

ABNORMALITIES OF THYROID HORMONE SECRETION

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HYPERTHYROIDISM

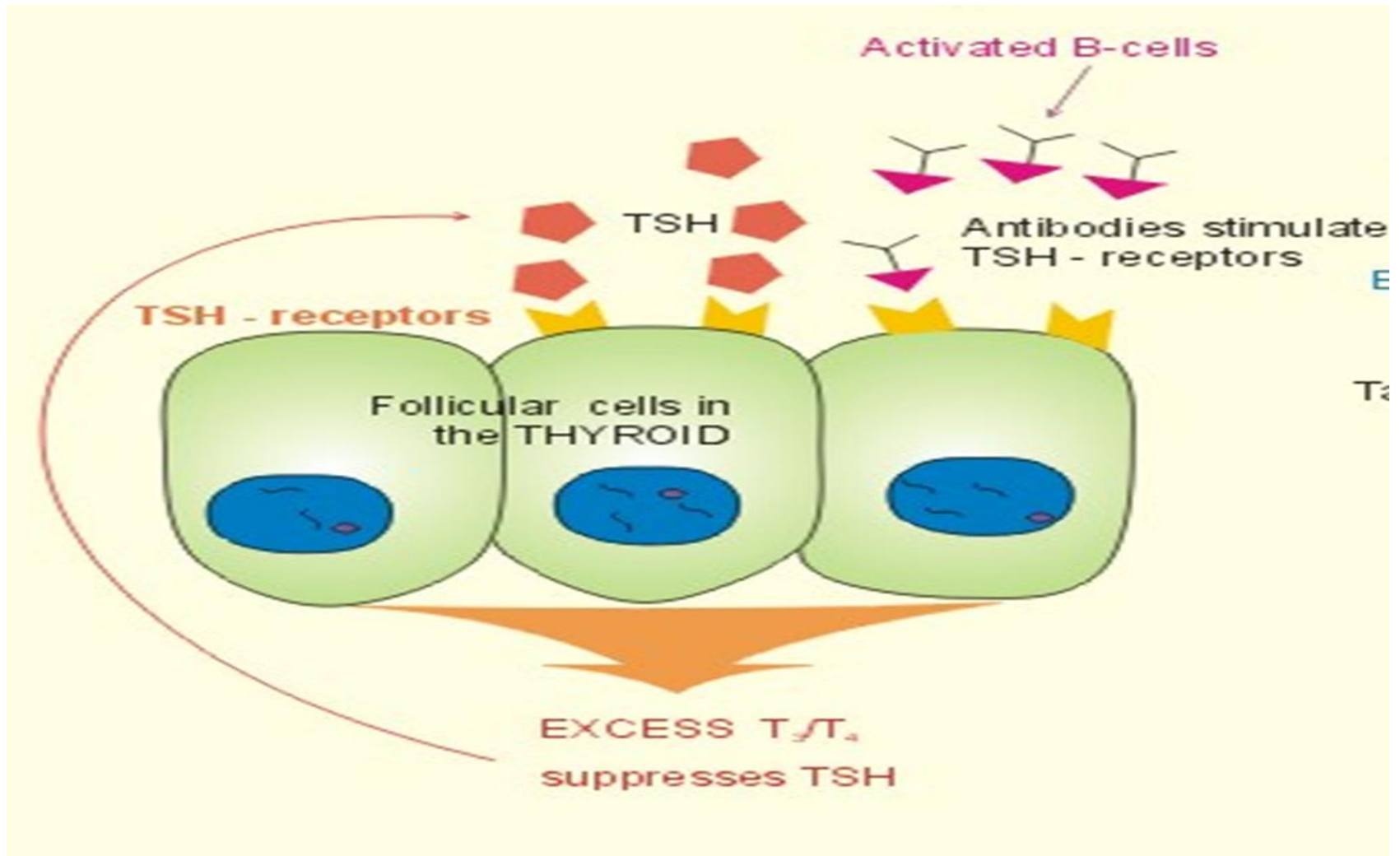
Defintion: Excess (increased) thyroid hormone secretion leads to Hyperthyroidism.

CAUSES:

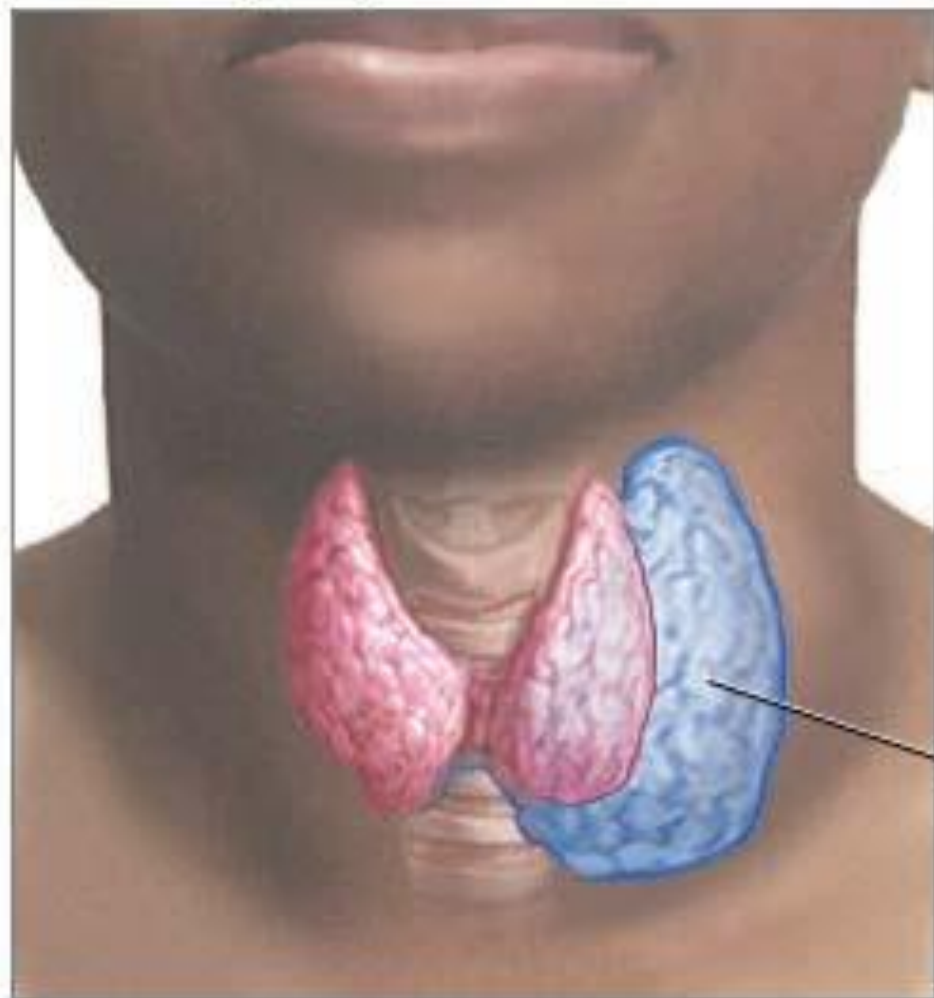
Primary Hyperthyroidism:

1. **GRAVE'S DISEASE (toxic goitre or thyrotoxicosis):** an autoimmune disorder in which abnormal thyroid stimulating immunoglobulins (TSI) attach to the TSH receptors on the thyroid gland
↓
 - Diffuse enlargement of the gland
 - Stimulation of thyroid hormone secretion
2. **THYROID ADENOMA (Nodular toxic disease or Plummer's disease):** localized adenoma or tumor that develops in the thyroid gland & secretes large quantities of thyroid hormone. Secretory function of the rest of the gland is almost totally inhibited as the thyroid hormone from the adenoma depresses the production of TSH from the anterior pituitary.
3. **SUBACUTE THYROIDITIS**
4. **EXCESSIVE INTAKE OF IODINE**
5. **EXCESSIVE INTAKE OF EXOGENOUS THYROID HORMONE (THYROTOXICOSIS FACTITIA)**

GRAVE's DISEASE



Hyperthyroidism caused
by thyroid adenoma



Hyperfunctioning
thyroid (goiter)

CAUSES OF HYPERTHYROIDISM:

- Secondary Hyperthyroidism:
 1. Secondary to increased TSH secretion (anterior pituitary adenoma)
 2. Secondary to increased TRH secretion (hypothalamic tumor)

CLINICAL FEATURES

Increased metabolism

- Weight loss
- Increased appetite
- Heat intolerance
- Warm moist skin
- Sweating
- Muscle weakness (thyrotoxic myopathy)

Involvement of CNS

- Irritability/ behavior changes
- Restlessness
- Anger
- Insomnia
- Emotional instability
- Psychosis
- Fine Tremors
- Brisk tendon reflexes

Involvement of CVS

- Cardiac failure
- Tachycardia
- Atrial fibrillation
- Raised pulse pressure
- Murmurs

Involvement of Reproductive system

- Impotence
- Loss of libido
- Oligomenorrhea or polymenorrhea

Eye changes

- Exophthalmos
- Lid lag

Involvement of respiratory system & GIT

- Breathlessness
- Diarrhea

Miscellaneous

- Fine, silky hair
- Pretibial myxedema
- Thick brittle nails

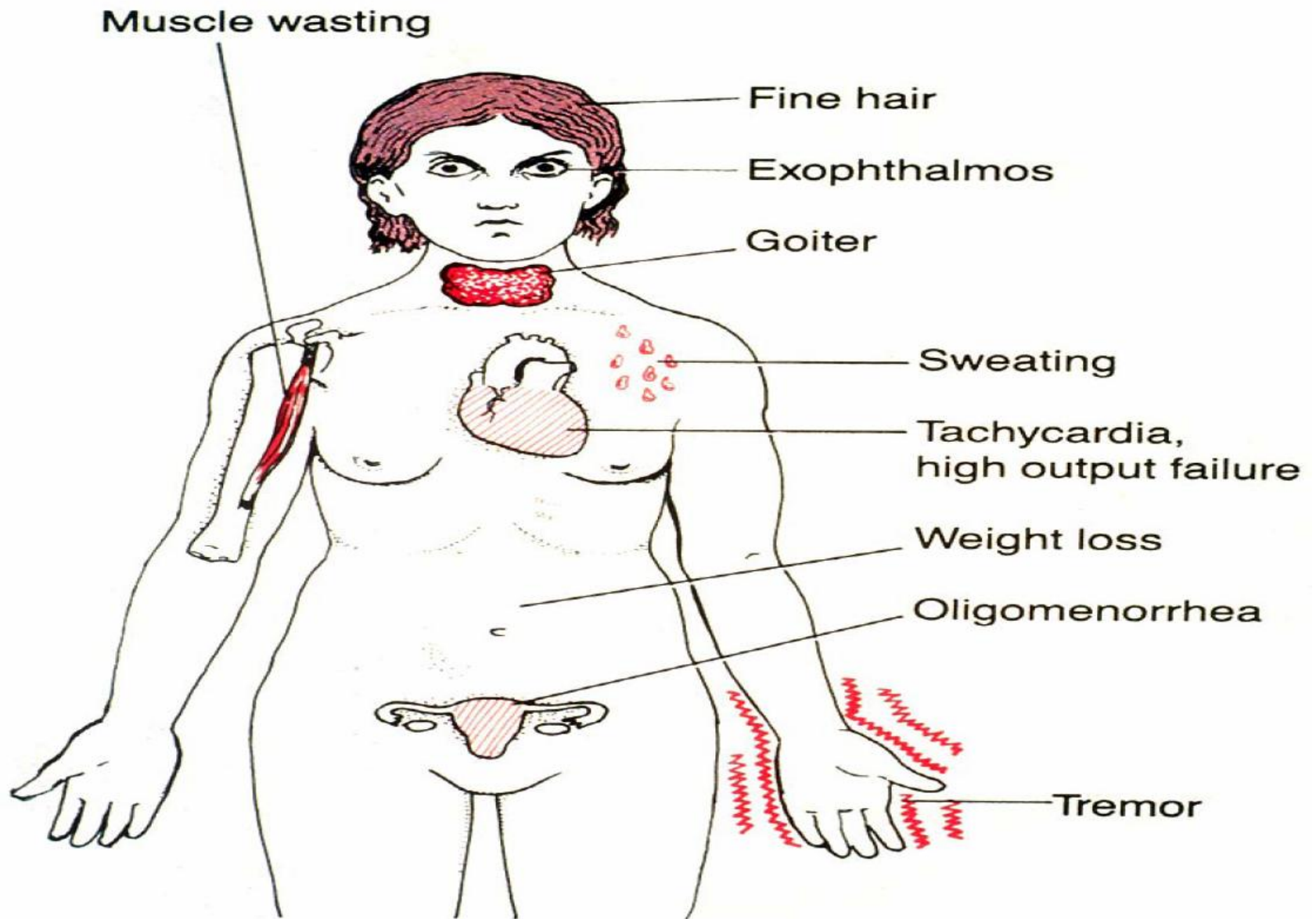


Figure 21-12. The major clinical manifestations of Graves' disease.

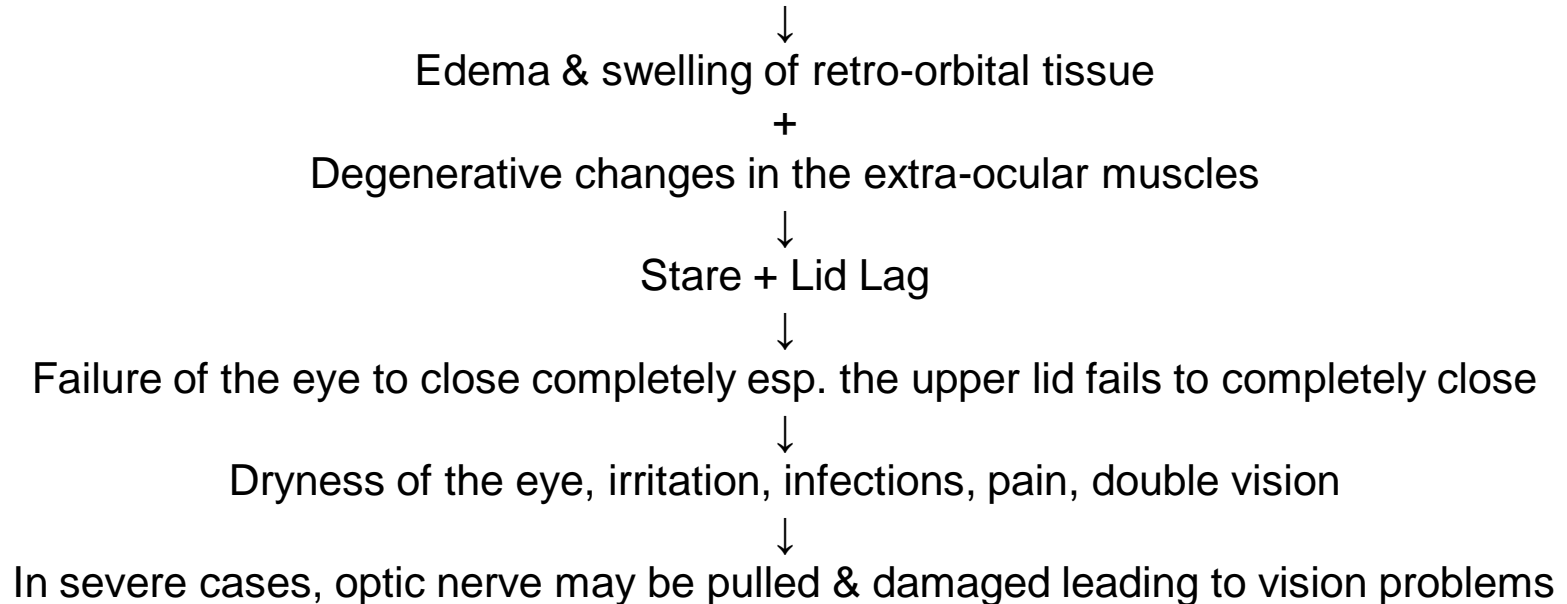
EXOPHTHALMOS

DEFINITION:

It is the protrusion of the eyeballs.

- Usually seen only with Grave's disease

CAUSE: Immunoglobulins are found in the blood that react with eye muscles



EXOPHTHALMOS



How will you diagnose **HYPERTHYROIDISM?**

- ↑ T3 & T4
- ↓ TSH
- ↓ TRH

However, both TRH & TSH will be raised if cause is excess hypothalamic or pituitary secretion: ↑ T3 & T4 & ↑ TRH & TSH

- Anti-thyroid antibodies
- TSI
- Scanning images show thyroid tumor if present

TREATMENT

1. Anti-thyroid drugs:

All the drugs that cause suppression of Thyroid hormone secretion are called Anti-thyroid drugs.

1. THIOCYANATE:

- Prevent iodide trapping by competitively binding to sodium-iodide symporter instead of iodide itself.
- Perchlorate & nitrate ions also follow the same M.O.A.
- It can lead to Goitre!!

2. PROPYLTHIOURACIL: e.g. methimazole, carbimazole

- M.O.A: 1: partly blocks peroxidase enzyme
2 : partly blocks coupling
- It also causes Goitre as it does not stop synthesis of TG.

3. IODINE:

- If Increased Iodide conc. in the blood (more than 100 times)



Most activities of the thyroid gland are decreased



Size of thyroid gland & its blood supply decreased

So, Iodine usually given 2-3 weeks before surgery, to reduce the size of the gland decreasing the necessary amount of surgery & especially the amount of bleeding!!

2. Surgery

3. Radioiodine

HYPOTHYROIDISM

DEFINITION: Decreased secretion of Thyroid hormone is called Hypothyroidism.

CAUSES:

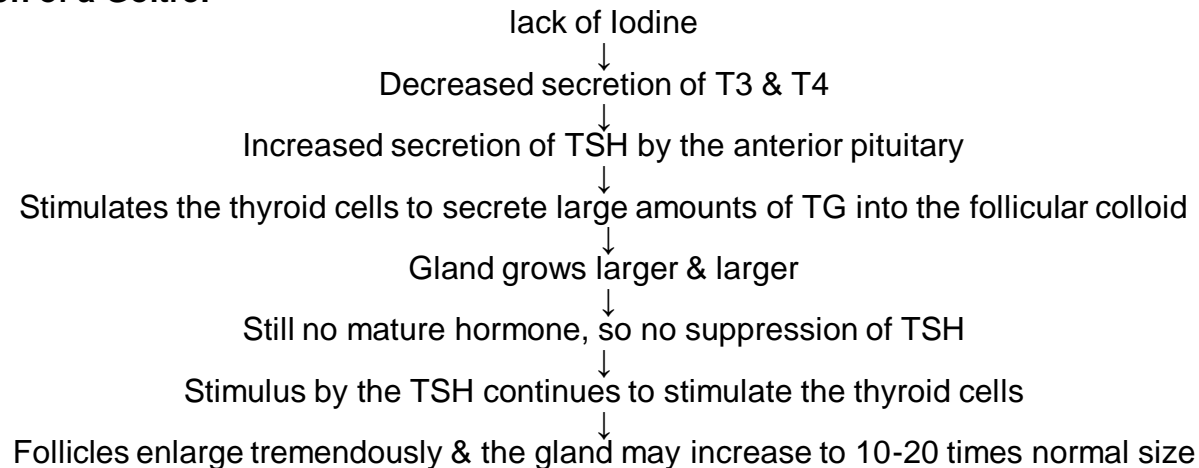
- **PRIMARY HYPOTHYROIDISM (due to abnormality of the Thyroid gland)**

ENDEMIC COLLOID GOITRE caused by dietary Iodine deficiency:

-In areas of Insufficient Iodine in the soil for the foodstuffs to contain even the minute quantities that are required are not fulfilled.

-In the absence of iodized table salts, these populations develop very large goitres called Endemic goitres.

-M.O.A of production of a Goitre:



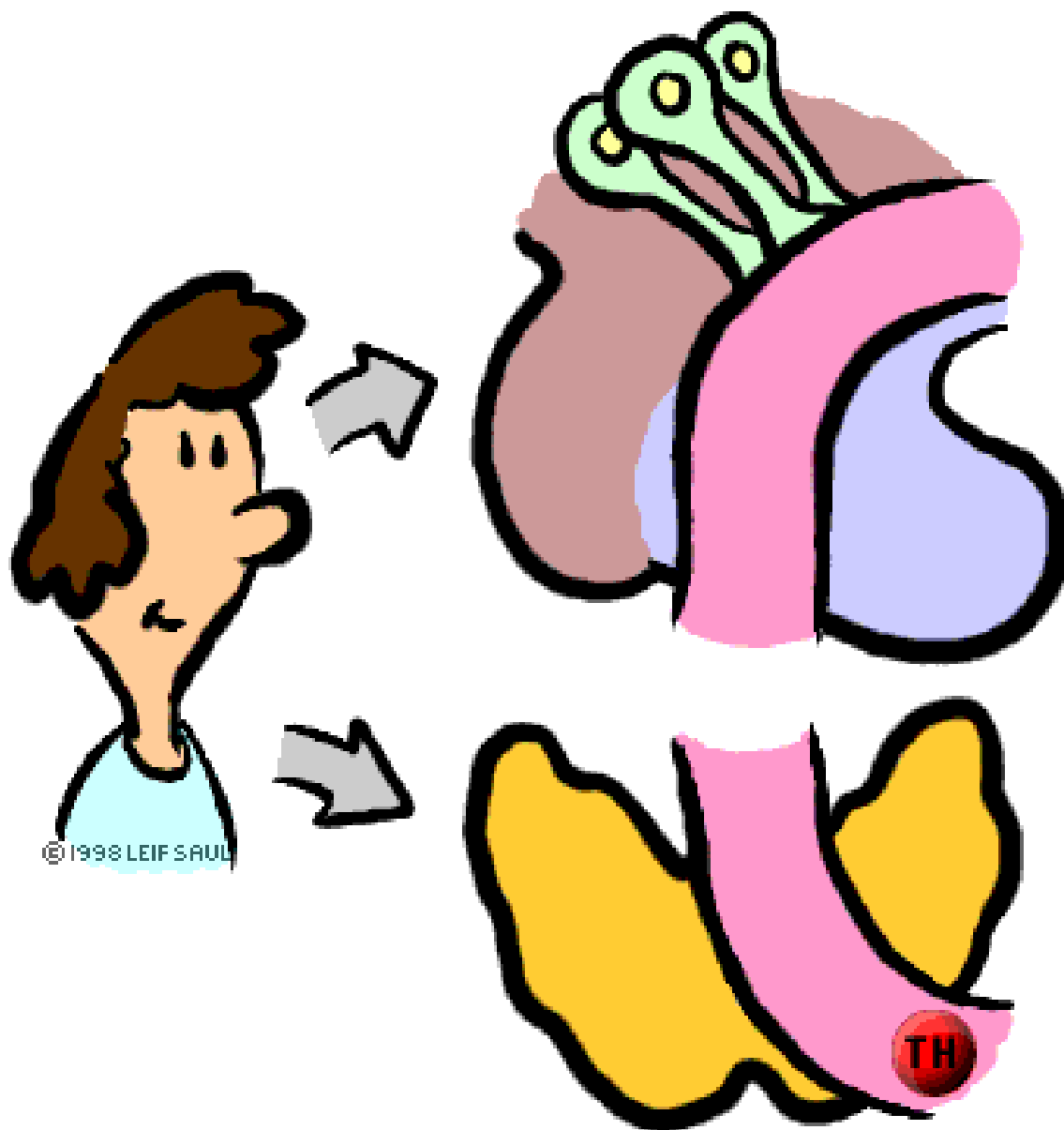
- **SECONDARY HYPOTHYROIDISM (due to abnormality of the Hypothalamus or Anterior pituitary)**

Tumors

Thyroiditis

Post-surgery

Post- Irradiation



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CAUSES OF HYPOTHYROIDISM

(Secondary causes)

1. Secondary to decreased Hypothalamic secretion
2. Secondary to decreased anterior pituitary secretion or Decreased TSH secretion

CLINICAL FEATURES

Decreased metabolism

- Weight gain
- Decreased appetite
- Cold intolerance
- Fatigue
- Depressed growth of the hair
- Scaliness of the skin
- Cold peripheries

Involvement of CNS

- Mental sluggishness
- Listlessness
- Lethargy
- Somnolence
- Psychosis
- Depression
- Poor memory
- Slow-relaxing reflexes

Involvement of CVS

- Cardiac failure
- Bradycardia

Involvement of Reproductive system

- Loss of libido
- Menorrhagia or oligomenorrhea

Involvement of GIT

- Constipation

Miscellaneous

- FROG-LIKE HUSKY VOICE
- Deafness
- Loss of eyebrows

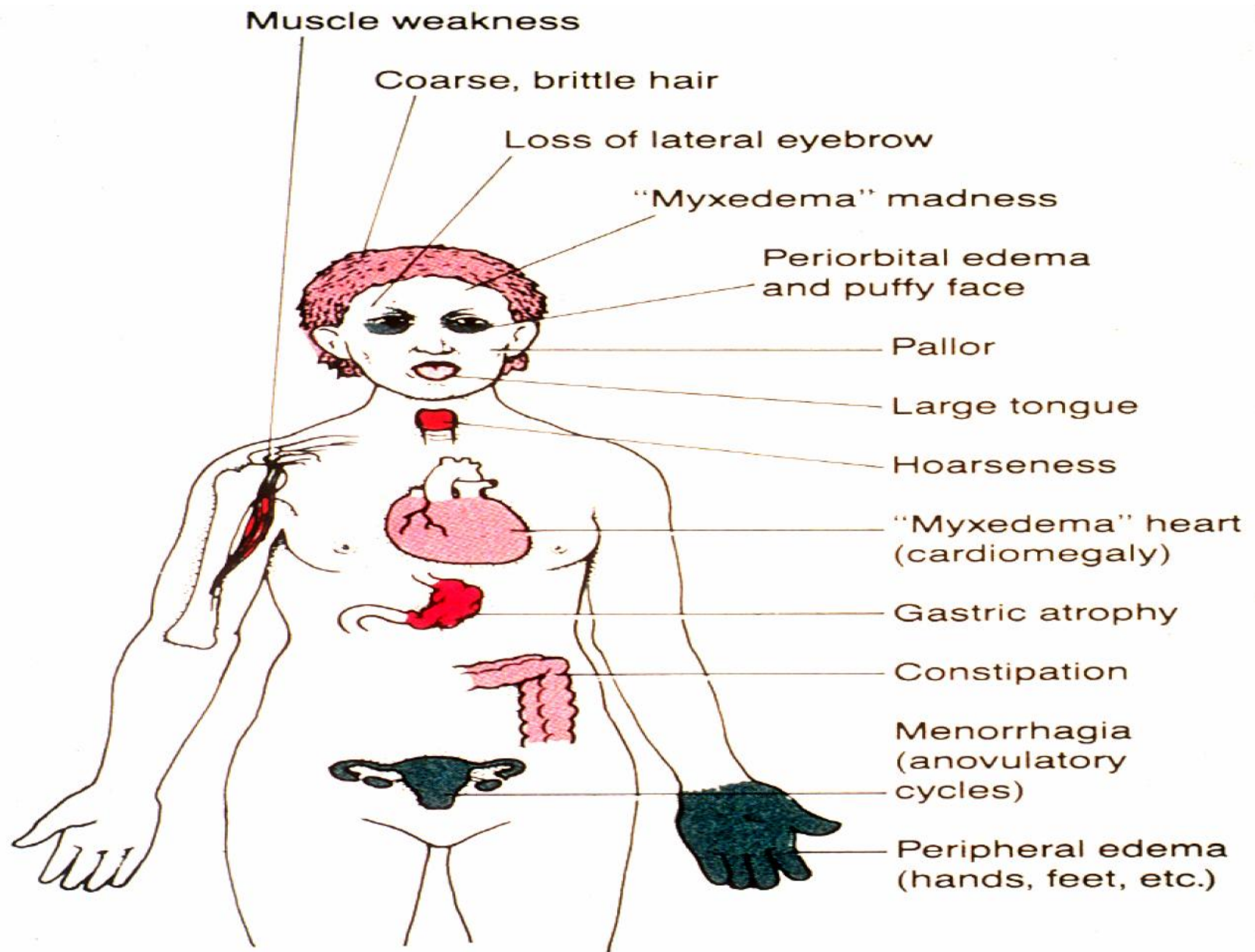
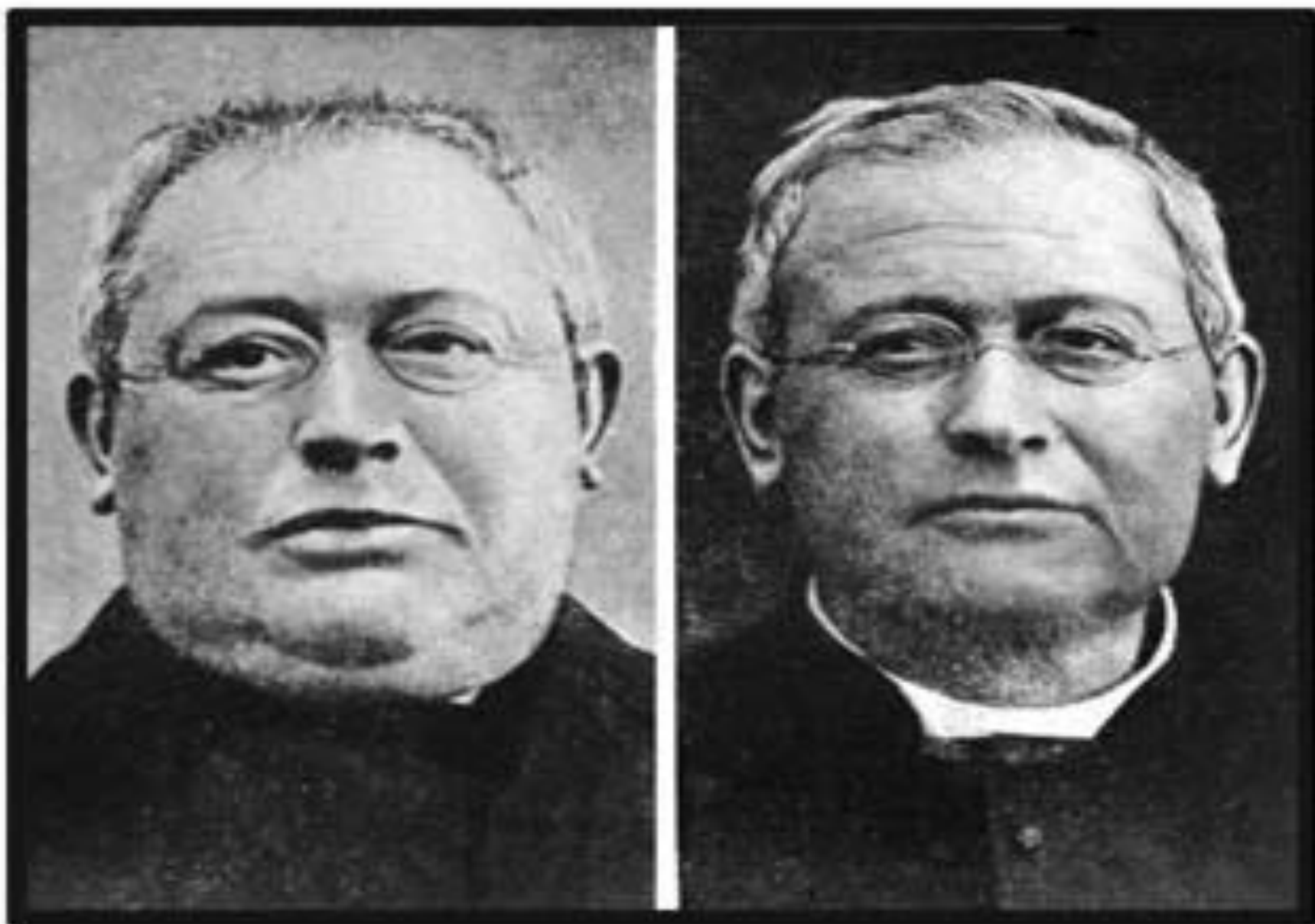


Figure 21-17. The dominant clinical manifestations of hypothyroidism.







MYXEDEMA

In patients with total lack of thyroid hormones, a condition known as Myxedema develops!!

-the patients suffer from all the symptoms of Hypothyroidism and show following symptoms too:

1. There is characteristic accumulation of a mucus-like material, which is:
Protein+ hyaluronic acid+ chondroitin sulphate

SITE: interstitial spaces, particularly skin.

Because of its osmotic effect, this material causes the water to accumulate in these spaces, giving rise to the typical non –pitting edema seen in hypothyroid patients.

2. Atherosclerosis: leading to peripheral vascular disease, deafness & coronary artery disease & early death.
3. Myxedema coma
4. Myxedema depression



Hypothyroidism

Lab studies

- • Decreased T4 and T3 levels
- • Increased TSH (primary)
- • Presence of antithyroid antibodies (autoimmune)
- • Elevated cholesterol & CPK (cardiac involvement)

TREATMENT

- Thyroxine replacement:

1 daily oral tablet of thyroxine leads to
complete cure!!

CRETINISM

- CAUSE: extreme hypothyroidism during fetal life, infancy or childhood.
- TYPES:
 1. Congenital cretinism (absence of thyroid gland at birth)
 2. Failure of the thyroid gland to produce the hormone due to a genetic defect
 3. Endemic cretinism (iodine lack in the diet)

CRETINISM

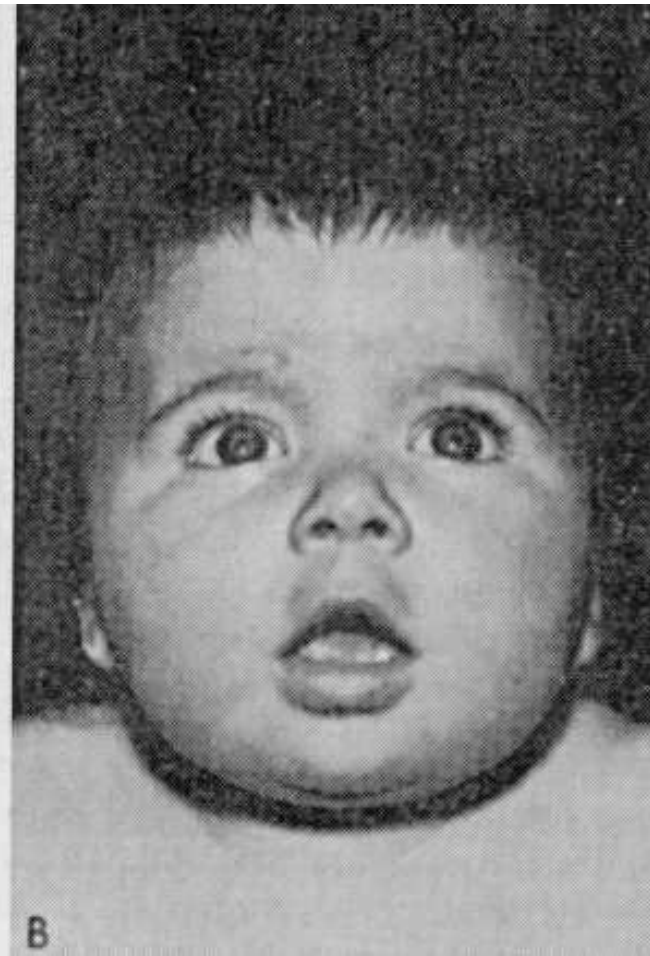
- **CHARACTERISTICS:**

A neonate without a thyroid gland may be of normal appearance & function b/c he was supplied by the mother in utero!

A few weeks after birth:

- Movements become sluggish
- Physical retardation (skeletal growth more retarded than soft tissue)
- Mental retardation
- Obese
- Stocky
- Short appearance
- Large tongue sometimes to the extent that its huge size obstructs swallowing & breathing inducing guttural breathing that sometimes chokes the child.

6 MONTHS OLD BOY & 4 MONTHS AFTER TREATMENT STARTED



CRETINISM

- **TREATMENT:**
 - Thyroid hormone replacement immediately within a few weeks as later no matter how much treatment given then irreversible, permanent mental retardation!

GOITRE

Large size of the thyroid gland OR thyroid gland enlargement is called Goitre.

Causes:

1. Physiological: puberty
pregnancy
2. Autoimmune disorder: Grave's disease
3. Thyroiditis
4. Iodine deficiency goitre (endemic)
5. Goitrogens
6. Tumors
7. Multinodular goitre

GOITRE

- CHARACTERISTICS:

It can cause dysphagia & difficulty in breathing, implying oesophageal or tracheal compression!

The patients can show all the symptoms of Hypothyroidism Or Hyperthyroidism depending on the cause of the goitre!

