Thyroid Gland

B.Sc. Part- II

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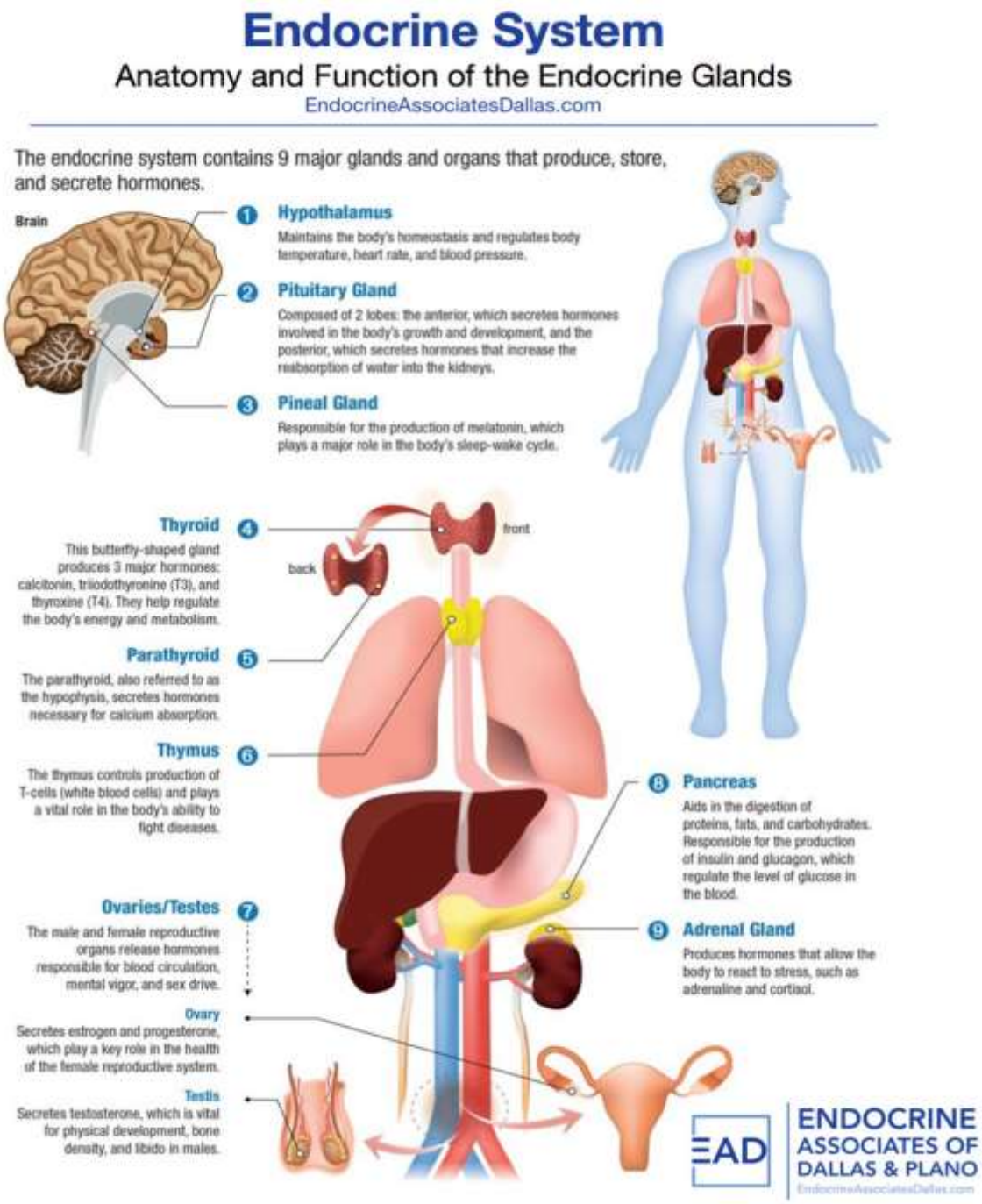


Thyroid gland is an endocrine gland, found in the neck region. It is responsible for regulating the body's metabolism with the help of hormones secreted by its cells.

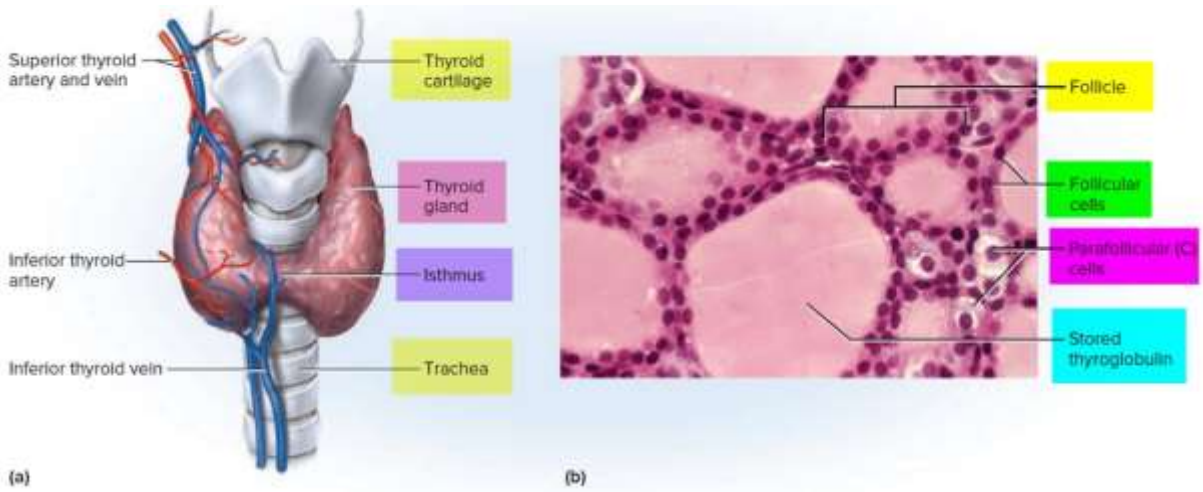
Important features of thyroid Gland

- Thyroid gland is located in neck, anterior to trachea. It consists of two lobe-one on each side of junction between laryngotracheal. The lobes are connected by a thyroid tissue called Isthmus.
- The gland is composed of two types of cells; follicular cell (secrete thyroid hormone) and para-follicular cell (secrete and store calcitonin hormone).
- Thyroid glands consist of hundreds of thousands of thyroid follicles which stores thyroid hormones.
- Follicles are made up of single layer of follicular cells.

Position and Structure of Thyroid Gland

Location: in neck region on either side of trachea

Size: Each lobe is 4-6 cm long, and 1.5 cm thick



Follicular cell:

- these cells are most prevalent cell.
- They secrete thyroid hormones (T3 and T4)

Parafollicular cell:

- cluster of parafollicular cells are found between follicular cells.
- they are larger than follicular cell.
- parafollicular cells synthesize and secretes calcitonin.

Hormones of Thyroid gland

1. Thyroxine (Tri-Iodothyronine and tetra-Iodothyronine)

- Follicular cells secrete thyroxine which contains 4 atoms of Iodine to form tetra-iodothyroxine (T4). Follicular cells also secrete tri-Iodothyroxine (T3) which contains only 3 atoms of Iodine.
- T3 and T4 collectively known as Thyroid hormone.

Functions of thyroxine hormone:

- Increase basal metabolism rate by increasing O2 consumption in most tissues except lungs, brain, testis and retina
- Essential for growth of skeletal in children. Thyroxine is regulated by TSH from Pituitary gland.
- Increase carbohydrate metabolism, promote gluconeogenesis
- Effect on lipid metabolism
- Stimulate NA-K ATPase.
- Influence water and electrolyte balance.
- It is regulated by TSH
- At first T4 is synthesized which is converted to T3. T3 is five times more potent than T4.
- **Deficiency of thyroxine:** Goitre, Hypothyroidism
- **Excess of thyroxine**: thyrotoxicosis, hyperthyroidism.

2. Calcitonin

- Parafollicular cells secretes calcitonin. Calcitonin is a polypeptide hormone.
- Secretion of calcitonin is regulated by concentration of calcium in blood but not by feedback mechanism of Pituitary gland.

Functions of calcitonin:

- It lowers calcium level in blood (antagonistic to parathyroid hormone)
- It acts directly on Osteoclast to reduce the remodelling bone and increase reabsorption of calcium.
- It increases the movement of Ca++ from blood to bone.

Disorder of thyroid gland

1. Cretinism:

- deficiency of thyroxine in children
- pot belly, pigeon chest in children with physical and mental retardness
- dwarfism (cretins)

2. Myxoedema:

- deficiency of thyroxine in adults
- puffiness of skin
- mental retardness
- low body temperature, BMR and blood pressure

3. Simple goitre:

- deficiency of iodine in diet and hence deficiency of thyroxine
- swelling of thyroid gland, visible in neck region
- low BMR. low Blood pressure and heart rate
- fatigue and sluggishness

4. Exophthalmic goitre (Grave’s disease):

- over stimulation thyroid gland
- goitre
- bulging of eye ball
- increased BMR, blood pressure and heart rate
- restlessness and nervousness