

The background features a complex network of thin grey lines connecting various sized nodes. Some nodes are solid black, some are solid blue, and some are white with black outlines. The overall aesthetic is clean and technical.

THYROID & PARATHYROID

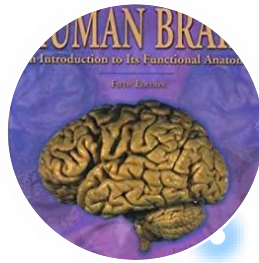
Khaleel Alyahya, PhD, MEd
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RESOURCES



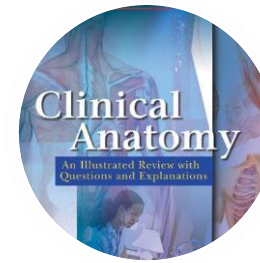
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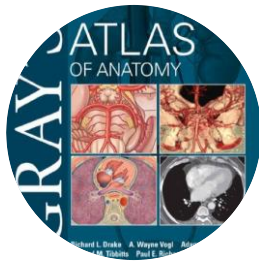
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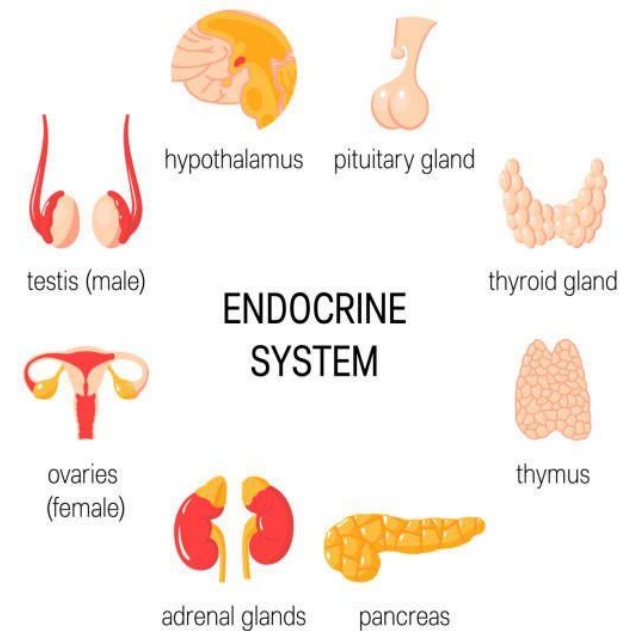
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OBJECTIVES

- Describe the shape, position, relations and structure of the thyroid gland.
- List the blood supply & lymphatic drainage of the thyroid gland.
- List the nerves endanger with thyroidectomy operation.
- Describe the shape, position, blood supply & lymphatic drainage of the parathyroid glands.
- Describe the development of the thyroid & parathyroid glands.
- Describe the most common congenital anomalies of the thyroid gland.

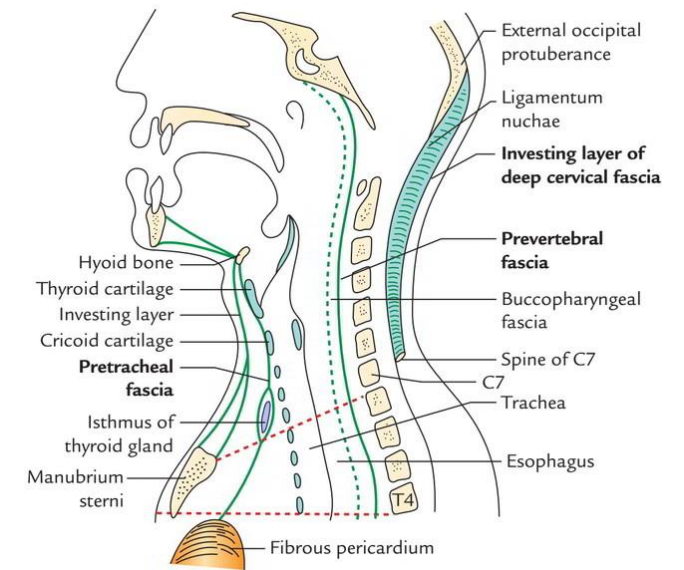
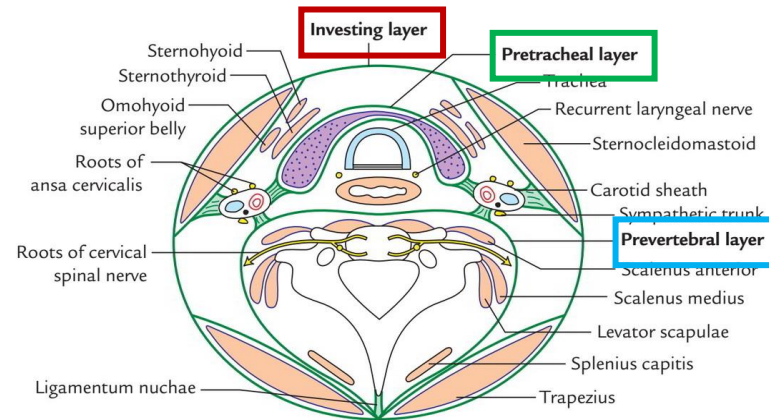
ENDOCRINE SYSTEM

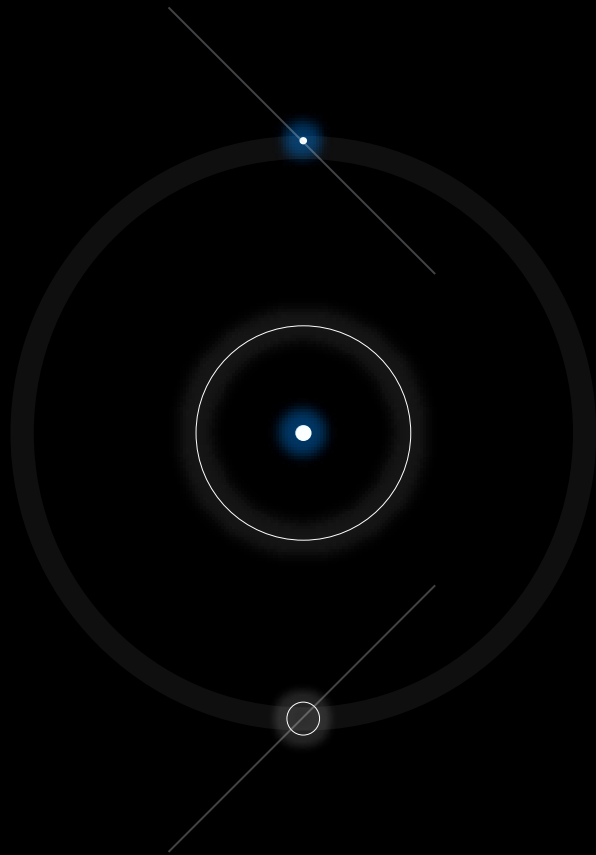
- The endocrine system is a network of glands in our body that make the hormones that to help cells talk to each other.
- It is the collection of glands that produce hormones that regulate metabolism, growth and development, tissue function, sexual function, reproduction, sleep, and mood, among other things.
- They are responsible for almost every cell, organ, and function in your body.
- If your endocrine system is not healthy, you might have problems developing during puberty, getting pregnant, or managing stress.
- You also might gain weight easily, have weak bones, or lack energy because too much sugar stays in your blood instead of moving into your cells where it's needed for energy.
- Endocrine glands release the substances they make into your bloodstream.



DEEP FASCIA OF NECK

- The deep cervical fascia of the neck is divided into three layers:
 - Investing layer
 - Pretracheal layer
 - Prevertebral layer

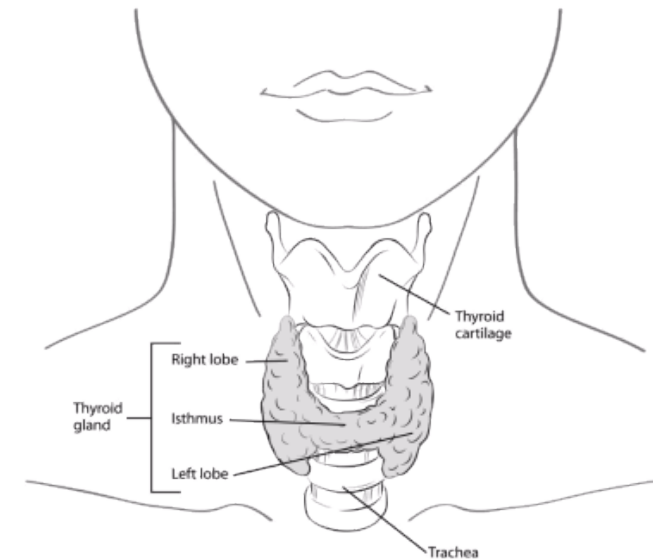




THYROID GLAND

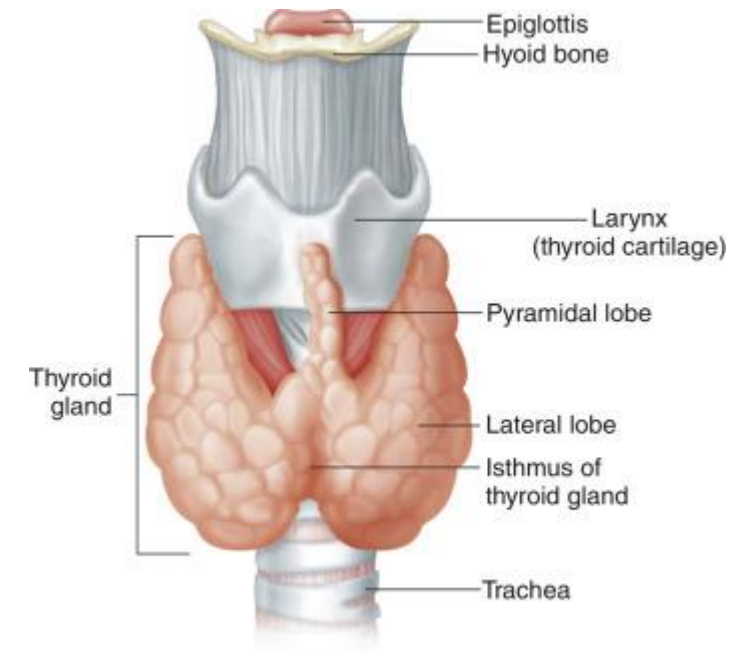
INTRODUCTION

- Largest endocrine gland.
 - Glands of the endocrine system that secrete their products, hormones, directly into the blood rather than through a duct.
- Found in neck below thyroid cartilage.
- Consists of right & left lobes.
- These 2 lobes are connected by a median tissue mass called **isthmus**.
 - Overlies the 2nd 3rd & 4th tracheal rings.
- Each lobe is pear shaped, with its apex reaches up to the oblique line of thyroid cartilage.
- Its base lies at the level of 4th or 5th tracheal ring.
- The isthmus extends across the midline in front of the 2nd 3rd & 4th tracheal rings.



THIRD LOBE

- The 3rd lobe of the gland is called the **pyramidal lobe**
- It extends from the upper part of the isthmus, up across the thyroid cartilage to be connect to the **hyoid bone**.
- The pyramidal lobe is a remnant of the fetal thyroid stalk, or thyroglossal duct.
- It is occasionally quite detached or may be divided into two or more parts.



SECRETION

- The gland is surrounded by a sheath derived from the pretracheal layer of cervical fascia.
- The gland produces thyroid hormones:
 - Triiodothyronine (T3)
 - Thyroxine (T4)
- These hormones regulate the growth and rate of function of many other systems in the body

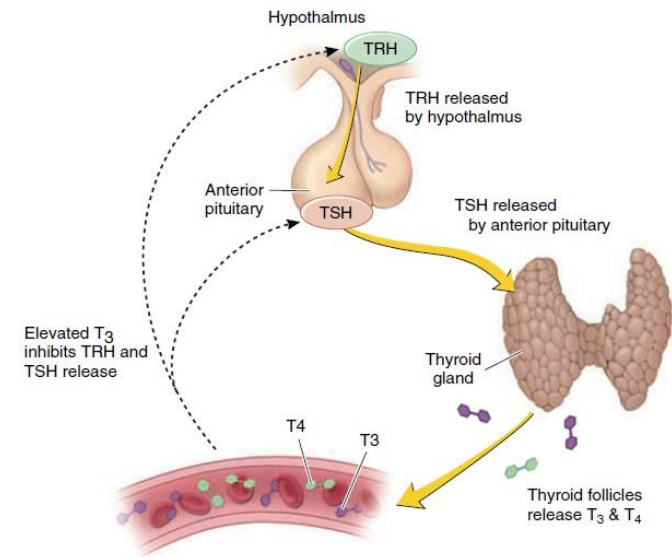
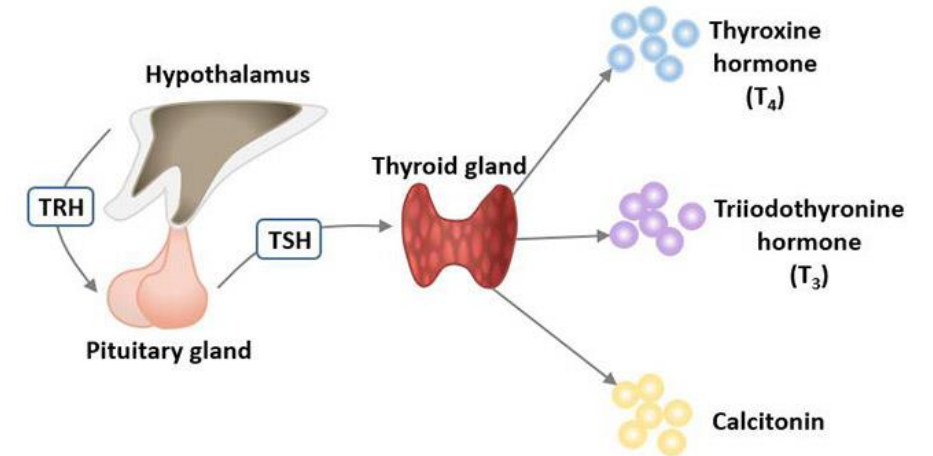


FIGURE 6.6. Regulation of Thyroid Gland Secretion

FUNCTIONS

- Regulating the **body metabolism** and **calcium balance**.
- The T4 and T3 hormones stimulate every tissue in the body to **produce proteins** and increase the amount of oxygen used by cells.
- The **calcitonin** hormone works together with the parathyroid hormone to regulate calcium levels in the body.



RELATIONS

■ Anterolaterally

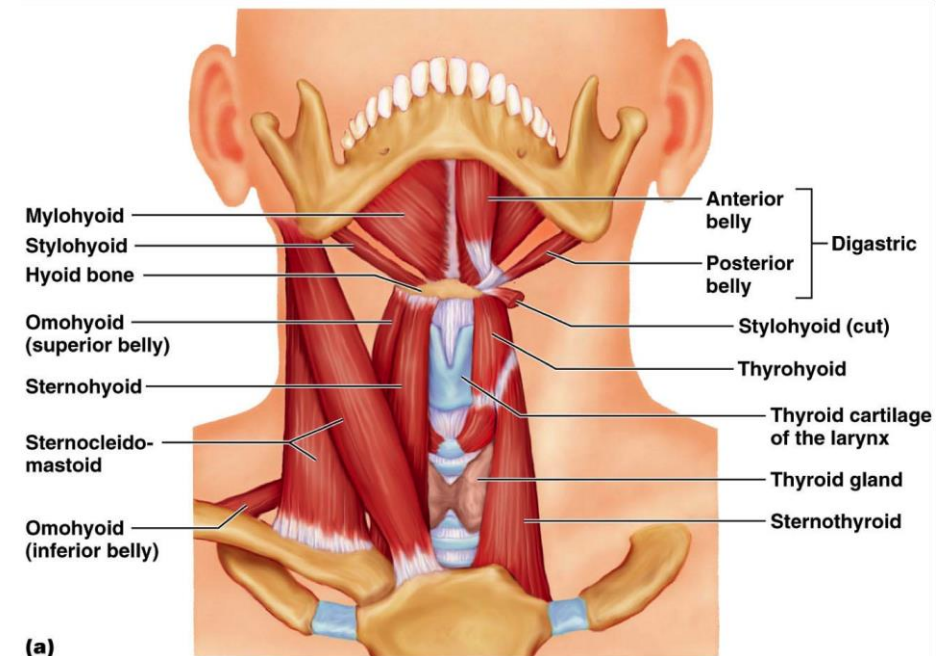
- Sternothyroid
- Superior belly of Omohyoid
- Sternohyoid
- Sternomastoid

■ Posterolaterally

- Carotid sheath and contents.

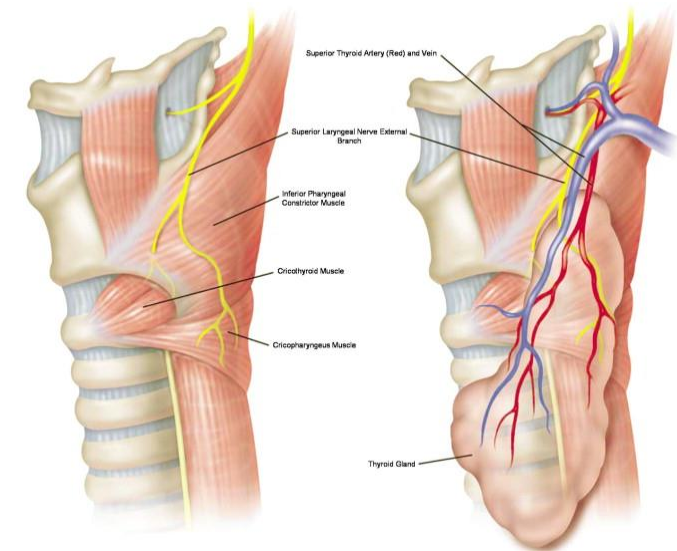
■ Medially

- Above
 - larynx & pharynx.
- Below
 - trachea & esophagus.
 - Recurrent laryngeal nerve in between.
 - Cricothyroid muscle & external laryngeal nerve.



POSTERIOR BORDER

- The rounded posterior border is related to the superior & inferior parathyroid glands.
- It is also related to the anastomosis between superior & inferior thyroid arteries.



BLOOD SUPPLY

■ Superior thyroid artery

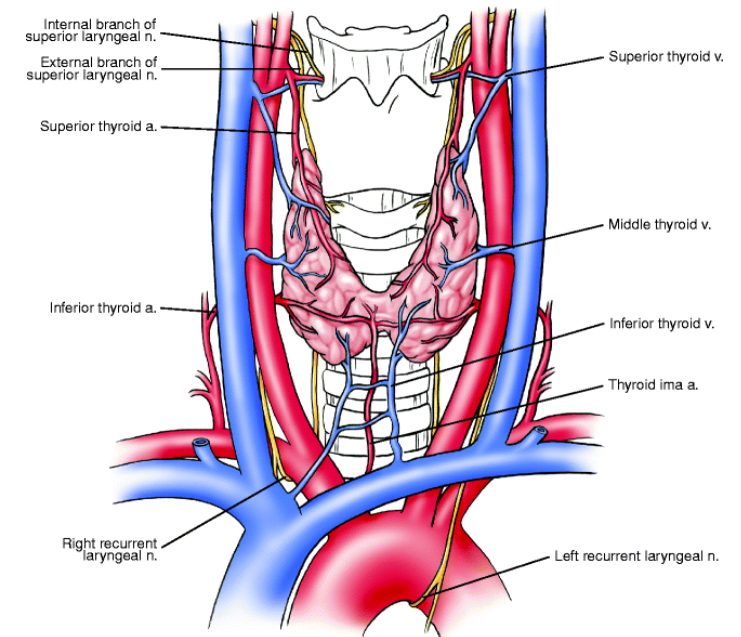
- From **External Carotid Artery**
- It descends to the upper pole of the lobe, with the external laryngeal nerve.
- It runs along the upper border of the isthmus to Anastomosis with its fellow.

■ Thyroidea ima Artery

- If present, it arises from aortic arch or from brachiocephalic artery.
- It ascends in front of trachea to reach isthmus.

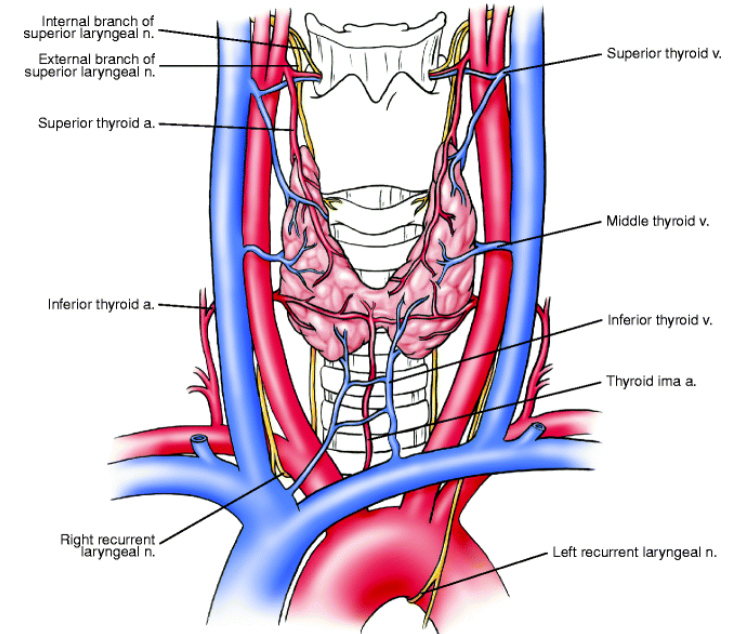
■ Inferior Thyroid Artery

- From **thyrocervical trunk** of 1st part of subclavian artery, ascends behind the gland to the level of cricoid cartilage.
- Then it turns medially behind the carotid sheath.
- Then it reaches the posterior border of the gland & descends downwards.



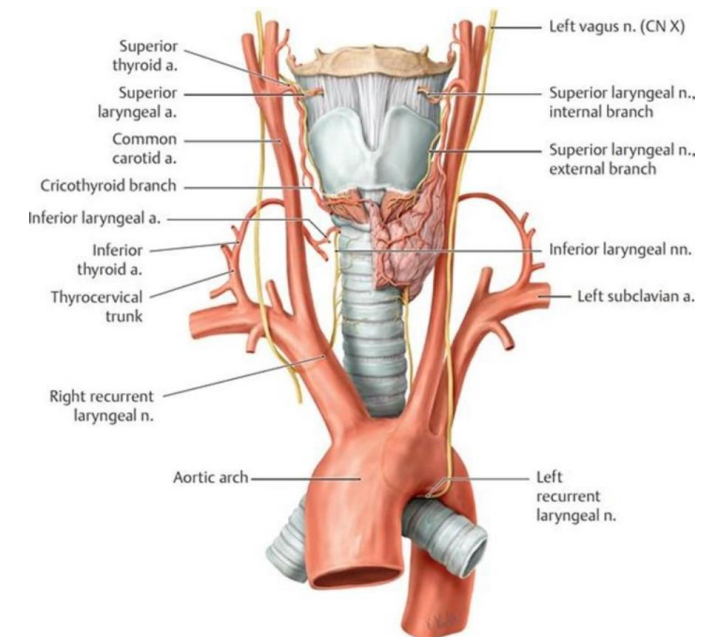
BLOOD DRAINAGE

- **Superior thyroid vein** to internal jugular .
- **Middle thyroid vein** to internal jugular.
- **Inferior thyroid vein** to left brachiocephalic.
- **Lymph Of the Thyroid Gland:**
 - Deep cervical & paratracheal lymph nodes.



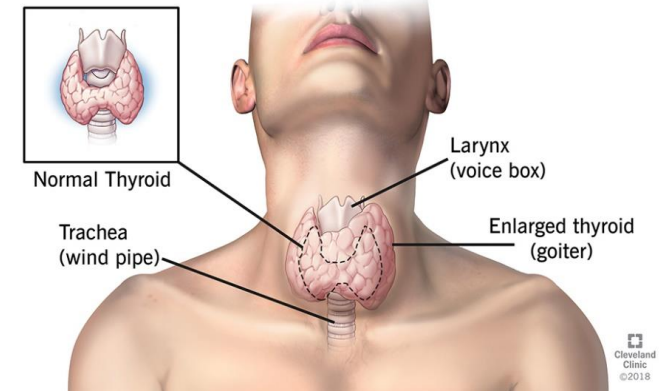
INNERVATION

- Principal innervation of the thyroid gland derives from the autonomic nervous system:
 - Parasympathetic fibers come from the **vagus nerves**.
 - Sympathetic fibers come from the **superior, middle, and inferior** ganglia of the **sympathetic trunk**.
 - These small nerves enter the gland along with the blood vessels.
- However, these nerves do not control endocrine secretion
 - The release of hormones is regulated by pituitary gland.



GOITER

- It is a **swelling** in the thyroid gland which can lead to a swelling of the neck or larynx (voice box).
- It is a term that refers to an enlargement of the thyroid and can be associated with a thyroid gland that is functioning properly or not.
- Worldwide, over 90% cases of goiter are caused by **iodine deficiency**.



GRAVES' DISEASE

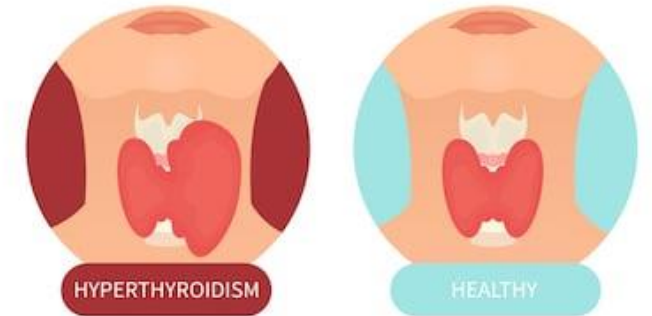
- It also called exophthalmic goiter, toxic goiter or thyrotoxicosis.
- It is an autoimmune disorder where hyperplasia of the thyroid parenchyma leads to excess thyroid hormone being produced.
- There is an increase in the metabolic rate of cells resulting in thyrotoxic symptoms such as sweating, weight loss, rapid pulse and warm moist skin.
- Exophthalmos occurs.
- Treatment includes drugs, destruction, or removal of the thyroid gland.



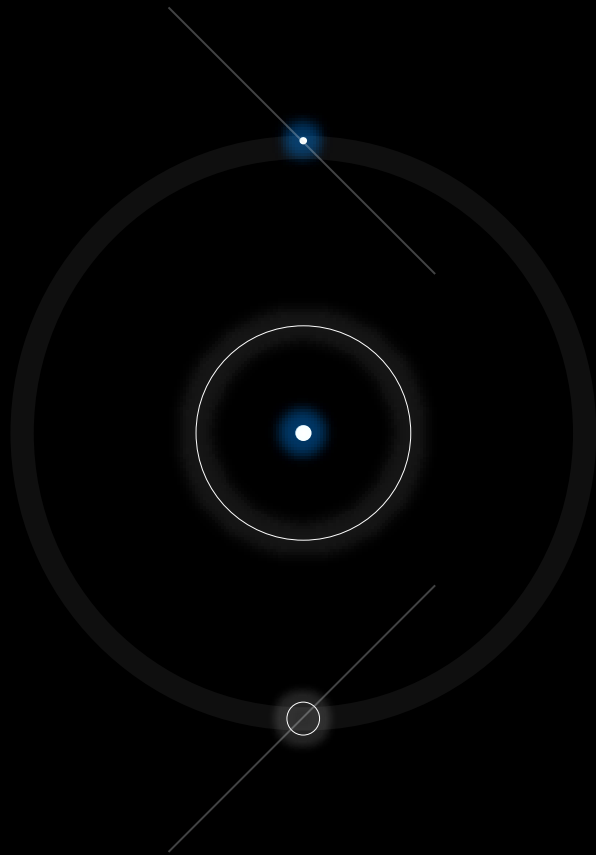
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HYPERTHYROIDISM

- It generally results from a tumor of the thyroid gland.
- Extreme overproduction of thyroxine results in a high basal metabolic rate, intolerance of heat, rapid heartbeat, weight loss, nervous and agitated behavior, and a general inability to relax.
- Graves' disease is one form of hyperthyroidism.
- In addition to the symptoms of hyperthyroidism described earlier, the thyroid gland enlarges, and the eyes may bulge, or protrude anteriorly.
- Hyperthyroidism may be treated surgically by removal of part of the thyroid (and/or a tumor if present) or chemically with thyroid-blocking drugs or radioactive iodine, which destroys some of the thyroid cells.
- **Hypothyroidism?**



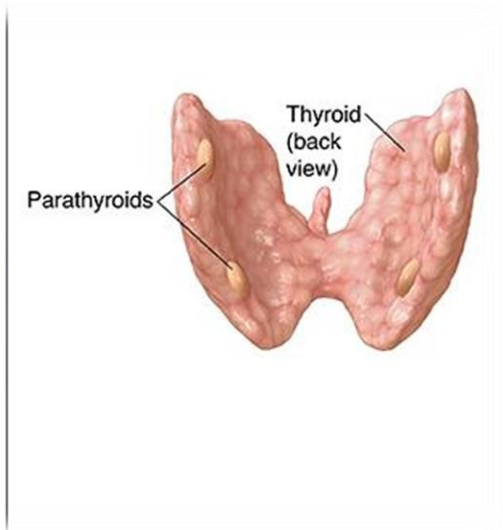
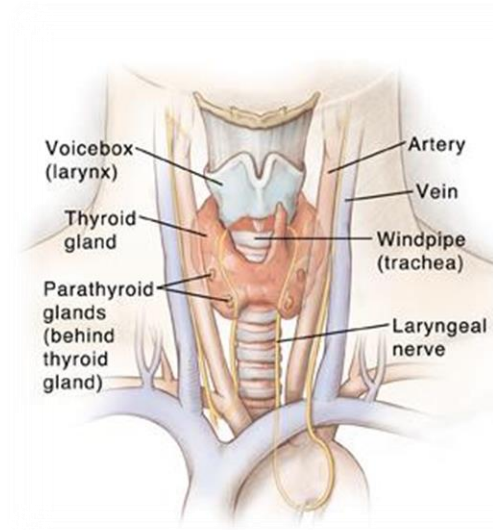
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PARATHYROID

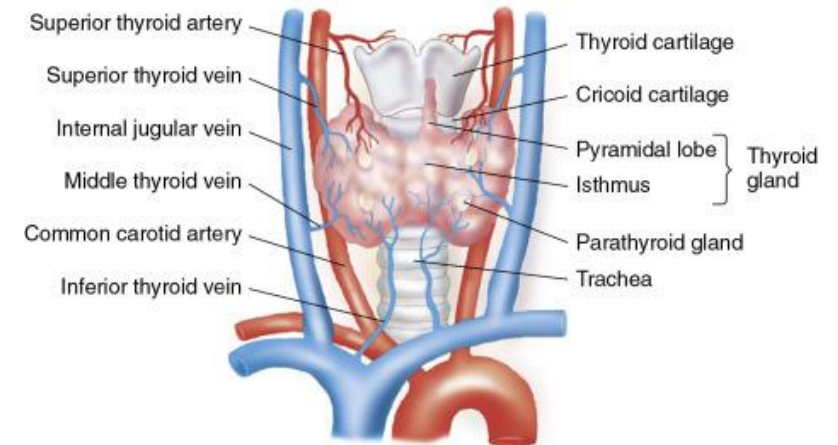
INTRODUCTION

- They are small endocrine glands in the neck that produce parathyroid hormone.
- Humans usually have **four parathyroid glands**, which are usually located on the rear surface of the thyroid gland.
- Parathyroid glands control the amount of **calcium** in the blood and within the bones.
- Two **superior parathyroid** has a constant position at the middle of post border of the gland.
- Two **inferior parathyroid** usually at the level of the inferior pole.
- They lie within the thyroid tissue or sometimes outside the facial capsule.



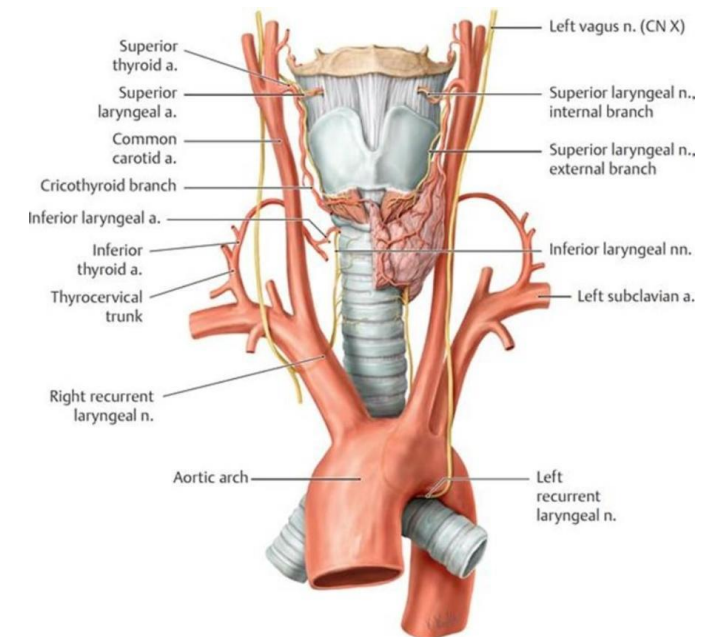
BLOOD SUPPLY & DRAINAGE

- The posterior aspect of the thyroid gland is supplied by the **inferior thyroid arteries**. Thus, its branches also supply the nearby parathyroid glands.
- **Collateral circulation** is delivered by the superior thyroid arteries, thyroid ima artery, laryngeal, tracheal and esophageal arteries.
- The parathyroid veins drain into the thyroid plexus of veins.
- The lymphatic vessels of the parathyroid glands drain into the deep cervical lymph nodes and paratracheal lymph nodes.



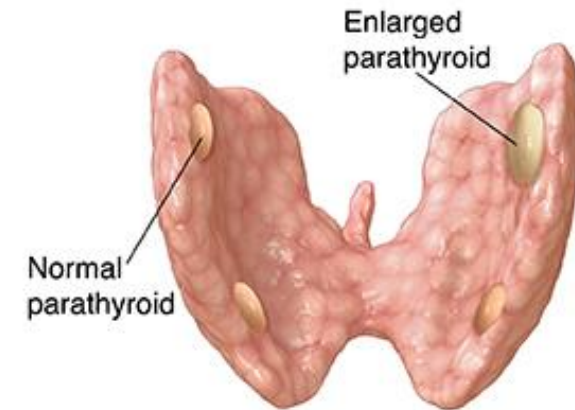
INNERVATION

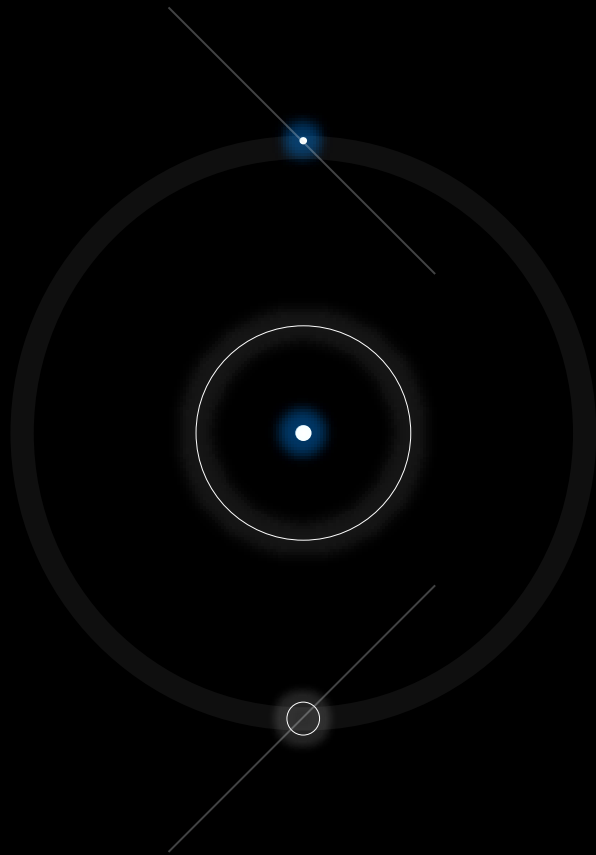
- Sympathetic trunk via superior & middle cervical sympathetic ganglia (vasomotor).



HYPERPARATHYROIDISM

- It occurs when excessive quantities of parathyroid hormone are released.
- This causes excessive amounts of calcium to leave the bones and enter the bloodstream.
- Bones decalcify resulting in osteoporosis, fractures and cysts.
- There is an increased likelihood of renal calculus in these patients.
- Hyperparathyroidism is usually due to a tumor in one of the parathyroid glands.
- Treatment involves removal of the tumor.
- **Hypoparathyroidism?**



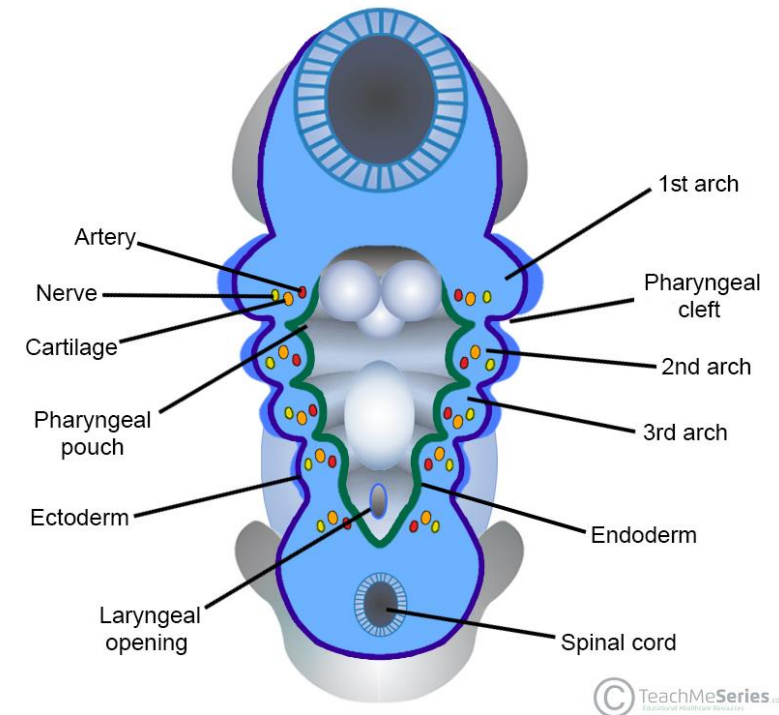


DEVELOPMENT

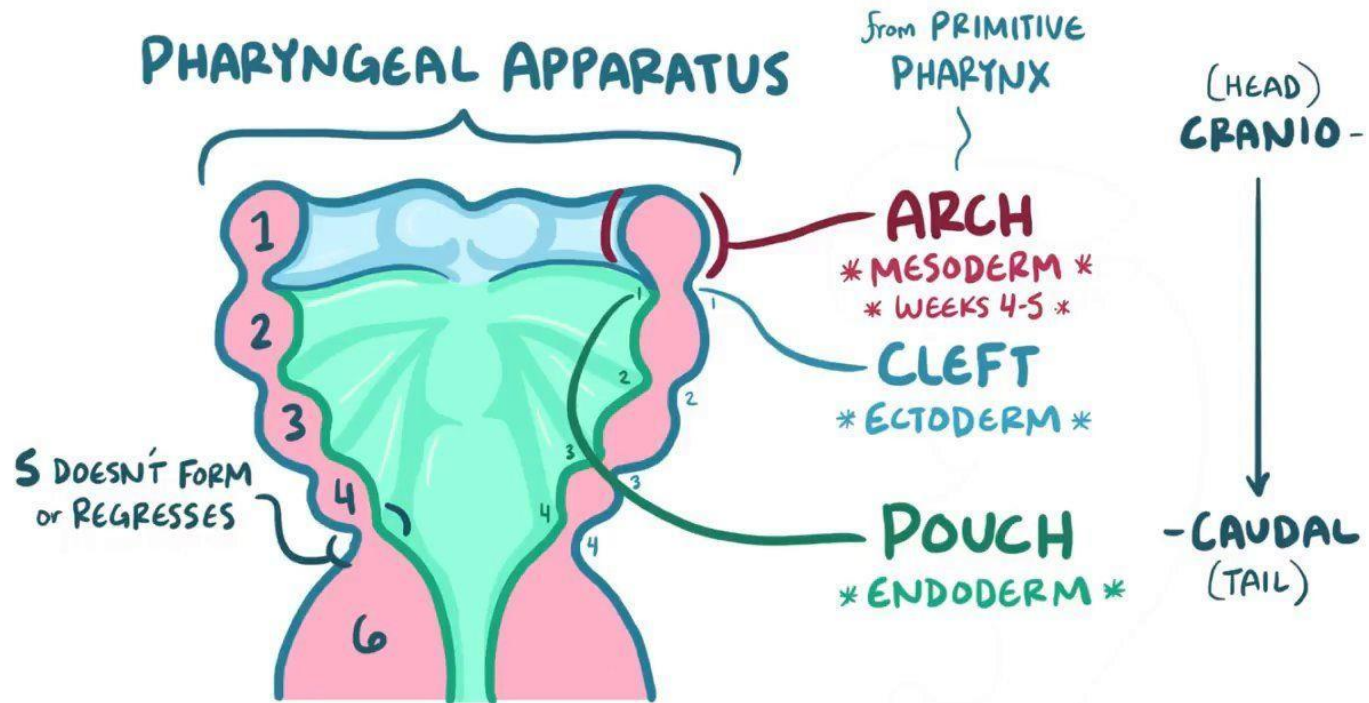
Of Thyroid & Parathyroid Glands

PHARYNGEAL APPARATUS

- The head & neck region develops from the **pharyngeal apparatus**, which is formed of:
 - Pharyngeal arches.
 - Pharyngeal grooves or clefts (externally).
 - Pharyngeal pouches (internally).
- The mesoderm in the **pharyngeal apparatus** of head and neck regions divided into six cubical masses called the **six pharyngeal or branchial arches**.
 - The 5th regresses soon after forming
- Each arch is formed of a **Core of mesoderm**, covered externally by **ectoderm** and the space between two arches from outside is called cleft or groove.
- Each arch is lined from inside by **endoderm** and the space between the two arches from inside is called pouch.

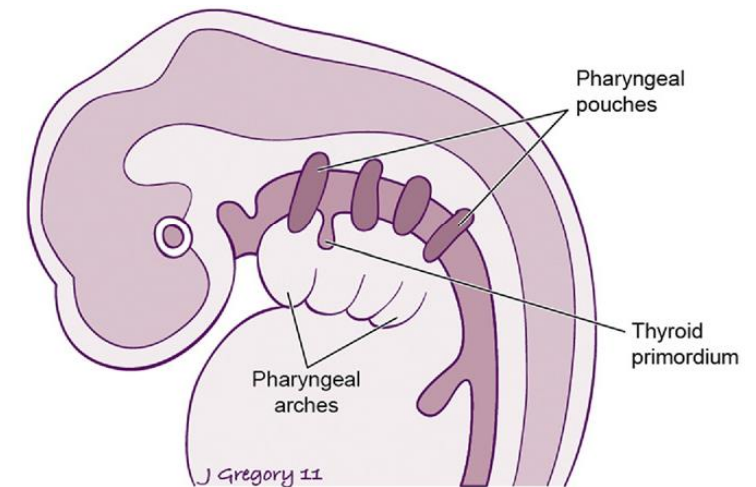


PHARYNGEAL APPARATUS



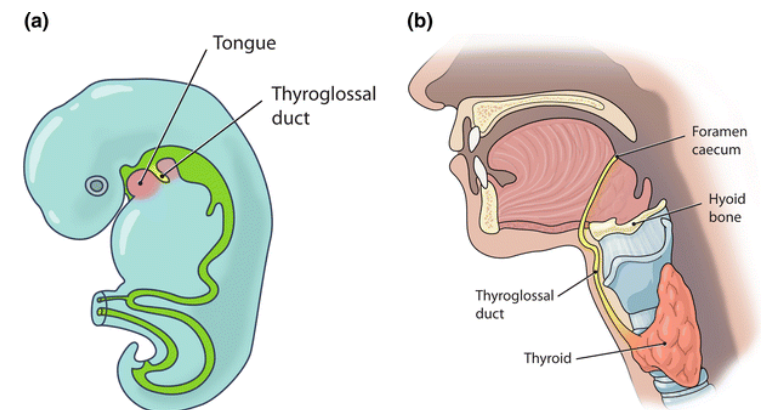
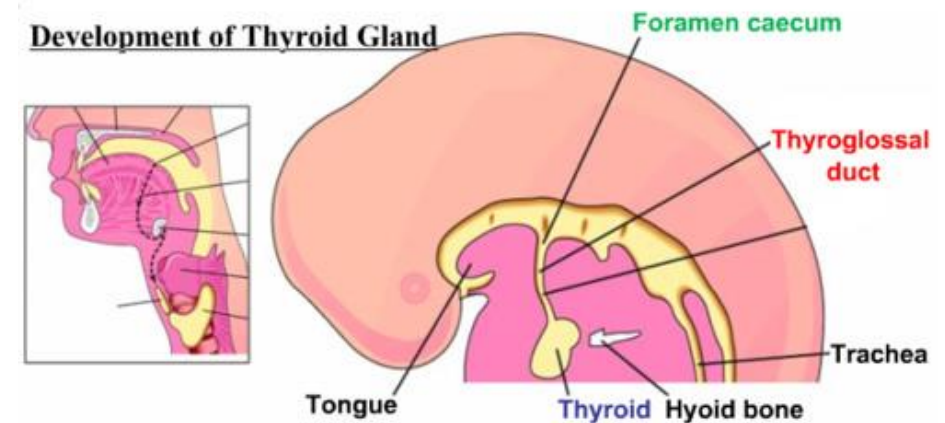
THYROID PRIMORDIUM

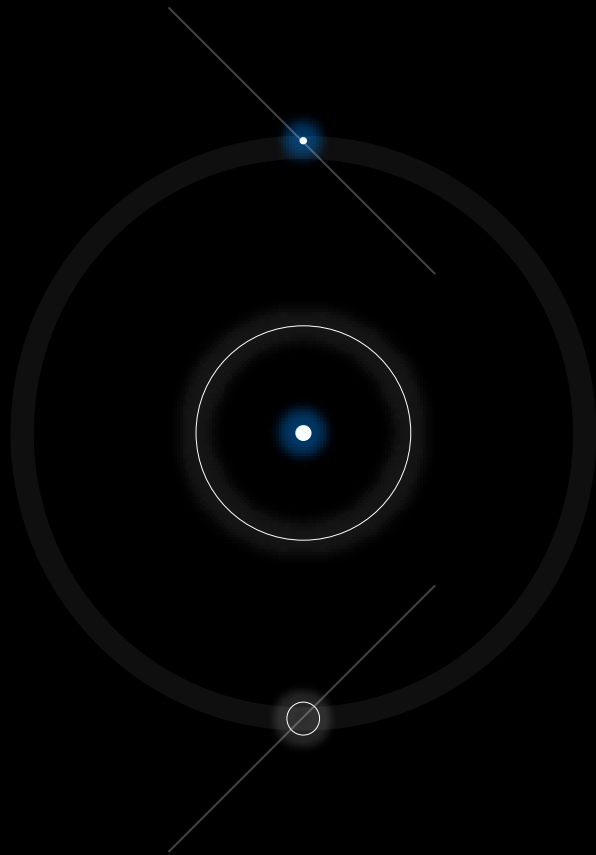
- By the **24th day** after fertilization, the thyroid gland begins its development.
- It is the first endocrine gland to develop.
- It develops from the endoderm of the floor of the **primitive pharynx** .
- It develops from the **Thyroid primordium**.



THYROID PRIMORDIUM

- As the tongue grows, the developing thyroid gland descends downward in the neck.
- It descends anterior to the developing **hyoid bone** & laryngeal cartilages through the **thyroglossal duct**.
- The thyroid is connected to the developing tongue by a narrow tube, called the **thyroglossal duct**.
- At first, the **thyroid primordium** is hollow, but soon it becomes solid & divided into two lobes and an isthmus.
- By 7th week (50th day), the gland takes its final shape & position, and the thyroglossal duct begins to fibroses and degenerates.
- The upper end of duct persists in the dorsum of the tongue as the **foramen caecum**.
- The distal part of the duct may persists in 50 % of people to form the **pyramidal lobe**.
- The pyramidal lobe may be attached to the hyoid bone by fibrous or smooth muscle; **the levator glandulae thyroidea**.

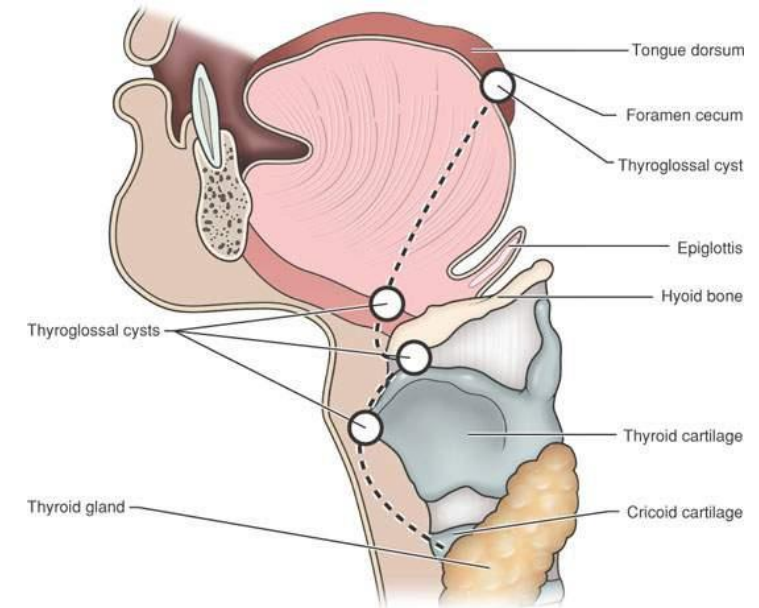




CONGENITAL ANOMALIES

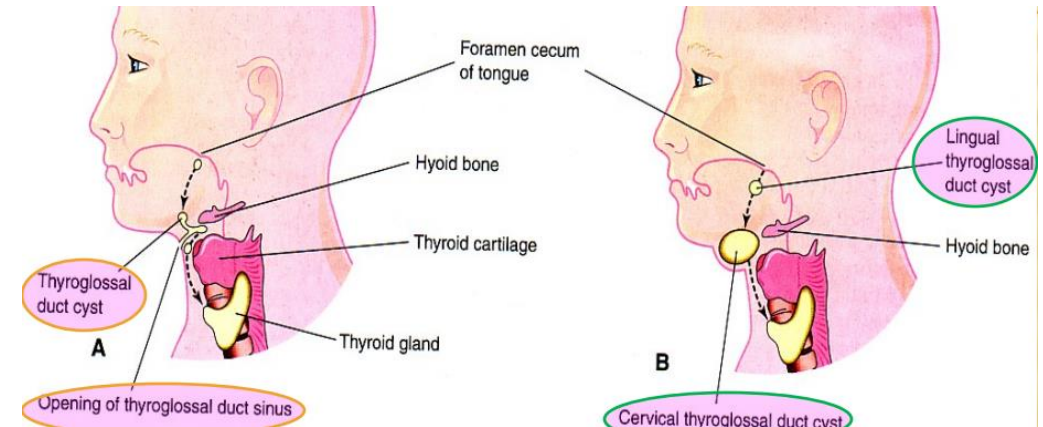
THE ANOMALIES

- Congenital hypothyroidism.
- Persistence of thyroglossal duct.
- Cervical thyroglossal duct cyst.
- Ectopic thyroid gland.
- Accessory thyroid tissue.
- Agenesis of the thyroid gland.



LOCATION OF THYROGLOSSAL CYST

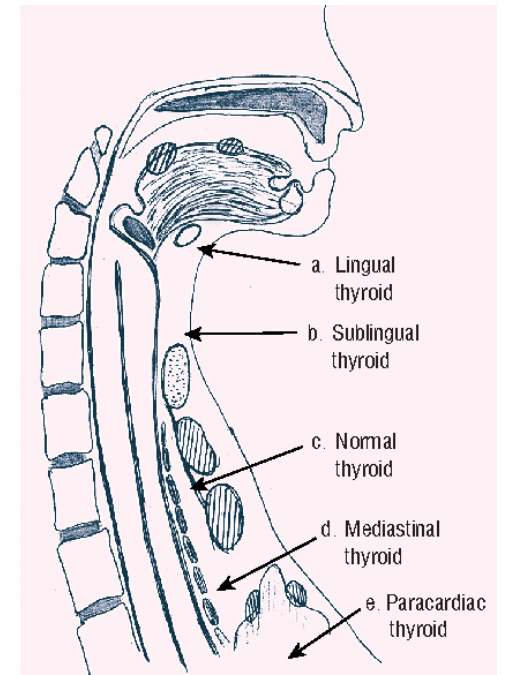
- (A) showing the possible locations of thyroglossal duct cysts through the broken line indicating the course of the duct.
- A thyroglossal duct sinus is illustrated.
- (B) illustrating lingual & cervical thyroglossal duct cysts.
- Most of thyroglossal duct cysts are located just anterior & inferior to hyoid bone.



ECTOPIC THYROID TISSUE

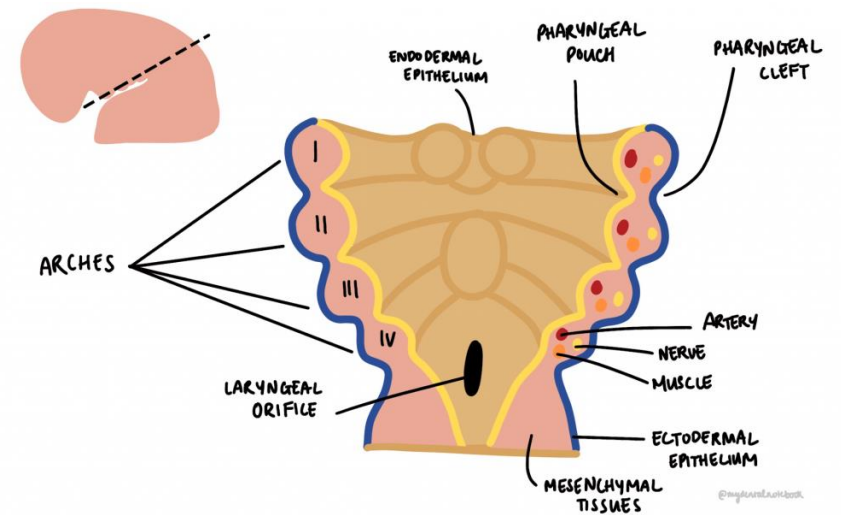
- The thyroid glands develops high up close to foramen cecum of the developing tongue.
- Then it descends along the thyroglossal duct to reach its final position by the 7th week.
- Ectopic: Descent of the thyroid could be arrested at any point, or extends down behind the sternum in the thorax.

Figure 1. Sketch diagram showing the different positions where ectopic thyroid gland is found.



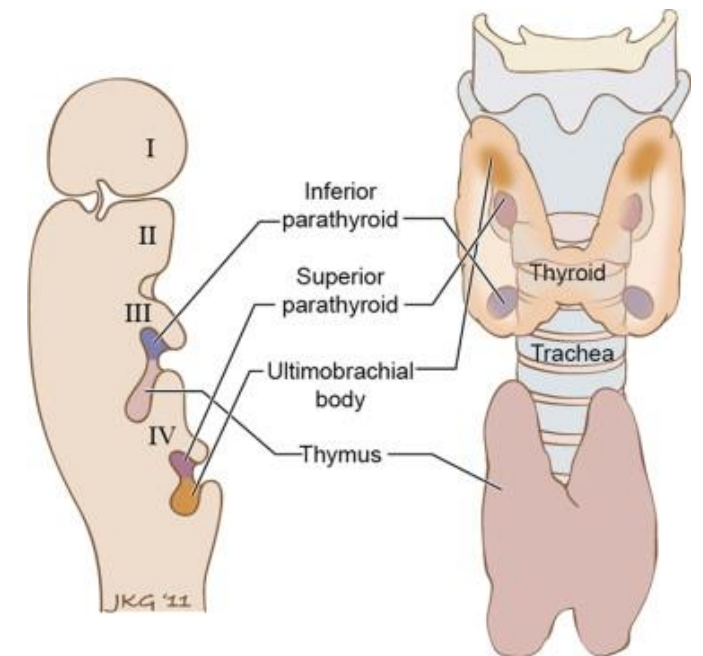
PHARYNGEAL POUCHES

- These are pairs of pouches develop in a craniocaudal sequence between the arches internally.
- The first pair of pouches lies between the first and second pharyngeal arches.
- There are four pairs of pharyngeal pouches.
- The fifth pair of pouches is **absent** or rudimentary.



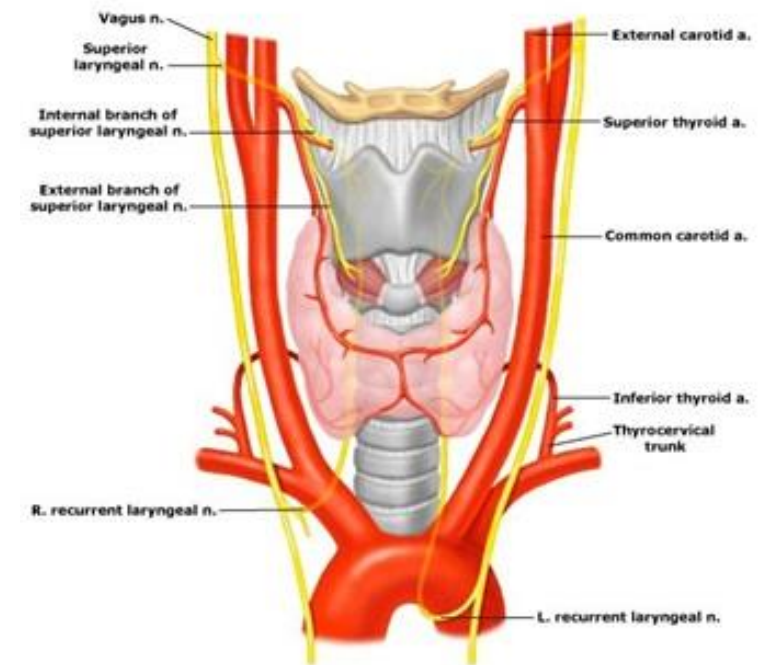
DEVELOPMENT OF THE PARATHYROIDS

- Each of the 3rd & 4th pharyngeal pouch develops into dorsal and ventral parts.
- By the **sixth week**:
 - The Dorsal part of the 3rd pouch develops into **inferior parathyroid bud**, while the dorsal part of the 4th pouch develops into the **superior parathyroid bud**.
 - The ventral part of 3rd pouch gives the **thymus gland** primordium while the ventral part of the 4th pouch forms what is called **Ultimopharyngeal body**.
- As the **thymus primordium** develops, it descends downward to the thorax, behind the sternum in superior mediastinum.
- It draws the inferior parathyroid bud to a lower level than the superior parathyroid.
- Both parathyroid glands lie behind the thyroid gland.



CLINICAL NOTES

- The **External laryngeal nerve** runs close to the **superior thyroid artery** before turning medially to supply the cricothyroid muscle.
- High ligation of the superior thyroid artery during **thyroidectomy** places this nerve at risk of injury, so it should be ligated within the upper pole of the gland.
- The lesion will cause **horsiness** of voice.
- The **inferior thyroid artery** is closely associated with the **recurrent laryngeal nerve**.
- This nerve can be found in a triangle bounded laterally by the common carotid artery, medially by the trachea, and superiorly by the thyroid lobe.
- The relationship of the recurrent laryngeal nerve and the inferior thyroid artery is highly variable in that the nerve can lie deep or superficial to the artery, or between the branches of the artery, and be different on either side of the neck.
- So, the consideration of this nerve and its branches must be given during thyroidectomy





QUESTIONS



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