ENDOCRINOLOGY

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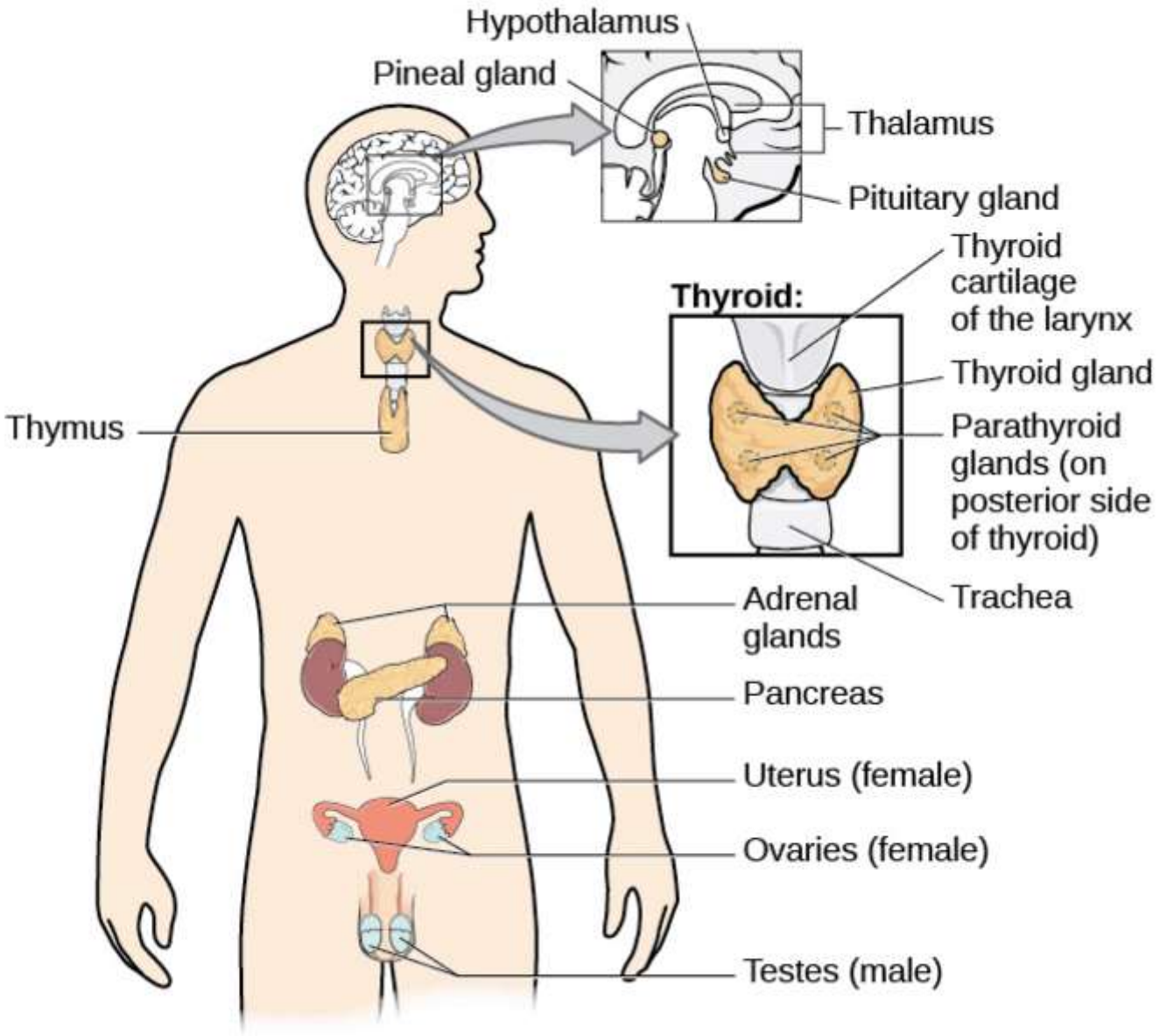
(Prof.& HOD of Medicine)

MHMC

Specific Learning Objectives (SLO)

1. Cognitive Domain (Knowledge)
2. Psychomotor Domain (Skill)
3. Affective Domain (Feeling of both affect & affectee)

At the end of each module (we) student should be able to…

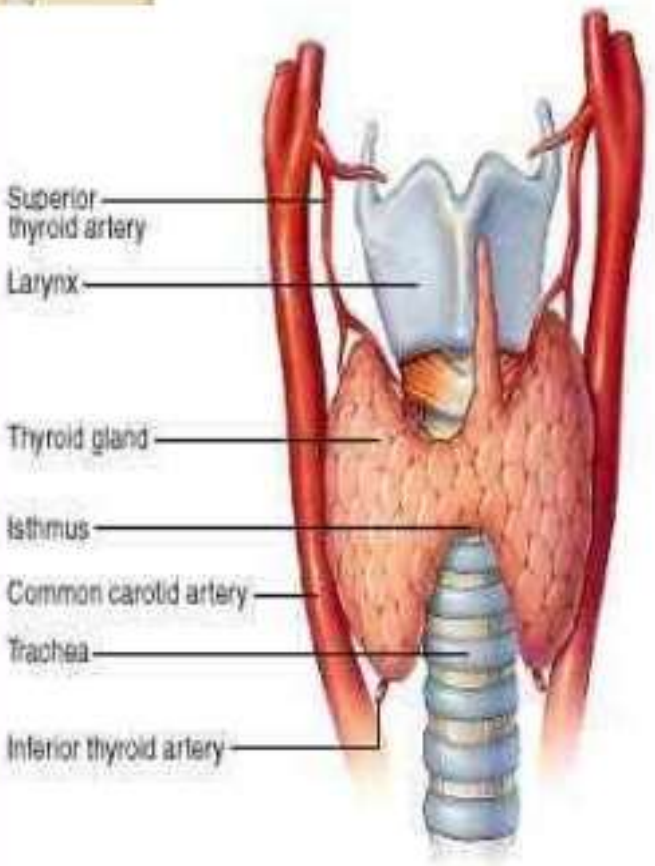

Hypothalamus
Pineal gland
Thalamus
Pituitary gland
Thyroid:
Thyroid cartilage of the larynx
Thyroid gland
Parathyroid glands (on posterior side of thyroid)
Trachea
Thymus
Adrenal glands
Pancreas
Uterus (female)
Ovaries (female)
Testes (male)

THYROID GLAND

Physiological effects of thyroid hormone

- Increases oxygen consumption and heat production
- Positive chronotropic and inotropic effects on heart
- Increase sensitivity to adrenergic effectors
  - Up-regulates β-adrenergic receptors
- Increase gut motility
- Increase bone turnover

Thyroid gland



- The thyroid gland is one of the largest endocrine glands.
- The thyroid gland is located immediately below the larynx and anterior to the upper part of the trachea. It weighs about 15-20g.
- It consists of 2 lateral lobes connected by a narrow band of thyroid tissue called the isthmus.
- The isthmus usually overlies the region from the 2nd to 4th tracheal cartilage.

- 4 tiny parathyroid glands located posteriorly at each pole of thyroid gland.
- **Hormone secreted-**
- Thyroxine(T4)
- Tri iodothyronine (T3)
- Reverse T3
- Calcitonin

Physiological effects of thyroid hormone

- Increases reflex response
- Increase hepatic glycogenolysis and gluconeogenesis
- Developmental effects
  - Growth
  - Brain development

T3 & T4

- Facilitate normal growth and development
- Increase metabolism
- Increase catecholamine effects

TSH

- Most useful marker of thyroid hormone function
- Released in a pulsatile diurnal rhythm- highest at night

Diseases Of Thyroid Gland

- **DIVIDED INTO:**

HYPOTHYROIDISM (Gland destruction)

- Under-production of thyroid hormones
  - Myxoedema (Gull Disease)
  - Cretinism
  - Thyroiditis

HYPERTHYROIDISM (thyrotoxicosis)

- Over-production of thyroid hormone
  - Grave's Disease
  - Thyrotoxicosis

GOITER- Diffuse and multi-nodular

NEOPLASTIC PROCESSES

- Beningn
- Malignant

Hypothyroidism

Resulting from reduced circulating level of T3 and T4

Acquired disease due to primary and other various causes of thyroid and hypothalamo pituitary thyroid axis abnormalities.

Causes of Hypothyroidism

- **Primary**

  1. Dietary Iodide deficiency
  2. Iodine defficiency
  3. Autoimmune (Hashimoto´s Thyroiditis)
  4. Drugs: amiodarone, lithium, thiocyanates, phenylbutazone, sulfonylureas
  5. Iatrogenic- Surgical removal of the thyroid gland and radiation treatment
  6. Congenital (1 in 3000 to 4000)
  7. Infiltrative disorders

- **Secondary**
  - Pituitary gland destruction
  - Isolated TSH deficiency
  - Bexarotene(anti cancer drug) treatment
  - Hypothalamic disorders

- Hypothyroidism appears in 3 forms-
- 1. Myxoedema (Gull Disease)
- 2. Cretinism
- 3. Thyroiditis

Myxoedema (Gull Disease)

- **hypothyroidism developing in adults, deposition of excess mucoprotein in skin of forearm, Leg, feet**
- **Features-**
  - Enlargement of thyroid gland (Goiter)
  - Lack of interest in daily household chores.
  - slowing of physical and mental activity
  - generalized fatigue, dull look
  - apathy
  - overweight
  - ↓ CO
    - shortness of breath
    - ↓ exercise capacity
  - ↓ Sympathetic activity
    - constipation
    - ↓ sweating

- **Skin**-dry, thicken, yellow(carotinemia), cool (↓ blood flow)
- edema, puffy face, periorbital swelling.
- Ptosis (drooping of upper eyelid)
- coarse hair
- broadening of facial features
- enlarged tongue
- deepening of voice (telephonic voice)

- **Calorigenic action-** BMR decreases to 30-40%
- cold-intolerant
- **Bone marrow-** anemia (normocytic, normochromic)
- Menstrual irregularities
- **Carbohydrate metabolism-** Low blood sugar
- **Lipid metabolism-** Increased serum Cholesterols, TGs, phospholipids

- **CNS**- Myxedematous madness (psychosis)
- Knee jerk reaction time increased
- Memory loss

CRETINISM

Congenital iodine deficiency syndrome

Congenital disease due to absence or deficiency of normal thyroid secretion, characterized by physical deformity, dwarfism and mental retardation and often by goitre.

Symptoms:

- ❑ Goitre
- ❑ Mental impairement
- ❑ Poor growth
- ❑ Infertility
- ❑ Hair loss
- ❑ Thickened skin
- ❑ Enlarged tongue
- ❑ Protruding abdomen
- ❑ Delayed puberty and bone maturation

THYROIDITIS

Thyroiditis is the swelling, or inflammation, of the thyroid gland and can lead to over- or under-production of thyroid hormone.

3 phases to thyroiditis:

Thyrotoxic phase - means that the thyroid is inflamed and releases too many hormones.

Hypothyroid phase. Following the excessive release of thyroid hormones for a few weeks or months, the thyroid will not have enough thyroid hormones to release. This leads to a lack of thyroid hormones or hypothyroidism.

Euthyroid phase. The thyroid hormone levels are normal. This phase may come temporarily after the thyrotoxic phase before going to the hypothyroid phase, or it may come at the end after the thyroid gland has recovered from the inflammation and is able to maintain a normal hormone level.

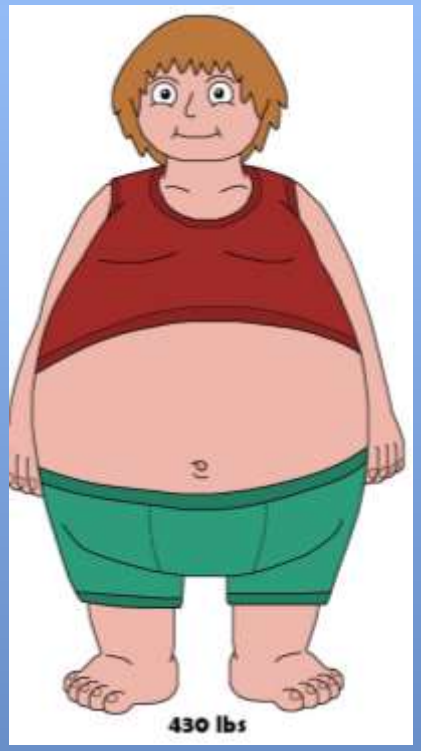
HASHIMOTO'S THYROIDITIS

An autoimmune condition caused by anti-thyroid antibodies. This is the most common form of thyroiditis and is around five times more common in women than in men.

Characterised by destructive lymphoid infiltration of the thyroid, ultimately leading to varying degree of fibrosis and thyroid enlargement.

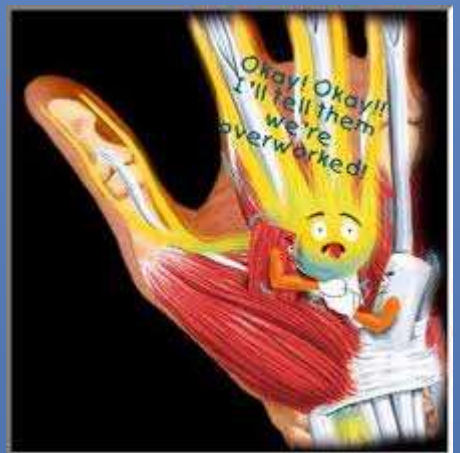
Hypothyroidism Symptoms

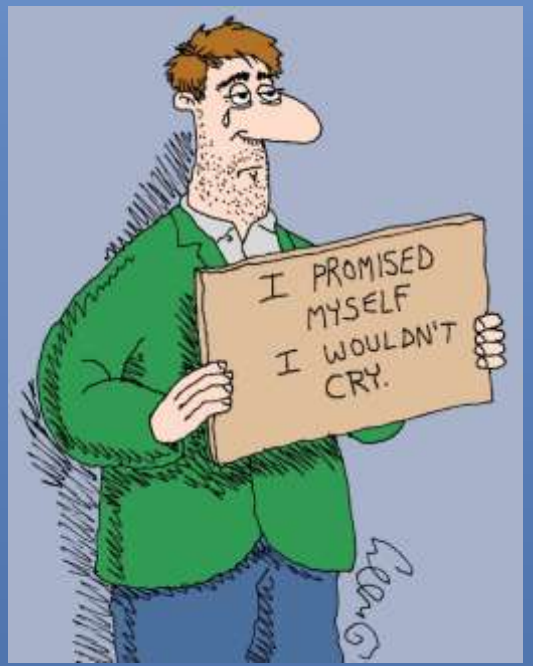
- Fatigue (feel tired)
- Depressed
- Constipation
- Weight gain and obesity
- Leg swelling (edema)
- Dry skin
- Muscle cramps
- Very sensitive to cold
- Hair loss
- Poor concentration
- In female heavy menstrual periods.
- Poor hearing


430 lbs


zzzzzzzzz

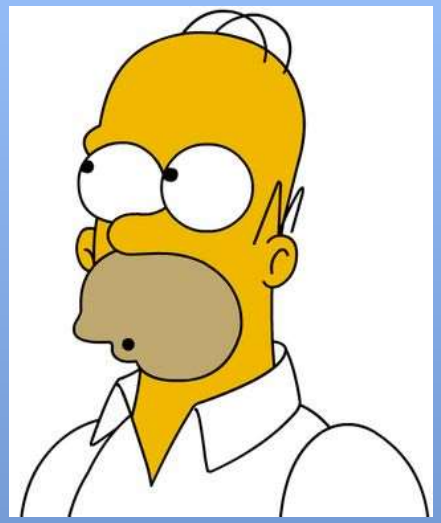

Argh, stomach pain, but I cannot poop... Help! Help!

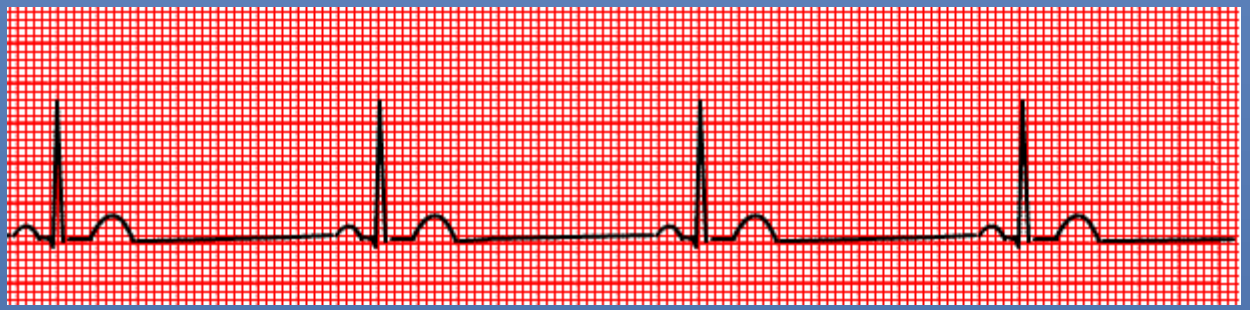

Okay! Okay!! I'll tell them we're overworked!


I PROMISED MYSELF I WOULDN'T CRY.

Hypothyroidism Signs

- Dry, coarse skin
- Cool extremities
- Myxedema
- Hair loss
- Slow pulse rate
- Swelling of the limbs
- Delayed relaxation of tendon reflexes
- Carpel tunnel syndrome
- Pleural effusion
- Ascetis





Hyperthyroidism Causes

Hyperthyroidism (thyrotoxicosis) is excess thyroid hormone

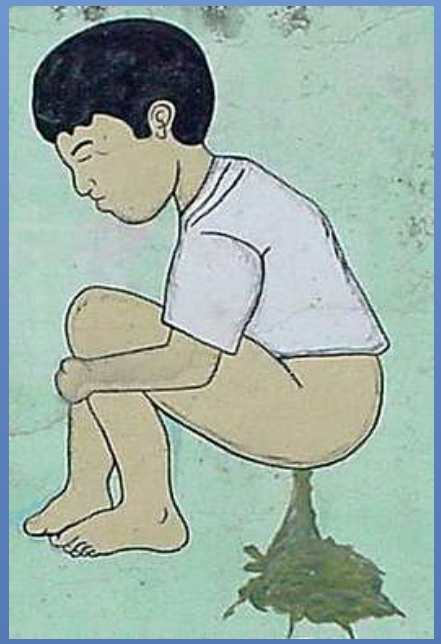
- Autoimmune
  - Graves Disease (76%)
    - F>M, age 20-40
    - IgG auto antibodies bind TSH receptors → T3 & T4
    - Leads to gland hyper function
  - Toxic adenoma and toxic multinodular goitre
  - Viral Thyroiditis (de Quervain's)
    - Fever and ↑ESR- self limiting
  - Exogenous Iodine
  - Neonatal thyrotoxicosis
  - Drugs- Amiodarone
  - TSH secreting pituitary adenoma (rare)
  - HCG producing tumour

GRAVES DISEASE
Toxic diffuse goitre

- An autoimmune disease resulting in increased synthesis and release of thyroid hormones
- Female: male = 8:1
- 20-40 yrs
- Accompanied by infiltrative opthalmopathy in 60% specially in smokers.

Hyperthyroid Symptoms

- ❑ Fast heart rate
- ❑ Irregular heart rate
- ❑ Unable to sleep
- ❑ Palpitations
- ❑ Bone loss
- ❑ “Bulging eyes”
- ❑ Weight loss
- ❑ Nervous and anxious
- ❑ Very sensitive to cold
- ❑ Easily upset
- ❑ Muscle weakness




I DO NOT
HAVE PMS!

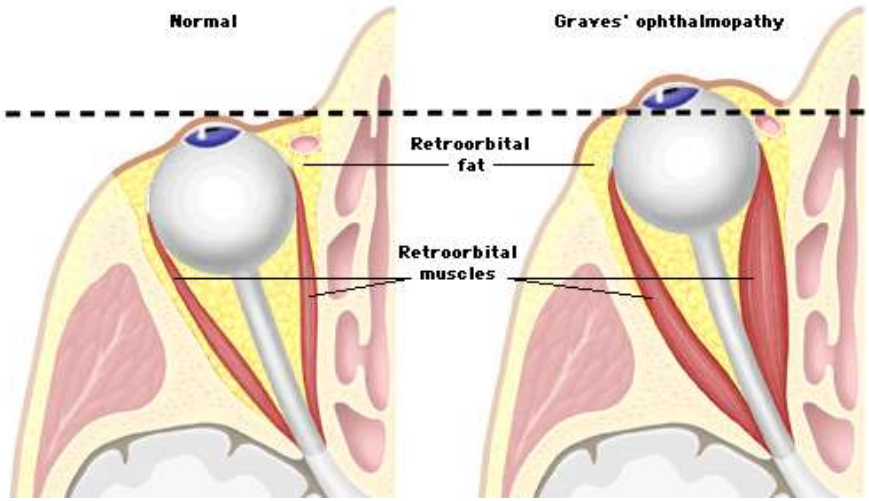
Hyperthyroid Signs

Hyperthyroidism

- Thyrotoxicosis
- Grave's disease
- Toxic Adenoma
- Toxic Multinodular Goiter
- Chronic Thyroiditis

Hyperthyroidism – Eye Disease

- Associated with Graves' disease
  - Inflammation of retro-orbital tissues
  - Optic nerve compression→ atrophy
- Symptoms
  - Eye discomfort, grittiness
  - Excess tear production
  - Photophobia
  - Diplopia
  - Decreased acuity
- Signs
  - Exopthalmos- Graves
  - Proptosis
  - Opthalmoplegia
  - Oedema



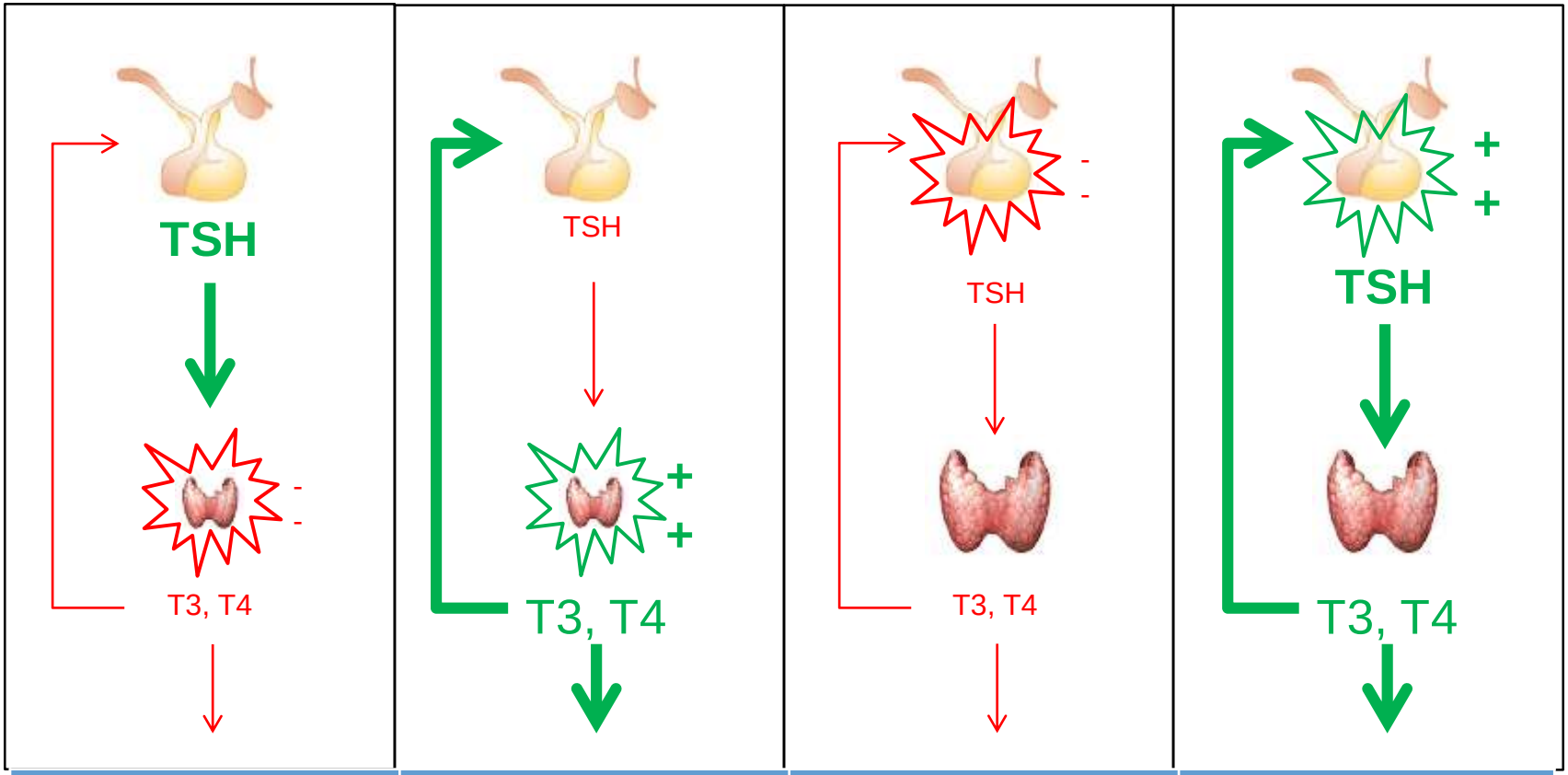
Investigating Thyroid Disease

- TSH- first thing you assess
  - Normal range 0.5-5 μU/ml
  - Supressed= Hyperthyroid
  - Elevated= Hypothyroid

If TSH abnormal request Free T4

- Elevated= Hyperthyroid
- Suppressed= Hypothyroid

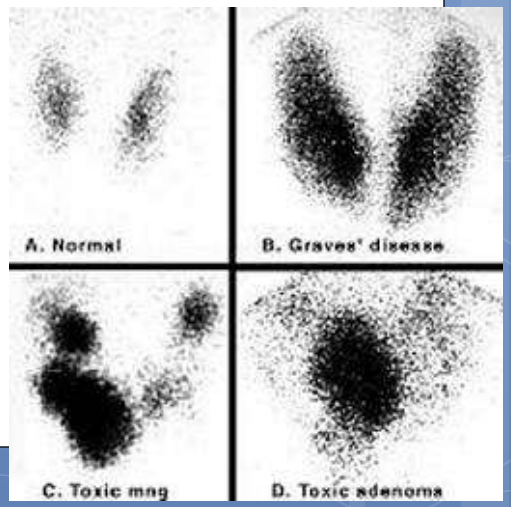
Investigations – TFTs



Hypothyroidism	Hyperthyroidism	Hypopituitarism	TSH secreting tumour
↑TSH; ↓T4,T3	↓TSH; ↑T4,T3	↓TSH; ↓T4,T3	↑TSH; ↑T4,T3

Investigations – Other tests

- Bloods
  - Thyroid auto-antibodies
  - Anti thyroid peroxidase antibodies
  - TSH receptor antibodies – Graves' disease
- USS Thyroid- can detect nodules >3mm
- FNAC
- Isotope scan
- CXR- retrosternal expansion or tracheal compression



Hypothyroidism - Management

- Conservative
  - Lifestyle - smoking cessation, weight loss
- Medical
  - **Levothyroxine (T4)**
    - Repeat TSH in 6/52
    - Adjust dose according to clinical response and normalisation of TSH
    - Caution in patients with IHD- risk of exacerbation of MI
    - Clinical improvement may not begin for 2/52
    - Symptom resolution 6/12→ if not consider +T3
- Surgical
  - Symptomatic – carpal tunnel decompression, thyroidectomy if compression of local structures

Hyperthyroidism - Management

- Conservative
  - Smoking cessation – especially with Graves's ophthalmology, associated with worse prognosis
- Medical
  - Symptomatic – β-blockers
  - Carbimazole, propylthiouracil (50% relapse)
    - Risk of agranulocytosis
  - Radio-iodine treatment –avoid contact with pregnant women and small children
    - Long term likely to become hypothyroid

Hyperthyroidism - Management

- Surgical
  - Subtotal/total thyroidectomy
  - Orbital decompression if thyroid eye disease causing compression of optic nerve

- Complications of thyroid surgery
  - Immediate
    - Haemorrhage
  - Short term
    - Infection
  - Long term
    - Damage to laryngeal nerve
    - Hypothyroidism
    - Transient hypocalcaemia
    - Hypoparathyroidism