Pathology

Neoplastic thyroid diseases

Learning Outcomes

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

- Identify classification of benign and malignant thyroid tumors.
- Identify types of thyroid carcinoma.
- Identify and recognize pathological features of Follicular adenoma, Papillary carcinoma, Follicular carcinoma, Medullary carcinoma and Anaplastic carcinoma.

Agenda

- Classification of thyroid tumors
- Follicular adenoma
- Follicular carcinoma
- Papillary carcinoma
- Medullary carcinoma
- Anaplastic carcinoma

Classification of thyroid tumors

- **Primary thyroid tumors**
  - Epithelial tumors
    - Benign epithelial tumors
      - Follicular Adenoma.
      - Hurthle cell Adenoma.
      - NIFTP (Non-invasive follicular thyroid neoplasm with papillary like nuclear features).
      - Hyalinizing trabecular tumor.
    - Malignant epithelial tumors
      - Follicular carcinoma
      - Papillary carcinoma
      - Medullary carcinoma
      - Anaplastic carcinoma
  - Mesenchymal tumors
  - Hematolymphoid tumors
- **Metastases (rare)**

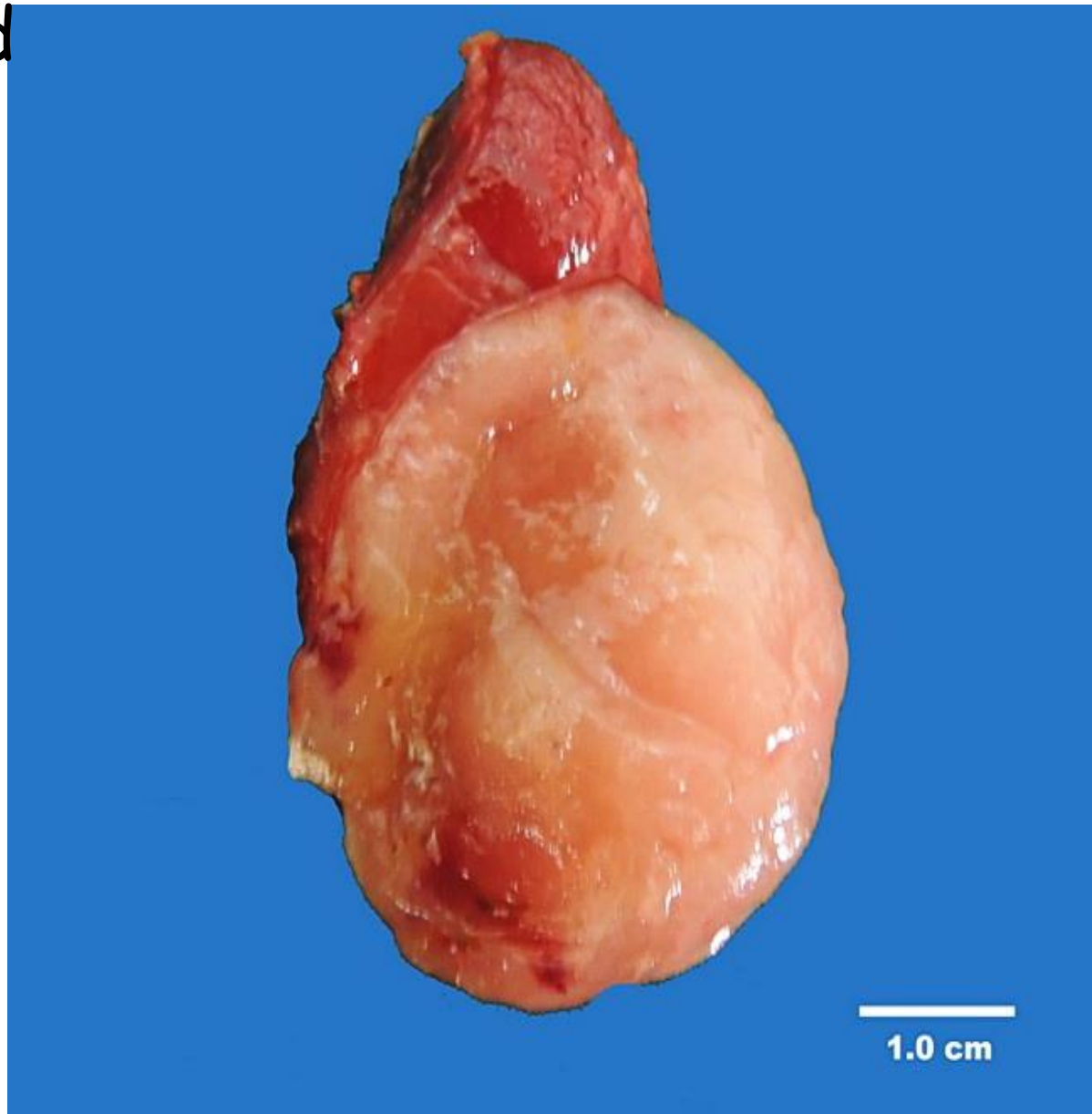
Follicular Adenoma

Most common benign thyroid gland tumor.

Grossly, the follicular adenoma is characterized by four features:

1. Solitary nodule.
2. Complete encapsulation.
3. Difference between inside and outside the capsule.
4. Compression of the thyroid tissue outside the capsule.

Hemorrhage, fibrosis and cystic change are common.



Follicular Adenoma

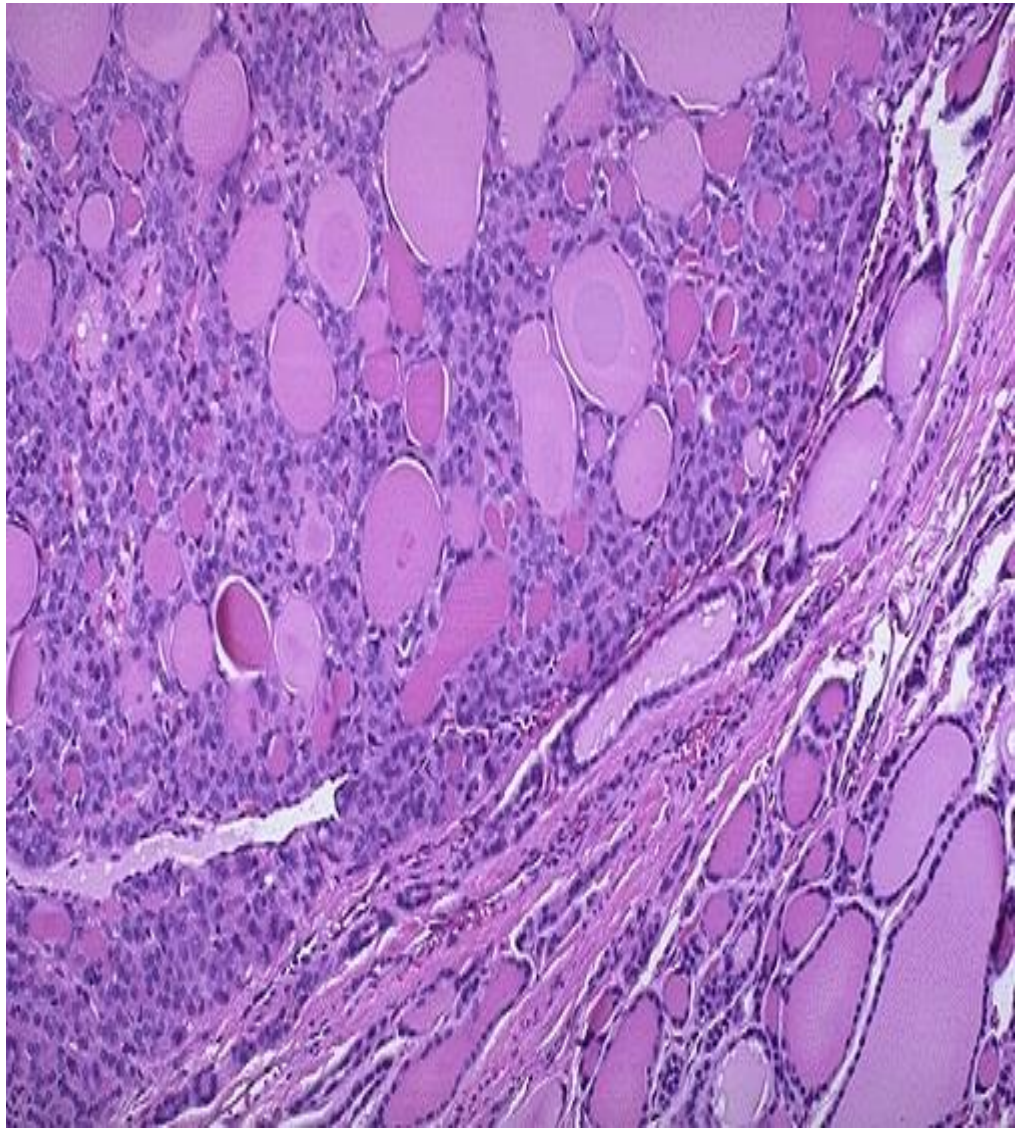
Microscopically

Complete fibrous capsule

The tumor is formed of thyroid follicles (large or small)containing colloid (abundant or scanty).

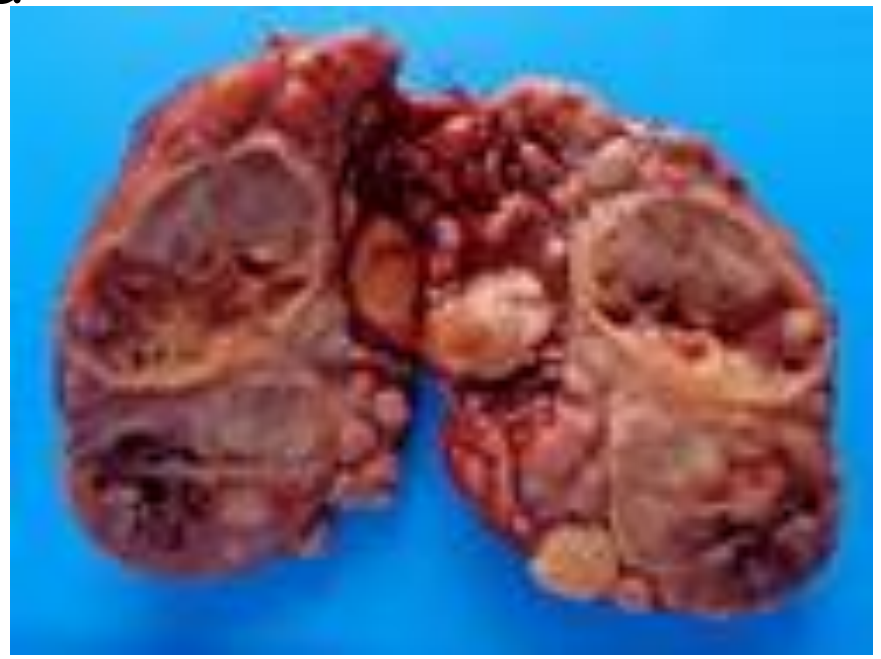
* Hurthle cell type: the follicles are lined by oncocytic cells (Cells with abundant granular eosinophilic cytoplasm and central rounded vesicular nuclei).

Careful evaluation of the capsule to differentiate follicular adenomas from follicular carcinomas, which demonstrate capsular and/or vascular invasion.



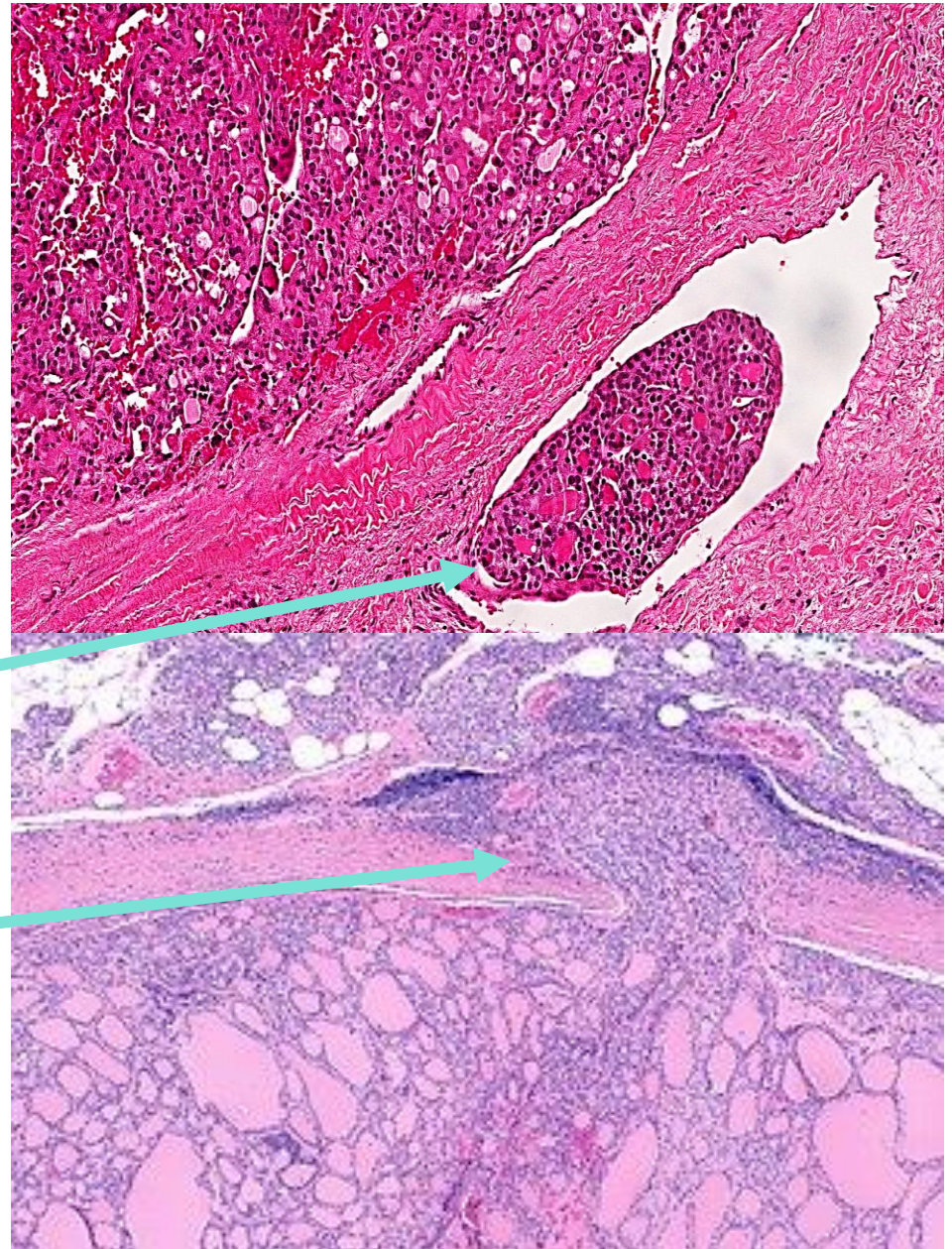
Follicular carcinoma

- The second most common type of thyroid carcinoma (10-15%).
- Common in females.
- Blood spread to distant sites (lung, bone).
- Worse prognosis than papillary thyroid carcinoma.
- Grossly, it appears as well-defined, encapsulated tumor. On cut section, it is soft and pale tan to pink with areas of hemorrhages, necrosis, cyst formation and bulges from within its capsule.



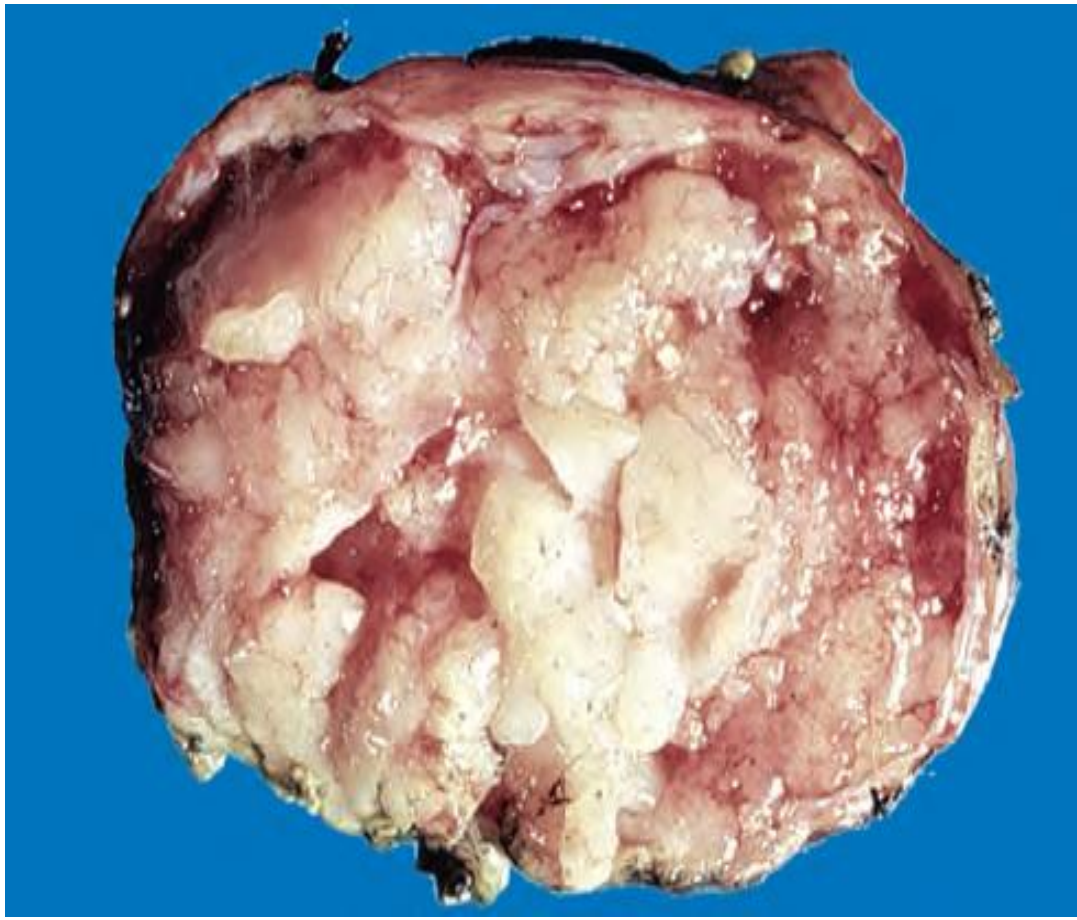
Follicular carcinoma

Microscopically, resembles follicular adenoma.
The principal distinction from adenoma is at the interface of the capsule and normal parenchyma by demonstration of **invasion of blood vessels** in region of capsule or by finding **capsular invasion**



Papillary thyroid carcinoma

- The most common type of thyroid carcinoma (75-85%).
- It can occur at all ages including children.
- Common in females.
- Lymphatic spread to cervical lymph nodes.
- Good prognosis.



Papillary thyroid carcinoma

- Grossly, ranges from microscopic foci < 1 cm to large nodule up to 10 cm in diameter, can be multicentric with firm consistency. Cut surface is greyish-white.
- Sometimes the tumor is transformed into cyst, into which numerous papillae projection.

Papillary thyroid carcinoma

- Microscopically,

❖Papillary structures with thin fibrovascular cores.

❖Psammoma bodies: Concentrically calcified structures.

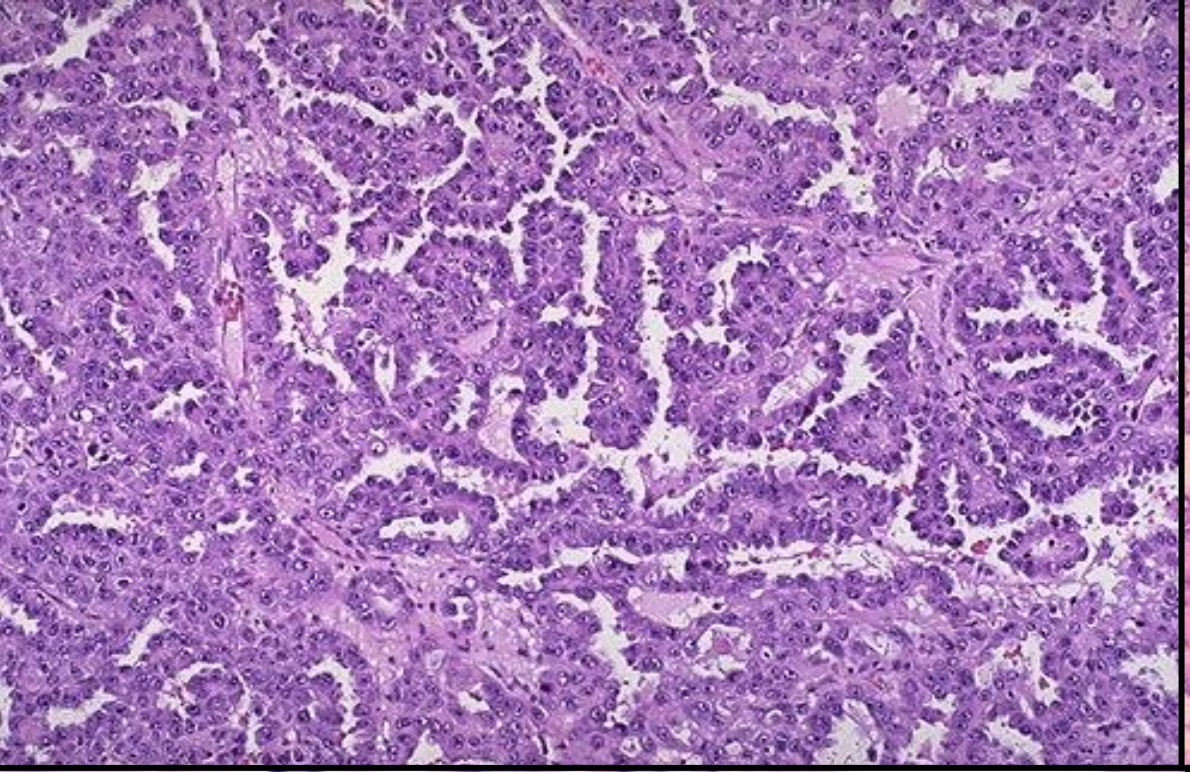
Nuclear features:

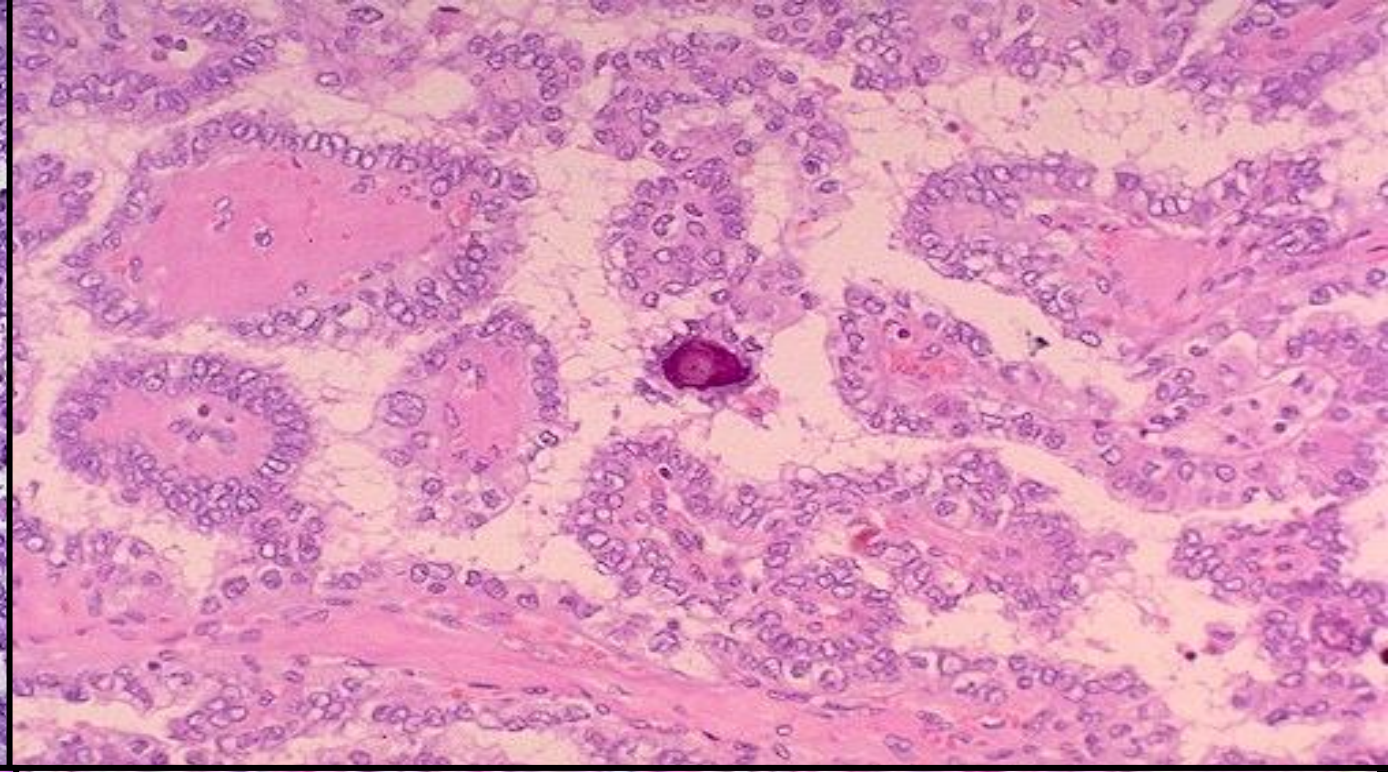
✓Glassy/ground glass nuclei (Orphan Annie nuclei, washed out nuclei): very finely dispersed chromatin.

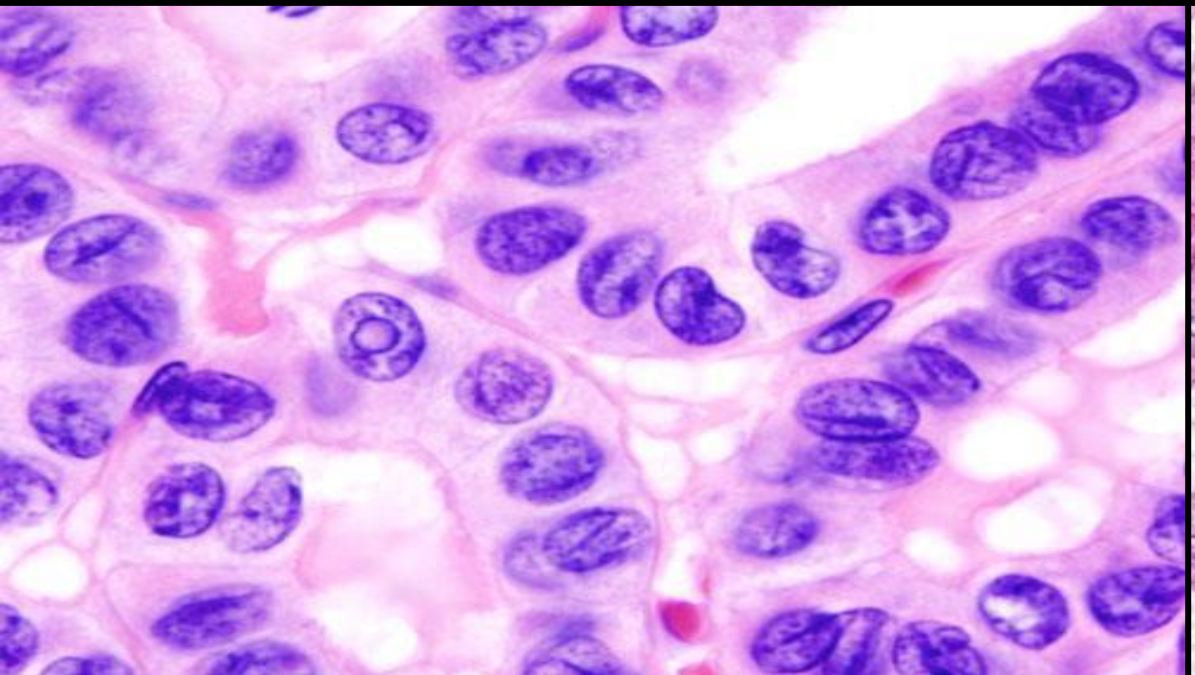
✓Pseudo-inclusions: invaginations of the cytoplasm may give the appearance of intranuclear inclusions.

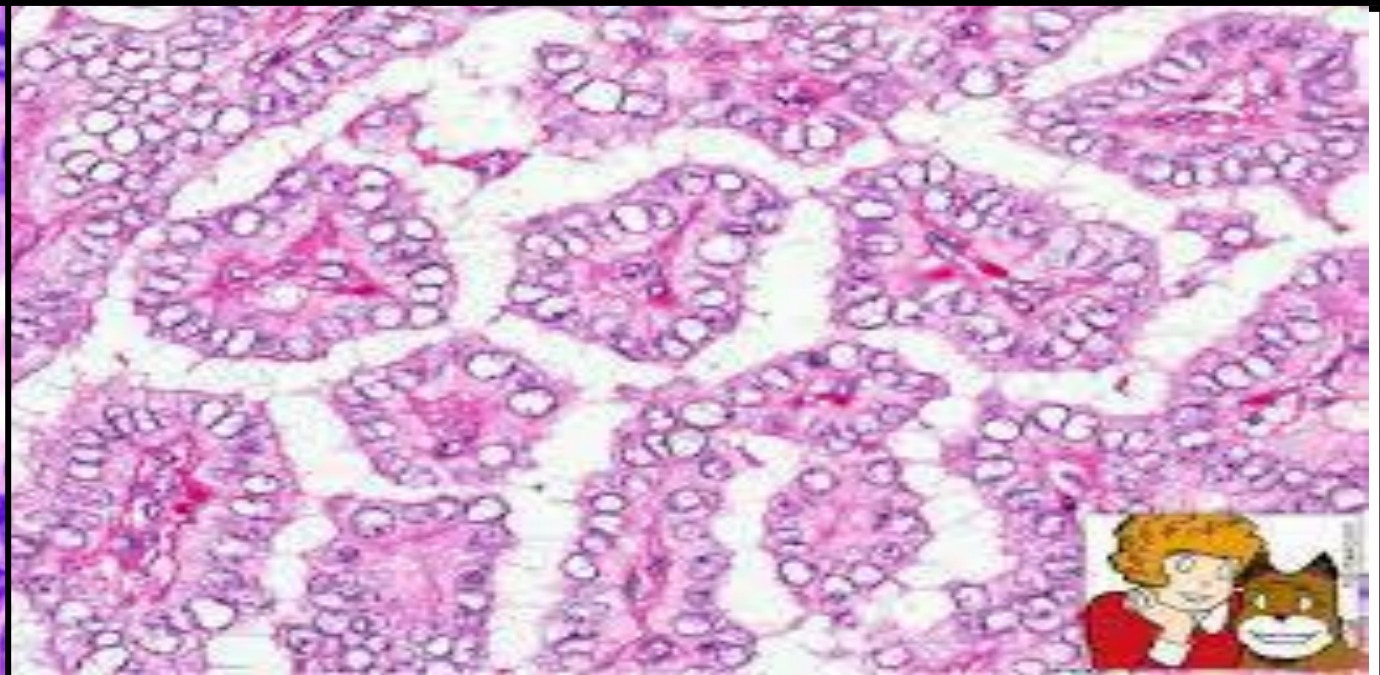
✓Grooved nuclei.

✓Crowded & overlapping nuclei



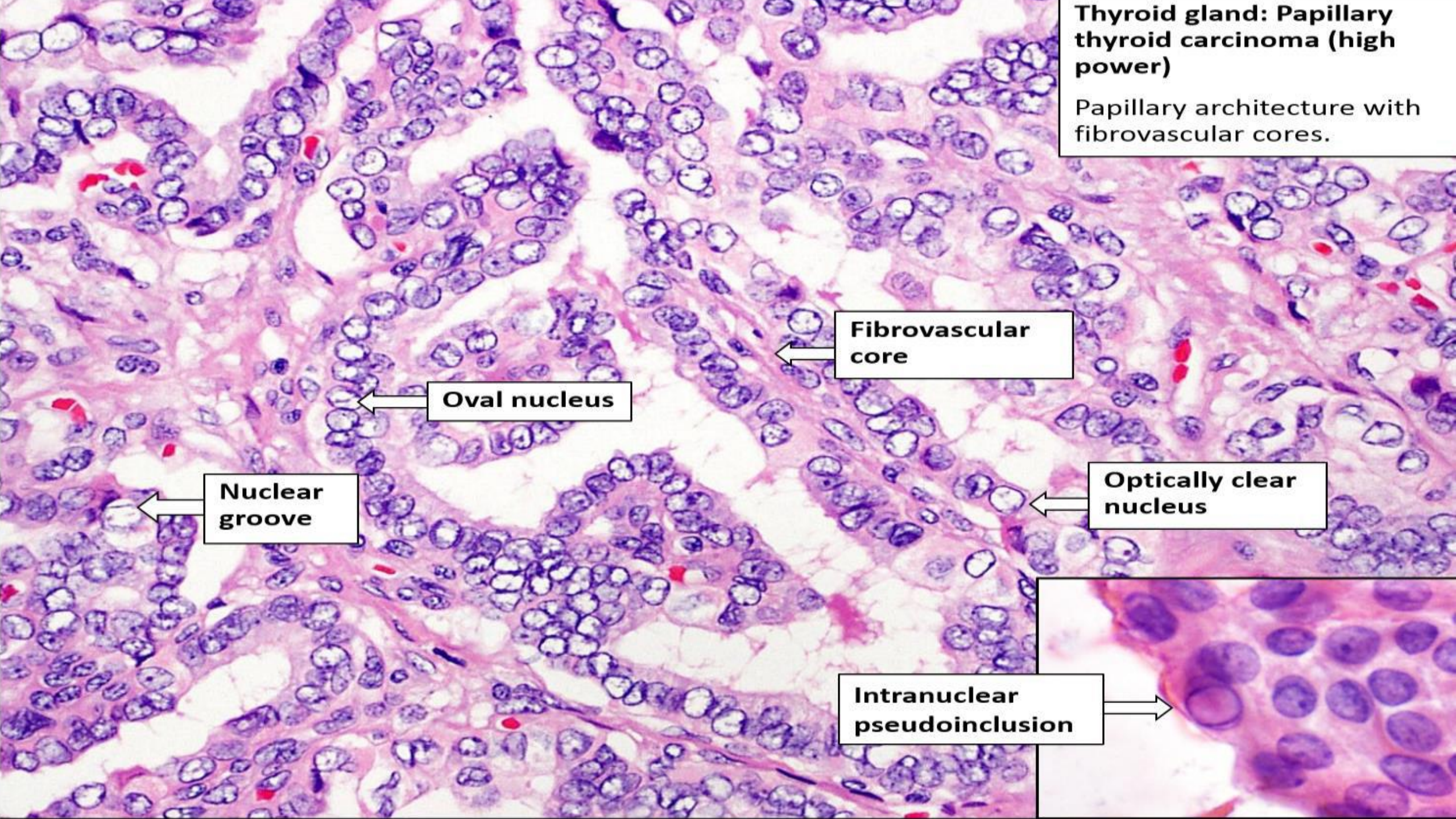






Thyroid gland: Papillary thyroid carcinoma (high power)

Papillary architecture with fibrovascular cores.



Medullary thyroid carcinoma

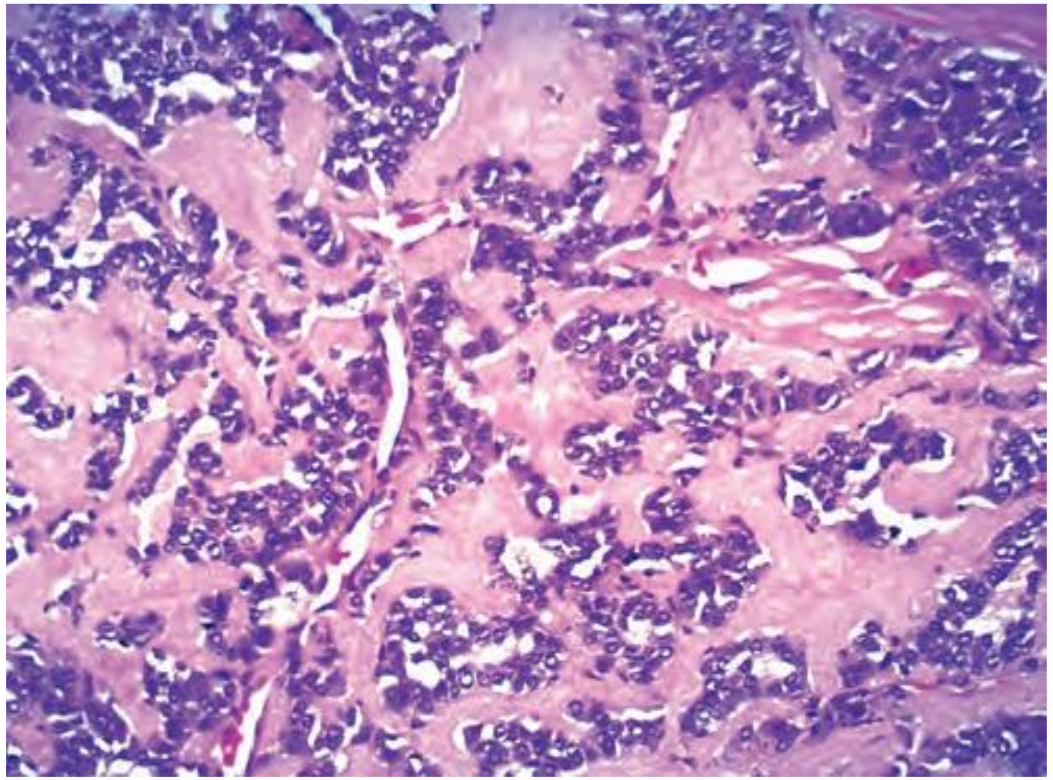
- This tumor is derived from C cells or parafollicular cells.
- They secrete calcitonin.
- The disease can be sporadic or familial, Patients with the familial medullary carcinoma have MEN type 2 syndrome, which includes medullay carcinoma, adrenal pheochromocytoma and parathyroid adenoma.
- The mean age of patients is 50 years, but familial cases appear earlier (mean age, 20 years).
- Both lymphatic and blood spread occurs.
- Worse prognosis.

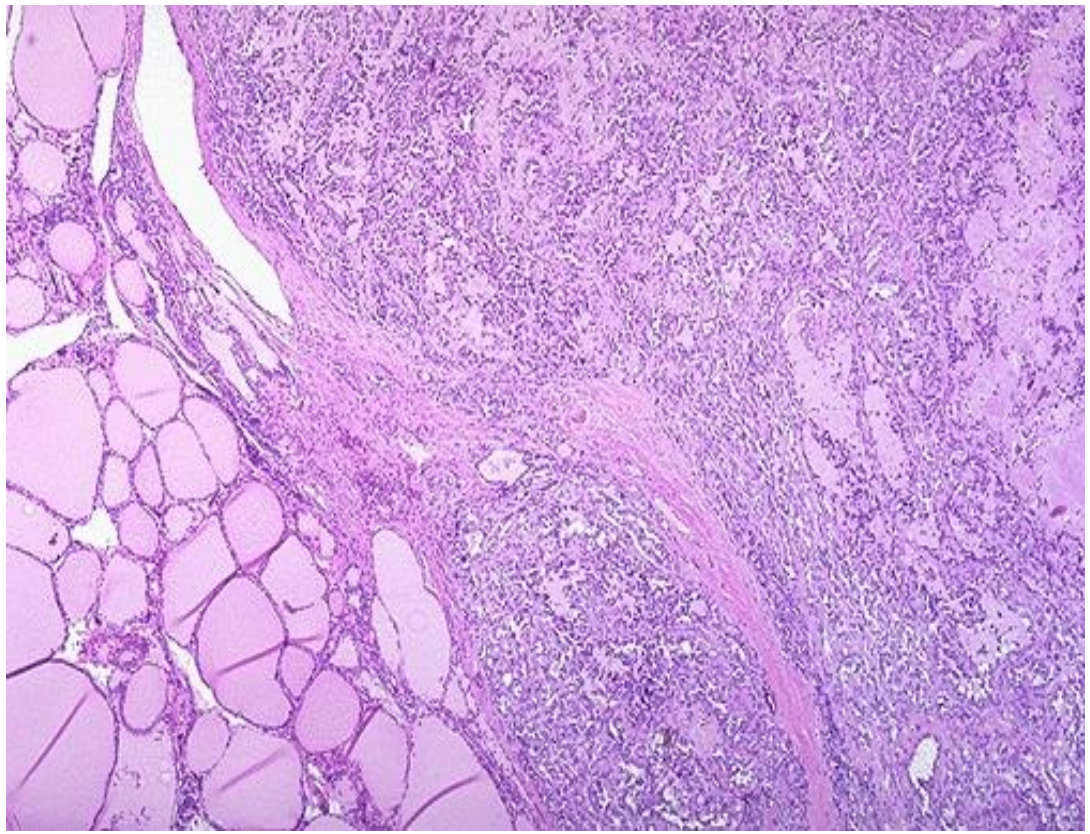
Medullary thyroid carcinoma

- Grossly, *It is* usually single nodule not encapsulated, but are usually circumscribed.
- Cut surface is firm and grayish white.
- In MEN type 2, tumors are often multicentric and bilateral.

Medullary thyroid carcinoma

- **Microscopically,** it is composed of nests, trabeculae, and sheets of spindle/polygonal cells.
- The stroma contains **amyloid material.**



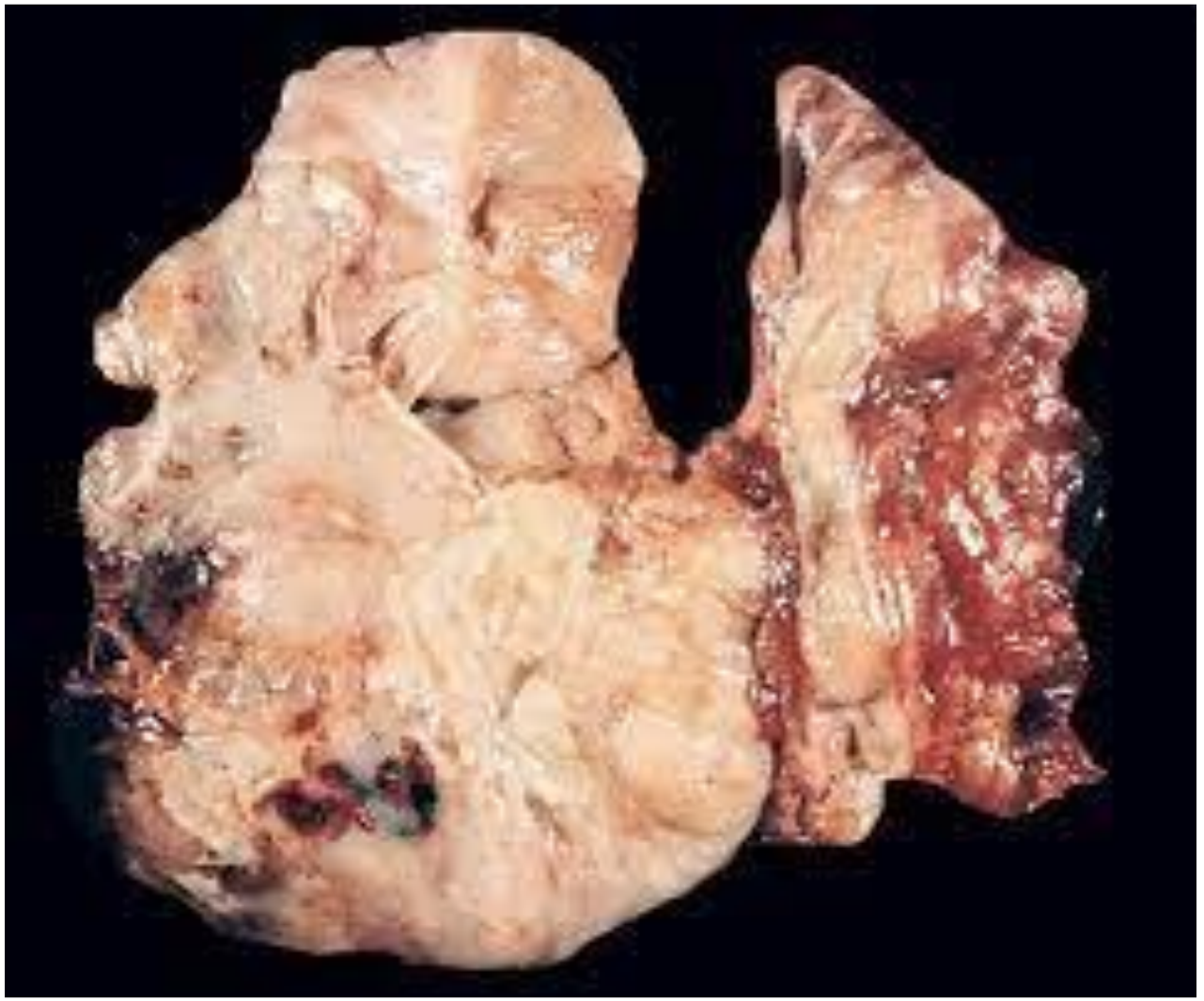


Anaplastic thyroid carcinoma

- They are undifferentiated tumors of the thyroid follicular epithelium.
- Rare, less than 5% of thyroid carcinomas.
- The tumor is predominantly found in old age.
- The features at presentation are usually those of extensive invasion of adjacent soft tissue, neck muscles and structures of the neck.
- Both lymphatic and blood spread occurs.
- Worse prognosis.

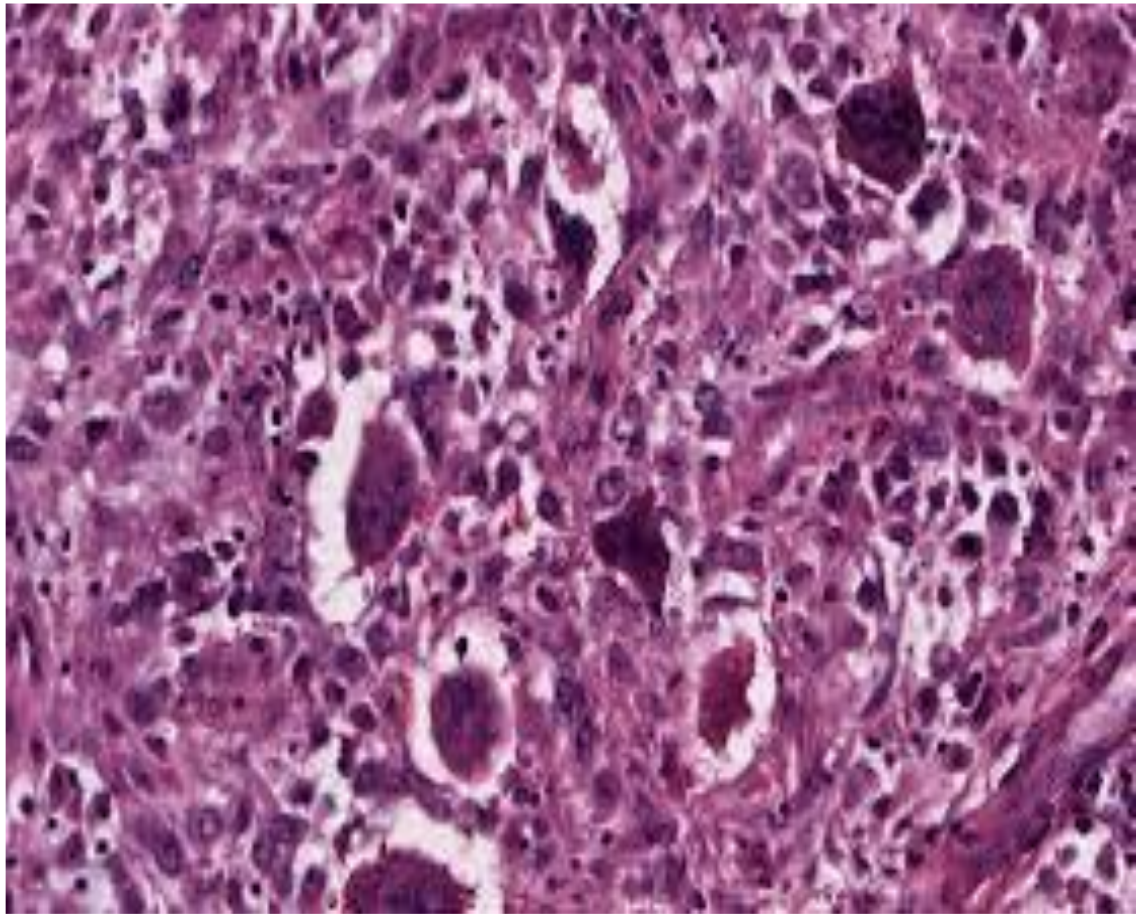
Anaplastic thyroid carcinoma

- Grossly, A huge infiltrative lesion. It is hard, and grayish-white and show areas of necrosis and hemorrhage.



Anaplastic thyroid carcinoma

- Microscopically, It is composed of highly malignant spindle or giant cells, showing marked pleomorphism and numerous mitotic figures.



Now….Answer this

Q1 What is the most common type of thyroid carcinoma?

A- Follicular carcinoma.

B- Papillary carcinoma.

C- Medullary carcinoma.

D- Anaplastic carcinoma.

Now….Answer this

Q2 The material characteristic for medullary thyroid carcinoma is called:

A- Amyloid.

B- Colloid.

C- Psammoma bodies.

D- Hyalinosis.

E- Fibrosis.

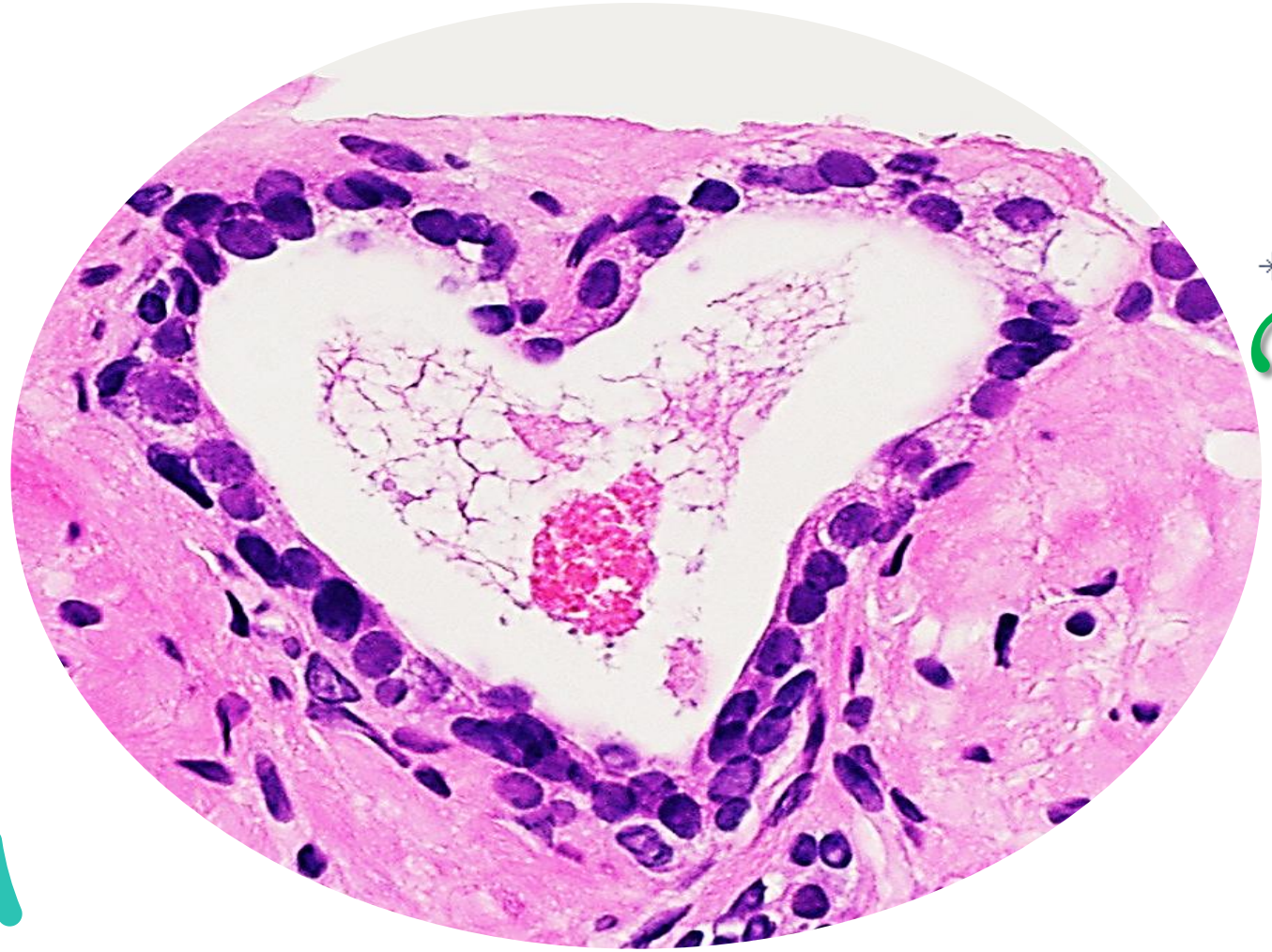
Discussion & Feedback

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