Diseases of the Thyroid Gland

Biomedical Engineering - URJC

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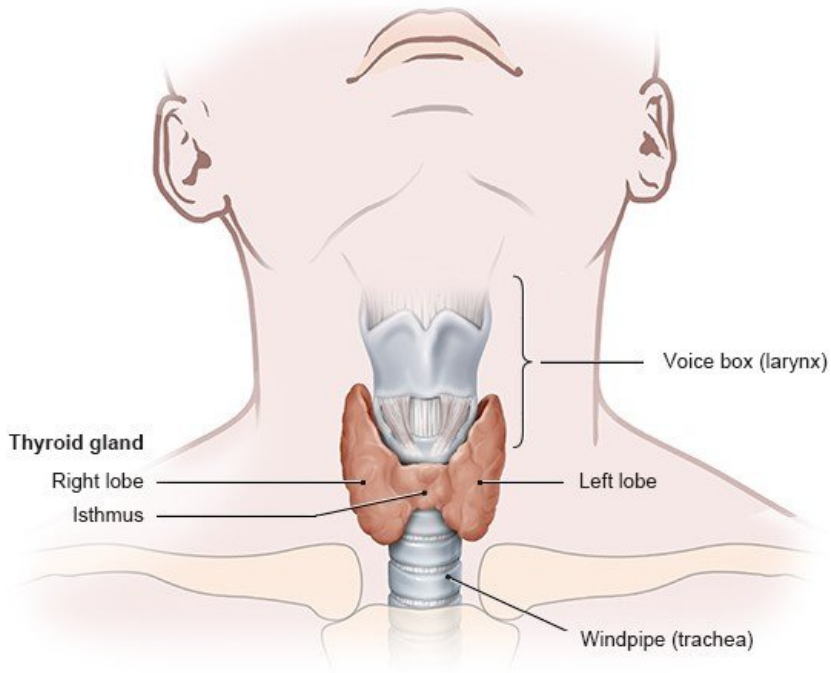
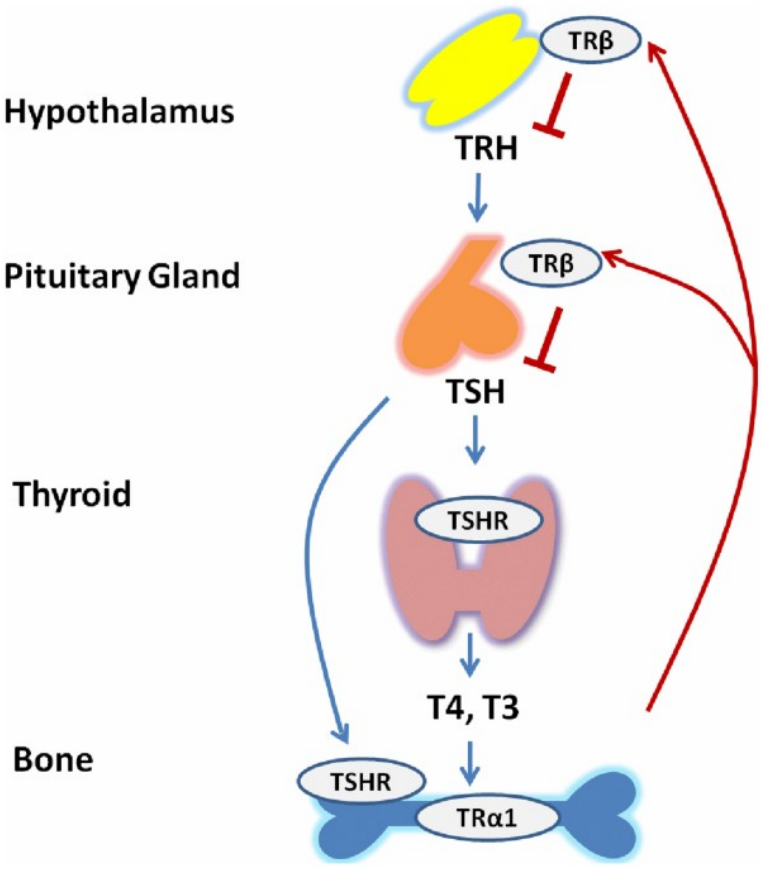
Introduction

Thyroid gland overview

- The thyroid gland synthesizes and stores thyroid hormone.
- Hormone synthesis depends on iodide availability.
- Thyroid hormones influence various organ systems and metabolic processes.



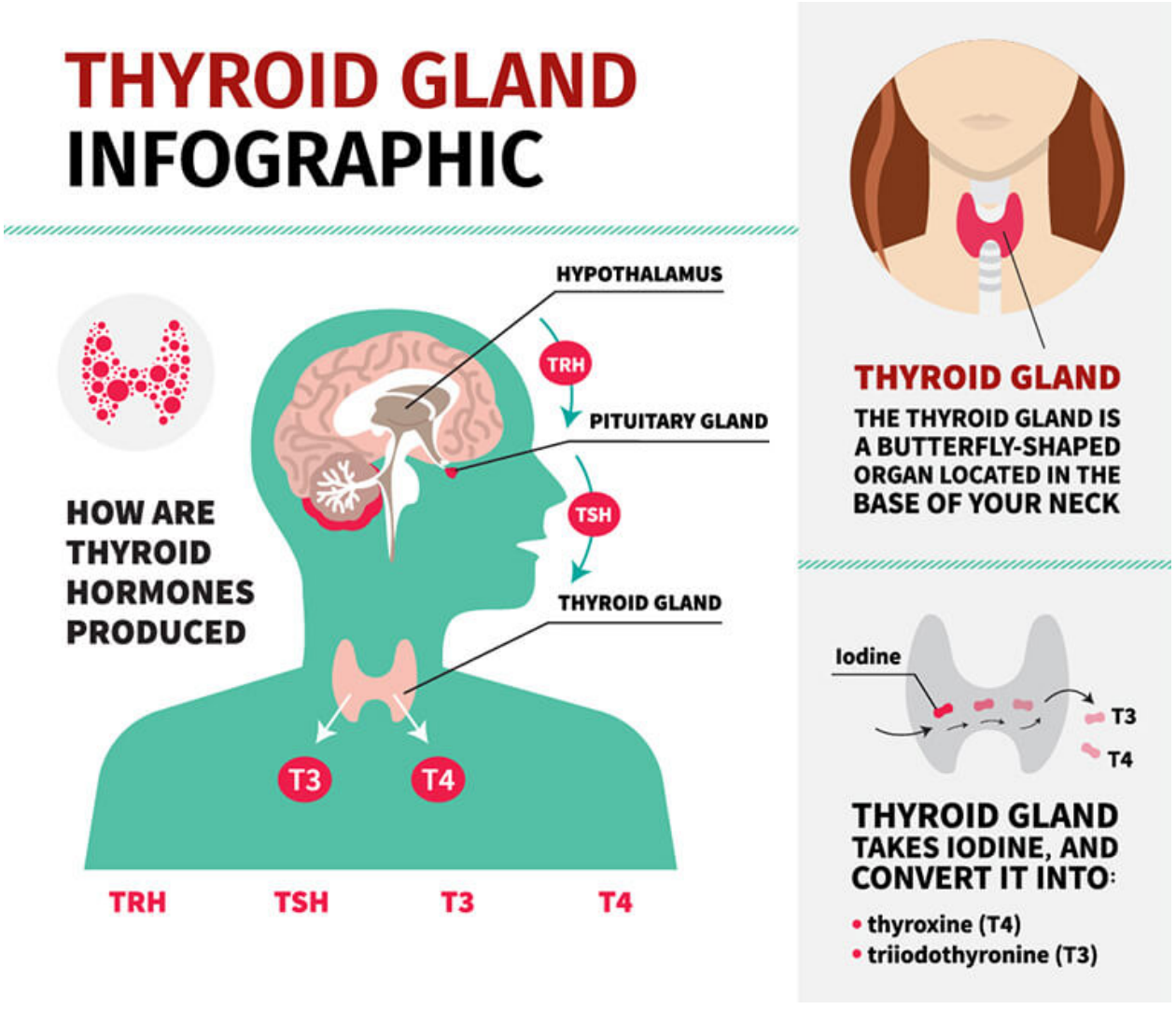
Introduction



Thyroid gland overview

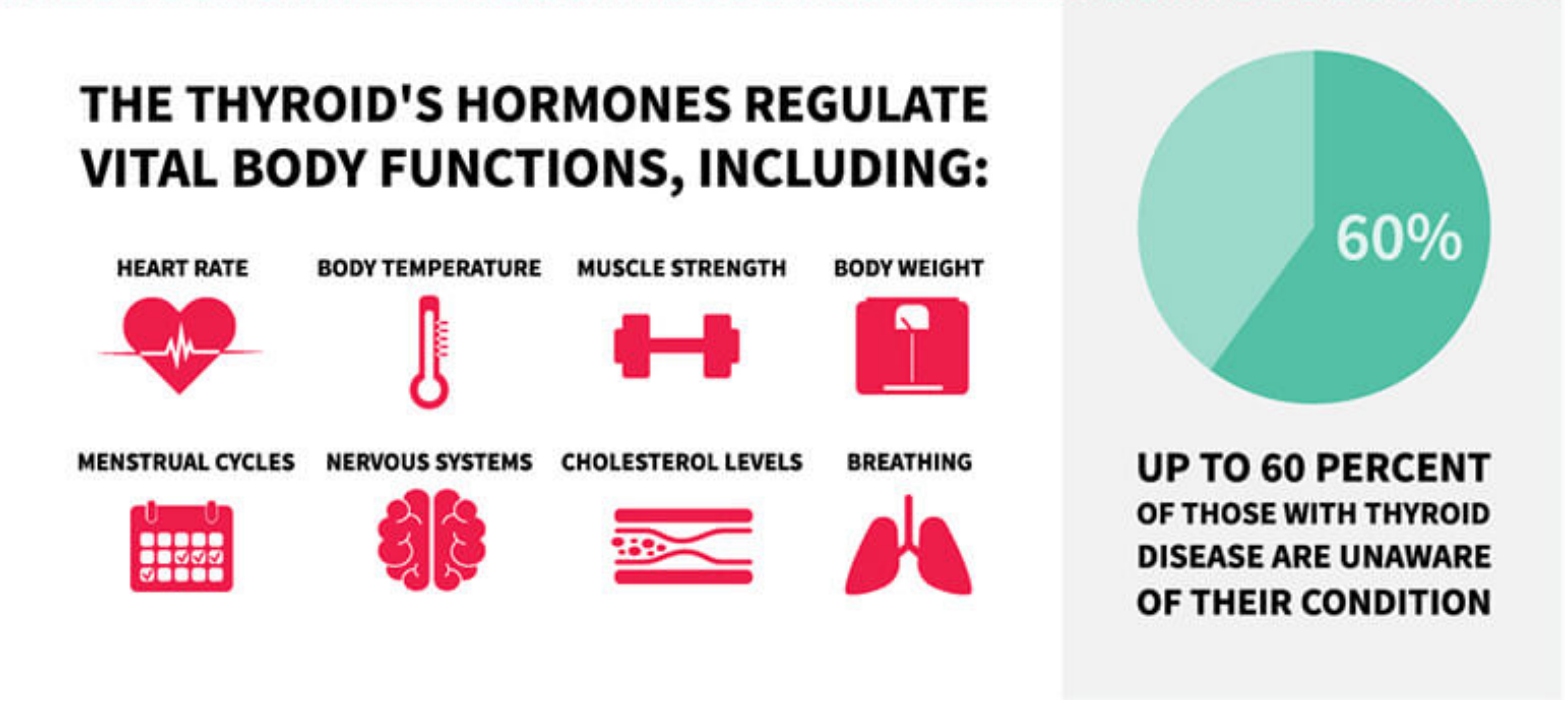
- Thyroid-releasing hormone (TRH) from the hypothalamus stimulates thyroid-stimulating hormone (TSH) release from the anterior pituitary.
- TSH stimulates thyroid follicular cells to release thyroxine (T4) and triiodothyronine (T3).

Introduction



Introduction

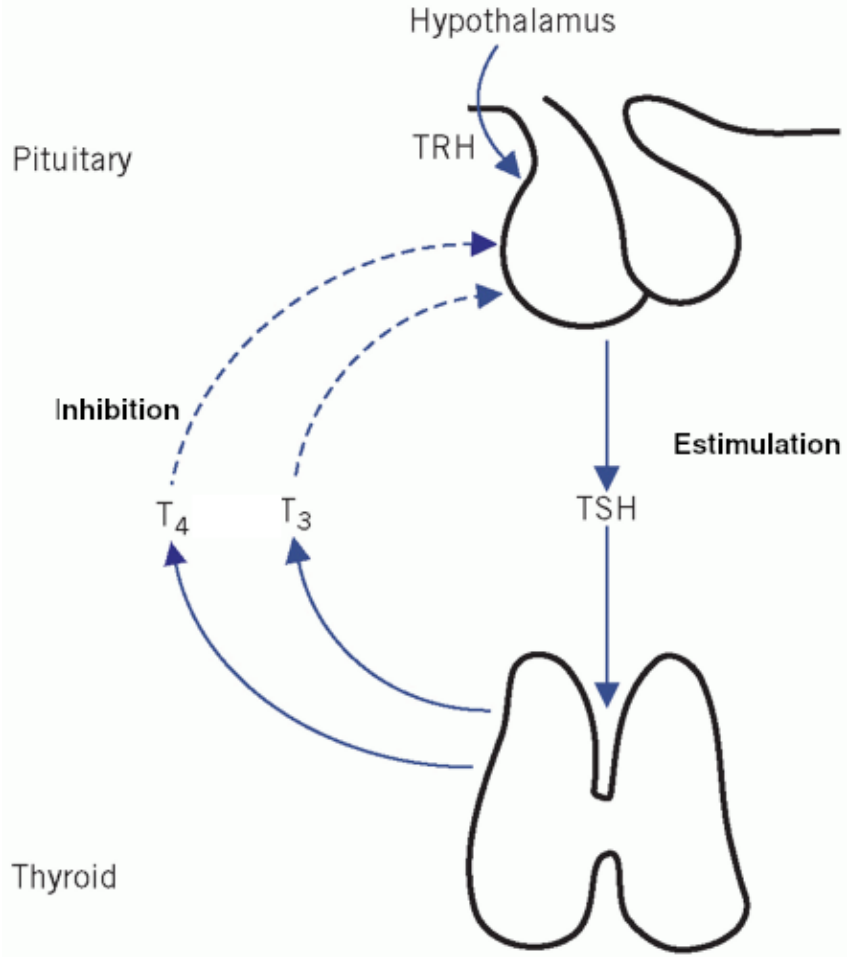
Thiyroid hormones increase basal metabolism, that is, they boost or speed up metabolism



Introduction

Thyroid gland disease

- **Primary** disease originates in the thyroid gland.
- **Secondary** disease originates in the pituitary gland.

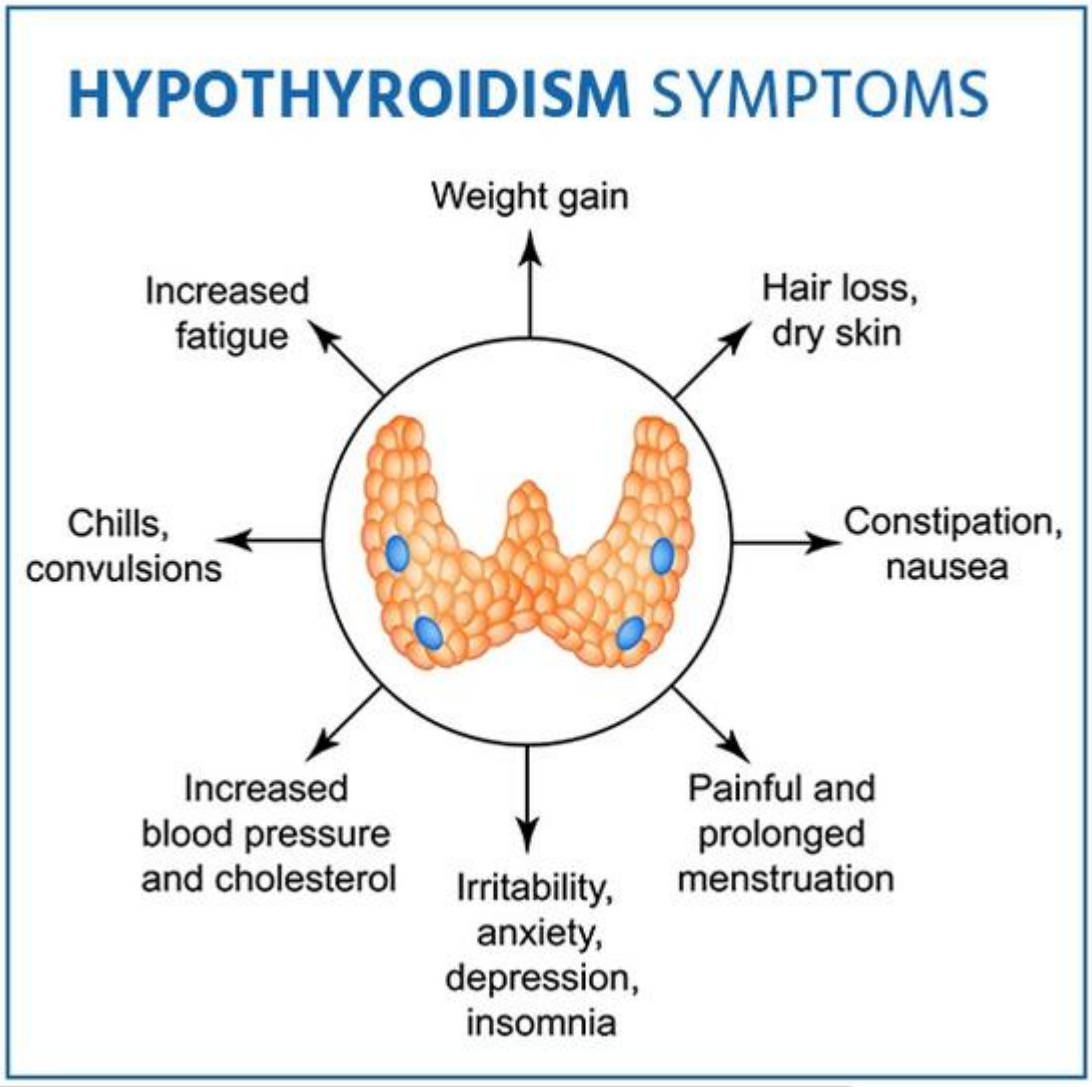


Clinical Significance: Hypothyroidism (I)

Hypothyroidism

- Hypothyroidism is also known as **underactive thyroid**
- The gland fails to produce and secrete enough thyroid hormones
- Almost every system in the body responds to thyroid hormone: The consequences of hypothyroidism include the **speed down** of all metabolic functions.

Clinical Significance: Hypothyroidism (II)



Clinical Significance: Hypothyroidism (III)

Hypothyroidism

- Symptoms include **decreased metabolic rate**, weight gain, cold sensitivity, lethargy, and goiter.
- Most common cause is Hashimoto thyroiditis (autoimmune).
- Diagnosis: Elevated TSH, low free T4.
- Treatment: Levothyroxine replacement therapy.

Clinical Significance: Hyperthyroidism (I)

Hyperthyroidism

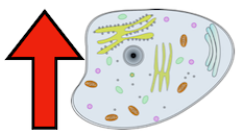
- Characterized by **excess thyroid hormone production**.
- Hyperthyroidism is an overactive thyroid
- Metabolism may **speed up** due to hyperthyroidism, resulting in unexpected weight loss and a rapid or erratic pulse.
- **Symptoms**: Weight loss, palpitations, tremors, intolerance to heat, diarrhea, tachycardia, high blood pressure.

Clinical Significance: Hyperthyroidism (II)

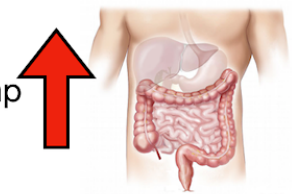
Hyperthyroidism Symptoms

Increased Levels of Thyroid Hormone in the Blood

- *Symptoms:* ↑ Thyroid Hormone Effects **"Speeds Things Up"**

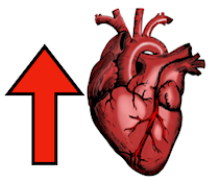


Weight Loss
Increased Appetite
Increased Body Temp
Heat Intolerance
Sensitivity to Heat

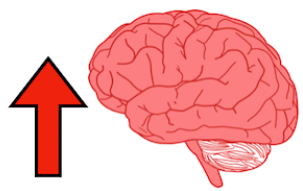


Diarrhea

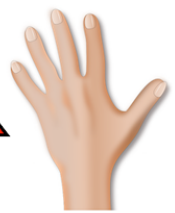
Sweating
Hair Growth
Fine, Soft Hair



Tachycardia
Palpitations
Arrhythmias
Hypertension



Anxiety
Nervousness
Irritability
Insomnia
Tremors



Nail Growth
Onycholysis

Clinical Significance: Hyperthyroidism (III)

- Most common causes:
  1. Graves' disease
  2. Toxic multinodular goiter
  3. Toxic adenoma
- Diagnosis: Low/suppressed TSH, elevated T3/T4.

Pathophysiology of Hyperthyroidism

1. **Graves' Disease**: Autoimmune process with antibodies against TSH receptor.
2. **Toxic Multinodular Goiter**: Development of nodules with autonomous hormone production.
3. **Toxic Adenoma**: Solitary nodules with autonomous hormone production.

Treatment of Hyperthyroidism

- Symptomatic treatment: Beta-adrenergic antagonists to control symptoms.
- Definitive therapy: Radioactive iodine therapy, antithyroid drugs, or thyroidectomy.
- Choice of treatment depends on etiology, comorbidities, and patient preferences.