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**Class: B.Sc Part –III (Hons.)**

**Paper: V**

**Group – B**

**Topic: Thyroid Gland**

### **Thyroid Gland**

Thyroid gland is the largest endocrine gland in the body. It is located on either side of the trachea.

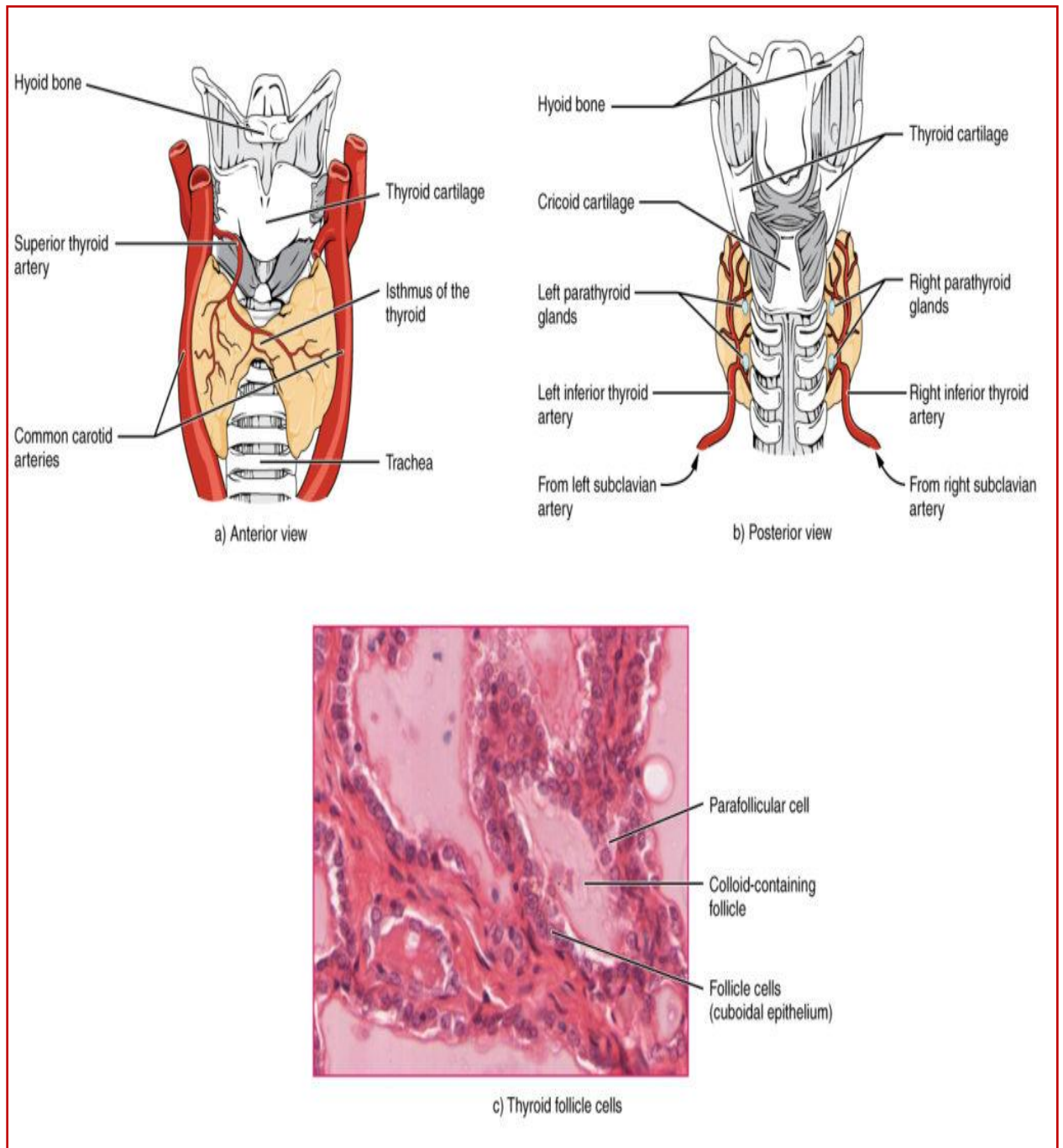
It is composed of right and left lobes, on either side of the trachea that is connected by a fibrous connective tissue, **Isthmus**. It produces hormones like **thyroid hormones** and **calcitonin**.

The thyroid gland consists of numerous spherical hollow sacs called thyroid follicles and parafollicular cells. Thyroid follicles are lined with a simple cuboidal epithelium composed of follicular cells.

The interior of the follicles contains colloid, a protein-rich fluid. The follicular cells produce two hormones; **thyroxine** (also called **tetraiodothyronine** or **T<sub>4</sub>** because it contains four atoms of iodine) and **triiodothyronine** (or **T<sub>3</sub>**), which contains three atoms of iodine.

**T<sub>3</sub>** and **T<sub>4</sub>** together are known as **thyroid hormones**.

The **parafollicular cells (or C-Cells)** lie between follicles and secrete a hormone known as **Calcitonin (or thyrocalcitonin)**.



**Fig; Thyroid Gland, A- Anterior view, B- Posterior View,  
C- Thyroid Follicle Cells**

## Production of thyroid hormone:

The follicular cells of thyroid follicles actively accumulate iodide from the blood and secrete it into the colloid. In the colloid, iodide is oxidized into iodine and attached to a tyrosine residue of thyroglobulin protein. Thyroglobulin is also synthesized and secreted by follicular cells.

The attachment of one iodine to tyrosine produces monoiodotyrosine (MIT); the attachment of two iodines produces diiodotyrosine (DIT). Within the colloid, enzymes modify the structure of MIT and DIT and couple them together.

When two DIT molecules that are appropriately modified are coupled together, a molecule of tetraiodothyronine ( $T_4$ ) is produced. The combination of one MIT with one DIT forms triiodothyronine ( $T_3$ ). Upon stimulation by TSH, the thyroid hormones, bound to thyroglobulin, are taken into the follicular cells. Hydrolysis reactions within the follicular cells release the free  $T_4$  and  $T_3$ , which are secreted.

The major hormone secreted by the thyroid gland is thyroxine ( $T_4$ ). It travels in the blood attached to carrier proteins. The thyroid also secretes a small amount of triiodothyronine ( $T_3$ ).

The carried proteins have a higher affinity for T4 than for T3. Approximately 99.96% of the T4 in the blood remain attached to carrier proteins in the plasma.

Free T4 and T3 enter target cells. Once the free T4 passes into the target cell cytoplasm, it is enzymatically converted into T3. Hence it is the T3 rather than T4 that is active within the target cells.