



Objectives:

- Hypothyroidism and hyperthyroidism.
 - Common causes
 - Clinical presentation
 - Investigations
 - Brief on management

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References: **435 internal medicine team**, Step up to Medicine, Master the boards

[**Color index** : **Important** | **Notes** | **Extra**]



Hyperthyroidism

Definition: the condition that occurs due to excessive production of thyroid hormone (free T3 and T4) by the thyroid gland.

Thyrotoxicosis: Is the condition that occurs due to excessive thyroid hormone of any cause and therefore includes hyperthyroidism.

Some, however, use the terms interchangeably.

❖ Causes: (primary Hyperthyroidism)

Normal or High Radioiodine uptake	
Graves disease associated with Diffuse hyperplasia - Eye (proptosis) "Accounts for 85% of cases".	
TSH-secreting pituitary adenoma "High TSH level"	Toxic multinodular goiter & Toxic adenoma
Low Radioiodine uptake	
Thyroiditis "Tender thyroid"	Exogenous thyroid hormone use

Clinical Manifestation Of Hyperthyroidism (↑ Thyroxine)	
Skin	Sweating, Moist warm skin, palmar erythema, thin hair
Brain	Hyperthermia, Heat intolerance, Increase appetite, Anxiety, Insomnia, Hand tremor
GIT	Hyperdefecation (diarrhea), Loose bowel motion, Increase gluconeogenesis (Failure of controlling a known DM)
Renal	Urinary frequency
Heart	Palpitation, Sinus tachycardia, Atrial fibrillation
Eye	Eyelid lag, Eyelid retraction (staring gaze) Why? because thyroid hormones potentiate the effect of sympathetic innervation on the eyelid muscle (levator palpebrae) → contraction.
Bone	Bone fracture, Osteoporosis, Hypercalcemia
Muscles	Muscle wasting & weakness, Hyperreflexia, Weight loss



Reproductive	Female: Menstrual cycles disturbances (<u>Oligo-or amenorrhea</u>)/ Male: ED ¹
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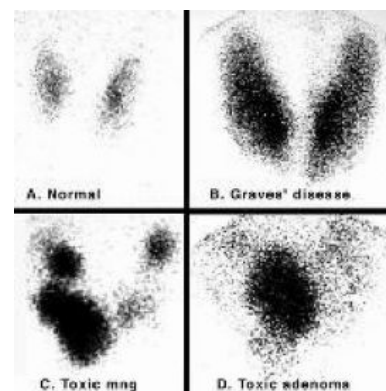
◆ Investigations:

- 1- Serum TSH level (**Best initial test**). “(Low) except in Pituitary adenoma(High).”.
- 2- Free T4. “Should be elevated”.

Hyperthyroidism			
Types	Clinical Hyperthyroidism	Subclinical Hyperthyroidism	TSH Mediated Hyperthyroidism (Secondary hypothyroidism”rare”)
Blood Test	FT4 high FT3 high TSH low Some cases only T3 will be elevated b/c T4 is converted to T3 so it appear normal	FT4 normal FT3 normal (Upper borderline!) TSH low The pituitary is sensing the overproduction of thyroid hormones so TSH decreases before the level T3, T4 get high	FT4 high FT3 high TSH high TSH secreting tumor (not responding to - feedback)

3- Radioactive Iodine Uptake (RAIU):

- Indicated when the diagnosis is in question (except during pregnancy).
- To differentiate between the etiologies.
 - Graves disease: Diffuse pattern (Elevated uptake).
 - Toxic adenoma: Focal uptake in the adenoma with suppressed uptake in the surrounding and contralateral thyroid tissue.
 - Toxic Multinodular Goiter: Multi focal uptake.
 - Thyroiditis: Near absent uptake.



- 4- TSH receptor Antibodies: Specific for Graves disease.
- 5- Thyroid Ultrasound with Doppler: High flow in Graves.

◆ Management:

Diagnosis	Treatment
Graves disease	Radioactive iodine - Antithyroid drugs: (Propylthiouracil, <u>Carbimazole*</u>) - Surgery.
Toxic multinodular goiter or Toxic adenoma	Radioactive iodine or Surgery.
Subacute thyroiditis	Aspirin ²

¹ Erectile dysfunction

² Subacute thyroiditis is self-limiting; therefore, the goals of treatment are to relieve discomfort and to control the abnormal thyroid function. The discomfort can usually be relieved with low-dose aspirin



Painless “silent” thyroiditis	Nothing
Exogenous thyroid hormone use	Stop use
Pituitary Adenoma	Surgery

Graves’ disease in children, adolescents, or pregnant patients; treat underlying cause. Carbimazole preferred over propylthiouracil - If pregnant: Consult Endocrinologist & PTU is preferred).

Hypothyroidism

Definition: The condition that occurs due to low production of thyroid hormone (free T3 and T4) by the thyroid gland.

Causes

Primary causes	
Autoimmune disease	Hashimoto’s thyroiditis “Most common cause” ³
Enlargement of thyroid gland	<ul style="list-style-type: none"> - Iodine deficiency - Endemic Colloid Goiter caused by Dietary
Iatrogenic	<ul style="list-style-type: none"> - Surgical removal of thyroid gland - Destruction of thyroid gland by irradiation - I₁₂₃ Treatment - Drugs: Iodine excess, lithium, antithyroid drugs
Secondary causes	
Secondary hypothyroidism	Pituitary → decreased TSH → decreased thyroid hormones

Clinical Manifestation of Hypothyroidism

DECREASE FUNCTIONS OF THE ORGANS "except menstrual flow"

General	Myxedematous Appearance (caused by infiltration of mucopolysaccharides) pericardial/pleural effusion, carpal tunnel syndrome. Weight gain
skin	Scaliness of skin, Brittle hair and loss of outer eyebrow

³ Hyperthyroidism symptoms in the beginning of the disease as thyroid hormone leaks out of the damaged gland as it is destroyed



Brain⁴	Cognitive dysfunction, Hypothermia, Cold Intolerance, Extreme Somnolence sleepiness, Decrease Appetite.
GIT	Constipation
Renal	Oliguria electrolyte abnormality seen is hyponatremia
Heart	Bradycardia
Eye	Periorbital Edema (Non-pitting & again caused by infiltration of mucopolysaccharides)
Muscles	Proximal Myopathy, Fatigue, Delayed Relaxation Reflexes.
Reproductive	Male → Loss of libido. Women → <u>Menorrhagia</u> .

❖ Investigations:

- 1- Serum TSH level (**Best initial test**). “(High) except in Secondary hypothyroidism(Low)”.
- 2- Free T4. “Should be low”.

Hypothyroidism			
Types	Clinical Hypothyroidism	Subclinical Hypothyroidism	Secondary hypothyroidism
Blood Test	FT4 Low FT3 Low TSH High	FT4 (Low normal) FT3 (Low normal) TSH Raised Treat if symptomatic, or if: 1- autoimmune causes(It progress with time) 2-pregnancy 3- someone with dyslipidemia 4-psychiatric illness 5-goiter	FT4 Low FT3 Low TSH Low or Normal

- 3- Anti-Thyroid antibody: Anti-TPO Specific for Hashimoto’s thyroiditis. Then confirm by FNA “Lymphocytes infiltrate”.
- 4- Anti-Thyroid peroxidase Ab: Tells who need treatment when T4 is normal and TSH is high.
- 5- ECG: Sinus bradycardia.
- 6- CBC: Normocytic Anemia “Most common”

Note: When TSH is very high (More than double the upper limit of normal) with normal T4, replace hormone. When TSH is high (But less than double) get Anti-TPO and Anti-thyroid peroxidase. If +ve treat.

- ❖ **Management:** Levothyroxine. “Increase the dose if pregnant women” + “Measure the efficacy 6-8 weeks after initiation of the treatment”