Endocrine system. Thyroid gland pathology-1.

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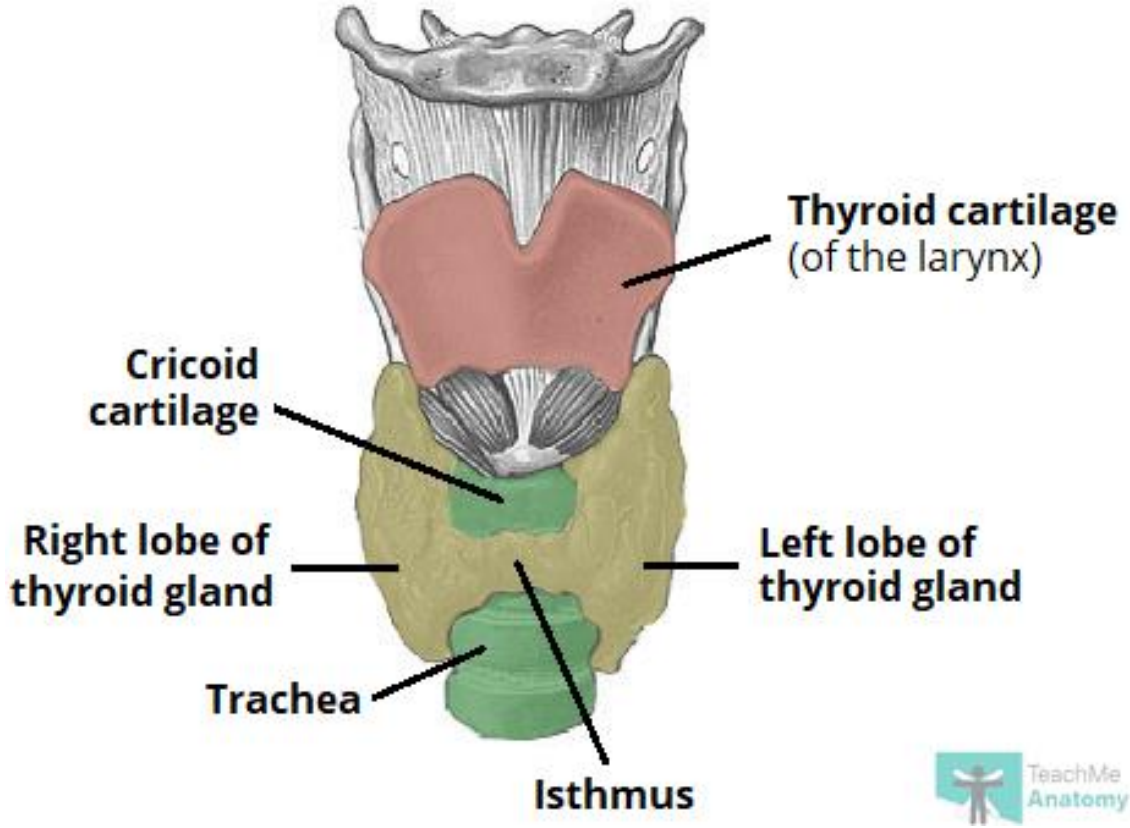
major thyroid gland, it resembles a butterfly structure.
gross anatomy: it contains 2 lobes connected by a thin fibrous band called isthmus

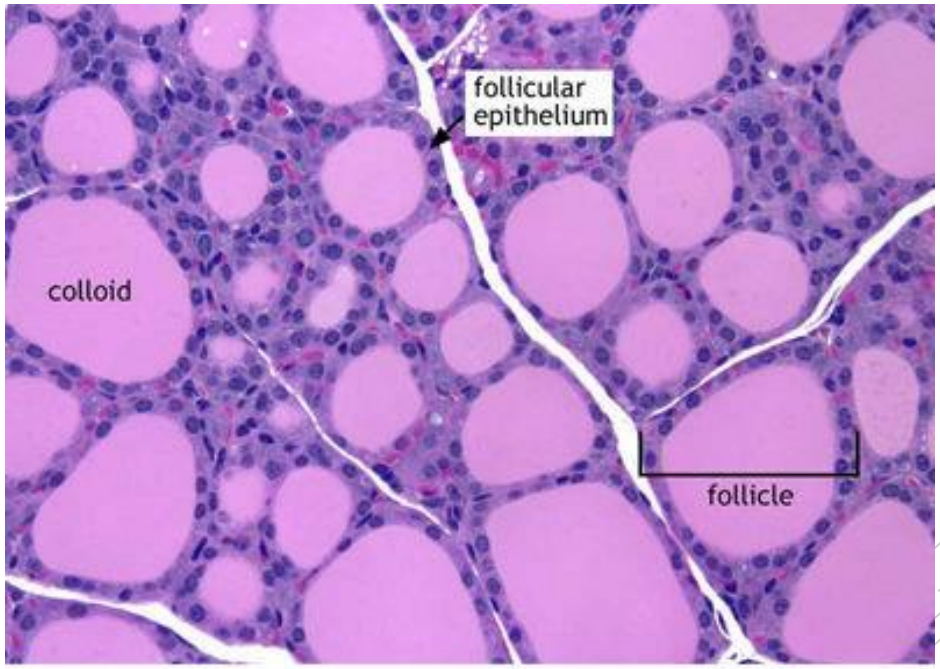
Thyroid. Anatomy.



nearly identical sized lobes, smooth surface

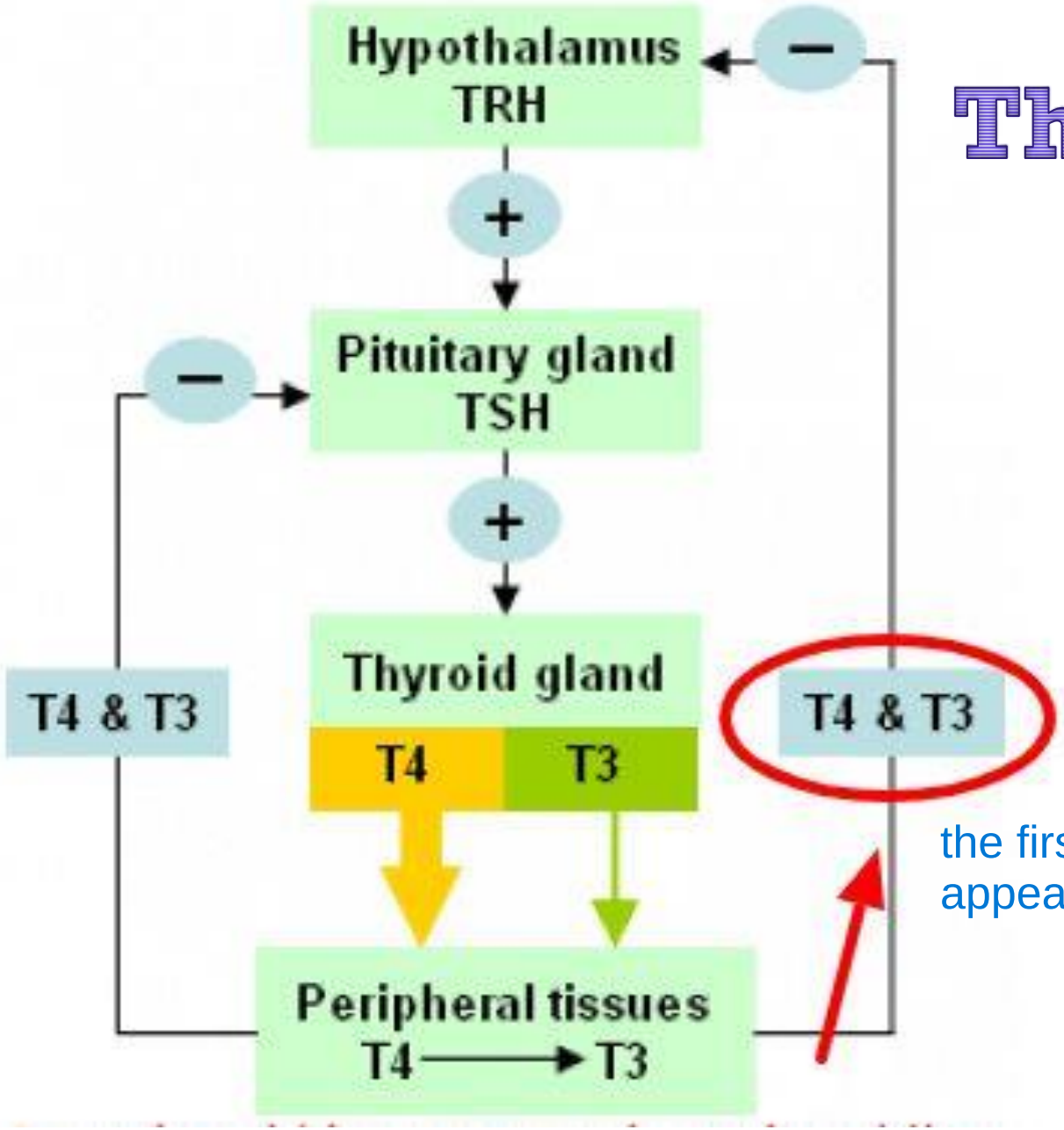
T3 & T4 function: regulating metabolic rate and in children it's associated with growth development

Gross histology



it's basic function is to release thyroid hormones (T3 & T4) from the follicular cells

parafollicular cells secrete calcitonin (homeostasis of calcium)



Thyroid function test

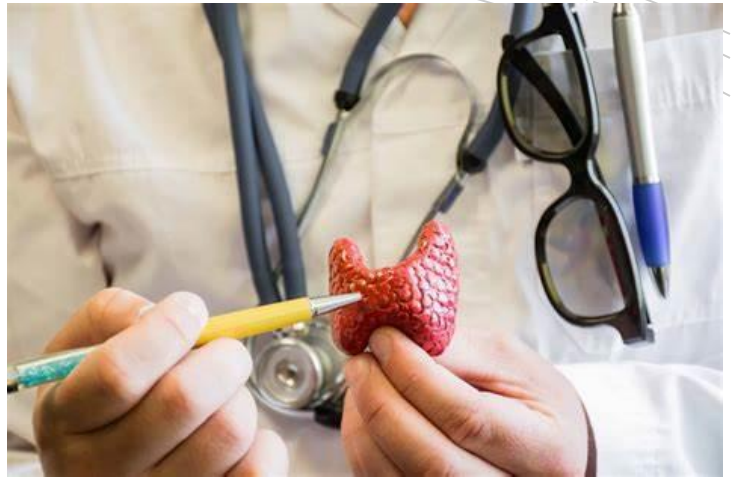
TSH

T3

T4

the first test to do if symptoms of a thyroid disease appear is the TSH test

Diseases of thyroid gland



❖ **Non-neoplastic:**

- Hyperthyroidism.
- Hypothyroidism.
- Autoimmune Thyroid Disease

✓ Hashimoto Thyroiditis .

✓ de Quervain Thyroiditis.

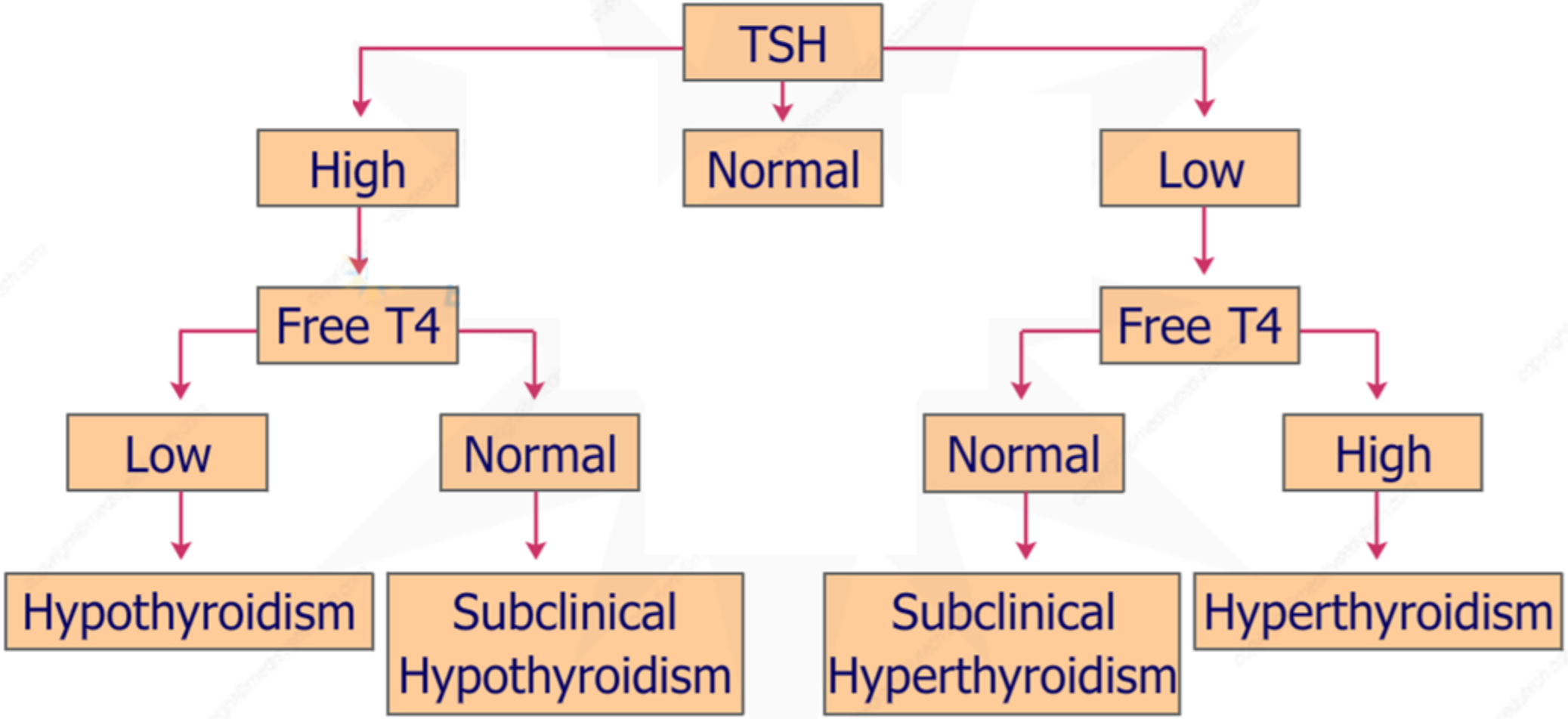
✓ Subacute Lymphocytic Thyroiditis

✓ Graves Disease.

- Diffuse and Multinodular Goiter

❖ **Neoplastic.**

My approach


TSH
High
Normal
Low
Free T4
Free T4
Low
Normal
Normal
High
Hypothyroidism
Subclinical Hypothyroidism
Subclinical Hyperthyroidism
Hyperthyroidism

is thyrotoxicosis equal to hyperthyroid? no the difference between them is that when there's thyrotoxicosis the levels of T3 AND T4 are high but there is no pathology in the thyroid gland while in the case of hyperthyroidism the main pathology is in the gland

1. THYROTOXICOSIS:

- Hypermetabolic state caused by elevated T4, T3.

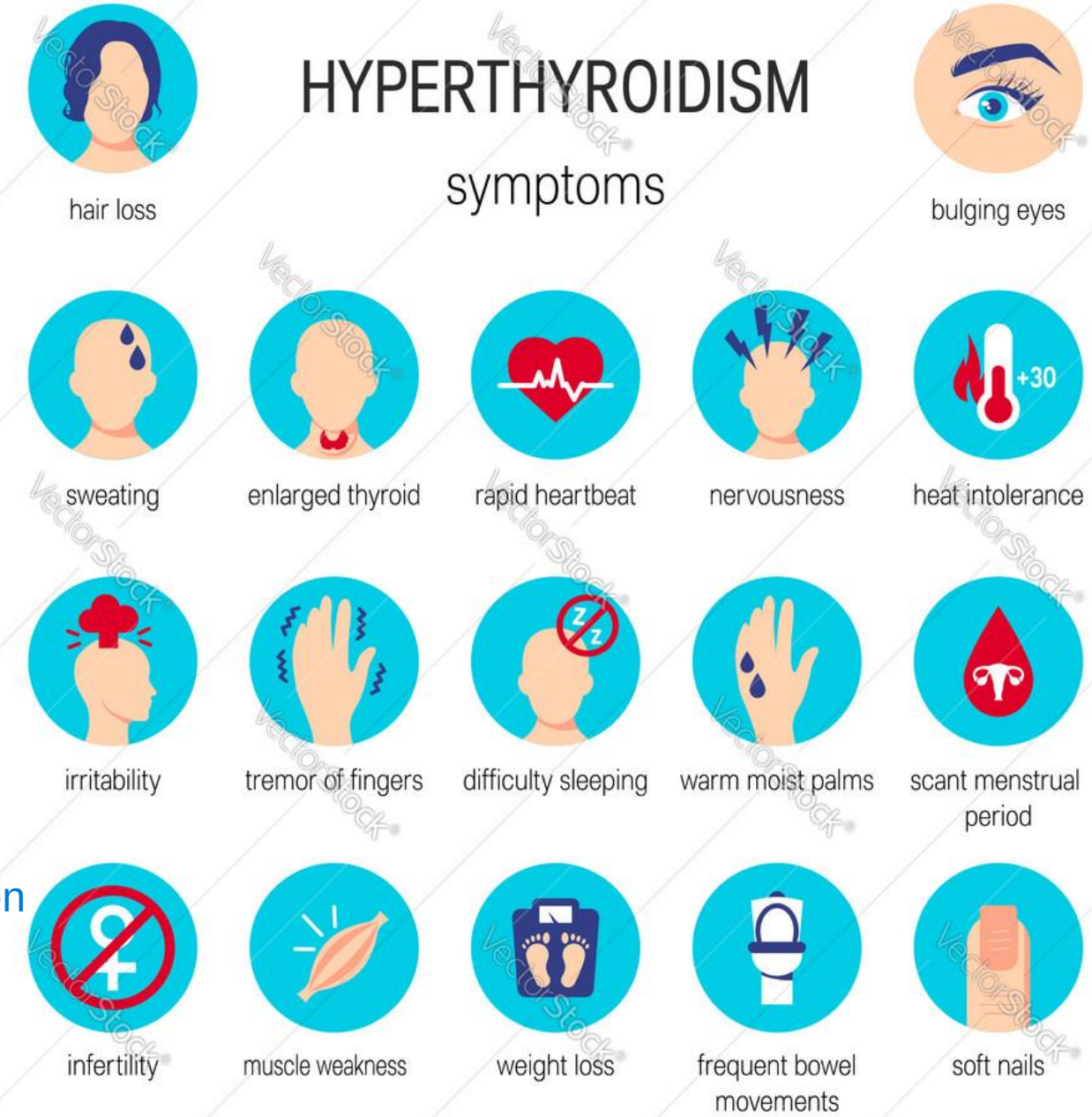
Table 20.2 Causes of Thyrotoxicosis

Associated With Hyperthyroidism
Primary
Diffuse toxic hyperplasia (Graves disease)
Hyperfunctioning ("toxic") multinodular goiter
Hyperfunctioning ("toxic") adenoma
Iodine-induced hyperthyroidism
Secondary
TSH-secreting pituitary adenoma (rare)*
Not Associated With Hyperthyroidism
Granulomatous (de Quervain) thyroiditis *(painful)*
Subacute lymphocytic thyroiditis *(painless)*
Struma ovarii (ovarian teratoma with thyroid)
Factitious thyrotoxicosis (exogenous thyroxine intake)

the most common adenoma found in the pituitary (usually affecting females)? prolactinoma

struma ovarii is a monoderma teratoma which contains thyroid only

clinical manifestations



infertility in males: effects in the quality of the semen
in females: effects in the ovulation

diarrhea usually

neck swelling (which moves while swallowing)

exophthalmos

Diagnosis????

2. HYPOTHYROIDISM

- Hypothyroidism is caused by structural or functional derangements that interfere with thyroid hormone production.

Table 20.3 Causes of Hypothyroidism

Primary
Postablative
Surgery, radioiodine therapy, or external irradiation
Autoimmune hypothyroidism
Hashimoto thyroiditis*
Iodine deficiency*
Drugs (lithium, iodides, p-aminosalicylic acid)*
Congenital biosynthetic defect (dyshormonogenetic goiter) (rare)*
Genetic defects in thyroid development (rare)
Thyroid hormone resistance syndrome (rare)
Secondary (Central)
Pituitary failure (rare)
Hypothalamic failure (rare)

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HYPOTHYROIDISM

symptoms


dry hair


loss of eyebrow hair


puffy face


enlarged thyroid


slow heartbeat


arthritis

cold intolerance


depression


dry skin

fatigue

forgetfulness


menstrual disorders


infertility


muscle aches


weight gain


constipation


brittle nails

CRETINISM

- Cretinism refers to hypothyroidism developing in infancy or early childhood.
- common in areas of the world where dietary iodine deficiency is endemic.
- Clinical features:

✓ impaired development of the skeletal system and central nervous system.

✓ severe mental retardation.

✓ short stature.

most important sign

✓ coarse facial features, a protruding tongue.

✓ umbilical hernia

the first signs to be seen on the baby

Autoimmune thyroiditis.

- **1. HASHIMOTO's THYROIDITIS :**

✓ Autoimmune disease characterized by progressive destruction of thyroid tissue

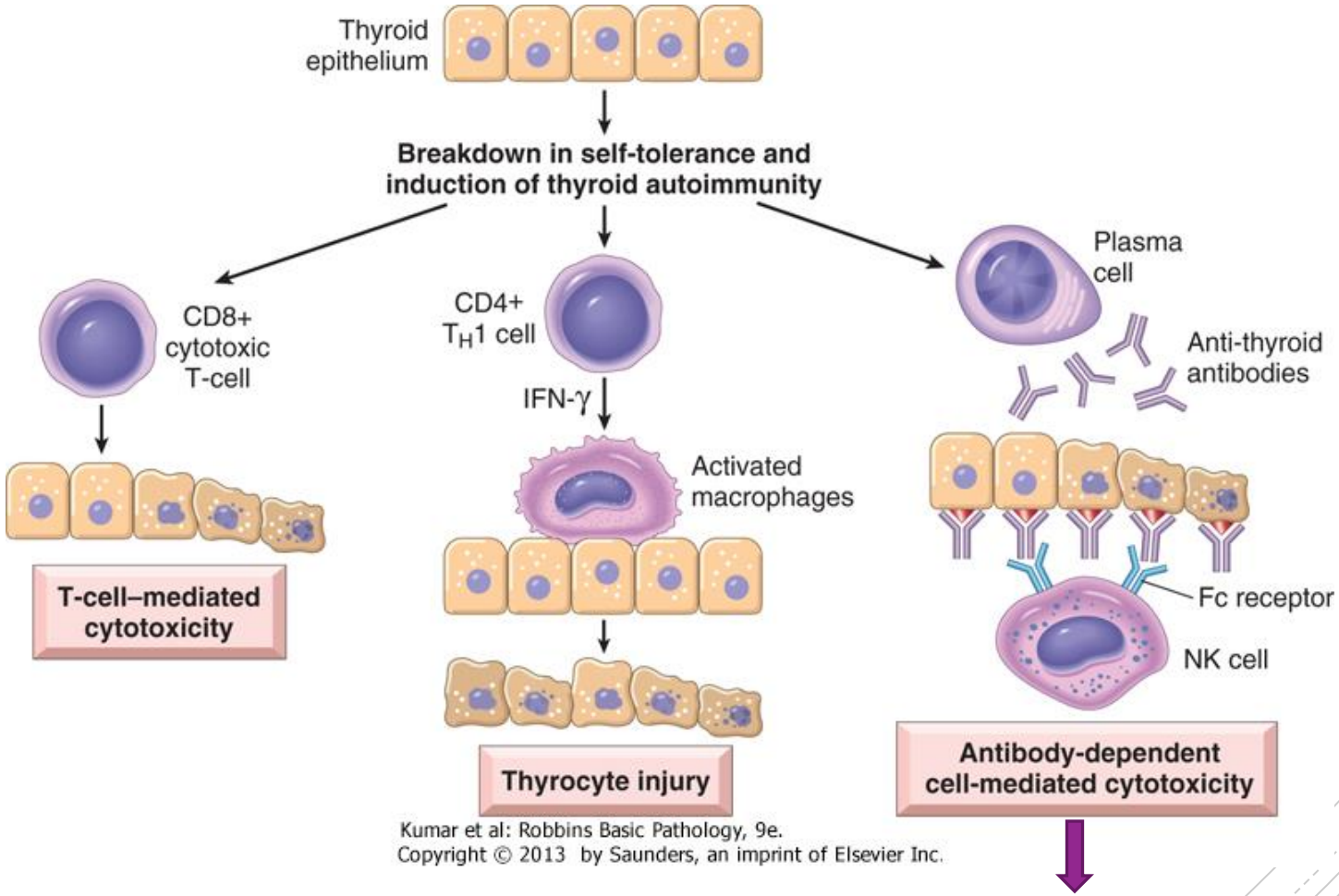
✓ Commonest type of thyroiditis

✓ Commonest cause of hypothyroidism in areas of sufficient iodine levels

✓ F:M = 10-20 :1, 45-65 yrs.

✓ Patient presented with Painless symmetrical diffuse goiter

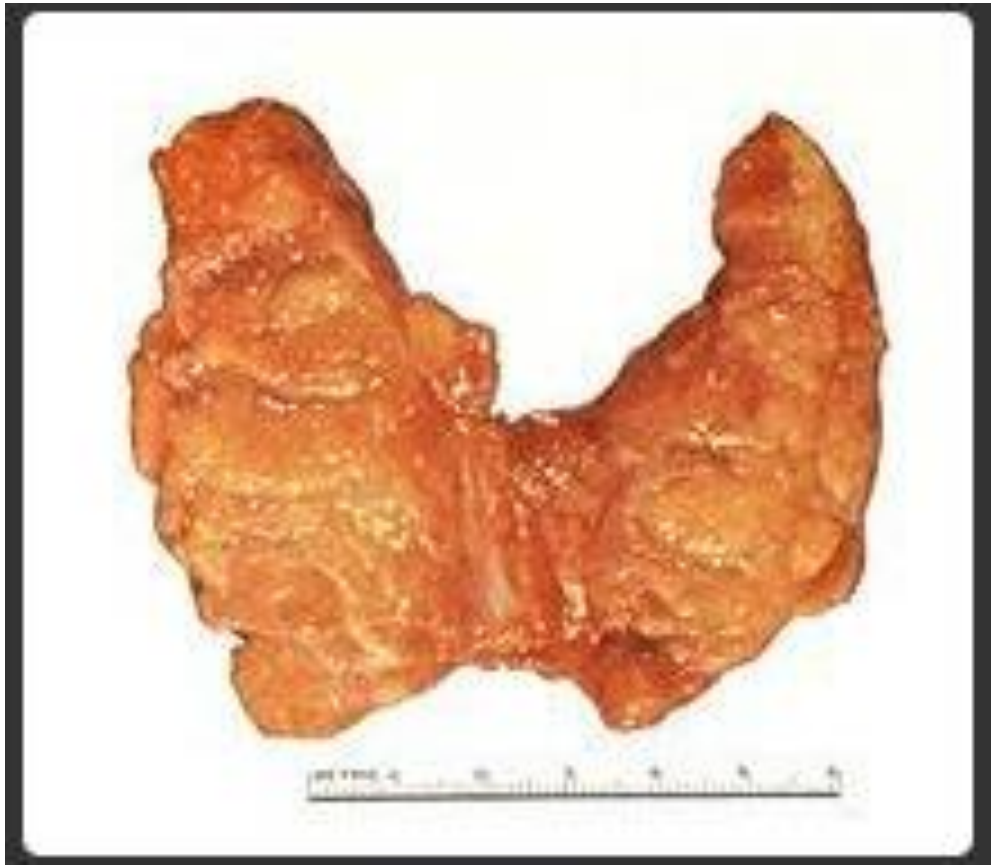
Hashimoto… Pathogenesis



- Anti thyroglobulin
- antithyroid peroxidase

Morphology

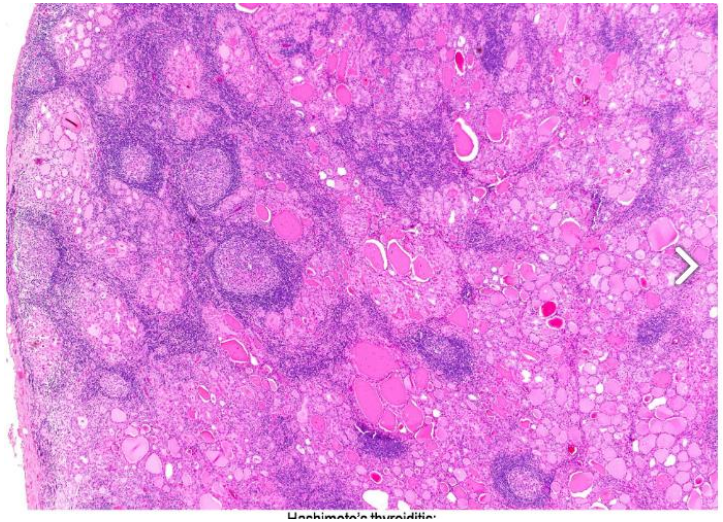
Gland is a smooth pale goiter, minimally nodular, well demarcated.

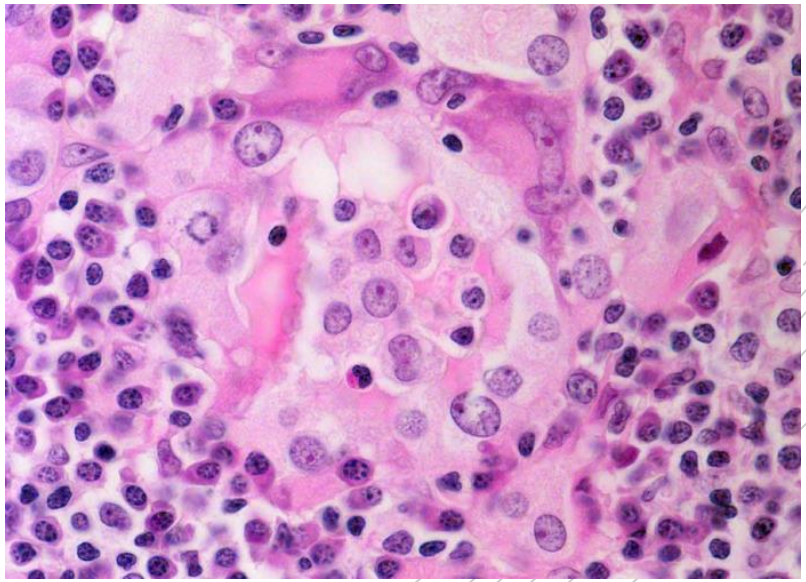


Microscopic

- Dense infiltration by lymphocytes & plasma cells
- Formation of lymphoid follicles, with germinal centers
- Presence of HURTHLE CELLS

nucleus enlarged cells, the cytoplasm is pale (acidophilic)





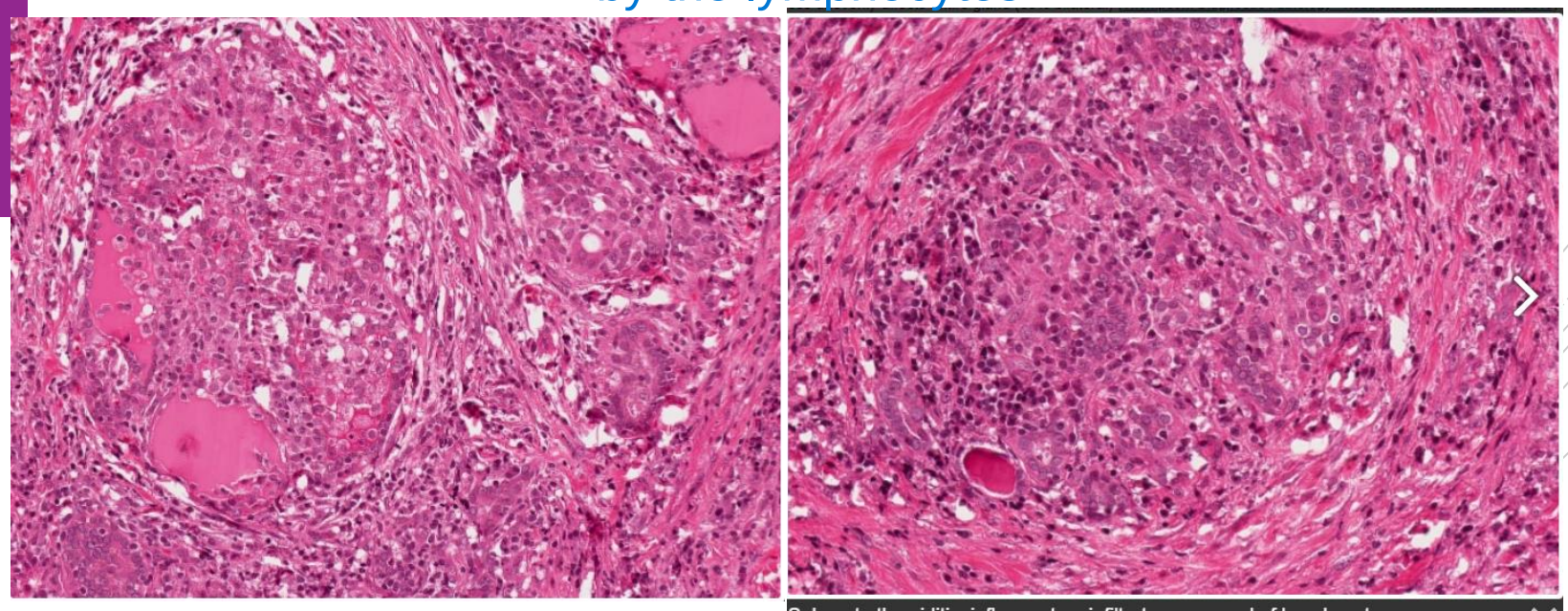
2. De Quervain Thyroiditis

- Also called subacute granulomatous thyroiditis .
- Middle aged , more in females. Viral etiology ?
- Self-limited (6-8w) cause of thyrotoxicosis
- Acute onset of pain in the neck , fever,
  ↑ ESR, ↑ WBC their levels are high when there is inflammation
- Transient thyrotoxicosis.

Morphology

- Destruction of follicles leads to mixed inflammatory infiltrate.
- Neutrophils , Macrophages & Giant cells & formation of granulomas.

macrophages are in the center surrounded by the lymphocytes

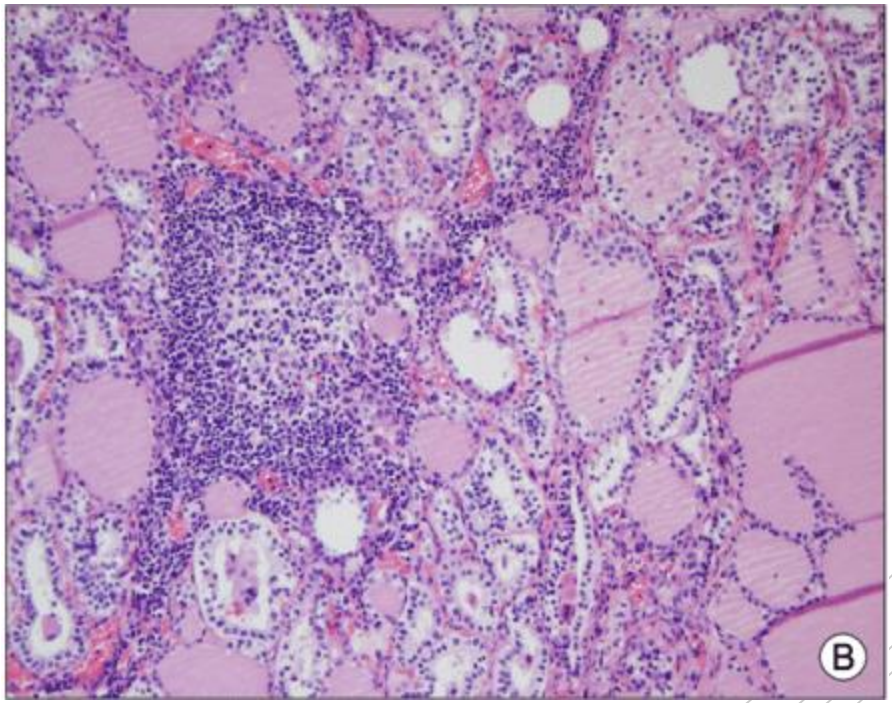


3. subacute lymphocytic thyroiditis : (silent)

- Middle aged females & post partum patients
- Probably autoimmune with circulating AB.
- May recur in subsequent pregnancies
- May progress to hypothyroidism

Morphology

•Preserved lobular pattern with follicular destruction.
•variable lymphocytic infiltrate.
•rare / no oncocytic change.
• no / focal fibrosis



if the mass doesn't move while swallowing it's considered to be a bad sign since it's probably a neoplastic process that came out of the capsule and made adhesions with other structures

4. Reidel's Thyroiditis

this disease is non neoplastic and it's fixed to the gland and not symmetrical

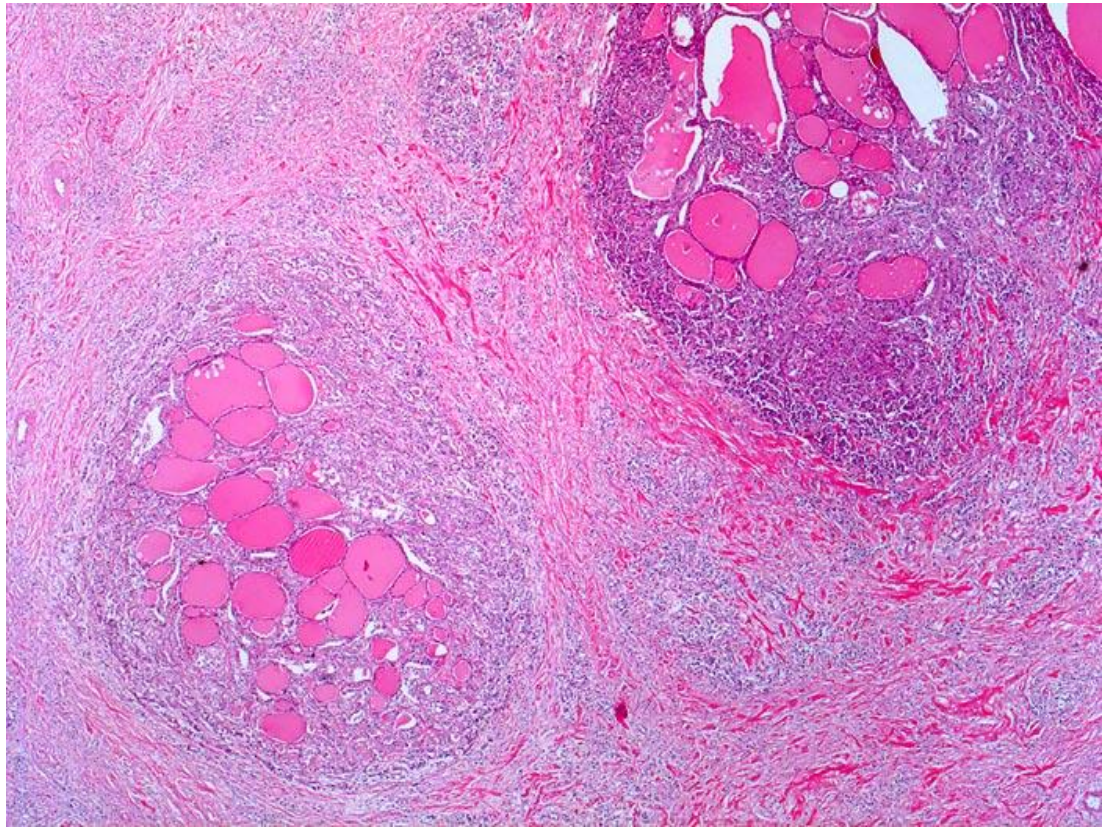
- Densely fibrotic inflammatory process involving thyroid gland and adjacent neck tissue.
- 65% have antithyroid antibodies
- Clinically resembles carcinoma.

since it has a feature similar to the features of carcinoma which is " fixation"

**Morphology

there isn't a lot of thyroid follicles due to their destruction by fibrosis

Follicles are obliterated or compressed by extensive dense fibrous tissue



hashimoto disease antibodies: Anti thyroglobulin
antithyroid peroxidase

grave's disease: TSH receptor/ thyrotropin

5. GRAVE'S DISEASE.

- Autoimmune disease characterized by hyperthyroidism due to circulating autoantibodies against thyrotropin (TSH receptor) that activates the receptor, leading to increased thyroid hormone synthesis and secretion and growth of the thyroid gland

- Commonest cause of endogenous hyperthyroidism
- Age 20- 40 y.
- M: F ratio is 1: 7
- More common in western races

more common in young female

Associated with…

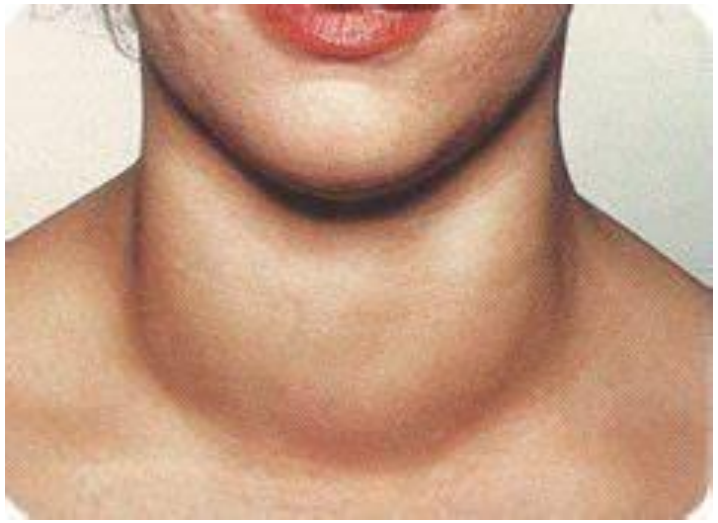
phenotypes of grave's disease:

- diffuse goiter.
- infiltrative ophthalmopathy .
- infiltrative dermopathy, including:

❑ pretibial myxedema .

❑ thyroid acropachy (extremity swelling, clubbing of fingers and toes due to periosteal new bone formation)

goiter; there is swelling in the neck



exophthalmos

pretibial myxedema

clubbing of the fingers

Diagnosis

TSH test first then T4

- clinically by symptoms.
- presence of laboratory markers of hyperthyroidism.

(Increased T3 / T4, increased uptake of radioactive iodine, decreased TSH).

- presence of serum anti thyrotropin antibodies.

(thyroglobulin, thyroid peroxidase, sodium iodide symporter and thyrotropin / TSH receptor).

Pathogenesis

- Exact cause is unclear.
- It is believed to involve a combination:

❖ Genetic (Caused by B and T cell mediated immune responses leading to production of autoantibodies to thyrotropin / TSH receptor).

❖ environmental factors (Onset of disease may be triggered by stress, infection or giving birth).

this doesn't mean that all of these disease are always found with grave's disease but usually some of them are seen with grave's

- May exist with other similar diseases e.g. SLE, Pernicious anemia, Diabetes type I, Addison's disease.

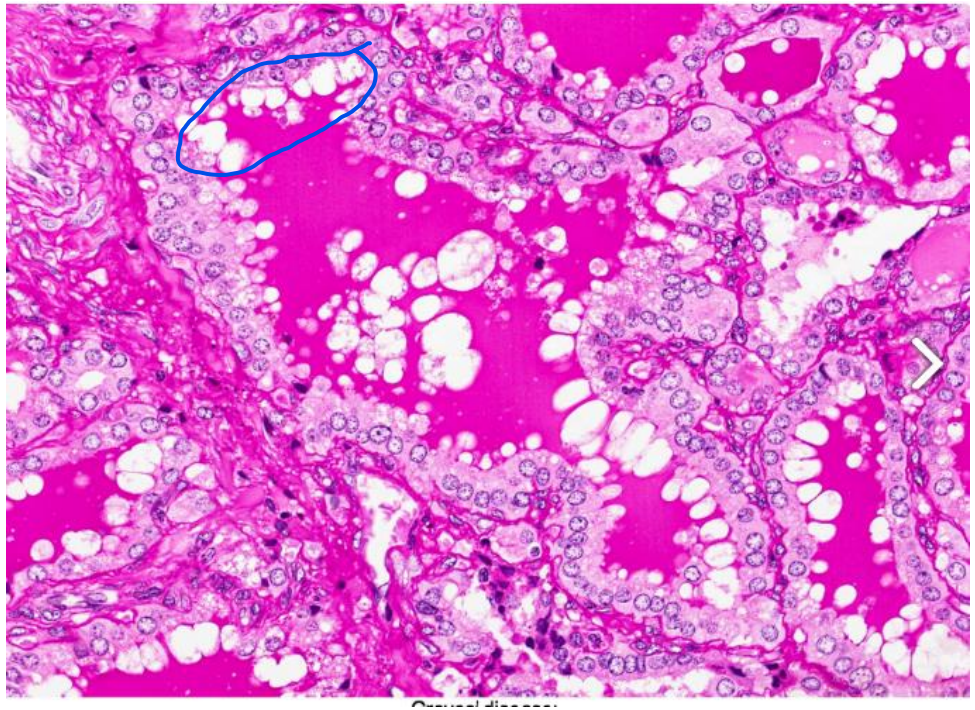
Morphology.

- Diffuse and symmetrically enlarged thyroid gland with beefy red cut surface.

Histology

•Hyperplastic thyroid follicles with papillary infolding. due to extensive proliferation

•Colloid is typically decreased, when present shows peripheral scalloping as if it's eating the colloid,



DIFFUSE & MULTINODULAR GOITRE

- Goiter is clinical term meaning enlarged thyroid, which can be either diffuse or nodular (e.g. multinodular or solitary / dominant nodule).
- Multinodular goiter: irregular enlargement of thyroid gland due to repeated episodes of hyperplasia and involution (degeneration) .
- Iodine deficiency is most common cause worldwide.

most patients that have goiter usually live at the top of the mountains not near the sea, due to the lack of iodine sources

DIFFUSE & MULTINODULAR GOITRE

- 90% of those affected are women (F > > > M)
- Variable age; develops more frequently during adolescence and pregnancy.
- Increase in TSH secretion is the main cause in iodine deficiency related goiter.

❖ Endemic : 10% of population have goiter

❖ Sporadic : 1- Physiological demand

2- Dietary intake of excessive calcium & cabbages.

3- Hereditary enzyme defects

Clinical features

- neck mass
- Majority asymptomatic and euthyroid. the thyroid test results are normal
- Pressure symptoms due to compression of trachea and esophagus the patient can't swallow due to the compression

Diagnosis

- Clinical examination
- Thyroid function tests: TSH, T3, T4

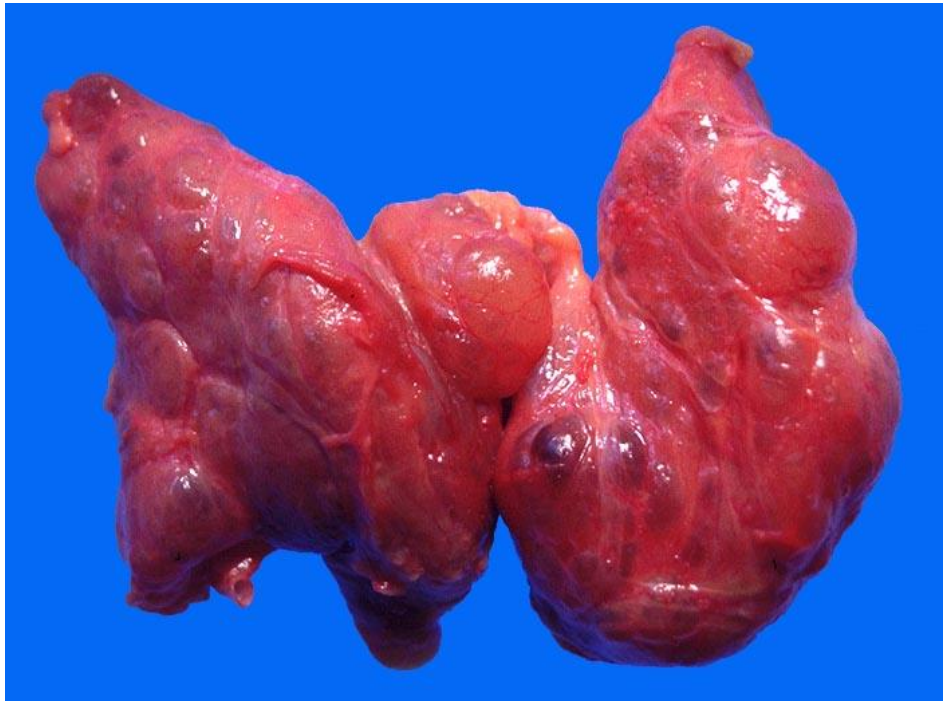
(Usually normal T3 / T4, TSH, normal radioactive iodine uptake)

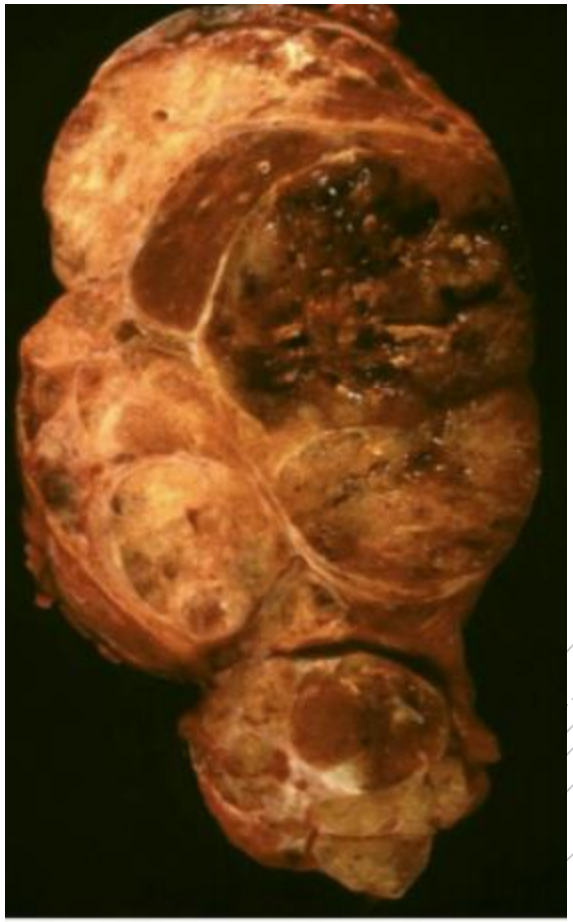
- Thyroid ultrasound
- CT or MRI to evaluate extent of goiter

Morphology

* Multinodular goiters are asymmetric, large

  Nodular, bumpy outer surface and variegated cut surface





Histology

- Variable sized dilated follicles with flattened to hyperplastic epithelium.
- Nodules may be present.