



Pathology

Non-neoplastic thyroid diseases

Learning Outcomes

By the end of the lecture, you will be able to:

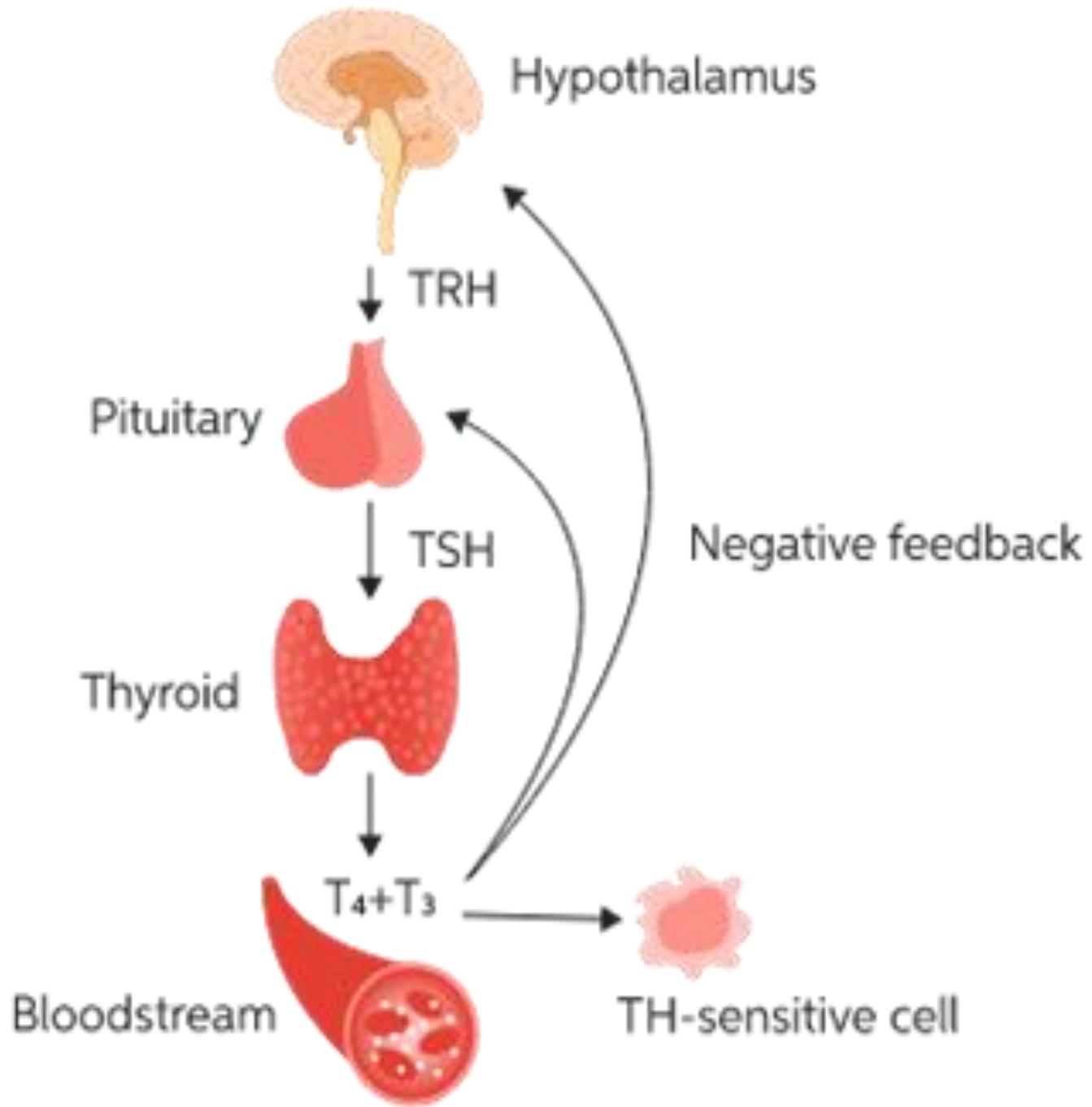
- Identify causes of hypo and hyperthyroidism.
- Pathological features of Graves disease.
- Identify types of thyroiditis and pathological features of each type.
- Pathogenesis and pathological features of multinodular goiter.

Agenda

Thyroiditis

Graves Disease

Simple Multinodular Goiter



Hyperthyroidism

Primary

- Graves disease
- Toxic multinodular goiter
- Toxic follicular thyroid adenoma

Secondary

TSH-secreting pituitary adenoma

Hypothyroidism

Primary

- Iodine deficiency
- Hashimoto thyroiditis
- Postablative
- Genetic defects in thyroid development
- Thyroid hormone resistance

Secondary

Pituitary failure.

Thyroiditis

Types:

- Acute / infectious thyroiditis
- Autoimmune thyroiditis (Hashimoto thyroiditis).
- Riedel thyroiditis
- Subacute granulomatous thyroiditis

Acute Infectious Thyroiditis

Risk factors:

- Malnourished infant, debilitated elderly, immunosuppression, trauma

Etiology:

- Often *Streptococcus haemolyticus*, *Streptococcus pneumoniae*, *Staphylococcus aureus*
- Via blood or direct seeding from upper respiratory infections, causes sudden onset of pain and glandular enlargement

Acute Infectious Thyroiditis

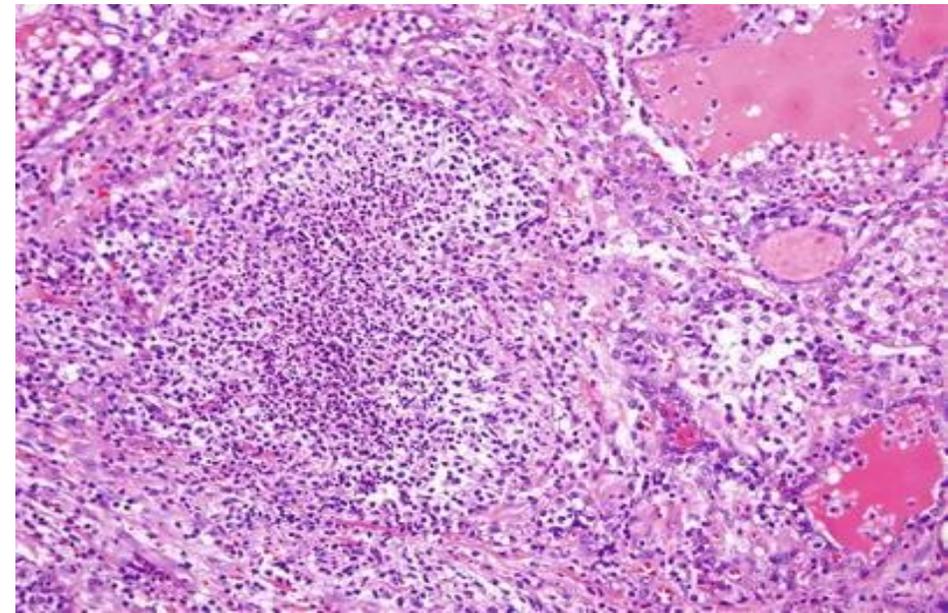
Gross description

- Normal or slightly enlarged thyroid gland
- May have suppurative areas



Microscopic description

- Neutrophils, possibly microabscesses and tissue necrosis
- Fungi are associated with necrosis, acute inflammation and granulomas



Hashimoto Thyroiditis

- The most common cause of Hypothyroidism after iodine deficiency.
- More common in females

Pathogenesis

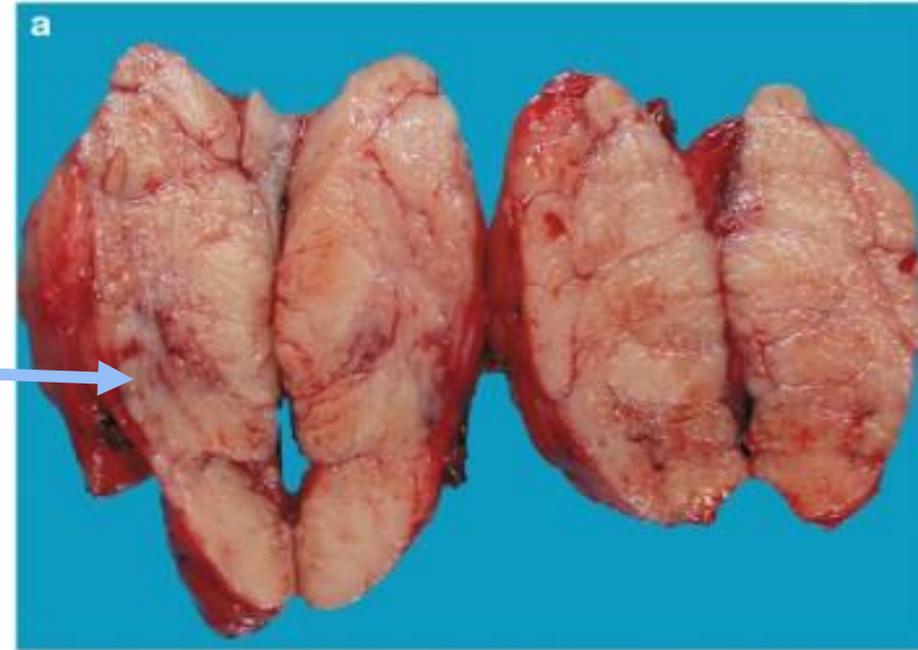
- Auto-immune thyroiditis
- Activation of helper (CD4+) T lymphocytes sensitized to thyroid antigens
- These helper T lymphocytes stimulate proliferation of cytotoxic (CD8+) T lymphocytes, which attack thyroid follicular cells.

Activated helper T lymphocytes also recruit reactive B lymphocytes to produce antibodies against thyroid antigens as anti-thyroglobulin and anti-thyroid peroxidase

Hashimoto Thyroiditis

Gross

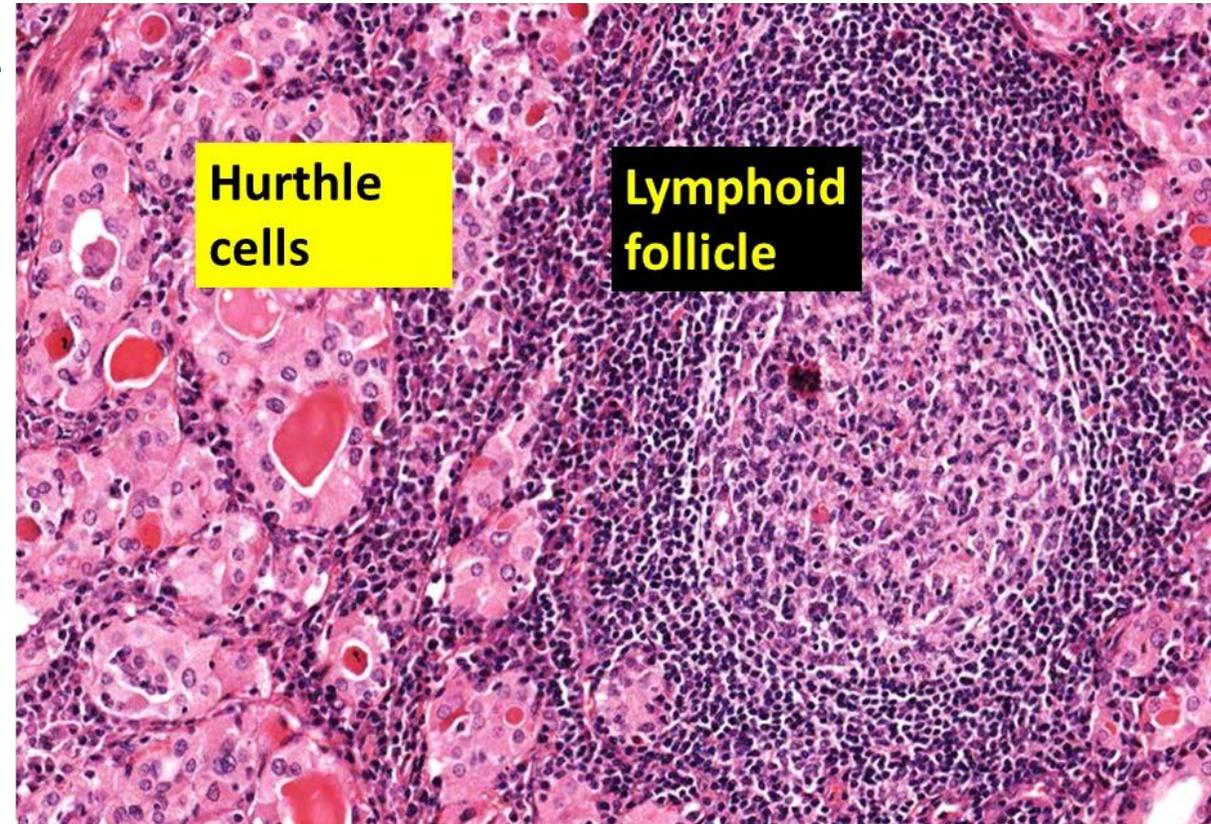
- 1- **Early**... There is symmetrical diffuse enlargement of the thyroid gland with vague nodularity
- The affected areas are pale (gray or yellow) and firm
- They lack the glistening appearance of colloid
- 2- **Late**... The gland becomes symmetrically atrophic



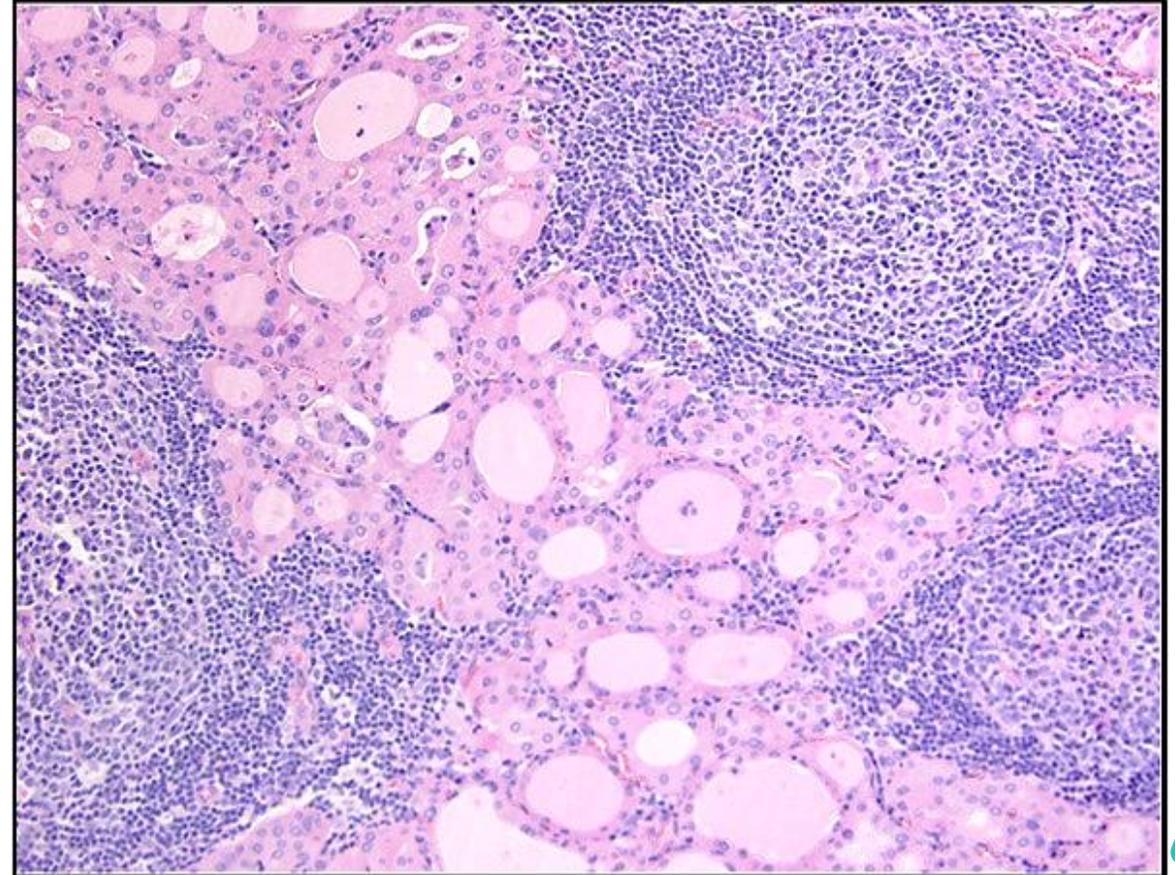
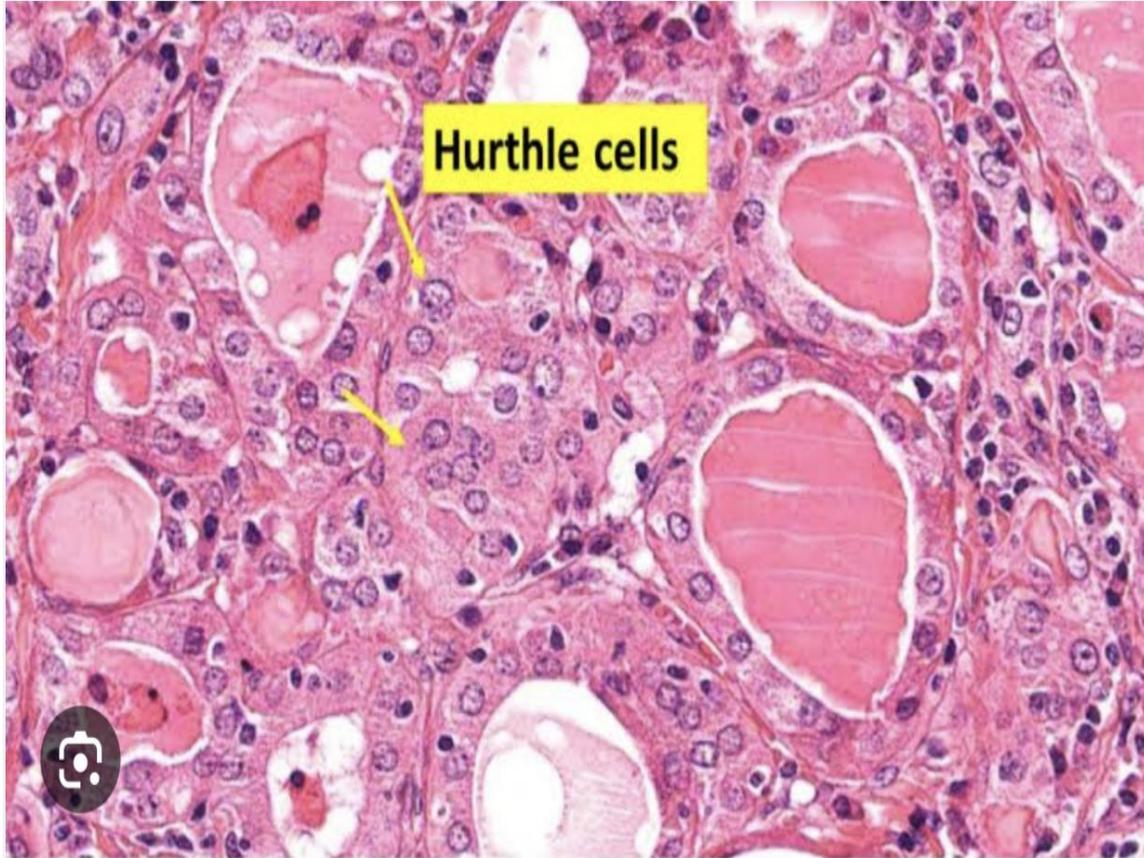
Hashimoto Thyroiditis

Microscope:

- Follicles are atrophied. Follicles are lined by large cubical cells with eosinophilic granular cytoplasm (**Hurthle cells**).
- -Inflammatory cells (lymphocytes, plasma cells, macrophages).
- -Reactive lymphoid follicles.



Hashimoto Thyroiditis



Riedel Thyroiditis

- -Rare of chronic disease of unknown cause.
- Riedel thyroiditis may be part of multifocal idiopathic fibrosclerosis.

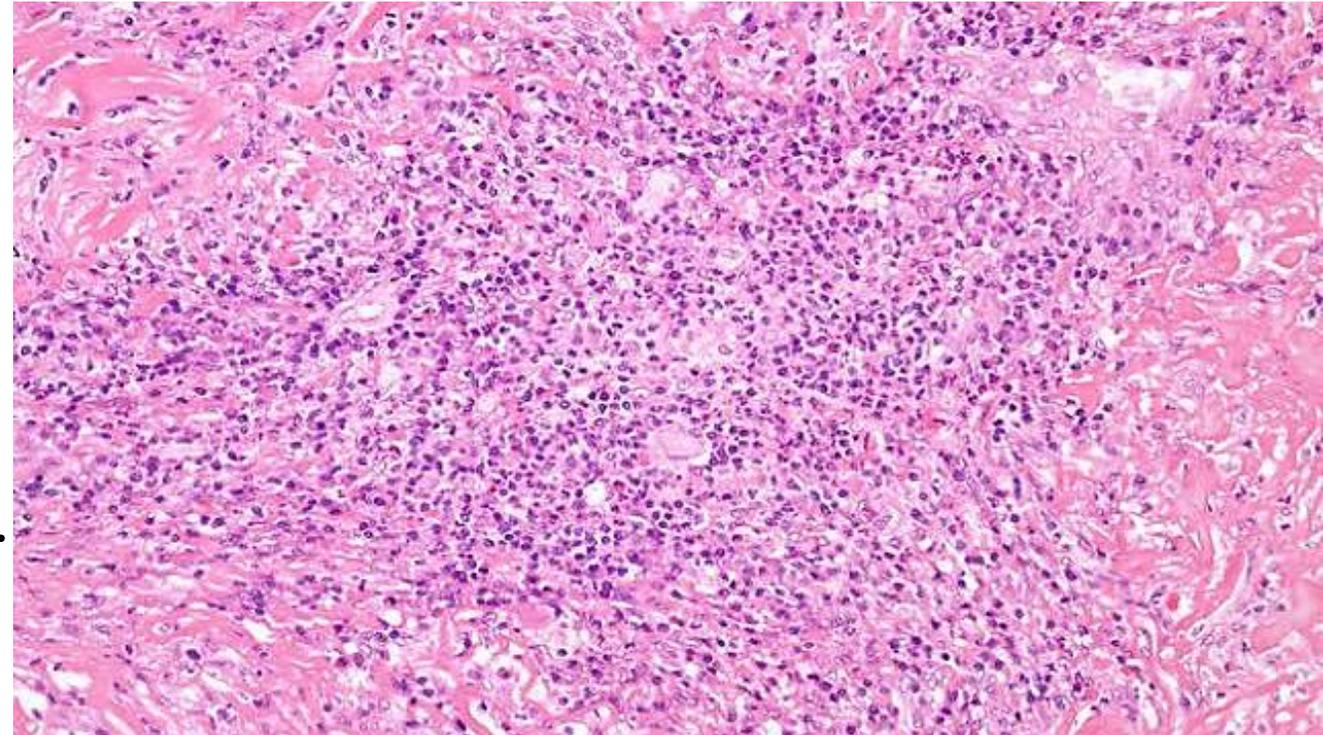
Gross:

- The gland is **stony hard** and greyish white
- Adherent to the surrounding structures



Riedel Thyroiditis

- **Microscopic:**
 - Follicles are atrophied
 - Excess fibrous tissue may extend outside the gland
 - Lymphocytic infiltrate
- **Complications:**
 - Compression manifestations: dysphagia, dyspnea, recurrent laryngeal nerve paralysis.

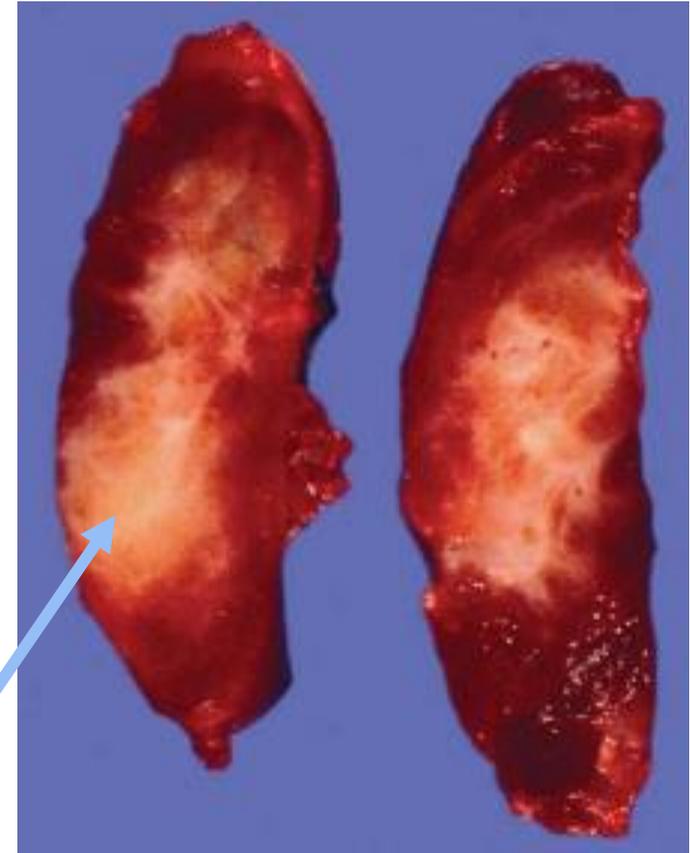


Subacute Granulomatous Thyroiditis

- A self-limited disorder in which patients present with a **tender** thyroid.
- Etiology is not known but clinical features of preceding respiratory infection suggest a possible viral etiology.

Gross:

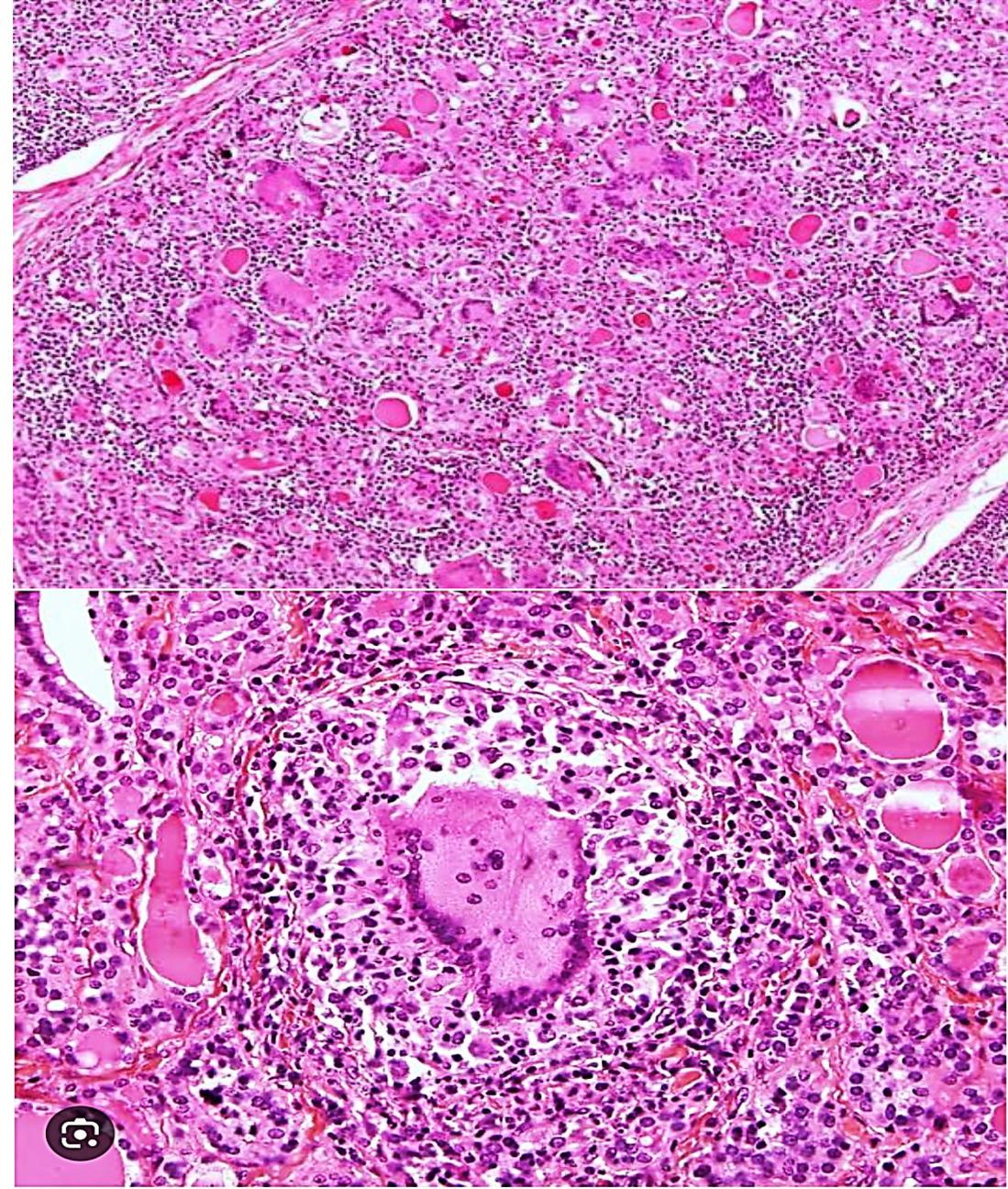
- Moderate enlargement of the gland which is often focal and asymmetrical.
- The cut surface of the involved area is firm and greyish white.



Subacute Granulomatous Thyroiditis

Microscope:

- Early, Acute inflammatory destruction of the thyroid follicles.
- Late, Granulomas consist of central colloid material surrounded by histiocytes and scattered multinucleated giant cells.
- Advanced cases, Fibrosis.



Graves Disease

- **Autoimmune** disease, more common in females.
- Due to auto-antibodies. Most common is **TSI** (thyroid stimulating immunoglobulin).
- Stimulate **TSH receptors** leading to diffuse hyperplasia and hyperfunctioning thyroid follicles with excess thyroid hormone secretion



Graves Disease

Gross

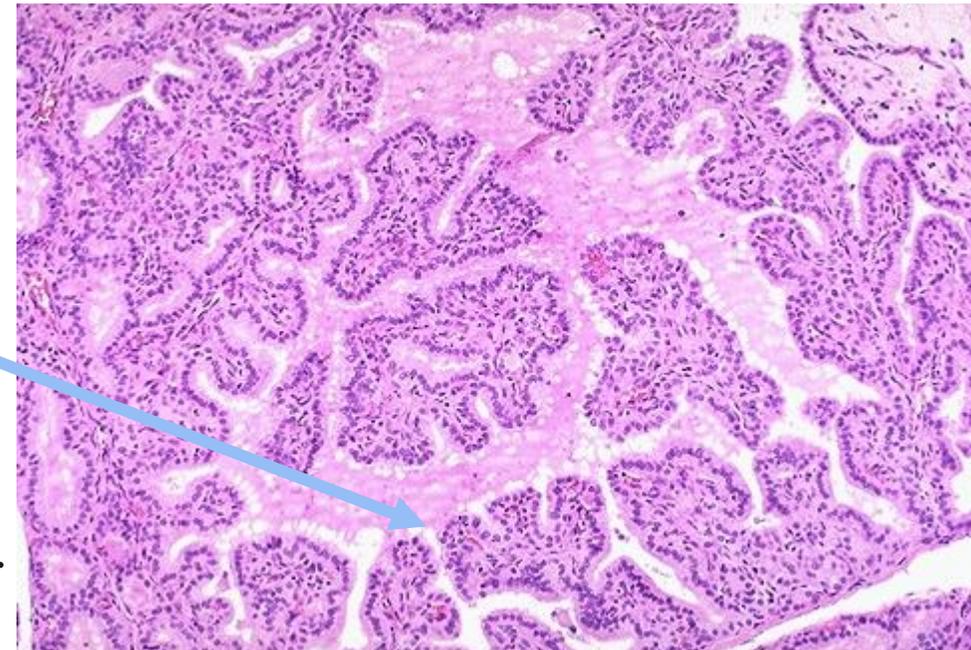
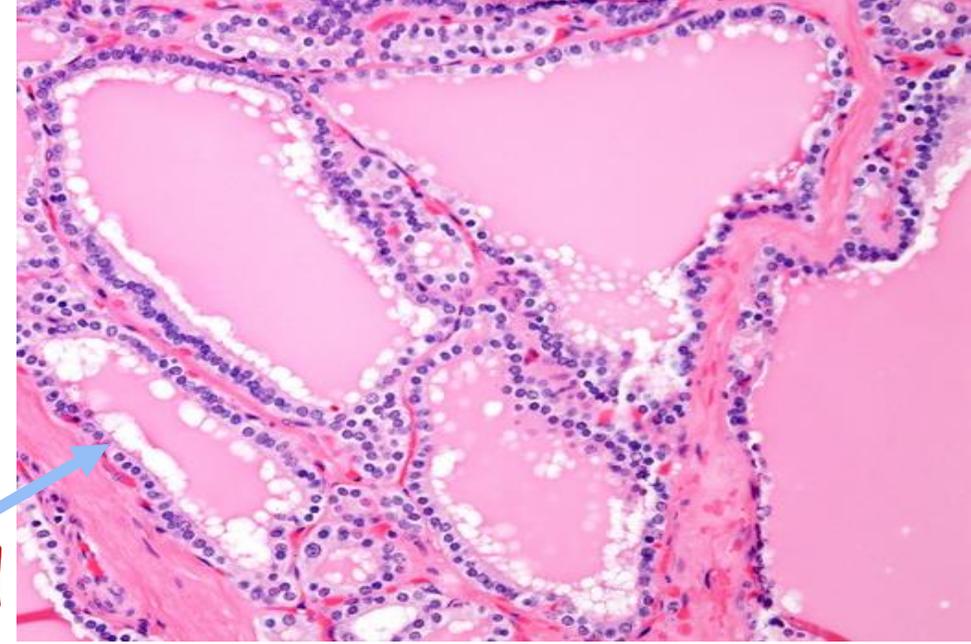
- The thyroid gland is symmetrically enlarged.
- The gland appears **fleshy**.
- Cut surface is firm and dark red.
- Loss of the normal translucence of stored colloid.



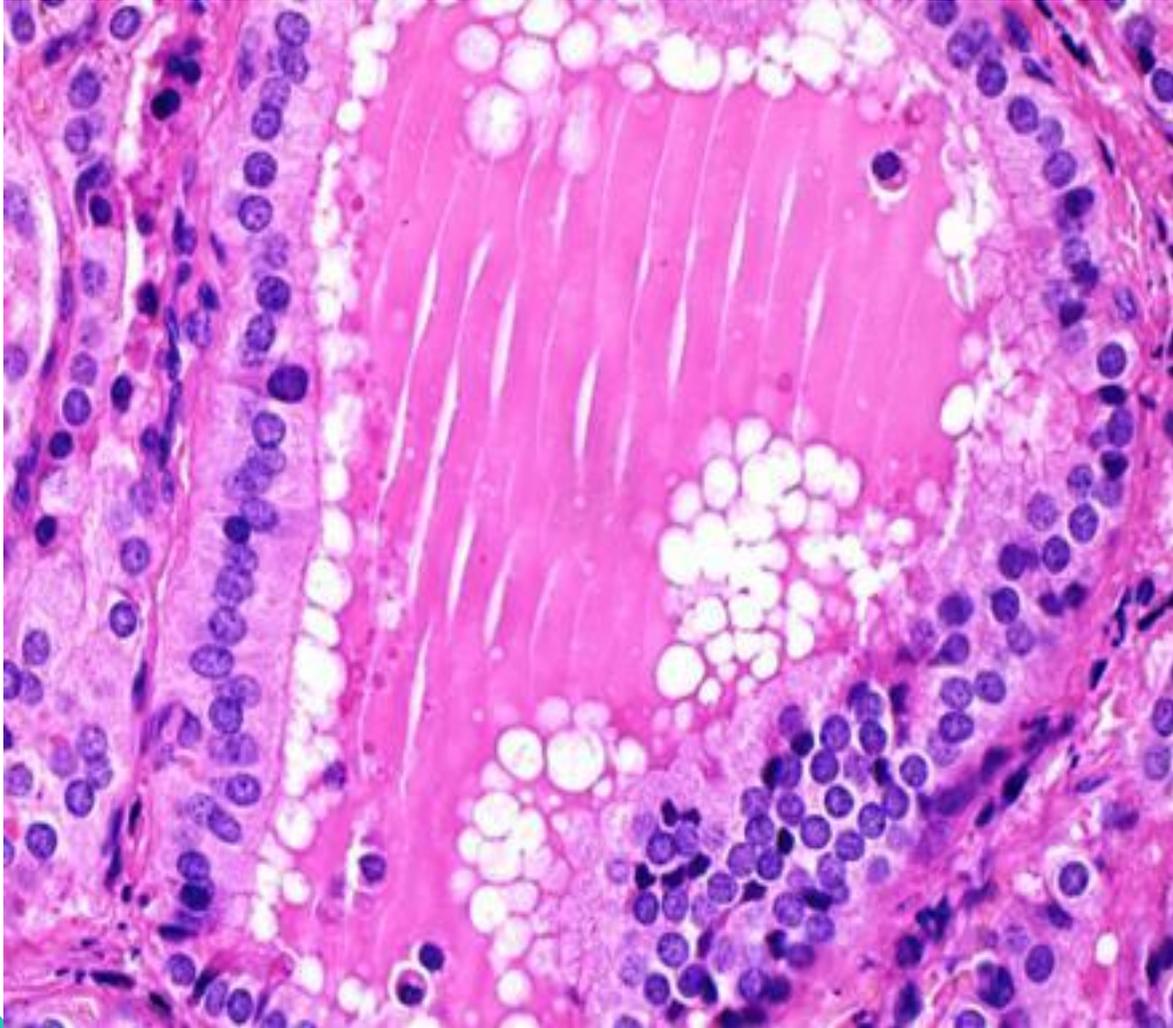
Graves Disease

Microscopic

- the gland is diffusely **Hyperplastic** and highly vascular.
- The follicles are lined by tall columnar cells.
- The colloid is depleted and **scalloped** (moth-eaten) at the periphery.
- Hyperplastic **papillae** that project into the lumen
- of the follicles.
- Lymphocytes and plasma cells **infiltrate** the interstitial tissue and may form reactive lymphoid follicles.



Graves Disease



Goiter

- **Goiter:** Non inflammatory, non neoplastic enlargement of the thyroid gland
- **Goitrogen:** agents that suppress thyroid hormone synthesis, and so elevating TSH levels and leads to hyperplastic changes of thyroid (goitrous enlargement) as cabbage and cauliflower.
- **Classification**
 - Simple (non toxic)
 - Diffuse
 - Multinodular
 - Toxic (associated hyperthyroidism)

Diffuse Simple (Nontoxic) Goiter

- Diffusely involves the thyroid gland without producing nodularity.
- Common in females.

Causes

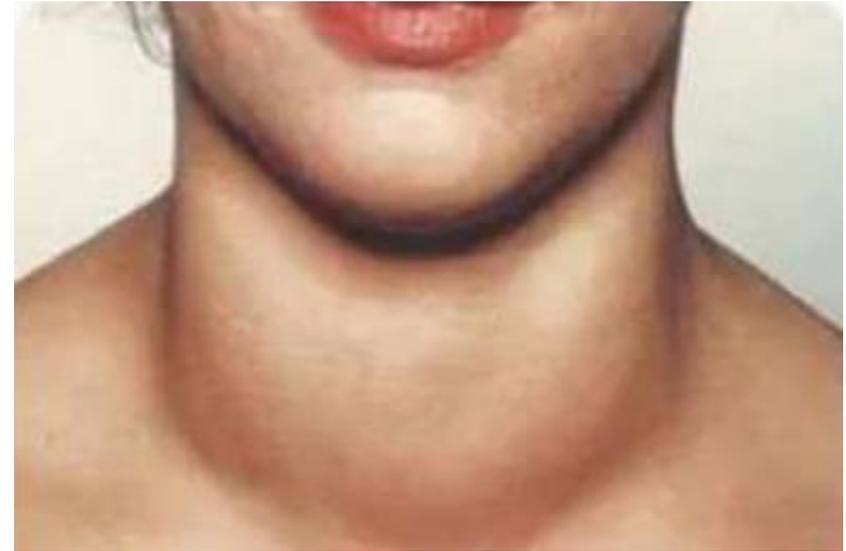
- Physiologic Goiter: Usually seen at times of increased physiological demands as puberty, pregnancy.
- The disease occurs in two forms:
 - Endemic form occurs in geographic areas where the soil, water, and food supply contain low levels of iodine
 - Sporadic form.

Diffuse Simple (Nontoxic) Goiter

- Diffusely involves the thyroid gland the gland has two phases:

1-Hyperplastic stage: there is diffuse and symmetric enlargement of the thyroid gland. There is hypertrophy and hyperplasia of the follicular epithelium with scant colloid.

2-Colloid involution stage: if iodine correction and decreased demand to thyroid hormones occur after a short period of hyperplasia, there is colloid accumulation and atrophy (involution) of follicular epithelium. Most patients are clinically euthyroid.



Simple Multinodular (Nontoxic) Goiter

- Repeated cycles of stimulation and involution of a diffuse goiter lead to rupture of some follicles followed by fibrosis, hemorrhage, scarring, and sometimes calcification.
- This produces an irregular enlargement of the thyroid gland (variable nodularity and scarring).



Simple Multinodular (Nontoxic) Goiter

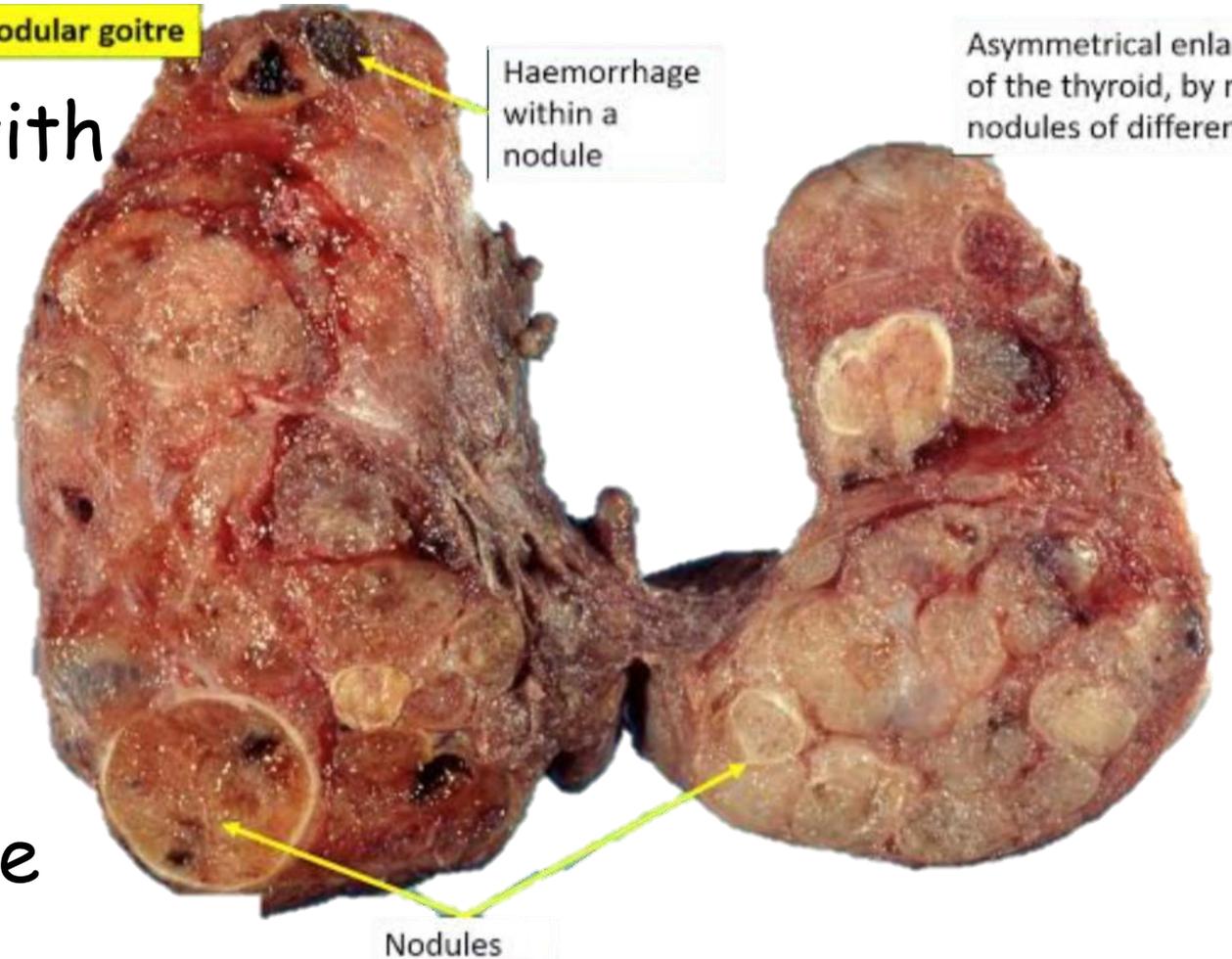
Gross

- The thyroid gland is asymmetrically enlarged with nodular surface.
- The cut surface shows numerous irregular nodules contain glistening colloid.
- Fibrosis, calcification, hemorrhage & cystic degeneration may be present.

- Multinodular goitre

Haemorrhage
within a
nodule

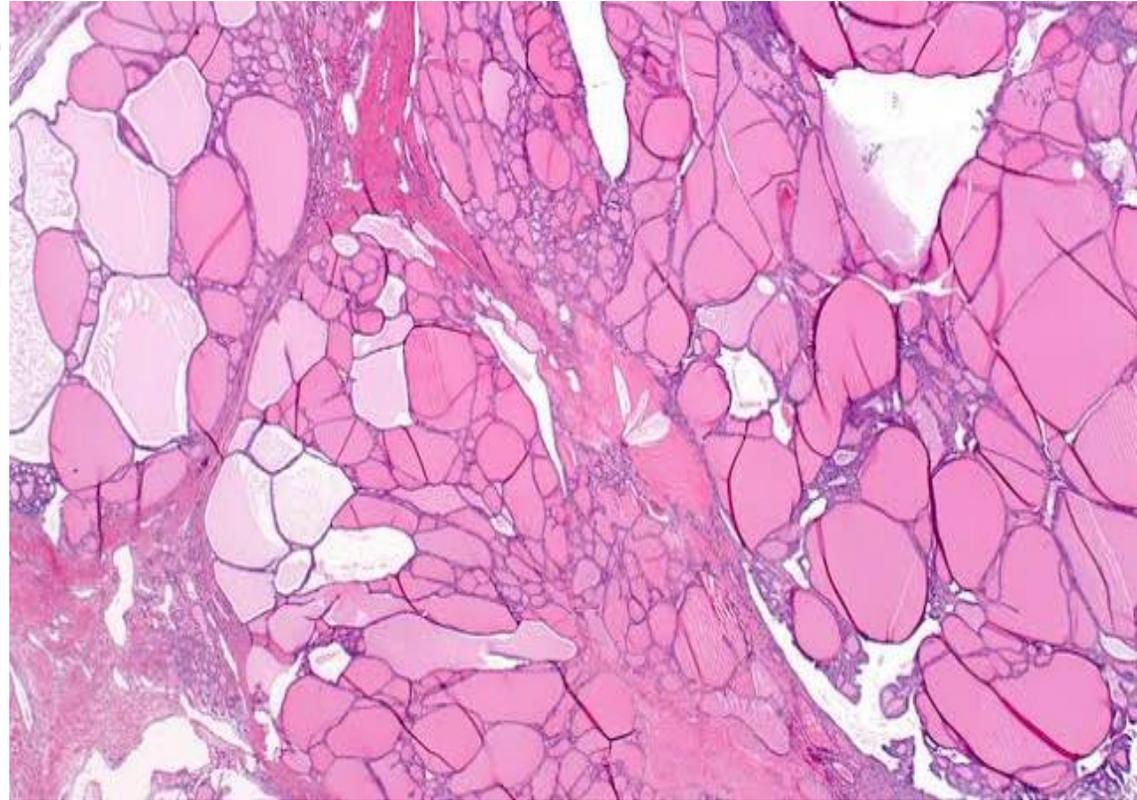
Asymmetrical enlargement
of the thyroid, by multiple
nodules of different sizes



Simple (Nontoxic) Goiter

Microscopic

- Nodular thyroid gland separated by fibrous tissue.
- Hyperplastic nodules, tall columnar follicular epithelium, papillary structures, formation of small new follicles.
- Involuted nodules, large follicles distended by colloid and lined by flat follicular epithelium. Large colloid-containing follicles may fuse to form colloid cysts.
- Calcification, chronic inflammation, hemorrhage & cystic degeneration are common in the old standing cases.

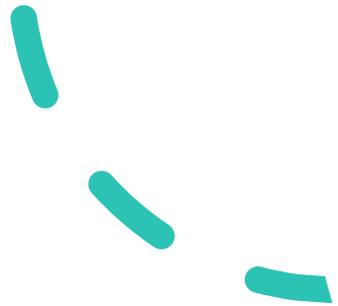


Simple (Nontoxic) Goiter

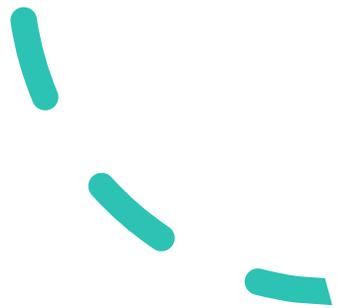
Complications

- Pressure effects: on trachea, esophagus and recurrent laryngeal nerve
- Some of these nodules may become hyper functioning and cause hyperthyroidism (no exophthalmos)
- Malignancy: rare in 2% of cases

Now....Answer this



Now....Answer this





Discussion & Feedback

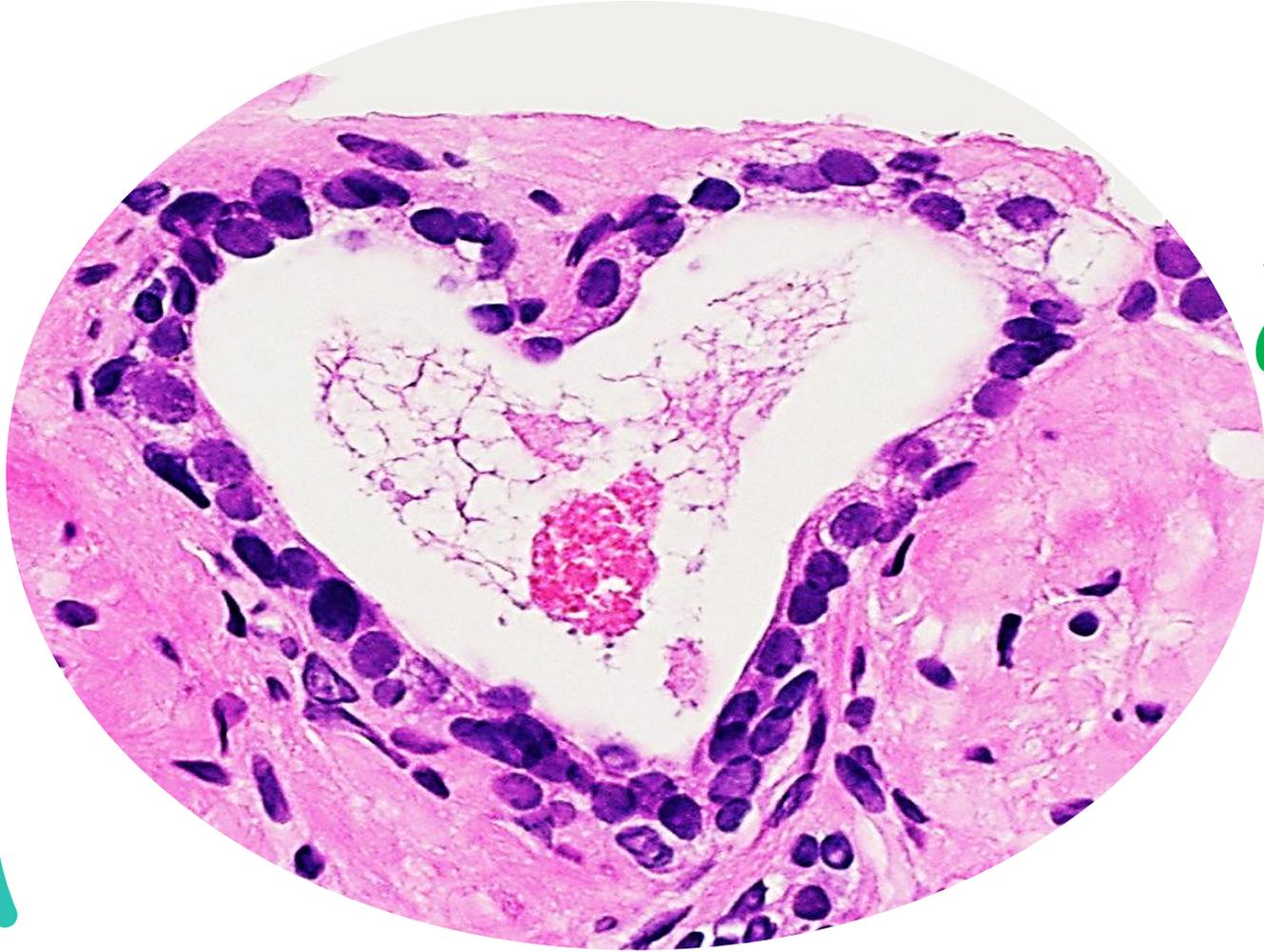
References & recommended readings

1. Robbins & Cotran Pathologic Basis of Disease,
(Robbins Pathology), 2018 ISBN: 978-0-323-35317-5,
Edition: 10th

2. Webpath:

<https://webpath.med.utah.edu/webpath.html>

<https://www.pathologyatlas.ro/index.php>



Thank you