

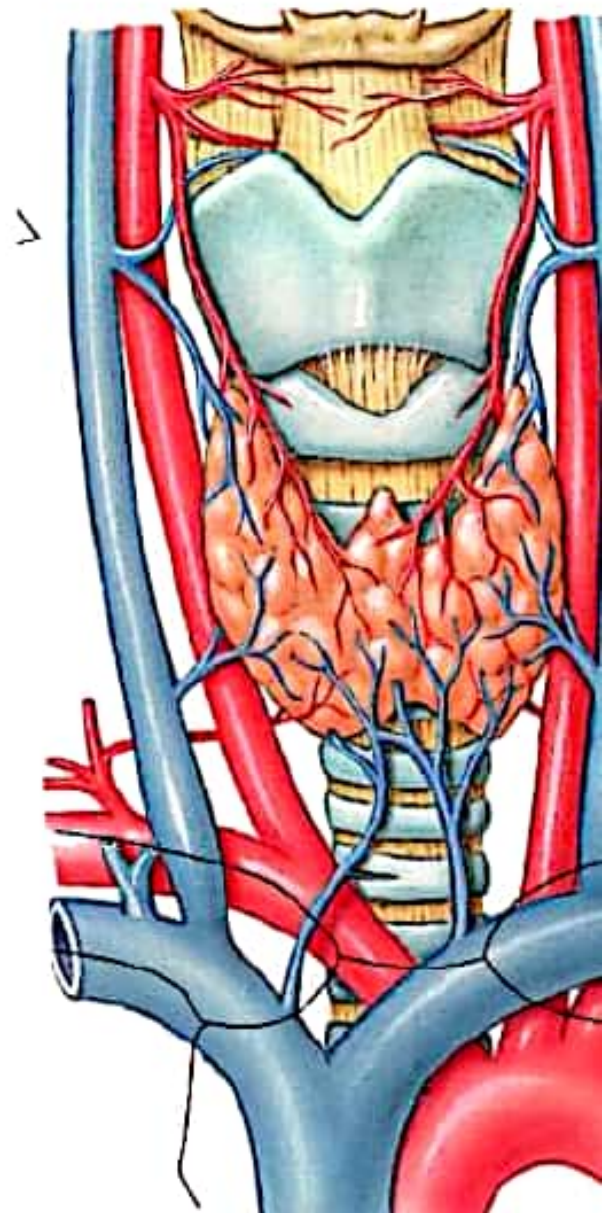
Thyroid gland

- Largest gland in the body
- Location : in the neck inferior the larynx and spanning over the ventral surface of trachea
- Function:
 - Secretion of thyroxin and triiodothyronine
 - Secretion of calcitonin

Thyroid Gland

- Anterior surface of trachea just inferior of thyroid cartilage (or Adam's apple)
- Two lobes connected by isthmus
- Microscopic thyroid follicles produce thyroid hormone
- C Cells - produce calcitonin ($\downarrow\text{Ca}^{2+}$)

Fig 19-7



Structures and Functions of Endocrine System

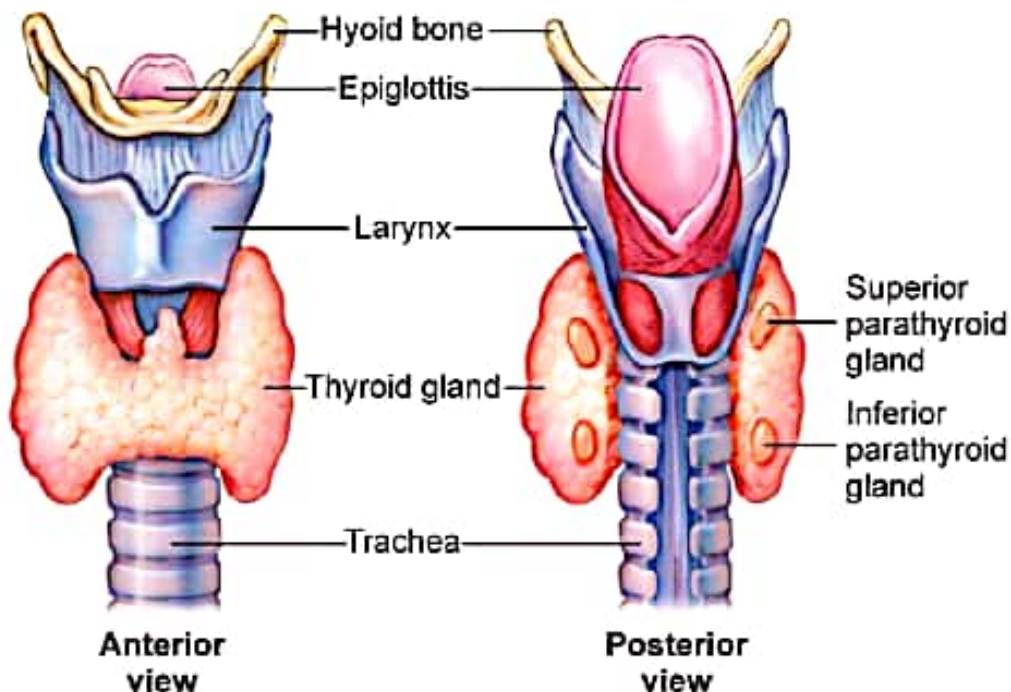
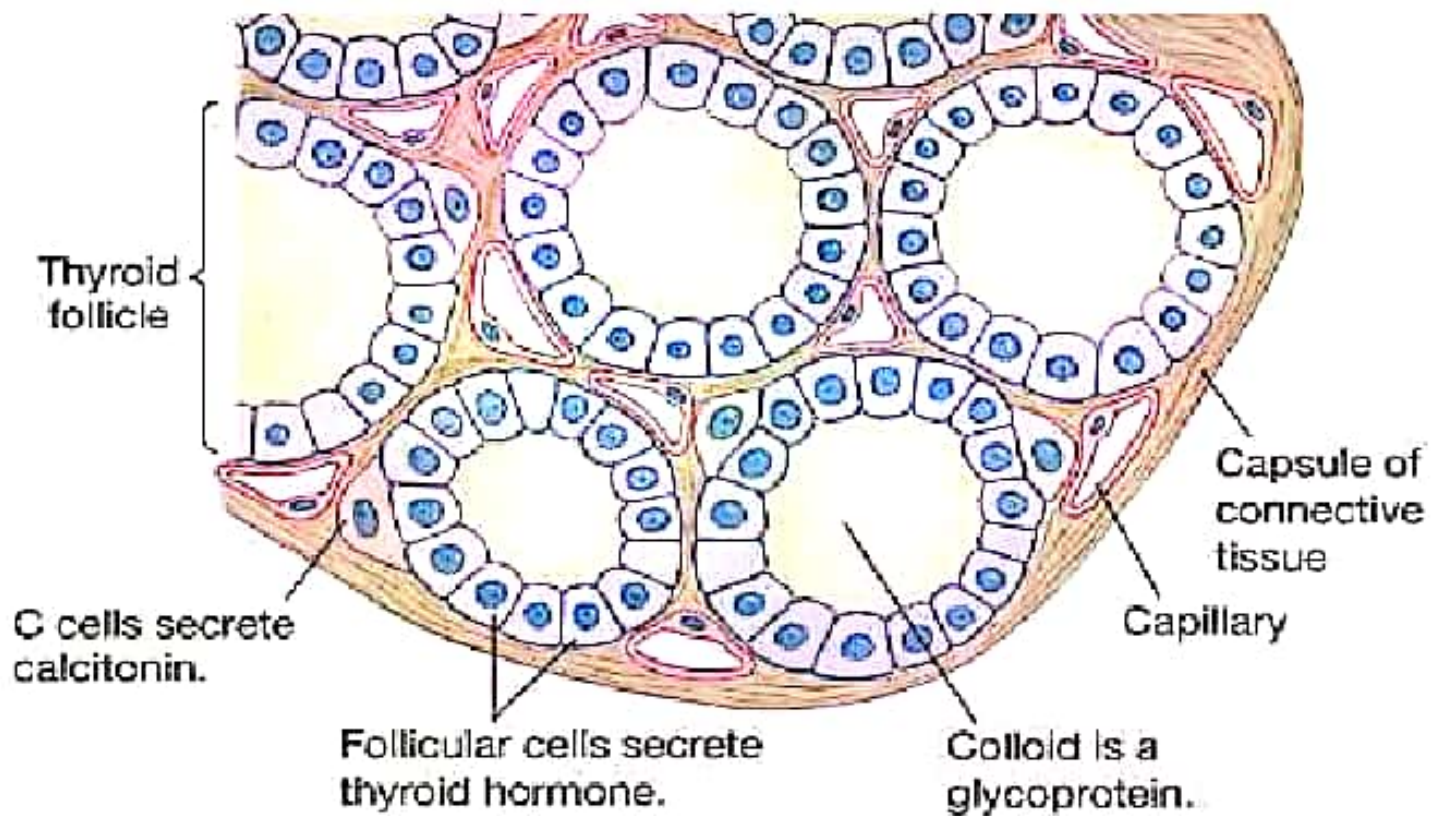


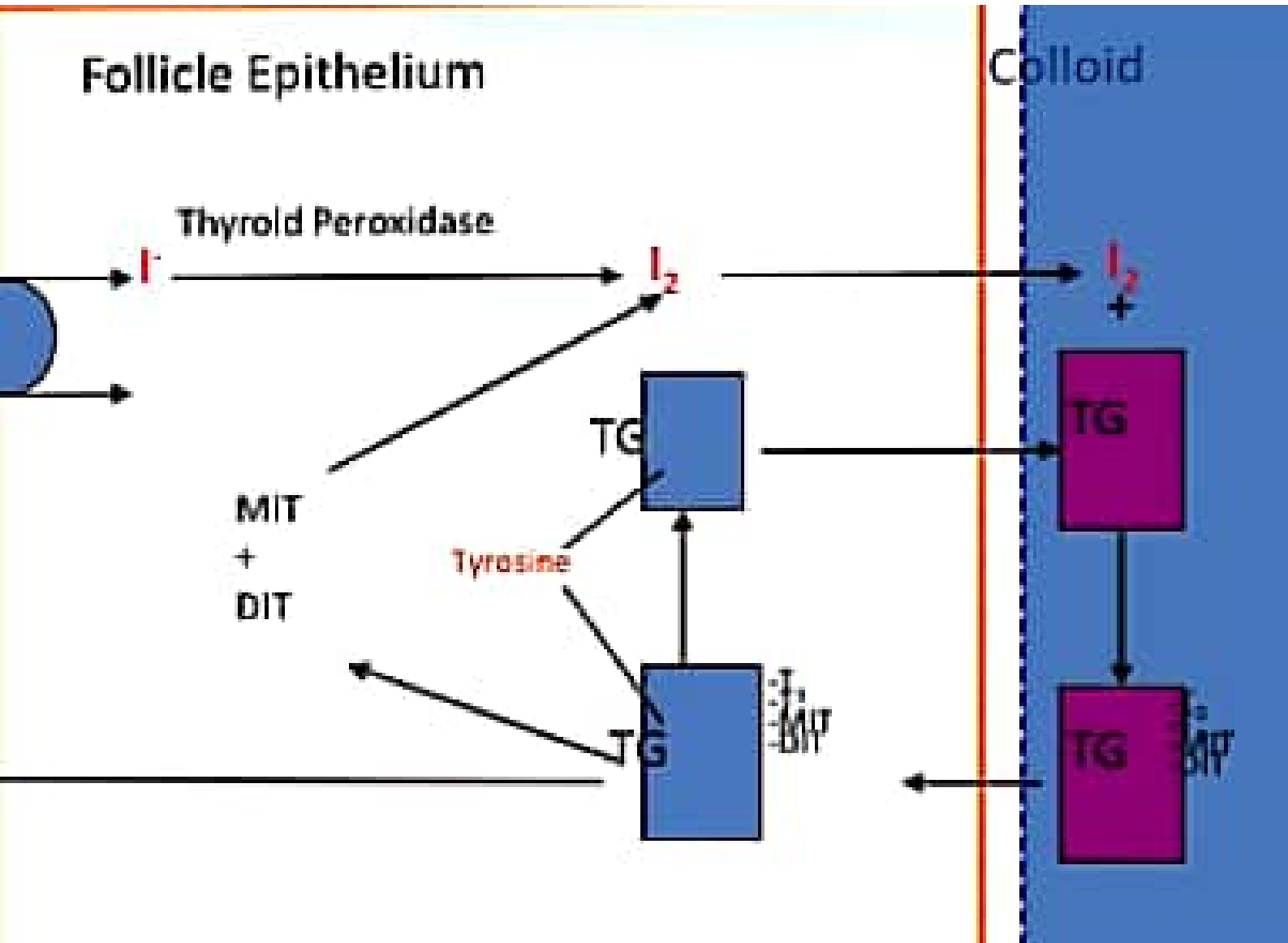
Fig. 48-10. Thyroid and parathyroid glands. Note the surrounding structures.

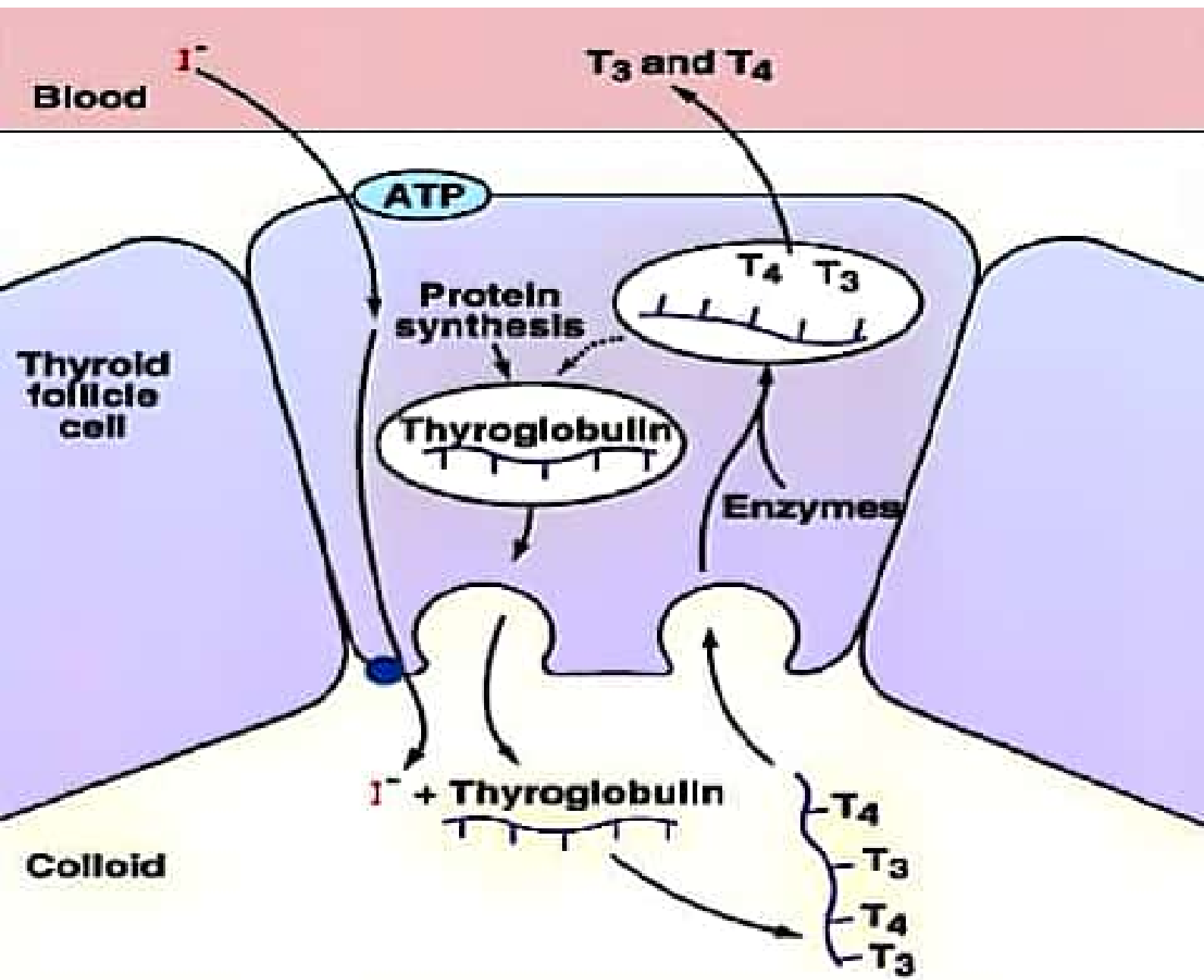
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Thyroid Gland: Hormones and Iodine Metabolism

(b) Section of thyroid gland







Synthesis of thyroid hormones

1. Iodide trapping

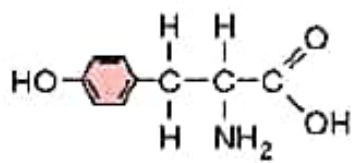
- By sodium iodide symporter
- Blocked by:
 - Thiocyanate SCN^-
 - Perchlorate ClO_4^-
 - Pertechnetate TcO_4^-

2. Oxidation of iodide

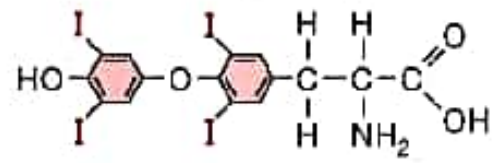
- By thyroid peroxidase
- Inhibited by:
 1. large intake of iodide $>150\text{mcg/day}$
 2. Thioamides (refer to hyperthyroidism therapy)

Thyroxine and its precursors: Structure & Synthesis

Tyrosine

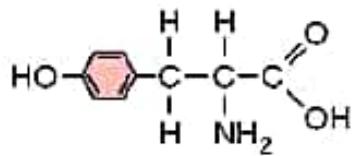


Thyroxine (T₄)

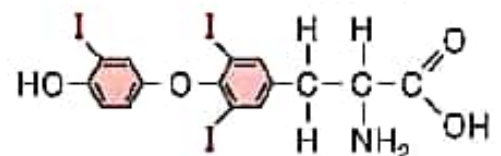


(2 tyrosine + 4 I)

Tyrosine



Triiodothyronine (T₃)



(2 tyrosine + 3 I)

Figure 1-1: Thyroid hormones are made from tyrosine and iodine

Production Of Thyroid Hormones



Dietary iodide (I^- , atomic wt. 127)

A. Rapid absorption

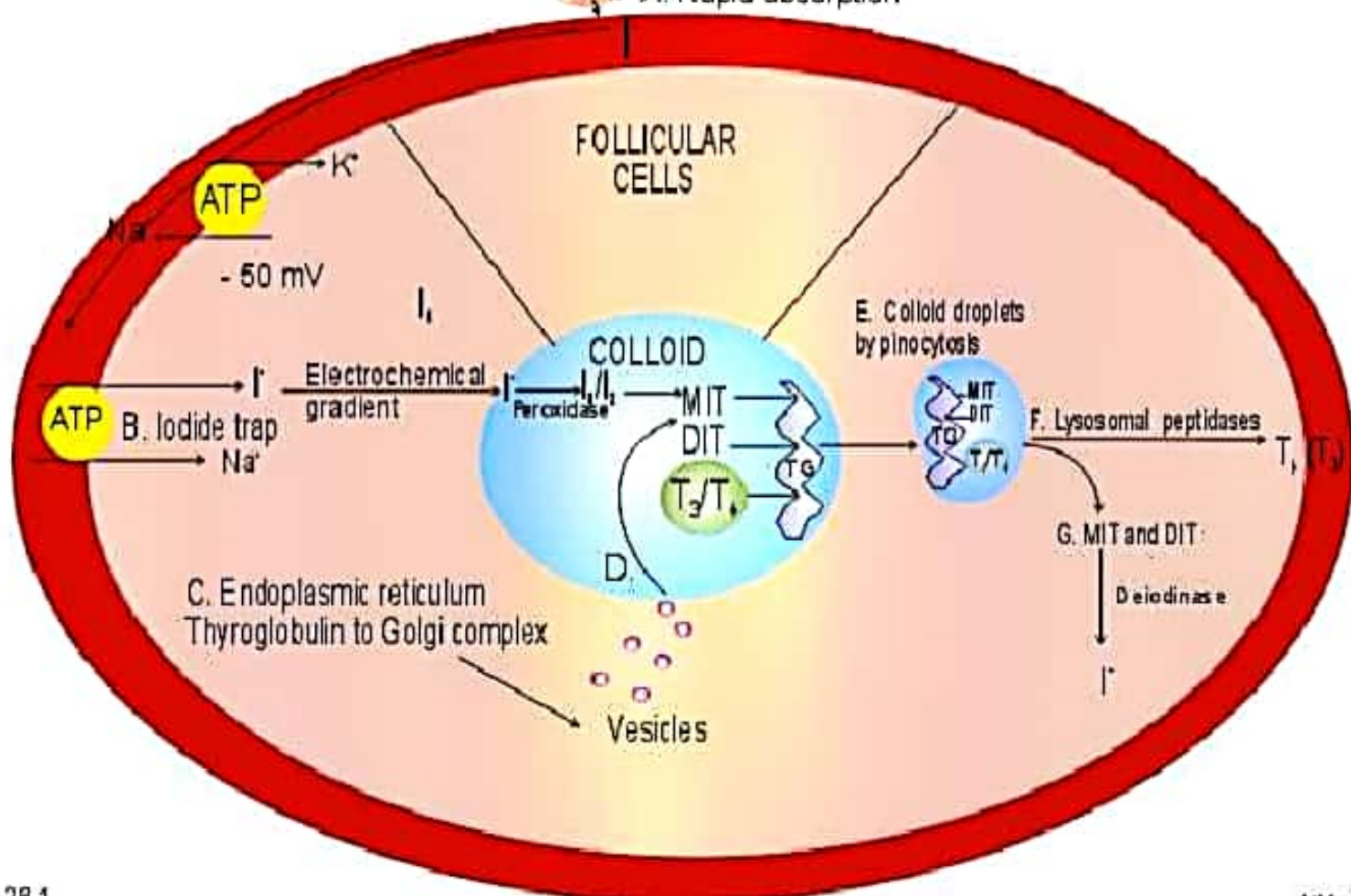


Fig. 28-1

H. TSH stimulates thyroid hormone synthesis and secretion

KMc

Synthesis of thyroid hormones

4. Coupling

- $DIT+MIT=T_3$
- $DIT+MIT=T_4$

5. Storage :

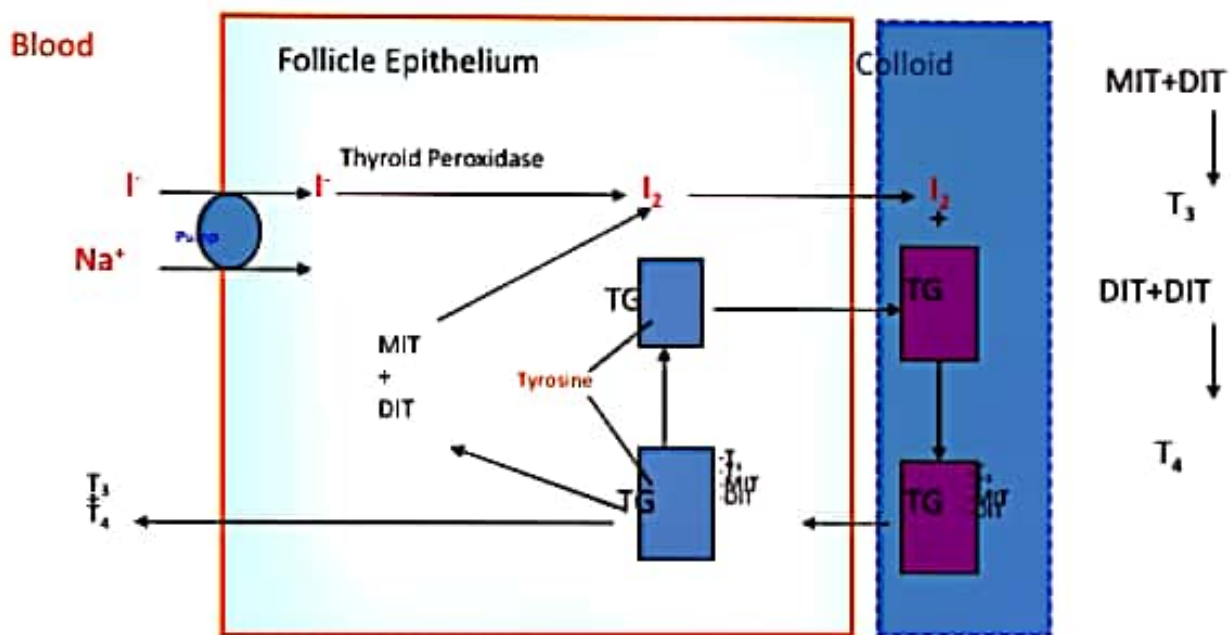
- Along with thyroglobulin

6. Exocytosis and proteolysis

- Release of T_4 & T_3

7. Conversion of T_4 to T_3 in peripheral tissue

Synthesis of Thyroid Hormone



Thyroid hormone synthesis and secretion involves processes that occur within follicular epithelial cells and in colloid.

I^- : iodide ions; I_2 : iodine; TG: thyroglobulin; MIT: monoiodotyrosine; DIT: diiodotyrosine.

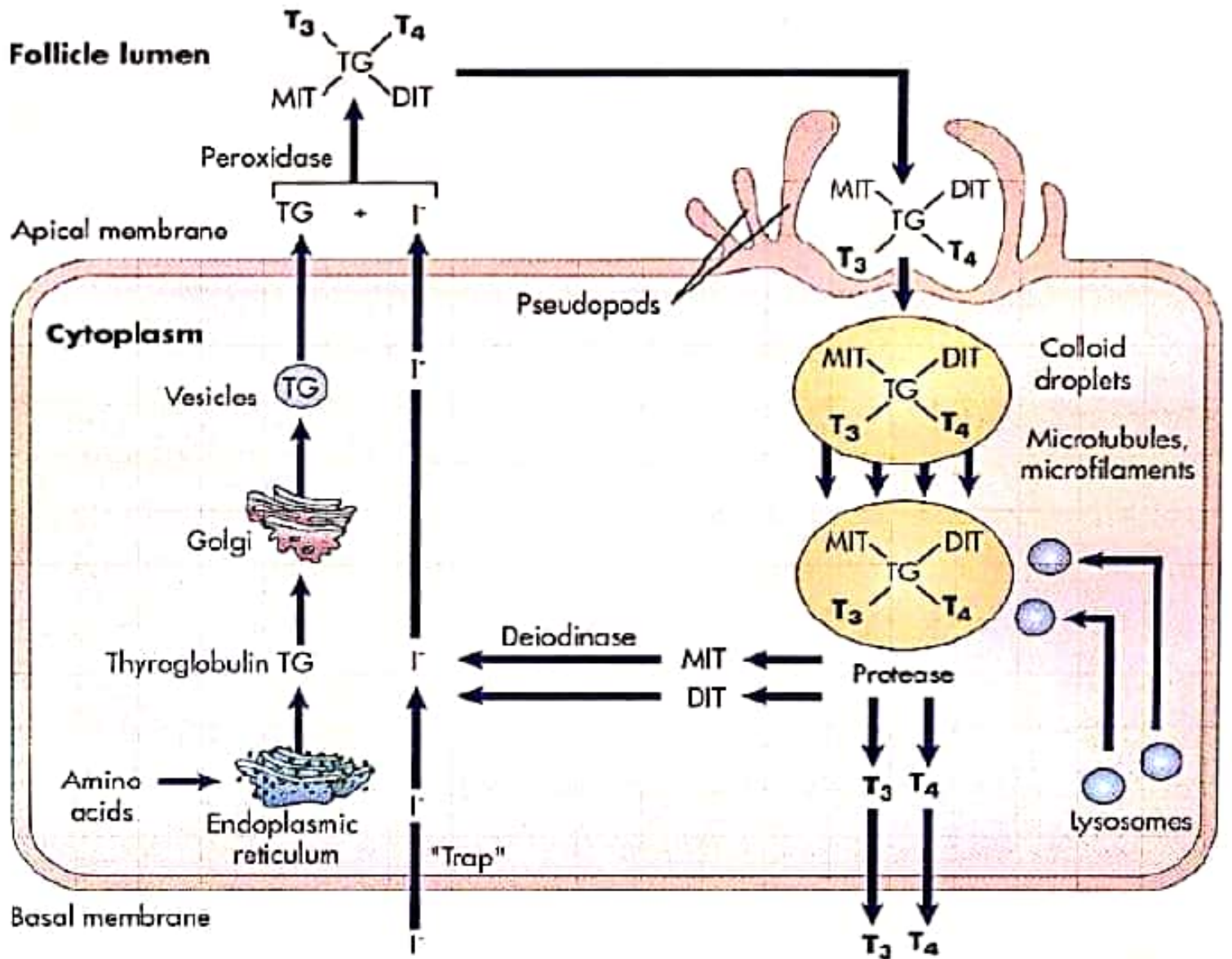
T4 vs T3

T4

- Thyroid gland synthesizes 90%
- 0.04% free
- Not active
- Long T_{1/2}

T3

- Thyroid gland synthesizes 9%
- 0.4% free
- active



Mechanism of action of thyroid hormones

