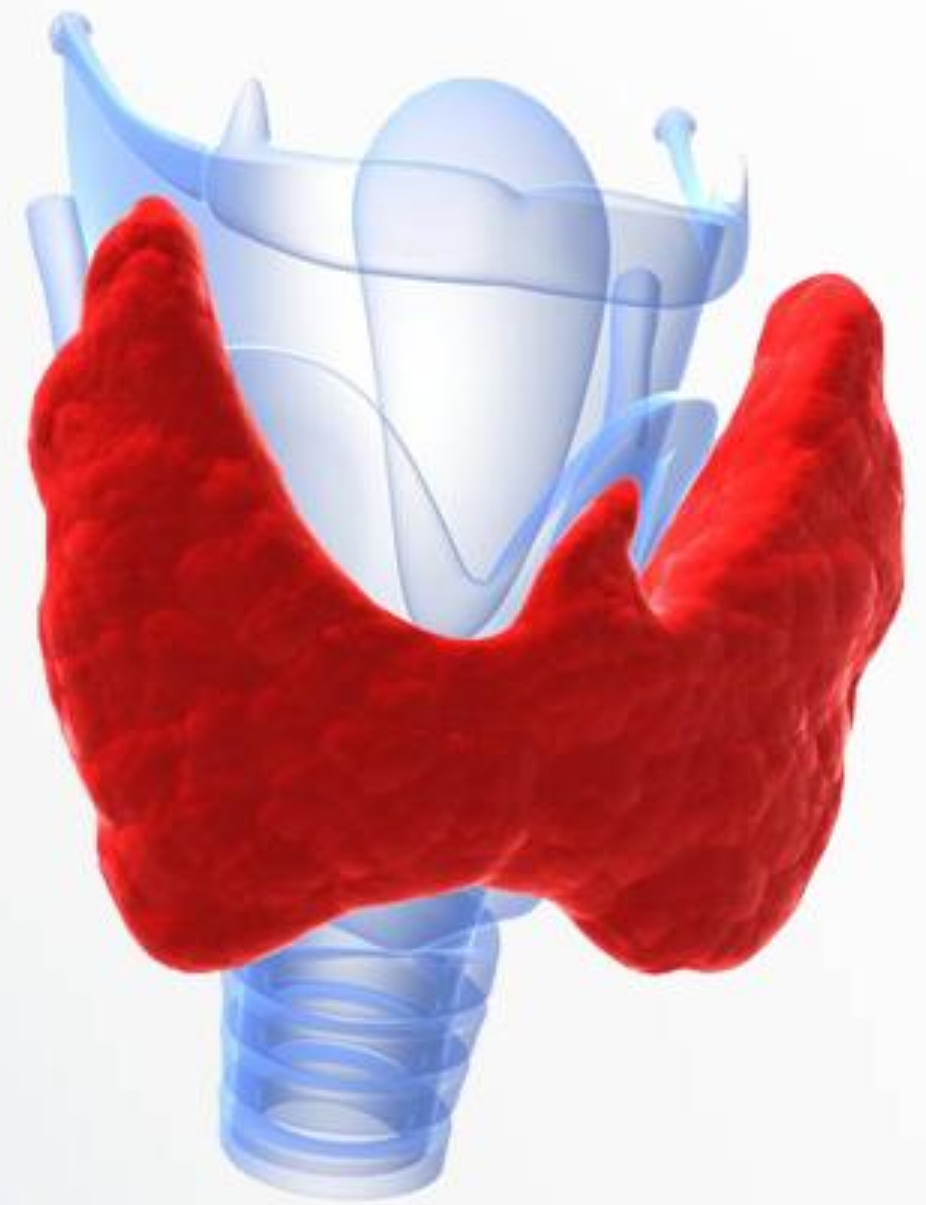


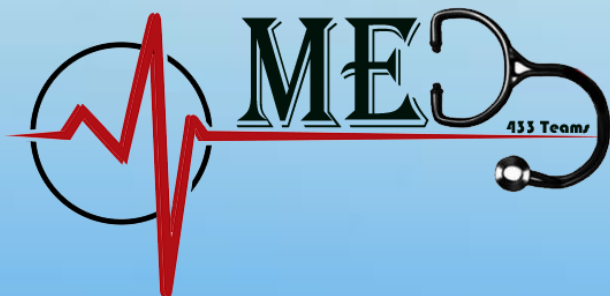


Physiology team

7 Diseases of thyroid gland



Sources:
Female slides
BRS Physiology



Objectives

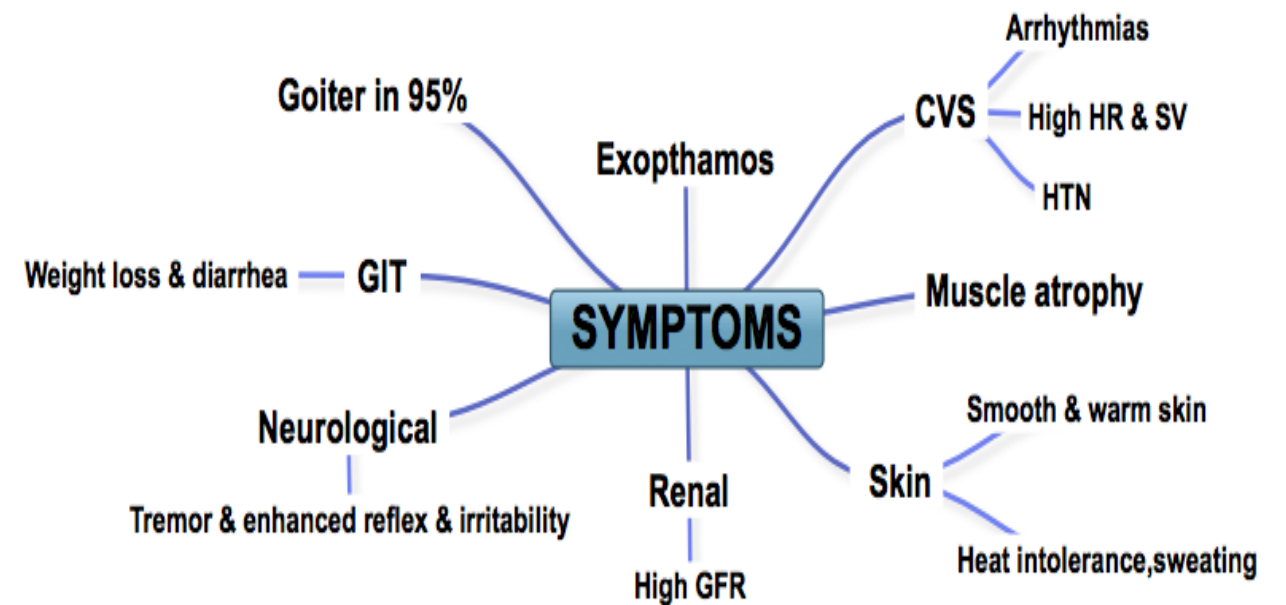
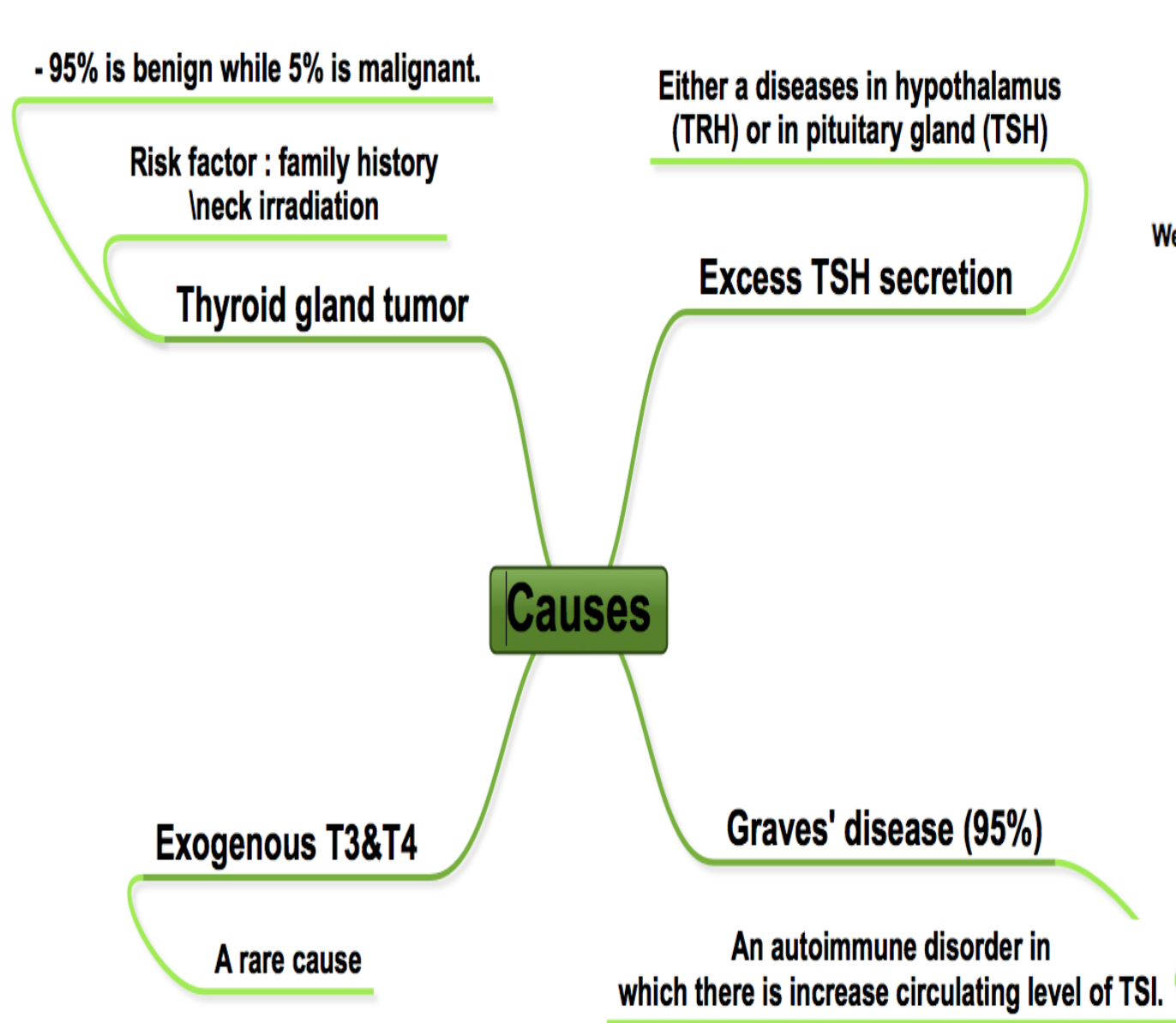
Hyperthyroidism

- It is hyperactivity of the thyroid gland.
- Affect women more than men ratio (8:1).
- **Activity of gland :**
 - 1) 5- 10 times increase in secretion.
 - 2) 2-3 times increase in size.

N.B: The thyroid gland may increase in size without increase in secretion and vice versa .



Causes and symptoms of hyperthyroidism



Also menstrual cycle disturbance can appear

TSI: thyroid-stimulating immunoglobulins (TSI)
 Goiter: Enlargement of thyroid gland
 Exophthalmos: Protrusion of eye balls
 GFR: glomerulus filtrating rate
 SV: Stroke volume
 HR: Heart rate
 HTN: Hypertension

Investigation

1- Serum T3, T4 measurement:

- In primary hyperthyroidism:
high T3, T4 and **low TSH**.
- In secondary hyperthyroidism:
high T3, T4 and **high TSH**.

Treatment

1- Medical therapy:

- e.g. **propylthiouracil**
- Usually for 12-18 months course
 - With 3-4 monthly monitoring
(Because one of its side effects is immunoallergic hepatitis)
(also agranulocytosis “ severe neutropenia”)

2- Surgery:

Subtotal thyroidectomy.

- ✓ Indication for surgery:
- A. Relapse after medical treatment.
 - B. Drug intolerance.
 - C. Cosmetic. (usually in teenager)
 - D. Suspected malignancy.

Hypothyroidism

- Under activity of the thyroid gland & more common in woman (30-60 years).

Causes

1-Inherited abnormalities of thyroid hormone synthesis.

- Peroxidase defect.
- Iodide trapping defect.
- Thyroglobulin defect.

2-Endemic Colloid Goiter (I* is low , before table salt)

↓Iodide>↓hormone formation>↑TSH>↑Thyroglobulin>↑ size of thyroid gland (>10 times)

3-Idiopathic Nontoxic Colloid Goiter(I* intake is normal , Thyroiditis)

Inflammation>↑cell damage>↓hormone secretion >↑TSH > ↑of activity of normal cells> ↑size

4-Gland destruction (surgery).

5-Pituitary diseases or tumor.

6-Hypothalamus diseases or tumor.

I: Iodine.

Symptoms

1-Skin	<ul style="list-style-type: none">▪ Dry skin.▪ Cold intolerance.
2-Musculoskeletal	<ul style="list-style-type: none">▪↑ Muscle bulk.▪↓ In skeletal growth.▪ Muscle sluggishness▪ Slow relaxation after contraction.
3-Neurological	<ul style="list-style-type: none">▪ Slow movement.▪ Impaired memory.▪ Decrease mental capacity.
4-Cardiovascular	<ul style="list-style-type: none">▪ Blood volume.▪ Heart rate▪↓ Stroke volume.
5-GI tract	<ul style="list-style-type: none">▪ Constipation▪ Increase weight.
6-Renal function	<ul style="list-style-type: none">▪ Decrease glomerular filtration rate.
7-Myxoedema	<ul style="list-style-type: none">▪ An edematous appearance through out body.
8-Others	<ul style="list-style-type: none">▪ Loss of libido.▪ Menstrual cycle disturbance.

Investigations

- **Serum T3,T4 are low.**
- TSH is elevated in **primary**.
- TSH is low in **secondary** hypothyroidism.

Treatment

- **L- thyroxine** (Synthetic thyroxine hormone)

Starting dose is 25-50 µg.

Increase to 200 µg.

At 2-4 weeks period.

The first response seen is the weight loss.

Table 9-9 Pathophysiology of Thyroid Hormones

	Hyperthyroidism	Hypothyroidism
Symptoms	Increased basal metabolic rate Weight loss Negative nitrogen balance Increased heat production Sweating Increased cardiac output Dyspnea (shortness of breath) Tremor, muscle weakness Exophthalmos Goiter	Decreased basal metabolic rate Weight gain Positive nitrogen balance Decreased heat production Cold sensitivity Decreased cardiac output Hypoventilation Lethargy, mental slowness Drooping eyelids Myxedema Growth retardation Mental retardation (perinatal) Goiter
Causes	Graves' disease (increased thyroid-stimulating immunoglobulins) Thyroid neoplasm Excess TSH secretion Exogenous T ₃ or T ₄ (factitious)	Thyroiditis (autoimmune or Hashimoto's thyroiditis) Surgery for hyperthyroidism I ⁻ deficiency Congenital (cretinism) Decreased TRH or TSH
TSH Levels	Decreased (feedback inhibition of T ₃ on the anterior lobe) Increased (if defect is in anterior pituitary)	Increased (by negative feedback if primary defect is in thyroid gland) Decreased (if defect is in hypothalamus or anterior pituitary)
Treatment	Propylthiouracil (inhibits peroxidase enzyme and thyroid hormone synthesis) Thyroidectomy ¹³¹ I ⁻ (destroys thyroid) β-Adrenergic blocking agents (adjunct therapy)	Thyroid hormone replacement therapy

CRETINISM

Extreme hypothyroidism during infancy and childhood (failure of growth).

CAUSES

- 1- Congenital lack of thyroid gland (congenital cretinism).
- 2- Genetic deficiency leading to failure to produce hormone.
- 3- Iodine lack in the diet (endemic cretinism).

SYMPTOMS

- 1- Infant is normal at birth but abnormality appears within weeks.
- 2- Protruding tongue.
- 3- Dwarf with short limbs.
- 4- Mental retardation.
- 5- Often umbilical hernia.
- 6- teeth.

TREATMENT

Changes are irreversible unless treatment is given early.



Summery

	HYPERTHYROIDISM	HYPOTHYROIDISM
Definition	Over activity of the thyroid gland. (More in Women)	Under activity of the thyroid gland. (More in woman)
Causes	<p>1- Graves' disease : an autoimmune disorder.</p> <p>2-Thyroid gland tumor.</p> <p>3-Exogenous T3 and T4.</p> <p>4-Excess TSH secretion:</p> <ul style="list-style-type: none"> -diseases of the hypothalamus (TRH). - diseases of the pituitary (TSH). 	<p>1- inherited abnormalities of thyroid hormone synthesis .</p> <p>2- Endemic Colloid Goiter: before table salt.</p> <p>3- Idiopathic Nontoxic Colloid Goiter:</p> <ul style="list-style-type: none"> - I in take is normal. -inflammation (thyroiditis) <p>4- Gland destruction (surgery).</p> <p>5- Pituitary diseases or tumor.</p> <p>6- Hypothalamus diseases or tumor.</p>
Symptoms	<p>1- Skin : smooth, warm , moist , heat intolerance and night sweating.</p>	<p>1- Skin : dry skin and cold intolerance.</p>
	<p>2- Musculoskeletal: Muscle atrophy.</p>	<p>2- Musculoskeletal: increase muscle bulk, decrease in skeletal growth, muscle sluggishness and slow relaxation after contraction.</p>
	<p>3- Neurological: tremor , enhanced reflexes. and irritability.</p>	<p>3- Neurological: slow movement, impaired memory and decrease mental capacity.</p>
	<p>4- Cardiovascular: increase heart rate, increase stroke volume ,arrhythmias and hypertension.</p>	<p>4- Cardiovascular: decrease blood volume, heart rate and stroke volume.</p>

Summery

	HYPERTHYROIDISM	HYPOTHYROIDISM
Symptoms	<p>5- G.I.T : weight loss and diarrhea.</p>	<p>5- G.I .T: constipation and increase weight.</p>
	<p>6- Renal function: increase glomerular filtration rate.</p>	<p>6- Renal function: decrease glomerular filtration rate.</p>
	<p>7-Exophthalmos: - anxious staring expression. - protrusion of eye balls.</p>	<p>7- Myxoedema: An edematous appearance through out body.</p>
	<p>8- Others: -Goiter in 95%. -menstrual cycle disturbance.</p>	<p>8- others: -loss of libido. -menstrual cycle disturbance.</p>
Investigations	<p>Serum T3, T4 measurement: 1- In primary hyperthyroidism: high T3, T4 and low TSH . 2- In secondary hyperthyroidism: high T3, T4 and high TSH.</p>	<p>:Serum T3,T4 are low -TSH is elevated in primary. - TSH is low in secondary hypothyroidism.</p>
Treatment	<p>1- Medical therapy: propylthiourcal 2- Surgery: Subtotal thyroidectomy.</p>	<p>L- thyroxine</p>

Summery

*CRETINISM :

Extreme hypothyroidism during infancy and child hood (failure of growth).

*CAUSES :

- 1- Congenital lake of thyroid gland.
- 2- Genetic deficiency leading to failure to produce hormone.
- 3- Iodine lake in the diet.

* SYMPTOMS:

- 1- Infant is normal at birth but abnormality appears within weeks.
- 2- Protruding tongue.
- 3- Dwarf with short limbs.
- 4- Mental retardation.
- 5- Often umbilical hernia.
- 6- teeth.

MCQs

1- In Hyperthyroidism the Women : Men ratio is :

- A- 5:7
- B-7:5
- C- 8:1
- D- 1:8

2- Neurological symptom in Hyperthyroidism:

- A-tremor
- B-slow movement.
- C-impaired memory.
- D-decrease mental capacity.

3-Renal function in Hyperthyroidism :

- A- decrease glomerular filtration rate.
- B- increase glomerular filtration rate.
- C- normal glomerular filtration rate.

4-Serum T3, T4 measurement In secondary hyperthyroidism :

- A- high T3, T4 and high TSH.
- B- high T3, T4 and low TSH .
- C- low T3, T4 and low TSH .
- D-low T3, T4 and high TSH .

5- Treatment of Hypothyroidism:

- A- propylthiourcal
- B-Subtotal thyroidectomy
- C-Methimazole
- D-L- thyroxine

6-Cause of Hypothyroidism :

- A- Graves' disease
- B-Excess TSH secretion
- C- inherited abnormalities of thyroid hormone synthesis.
- D- Exogenous T3 and T4.

7- Which of the following symptoms is NOT a symptoms of Hypothyroidism :

- A-dry skin.
- B-protrusion of eye balls.
- C- increase in muscle bulk.
- D-constipation

8-Symptoms of CRETINISM:

- A-Dwarf with short limbs.
- B-Mental retardation.
- C- All above

1- C 2- A 3- B 4- A 5- D 6-C 7- B 8-C



@PhysiologyTeam



Pht433@gmail.com



Physiology team

Done by :

jowaher alabdulkarim

Kholoud Al-dosari

nouf alrushaid

Revised by:

Mojahed Otayf

Endocrine Block