

# **Approach to Patient with Thyroid Disorders**

# Objectives

**At the end of this session, students will be able to:**

- 1. Identify differential diagnosis of a case presented with the symptoms of tiredness.**
- 2. Identify differential diagnosis of thyroid swellings.**
- 3. Differentiate between different causes of thyroid swellings.**
- 4. Discuss briefly about hypo and hyperthyroidism symptoms.**
- 5. Investigate appropriately a patient with generalized tiredness.**
- 6. Investigate appropriately a patient with thyroid swelling.**
- 7. Advice initial management plan for a patient with hypothyroidism including sub-clinical hypothyroidism.**

# **CASE SCENARIO (Thyroid Swelling)**

- **A 40-year-old lady is a secretary in a private company. She presented today with her husband complaining of a six months history of generalized fatigue, feeling tired easily, and tingling in her hands during her work and at night. She mentioned that she has gained weight about 10 kg over six months. She also complained that her periods had become irregular and lighter than previously. Her husband had also commented that she had developed a deeper, croaky voice.**

# On examination

- **She looks well, not pale or jaundiced. She was overweight (BMI= 29) with generally dry skin and thin and coarse hair. Pulse was 60/min, but regular. She had swelling in the thyroid gland, which was mild and smooth, no pulse or bruit were heard over the swelling. The knee jerk had slow relaxing reflex. She also, had evidence of bilateral carpal tunnel syndrome.**
- **Laboratory Investigations:**
- **Thyroid-stimulating hormone (TSH) was increased: 28U/ml (normal <4) Thyroid hormone (T4) was low: 9 µmol/l.**
- **Antibodies to thyroid peroxidase were present at high titer.**

# Tiredness Or Fatigue

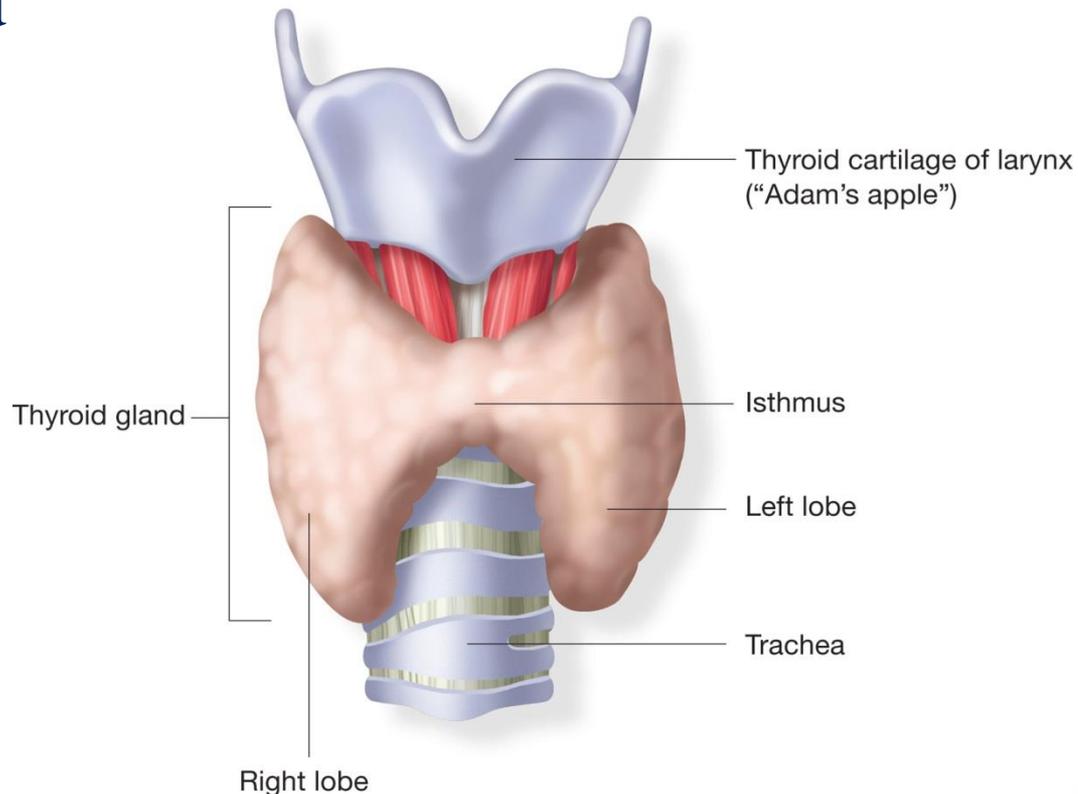
- 'Tired all the time' is a popular phrase given by patients to their family doctors.
- Tiredness or fatigue is a common problem. Often, it is not a medical issue but one that can be reversed by a change of lifestyle.

# Organic causes of fatigue

- Infectious causes
- Anemia
- Endocrinopathies e.g. diabetes and hypothyroidism
- Sleep disturbances e.g. sleep apnea
- Medication side-effects
- Adrenal insufficiency
- Malignancies.

# Thyroid Gland

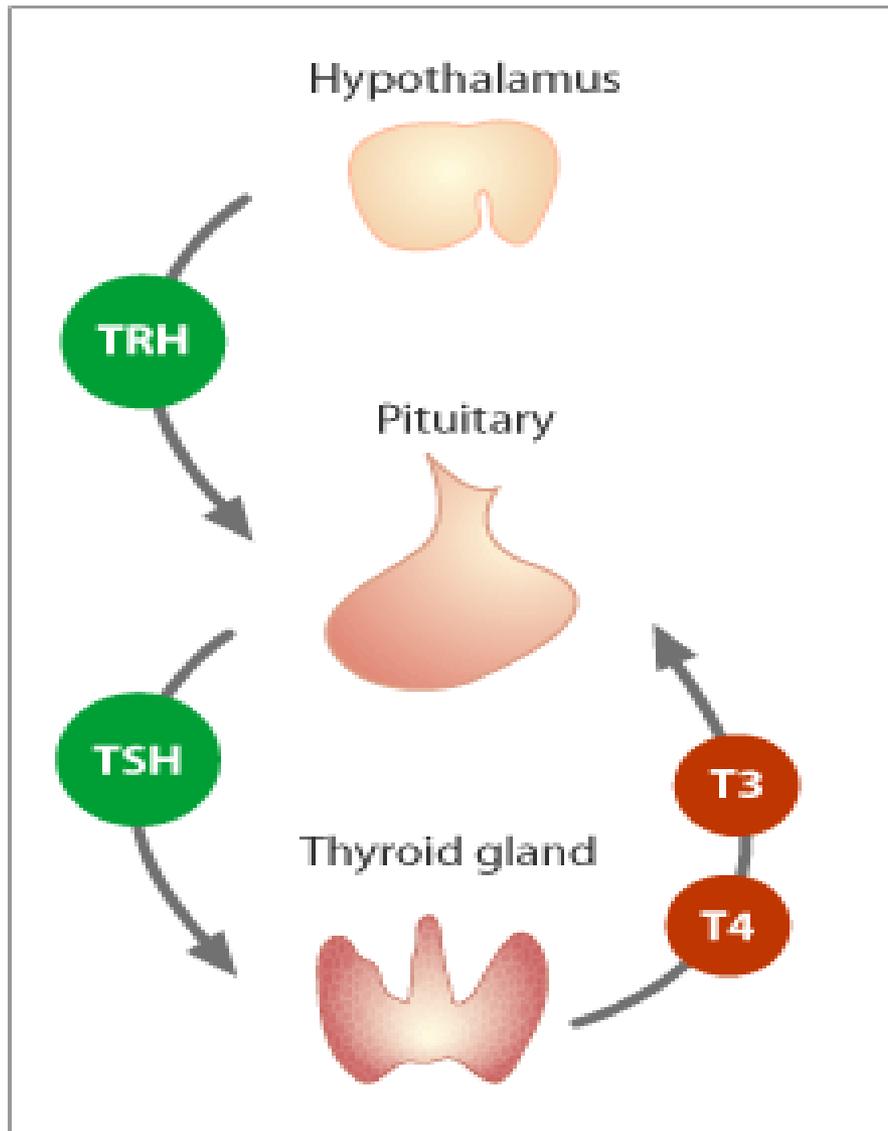
- The thyroid is a small, butterfly-shaped gland located at the base of the neck just below the cricoid



# Thyroid Gland Function

- The thyroid's main role in the endocrine system is to regulate the metabolism in the body by producing hormones.
- The two main thyroid hormones are:  
T3 and T4.

# Physiology



# Thyroid axis:

- Thyrotropin-releasing hormone (TRH) from **hypothalamus**  
Stimulates the pituitary to release TSH.
- TSH in turn stimulates the thyroid to secrete the pro-hormone thyroxin (T4) and to a lesser extent the receptor active hormone tri-iodothyronine (T3).
- The majority of circulating T3 is generated by peripheral conversion of T4 by the intracellular iodothyronine deiodinases.
- Thyroid hormone (TH) is transported over the cell membrane by specific TH transporters. After transport and metabolisation in the cell,
- T3 can interact with nuclear TH receptors and activate or inactivate TH responsive genes.

# Clinical Presentation of Thyroid Problems

## 1. Chief complain:

- Swelling in the neck (+/-), or only symptoms of hyper or hypothyroidism.

## 2. History of the presenting illness:

Swelling: Compressing symptoms:

--- Dyspnea.

--- Difficulty in swallowing.

--- Hoarseness of the voice when the recurrent laryngeal nerve is involved. Whistling of air sounds (stridor): heard when it compresses the trachea.

# Cont..

- - Symptoms of hyper or hypothyroidism. •

Risk factors:

- Exposure to radiation.
- Family history.
- Iodine intake.
- Pervious disease.

# • Thyroid Examination:



**The examination of thyroid gland**

(A) Look at the eyes and neck . (B) Ask the patient to swallow . ( C) Feel the trachea . (D) Palpate the neck from behind with the thumbs pushing the head forward to flex the neck slightly (E) Palpate both lobes and isthmus with the fingers straight and flat . (F) If one lobe is difficult to feel , make it more prominent by pressing firmly on the opposite side . Try to decide if there is one lump or diffuse enlargement . (G) Percuss the lower limit of the gland . (H) Listen over the lateral lobes for a systolic bruit . (I) Testing for lid lag .

# Thyroid diseases:

- Functional disorders:
  1. Hypofunction - Hypothyroidism
  2. Hyperfunction - Hyperthyroidism
- Nodular abnormalities - Goitre
- Tumors

# **Functional disorders**

# 1. Hypothyroidism

Hypothyroidism is a condition in which the body lacks sufficient thyroid hormone.

- hypo = too little  
thyroidism = disease of the thyroid  
Thus, hypo-thyroidism = a disease of too little thyroid activity.

**Table 18.11****Causes of hypothyroidism****PRIMARY DISEASE OF THYROID****Congenital**

Agenesis

Ectopic thyroid remnants

**Defects of hormone synthesis**

Iodine deficiency

Dyshormonogenesis

Antithyroid drugs

Other drugs (e.g. lithium, amiodarone, interferon)

**Autoimmune**

Atrophic thyroiditis

Hashimoto's thyroiditis

Postpartum thyroiditis

**Infective**

Post-subacute thyroiditis

**Post-surgery****Post-irradiation**

Radioactive iodine therapy

External neck irradiation

**Infiltration**

Tumour

**SECONDARY (TO HYPOTHALAMIC-PITUITARY DISEASE)****Hypopituitarism**

Isolated TSH deficiency

**PERIPHERAL RESISTANCE TO THYROID HORMONE**

# Causes of primary hypothyroidism

## Autoimmune:

### Atrophic (autoimmune) hypothyroidism.

This is the most common cause of hypothyroidism and is associated with antithyroid autoantibodies leading to lymphoid infiltration of the gland and eventual atrophy and fibrosis

# Causes of primary hypothyroidism

## Autoimmune:

### Hashimoto's thyroiditis:

This form of autoimmune thyroiditis, produces atrophic changes with regeneration, leading to goitre formation.

**TPO antibodies** are present, often in very high titers ( $> 1000$  IU/L). Patients maybe **hypothyroid or euthyroid.**

Defects of hormone synthesis:

**Iodine deficiency (Dyshormonogenesis)**

genetic defects in the synthesis of thyroid hormones

## Symptoms

Tiredness/malaise

**Weight gain**

Anorexia

**Cold intolerance**

Poor memory

Change in appearance

Depression

Poor libido

**Goitre**

Puffy eyes

Dry, brittle unmanageable hair

Dry, coarse skin

Arthralgia

Myalgia

Muscle weakness/Stiffness

Constipation

Menorrhagia or  
oligomenorrhoea in women

Psychosis

Coma

Deafness



A history from a relative is often revealing  
Symptoms of other autoimmune disease  
may be present

## Signs

**Mental slowness**

Psychosis/dementia

Ataxia

Poverty of movement

Deafness

'Peaches and cream'  
complexion

**Dry thin hair**

Loss of eyebrows

Hypertension

Hypothermia

Heart failure

**Bradycardia**

Pericardial effusion

Cold peripheries

Carpal tunnel syndrome

Oedema

Periorbital oedema

Deep voice

(Goitre)

**Dry skin**

Mild obesity

Myotonia

Muscular hypertrophy

Proximal myopathy

**Slow-relaxing reflexes**

Anaemia

**Fig. 18.15** Hypothyroidism – symptoms and signs. Bold type indicates signs of greater discriminant value. A history from a relative is often revealing. Symptoms of other autoimmune disease may be present.

# HYPOTHYROIDISM



# Diagnosis of primary hypothyroidism

The symptoms of hypothyroidism are very common.

- Thyroid Function Test (TFT) +
- Careful clinical assessment.
- The symptoms and/or signs alone are insufficient to make a diagnosis of hypothyroidism.

# Investigations of primary hypothyroidism

1. Serum TSH is the investigation of choice; a high TSH level
2. A low free T4 level
3. Antibody testing

# Treatment

- Replacement therapy with levothyroxine (thyroxine, i.e. T4), taken daily, for life.



# Untreated hypothyroidism

Can contribute to: •

- Hypertension
- Dyslipidemia
- Infertility
- Cognitive impairment and
- Neuromuscular dysfunction.

# Screening:

May be considered in those with risk factors for •  
hypothyroidism, such as:

- History of autoimmune disease, •
  - History of head or neck irradiation, •
  - Previous radioactive iodine therapy, •
  - Presence of a goiter, •
  - Family history of thyroid disease, •
  - Treatment with drugs known to influence •  
thyroid function.
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# Special Populations

Six populations deserve special consideration: •

- (1) Older patients; •
- (2) Known or suspected ischemic heart disease; •
- (3) Pregnant women;
- (4) Patient with persistent symptoms of •  
hypothyroidism despite taking adequate doses of  
levothyroxine;
- (5) patients with subclinical hypothyroidism; and •
- (6) patients suspected of having myxedema  
coma

# OLDER PATIENTS & PATIENTS WITH IHD

- The initial dosage is generally 25 mcg or 50 mcg daily, with the dosage increased by 25 mcg every three to four weeks.
- Thyroid hormone increases heart rate and contractility, and therefore increases myocardial oxygen demand.
- Consequently, starting at higher doses may precipitate acute coronary syndrome or an arrhythmia.

# Pregnancy

- - Thyroid hormone requirements increase during pregnancy. •
  - A median increase of 47 percent in their thyroid hormone requirements. •
  - It is recommended that women on fixed doses of levothyroxine take nine doses each week (one extra dose on two days of the week), •

# Patients with persistent symptoms

- ❑ Numerous medications can affect thyroid hormone levels in patients taking levothyroxine.
  - ❑ Amiodarone
  - ❑ Interleukin-2
  - ❑ Interferon alfa
  - ❑ Lithium
  - ❑ Sulfonylurea
  - ❑ Thalidomide

# Sub-Clinical Hypothyroidism

- Also known as mild thyroid failure.
- Diagnosed when peripheral thyroid hormone (T4) levels are within normal, but serum thyroid-stimulating hormone (TSH) levels are mildly elevated (usually 5-10 mU/L).
- Some patient may have some hypothyroid symptoms.
- Treatment is a dilemma.
- Patients should be treated with small dose of Levo-thyroxin if symptomatic.

# Sub-Clinical - Treatment

Treatment should be considered for patients •  
with:

- Initial TSH levels greater than 10 mIU per L •
- Patients with elevated thyroid peroxidase •  
antibody titers,
- Patients with symptoms suggestive of •  
hypothyroidism and
- TSH levels between 5 and 10 mIU per L,for •  
patients who are pregnant or are attempting to  
conceive.

# Myxedema Coma

A severe type of Hypothyroidism

- Is a rare but extremely severe manifestation of hypothyroidism.
- Mental status changes including lethargy, cognitive dysfunction, psychosis, and hypothermia are the hallmark features of myxedema coma.
- Hyponatremia, hypoventilation, and bradycardia can also occur.
- Endocrinology referral is recommended for all patients with suspected myxedema coma

## Table 6. Reasons for Endocrinology Consultation in Patients with Hypothyroidism

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Age younger than 18 years

Cardiac disease

Coexisting endocrine diseases

Myxedema coma suspected

Pregnancy

Presence of goiter, nodule, or other structural thyroid gland abnormality

Unresponsive to therapy

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# Complications of Hypothyroidism

What May Happen If the Disorder Is Untreated:

1. Birth Defects
2. Goiter
3. Heart Problems
4. Infertility
5. Mental Health Issues
6. Myxedema coma.
7. HTN
8. DLD

## 2. **Hyperthyroidism**

- **Hyperthyroidism is an excessive concentration of thyroid hormones in tissues caused by:**
- **- Increased synthesis of thyroid hormones,**
- **- Excessive release of preformed thyroid hormones, or**
- **- An endogenous or exogenous extrathyroidal source.**

**Table 18.12**

**Causes of hyperthyroidism**

**Common**

Graves' disease (autoimmune)



Toxic multinodular goitre

Solitary toxic nodule/adenoma

**Uncommon**

Acute thyroiditis

viral (e.g. de Quervain's)

autoimmune

post-irradiation

postpartum

Gestational thyrotoxicosis (HCG stimulated)

Neonatal thyrotoxicosis (maternal thyroid antibodies)

Exogenous iodine

Drugs – amiodarone

Thyrotoxicosis factitia (secret  $T_4$  consumption)

**Rare**

TSH-secreting pituitary tumours

Metastatic differentiated thyroid carcinoma

HCG-producing tumours

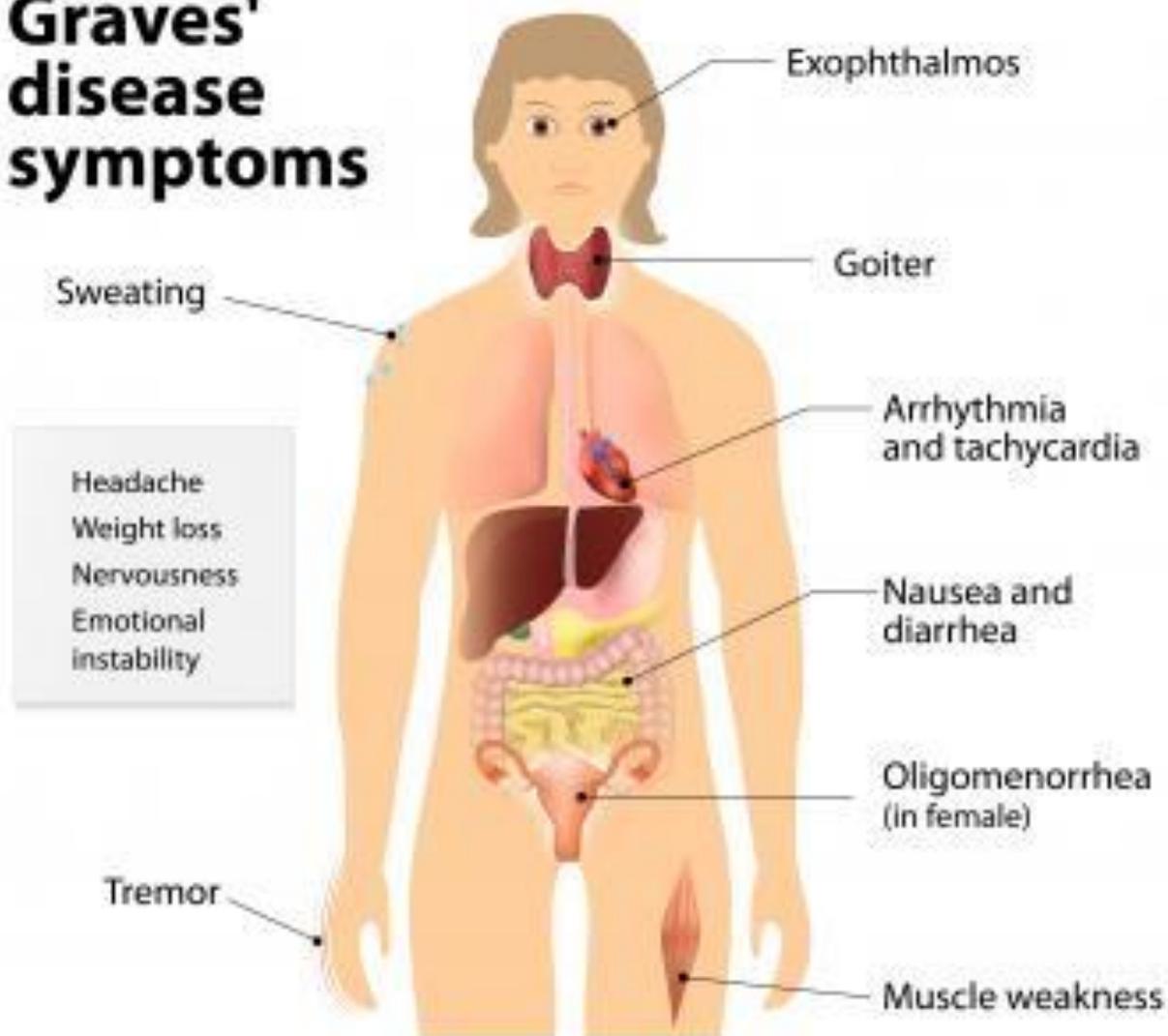
Hyperfunctioning ovarian teratoma (struma ovarii)

# Causes of Hyperthyroidism

## Graves' disease:

- This is the most common cause of hyperthyroidism and is due to an autoimmune process.
- Serum IgG antibodies bind to TSH receptors in the thyroid, stimulating thyroid hormone production.

# Graves' disease symptoms



# Other causes of hyperthyroidism/ thyrotoxicosis:

- Solitary toxic adenoma/nodule
- Toxic multinodular goitre
- de Quervain's thyroiditis

transient hyperthyroidism from an acute inflammatory process, probably viral in origin.

- Postpartum thyroiditis
- Amiodarone-induced thyrotoxicosis \*\*

## Symptoms

**Weight loss**

**Increased appetite**

**Irritability/behaviour change**

Restlessness

Malaise

Stiffness

Muscle weakness

**Tremor**

Choreoathetosis

Breathlessness

Palpitation

**Heat intolerance**

Itching

Thirst

Vomiting

Diarrhoea

Eye complaints\*

Goitre

Oligomenorrhoea

Loss of libido

Gynaecomastia

Onycholysis

Tall stature (in children)

Sweating

\*Only in Graves' disease



## Signs

**Tremor**

**Hyperkinesia**

Psychosis

Proximal myopathy

Proximal muscle wasting

Onycholysis

Palmar erythema

**Tachycardia or atrial fibrillation**

**Full pulse**

**Warm vasodilated peripheries**

Systolic hypertension

Cardiac failure

Graves' dermopathy\*

Thyroid acropachy

Pretibial myxoedema

**Exophthalmos\***

**Lid lag and 'stare'**

Conjunctival oedema

Ophthalmoplegia\*

Periorbital oedema

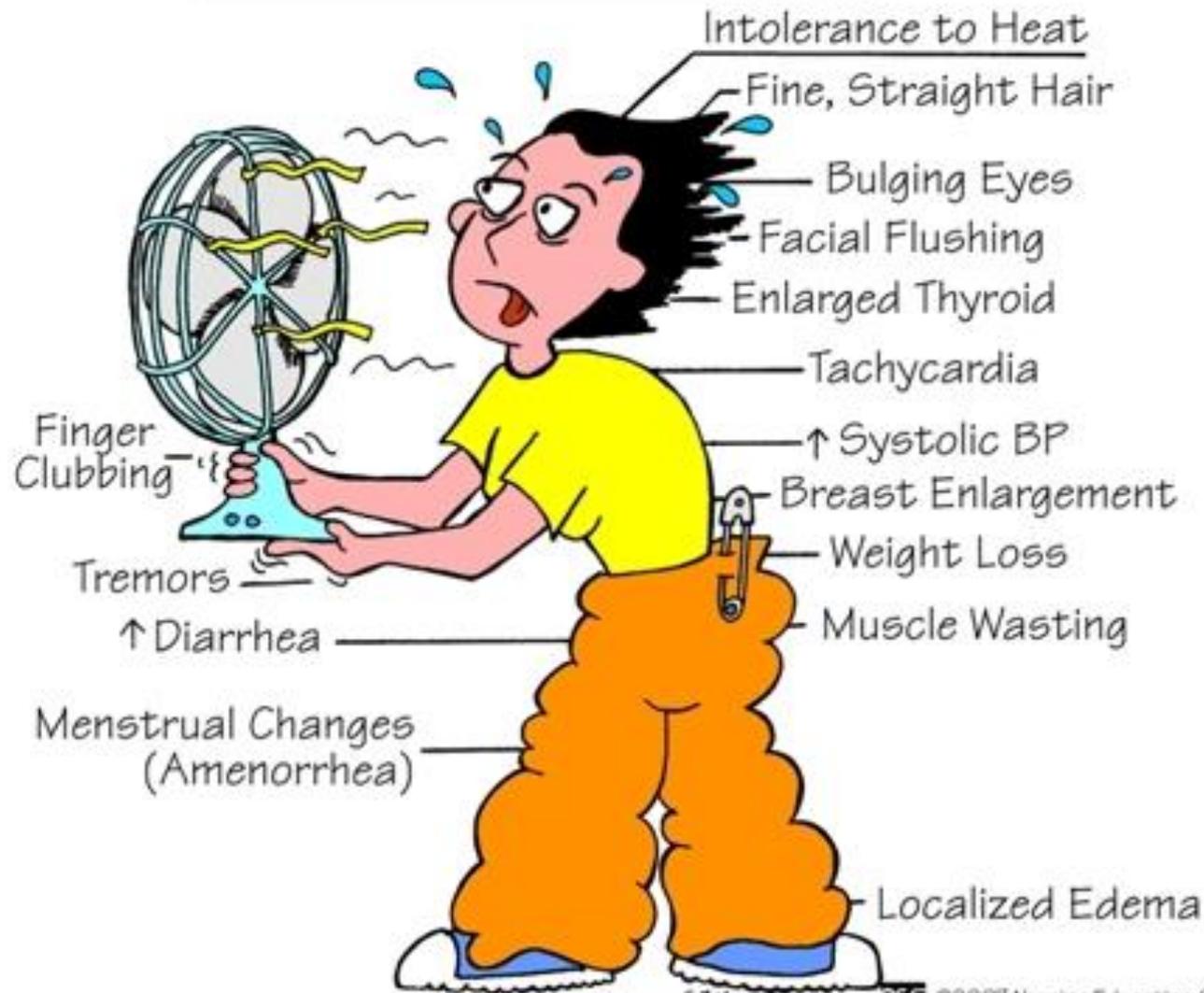
**Goitre, bruit**

Weight loss

\*Only in Graves' disease

**Fig. 18.16** Hyperthyroidism – symptoms and signs. Bold type indicates signs of greater discriminant value.

# HYPERTHYROIDISM



# Diagnosis Of Hyperthyroidism

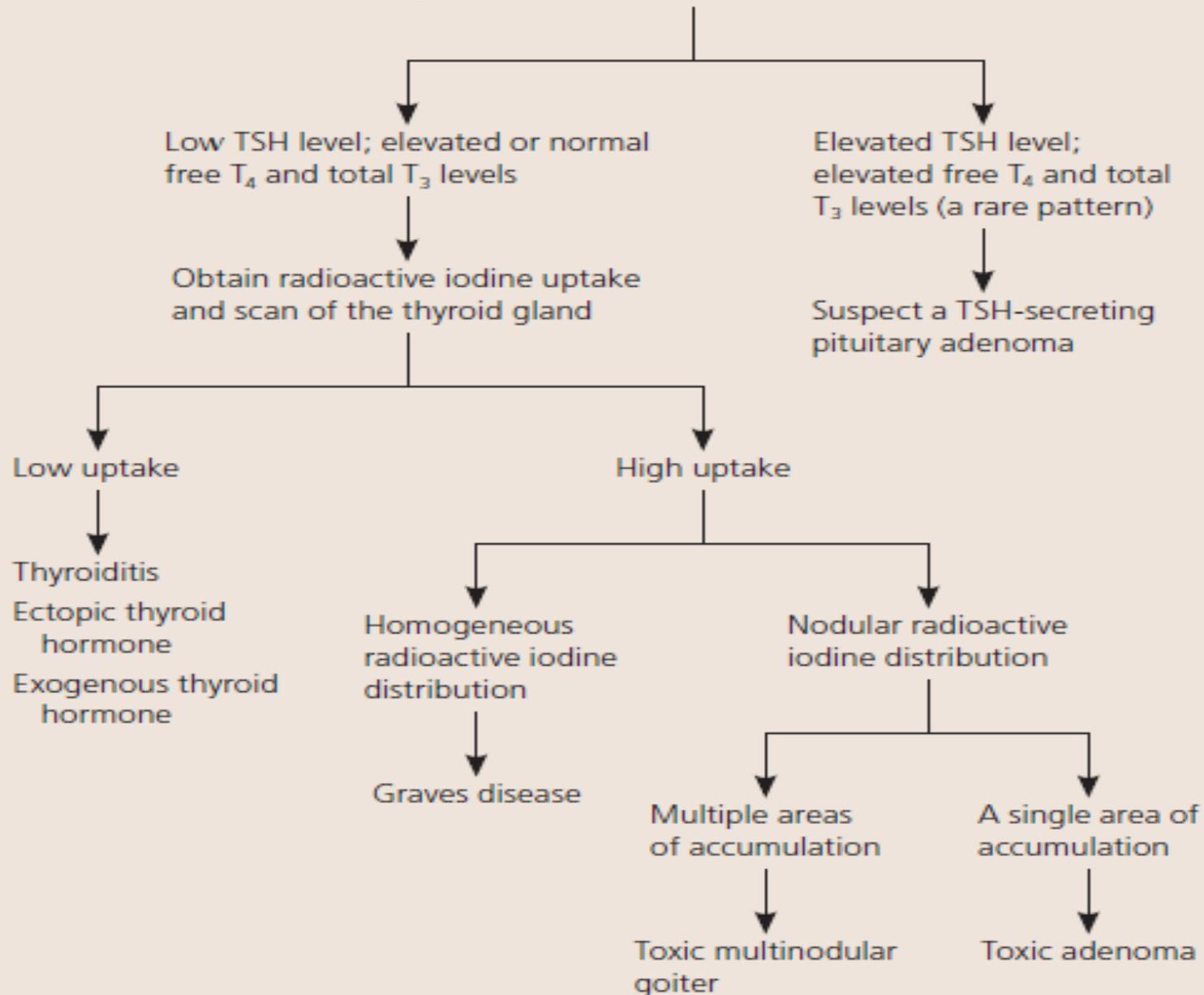
Hyperthyroidism is diagnosed based on symptoms, physical exam and blood tests to measure levels of thyroid stimulating hormone (TSH) and thyroid hormones  $T_3$  and  $T_4$ .

# Investigations

- Serum TSH is suppressed in hyperthyroidism (< 0.05 mU/L),
- A raised free T4 or T3 confirms the diagnosis
- TPO and thyroglobulin antibodies are present in most cases of Graves' disease.
- Radioactive Iodine Uptake
- Ultrasound scan

# Diagnostic Workup of Hyperthyroidism

Signs and/or symptoms of hyperthyroidism



# Treatment

Three possibilities are available:

1. Antithyroid drugs
2. Radioactive iodine.
3. Surgery: subtotal thyroidectomy

# Long-term Consequences Of Hyperthyroidism

- Increased risk of osteoporosis.
- Increased the risk of atrial fibrillation which may predispose to thromboembolic disease.
- Cardiac Failure

# Thyroid Disorders.. Cont.

Nodular abnormalities – Goitre:

Goitre is a lump in the neck caused by the thyroid gland becoming swollen.

**Table 18.14**

**Goitre – causes and types**

**Diffuse**

Simple

Physiological (puberty, pregnancy)

Autoimmune

Graves' disease

Hashimoto's disease

Thyroiditis

Acute (de Quervain's thyroiditis)

Iodine deficiency (endemic goitre)

Dyshormonogenesis

Goitrogens (e.g. sulfonylureas)

**Nodular**

Multinodular goitre

Solitary nodular

Fibrotic (Reidel's thyroiditis)

Cysts

**Tumours**

Adenomas

Carcinoma

Lymphomas

**Miscellaneous**

Sarcoidosis

Tuberculosis

# Investigations:

- Thyroid function tests
- Thyroid antibodies
- Ultrasound.
- Chest and thoracic X-rays
- Fine-needle aspiration (FNA).
- Thyroid scan

# Drugs known to affect thyroid function

- Inhibition of T4/T3 synthesis
  - Propylthiouracil
  - Methimazole
- Inhibition of T4/T3 secretion
  - Lithium
  - Iodide
  - Amiodarone
- TSH suppression
  - Glucocorticoids
  - Dopamine agonists

# References:

- ✓ Hypothyroidism: An Update; American Family Physician
- ✓ American association of clinical endocrinologists medical guidelines for clinical practice for the evaluation and treatment of hyperthyroidism and hypothyroidism