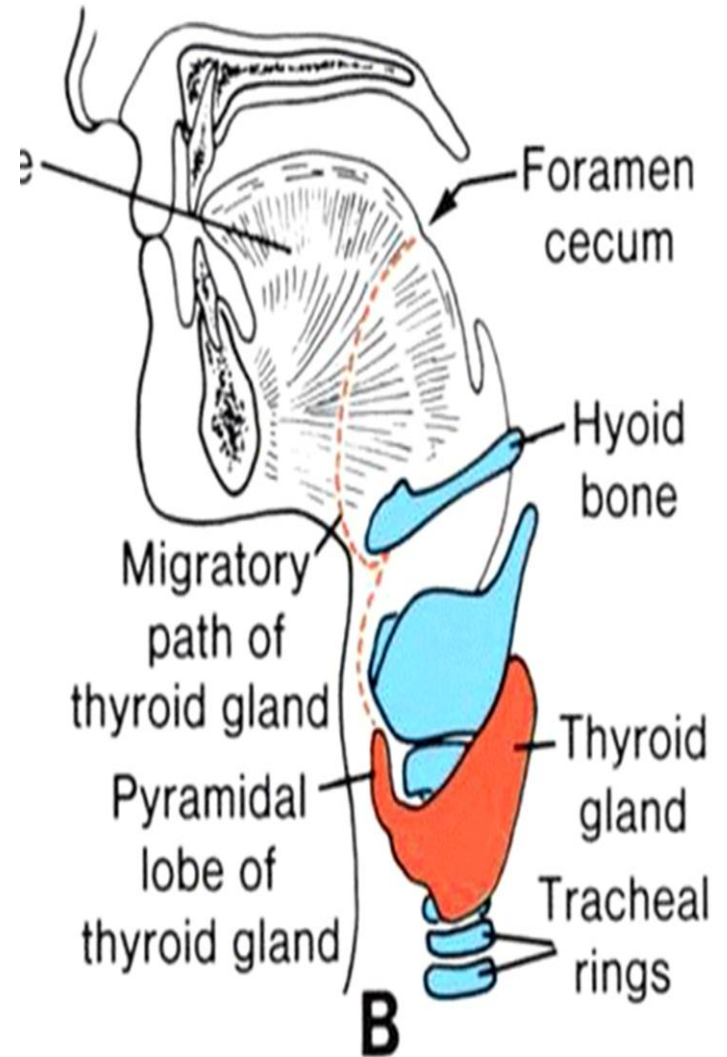
* The ultimobranchial body (from the 5th pouch) invades the gland → the parafollicular or C-cells which secrete calcitonin.

* Fate of the rest of the thyroglossal duct :

1. The infrahyoid portion → the levator glandulae thyroideae + the pyramidal lobe.

2. The suprahyoid portion → disappears.

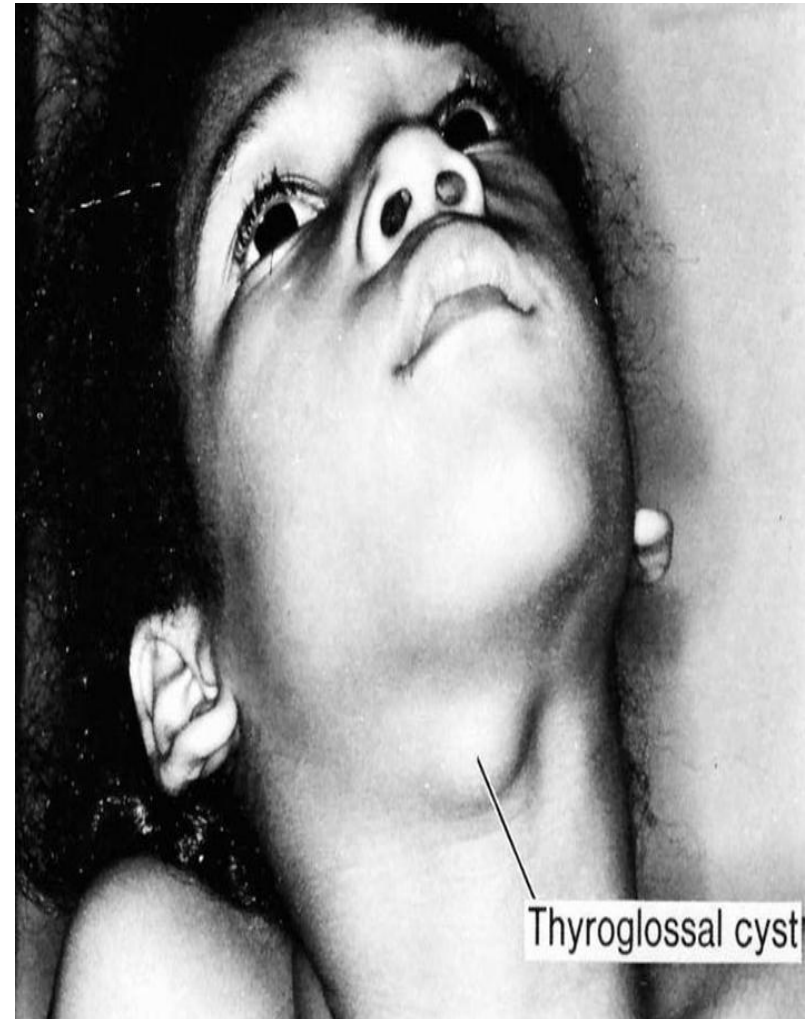
3. The site of origin of the duct is marked by the foramen caecum at the apex of sulcus terminalis of the tongue.



Development of the Thyroid Gland

* Thyroglossal cysts:

- * Represent the most common congenital anomaly of the neck.
- * They arise from a persistent epithelial tract, the thyroglossal duct, formed with the descent of the thyroid from the foramen caecum to its final position in the front of the neck.



* Anomalies of thyroid gland development:

1. Congenital cretinism :

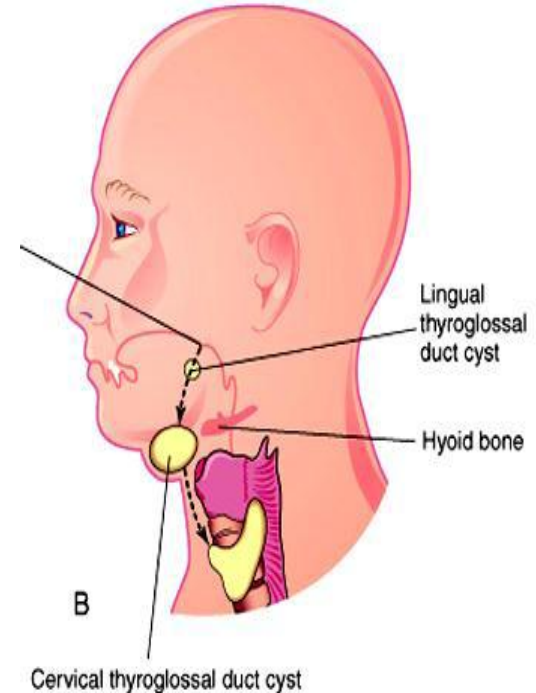
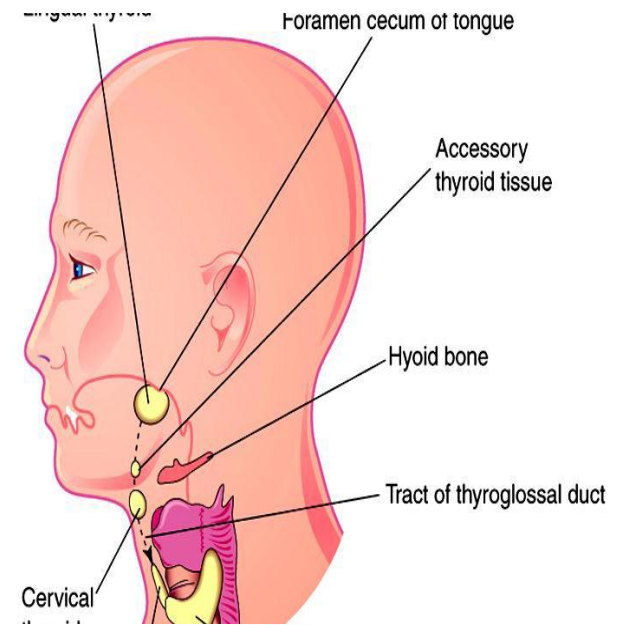
due to congenital absence of thyroid gland.

2. Aberrant thyroid tissue :

lingual thyroid, suprahyoid, retrohyoid, infrahyoid or retrosternal

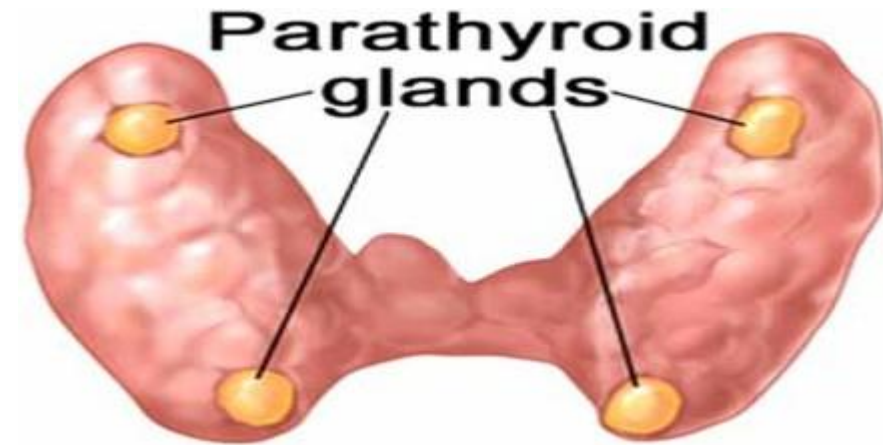
3. Thyroglossal cyst and fistula:

The fistula is due to rupture of the cyst. They differ from branchial cyst and fistula in being close to the midline and in moving up with deglutition.



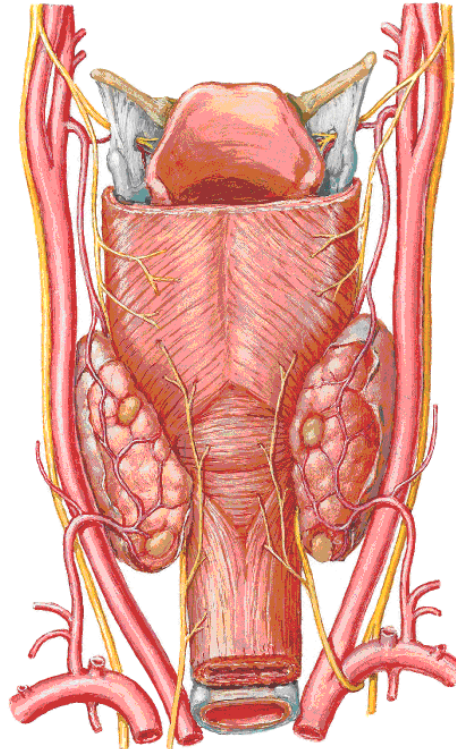
Parathyroid Glands

**Two pairs of small endocrine glands lying on the posterior border of thyroid gland within its capsule.*



**Shape: is oval.*

**Size:- 6 x 4 x 2 mm.*



Parathyroid Glands

* **Site:**

* **Superior one:** lies at the middle of posterior border of thyroid gland.

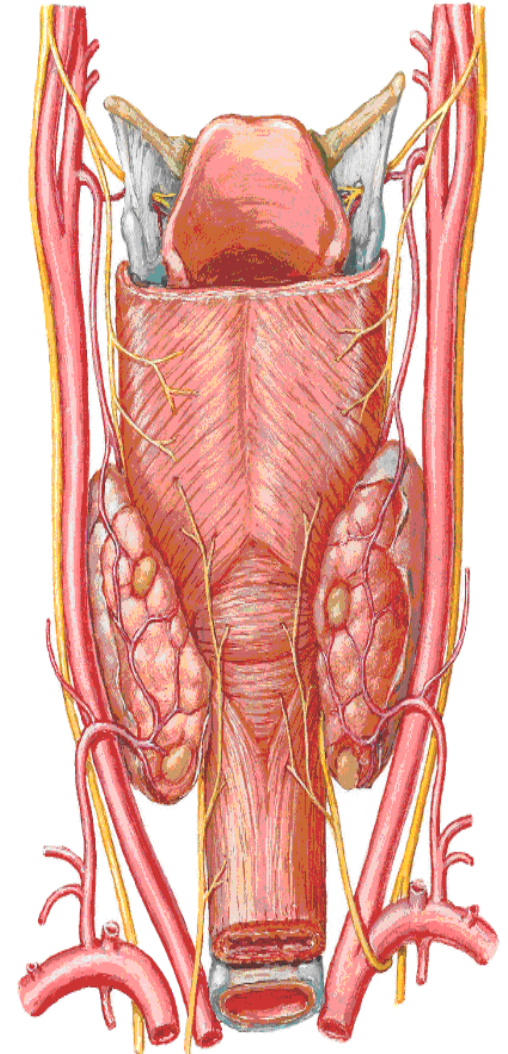
* **Inferior one:** has variable sites.

a. Below inferior thyroid artery near to the lower pole of the thyroid lobe.

b. Outside the capsule immediately above the inf. thyroid artery.

* **Blood supply:** Inferior thyroid A.

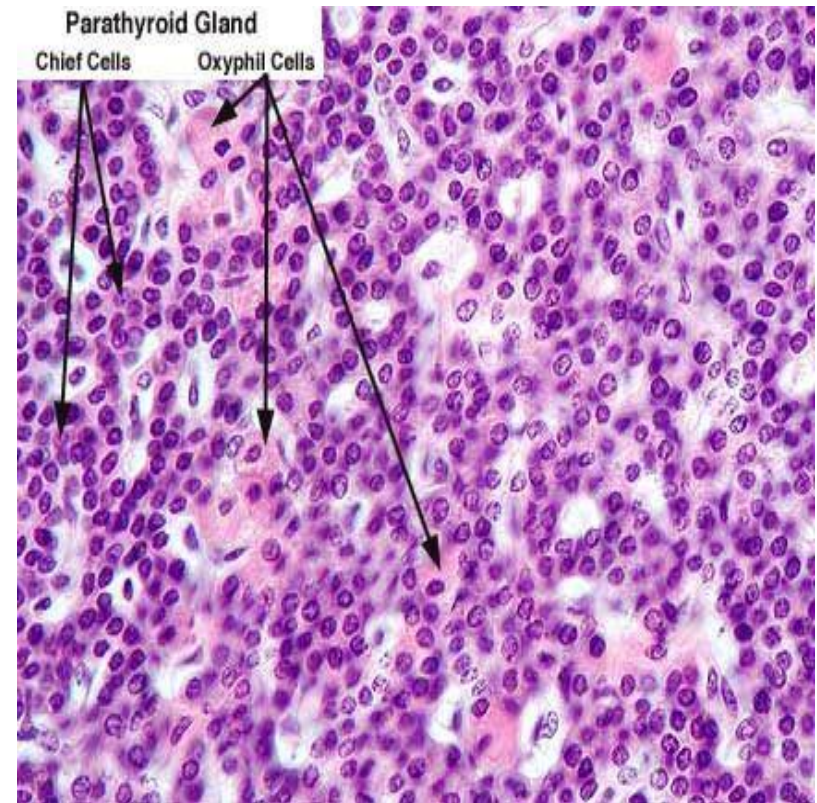
* **Veins & LNs.:** as thyroid gland.



Histology of the Parathyroid Glands

* The parenchyma of the gland is made up of two identifiable cell types: the predominant **chief (principal) cells** (source of parathyroid hormone) and occasional **oxyphil cells**.

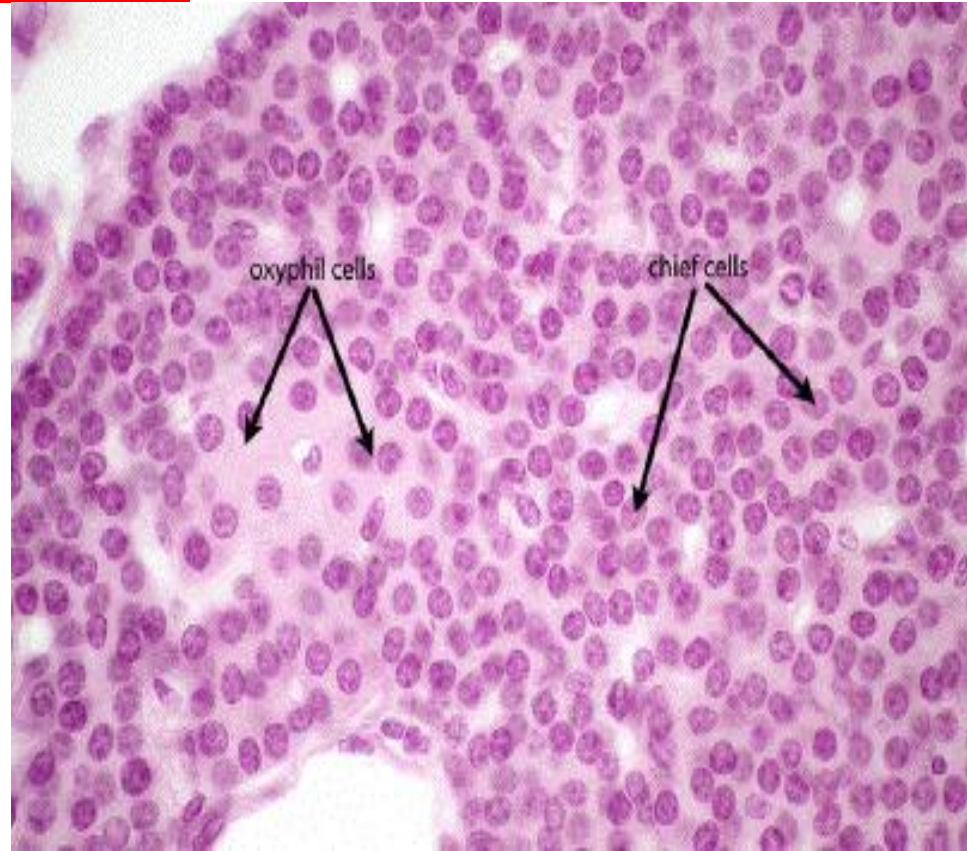
* The chief cells are arranged as interconnecting cords or clusters, with blood vessels and connective tissue forming the partitions between the cell cords.

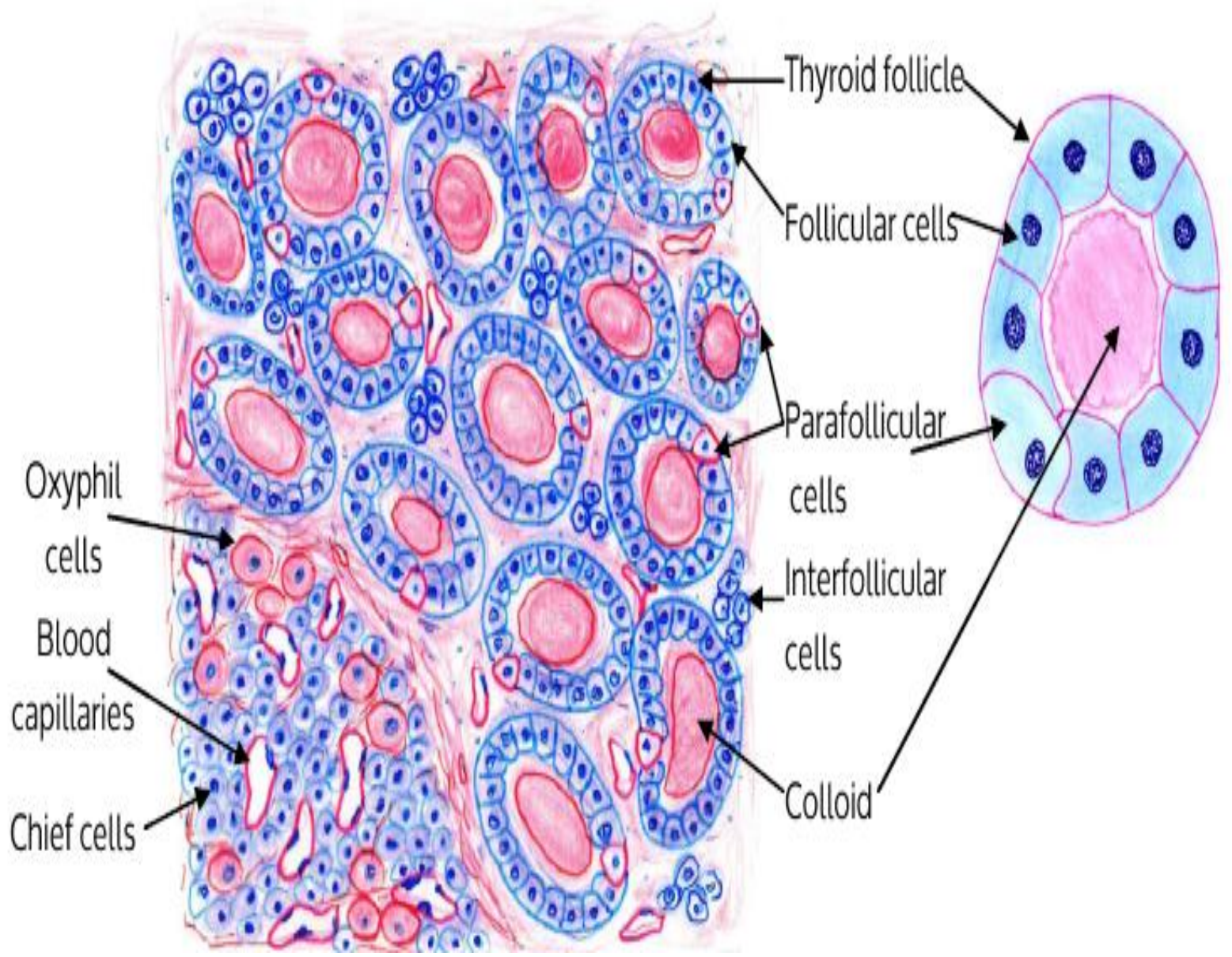


Histology of the Parathyroid Glands (contd)

- The chief cells, small polygonal cells with basophilic cytoplasm and central vesicular nuclei.
- Function : synthesis of parathyroid hormone
- The oxyphil cells are polygonal cells with dark and large nuclei with acidophilic cytoplasm.

* The function of oxyphil cells is yet unknown.





THANK YOU

