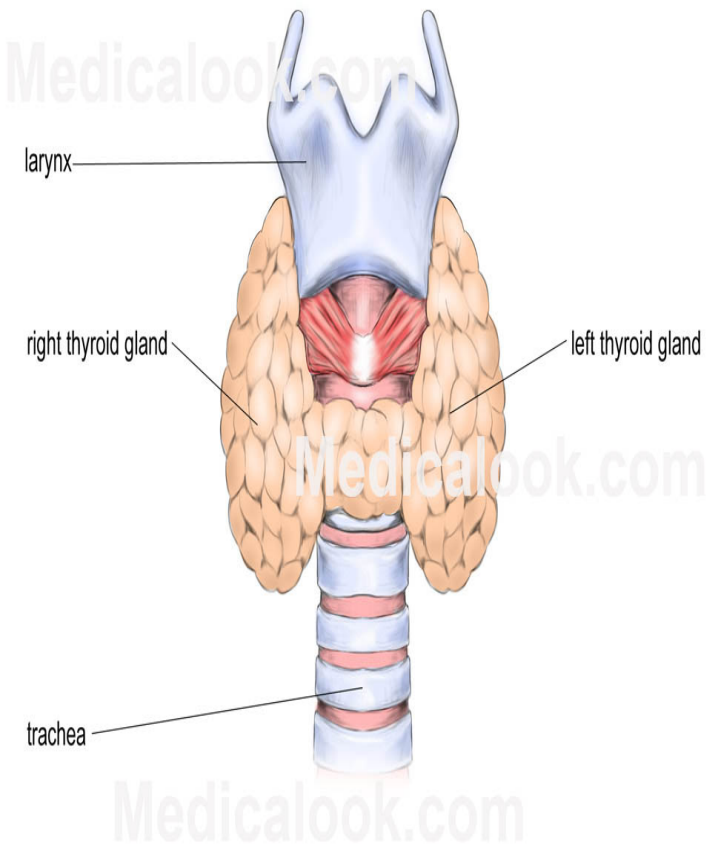


# lecture 4

## Diseases of thyroid gland



**Dr. Esraah Alharris**  
**PhD(path), MSc(path), MBChB**

# The objectives of this lecture

- ❖ To understand the types of thyroid tumors
- ❖ To know what are the pathological features of benign and malignant thyroid tumors
- ❖ To learn how to differentiate pathologically (Gross and Microscopical) between different types of thyroid tumors.

## **Solitary** thyroid nodules

Female to male ratio is **4:1**

Incidence **increases** throughout life.

**less than 1%** of solitary thyroid nodules are malignant

### **Risk of malignancy increases with:**

- Solitary nodules more than multiple nodules
- Nodules in younger patients (i.e., younger than 40 years)
- Nodules in men more than women.
- A history of head or neck radiation treatment.
- Nodules that do not take up radioactive iodine in imaging studies (cold nodules)

# Thyroid gland tumor



<b>Benign tumor</b> Follicular adenoma	<b>Malignant</b> ↓	
	<b>Carcinoma</b> ↓	<b>Lymphoma</b>
	Papillary carcinoma (75-85%)	
	Follicular carcinoma (10-20%)	
	Medullary carcinoma (5%)	
	Anaplastic carcinoma (5%)	

# Adenomas

- **Most adenomas present as unilateral painless cold nodules.**
- **Toxic manifestations may develop**
- **Large adenomas cause pressure symptoms as dysphagia.**

# Adenomas

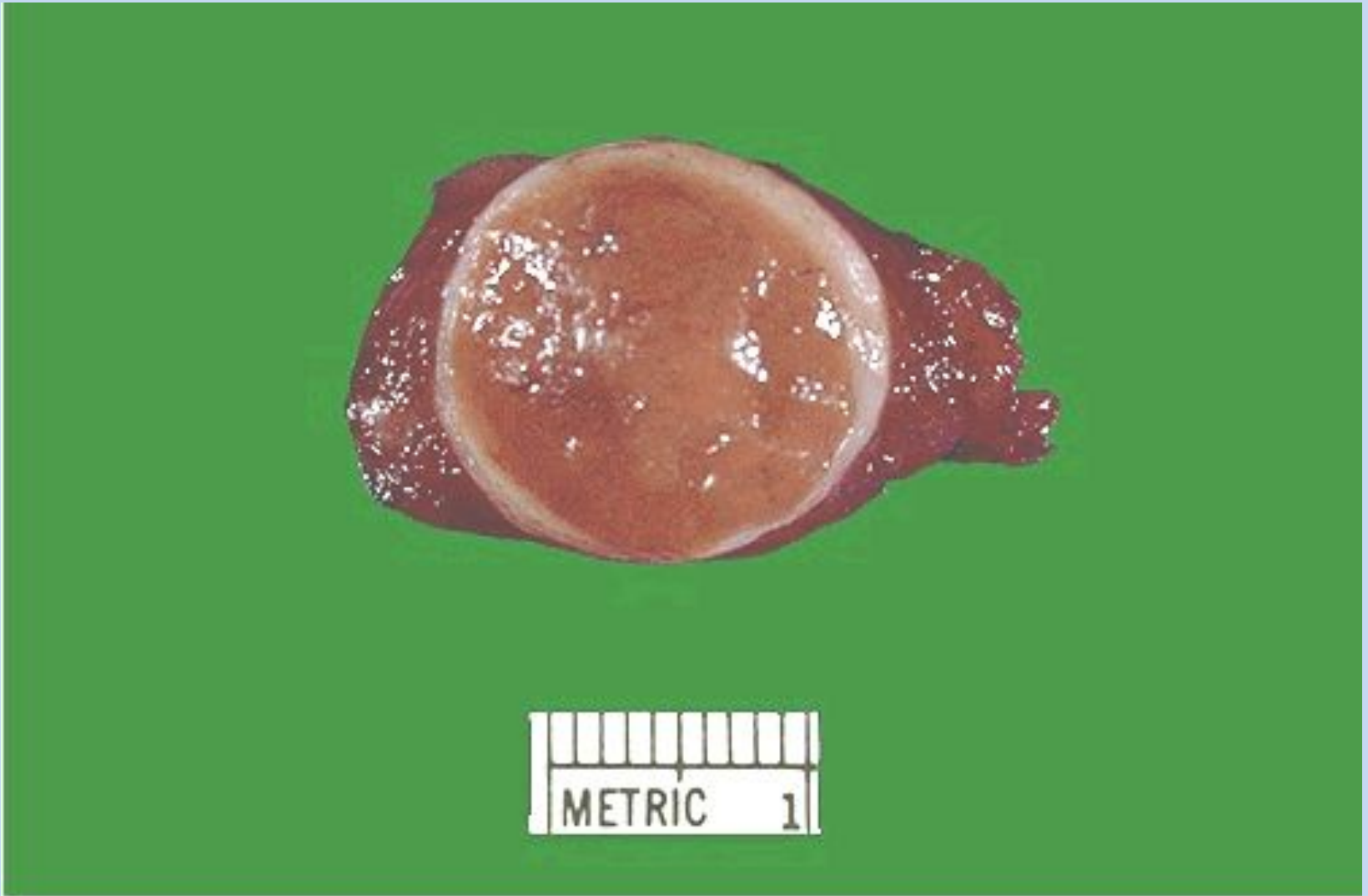
- Benign neoplasms derived from the follicular epithelium

## Gross

- rounded or oval firm solitary nodule,
- having a well developed capsule .
- Cut surface is translucent brown.

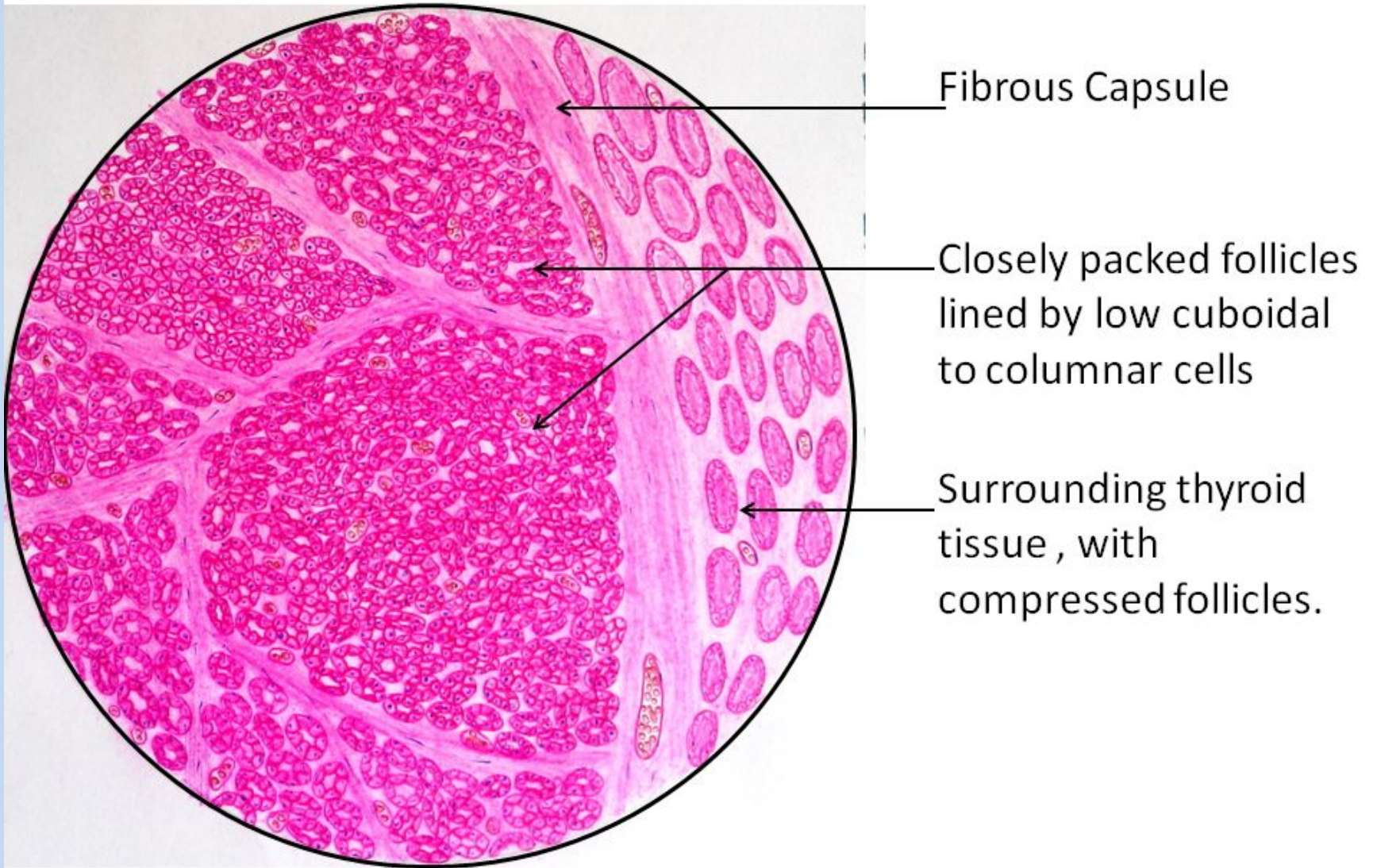


# Follicular adenoma G



Here is another follicular adenoma that is surrounded by a thin white capsule. It is sometimes difficult to tell a well-differentiated follicular carcinoma from a follicular adenoma. Thus, patients with follicular neoplasms are treated with thyroidectomy just to be on the safe side.

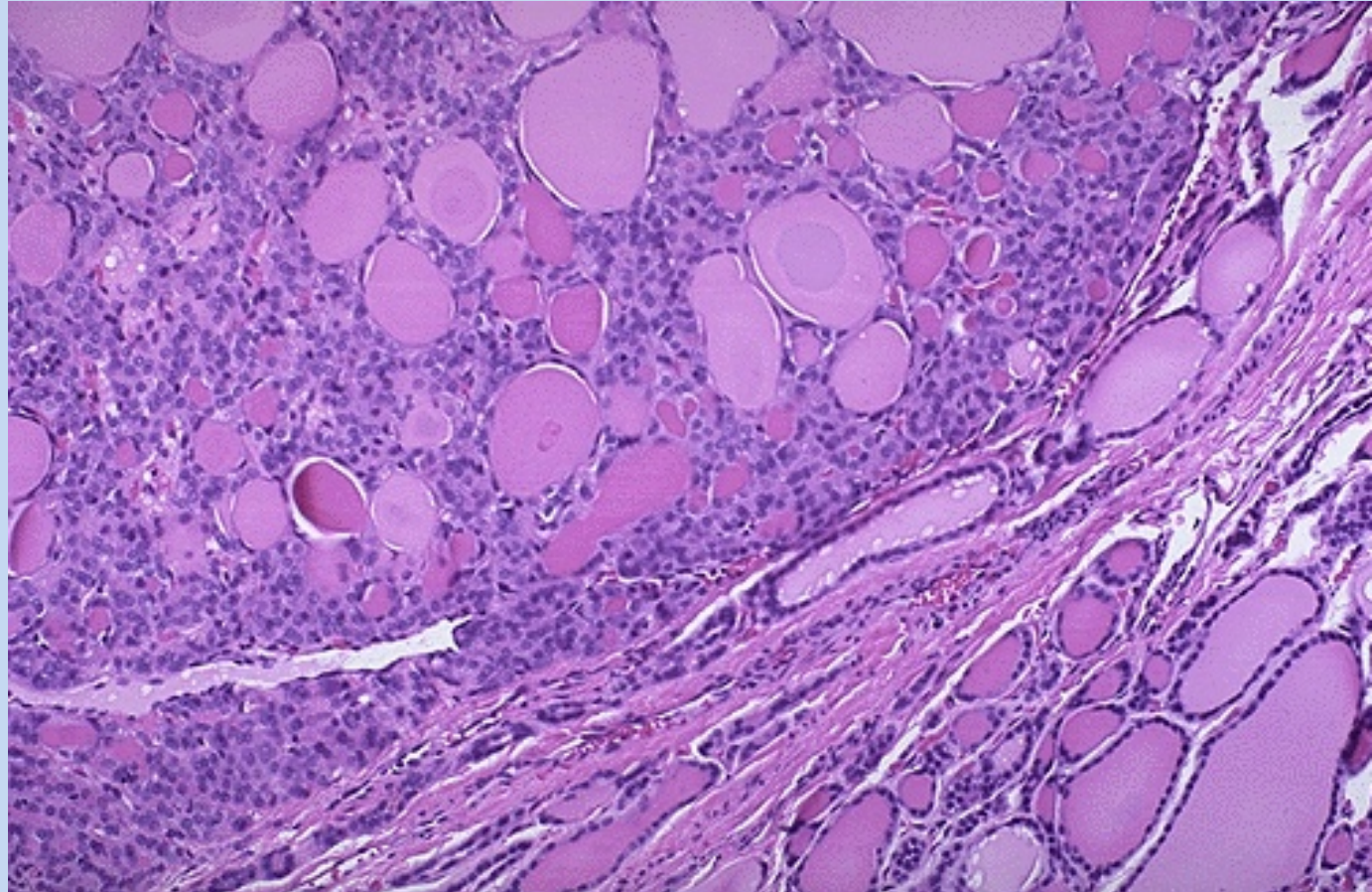
# Follicular adenoma



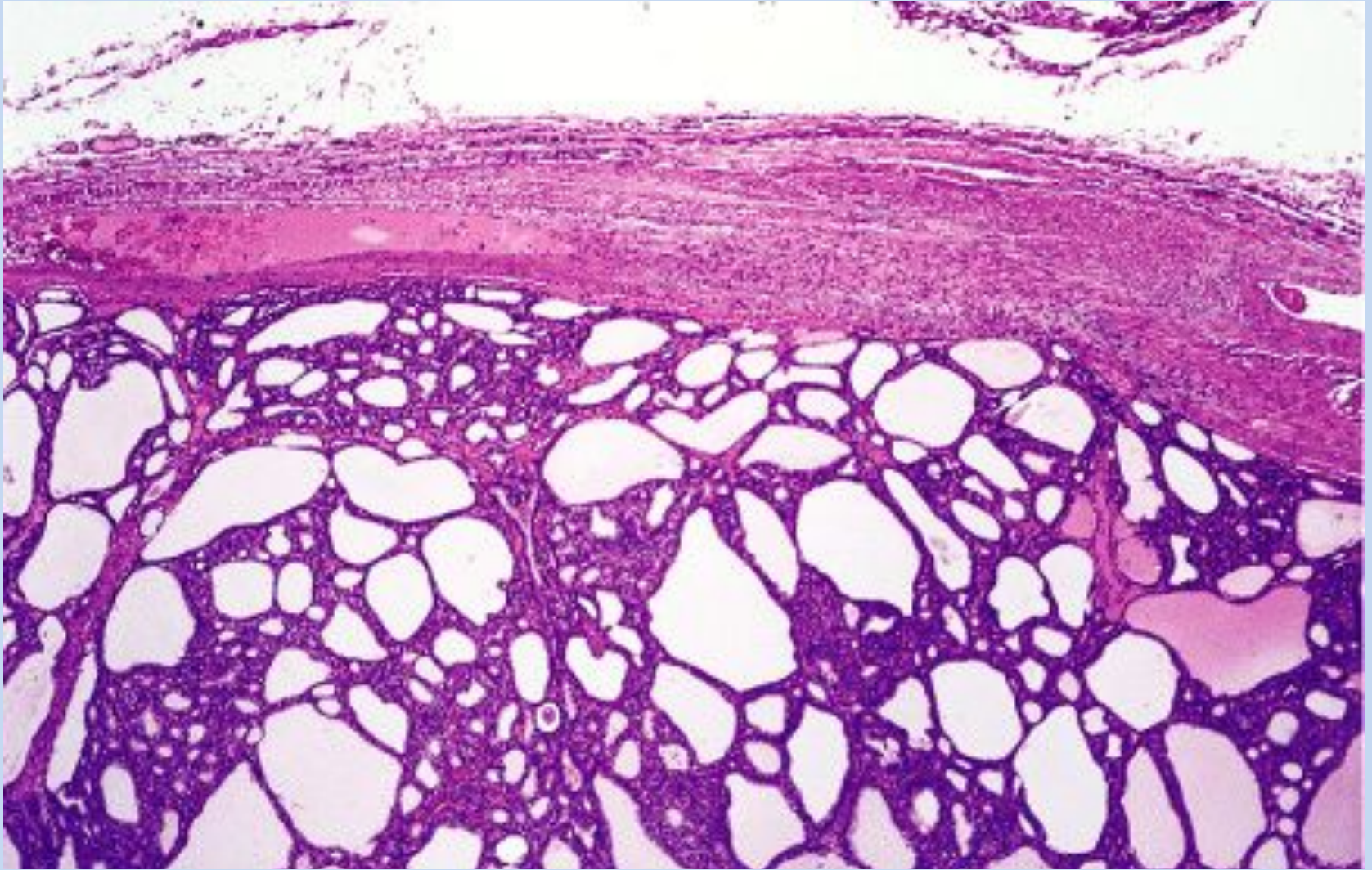


## ***1- Follicular adenoma***

- It is surrounded by an intact well formed capsule.
- Formed of well differentiated follicles containing colloid & resembles more or less normal thyroid tissue.

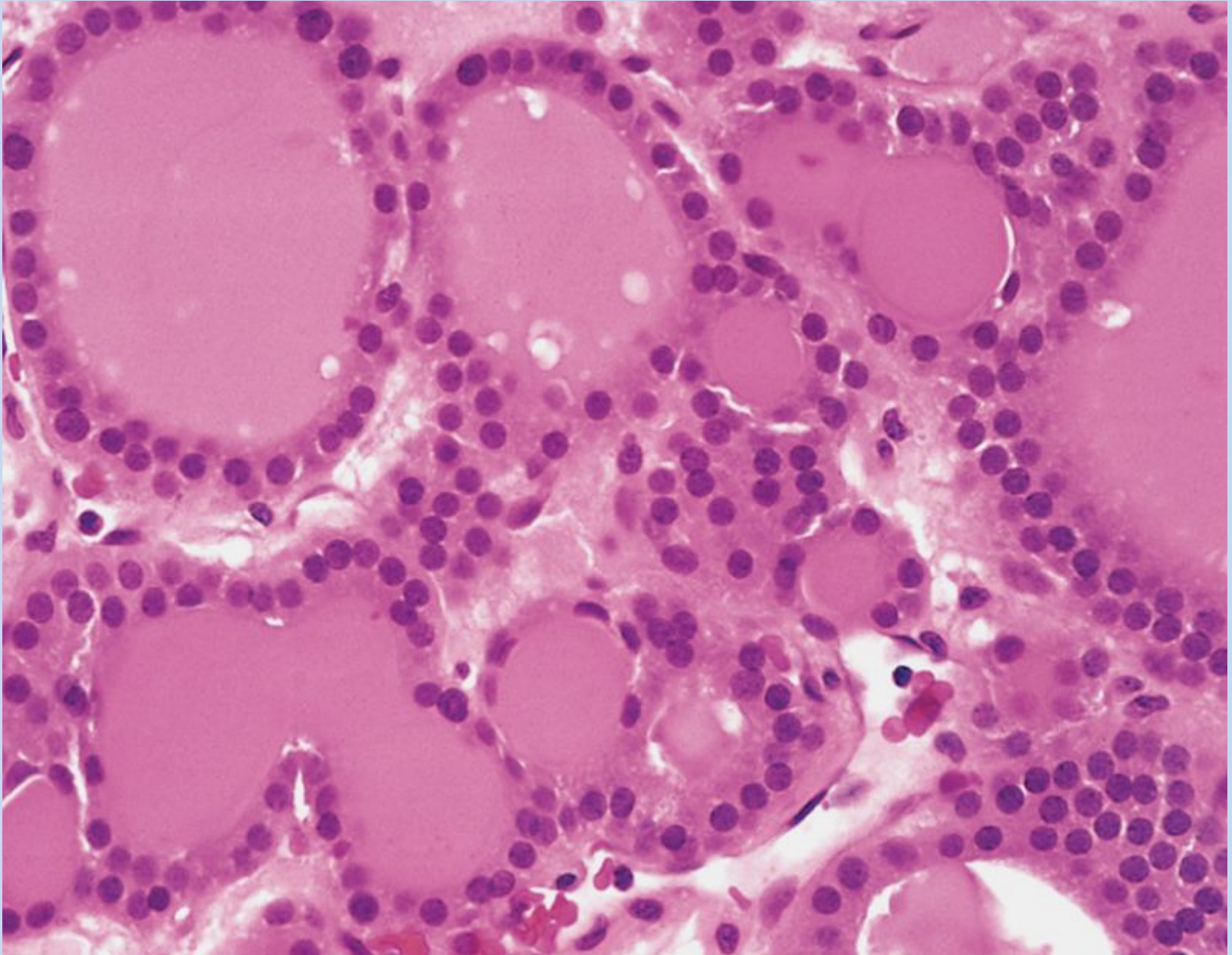


# Follicular Adenoma thyroid



Intact fibrous capsule around a follicular adenoma

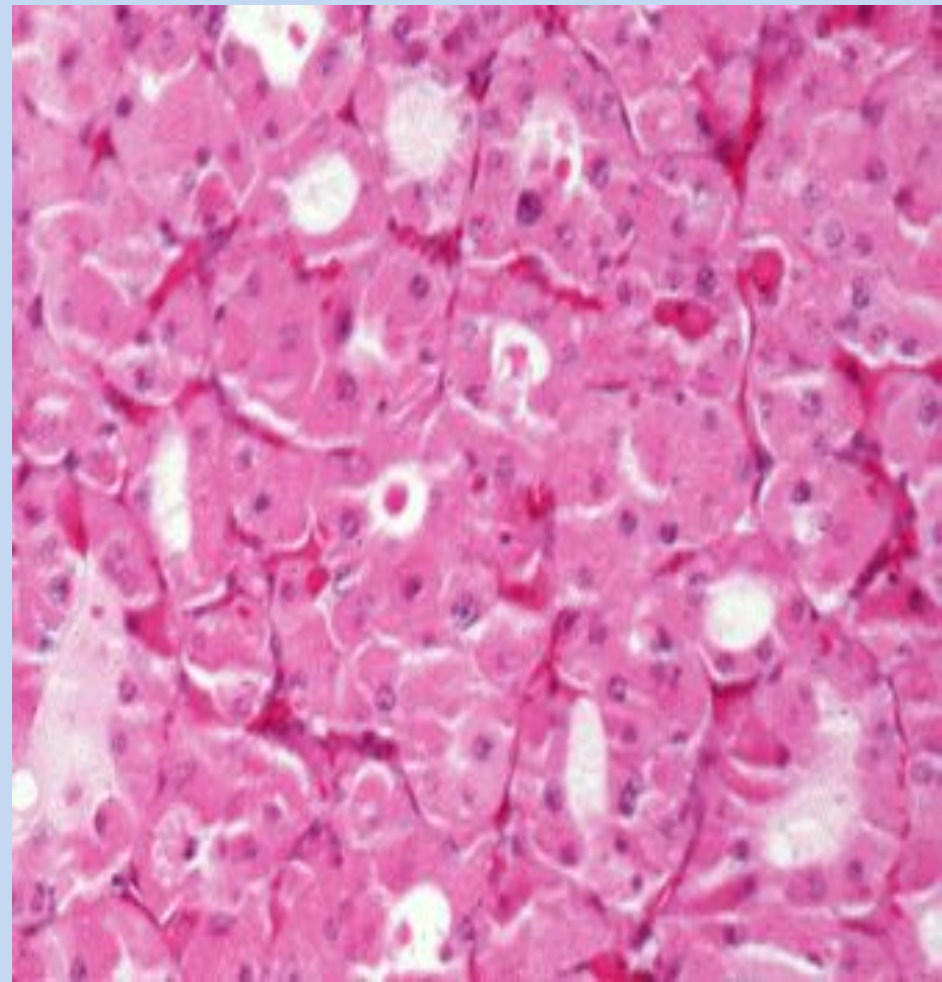
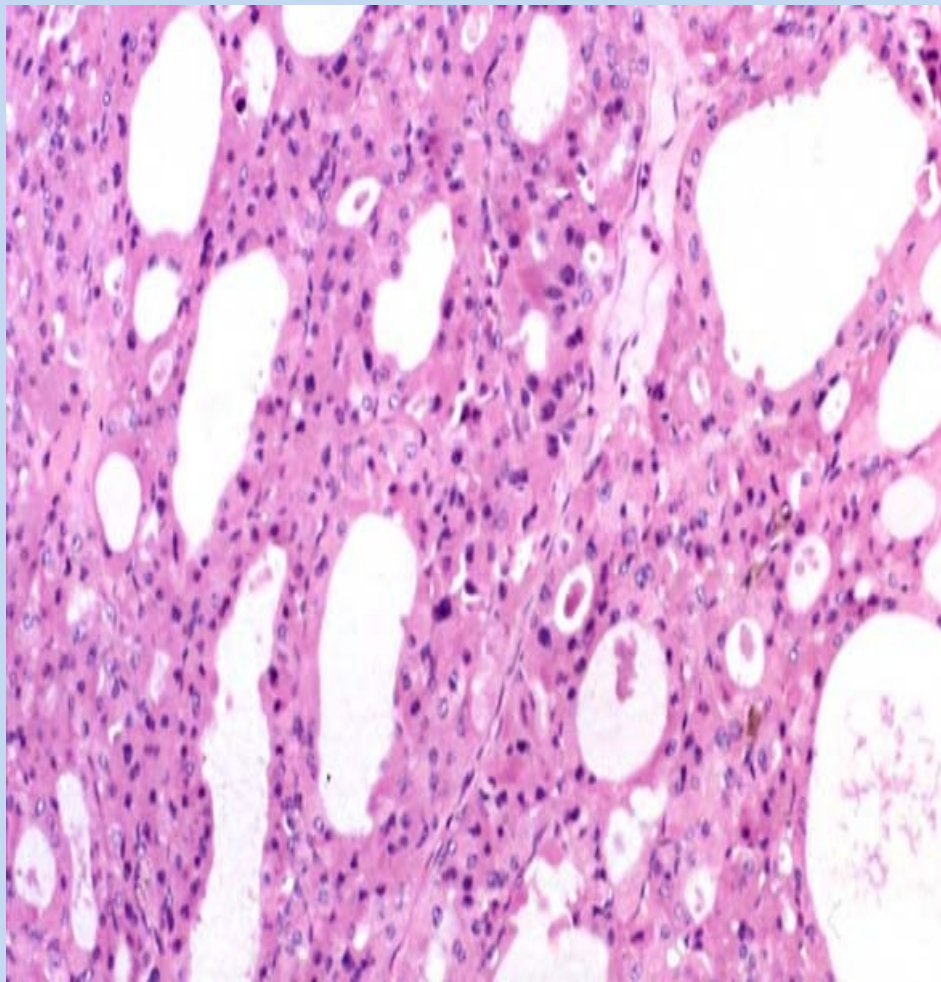
## Follicular adenoma thyroid



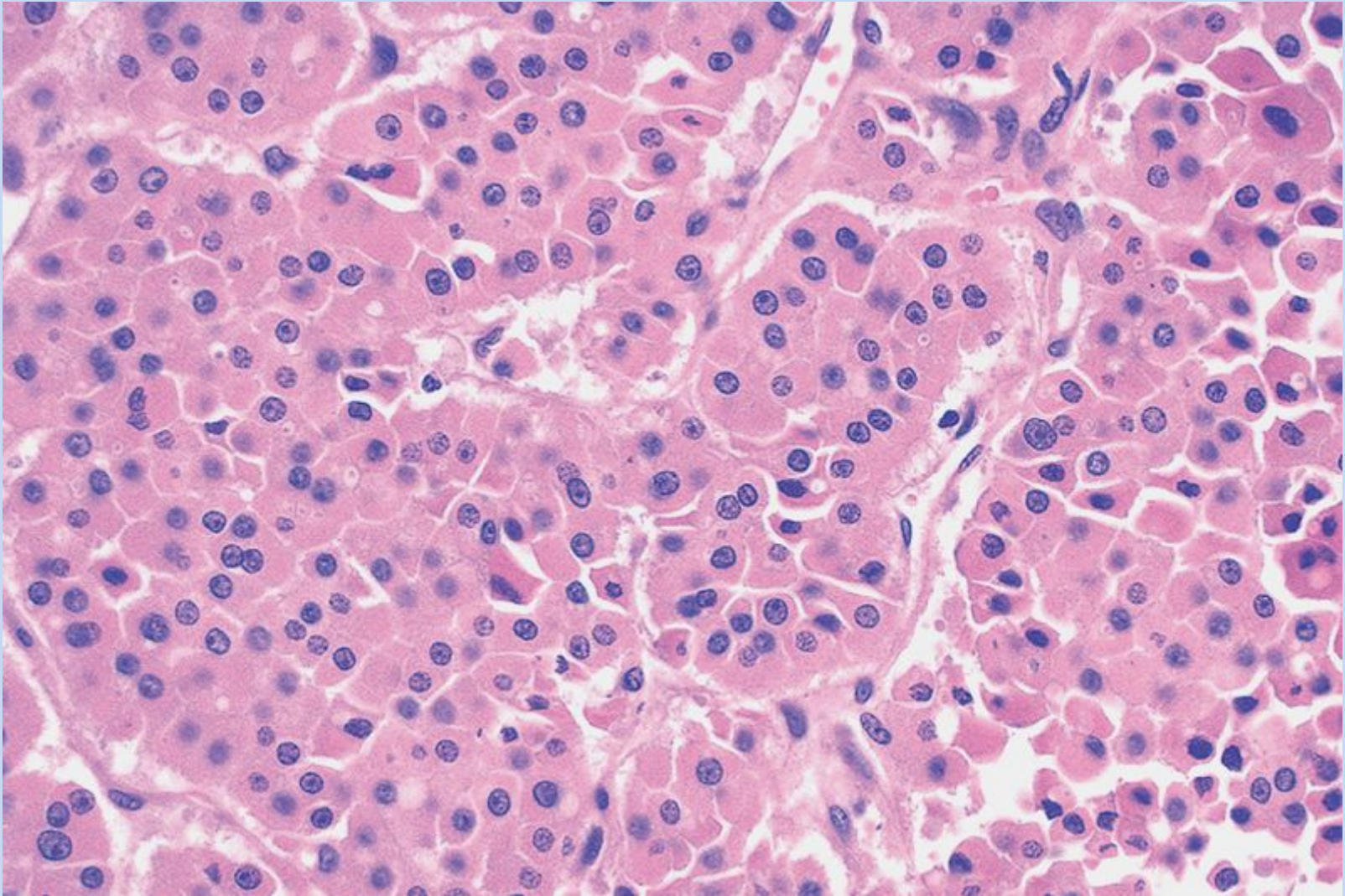
Well-differentiated follicles resemble normal thyroid parenchyma.

## ***2-Hurthle cell adenoma “oncocytic adenoma”:***

Most of the cells are large with a granular acidophilic cytoplasm & large vesicular nucleus

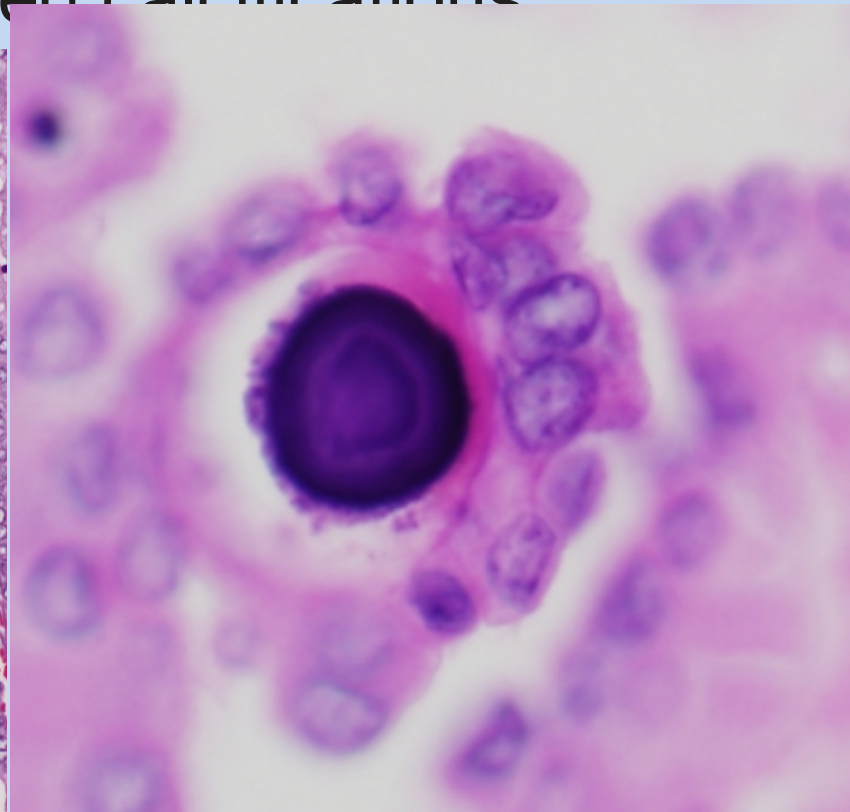
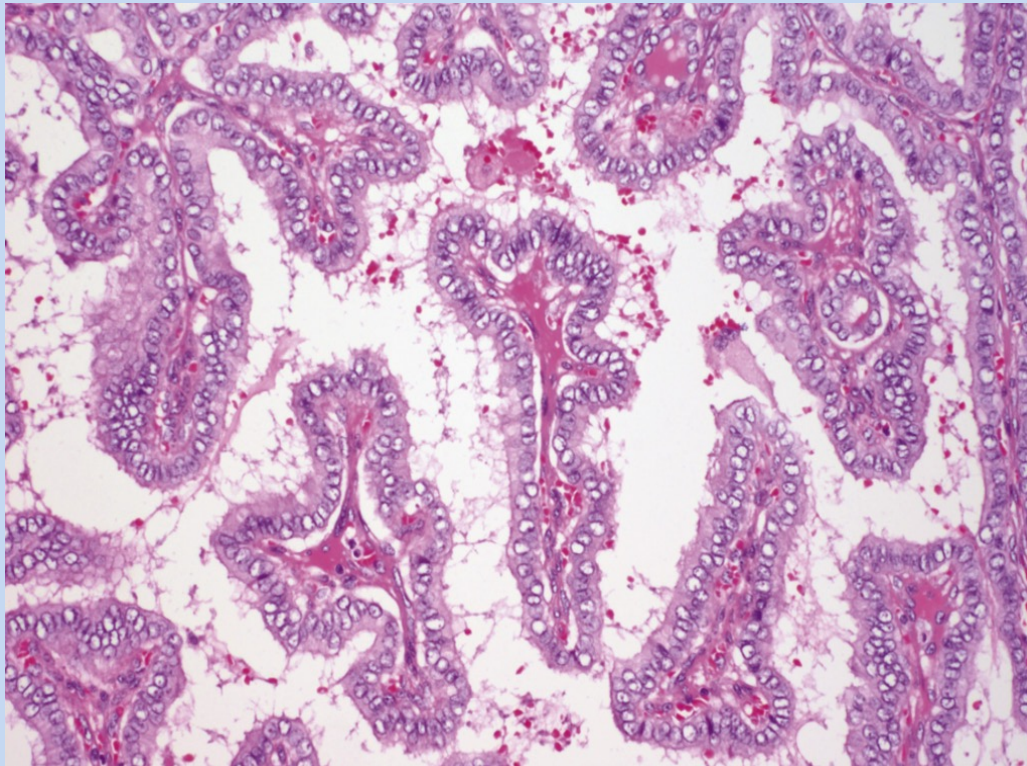


## Hürthle cell adenoma thyroid



**A high-power view showing that the tumor is composed of cells with abundant eosinophilic cytoplasm and small regular nuclei.**

Q. A 45-year-old woman presents for a routine physical examination and is found to have several small masses within the right lobe of her thyroid gland. No enlarged lymph nodes are found. Her thyroid gland is resected surgically and histologic sections from the tumor masses reveal multiple papillary structures and scattered small, round, laminated calcifications



# Tumors of thyroid

## A- Benign:

Adenoma ; Follicular / Hurthle cell

## B- Malignant: (carcinoma)

**1- Papillary**

**2- Follicular**

**3- Anaplastic**

**4- Medullary**

## Papillary carcinoma:

- Most common form of thyroid cancer (80%)
- Occurring more in females at any age but most often between the ages of 25 and 50
- Most cases are associated with previous exposure to ionizing radiation.



## Clinically

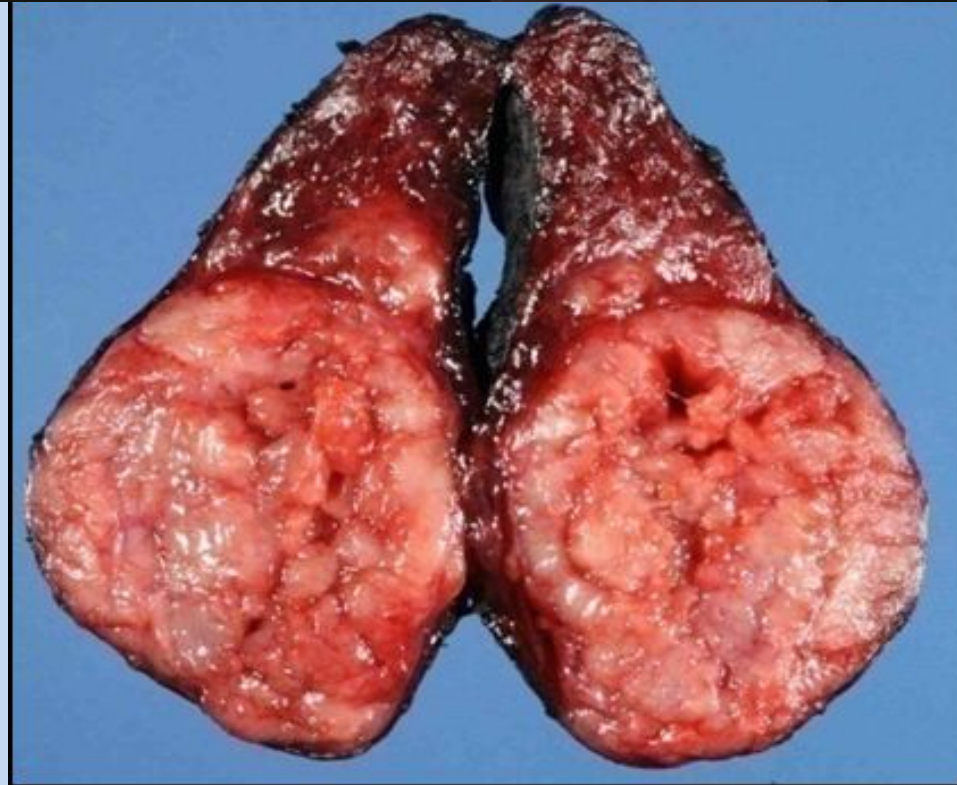
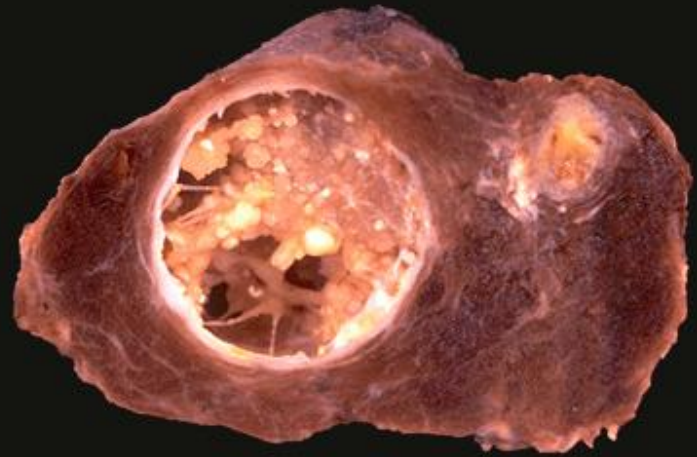
- **Asymptomatic thyroid nodules,**
- **but the first manifestation may be a mass in a cervical lymph node.**
- **A single nodule, moves freely during swallowing and is not distinguishable from a benign nodule.**
- **Hoarseness, dysphagia, cough, or dyspnea suggests advanced disease.**
- **In a minority of patients, hematogenous metastases are present at the time of diagnosis, most commonly in the lung.**



# Papillary carcinoma

## Gross

- solitary or multifocal
- +/- capsule, but usually unencapsulated & infiltrative.
- It may be small <1 cm (microcarcinoma)
- The cut surface is granular or papillary
- It may show areas of fibrosis, calcification or cystic changes.

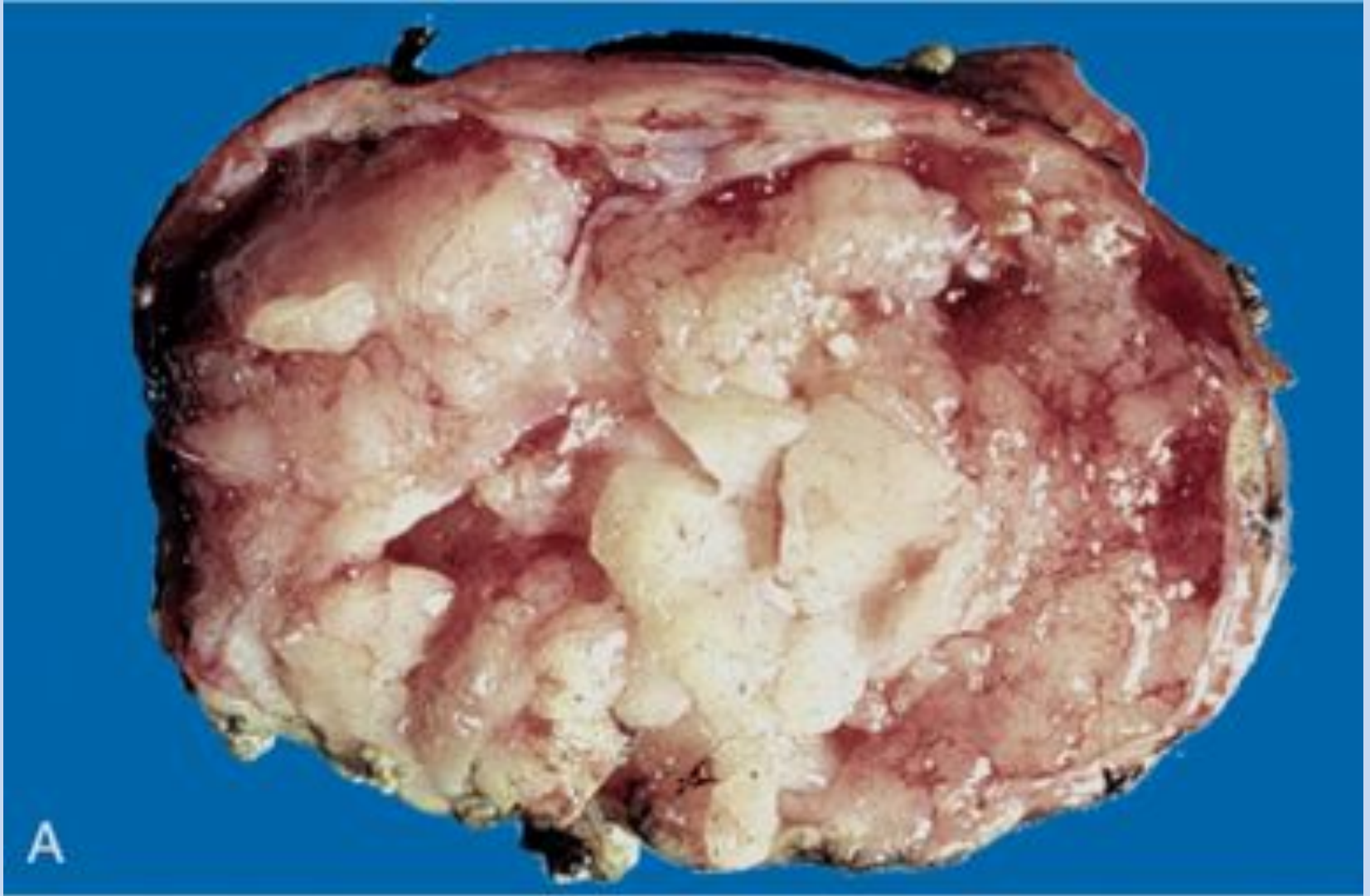


## Papillary ca thyroid central fibrosis



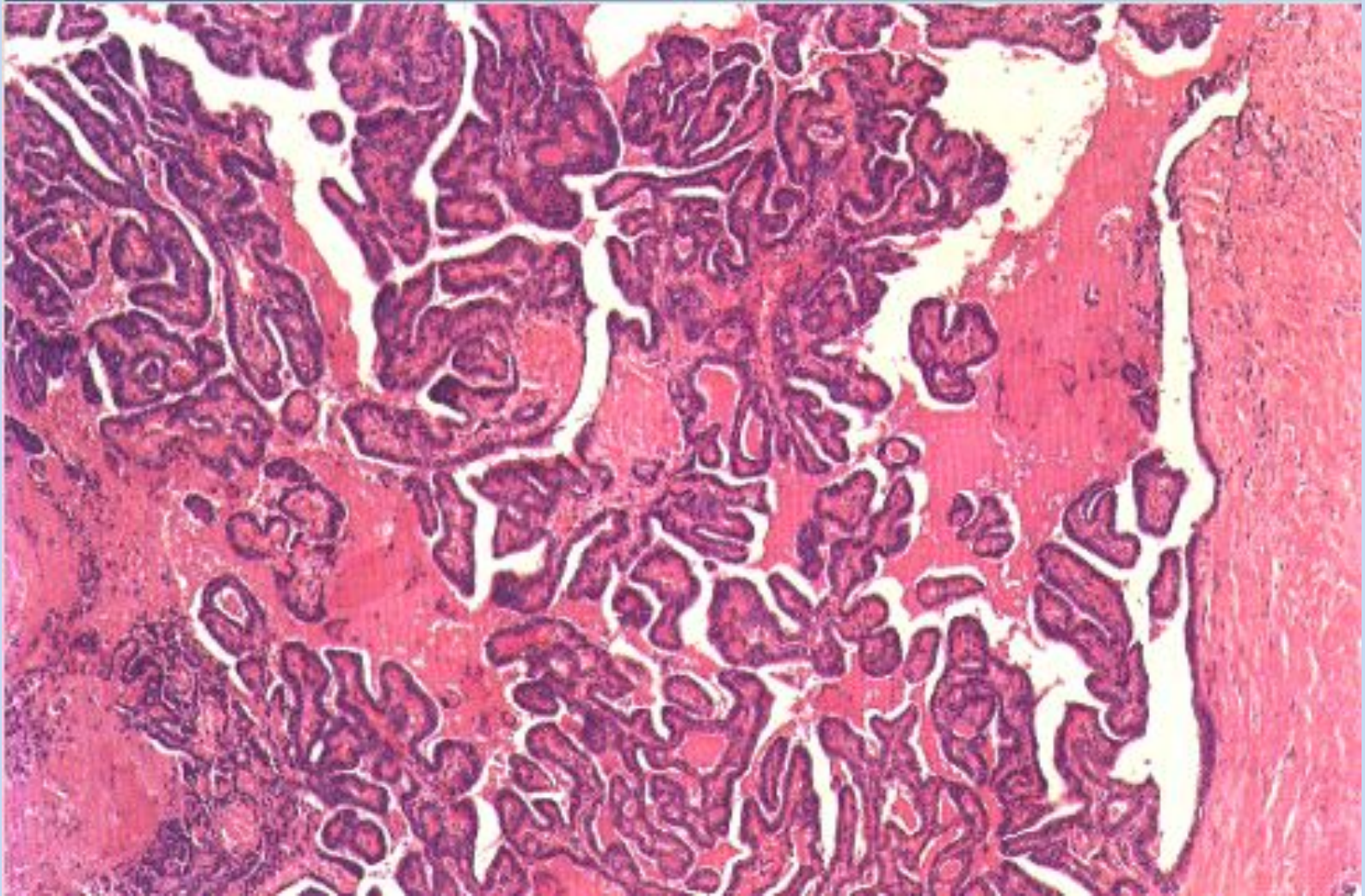
Most cases are solid, whitish, firm & clearly invasive. The tumor shown exhibits a central area of fibrosis

## Papillary carcinoma thyroid.



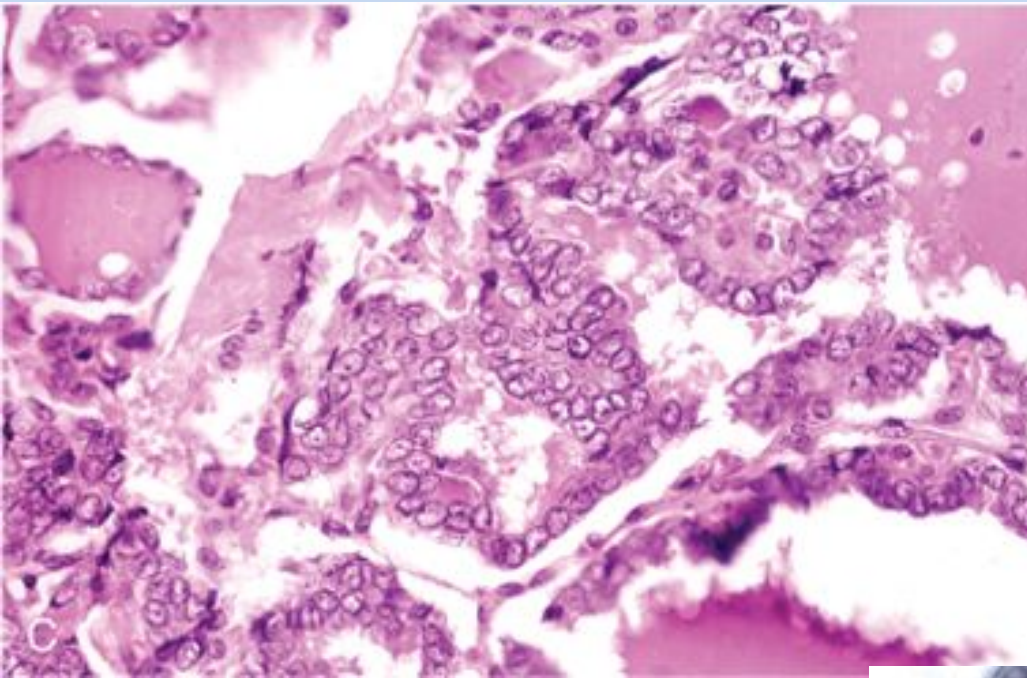
**A papillary carcinoma with grossly discernible papillary structures.**

## Papillary ca. thyroid mic

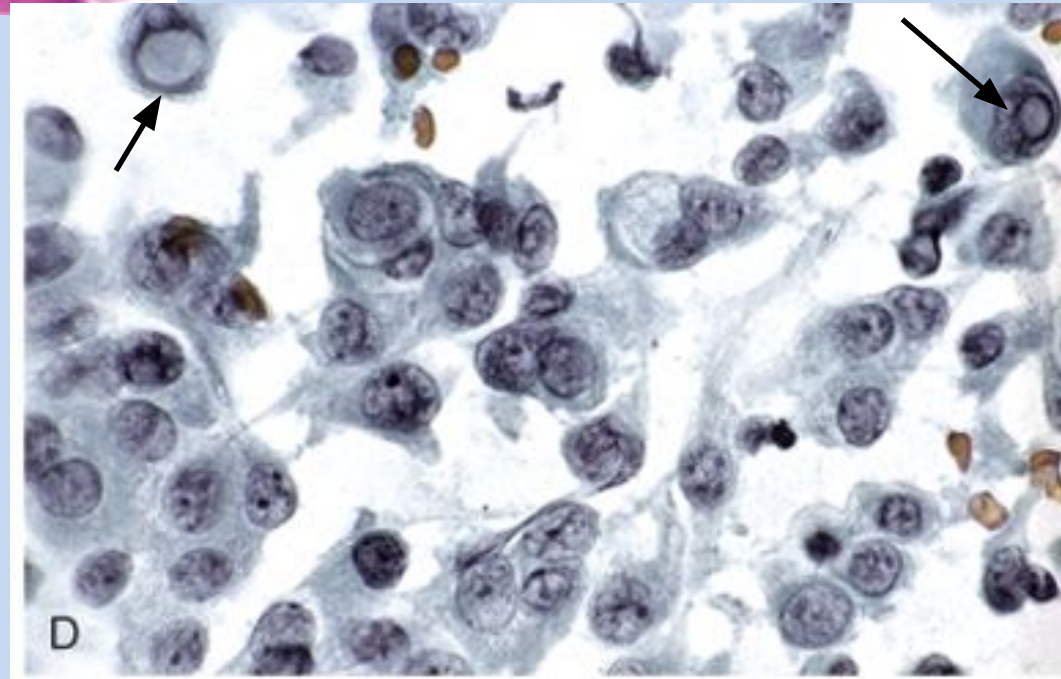


**Papillary adenocarcinoma: thyroid (HE x 30). It is a well-differentiated papillary lesion, lying within a cystic space. The fibrous capsule is on the right. The papillae have a core of vascular connective tissue and are covered with cuboidal epithelium.**

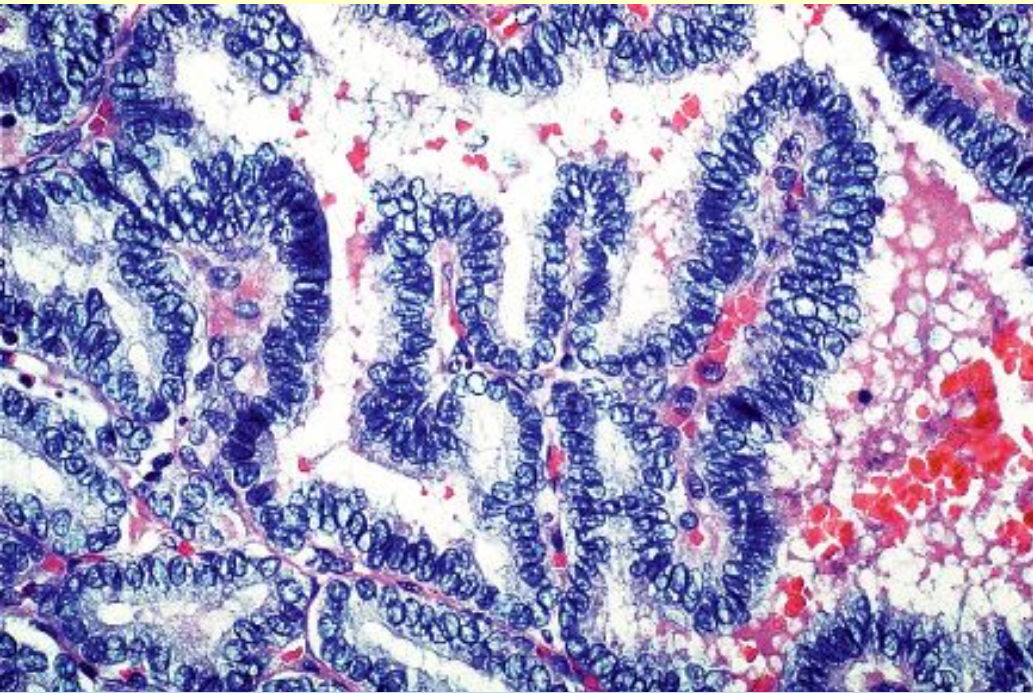
## Papillary carcinoma nuclear features



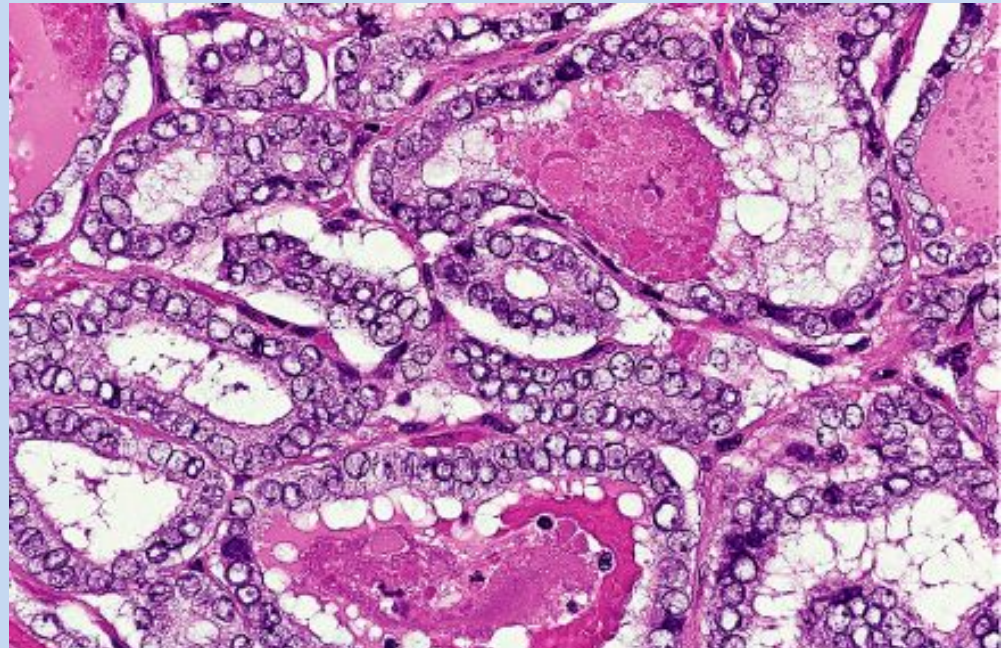
The papillae are lined by cells with characteristic empty-appearing nuclei, (ground glass or "Orphan Annie eye" nuclei) (C). D, Cells obtained by fine-needle aspiration of a papillary carcinoma. Characteristic intranuclear inclusions are visible in some of the aspirated cells.



## Papillary carcinoma thyroid ground glass nuclei

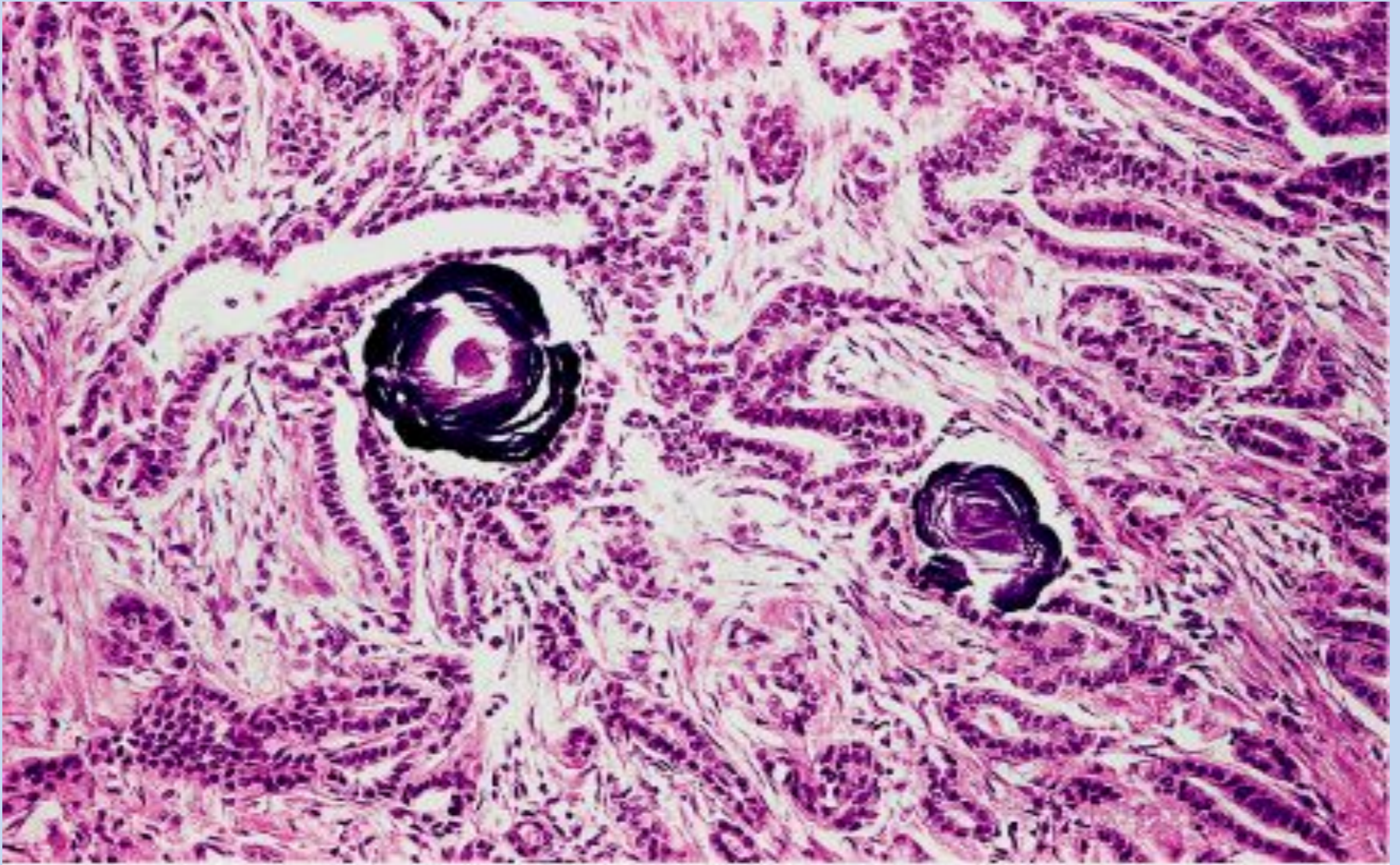


**Nuclear features of papillary carcinoma: optically clear (ground glass) nuclei**

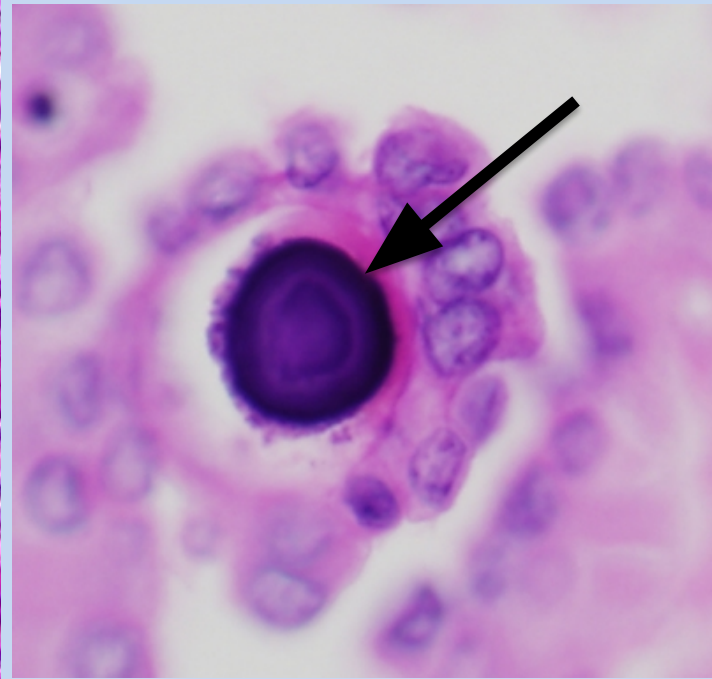
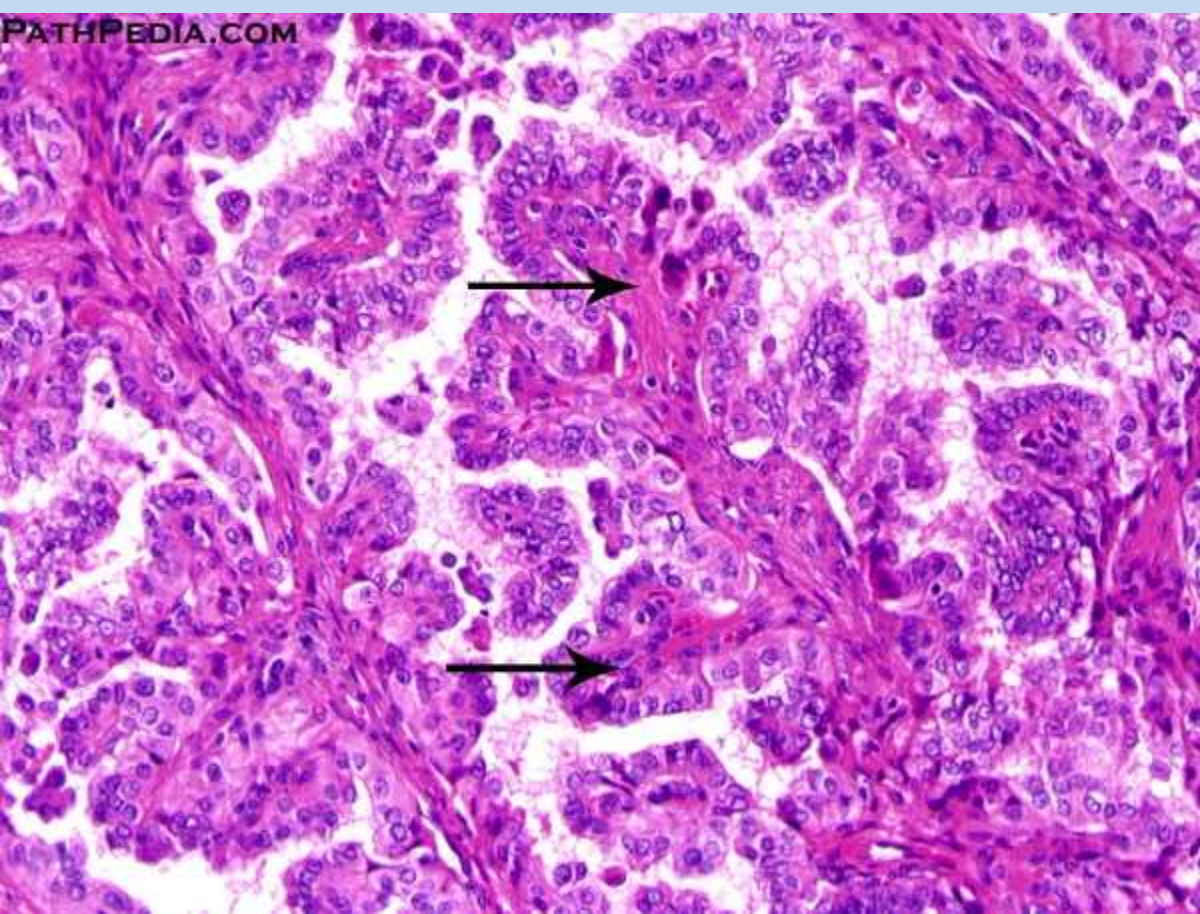




## Papillary ca thyroid



Psammoma body formation within the stroma of the tumor.



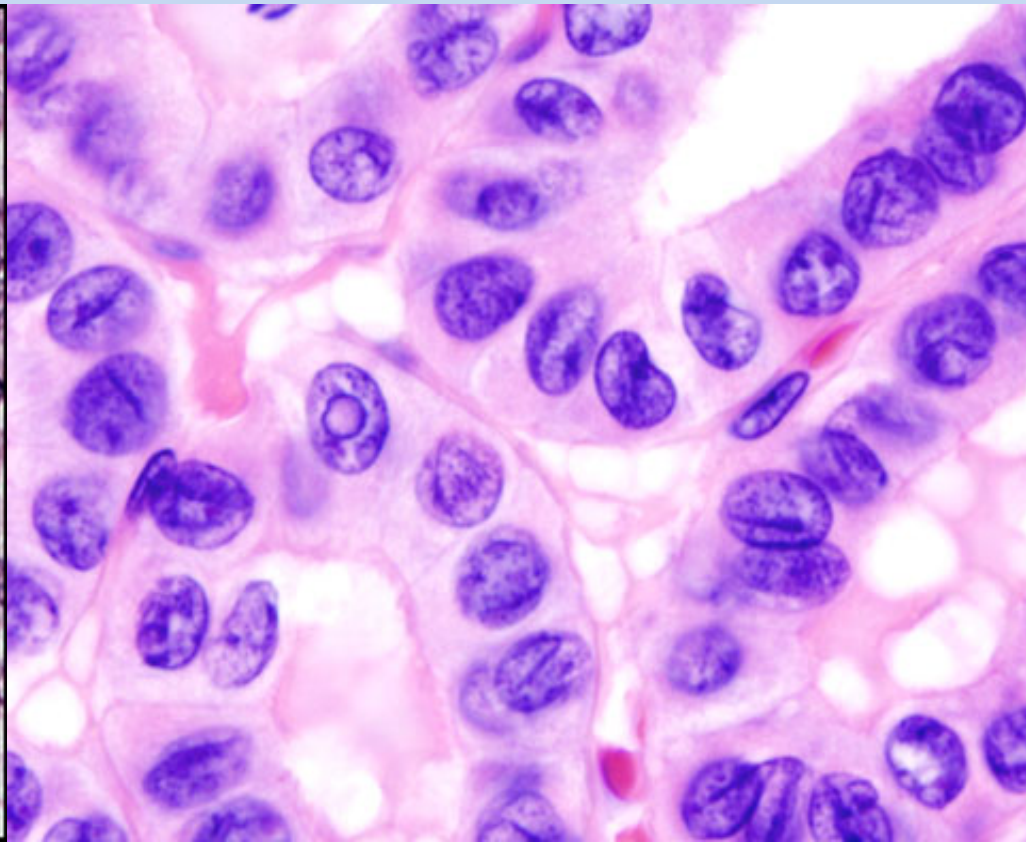
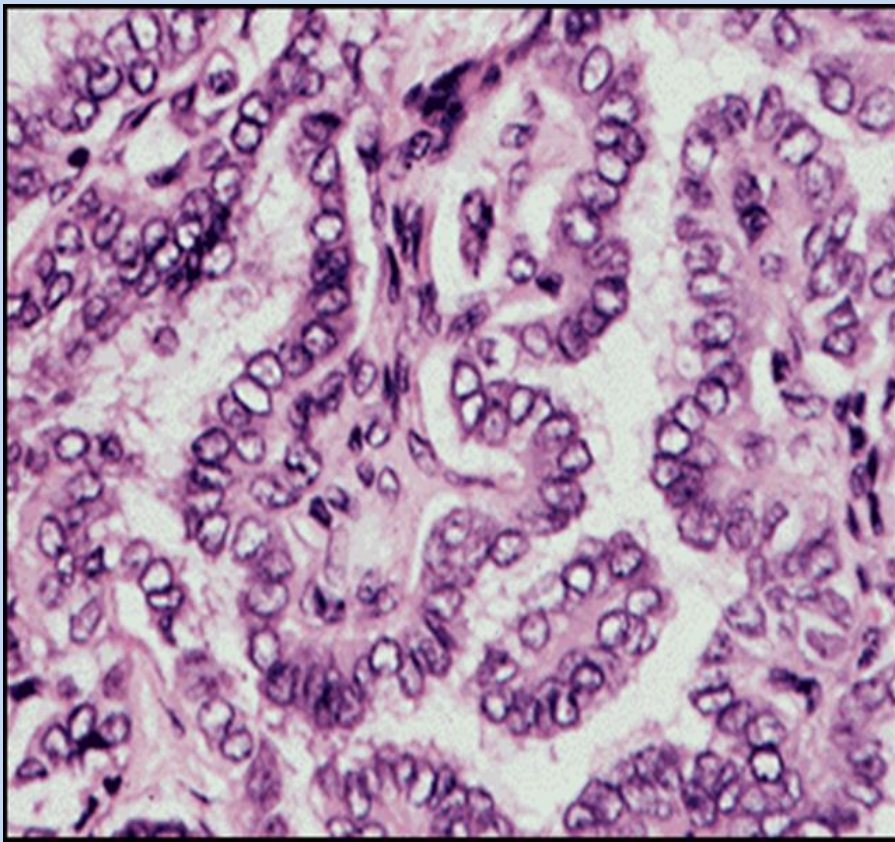
**Psammoma  
bodies**

## **Papillary carcinoma**

**complex papillary architecture**  
**malignant cells arranged in one or more layers**  
**around fibro-vascular cores**

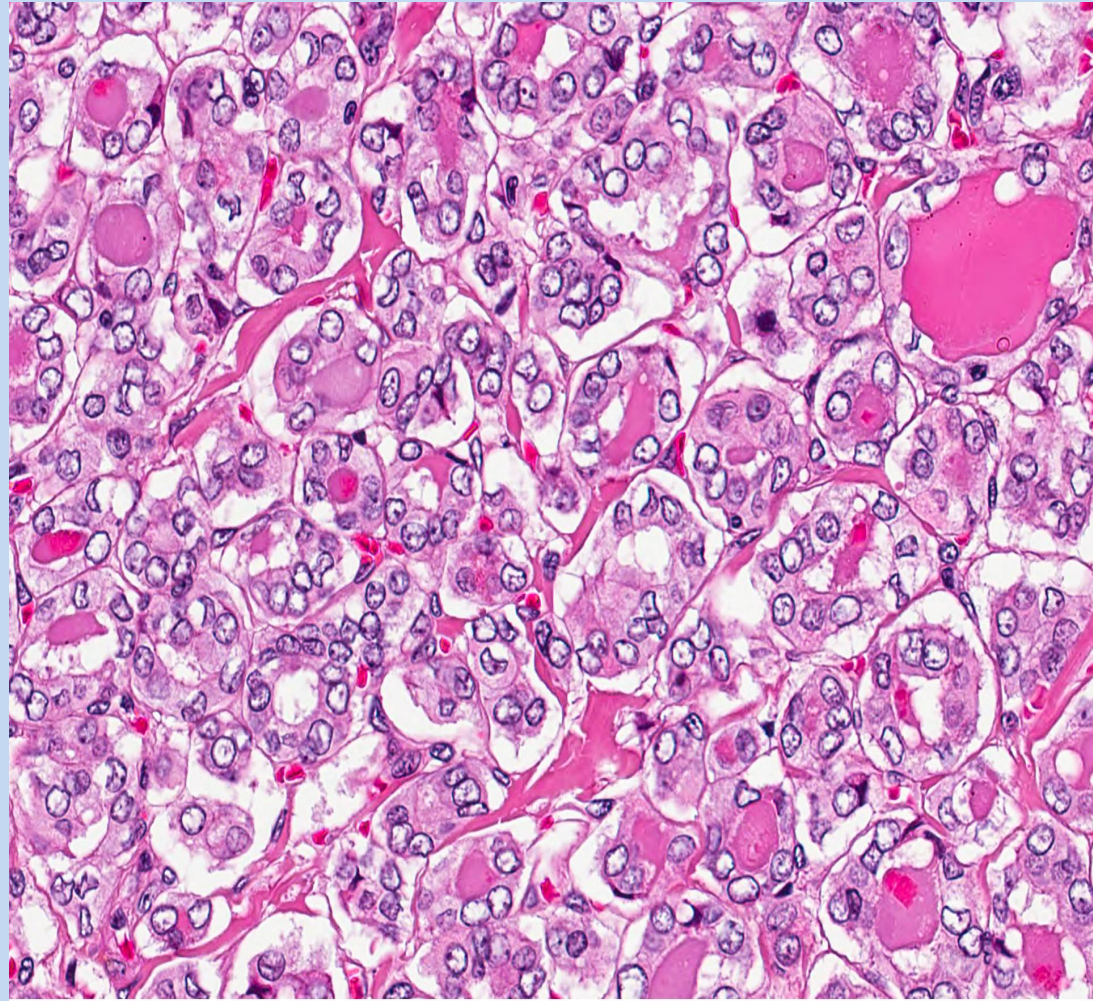
- *The diagnostic nuclear features are:*

- Optically clear nuclei devoid of nucleoli (ground glass nuclei).
- Nuclear grooves.
- Intranuclear cytoplasmic inclusions.



# Follicular variant of Papillary carcinoma

## Nuclear features



NIFTP:  
microfollicular pattern, PTC nuclei with prominent clearing and membrane irregularity (H&E, ×40)

# Spread

- Local infiltration to the surrounding tissues
  - **Lymphatic spread common & early to cervical lymph nodes**
  - Blood spread rare and late to the lungs and the bone
- Distant metastases are present at diagnosis in 3-5% of cases.

# Tumors of thyroid

## A- Benign:

Adenoma ; Follicular / Hurthle cell

## B- Malignant: (carcinoma)

1- Papillary

2- Follicular

3- Anaplastic

4- Medullary

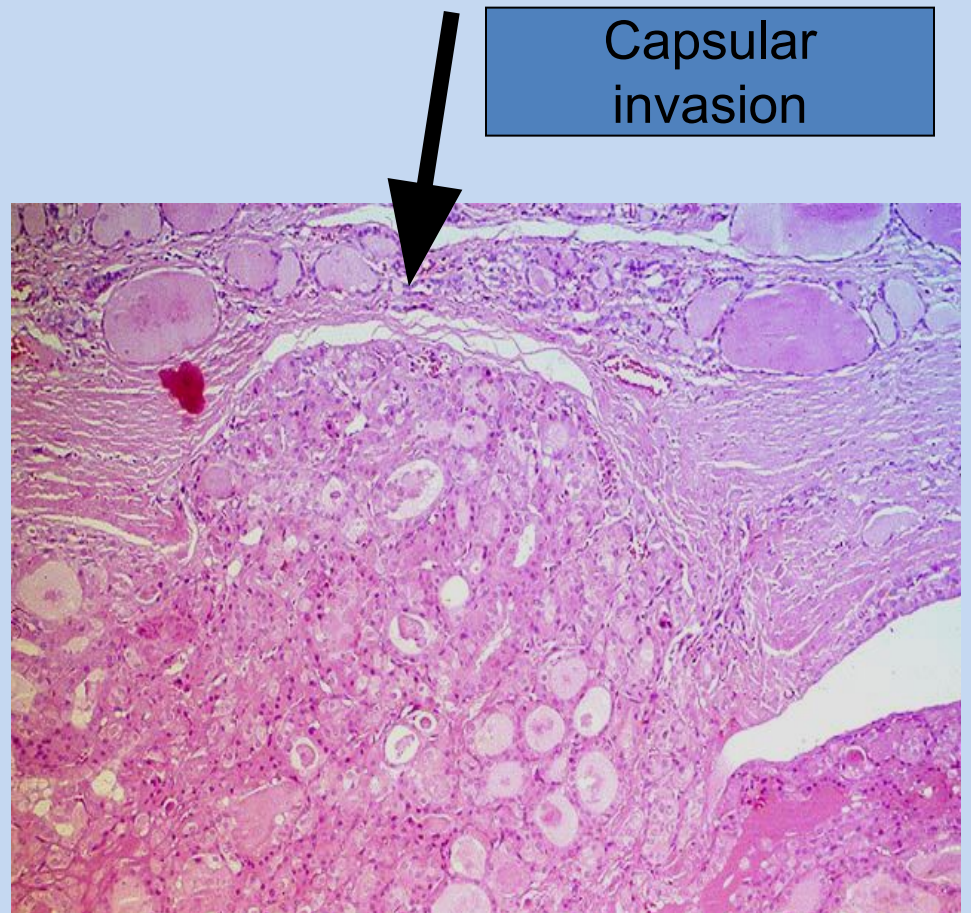
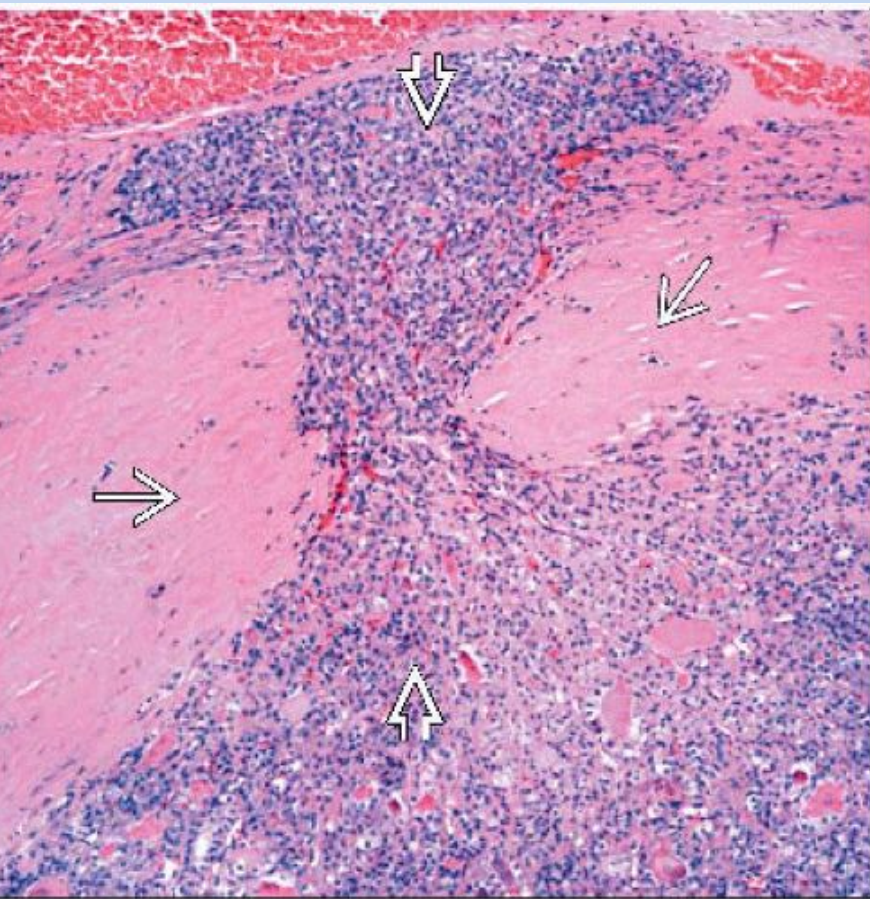
# Follicular carcinoma

- Uncommon
- Females 40-60 years
- Adenoma/ SNG (simple nodular goiter) ??



## Gross:

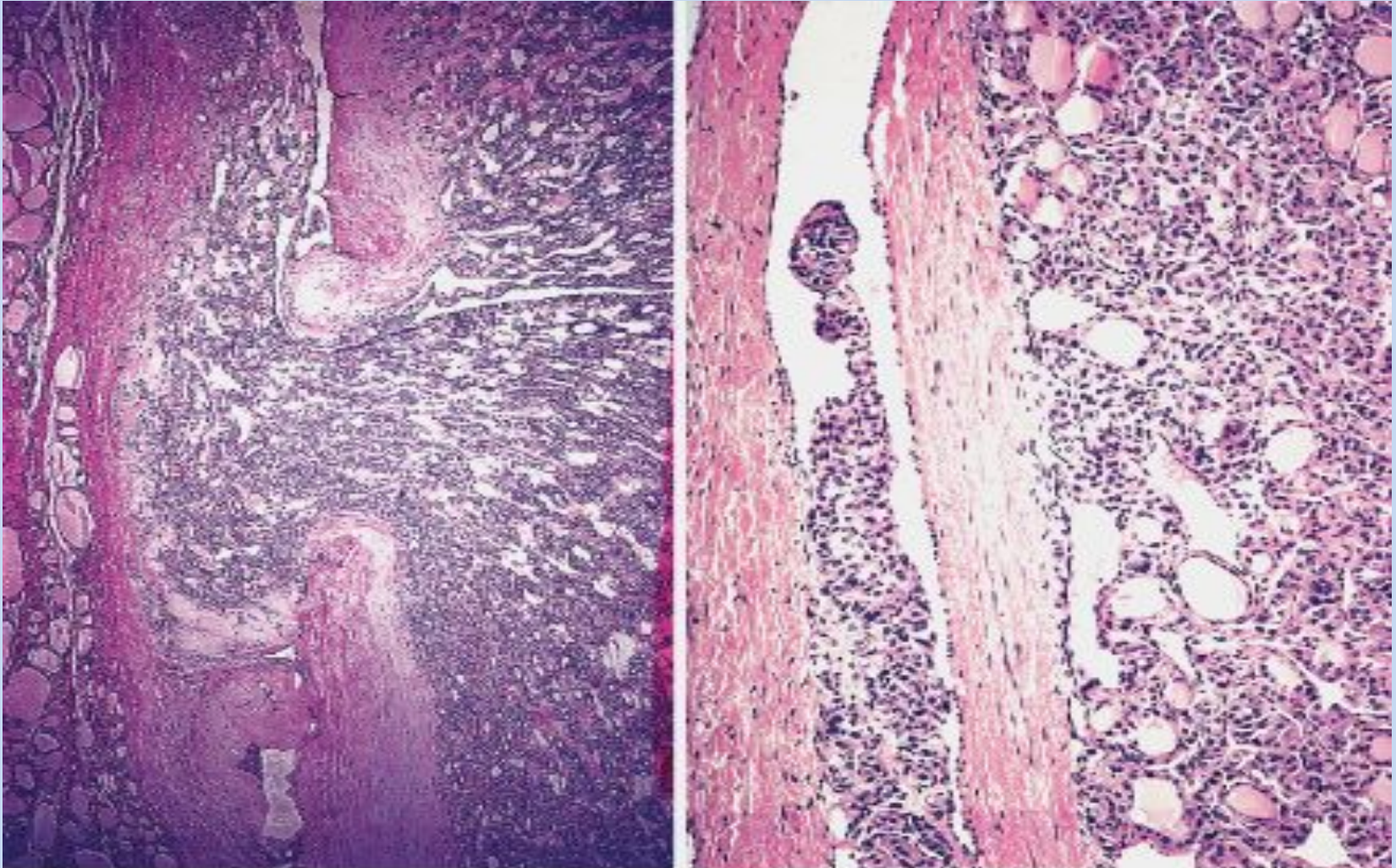
- The tumor appears fleshy infiltrating the thyroid & surrounding tissue



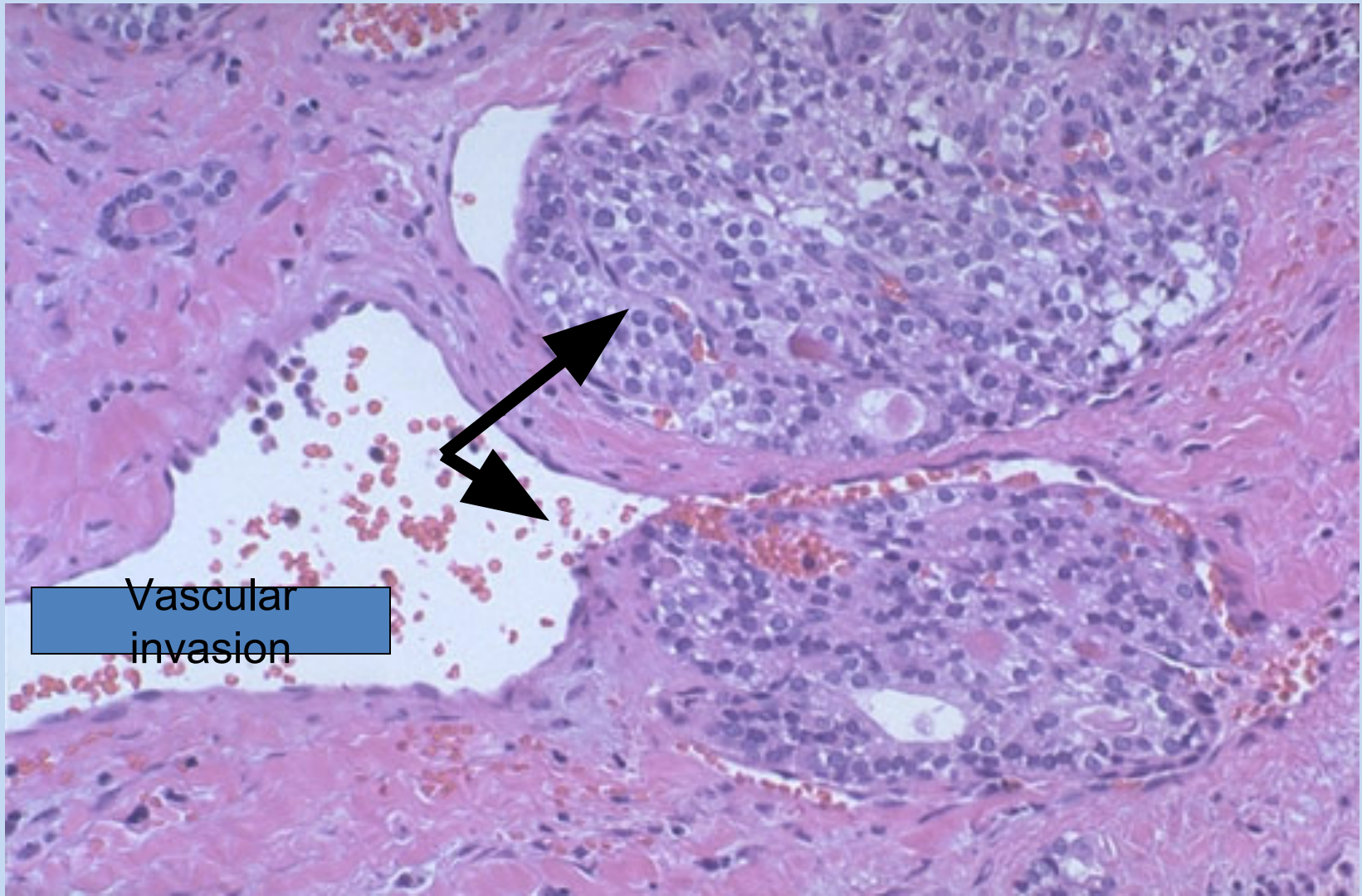
- Various grades of differentiation
- **Capsular and / or vascular invasion are mandatory to confirm the diagnosis.**



# Minimally invasive follicular ca Thyroid

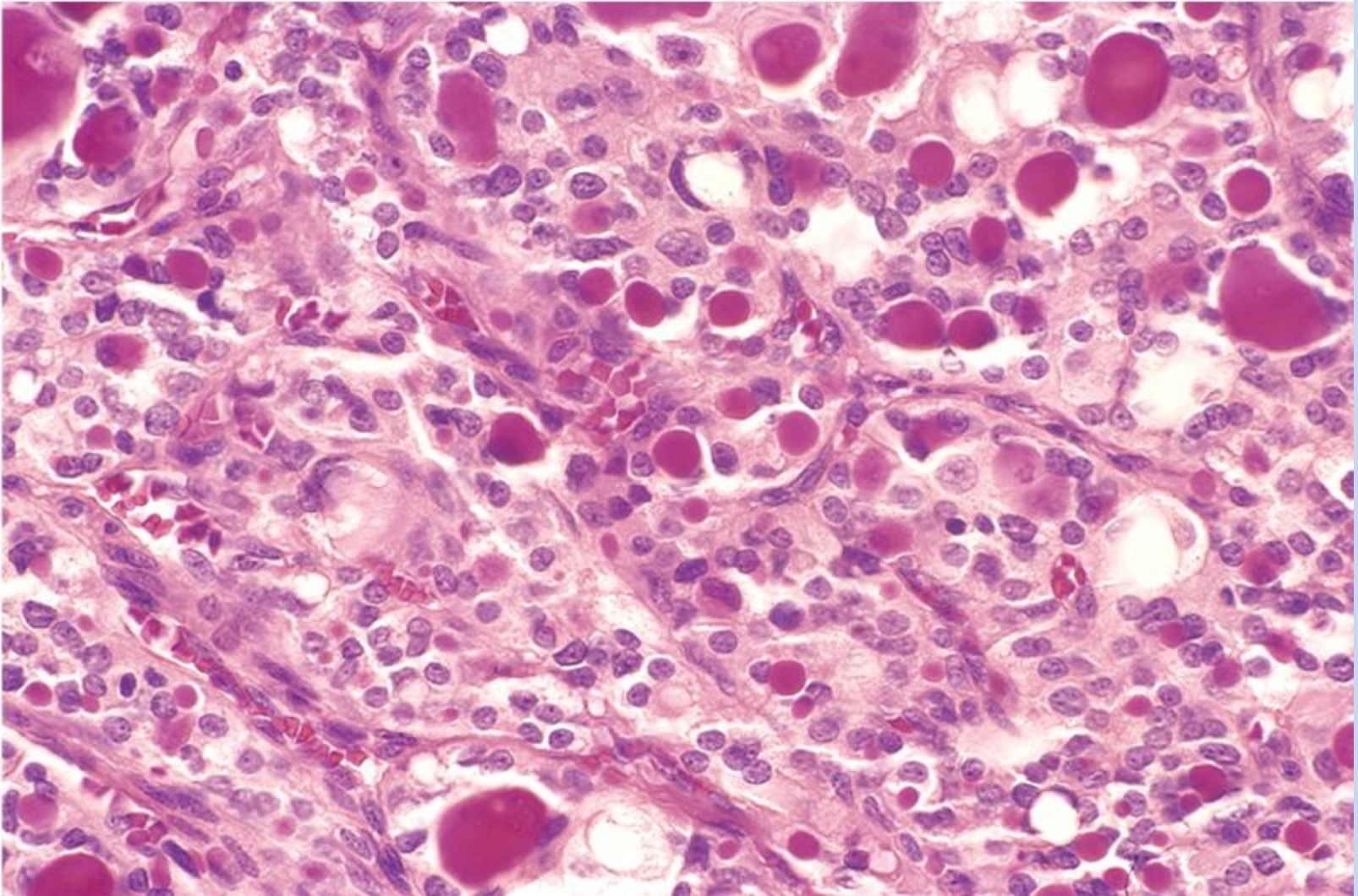


Capsular (A) and vascular (B) invasion in minimally invasive follicular carcinoma .



Vascular  
invasion

## Follicular carcinoma thyroid.



A few of the glandular lumens contain recognizable colloid.

# Spread

- Local infiltration to the surrounding tissue
- **Blood spread common and early**  
mainly to lungs and bones
- Lymphatic spread rare and late

# Tumors of thyroid

## A- Benign:

Adenoma ; Follicular / Hurthle cell

## B- Malignant: (carcinoma)

1- Papillary

2- Follicular

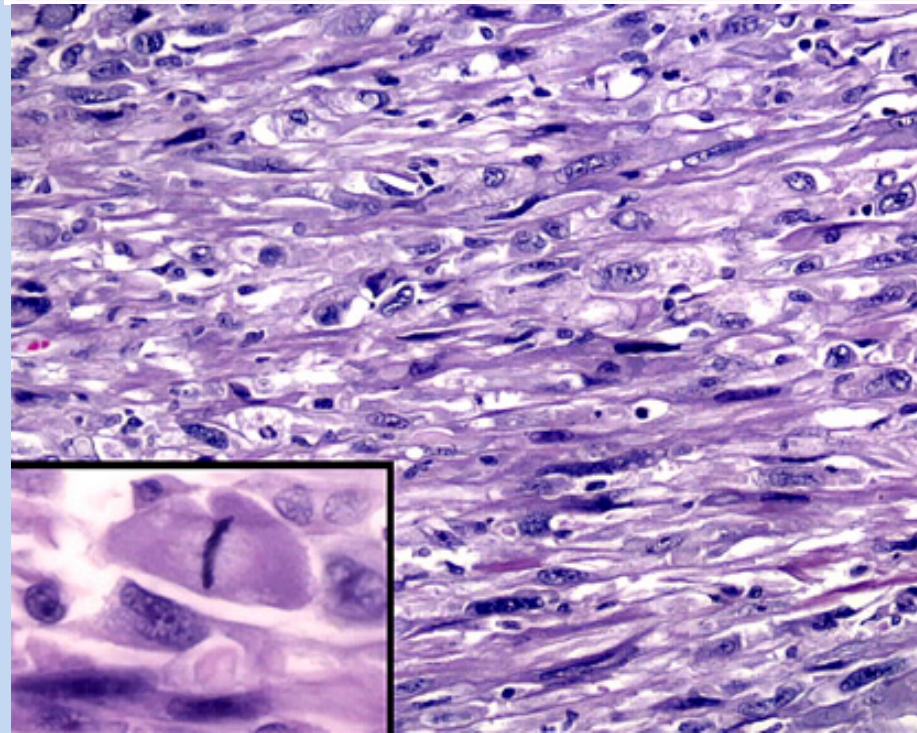
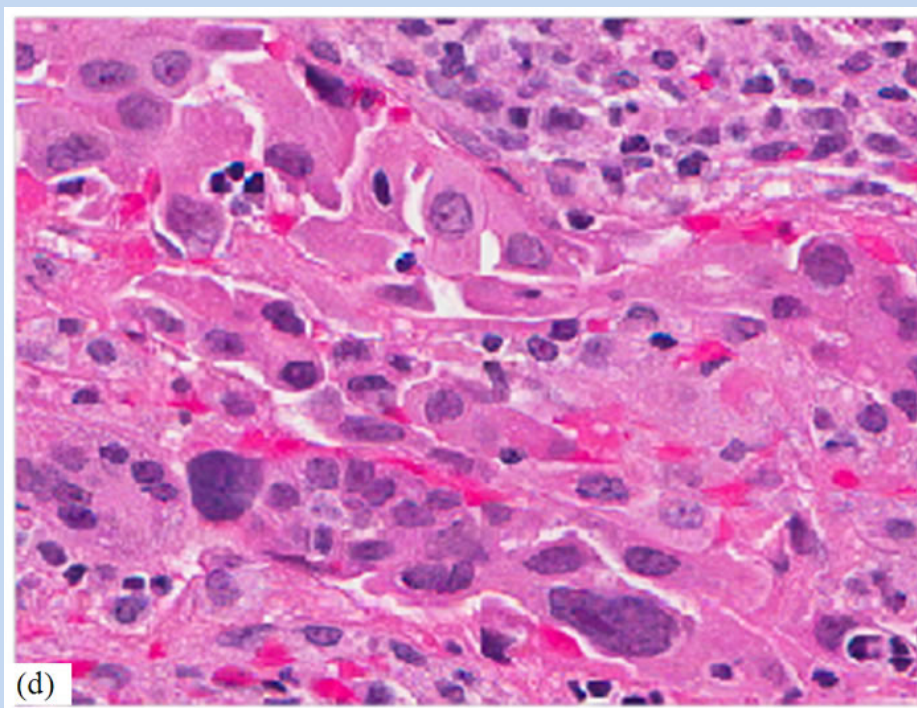
3- Anaplastic

4- Medullary

# Anaplastic carcinoma

- Rare
- **Elderly females > 65**
- Rapidly progressive > compression of airways
- Histological variants

**Large pleomorphic giant cells/ Spindle cells with sarcomatoid appearance.**



## Anaplastic (undifferentiated) ca thyroid

A 70-year-old Iraqi female presented with a 3-month-history of rapidly enlarging thyroid mass with shortness of breath & dysphagia.



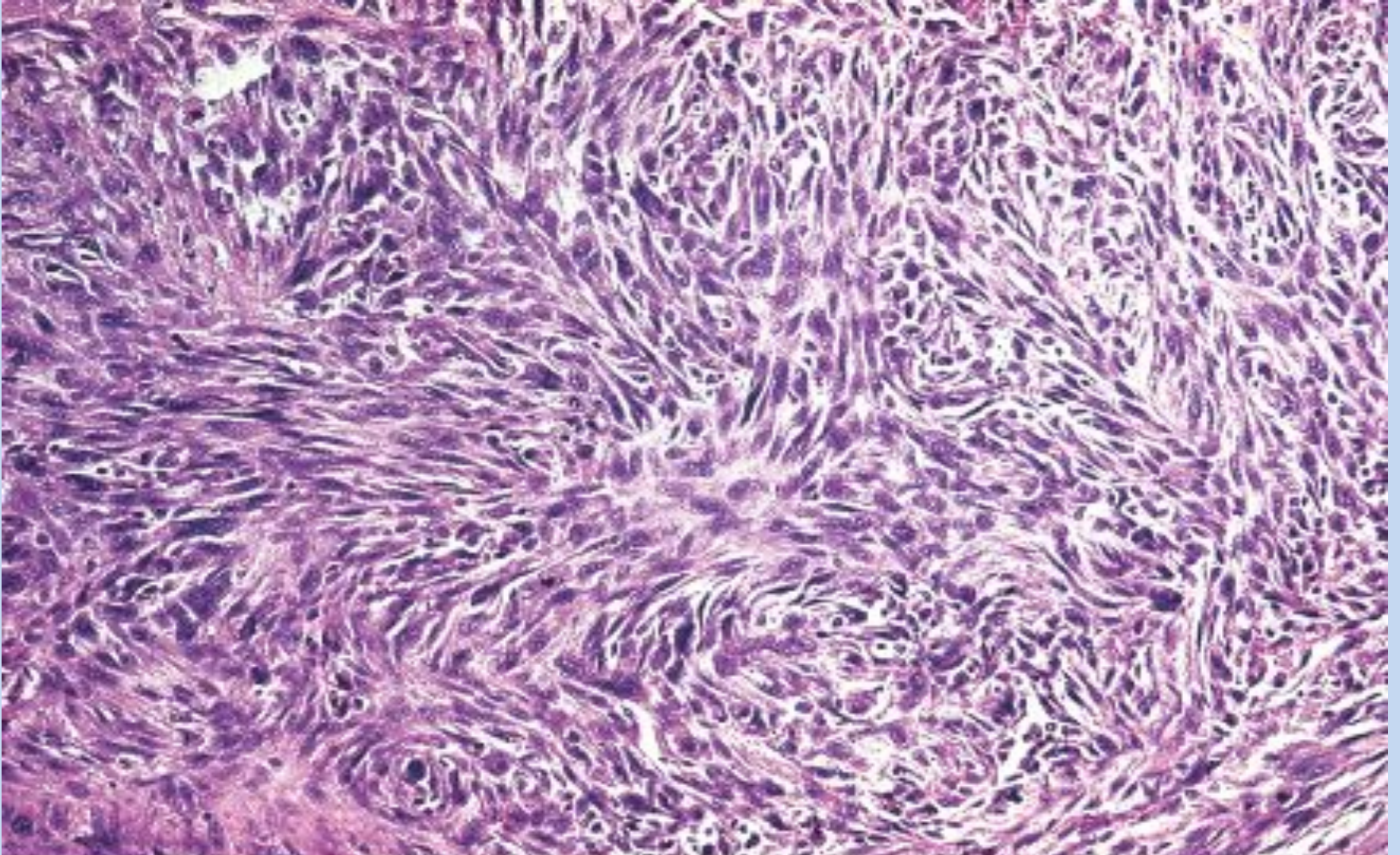
## Anaplastic (undifferentiated) ca thyroid



The cancer is entirely replacing the gland and extending into the surrounding skeletal muscle.

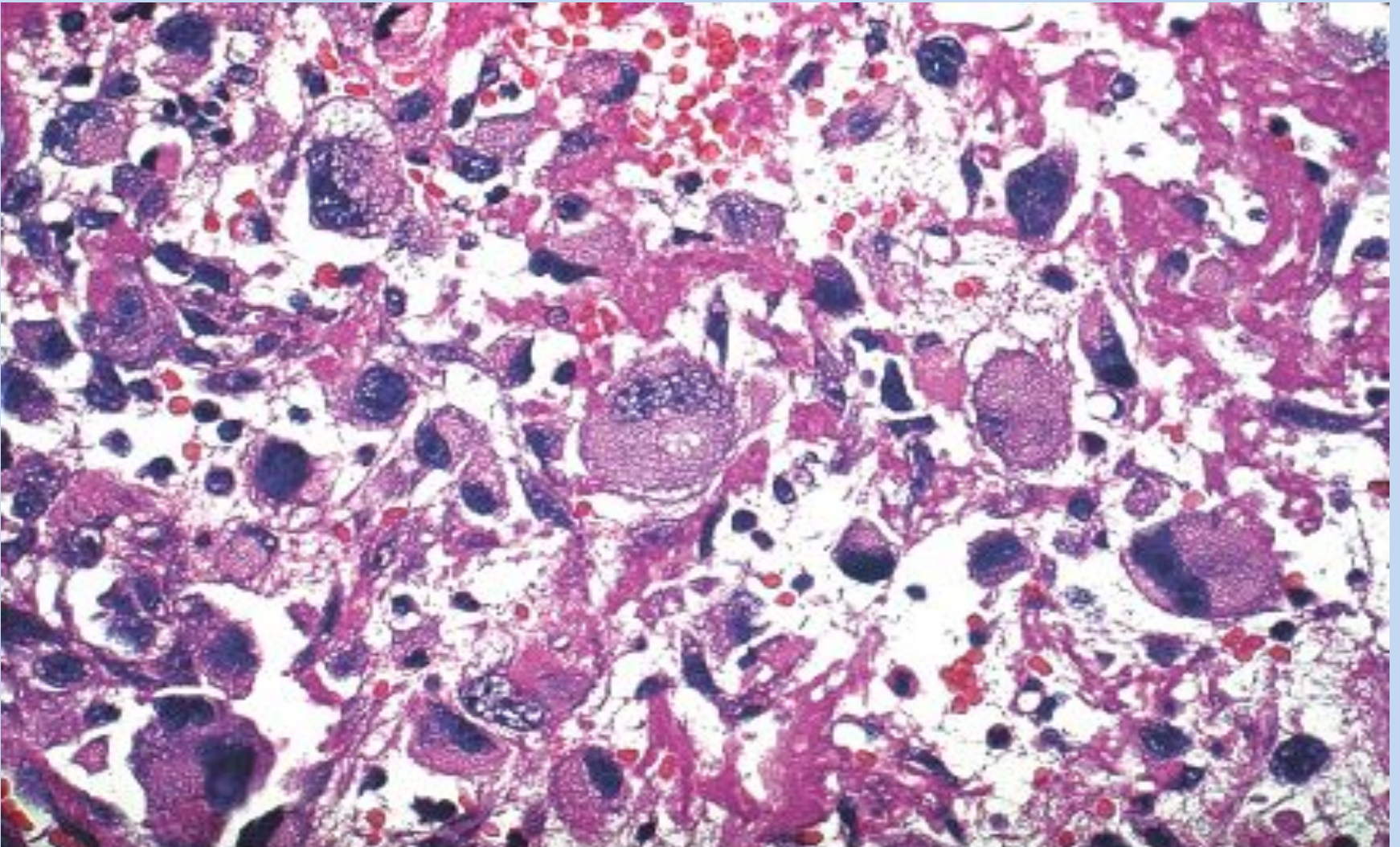


## **Anaplastic (undifferentiated) ca spindle cell type thyroid**



**Anaplastic carcinoma of the spindle cell type. Tumor grows in diffuse fashion around thyroid follicles. Appearance closely simulates that of soft tissue sarcoma.**

## Undifferentiated (anaplastic) ca



Several giant tumor cells with huge hyperchromatic nuclei are present in solid and myxoid background.

# tumors of thyroid

## A- Benign:

Adenoma ; Follicular / Hurthle cell

## B- Malignant: (carcinoma)

1- Papillary

2- Follicular

3- Anaplastic

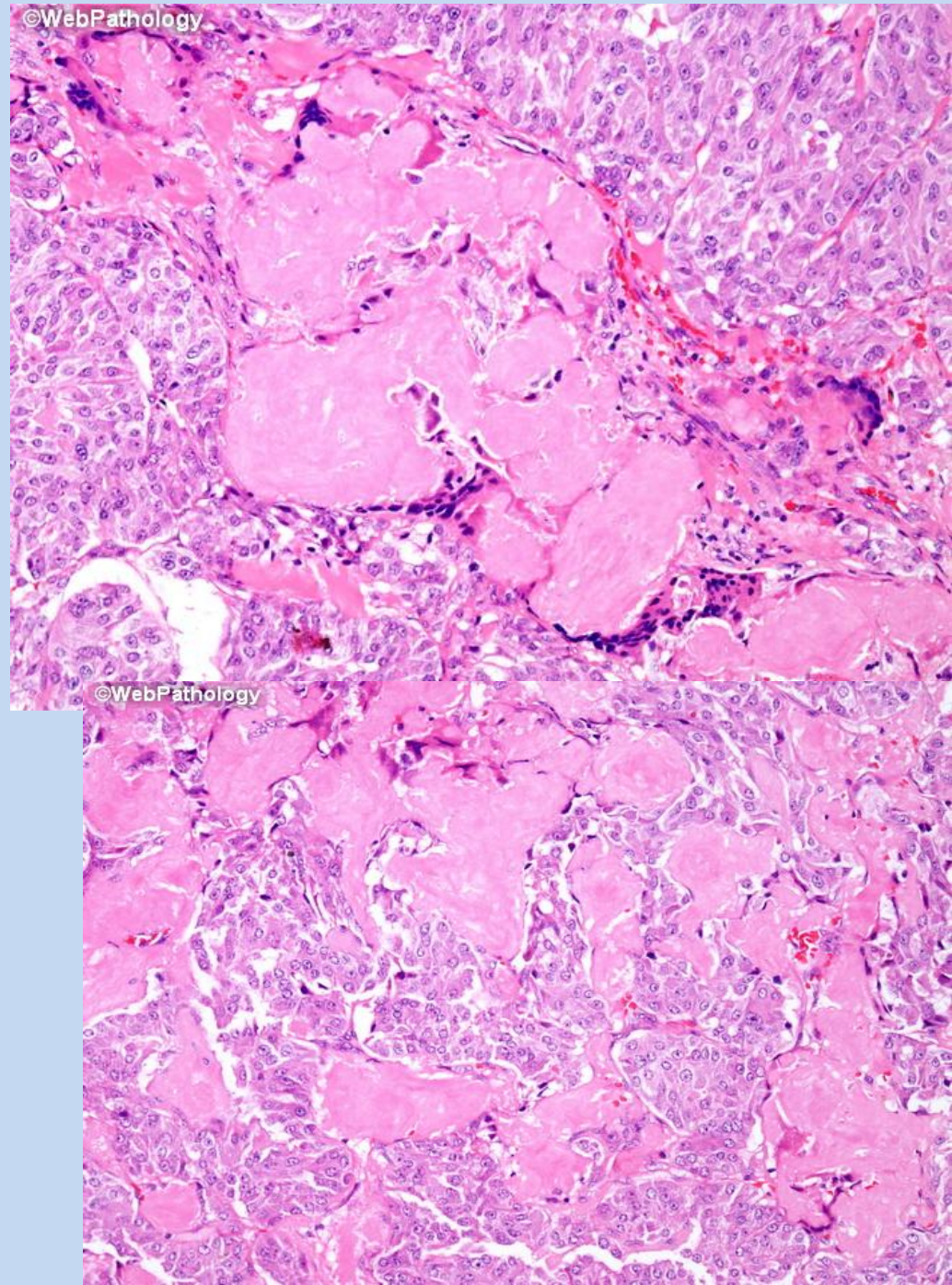
4- Medullary

# Medullary thyroid carcinoma

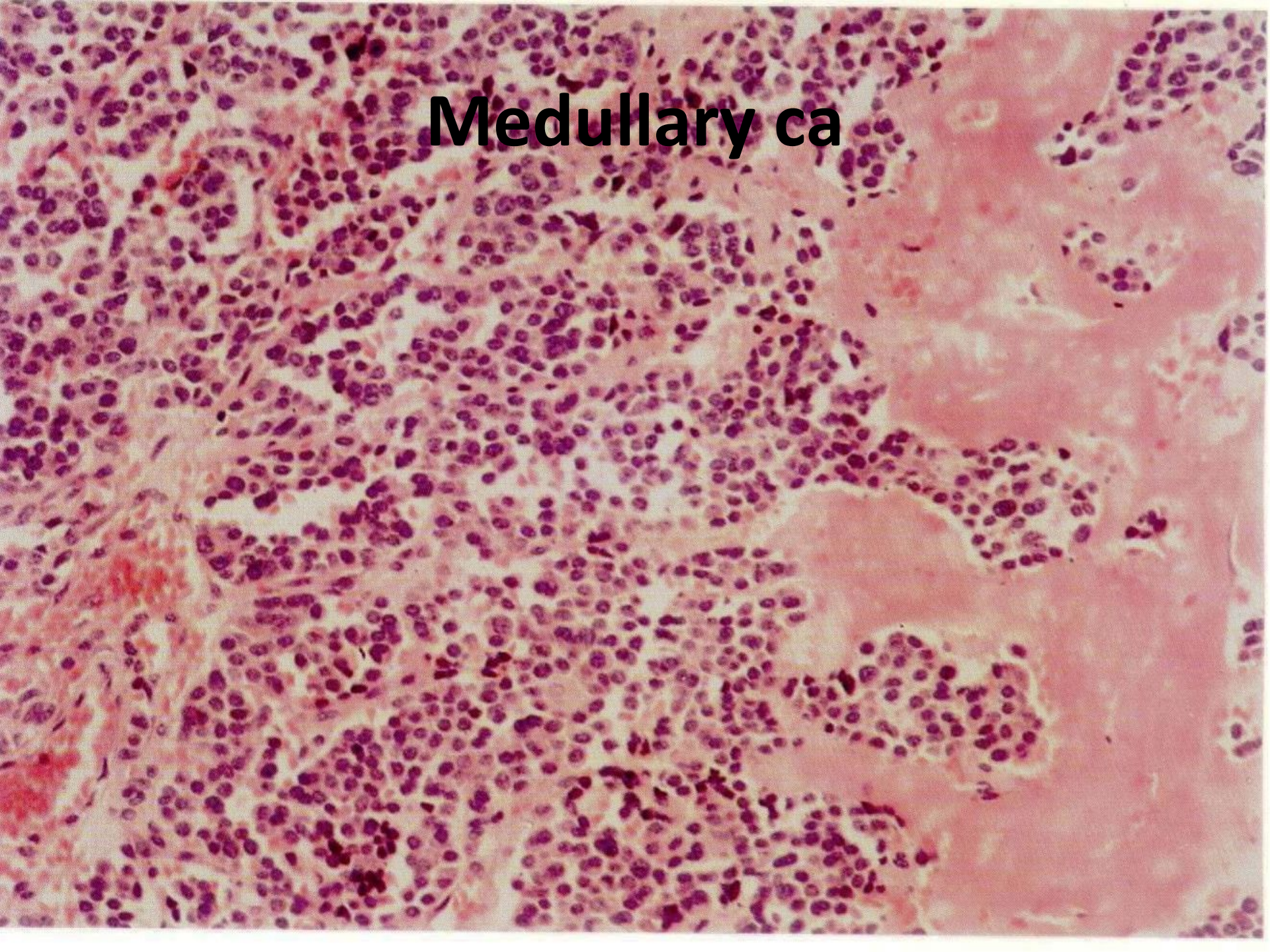
- **Parafollicular C- cell**
- **Neuroendocrine**
- **Sporadic or familial**
- **Secrete calcitonin**
- **Amyloid stroma**
- **Trabeculae or nests**

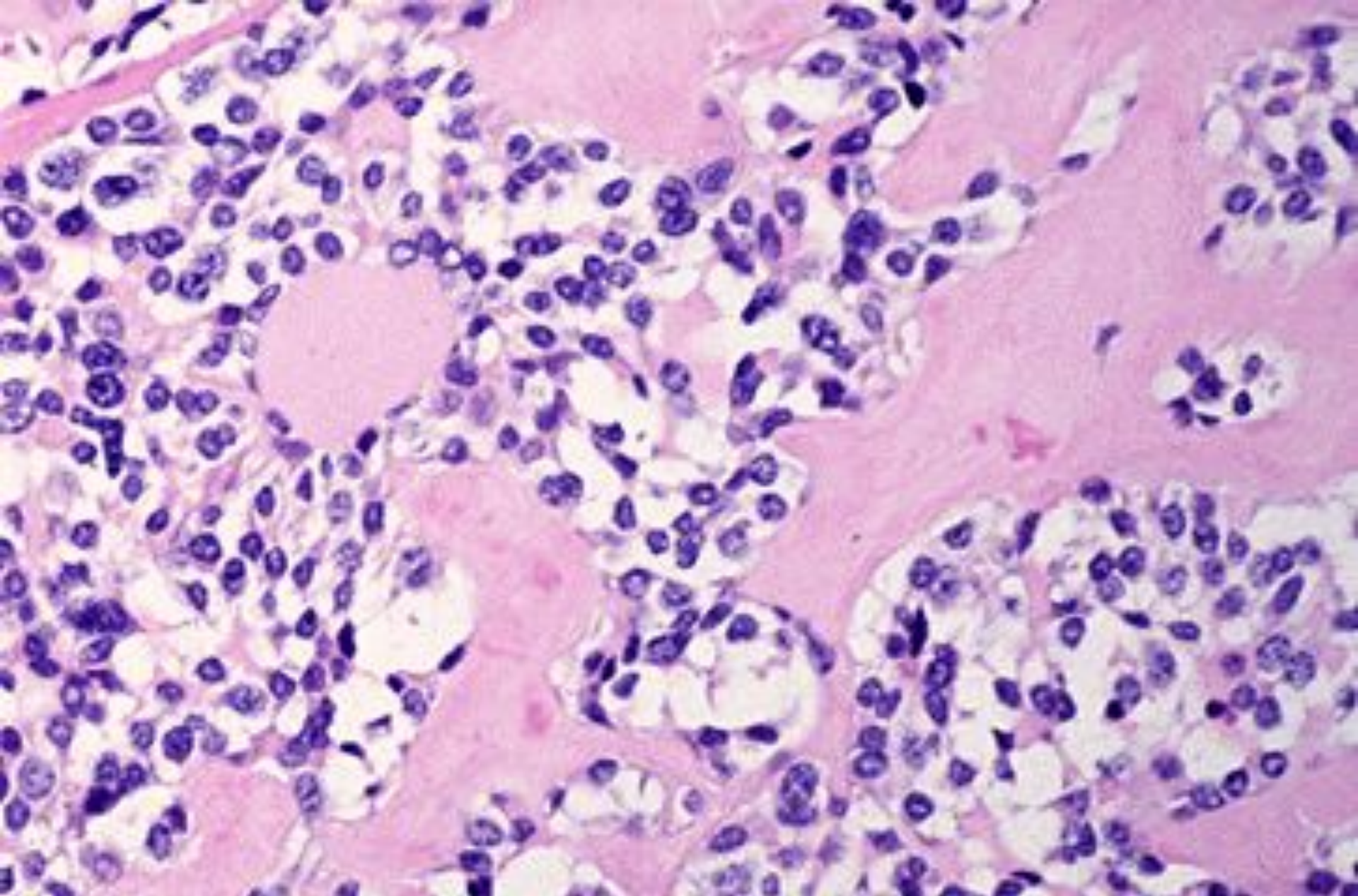
## **MEN 2 :**

**Medullary carcinoma +  
Parathyroid adenoma +  
Pheochromocytoma**



**Medullary ca**





**MEDULLARY CARCINOMA** of the thyroid with “HYALINIZATION”, i.e.,

**AMYLOID!!!**



**HYALINIZATION** showing **APPLE GREEN** birefringence in  
**CONGO RED** stain, i.e., **AMYLOID**

	Papillary carcinoma	Follicular carcinoma	Anaplastic carcinoma	Medullary carcinoma
Patient	Female/any age	Female/40-60	Elderly female	Elderly male
Etiology	Irradiation	Follicular adenoma? SNG?	On top of well differentiated tr.	Sporadic vs. Familial (MEN)
Microscopic : Diagnostic feature	Nuclear features Psammoma bodies?	Capsular invasion Vascular invasion	NONE	Amyloid C cells hyperplasia?
Variants	Papillary-Follicular	Minimally invasive Widely invasive	Large giant cell type/Spindle cell type/Mixed	
Clinical significance	LN mets.	Blood mets.		Hormonal manifestations



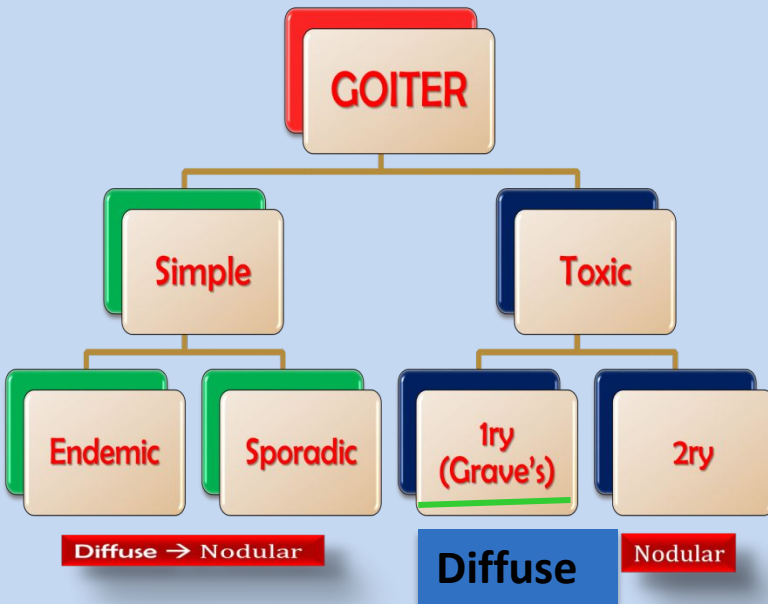
# REMEMBER

# DISEASES OF THE THYROID GLAND

Inflammation of thyroid gland 'THYROIDITIS'



- A) Infectious thyroiditis
- B) Riedel's fibrosing thyroiditis
- C) Hashimoto thyroiditis
- D) Subacute granulomatous (De Quervain's) Thyroiditis
- E) Subacute lymphocytic thyroiditis



	Papillary carcinoma	Follicular carcinoma	Anaplastic carcinoma	Medullary carcinoma
Patient	Female/any age	Female/40-60	Elderly female	Elderly male
Etiology	Irradiation	Follicular adenoma? SNG?	On top of well differentiated tr.	Sporadic vs. Familial (MEN)
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**ANY QUESTIONS???**