

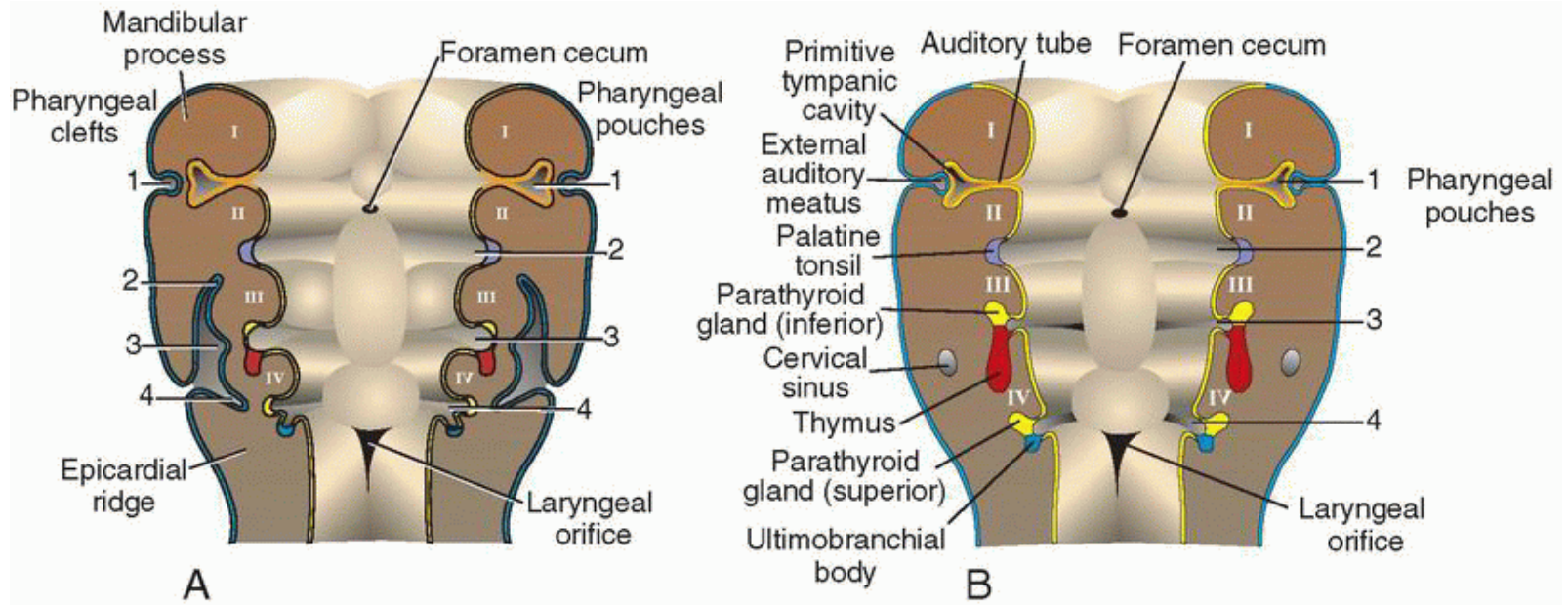
Thyroid gland

Anatomy, embryology and physiology

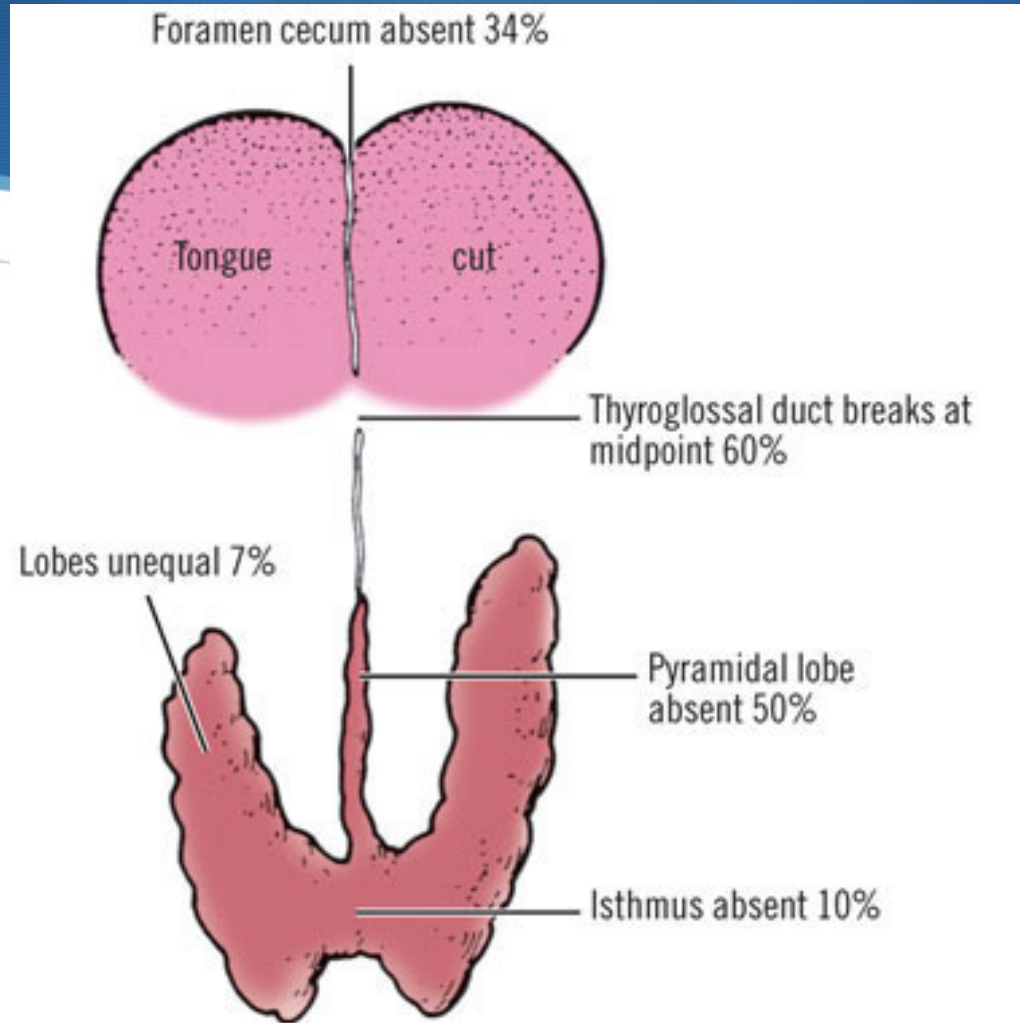


Embryology

- ◆ Develops from foramen caecum – in floor of pharynx
- ◆ Reaches final position at 7 th week
- ◆ Begins function at end of third month
- ◆ Parafollicular cells which are source of calcitonin are derived from ultimobranchial body



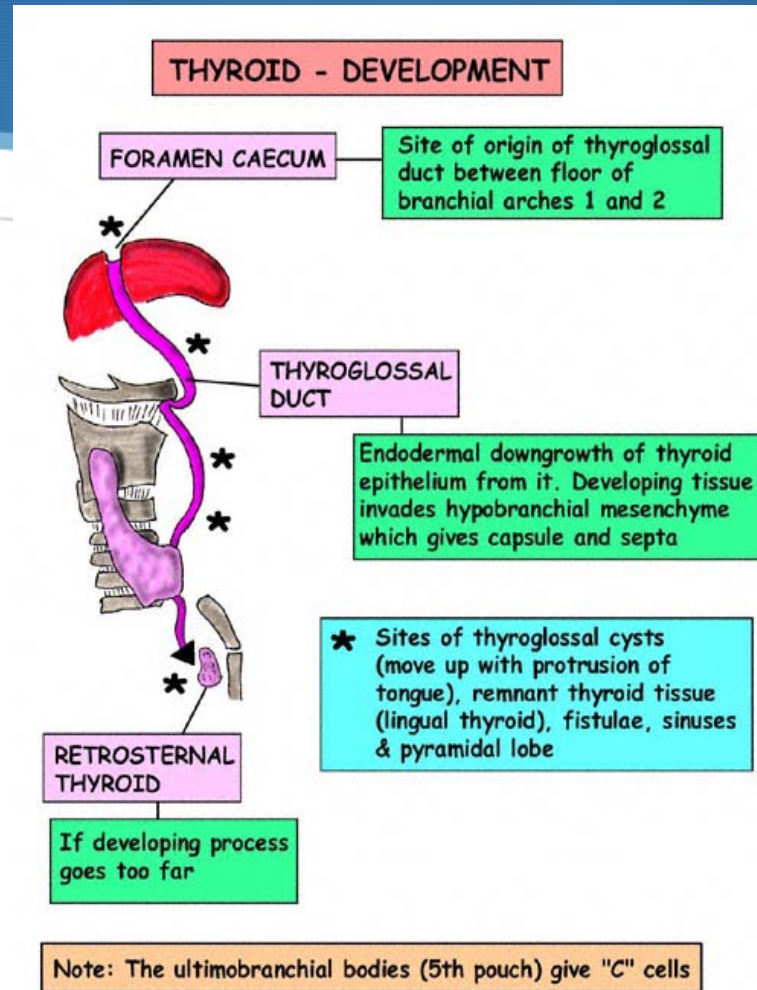
THYROID GLAND EMBRYOLOGY



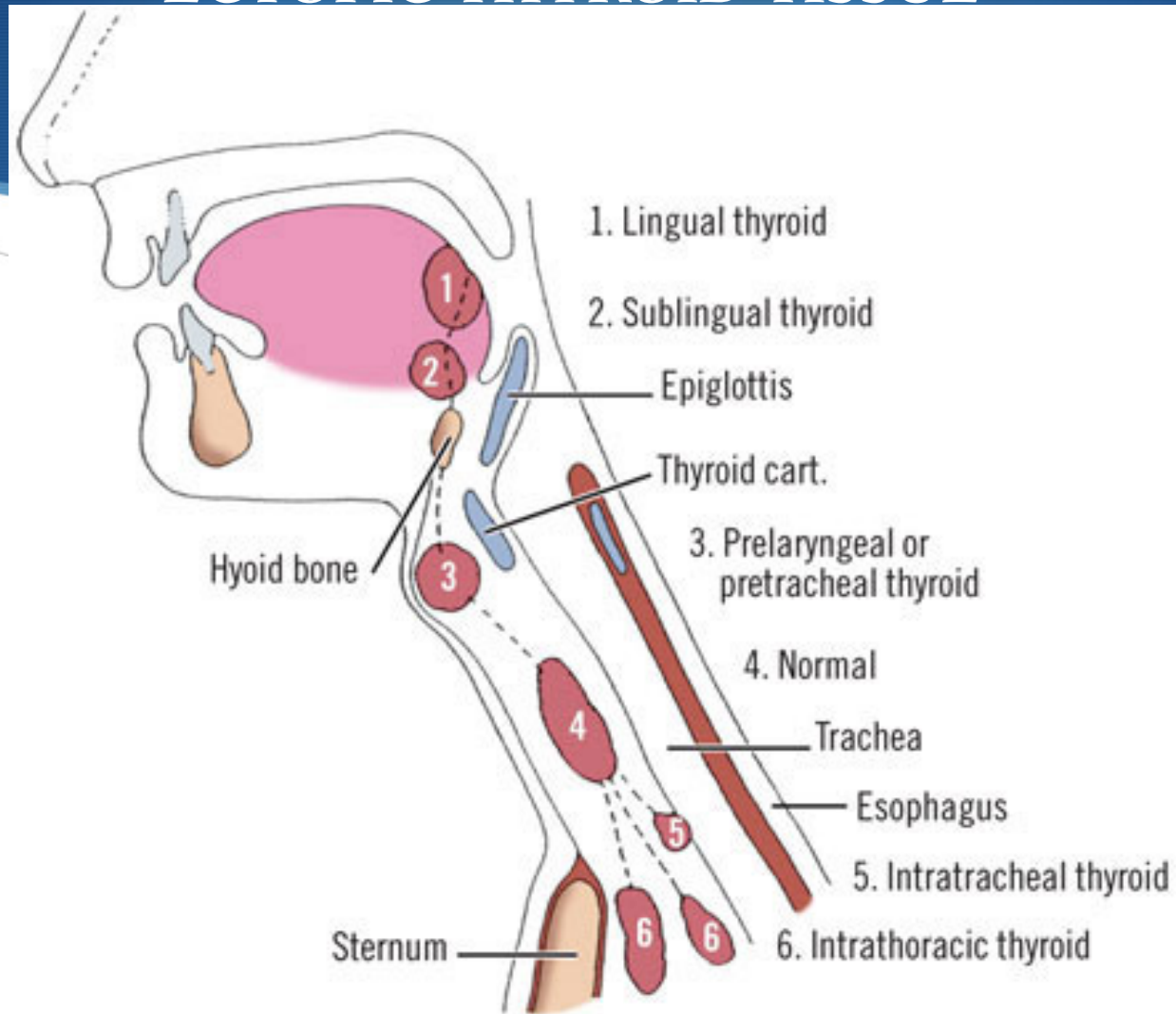
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THYROID EMBRYOLOGY



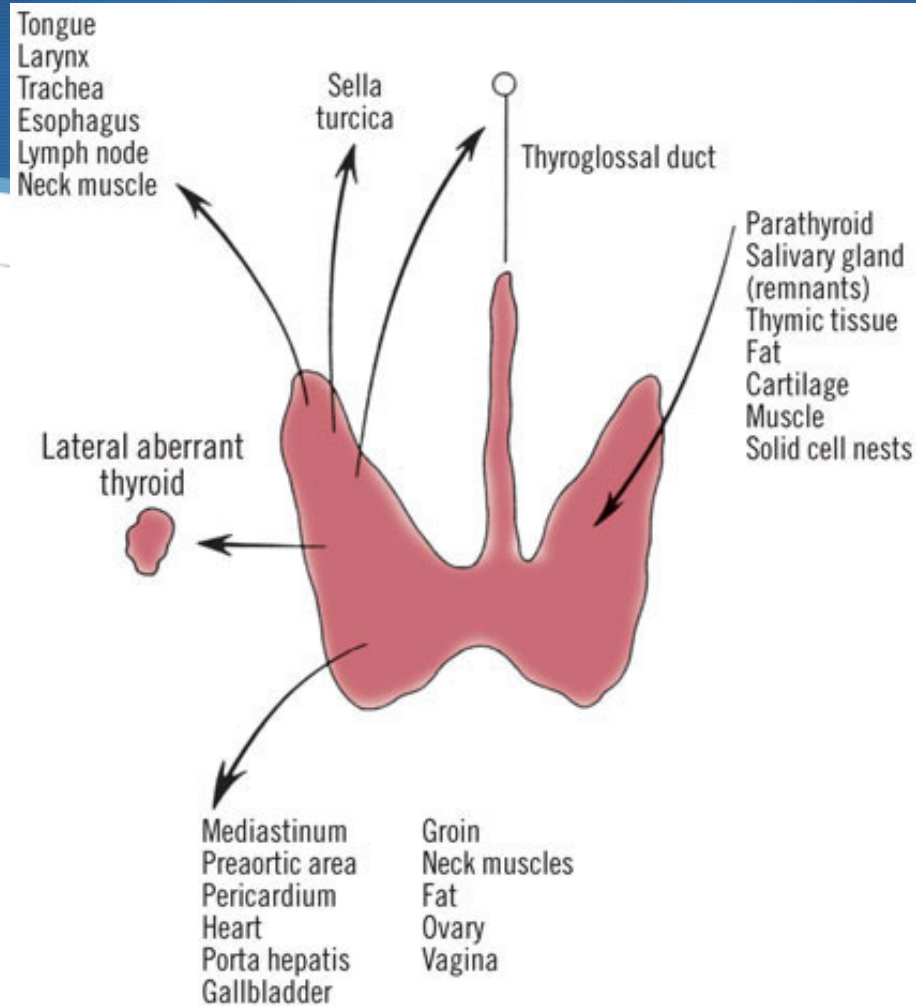
ECTOPIC THYROID TISSUE



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LEFT SIDE ECTOPIC THYROID TISSUE-RIGHT OTHER TISSES FOUND WITHIN THYROID



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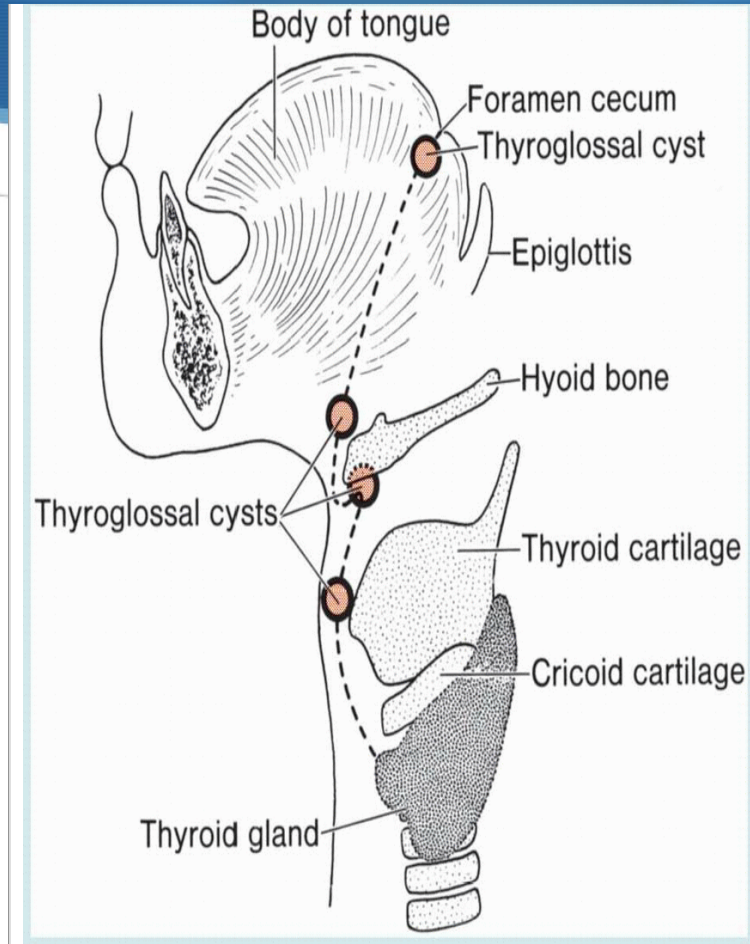


Figure 16.19

Thyroglossal cysts. These cysts, most frequently found in the hyoid region, are always close to the midline.

xi

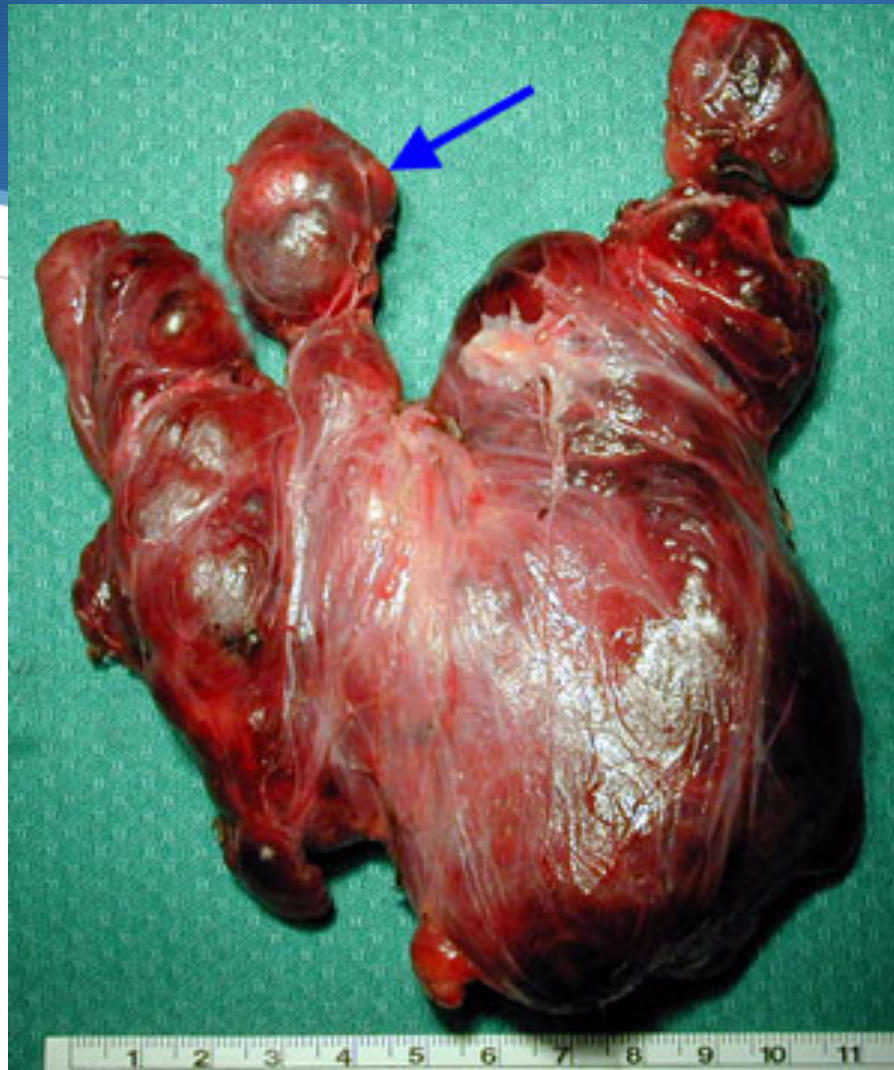
Anatomy

- ◆ Two symmetrical lobes united by a gland of tissue (isthmus) in front of 2nd – 4th tracheal rings. (C5-C7)
- ◆ 20g organ with two lobes and an isthmus
- ◆ Two pear shaped poles (narrow upper, broad lower pole)
 - ◆ Lower pole goes as low as 5th – 6th ring, upper pole to middle of thyroid cartilage
- ◆ Triangular in cross section
- ◆ Note presence of pyramidal lobe in 50% and presence of levator glandular thyroidea mm.

THYROID GLAND



PYRAMIDAL LOBE 50%



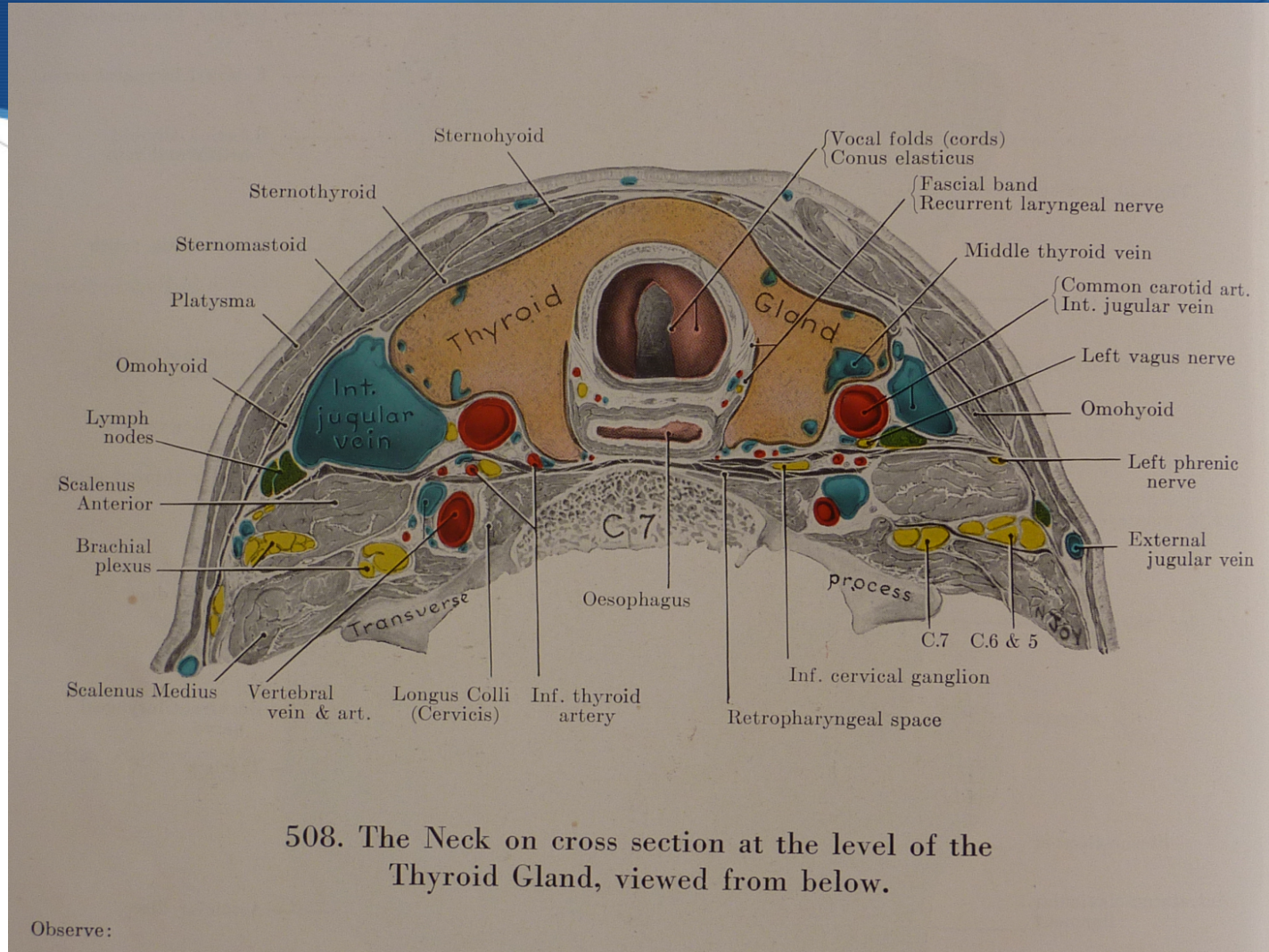
Anatomy

- ◆ Medial and lateral surface
 - ◆ Lateral surface under cover of sternohyoid and sternothyroid
 - ◆ Medial surface lies against larynx and upper trachea
- ◆ External laryngeal nn approaches it from above
- ◆ RLN approaches it from below

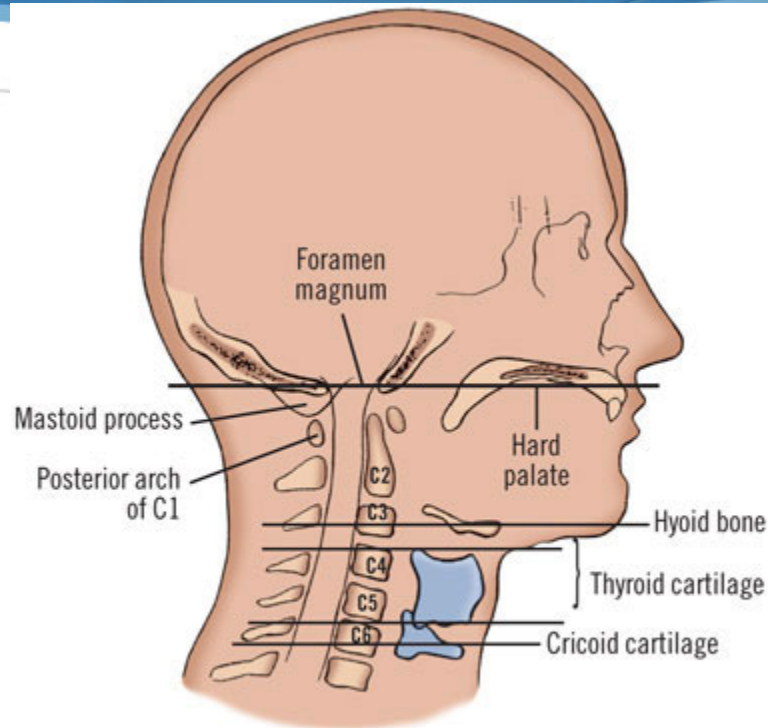
Anatomy

- ◆ Posterior surface overlies – carotid sheath (medial portion but can overlie lateral portion if enlarges)
- ◆ Parathyroids lie posteriorly

CROSS SECTION-THYROID



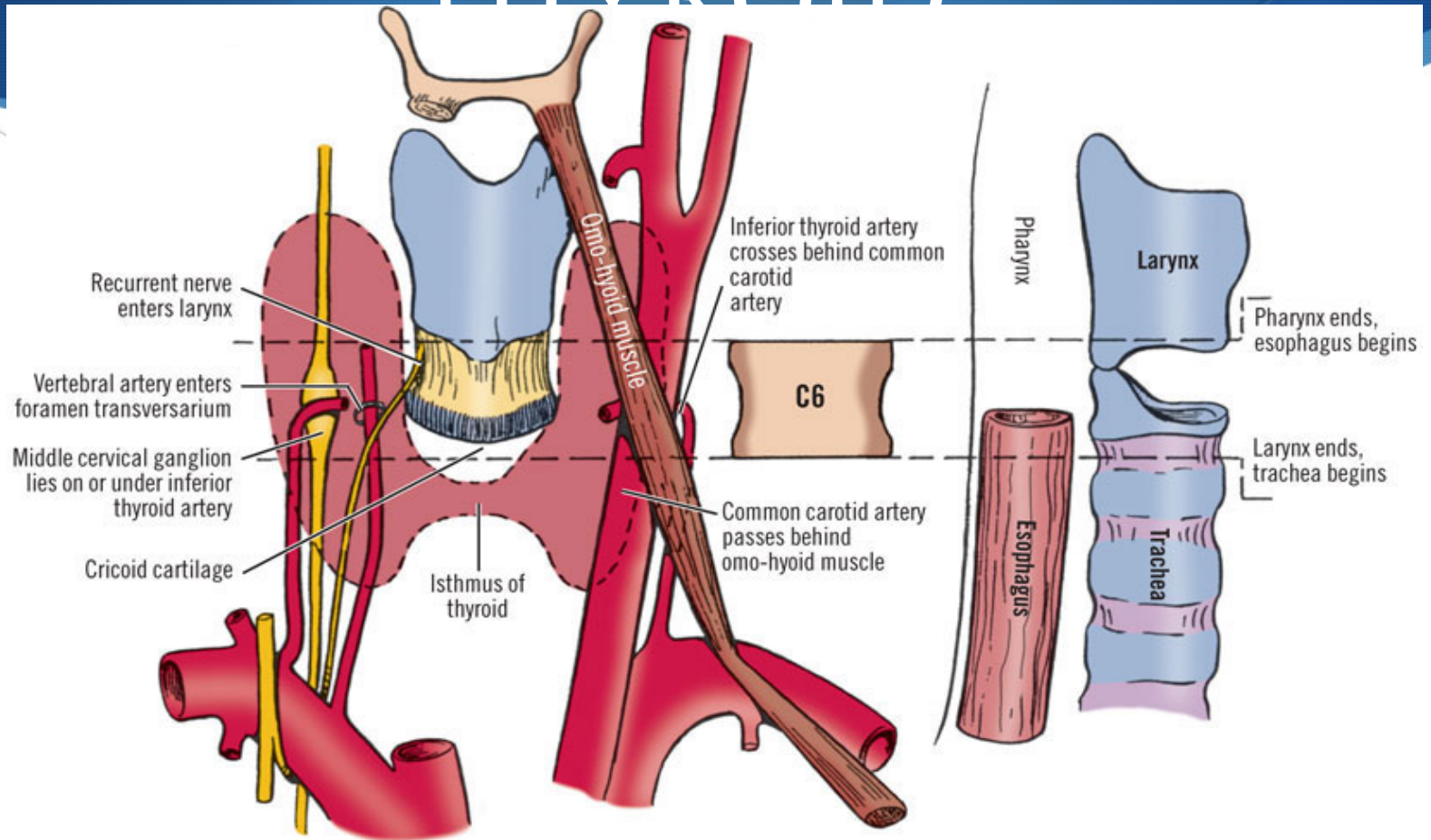
SURFACE MARKINGS LATERAL



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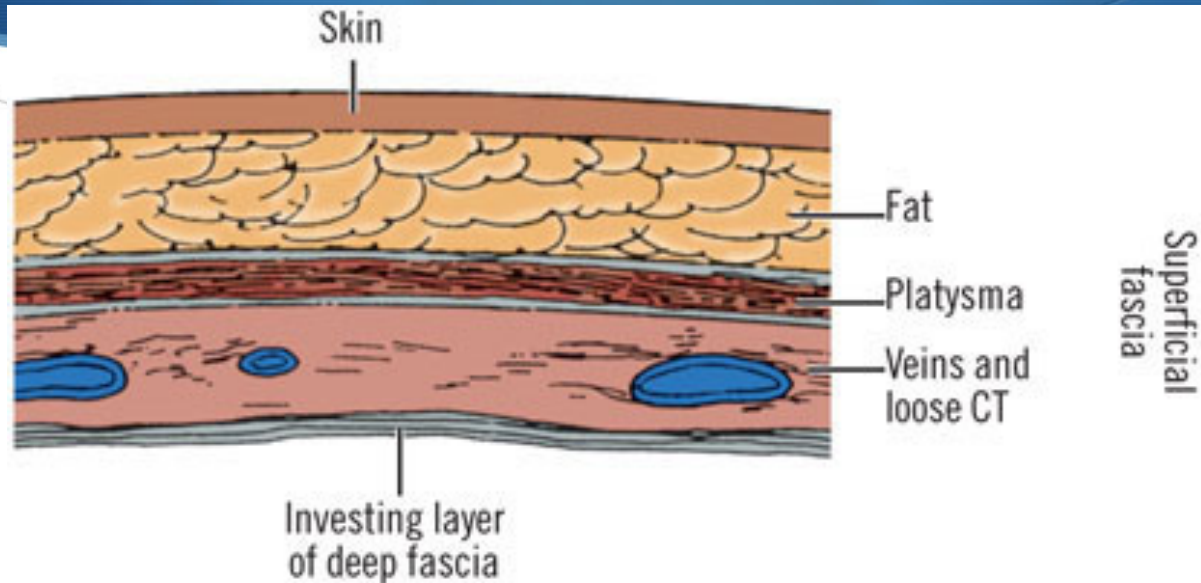
SURFACE MARKINGS OF THYROID



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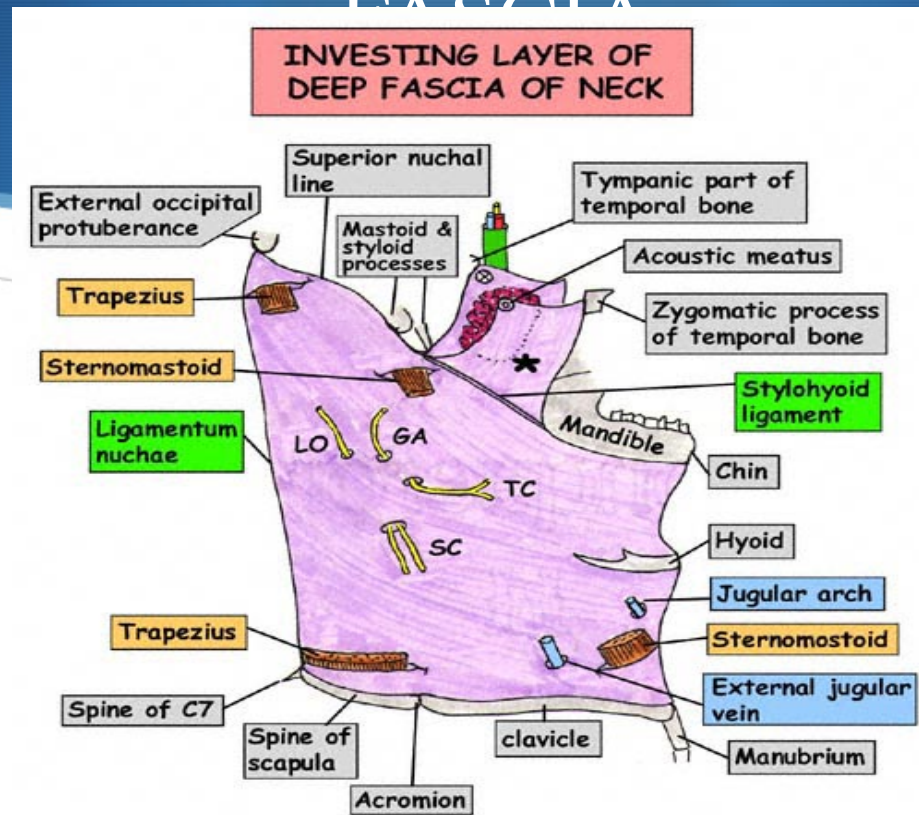
CERVICAL FASCIA



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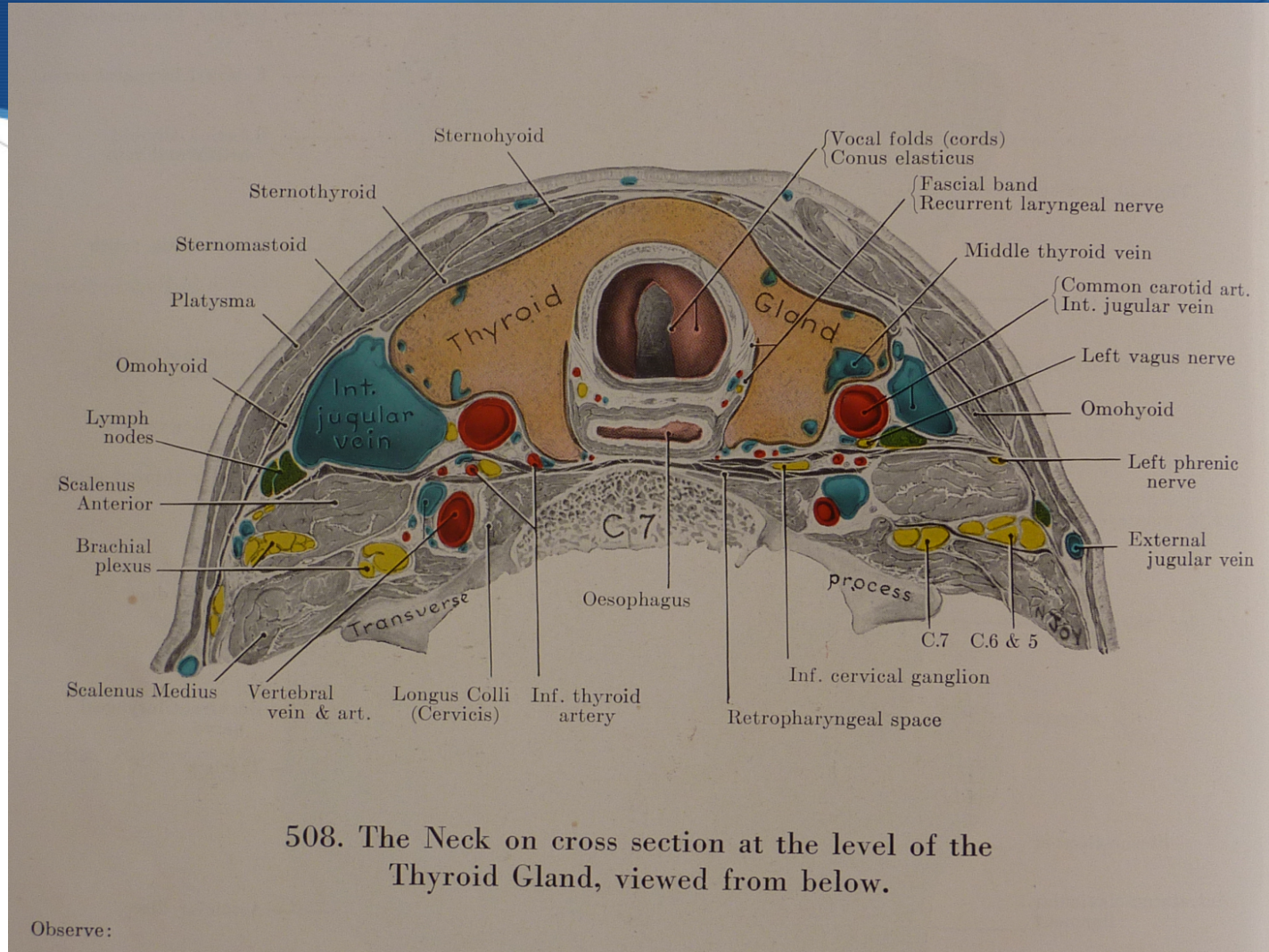
INVESTING LAYER OF CERVICAL FASCIA



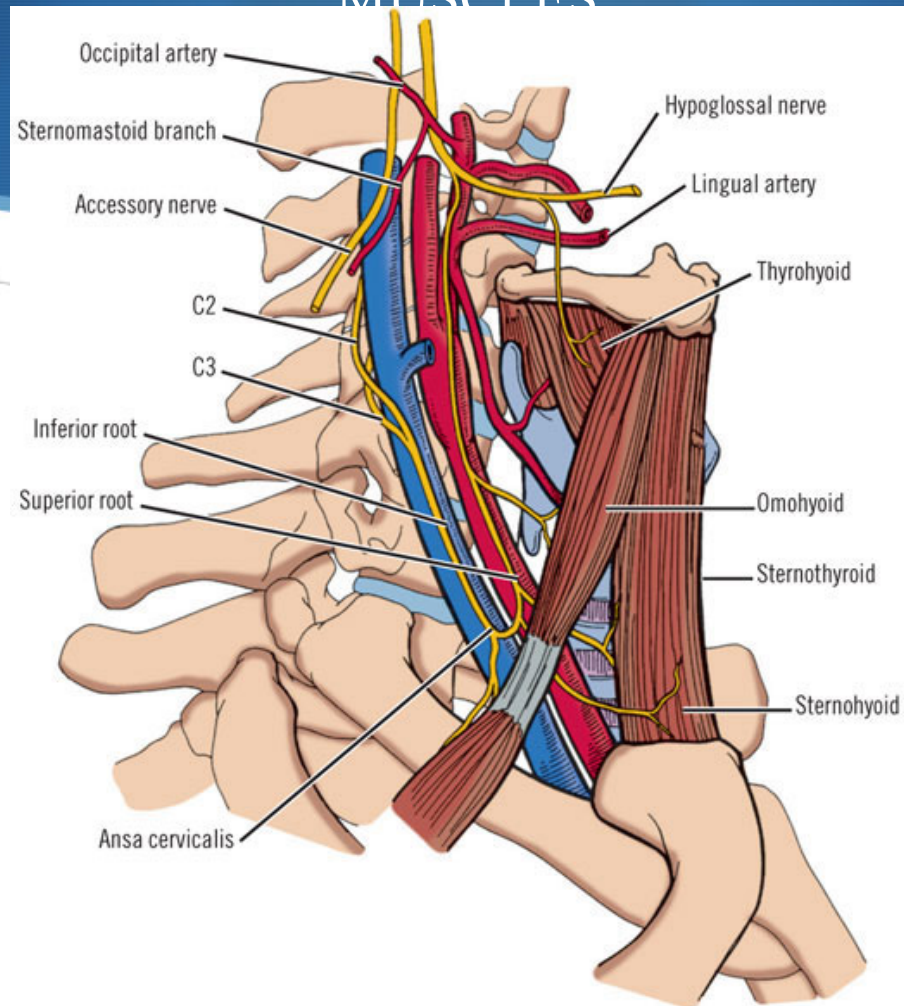
* Anterior layer of parotid fascia is the superficial layer of the investing fascia that has split from the stylohyoid ligament

⊗ Posterior layer of parotid fascia is the deep layer of the investing fascia that has split from the stylohyoid ligament. It fuses with the parotid gland

CROSS SECTION-THYROID



ANSA CERVICALIS AND BRANCHES TO INFRAHYOID MUSCLES



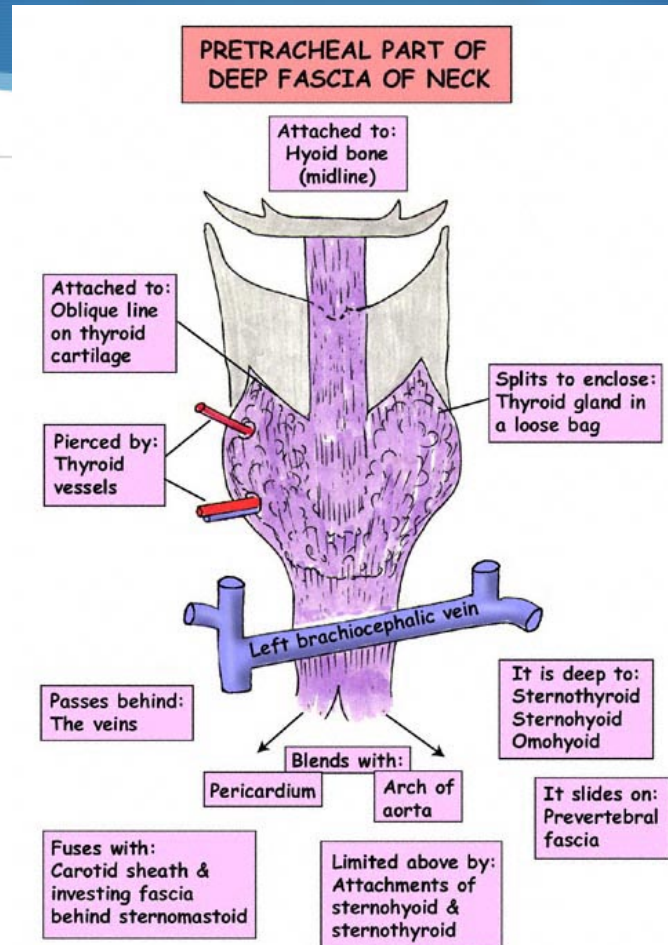
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◆ Pretracheal fascia

- ◆ Lies deep to infrahyoid strap mm
- ◆ Upward attachment limited by attachment to midline and oblique line of thyroid cartilage more laterally
- ◆ Splits to enclose thyroid gland
- ◆ Laterally fuses to carotid sheath behind SCM
- ◆ Inferiorly fuses with adventitia with aortic arch and fibrous pericardium heading behind brachiocephalic vv.

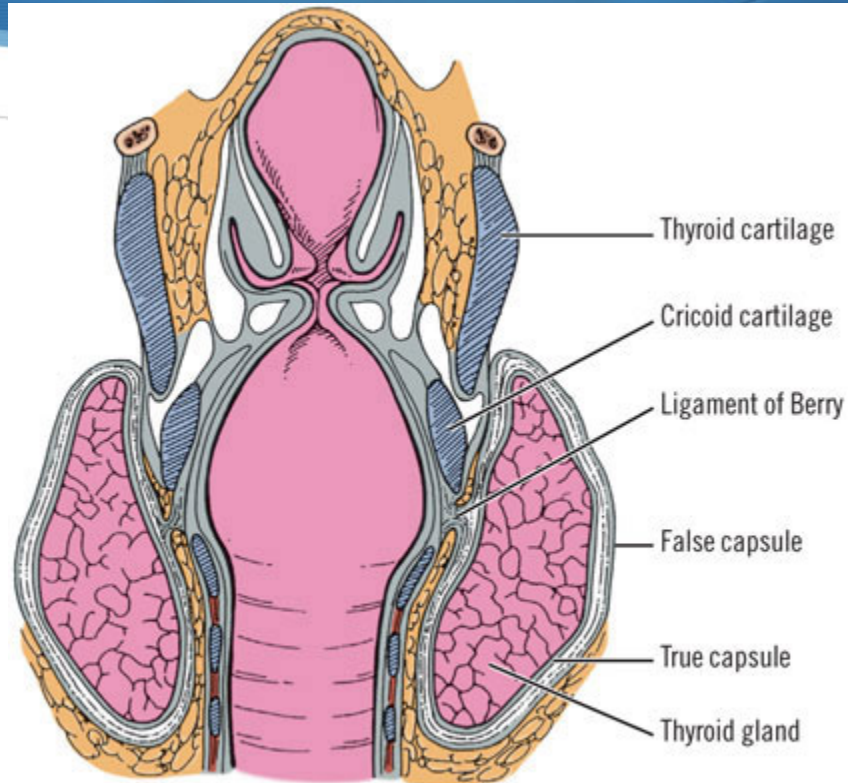
PRETRACHEAL FASCIA



LIGAMENT OF BERRY ATTACHMENT

- ◆ Side of cricoid cartilage
- ◆ First and second rings of trachea
- ◆ RLN passes deep to the Berry ligament or between the main ligament and its lateral leaf

LIGAMENT OF BERRY



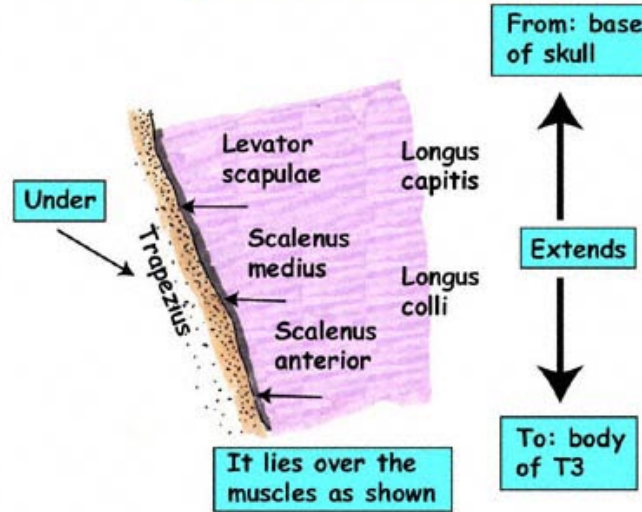
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PRE

ASCIA

PREVERTEBRAL PART OF DEEP FASCIA OF NECK



Pierced by:

- Great auricular nerve
- Lesser occipital nerve
- Transverse cervical nerve
- Supraclavicular nerves
- Inferior root of ansa cervicalis

Lying on it:

- Sympathetic chain
- Lymph nodes
- Spinal root of accessory nerve

Deep to it:

- Cervical plexus
- Trunks of brachial plexus
- 3rd part of subclavian artery
- Phrenic nerve

It blends with the anterior longitudinal ligament. Its lower border laterally is the lower border of scalenus anterior

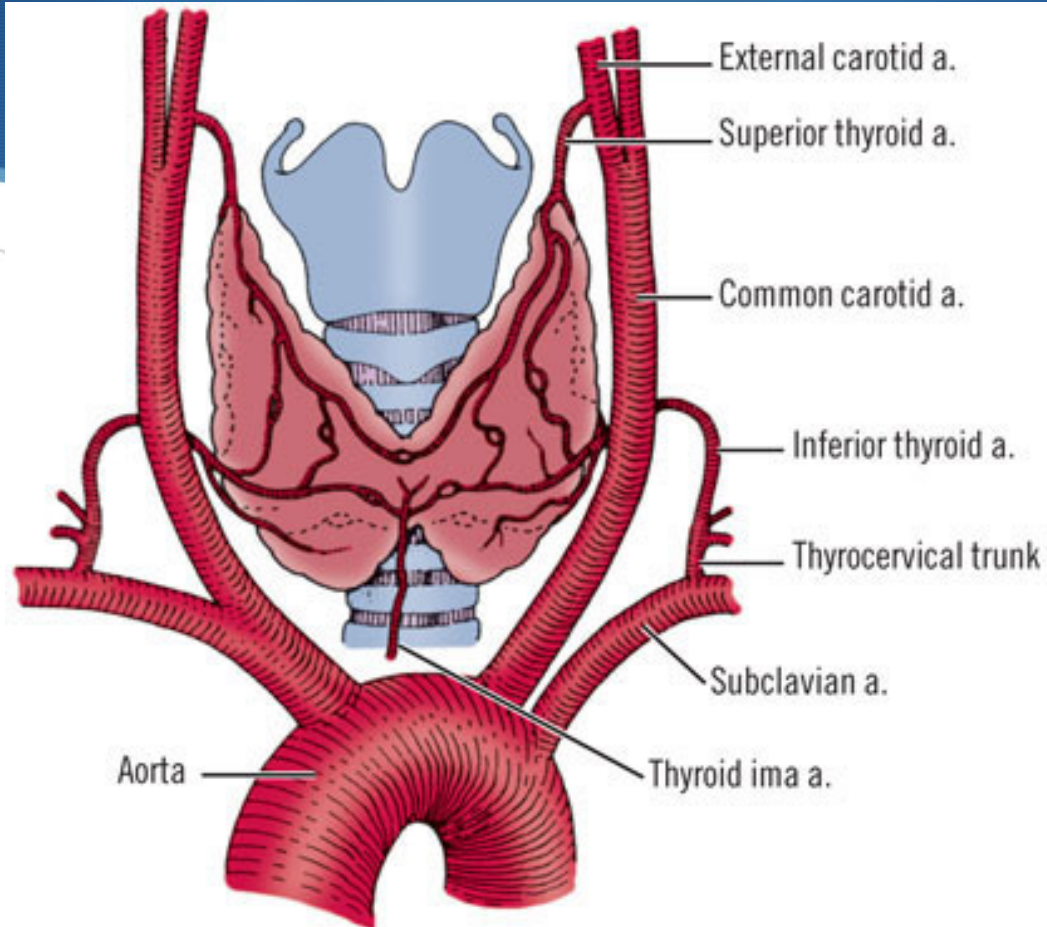
Anatomy

- ◆ Arterial supply
 - ◆ Superior thyroid artery from ECA
 - ◆ Inferior thyroid artery from thyrocervical trunk
 - ◆ Thyroid ima artery from brachiocephalic, aortic arch or R common carotid – present in 3% of people

ARTERIAL SUPPLY OF THYROID

- ◆ Superior thyroid artery-pierces thyroid fascia and divides into anterior and posterior
- ◆ Inferior thyroid artery-from thyrocervical trunk. Curves medially behind posterior to carotid sheath. Divides into superior branch which supplies parathyroids and inferior branches related to RLN
- ◆ Thyroid ima-12% aortic arch or innominate a

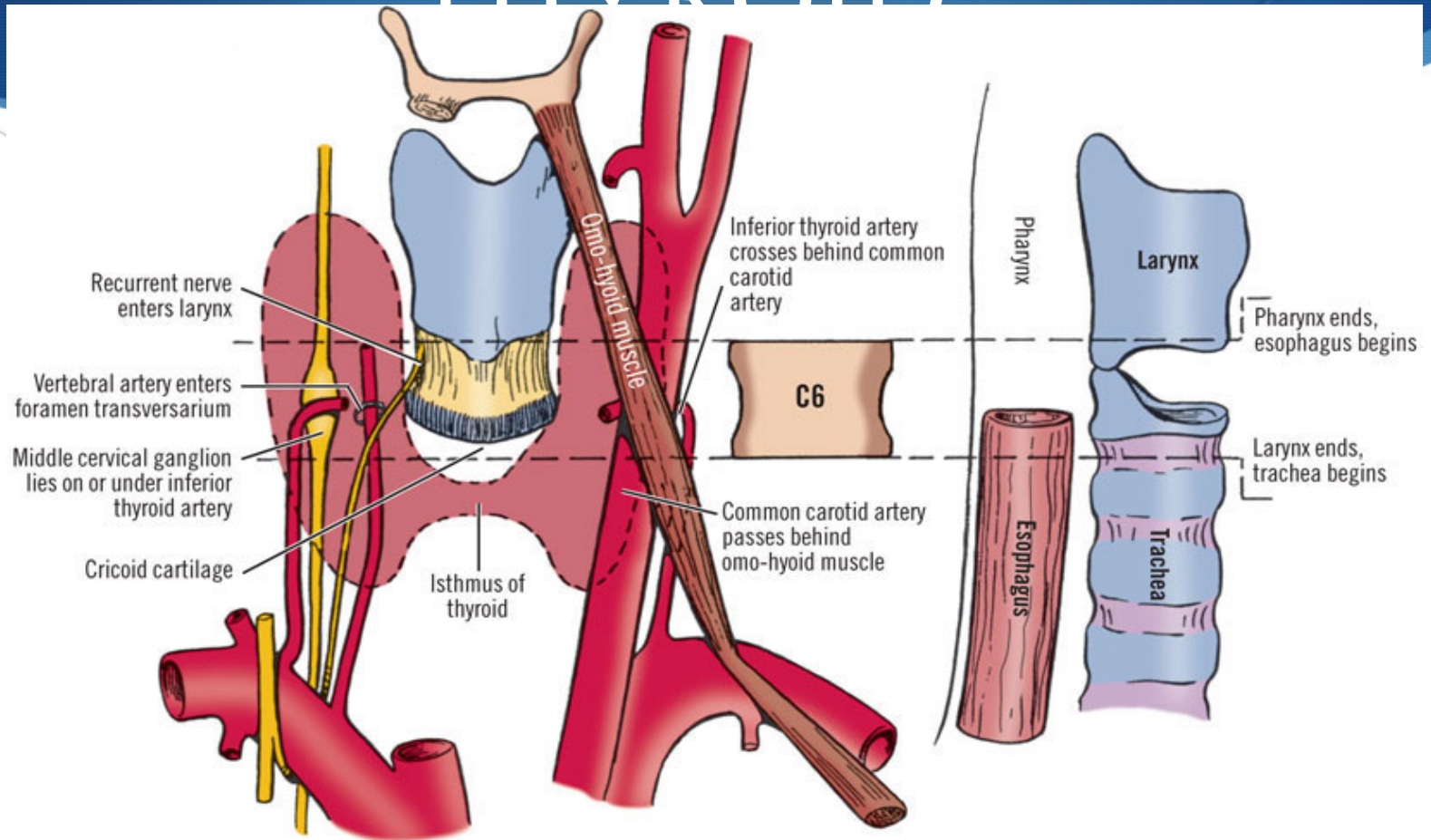
ARTERIAL SUPPLY



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SURFACE MARKINGS OF THYROID



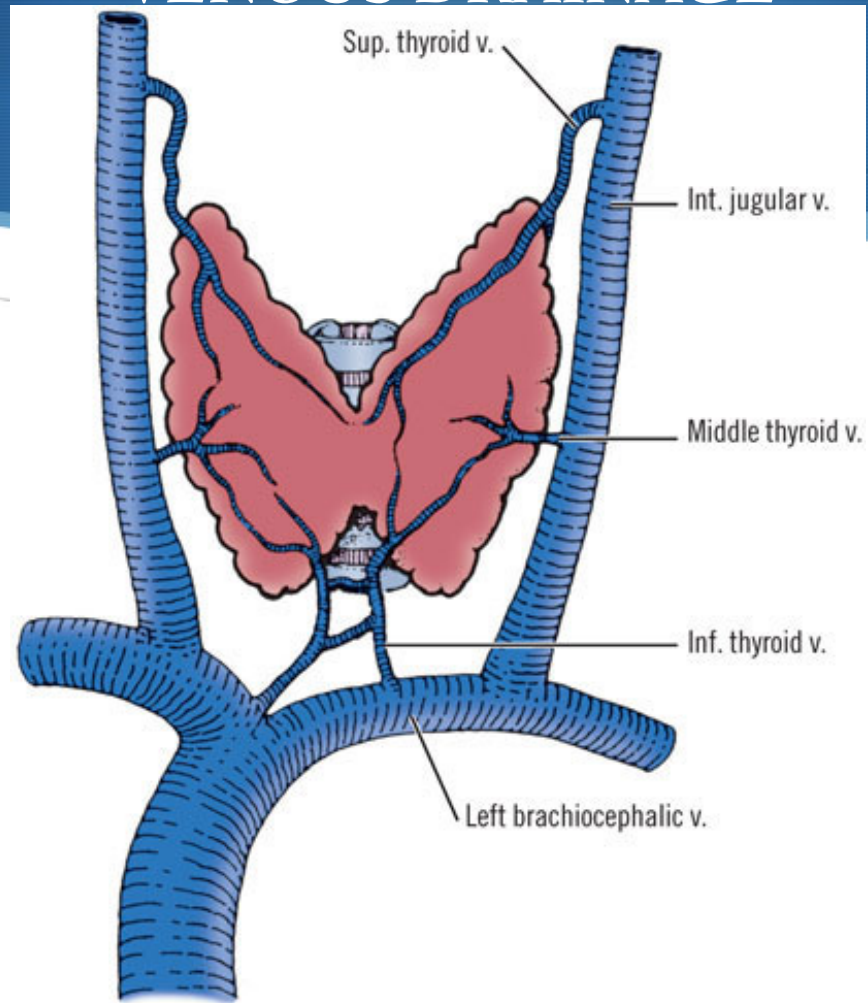
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Venous drainage

- ◆ Superior thyroid vein
 - ◆ Drains into internal jugular or facial vv
- ◆ Middle thyroid vein
 - ◆ Drain straight into internal jugular
- ◆ Inferior thyroid vein
 - ◆ Forms a plexus from isthmus usually draining into brachiocephalic, usually left side

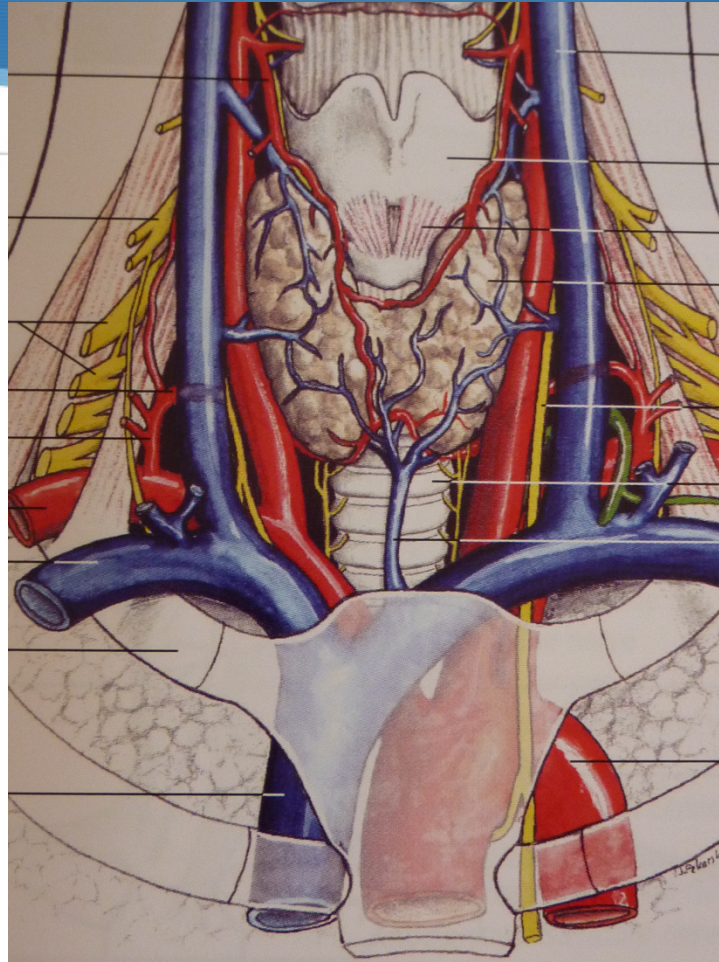
VENOUS DRAINAGE



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THYROID VESSELS



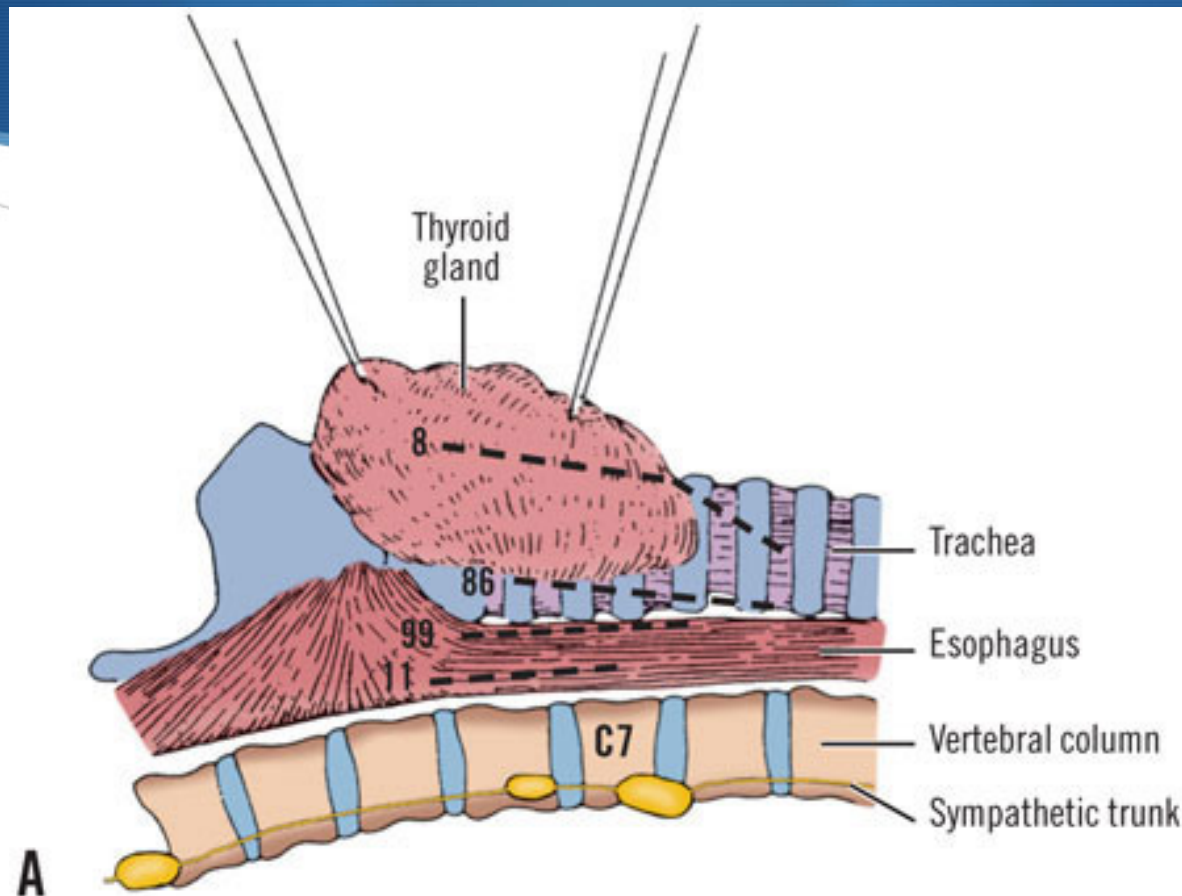
Lymphatics

- ◆ Upper pole – deep cervical anterosuperior nodes
- ◆ Lower pole – posteroinferior group
- ◆ Some follow thyroid ima to pretracheal nodes

Anatomy

- Recurrent laryngeal nerve
 - Lies in front of groove b/w the oesophagus and trachea
 - Divides into anterior and posterior branches at upper border of ishtmus
 - Lies behind pretracheal fascia
 - Continues superiorly to enter beneath inferior constrictor and along posterior aspect of cricothyroid mm.
 - Left side more like to lie behind RLN whereas R side is more 50/50

COURSE OF RECURRENT LARYNGEAL NERVE



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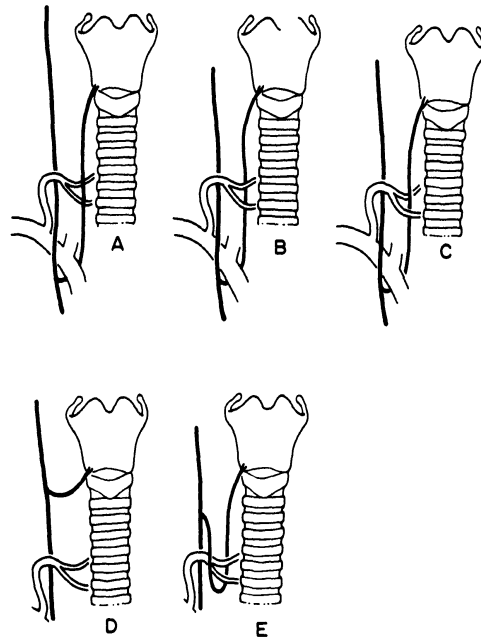


Figure 2.16. Relations at the crossing of the recurrent laryngeal nerve and the inferior thyroid artery. (A–C) Common variations. Their frequencies are given in Table 2.2. (D) A nonrecurrent nerve is not related to the inferior thyroid artery. (E) The nerve loops beneath the artery. (By permission S Tzinias, C Droulias, N Harlaftis, et al., *Am Surg* 42(9):639–644, 1976.)

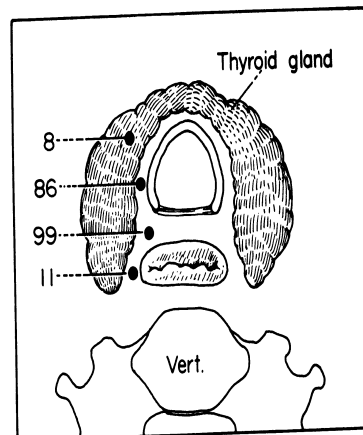
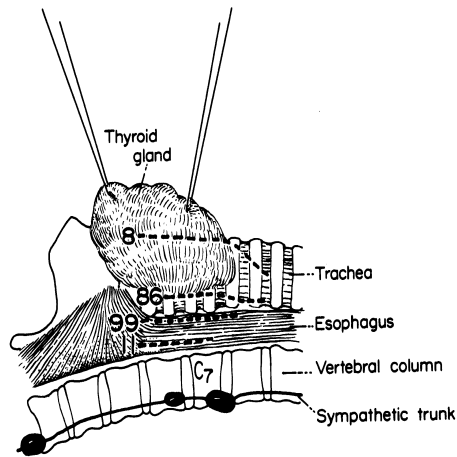
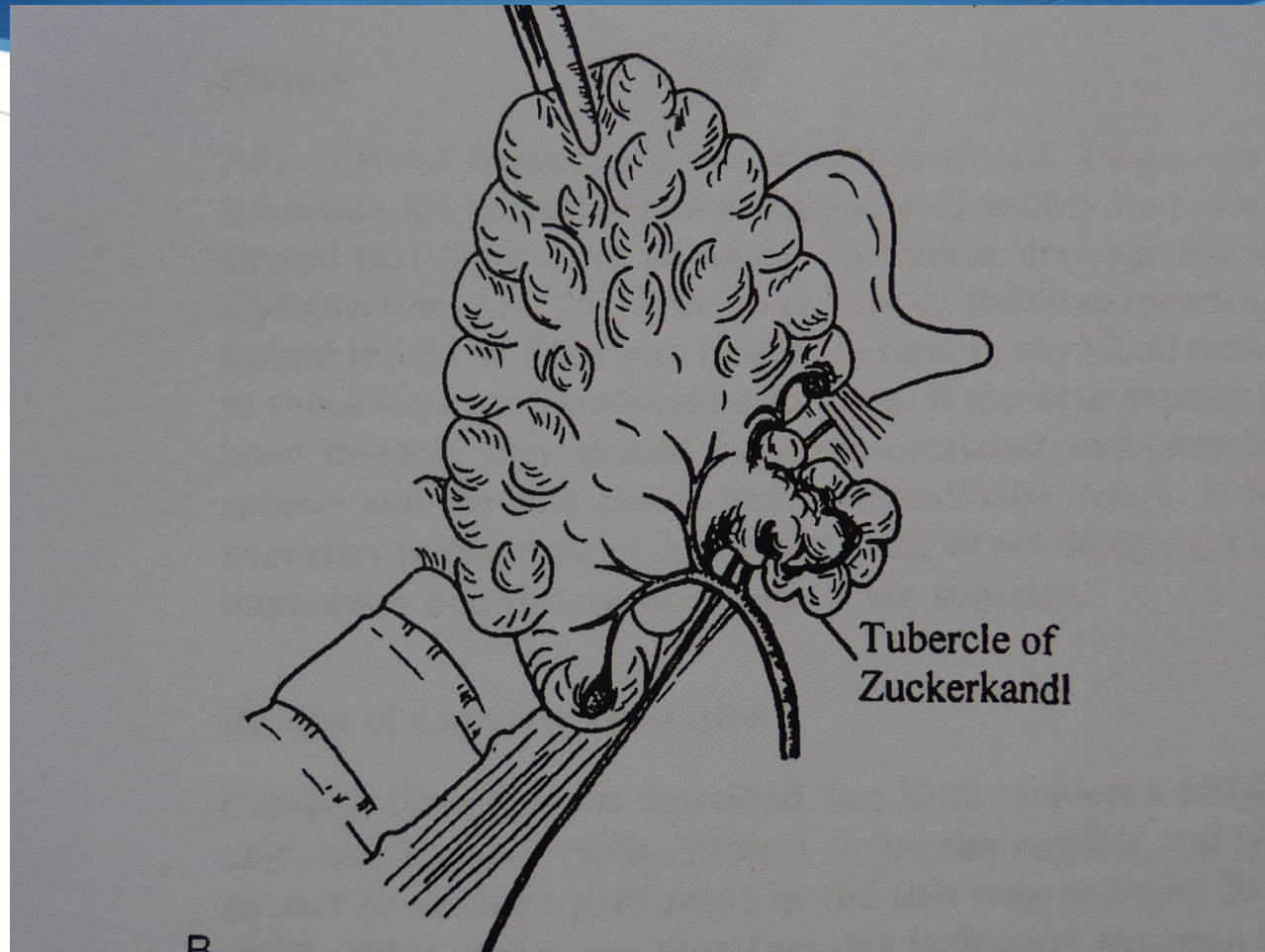
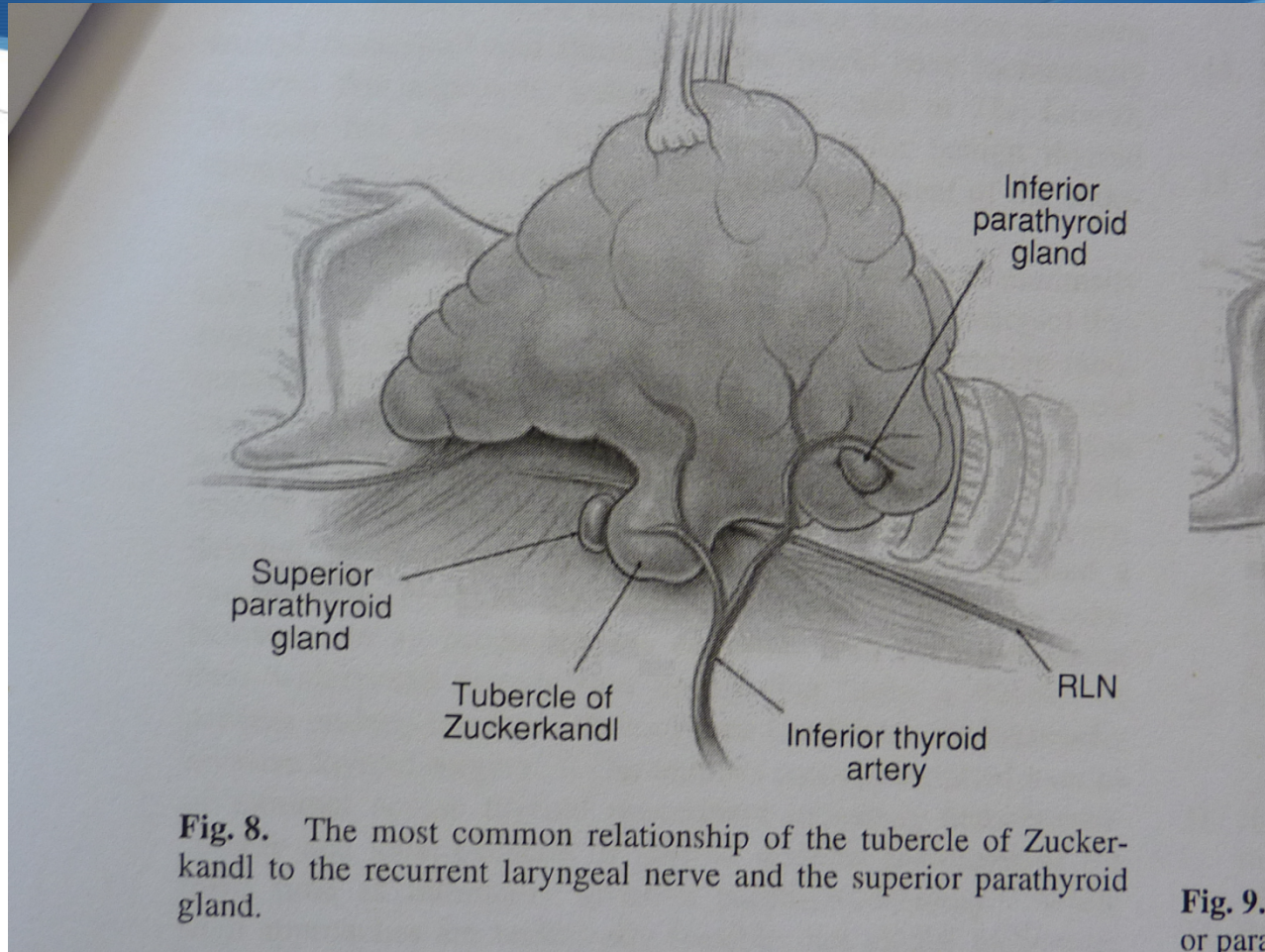


Figure 2.18. The course of the recurrent laryngeal nerve at the level of the thyroid gland in 102 cadavers. In about one-half of the cases, the nerve lay in the groove between the trachea and the esophagus. (Top) Lateral view. (Bottom) Cross-sectional view. (By permission of JE Skandalakis, C Droulias, N Harlaftis, et al., *Am Surg* 42(9):629-634, 1976.)

RLN “encased in thyroid”



COMMONEST RELTIONSHIP OF TUBERCLE OF ZUCKERKANDL AND RNL and SUPERIOR PARATHYROID



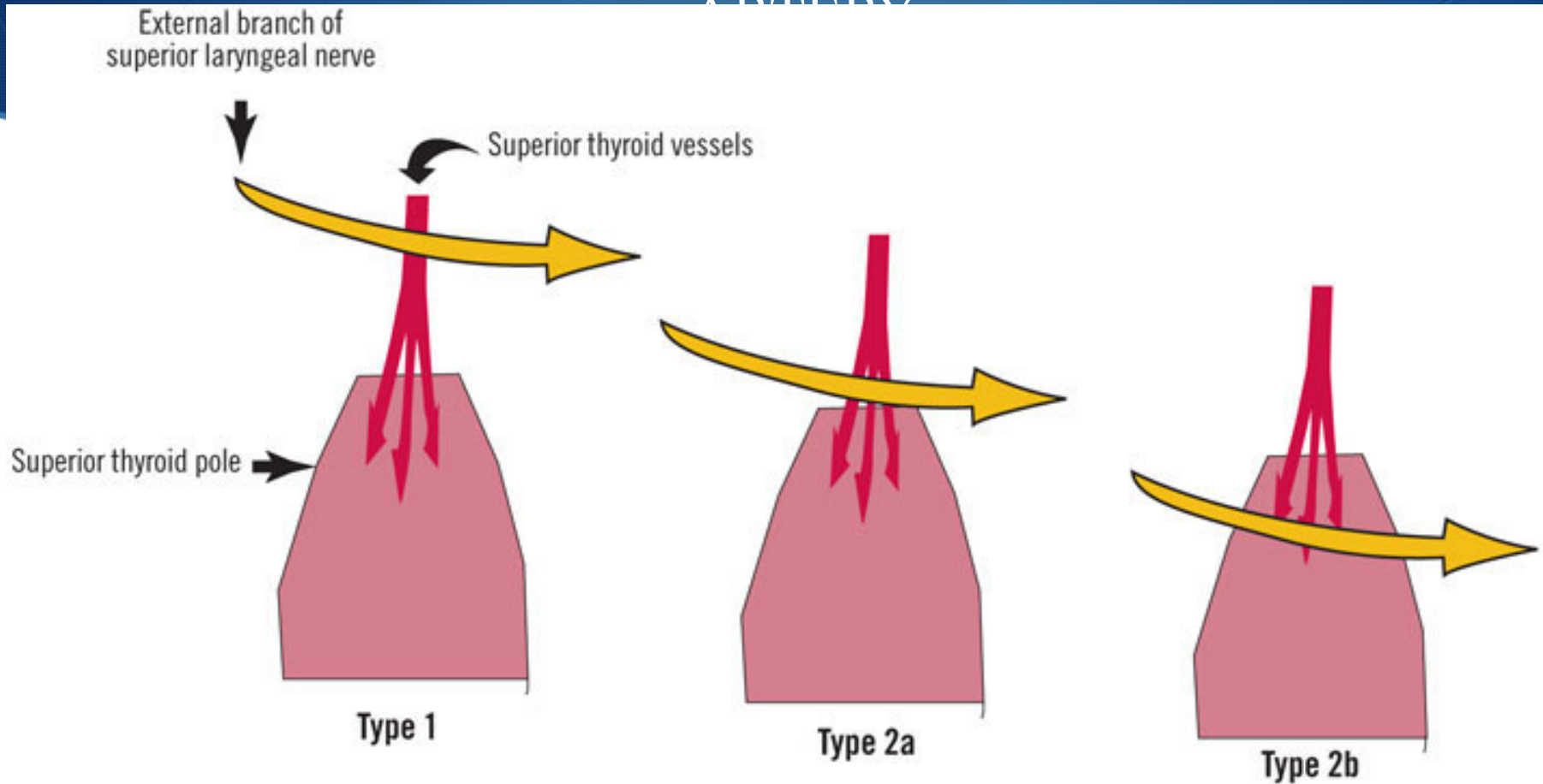


- ◆ Superior laryngeal nerve

- ◆ Note the different ways external branch of superior laryngeal has a relationship with superior thyroid artery

EXTERNAL LARYNGEAL NERVE AND SUP THYRIOD

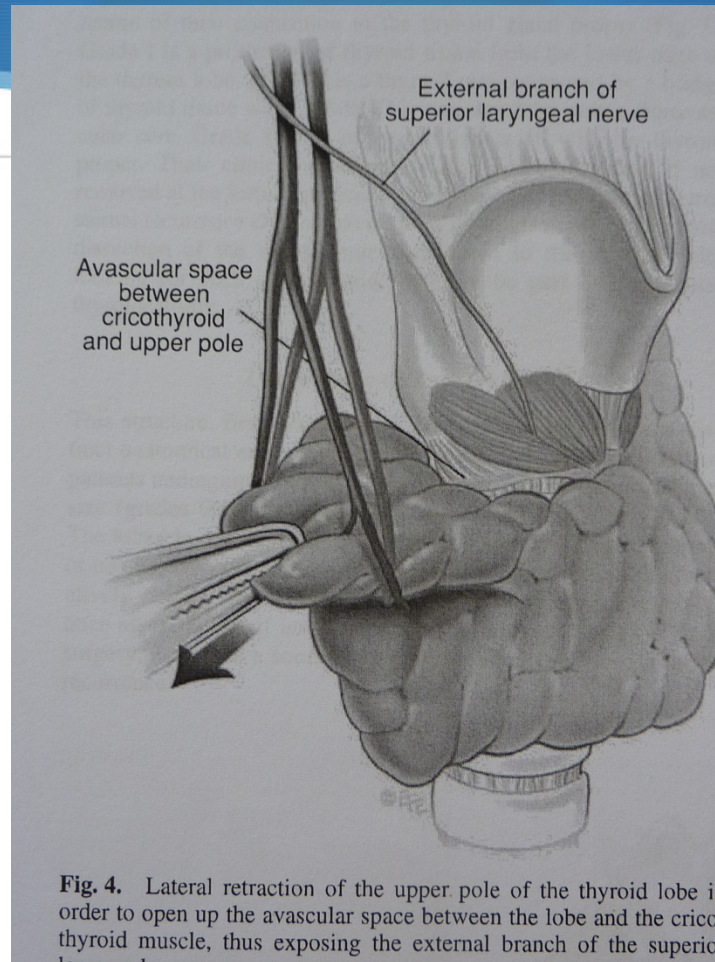
ARTERY



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THE AVASCULAR PLANE



DANGER AREA

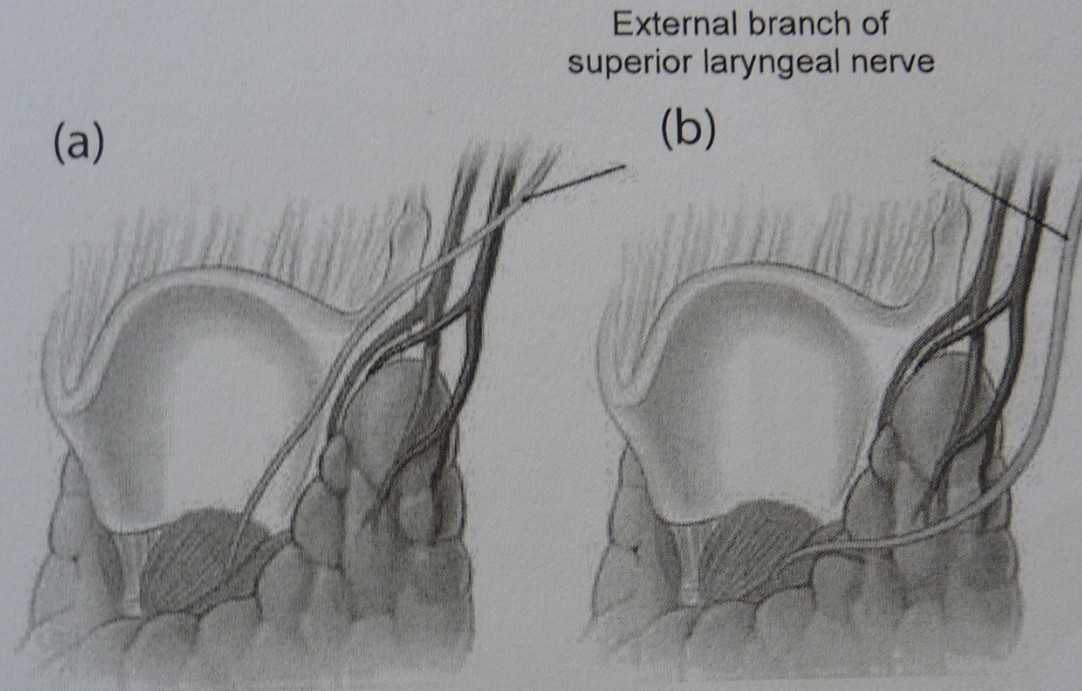
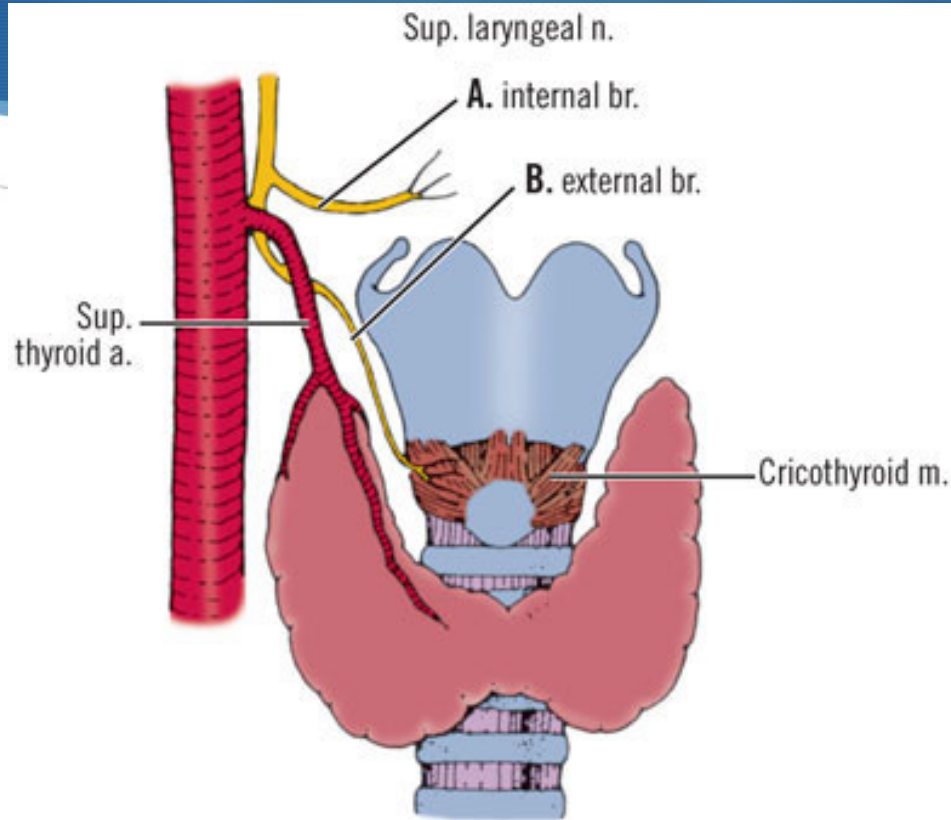


Fig. 5. (a) Type 1 EBSLN passing more than 1 cm above the upper pole; (b) type 2b EBSLN passing over the anterior surface of the thyroid lobe.

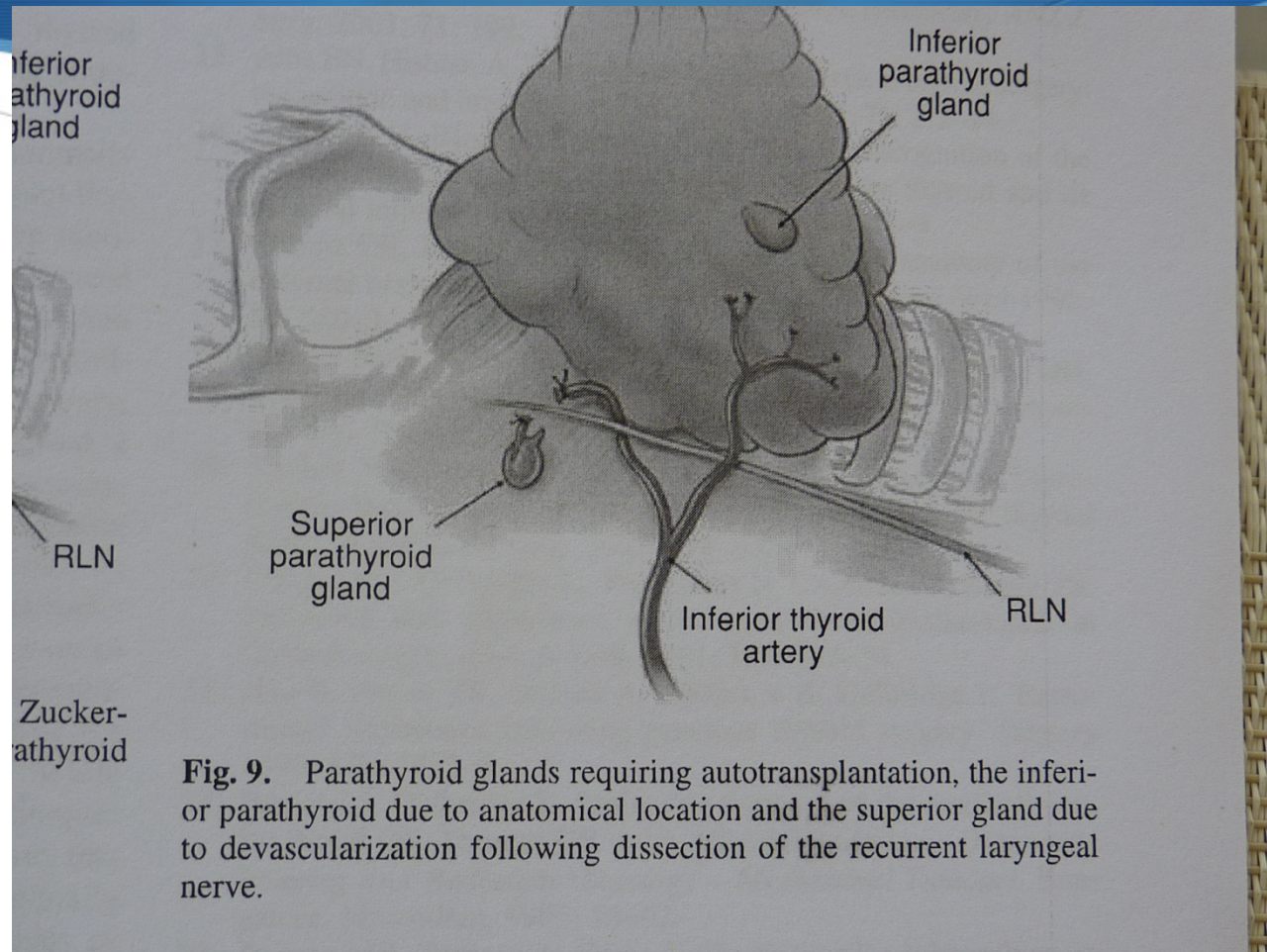
RELATIONSHIP OF SUPERIOR THYROID ART AND INTERNAL AND EXTERNAL BRANCHES OF SLN



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PATATHYROIDS NEEDING IMPLANTATION

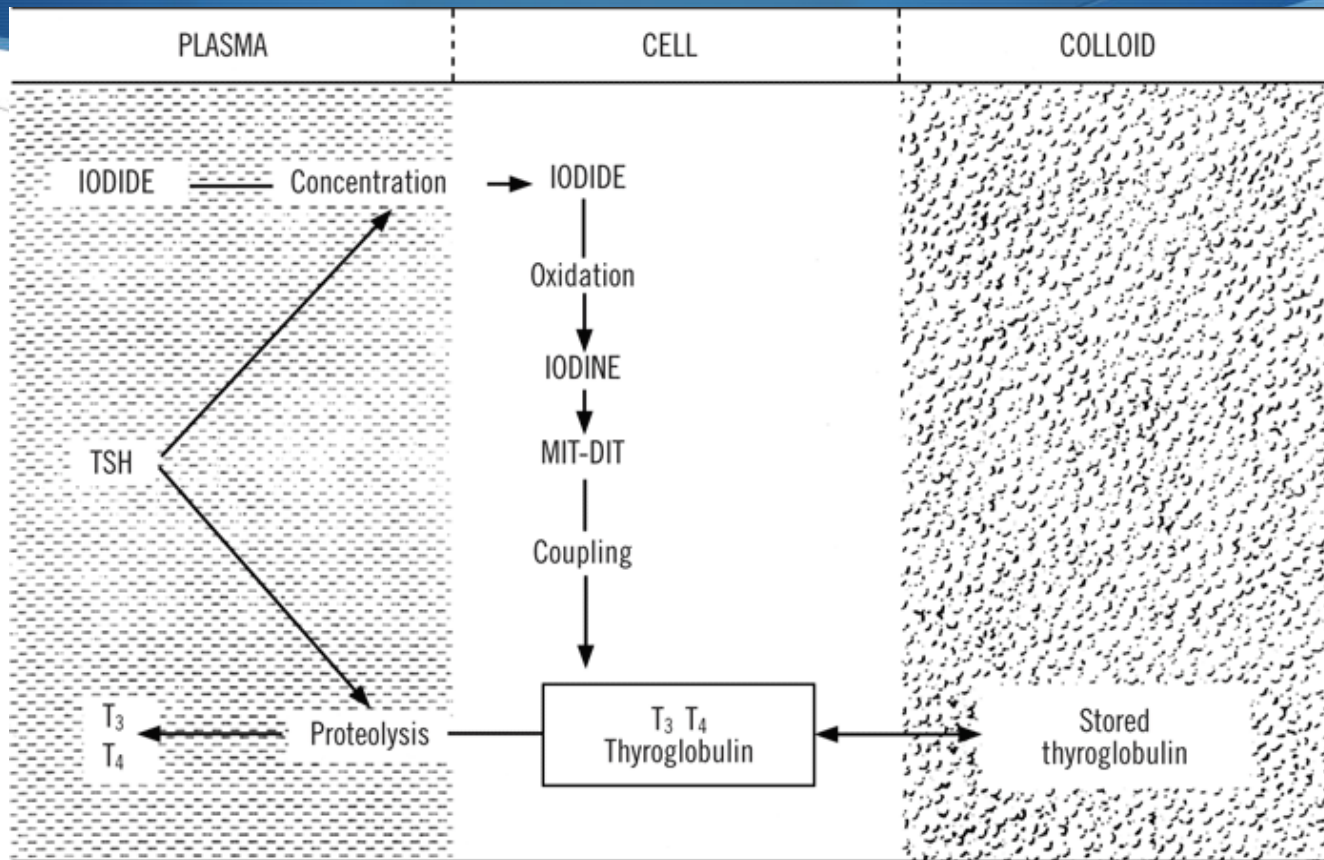


PHYSIOLOGY

- ◆ Histologically mass of follicles full of colloid
- ◆ Single layer of epithelial follicular cells produce colloid
- ◆ 2% or less are parafollicular cells which secrete calcitonin

- ◆ Primarily secretes t3 and t4
- ◆ T3 has greater activity
- ◆ T4 gets deiodinated in peripheral tissue
 - ◆ Only 13% of circulating T3 and 5% of RT3 are directly from thyroid
- ◆ Human thyroid secretes 80ug of T4, 4ug of T3, 2ug of RT3 per day

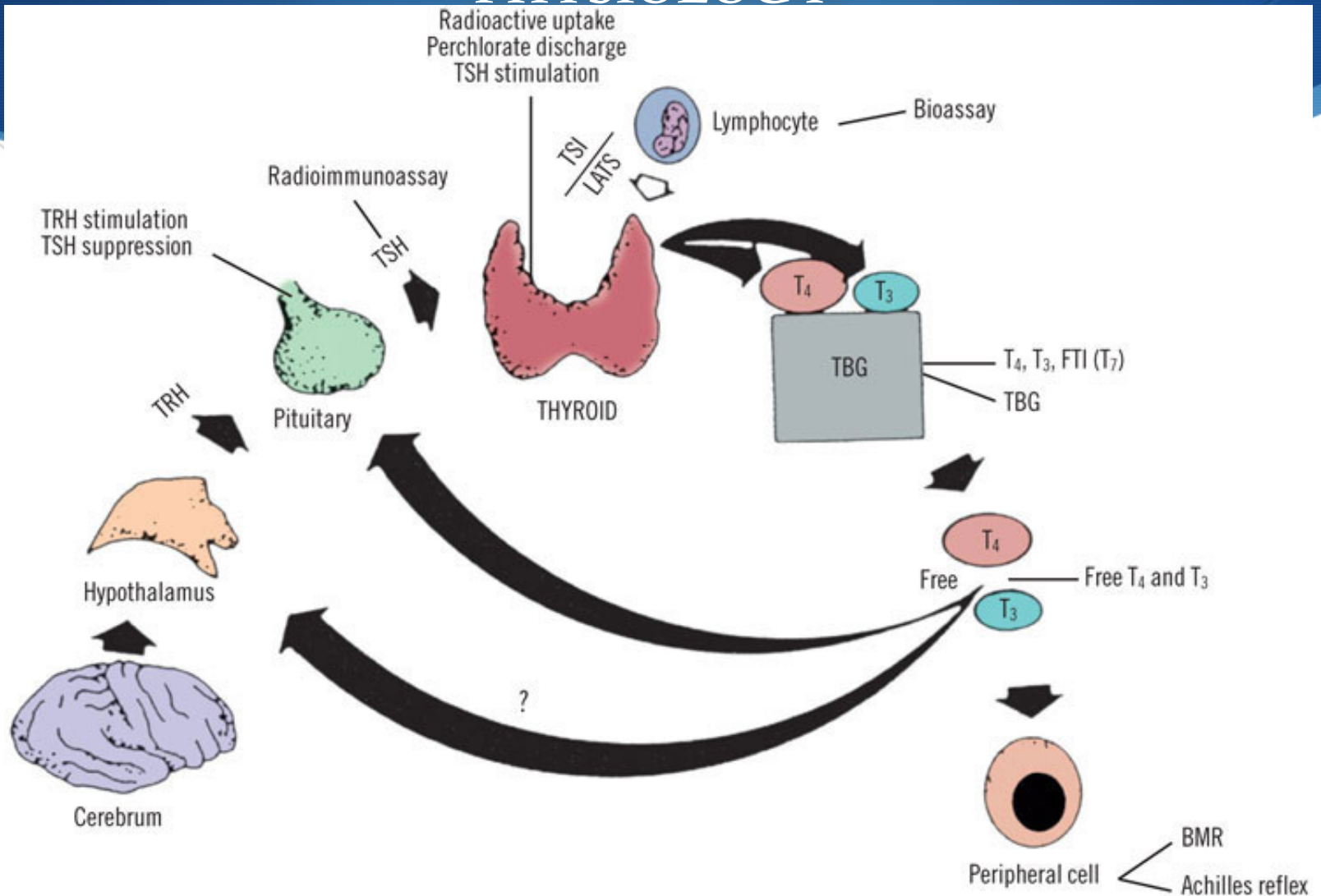
Protein	Plasma Concentration (mg/dL)	Amount of Circulating Hormone Bound (%)	
		T ₄	T ₃
Thyroxine-binding globulin (TBG)	2	67	46
Transthyretin (thyroxine-binding prealbumin, TBPA)	15	20	1
Albumin	3500	13	53



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PHYSIOLOGY



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