PRACTICAL CLASS: NEOPLASIA

Dr. Zaleha Kamaludin

Pathology Department

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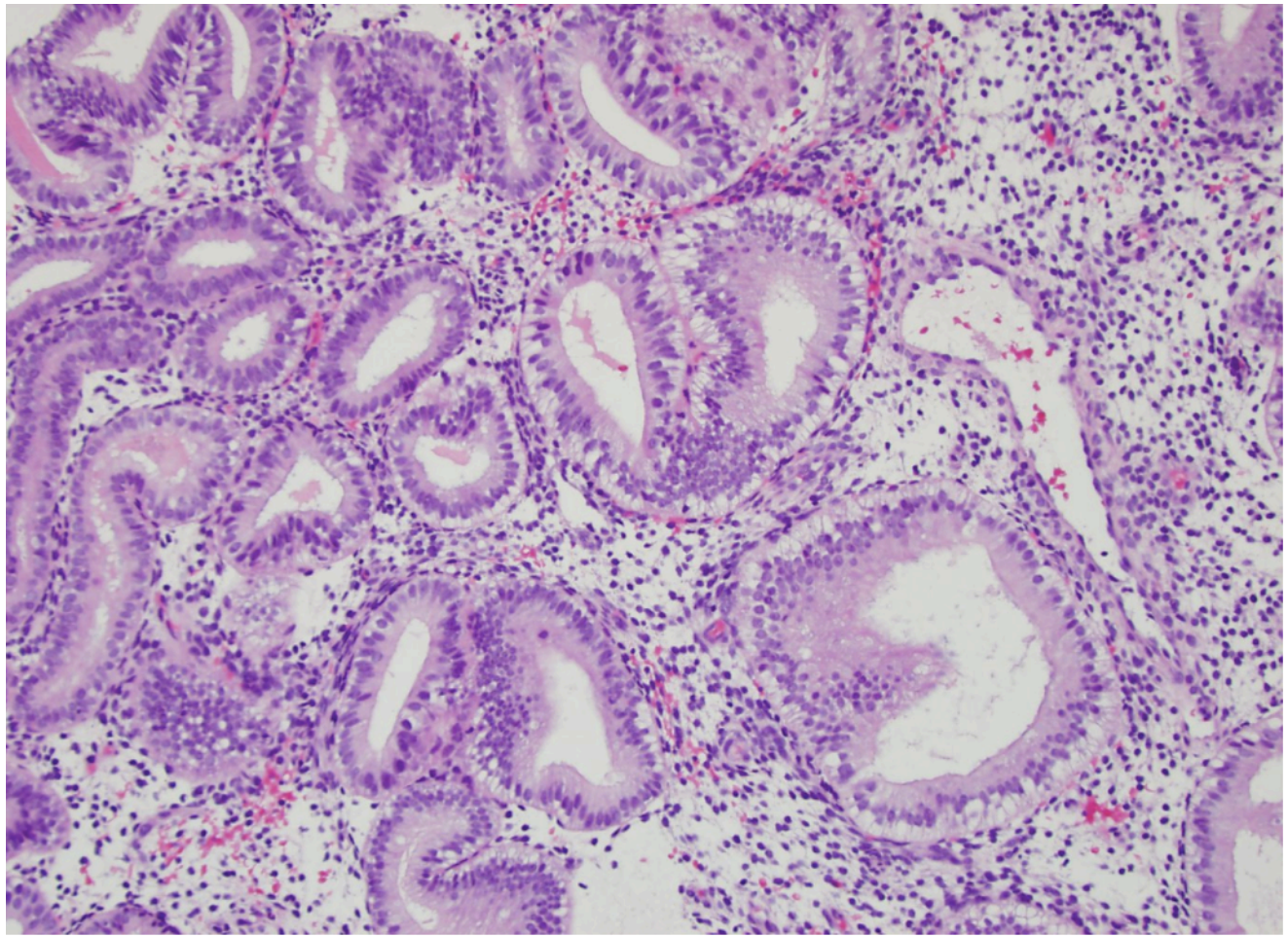
- **What is neoplasm?**

- **What are the two main components of all neoplasms?**

Answer

What are the two main components of all neoplasms?

- Histologically, almost all neoplasms are composed of **two main components**:
  - **the parenchyma** component
  - **tumour stroma** which is a supporting framework consisting of connective tissue and newly formed blood vessels elicited from adjacent tissues.



Stroma cells

Parenchyma: gland

Nomenclature

Cell type

+

Characteristic/modifier to indicate benign /malignant

+

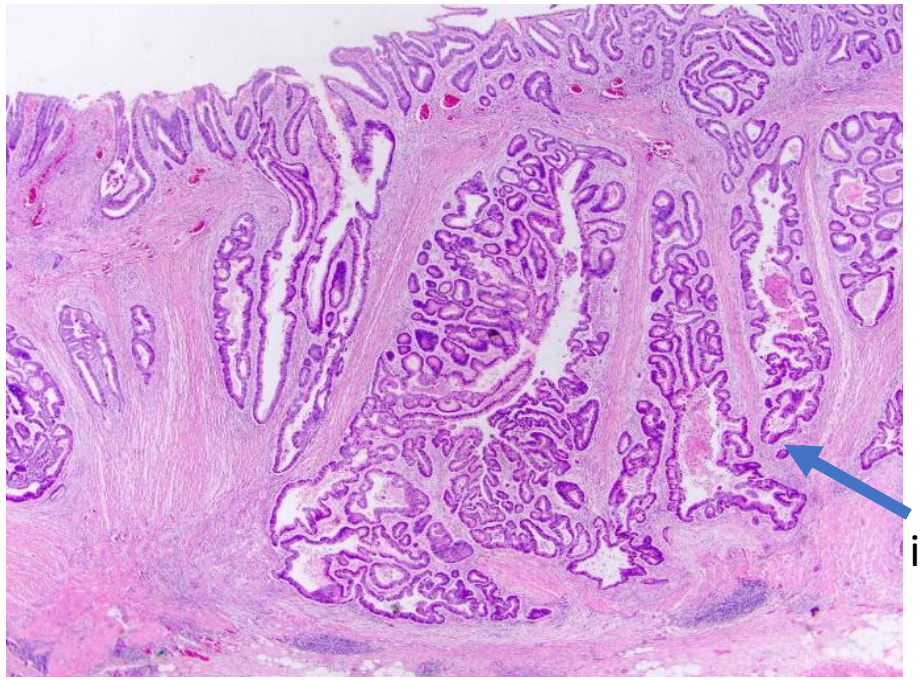
site of origin

= .....?

Epithelial

Glandular + benign features + colon=

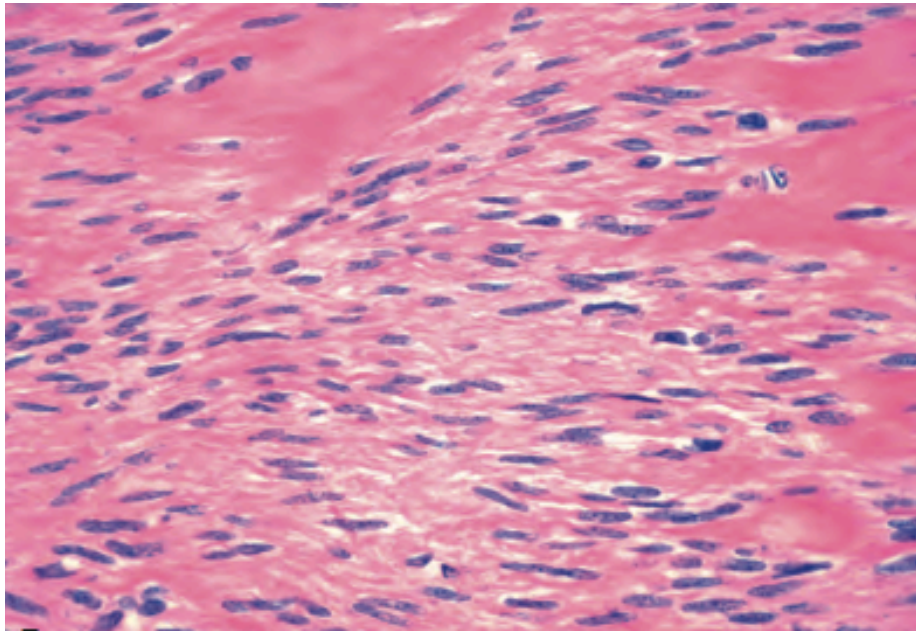
Adenoma of the colon



Glandular + malignant features + colon=

Adenocarcinoma of the colon

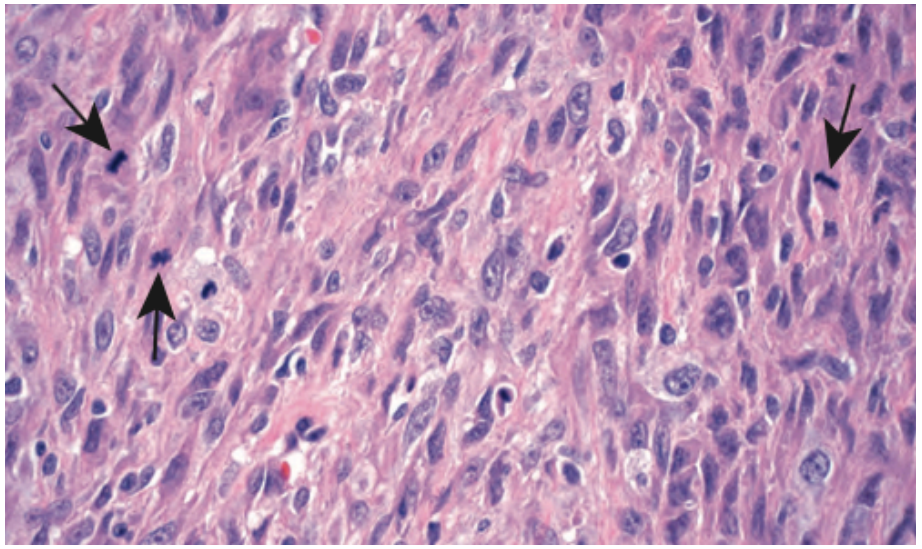
Malignant irregular gland infiltrate the muscle layer



Mesenchymal

Smooth muscle + benign + uterine wall =

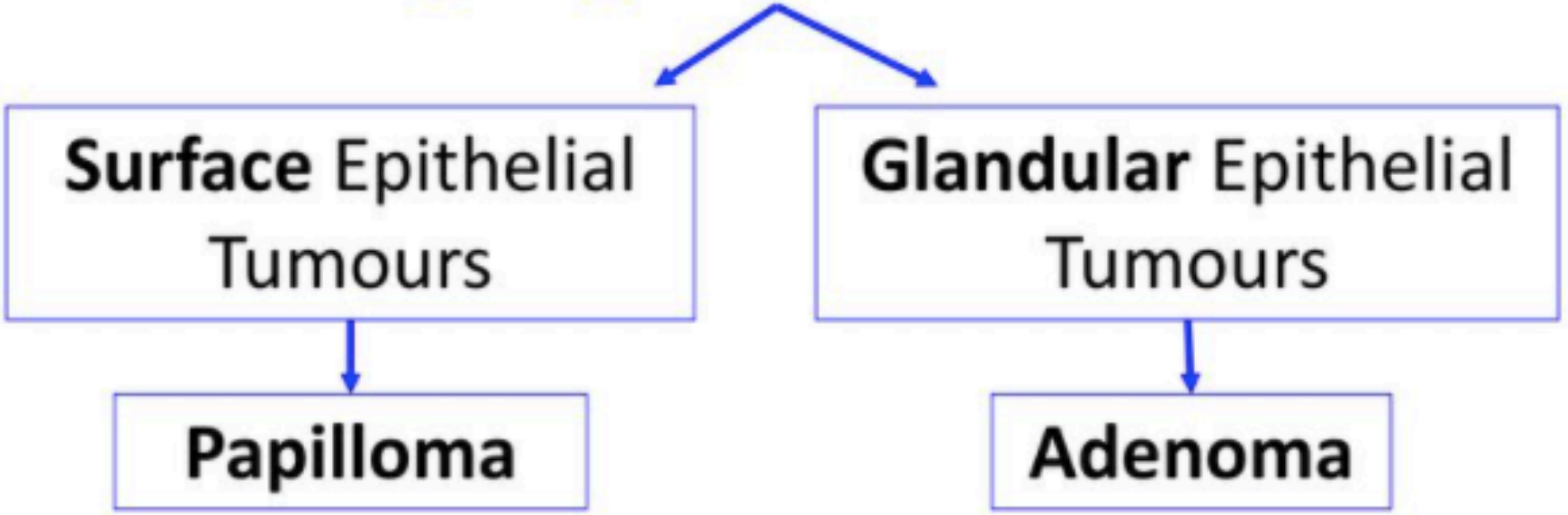
Leiomyoma of the uterus



Smooth muscle + malignant + uterine wall=

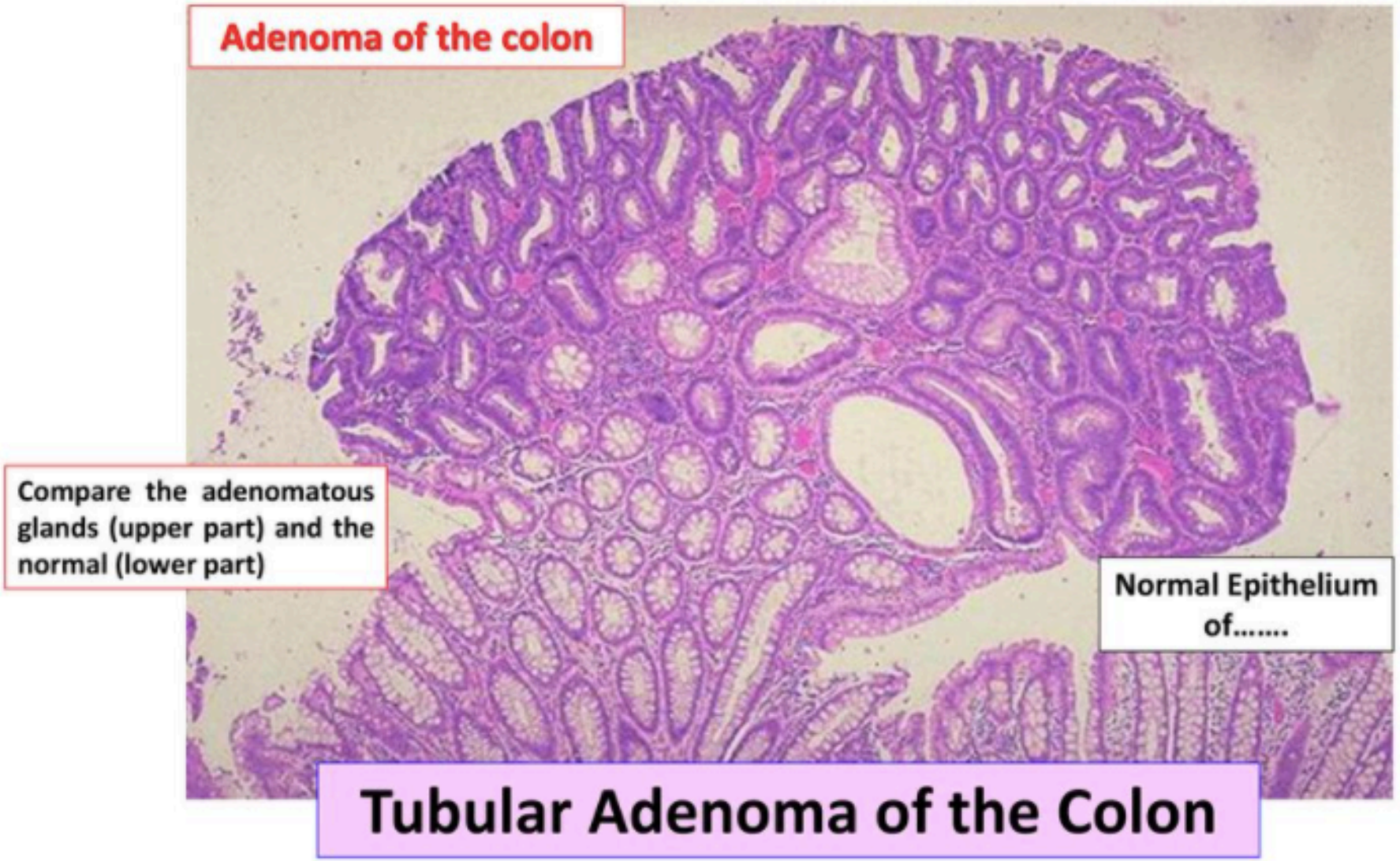
Leiomyosarcoma of the uterus

Benign Epithelial Tumours

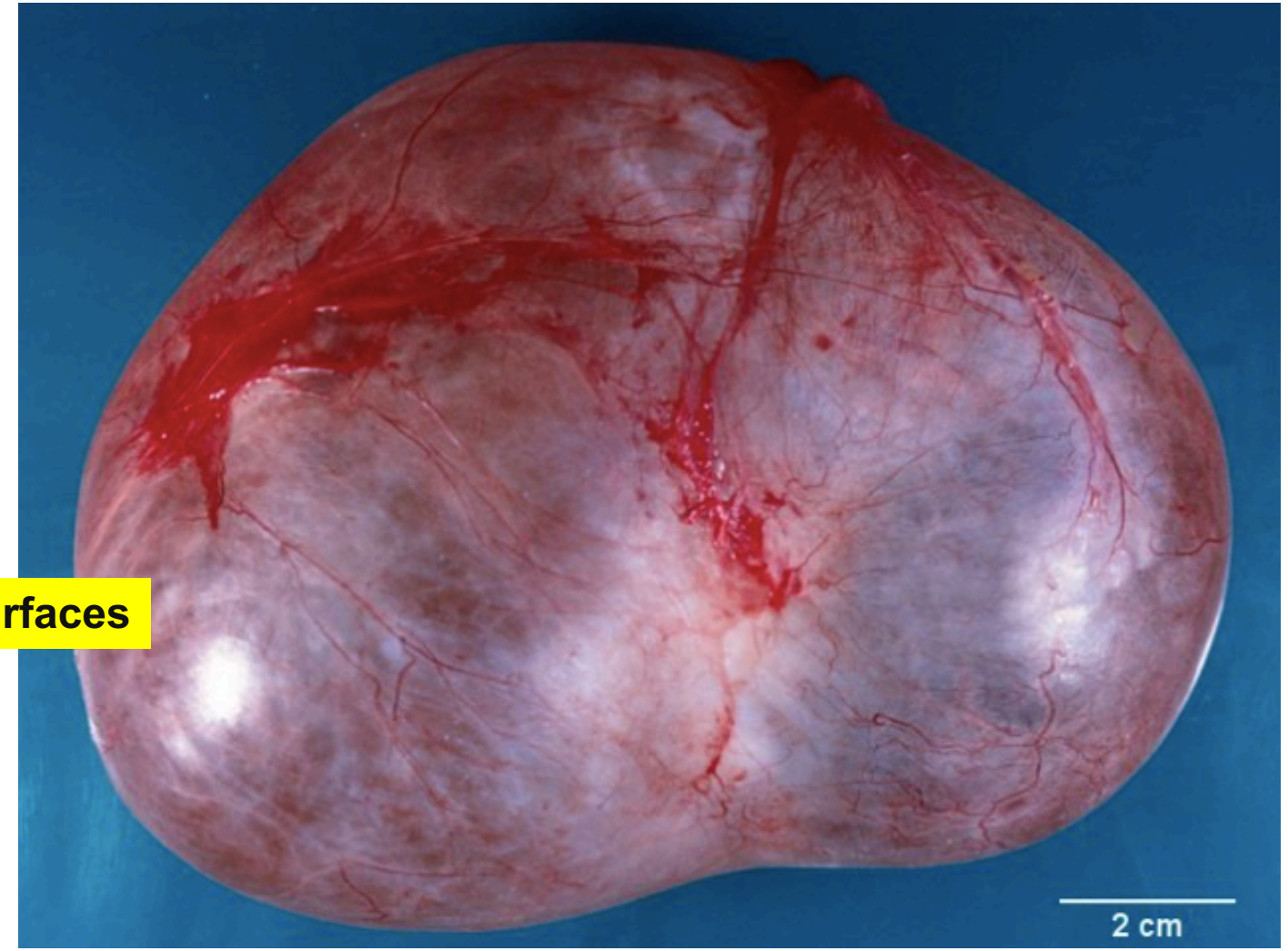


- Squamous Papilloma
- GIT

Adenoma-tumour with glandular formation/glandular growth pattern microscopically.



Cystadenoma-a form of adenoma that form cystic mass.



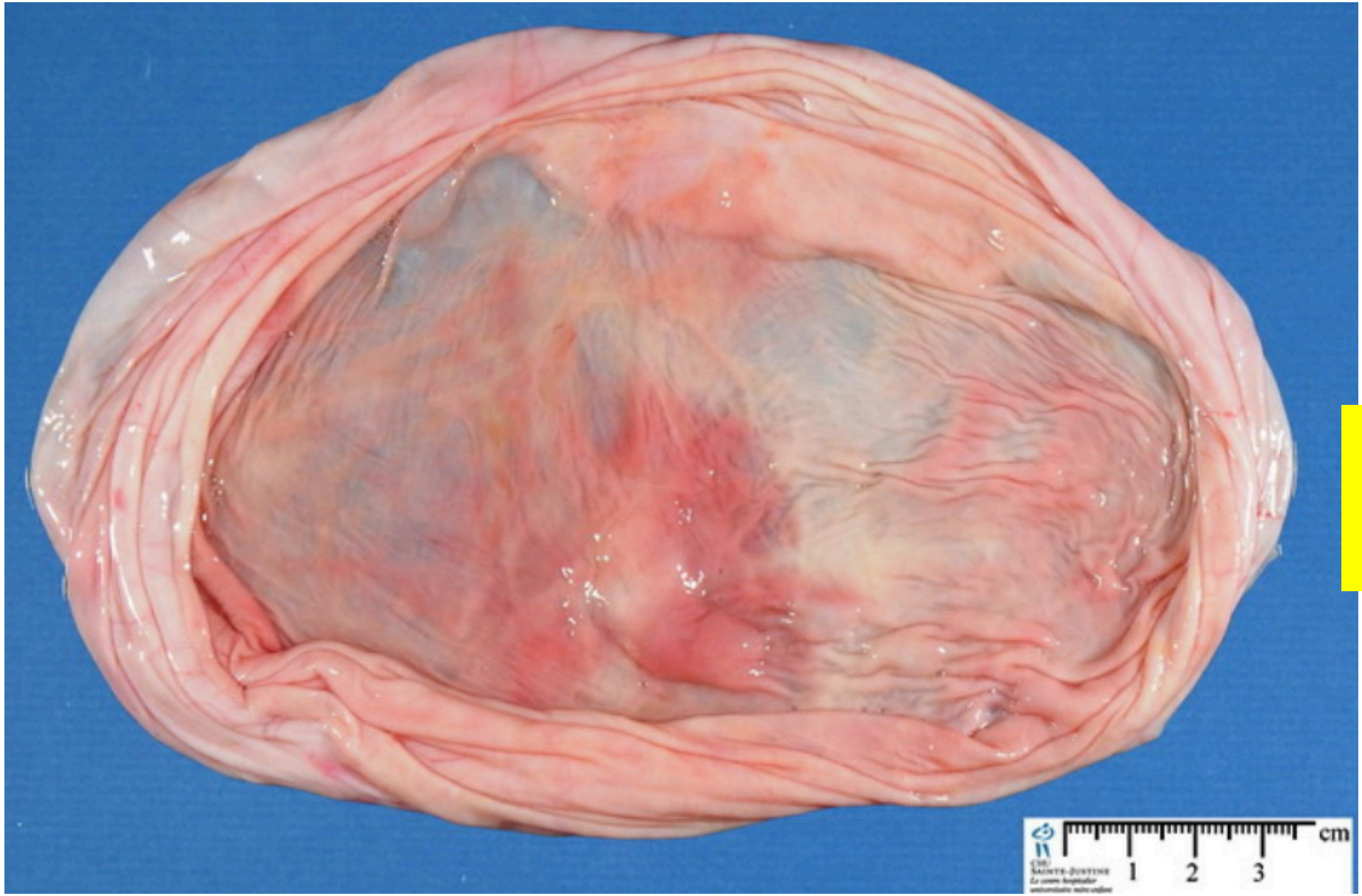
Thin walled

Smooth outer surfaces

Serous cystadenoma of the ovary- gross outer surface

Unilocular cyst

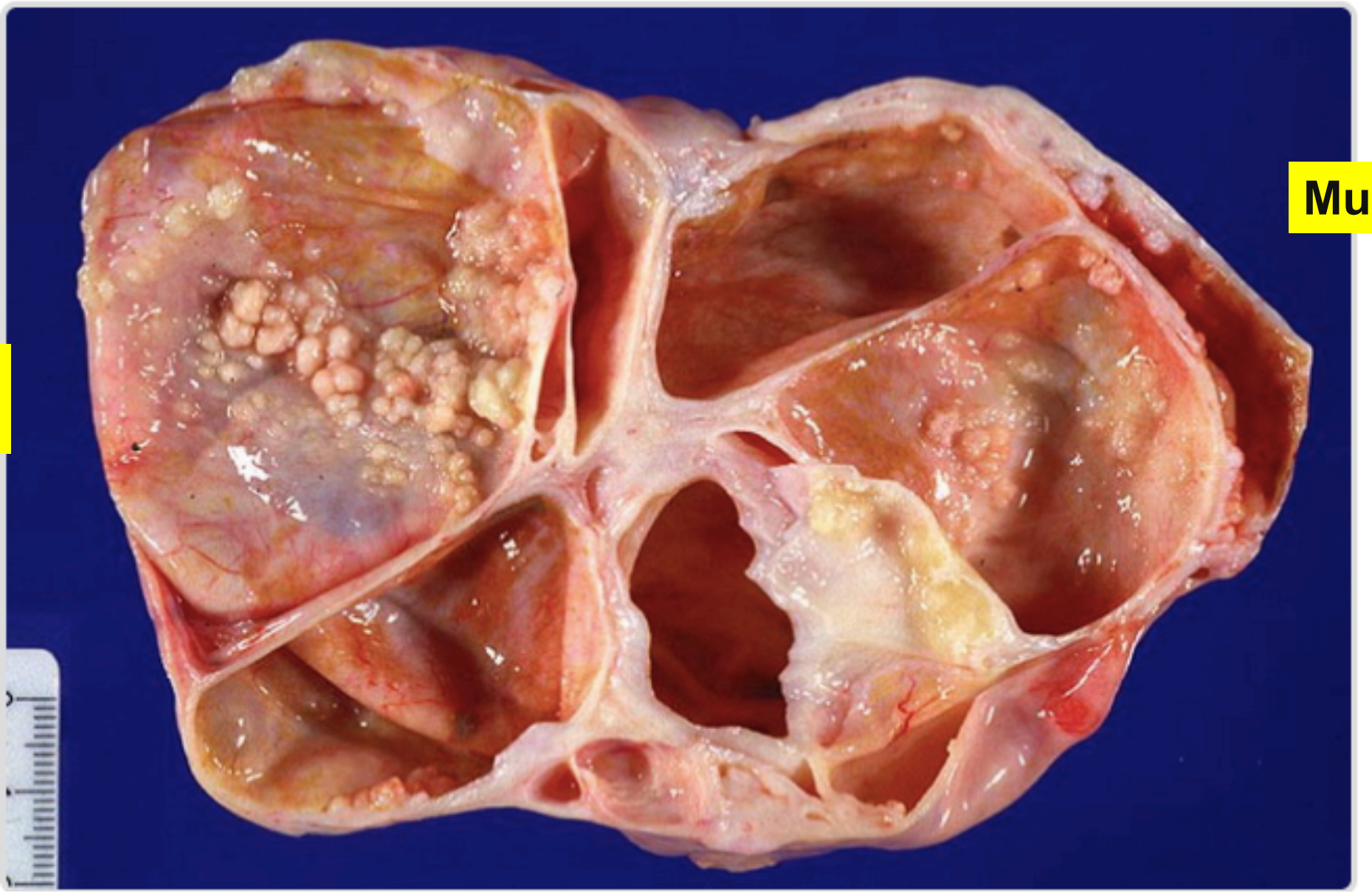
Cyst wall is thin



Filled with **clear serous fluid**.

Serous cystadenoma of the ovary- cut section/ inner surface

Papillary projections



Multicystic

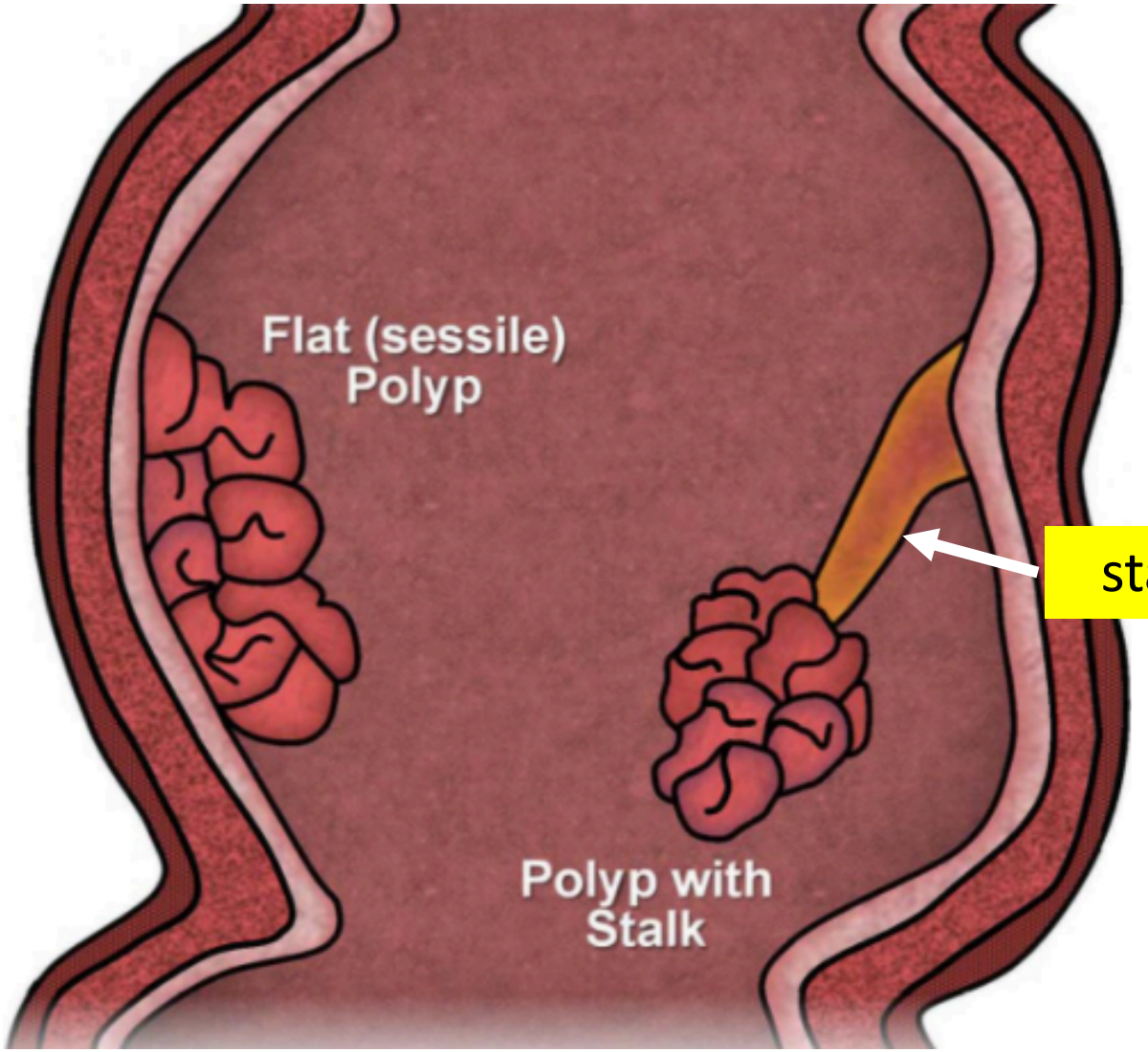
Serous cystadenoma of the ovary.

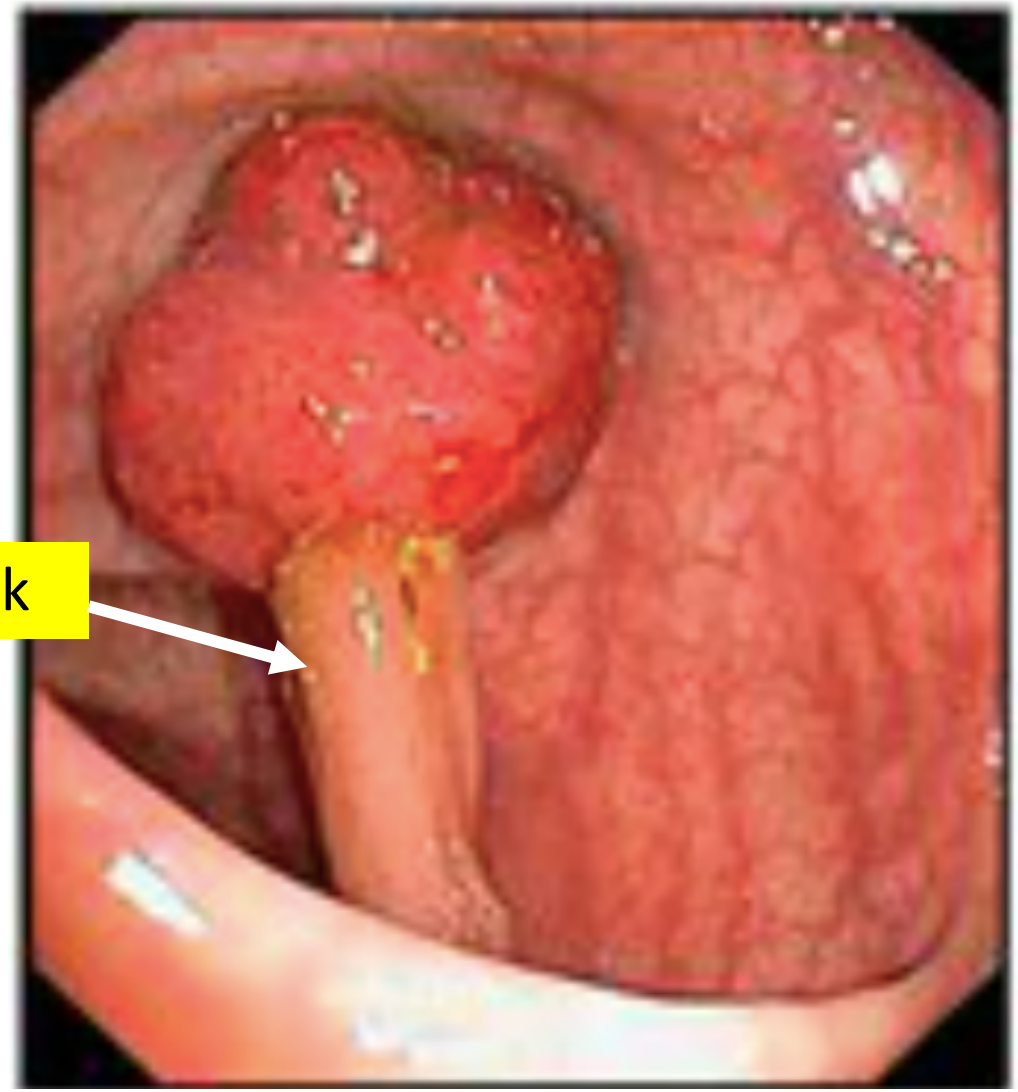
Papilloma-micro/macroscopic of visible finger like or warthy projection from epithelial surface -squamous papilloma.

Oral squamous papilloma

Squamous papilloma:**pedunculated**. It is composed of numerous **finger-like papillary projections** lined by **keratinized stratified squamous epithelium** with **fibrovascular connective tissue cores**.

Polyp/polypoid: macroscopic visible projection arise from the mucosal surface into the lumen -either benign or malignant





Mesenchymal Tumours

Tissue of Origin (Mesenchymal)	Benign Tumours	Malignant Ts
Adipose Tissue	**Lipoma**	Liposarcoma
Fibrous Tissue	**Fibroma**	Fibrosarcoma
Cartilage	**Chondroma**	Chondrosarcoma
Bone	Osteoma	Osteosarcoma
Smooth Muscle	**Leiomyoma**	Leiomyosarcoma
Skeletal Muscle	Rhabdomyoma	Rhabdomyosarcoma
Mesothelium	Benign Fibrous Tumor	Mesothelioma
Blood Vessels	**Haemangioma**	Angiosarcoma
Meninges	**Meningioma**	Invasive Meningioma

Q: Describe 5 macroscopic/ gross appearance of BENIGN tumour

1.

2.

3.

4.

5.

Describe 5 macroscopic/ gross features of MALIGNANT tumour

1.

2.

3.

4.

5.

Answer

Gross appearance of benign & malignant tumour

Benign	Malignant
• Well circumscribed • Encapsulated • Pushing border • Not much hemorrhage • No necrosis	• Infiltrative border, **fungating, ulcerative** • Non encapsulated • Hemorrhage or necrosis (pallor area within a fleshy tumour)

Malignant

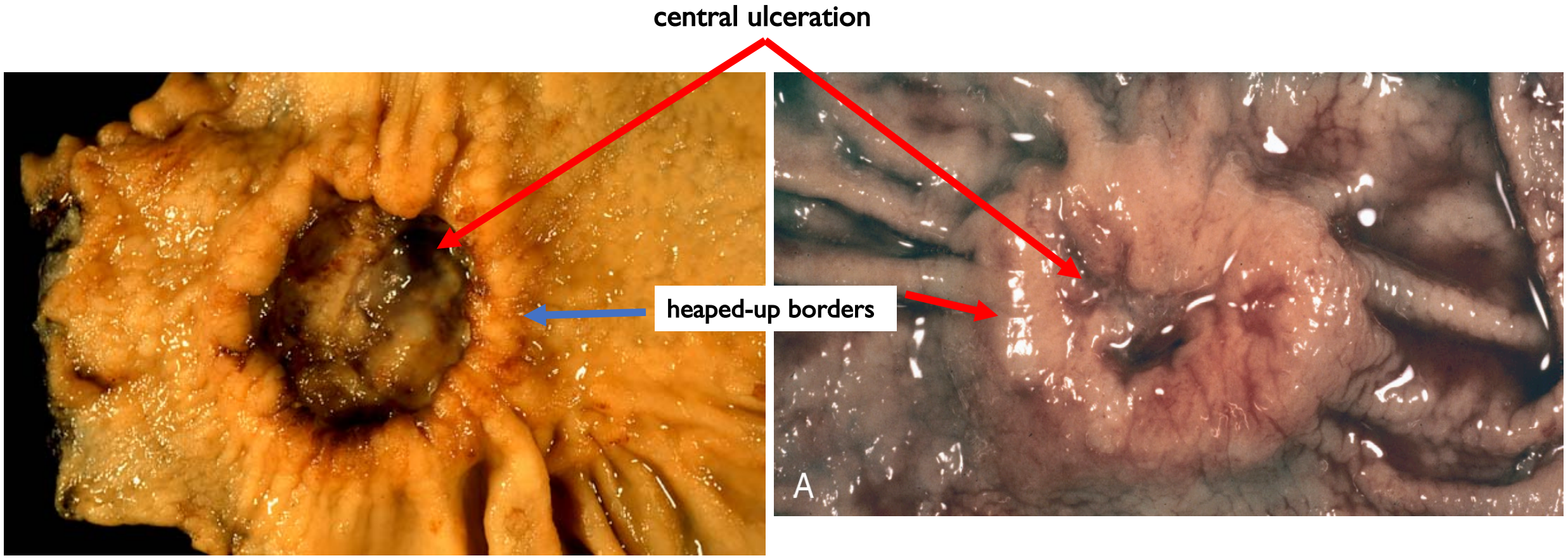
Cauliflower-like

Hemorrhage

Necrosis

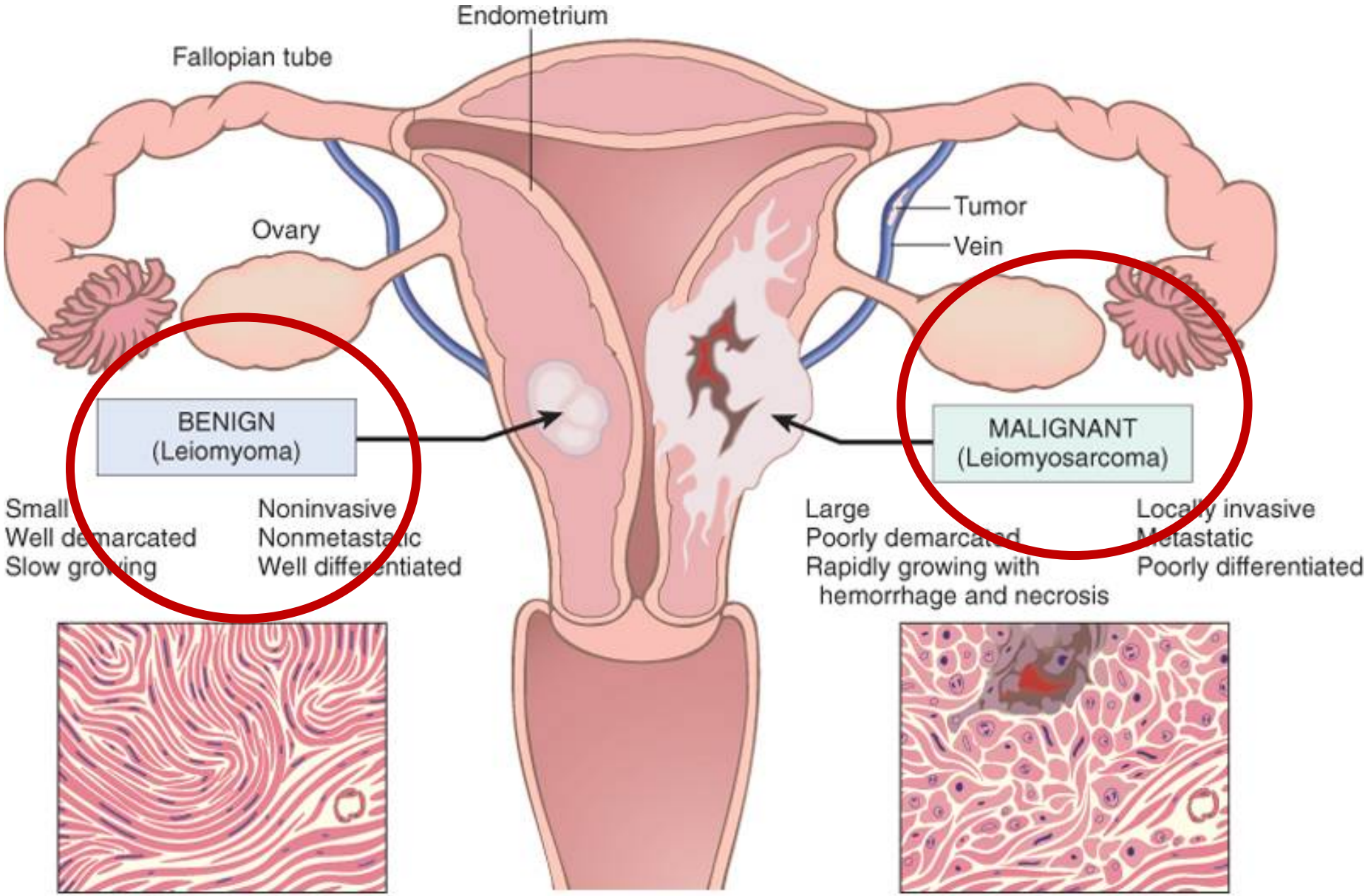
Fungating breast tumour

Malignant



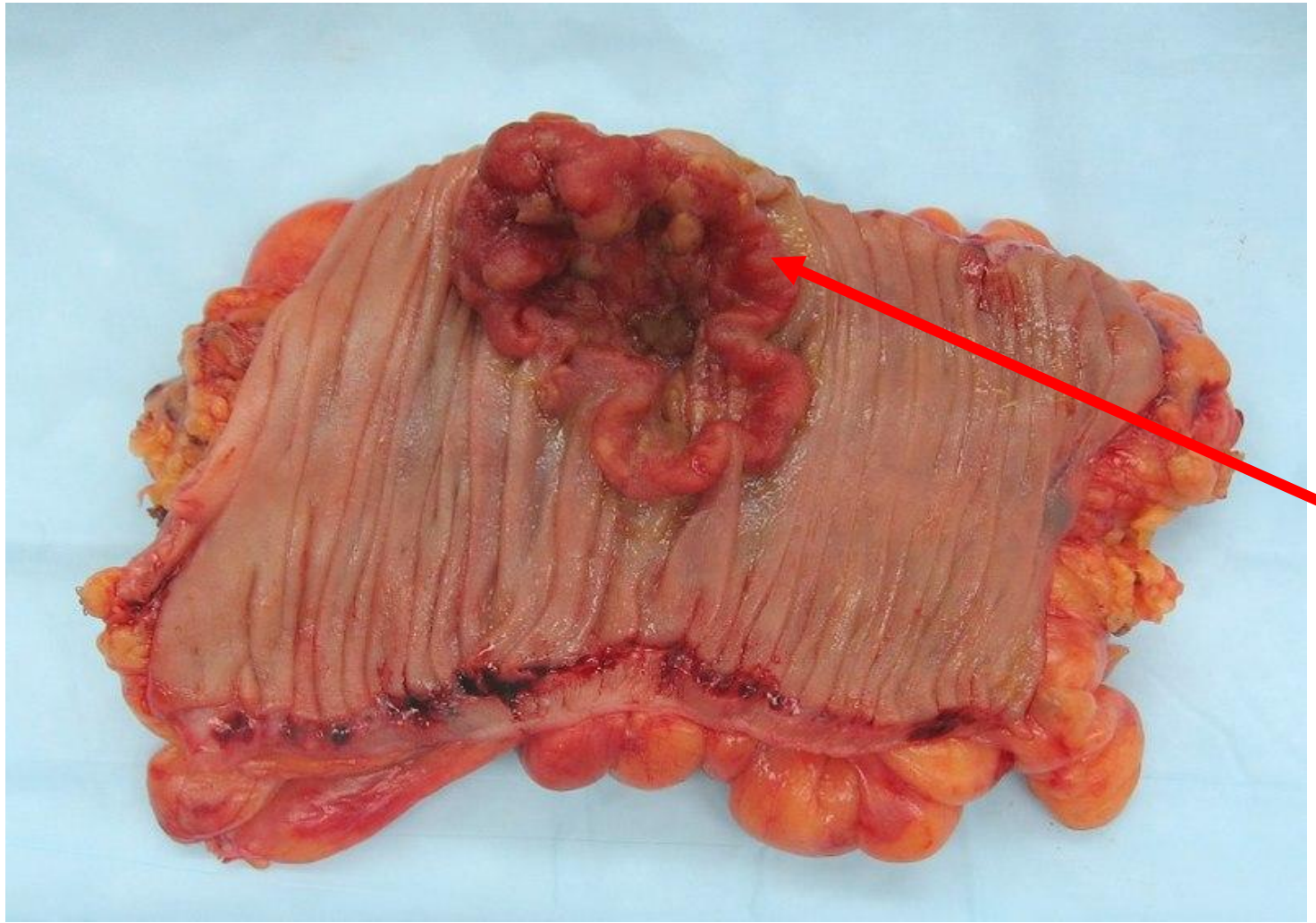
Gastric adenocarcinoma, consisting of an **elevated mass with heaped-up borders and central ulceration.**

Benign vs. Malignant



Malignant

Gross: Benign or malignant? What is the lesion? How to describe?



- **Rule 1**: Identify the organ. Find the organ written in scenario if any.

Here it is COLON

- **Rule 2**: Identify the tumour and location:

Mucosa surface

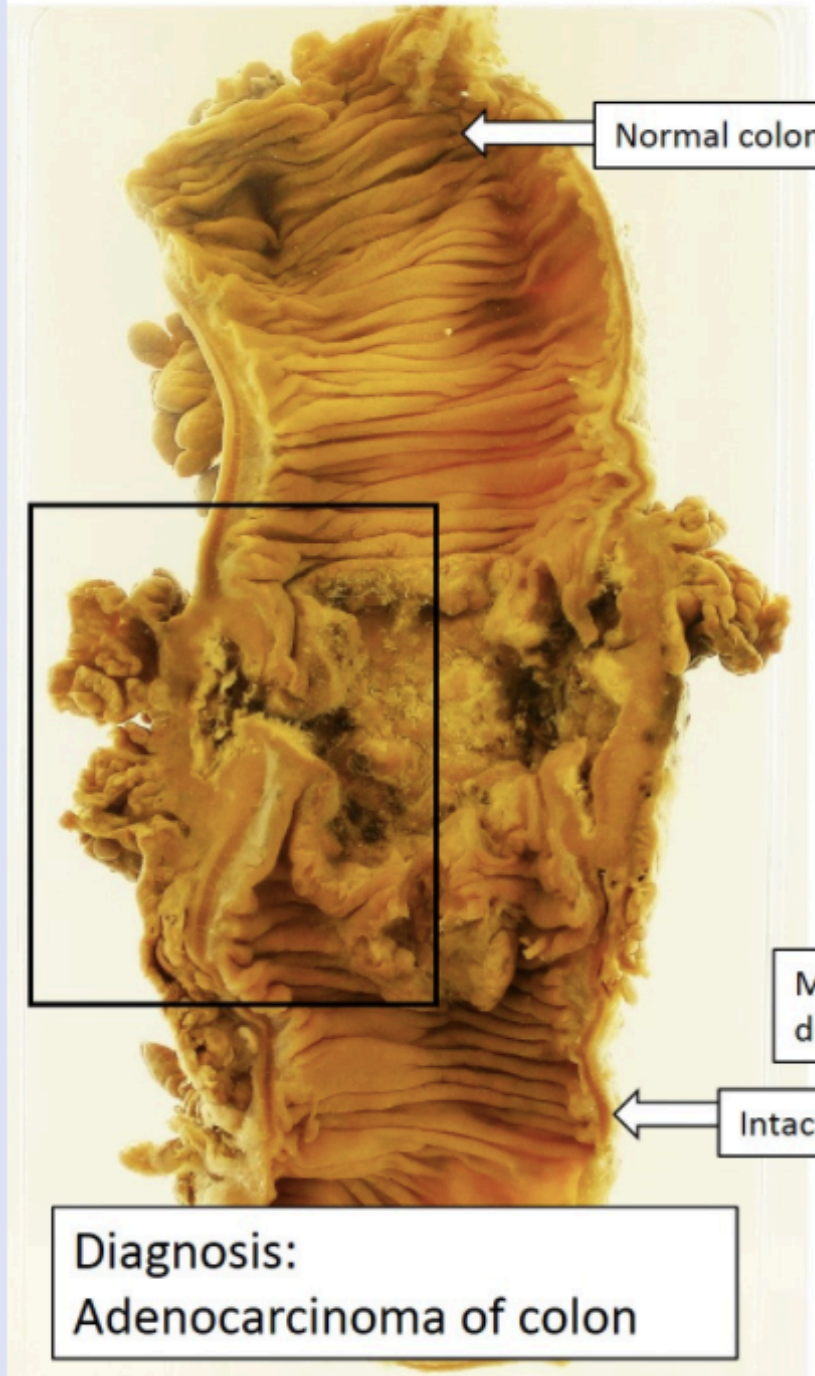
- **Rule 3**: Describe the tumour, size, shape, margin, surface:

fungating/ulcerative, irregular border, covered by necrotic slough

- **Rule 4**: What the tumour do to the organ & surrounding?

It causes lumen obstruction, some may infiltrative deeper layer and may lead to perforation

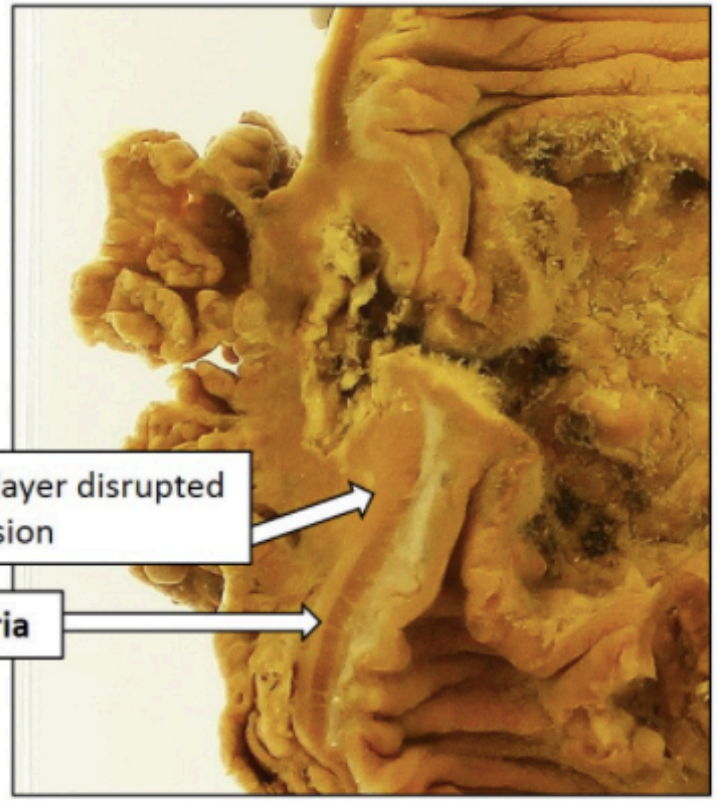
Malignant



Description: Colonic mass

Longitudinal cut section of the ***colon*** showing an irregular, circumferential ulcerating luminal mass.

There is gross invasion into the colonic wall as can be seen by the disruption of the muscularis propria.



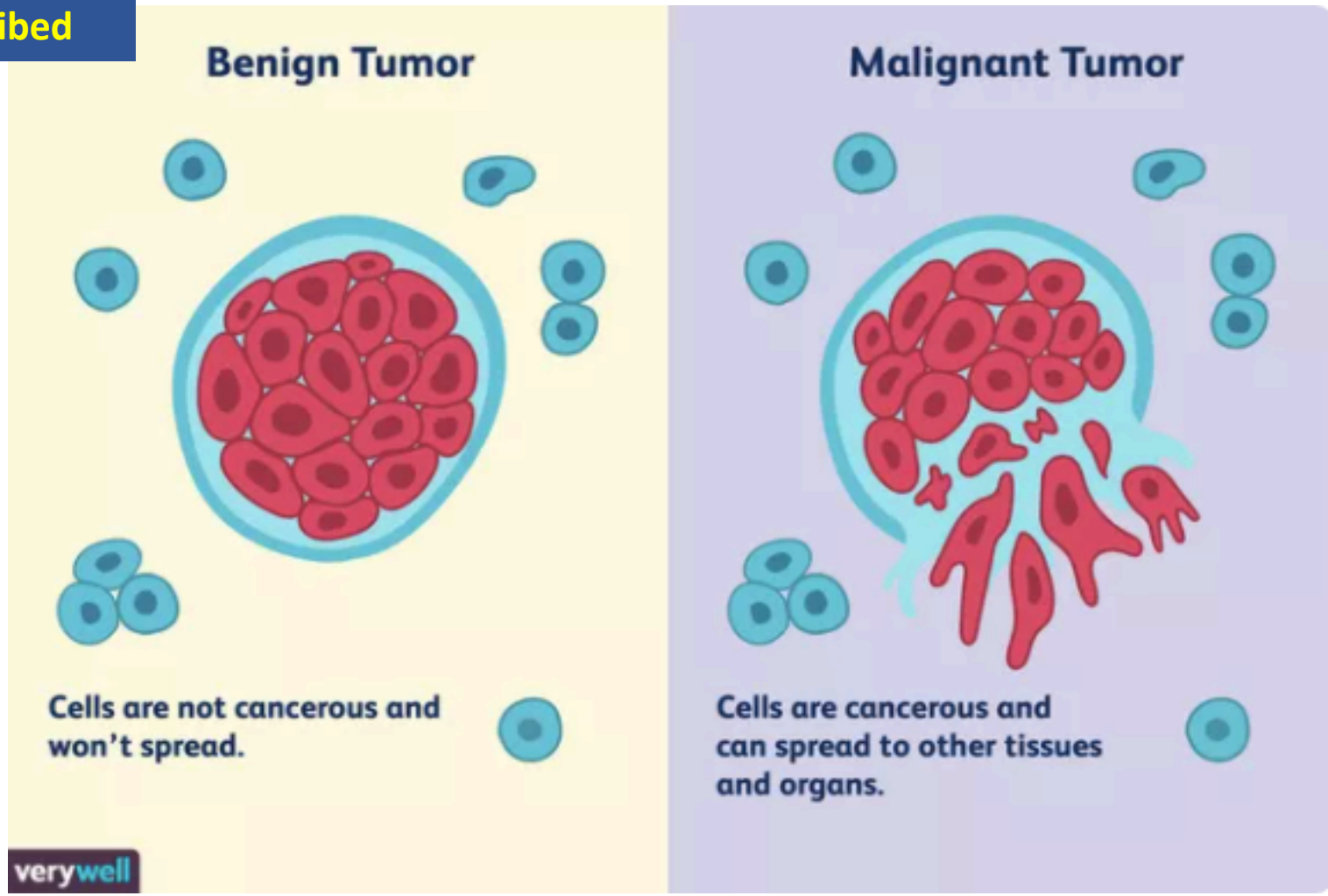
Diagnosis:
Adenocarcinoma of colon

Histology features of benign and malignant

Features	Benign	Malignant
Borders	• **Pushing border** • Well circumscribed • Encapsulated • Do not invade	• Irregular, spiculated • Non encapsulated
Rate of growth-size, mitosis	• Rare mitoses • Small size	• Mitoses easily seen • Larger size
Anaplasia	• No anaplasia • Well differentiated	• Present • Broad range of differentiation

Borders

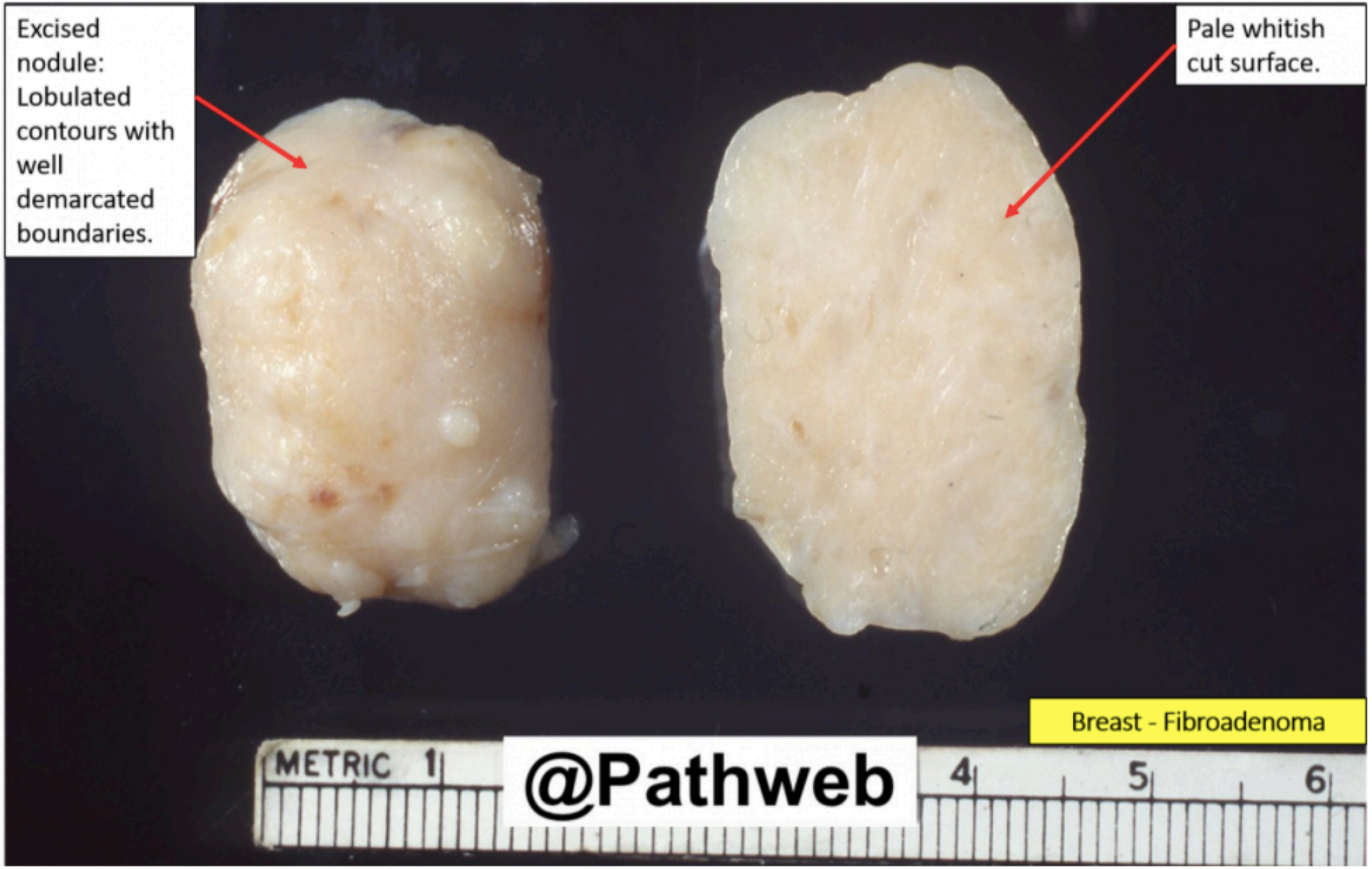
-Pushing border
-Well circumscribed



Irregular & infiltrative

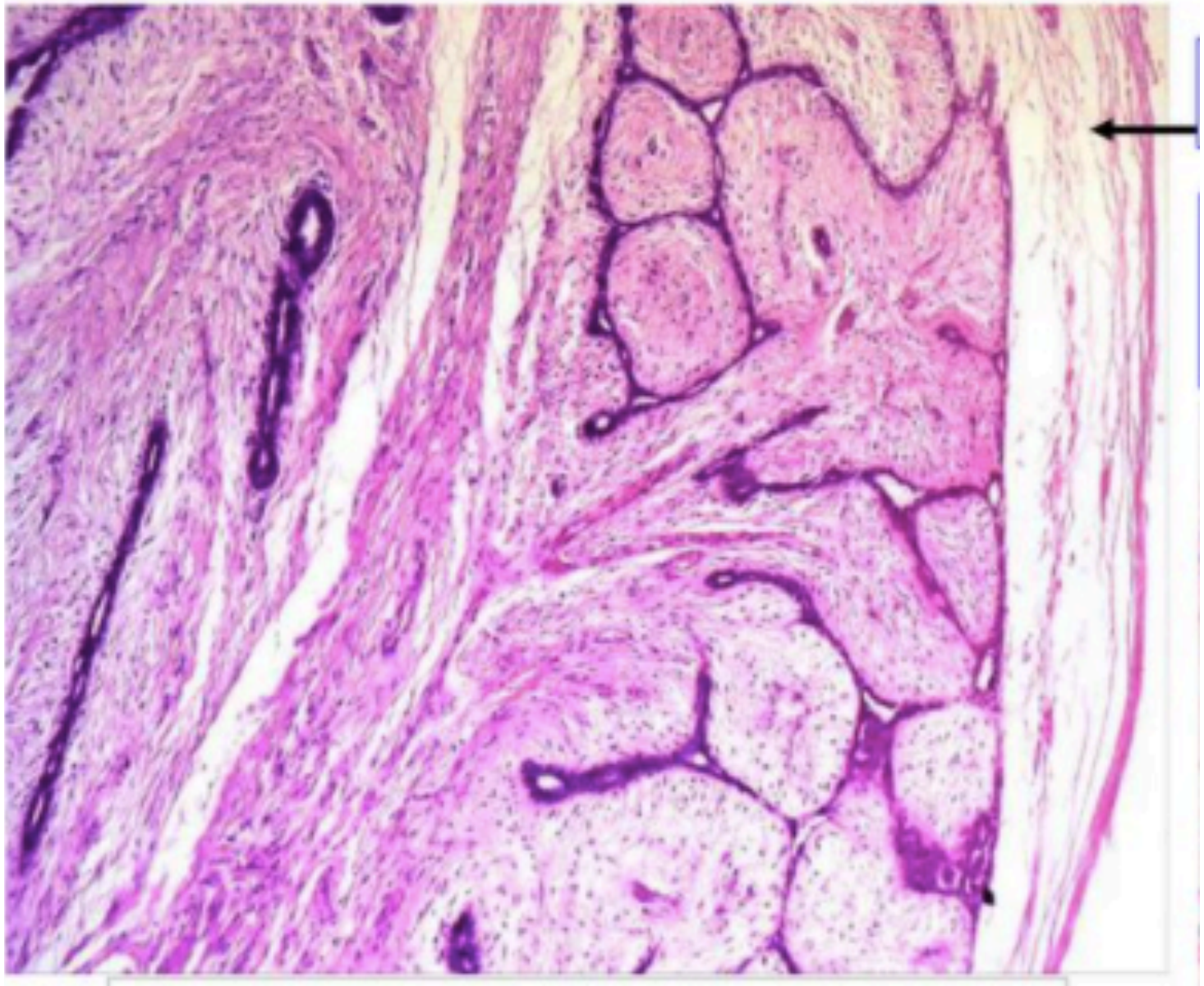
Borders-benign: pushing border

Benign



Borders-benign: pushing border

Benign

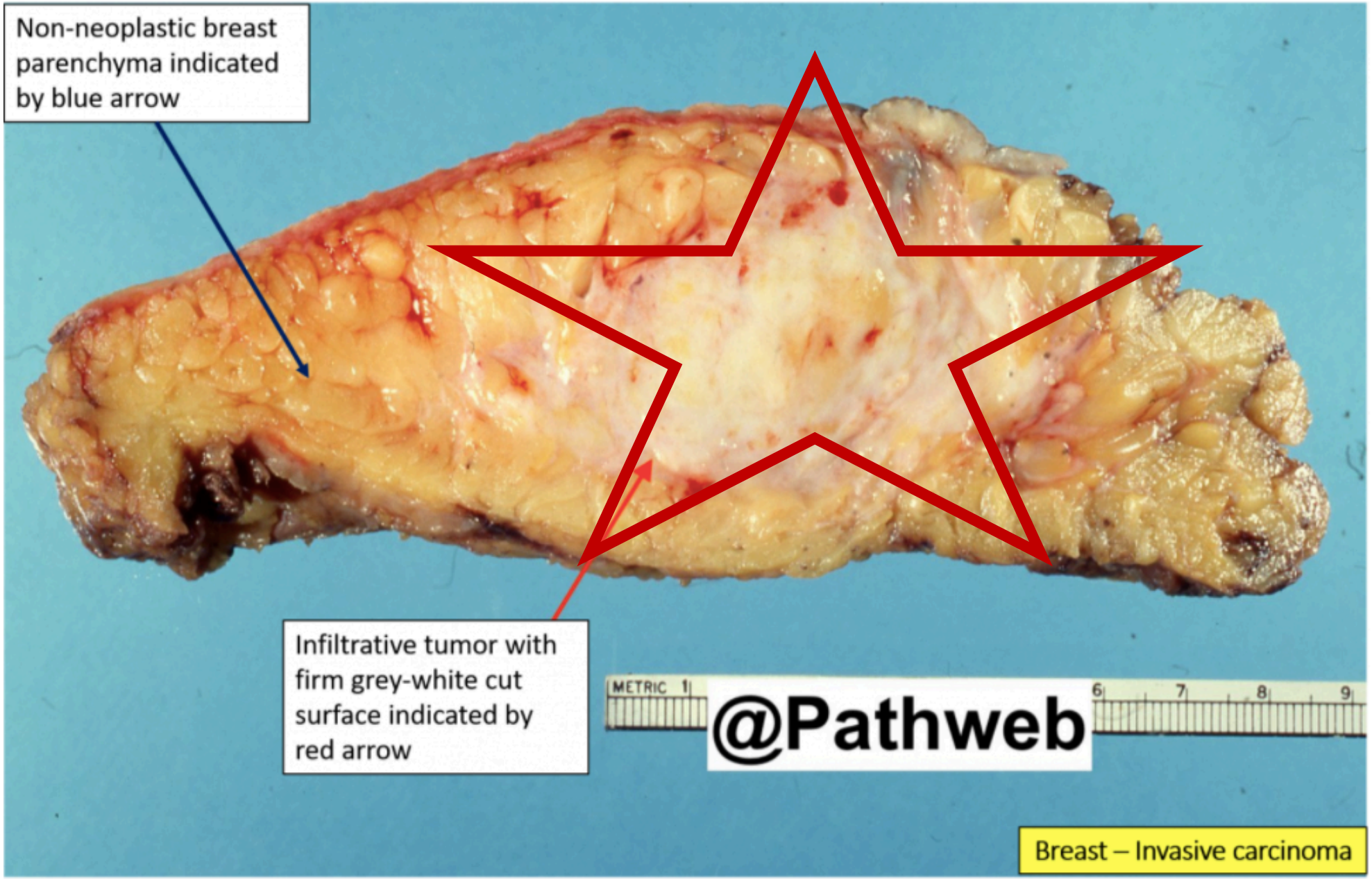


Pushing border

Well circumscribed

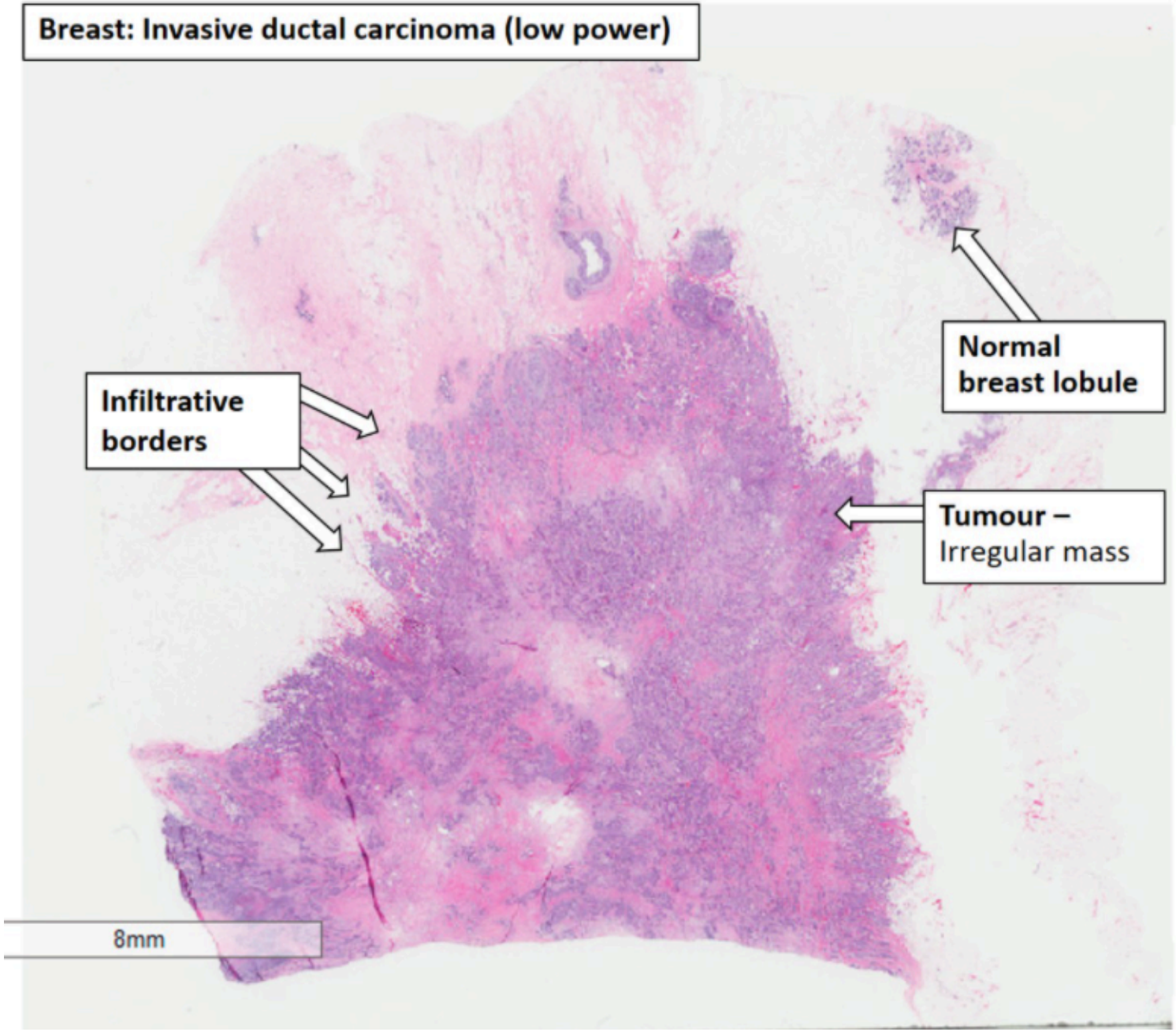
Borders-malignant : Infiltrative border

Malignant



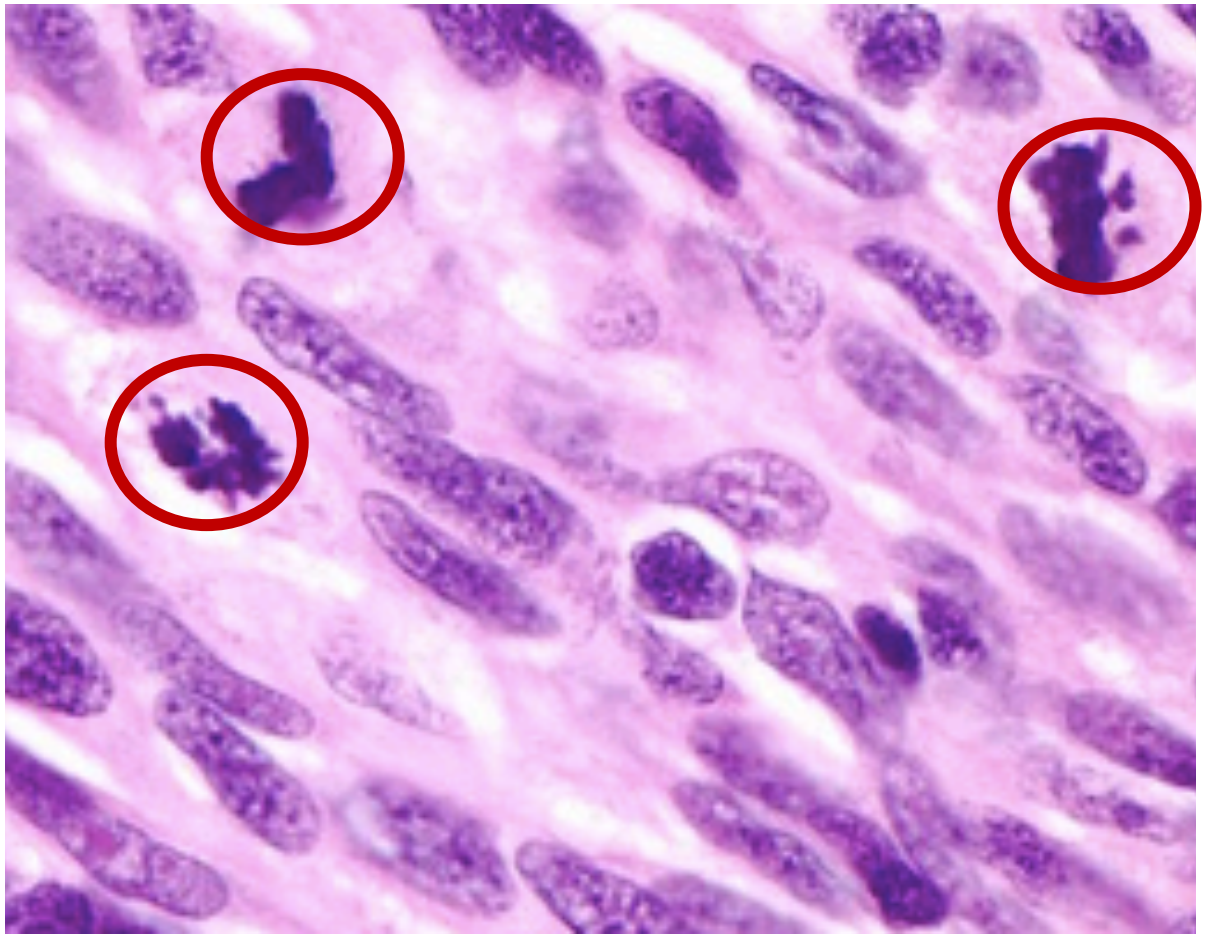
Borders-malignant : Infiltrative border

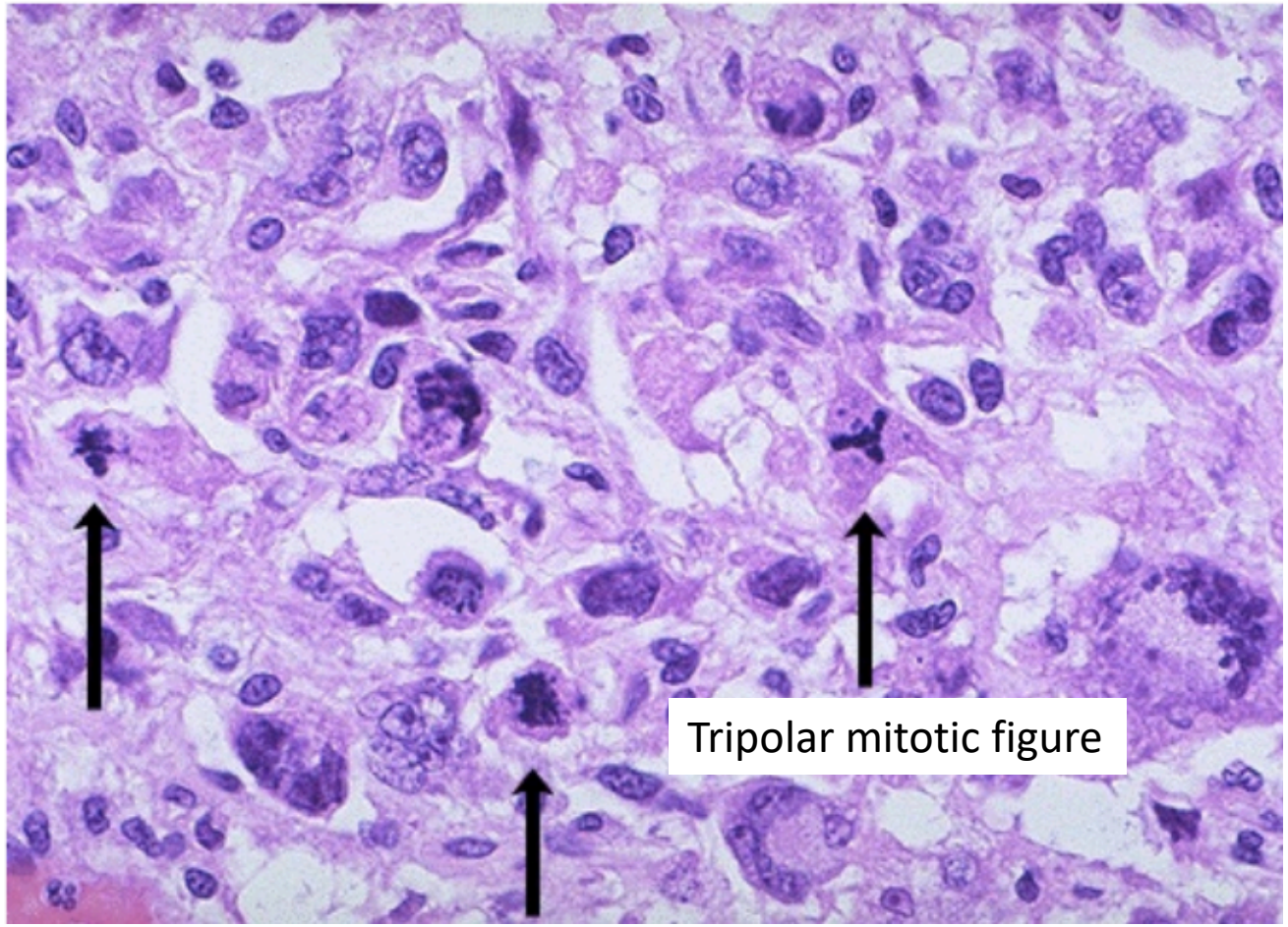
Malignant



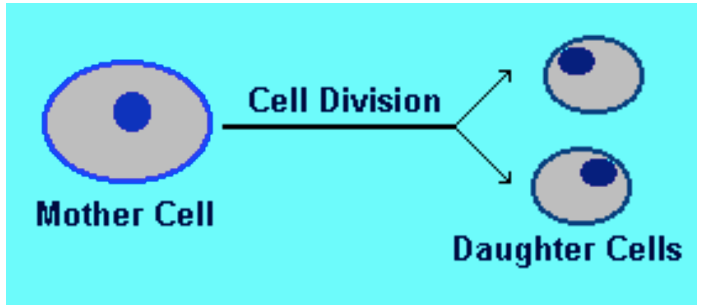
Rate of growth-size, mitosis

Malignant





Differentiation & Anaplasia



- **Differentiation**: refers to the extent to which neoplastic parenchymal cells resemble the corresponding normal parenchymal cells, both morphologically and functionally

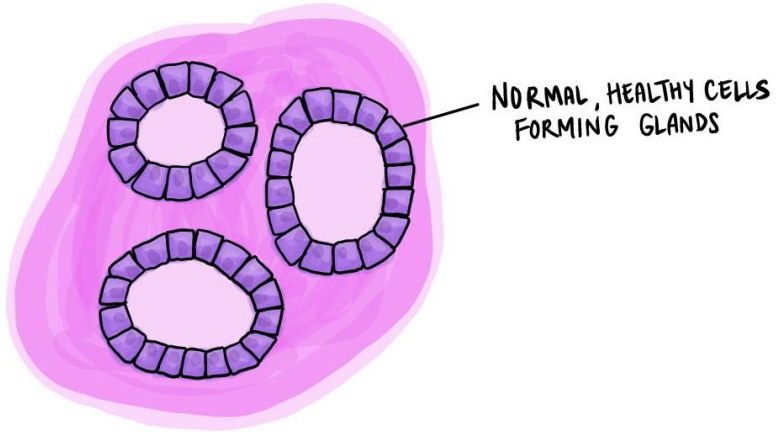
How well the children look like their parents?

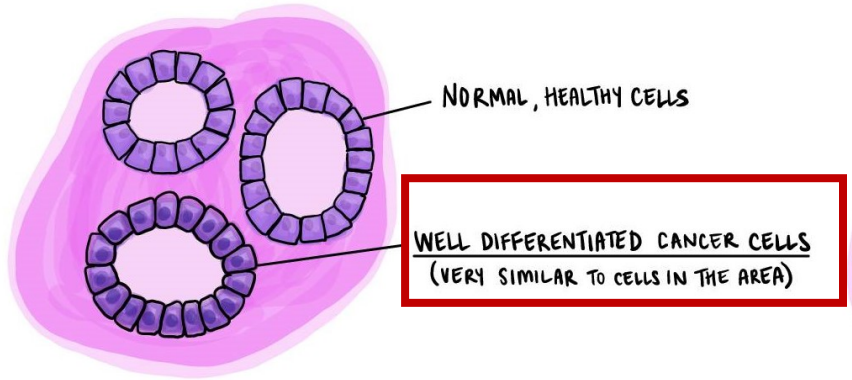
- If there look alike it is well differentiated
- If they don't it is poorly differentiated

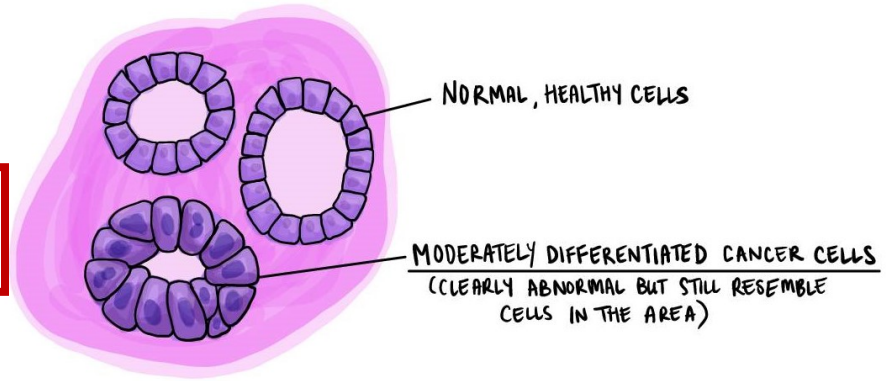
Undifferentiated → Becoming more like normal parenchymal cells → **Well differentiated**

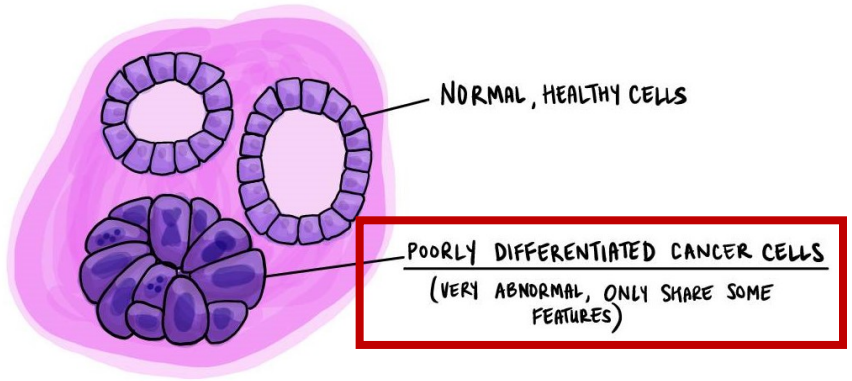
Poorly differentiated **Moderately differentiated**

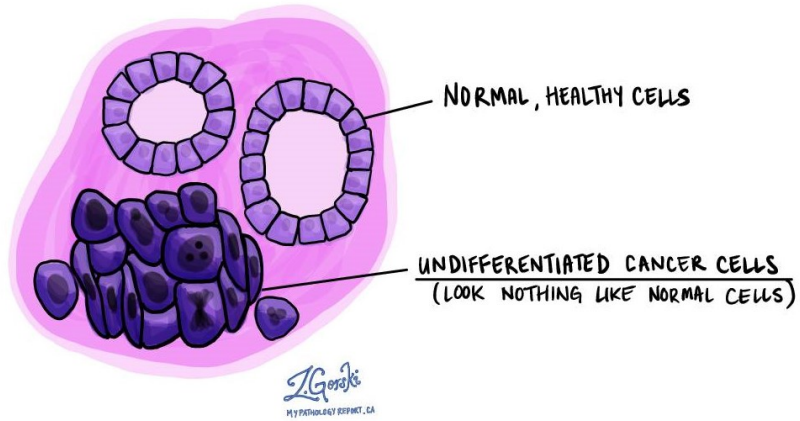
Chondroma is made up of mature cartilage cells that synthesis their usual cartilaginous matrix→ this is evidence of morphology and functional differentiation


NORMAL, HEALTHY CELLS
FORMING GLANDS


NORMAL, HEALTHY CELLS
WELL DIFFERENTIATED CANCER CELLS
(VERY SIMILAR TO CELLS IN THE AREA)


NORMAL, HEALTHY CELLS
MODERATELY DIFFERENTIATED CANCER CELLS
(CLEARLY ABNORMAL BUT STILL RESEMBLE
CELLS IN THE AREA)


NORMAL, HEALTHY CELLS
POORLY DIFFERENTIATED CANCER CELLS
(VERY ABNORMAL, ONLY SHARE SOME
FEATURES)

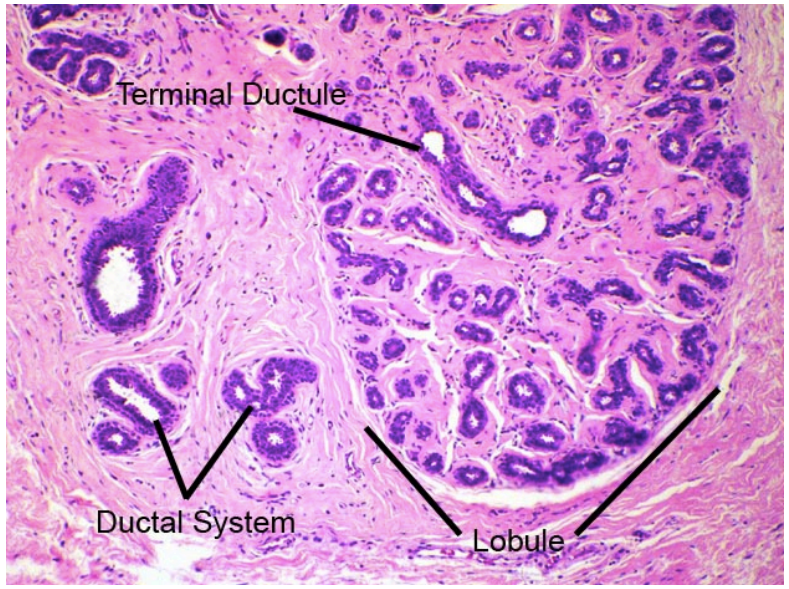

NORMAL, HEALTHY CELLS
UNDIFFERENTIATED CANCER CELLS
(LOOK NOTHING LIKE NORMAL CELLS)

Anaplasia: Lack of differentiation

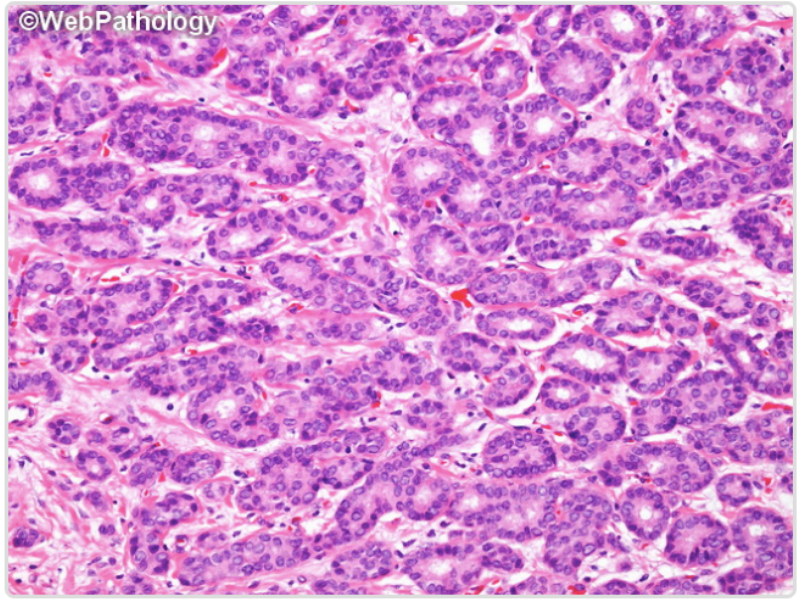
- **Anaplasia:** refers to lack of differentiation
- Best appreciated under higher magnification of the microscope

- Well differentiated glandular cells make many glands
- Well differentiated colonic epithelial produce more mucin

- Anaplastic glandular cells make only few glands
- Anaplastic colonic epithelial make little or no mucin



Normal terminal ductal lobular unit

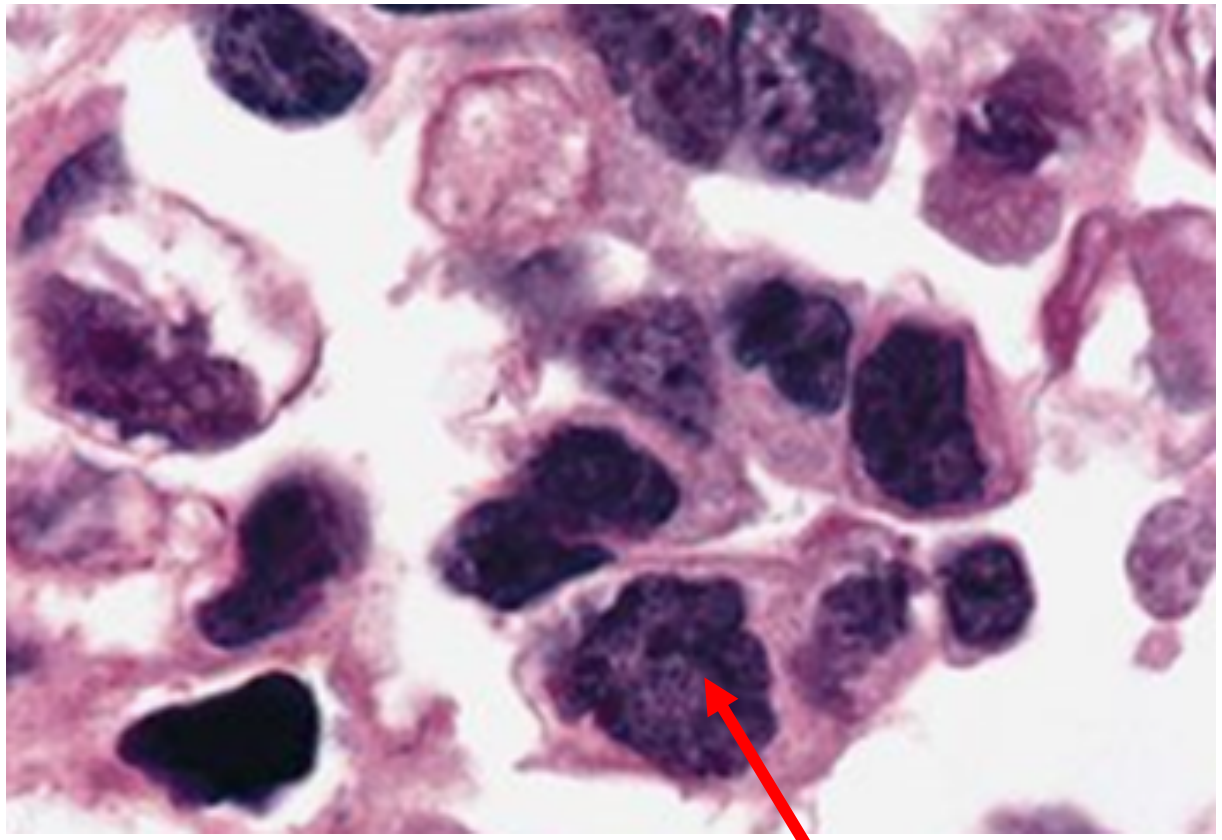


low grade, well differentiated

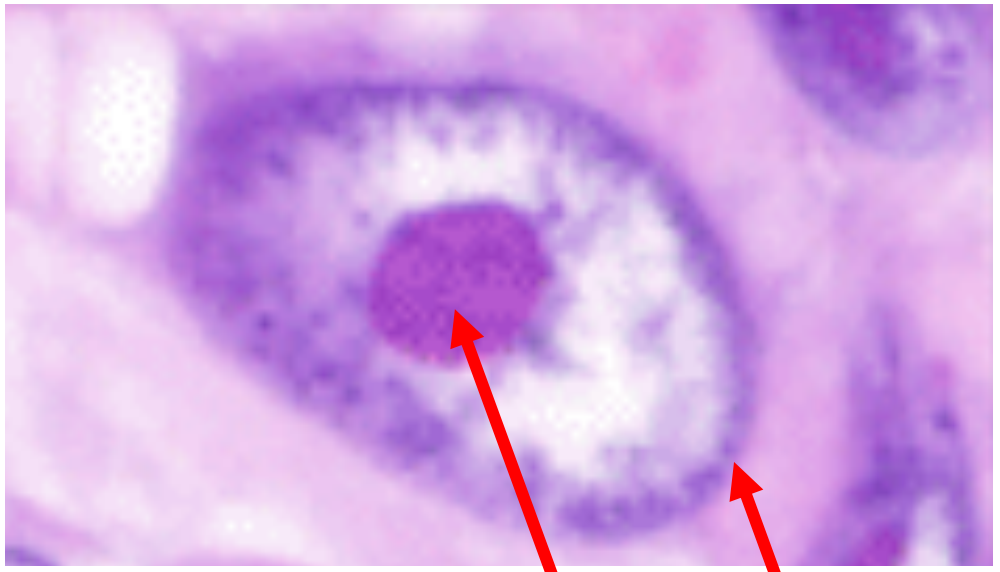
No gland formation

Invasive breast carcinoma poorly differentiated

Write NUCLEAR features of anaplastic cells



Increased N:C ratio
Hyperchromatism



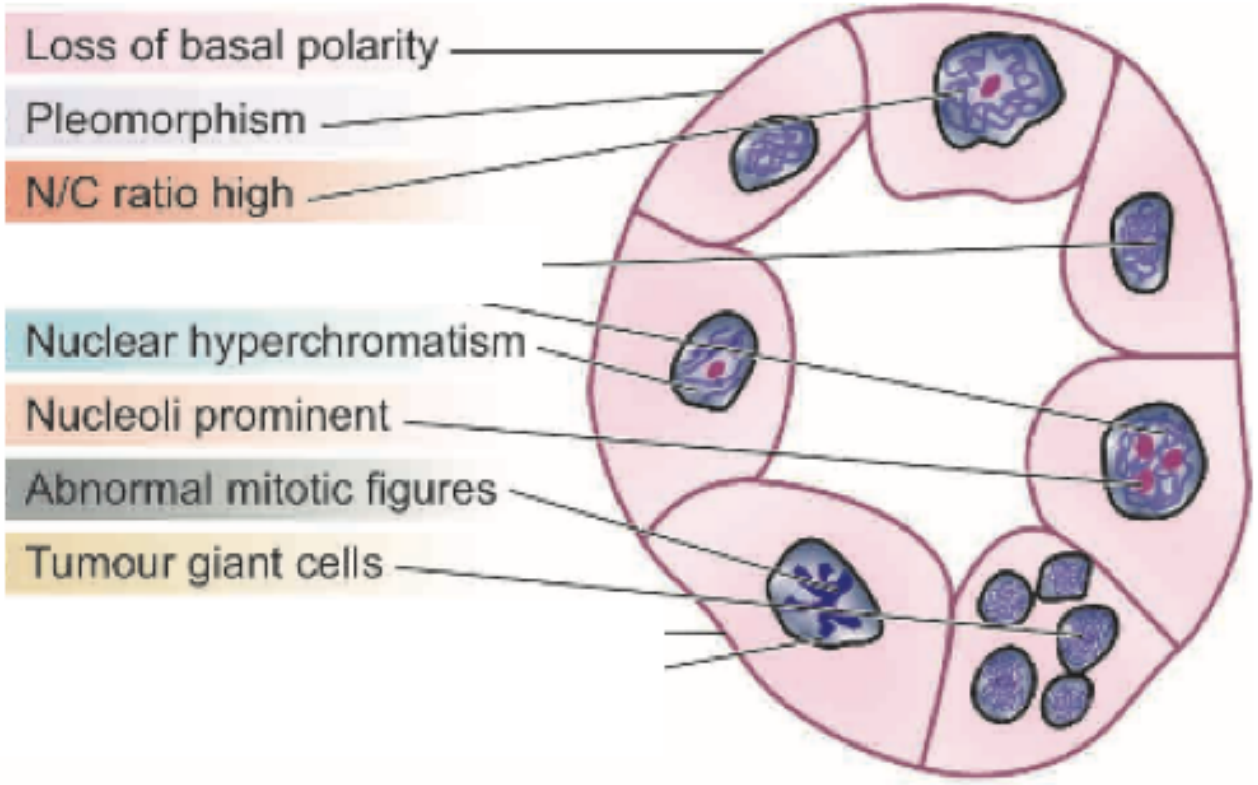
Prominent nucleolus

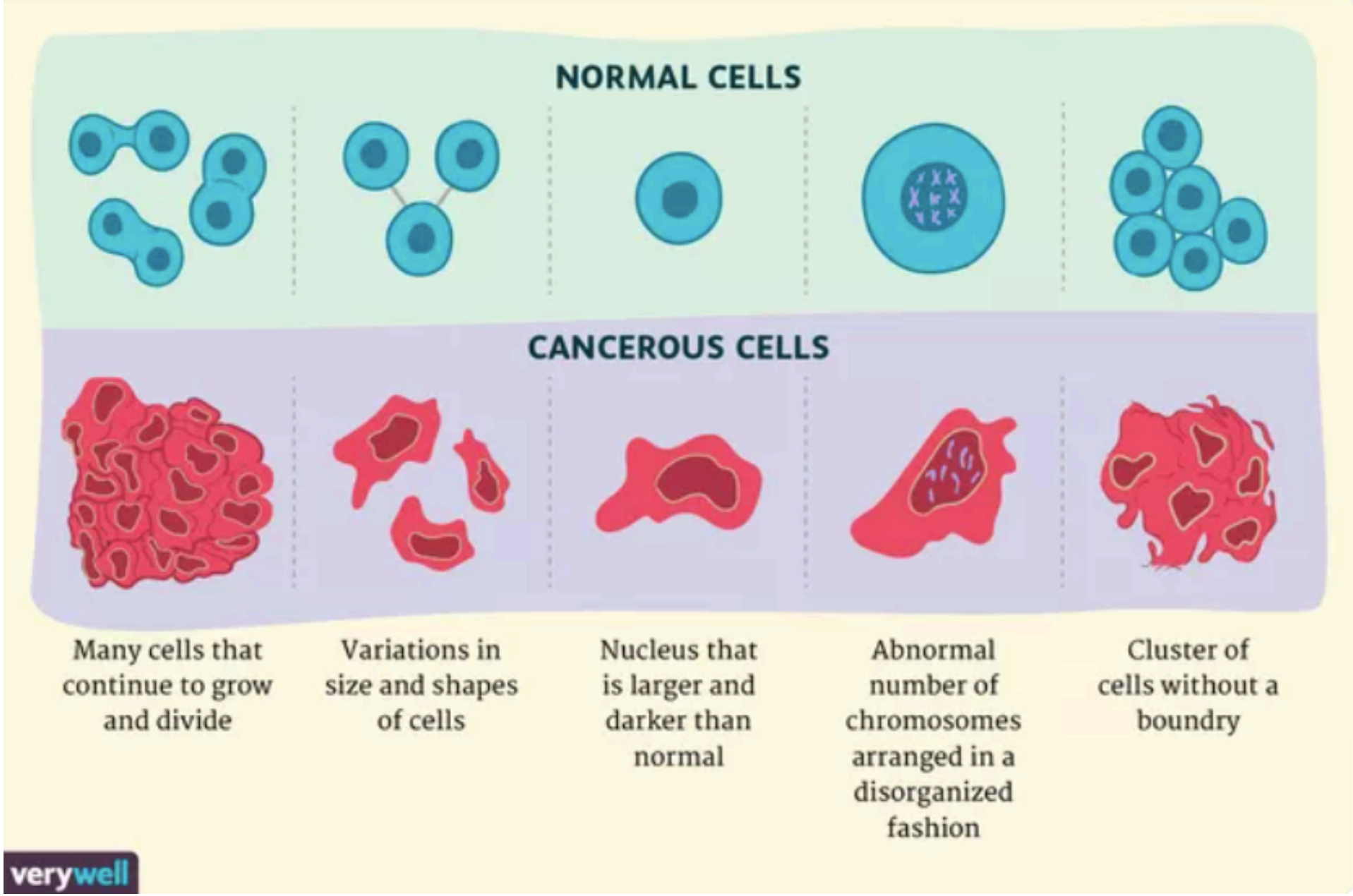
Enlarge nuclear

Anaplasia- Lack of differentiation

Features of anaplasia:

- Pleomorphism
- Abnormal nuclear morphology
  - Increased N:C ratio
  - Hyperchromatism
  - Prominent nucleoli
- Mitoses
- Loss of polarity
- Other-tumour giant cells




NORMAL CELLS
CANCEROUS CELLS
Many cells that continue to grow and divide
Variations in size and shapes of cells
Nucleus that is larger and darker than normal
Abnormal number of chromosomes arranged in a disorganized fashion
Cluster of cells without a boundry
verywell

What are the histology/ histomorphologic/microscopic/ features of cancer?

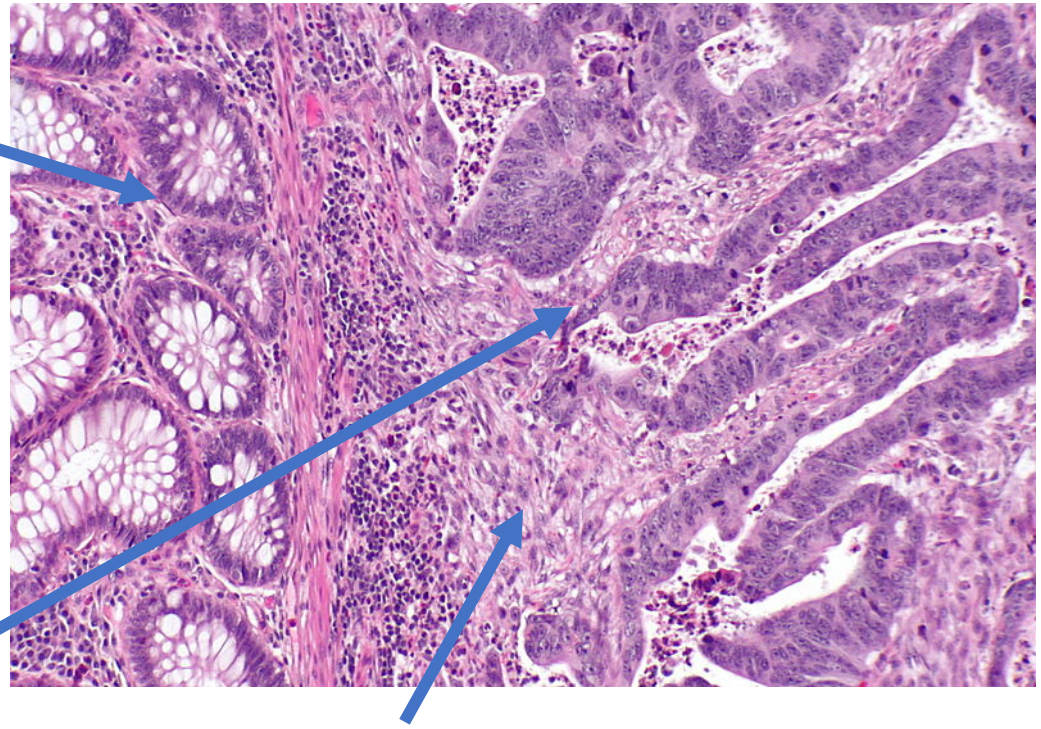
1. Infiltrative border
2. Non encapsulated
3. Larger size
4. Mitoses easily seen
5. Anaplasia-pleomorphic, increased N:C ratio, hyperchromatic, prominent nucleoli

Microscopic: Benign or malignant? How to describe?

- Identify the adjacent **normal tissue**
- **Type of Pattern:** Cells arranged in glandular formation/squamoid
- **Describe the pattern:** The glands are irregular, crowding, infiltrating
- **Describe the cells:** The cells are pleomorphic, hyperchromatic, high N:C
- **Mitosis**: present/ hardly seen/ normal/atypical
- **Stroma reaction -** Desmoplasia-hyperplasia of fibroblasts and formation of abundant collagen in the stroma as a reaction to infiltration by a cancer

Microscopic: Benign or malignant? How to describe?

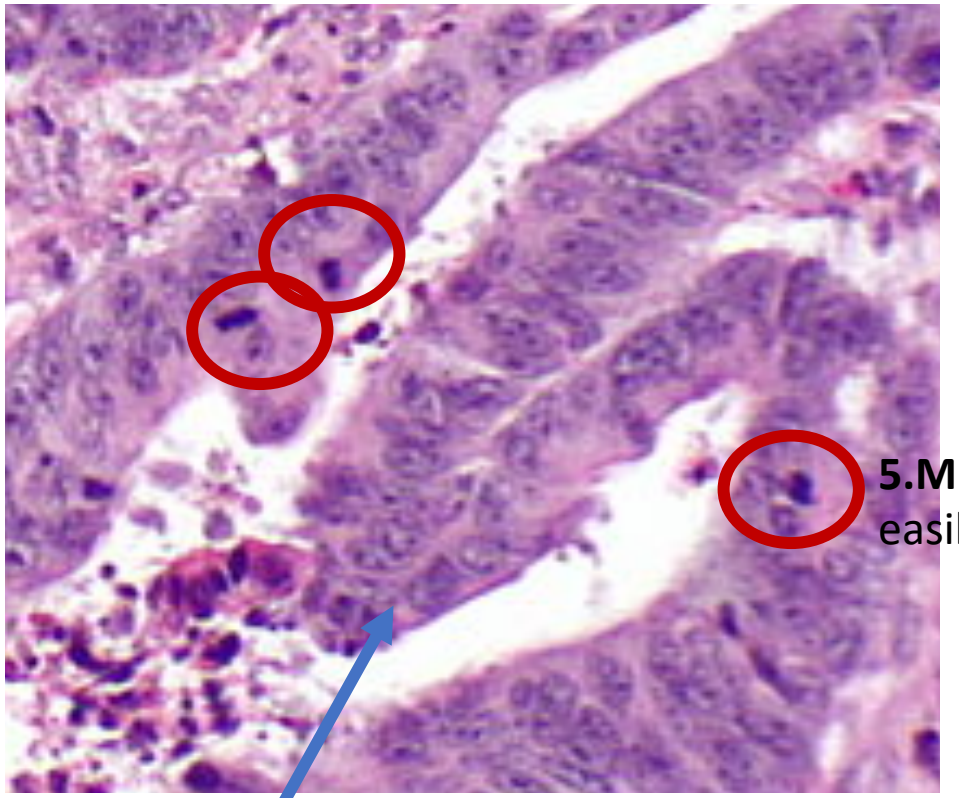
1.Identify **normal tissue: colon**



2.Type of Pattern: tumour cells arranged in glandular

3.Describe the pattern: The glands irregular/ crowding/back o back

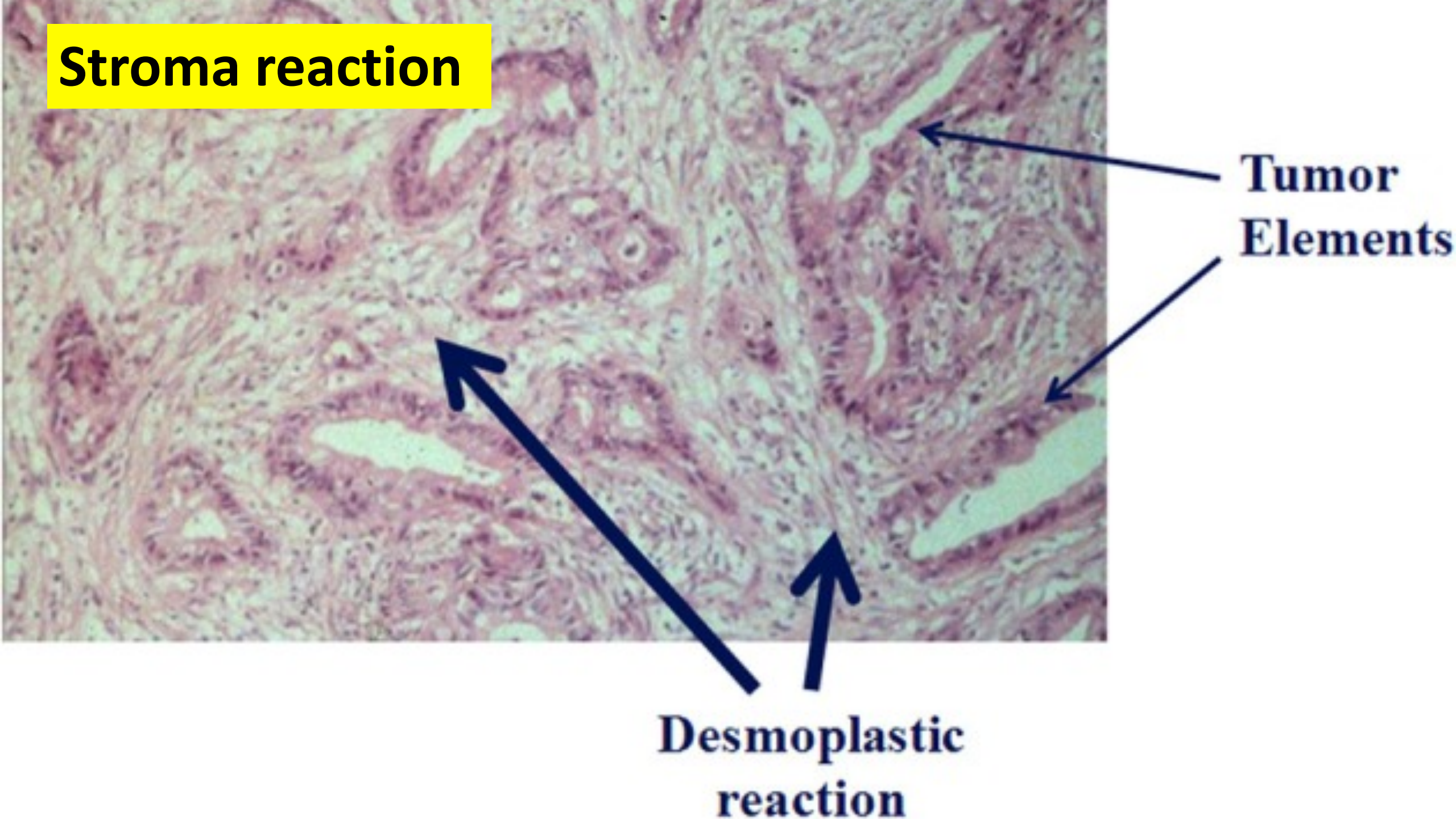
6.Desmoplasia **stroma reaction**



5.Mitosis: easily seen

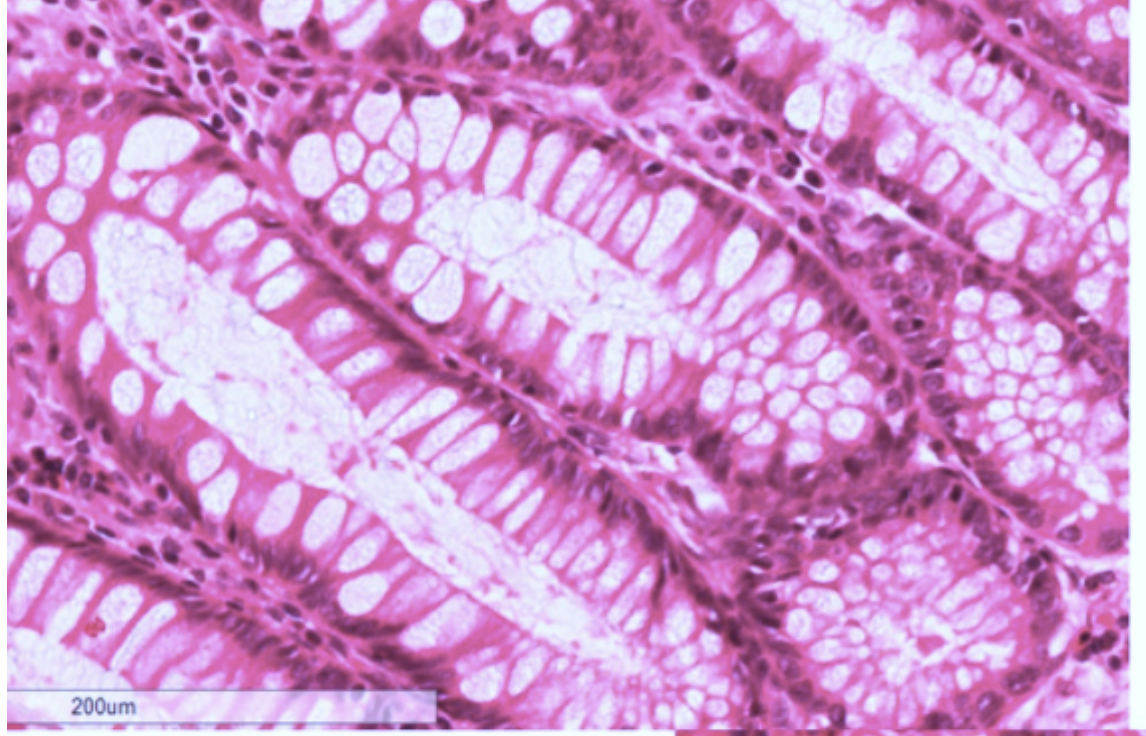
4.Describe the cells: The tumour cells are pleomorphic, high N:C or hyperchromatic,

Stroma reaction



Describe 5 microscopic features of adenocarcinoma

1) Malignant tumour arranged in glands formation
2) Glands – irregular, crowding and infiltrating
3) Cells – enlarged nuclei, High NC ratio, pleomorphic, hyperchromatic
4) Mitosis high
5) Stroma reactive



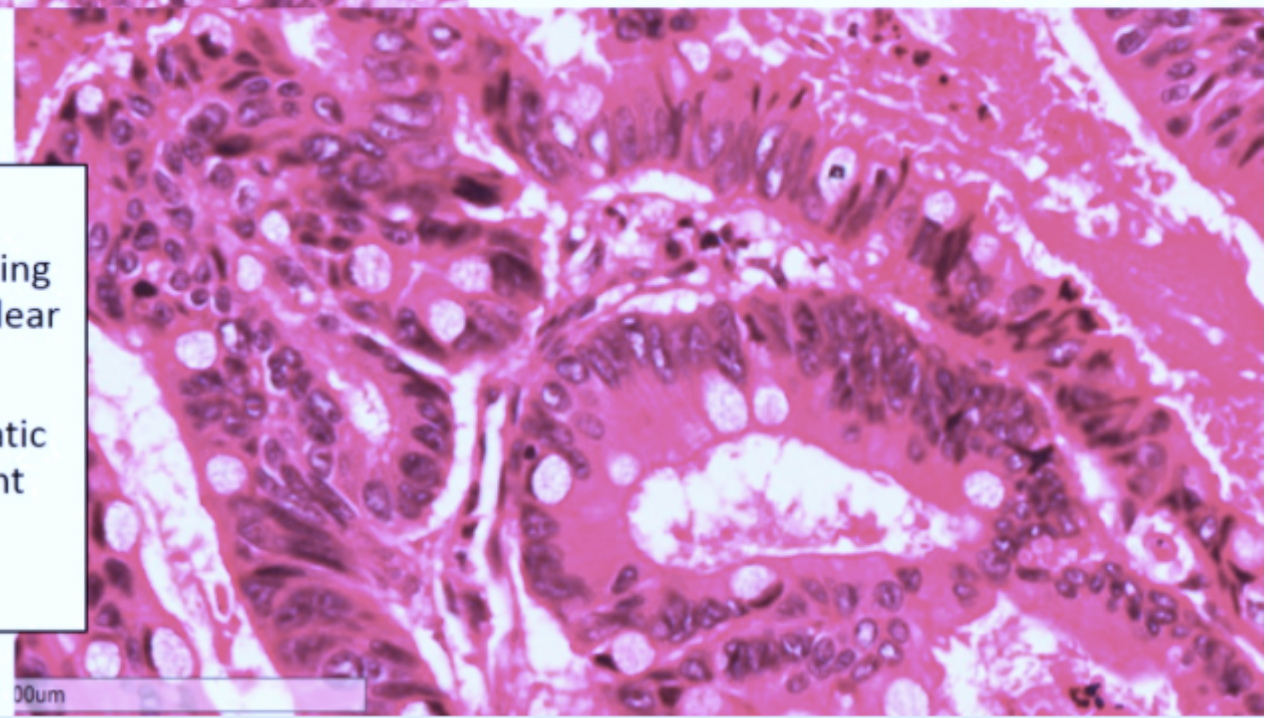
Microscopy: Normal colonic mucosa

Regular crypts lined by single-layered, well-differentiated columnar epithelium with mucus-producing goblet cells. Uniform nuclei.

Colonic adenocarcinoma

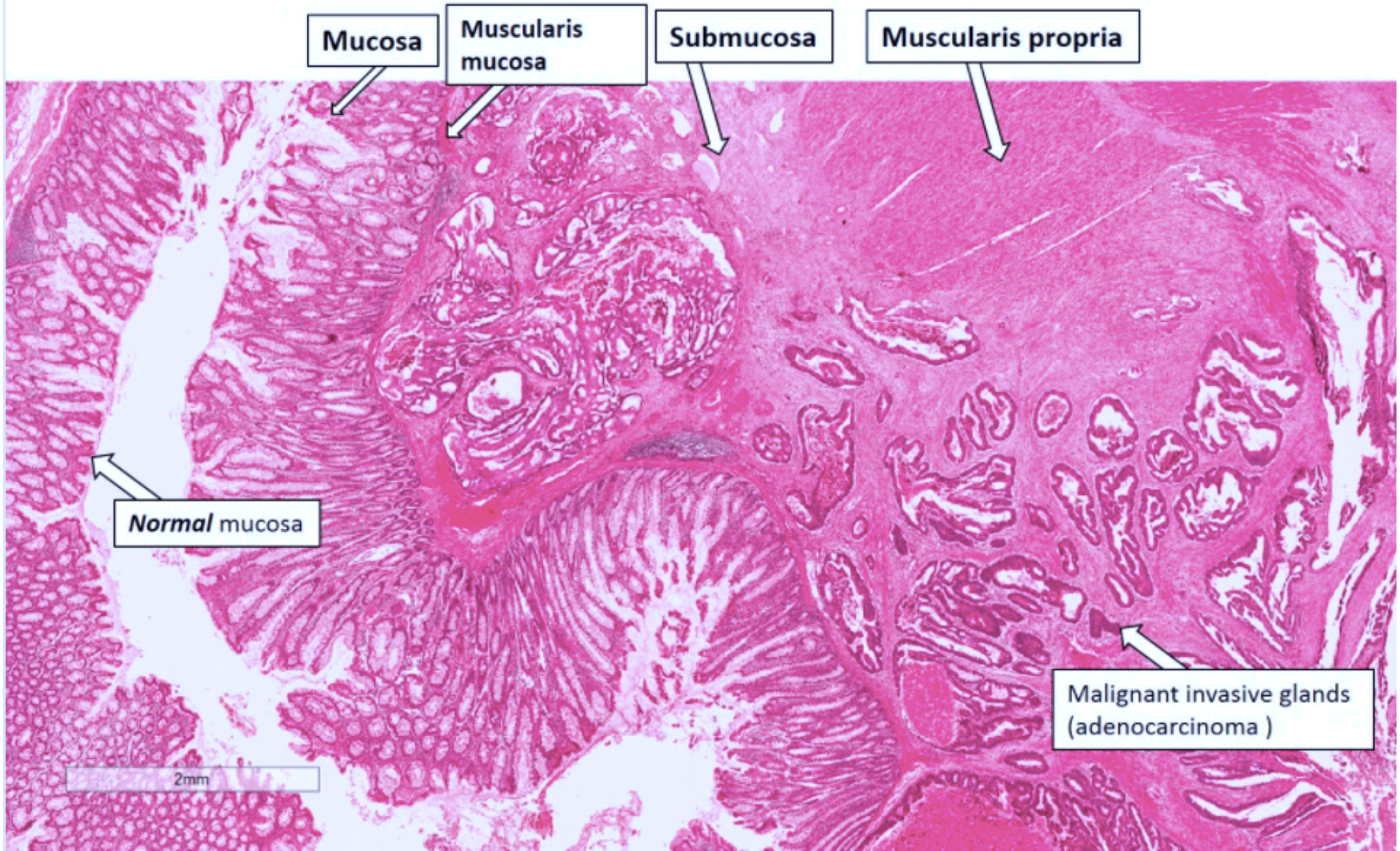
Disorganised, irregular glands invading through basement membrane. Nuclear stratification (multiple cell layers).

Raised N:C ratios with hyperchromatic & pleomorphic nuclei and prominent nucleoli.

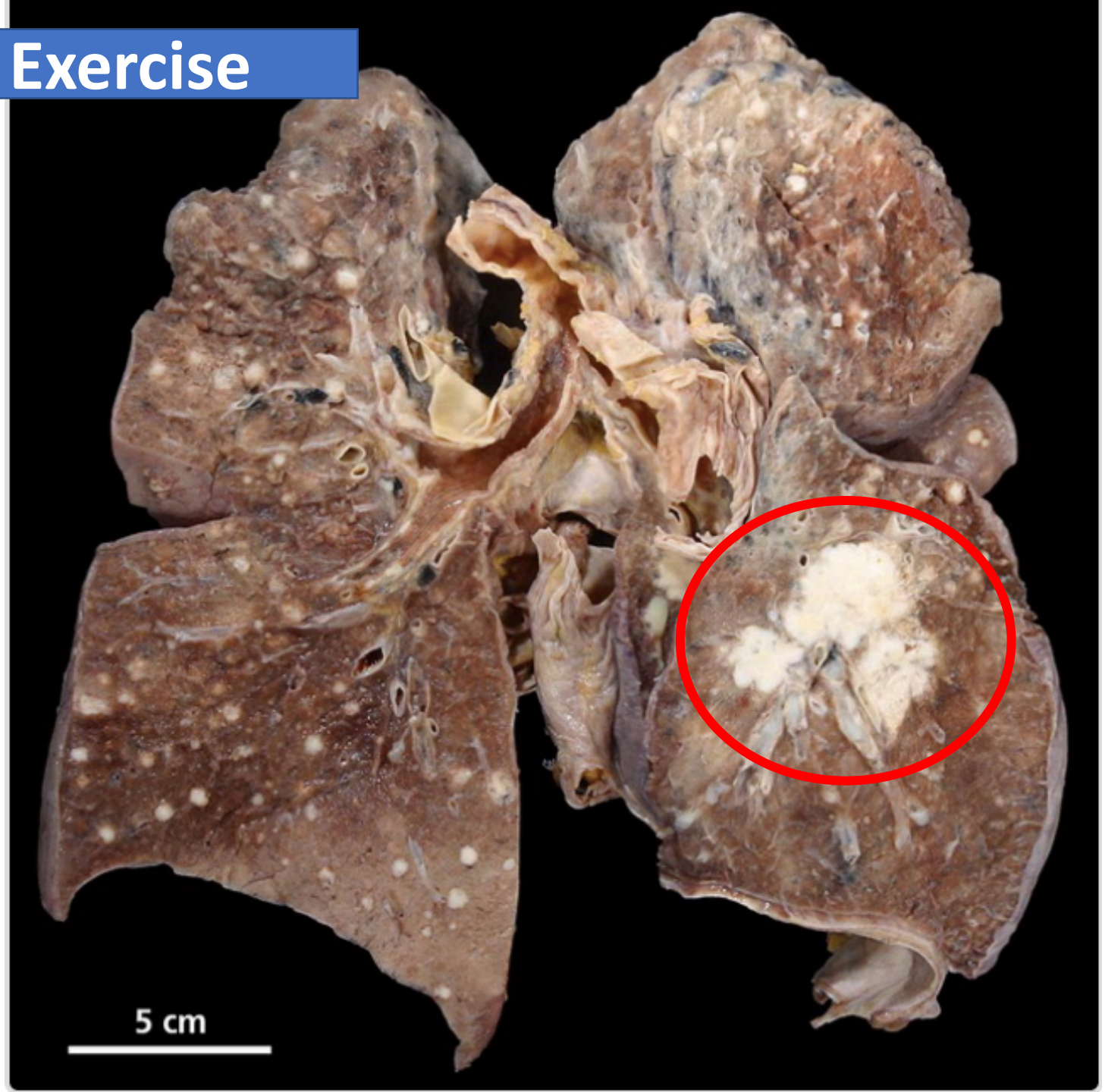


Microscopy: Colon Adenocarcinoma

Infiltrative irregular glands invading into submucosa and muscularis propria.



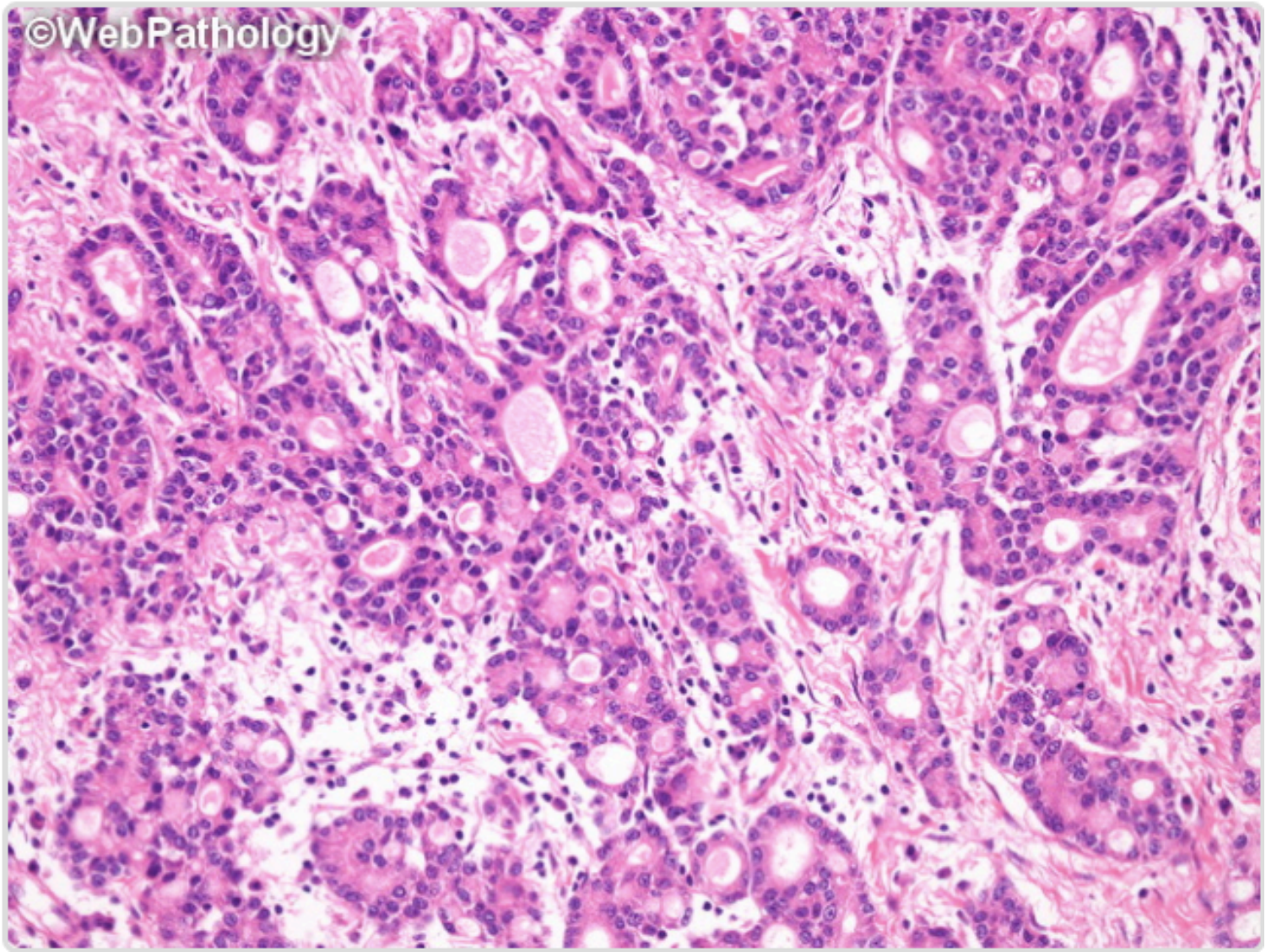
Exercise



60-year-old gentleman, presented with worsening shortness of breath. This is the photomicrograph of the lung tissue during autopsy.

1. Describe the gross pathological features (4 marks)

- Gross specimen of the lung show tumour
- Located at the lower lobe.
- The tumour show irregular/infiltrative border
- The cut surface is solid and whitish in colour
- The adjacent lung parenchyma show multiple small nodules



2. Describe the gross pathological features (4 marks)

- Section form the lung tissue show tumour tissue arranged in glandular pattern with secretion within the lumen
- The tumour cells are pleomorphic exhibit enlarged round hyperchromatic nuclei, some show vesicular nuceli with promineint nucleoli. The cytoplasm is moderate in amount
- The surrounding stroma show stroma reaction.

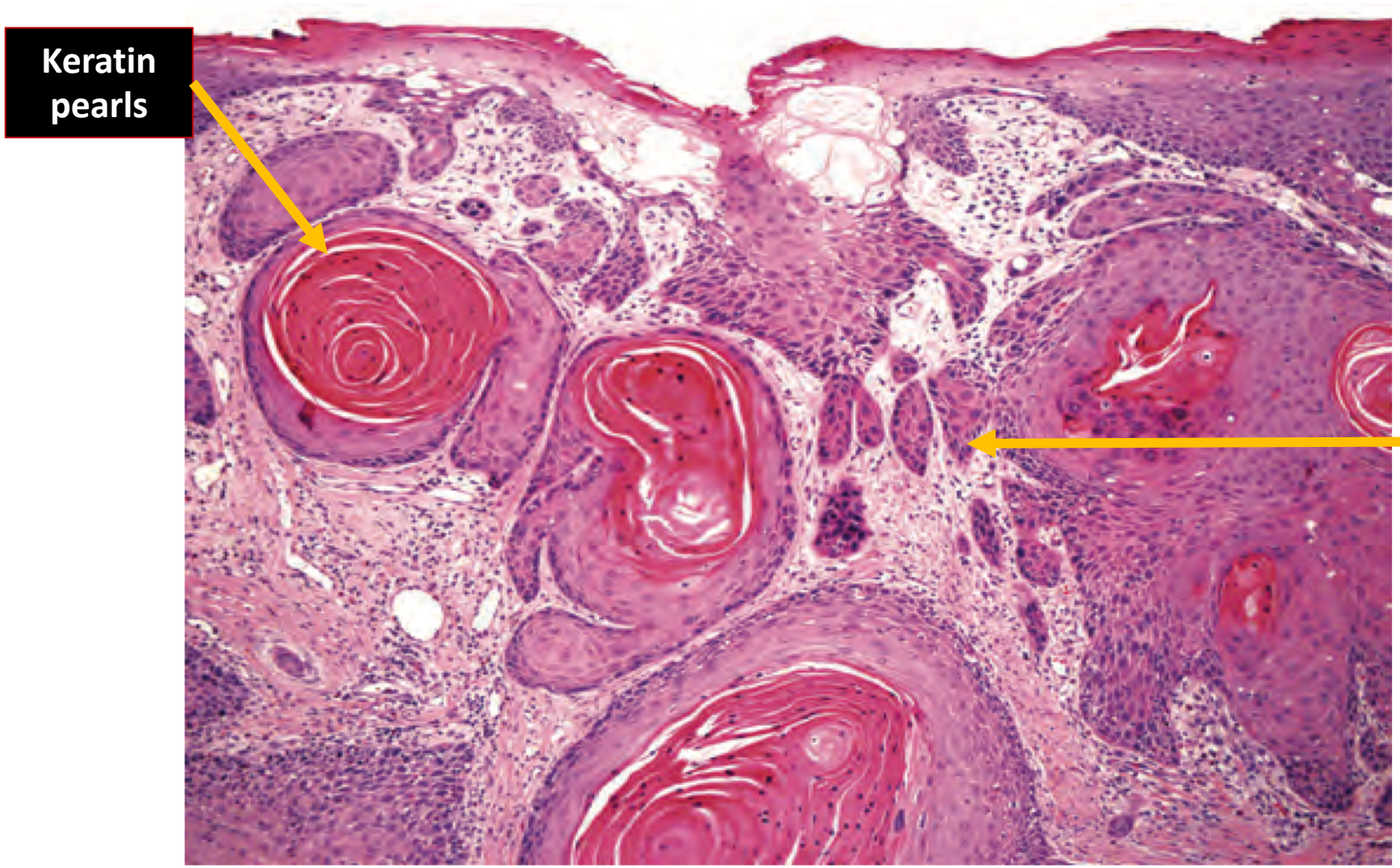
3. State your diagnosis

Adenocarcinoma of the lung, well differentiated

Describe 5 microscopic features of squamous cell carcinoma

1) Infiltrating nests and clusters of atypical squamous epithelium into the underlying tissue
2) Presents of keratin pearls, individual cell keratinization (abundant eosinophilic cytoplasm), intercellular bridges
3) Cells – enlarged nuclei, High NC ratio, pleomorphic, hyperchromatic
4) Mitosis seen
5) Stroma reactive

Please labelled the structure as labelled



Intercellular bridges

What is the diagnosis?
-Squamous cell carcinoma, well differentiated

What are the definition and differences of dysplasia and anaplasia?

Dysplasia: disordered growth, loss architecture orientation

Dysplasia

↓

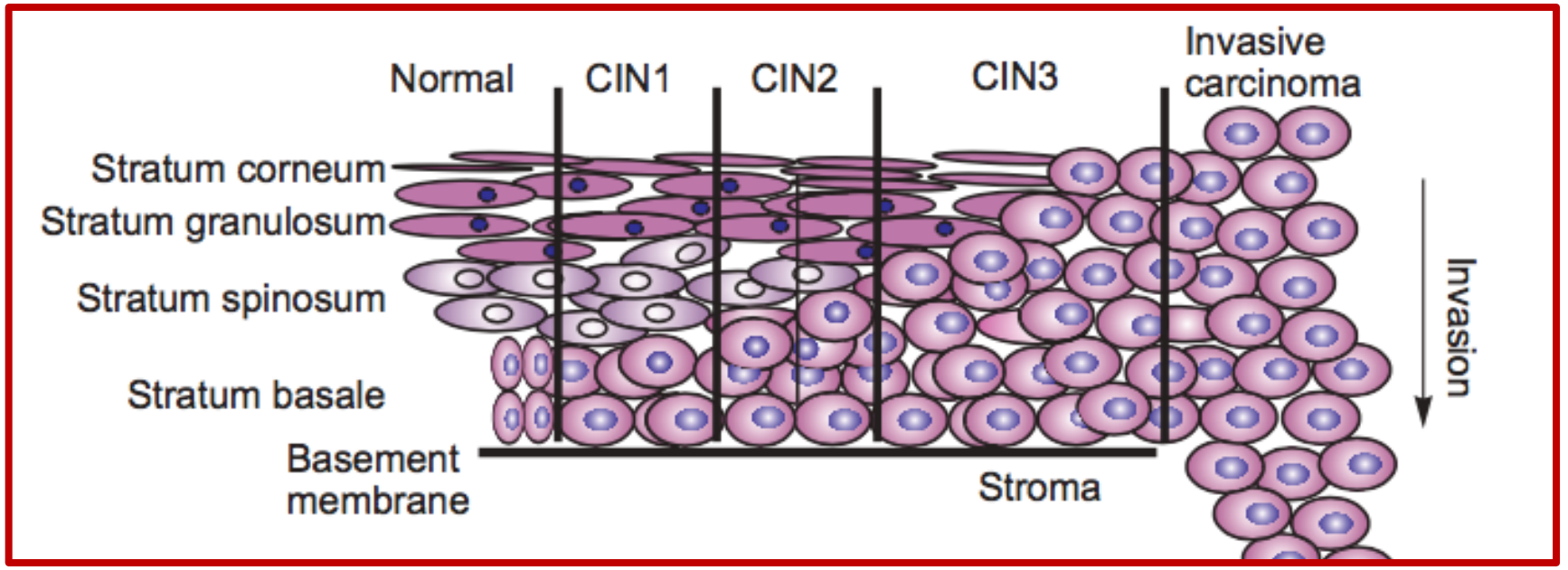
Carcinoma in situ

(Dysplasia involving the entire thickness of the epithelium)

↓

Invasive carcinoma

(Frank invasion into the stroma by malignant cells)



What are the definition and differences of dysplasia and anaplasia?

TABLE 6.2. Differences between dysplasia and anaplasia

Features	Dysplasia	Anaplasia
Definition	Lack of uniformity of individual cells with architectural distortion	Lack of morphological and functional differentiation of cells
Behaviour	A potentially precancerous condition, which may or may not progress to cancer	Anaplasia is usually a hallmark of malignant transformation
Tissue involved	Mainly epithelium	Both epithelium and mesenchyme
Cellular pleomorphism and nuclear atypia	Present, but usually low grade	High grade
Mitotic figures	Present, usually not atypical	Abnormal and atypical figures may be seen (tripolar, quadripolar and multipolar spindles)
Tumour giant cells	Absent	Present

Give 5 carcinogenic agents that possible to cause changes of normal cell to malignant cells

1. Radiation
2. Viruses
3. Chemical substance- many
4. Natural substances - aflatoxin
5. Man made- tobacco smoke