

Pathophysiology of

Simple Goiter

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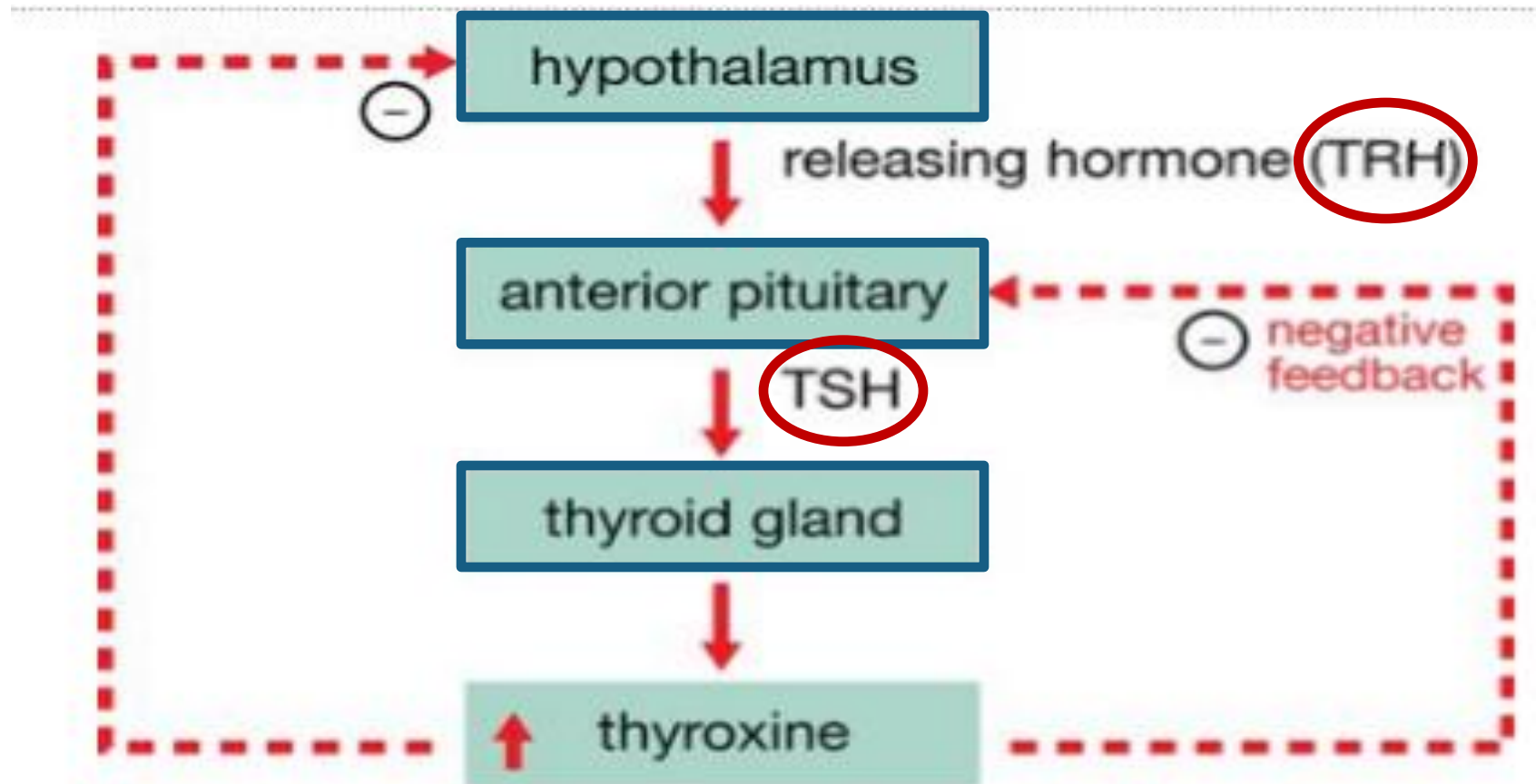
Introduction

As at any factory, effective production depends on three key components :

- 1) control
- 2) raw material
- 3) machinery

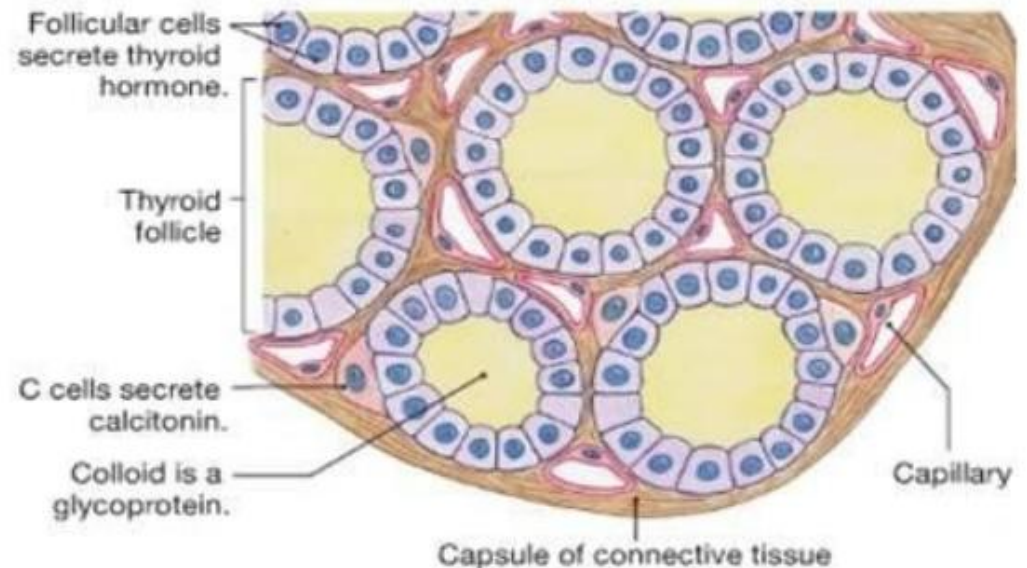
Introduction

Control of thyroid gland



Introduction

The gland is composed of a **uniform cluster of follicles** enclosed by a thin, fibrous capsule surrounded by capillaries. The follicles are the structural, functional, and secretory units of the thyroid gland.



Introduction

Thyroxine :

- * **Thyroxine-binding globulin (TBG)** is the primary protein that binds to T₃ and T₄ in the plasma.
- * **Unbound or free hormones** are available to the tissue.
- * **T₃ is the active hormone** (3 times the metabolic potency of T₄), and T₄ is the prohormone, broken down in the tissues to form T₃ as needed.

Introduction

TSH :

The normal range of serum TSH concentration in the euthyroid population was found to be **0.4 to 2.5 mIU/L** by the National Academy of Clinical Biochemistry.

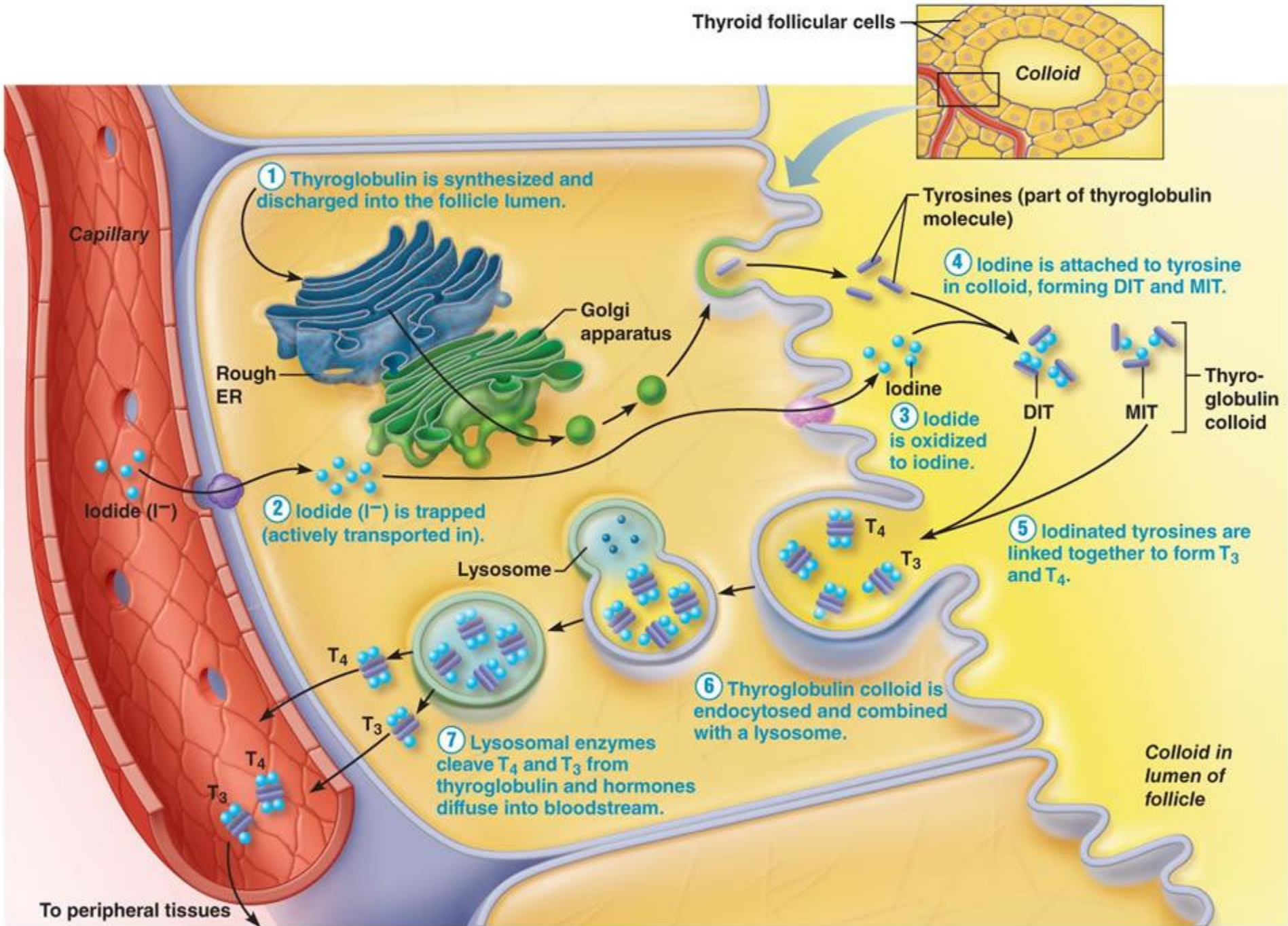
Iodine is a critical component of thyroid hormones and composes **65% of T4** weight and **58% of T3** weight. Daily requirement (0.1- 0.15 mg / day)

Hormone synthesis

1. **Thyroglobulin production** by follicular cell and released into colloid by exocytosis
2. **Iodide uptake** by follicular cell from the blood and transferred to colloid
(**Iodide trapping : active process**)
3. Iodide is **oxidized** into Iodine by **TPO**
(**thyroid peroxidase enzyme**)
4. **Attachments** of iodine to tyrosine on thyroglobulin in colloid forming **MIT & DIT** .
(**mono & di iodotyrosine**)

5. **Coupling processes** between the iodinated tyrosine molecules to form T₄ and T₃ .
(Tri & Tetra iodothyronine)

6. Secretion (upon stimulation) of T₄ and T₃ occurs by **endocytosis** a piece of colloid, **uncoupling** of T₄ and T₃ and **diffusion** out of the follicular cell into the blood .



Simple Goiter

Non Inflammatory
Non neoplastic
Non toxic

Enlargement of
thyroid gland

Euthyroid

Simple Goiter

1

- Endemic Goiter

2

- Physiologic Goiter

3

- Colloid goiter

4

- Dyshormonogenesis

5

- Sporadic Goiter

6

- Simple nodular Goiter

Endemic Goiter

Area poor in iodine as oases



Deficient intake of Iodine
(daily requirement : 0.1 – 0.15 mg)

Endemic Goiter



Physiological Goiter

Female at puberty , pregnancy or lactation



Increase body demand & relative decrease of iodine

Relative decrease of T₃ & T₄



Increase TSH



More stimulation of thyroid gland

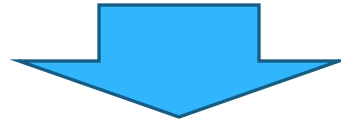
Simple diffuse hyperplastic Goiter

Physiological Goiter



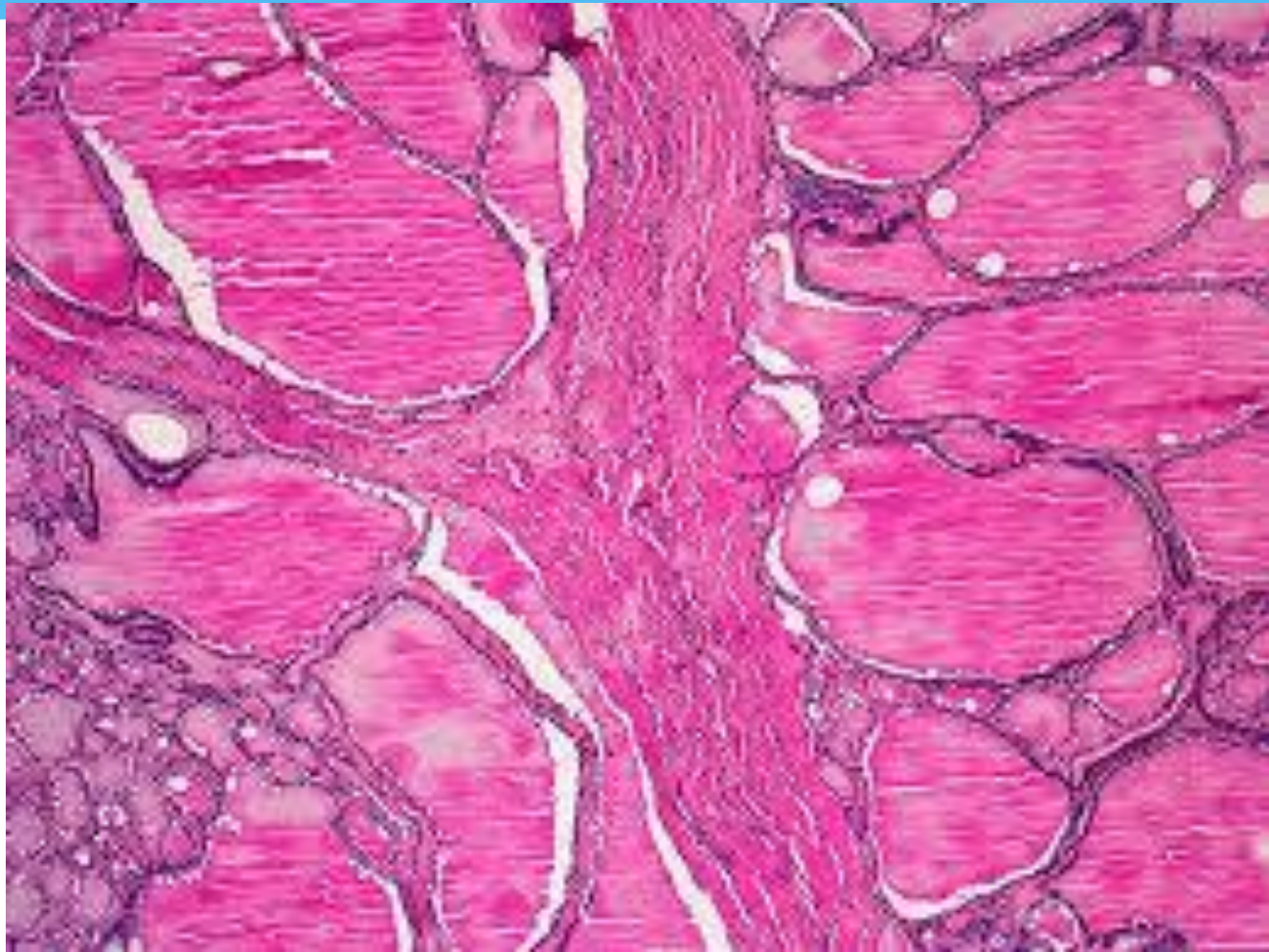
Colloid Goiter

Diffuse hyperplastic Goiter + Large dose of Iodine



Follicles are lined with flat epithelium
& distended with colloid
“ Hyperinvolution “

Colloid Goiter



Dyshormonogenesis

- * Autosomal recessive disorders
- * Aspendred's syndrome :
(Goiter – Deafness – Dwarfism – mental retardation – mutism)
- * **Thyroid is hungry in rich media ..**
- * defect may be in :
 - + iodine trap
 - + oxidation : most common
 - + coupling
 - + protease enz. Deficiency
 - + synthesis of abnormal iodoproteins

Dyshormonogenesis

Peroxidase enzyme deficiency



Inborn error of iodine metabolism
Defect in thyroglobuline synthesis

Dyshormonogenesis

* Goiter may be :

with Hypothyroidism .

With euthyroid state . (goiter is the only symptom)

Dyshormonogenesis



Sporadic Goiter

Due to **Goitrogenic agents** :


Antithyroid drugs , anti TB , Calcium

PASA (para amino salicylic acid)

Thiocynates , Perchlorates

Vegetables in the genus Brassica (broccoli and cabbage)

Simple nodular Goiter

- * females > males (**estrogen receptors**) ,,
- * 30- 40 years
- * Repetitive fluctuation of TSH  **Hyperplasia** of the follicles
Hypervascularity

(Hge may occur producing necrotic nodules)



Formation of nodules

Simple nodular Goiter



References

- 1) bailey & love`s short practice of surgery 25th edition
- 2) J Midwifery Womens Health. 2006;51(3):152-158.
- 3) National Center for Biotechnology Information, U.S. National Library of Medicine8600 Rockville Pike, Bethesda MD, 20894 USA
- 4) International archives of integrated medicine, Vol. 2, Issue 9, Sept., 2015.



Thank
You