NEOPLASIA-1

DR. JANICE JAISON
Professor, Dept. of Pathology
MIMER Medical College, Talegaon (D)

PA 7.1

- Define and classify neoplasia. Describe the characteristics of neoplasia including gross, microscopy, biologic behaviour and spread. Differentiate between benign and malignant neoplasms

SPECIFIC LEARNING OBJECTIVES

At the end of the session , the II MBBS student shall be able to

- Define Neoplasia,
- Outline the classification and nomenclature for benign and malignant neoplasms, using appropriate prefixes and suffixes and indicating specific exceptions to rules of nomenclature
- Compare and contrast the Benign from Malignant Neoplasms in terms of gross and microscopic features, biologic behaviour and mode of spread

Definition

- **Neoplasm** – New growth
- **Neoplasia** – process of new growth
- **Tumor** – originally applied to swelling

caused by inflammation but neoplasms also cause swelling

Tumor synonymous with NEOPLASM

- **Oncology** – Onco – tumor, logos – study

study of tumors or neoplasms

Definition

- British Oncologist WILLIS
- **Neoplasm /Tumor**

✓ A neoplasm is an ABNORMAL mass of tissue

✓ GROWTH of which exceeds & is uncoordinated with that of normal tissue

✓ and PERSISTS in the same excessive manner, even after cessation of the stimuli which evoked the change.

Modern Era Definition

Genetic disorder of cell growth that is triggered by acquired or less commonly inherited mutations affecting a single cell and its clonal progeny

❖**Benign –**

- slow growing
- localised
- do not cause much difficulty to host

❖**Malignant**

- proliferate rapidly
- spread throughout the body
- can cause death of host

(Cancer /crab: adhering to any part in an obstinate manner like a crab)

Nomenclature

- **Tumor – 2 basic components**

1. **Parenchyma** – proliferating tumor cells
2. **Stroma** – connective tissue & blood vessels

➢ scant stroma – soft & fleshy consistency

e.g.Medullary Ca

➢ abundant stroma – desmoplasia,hard

e.g. Scirrhous Ca

Nomenclature based on parenchymal component

Nomenclature

Benign tumors – by attaching suffix OMA to cell of origin.

Benign tumors of mesenchymal origin

- adipose tissue – lipoma
- fibrous tissue – fibroma
- cartilage -- chondroma
- ostoblasts -- osteoma

Tumors of mesenchymal cells generally follow this rule.

Nomenclature

Benign Epithelial tissue - complex

- **cell of origin**
- **microscopic architecture**
- **macroscopic pattern**

a)Tumors forming cystic masses – cystadenoma

b) Papillae protruding into cysts – papillary cystadenoma

a) Microscopically or macroscopically finger like or warty projections arising from epithelium – papilloma

squamous epithelium – squamous papilloma

transitional epithelium - transitional papilloma


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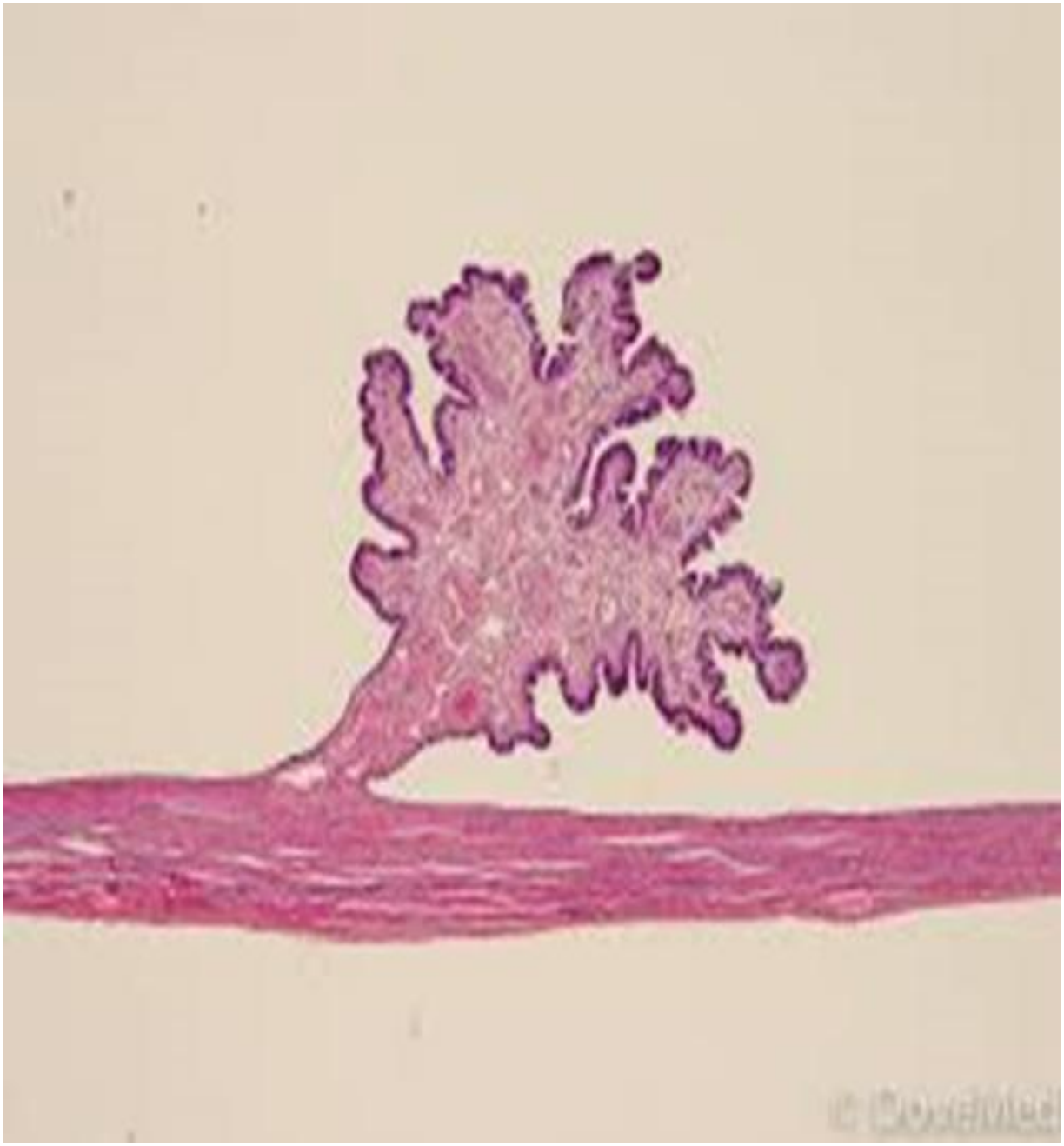

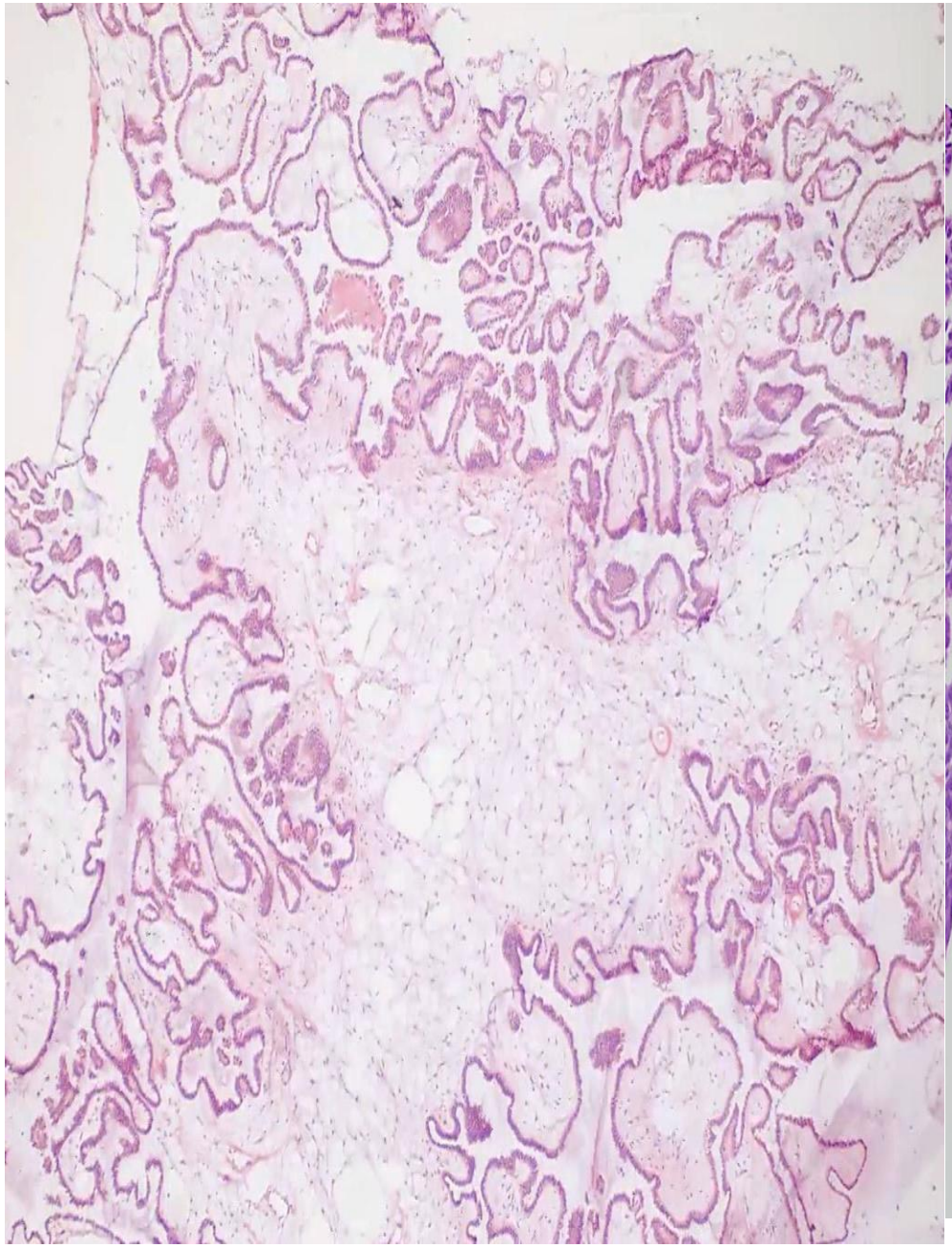

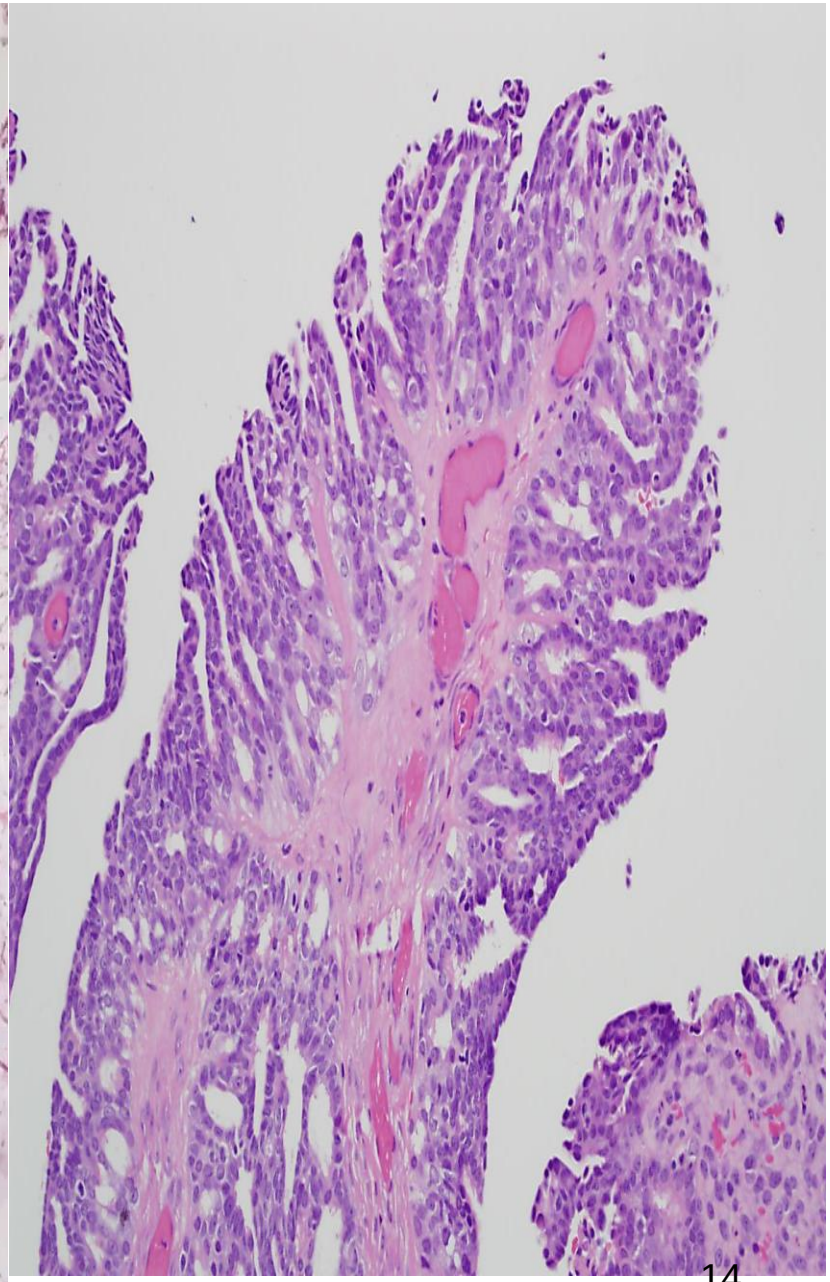

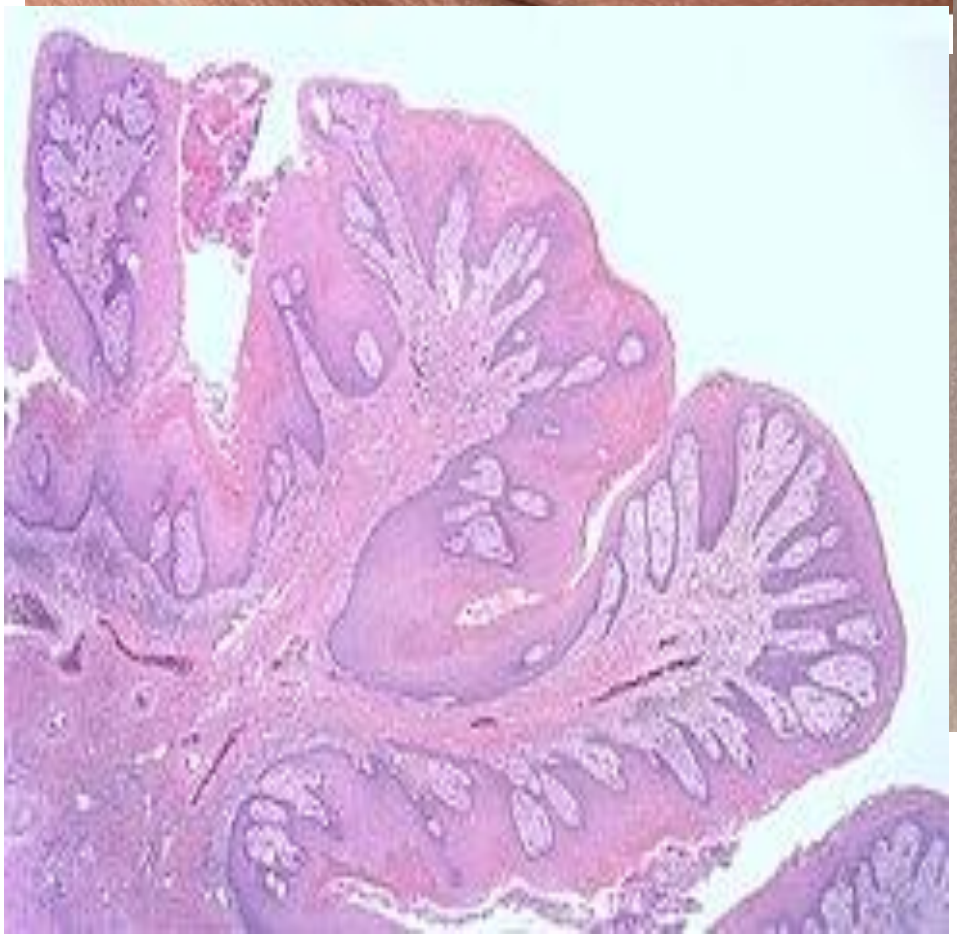


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Nomenclature

- Malignant tumors

Mesenchymal tissue – Sarcoma

adipose tissue – liposarcoma

fibrous tissue – fibrosarcoma

Epithelium – Carcinoma

squamous epithelium – Squamous cell Ca

columnar epithelium – Adeno carcinoma

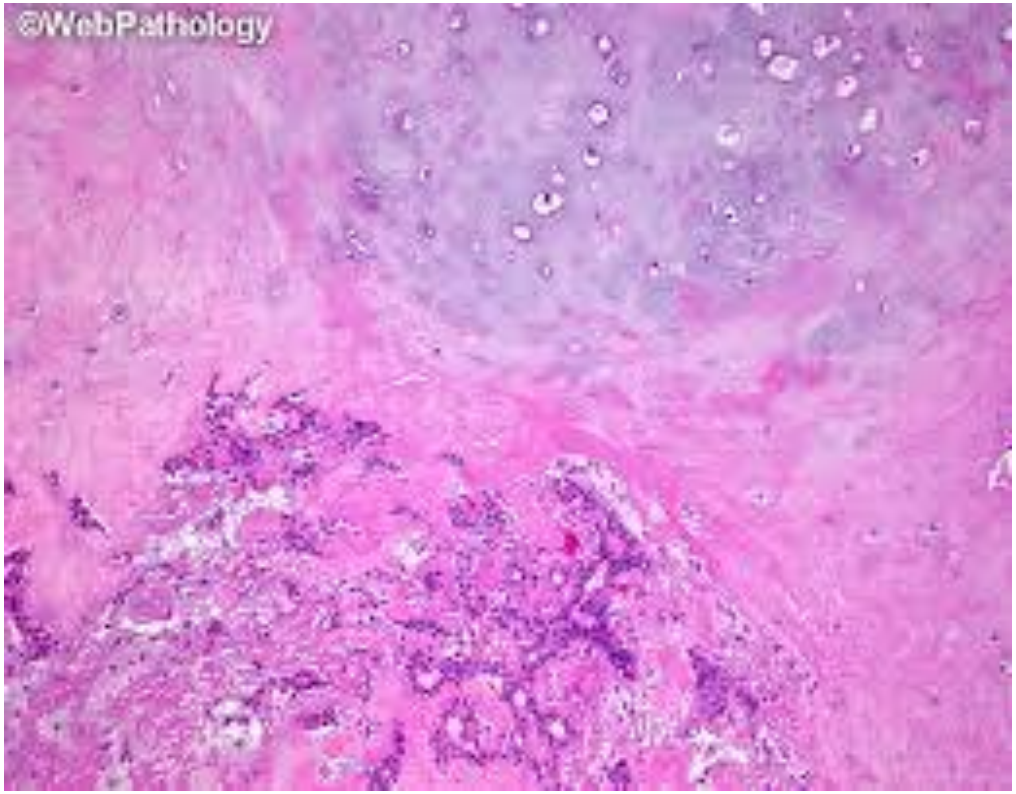
EXCEPTIONS

- **Melanoma –** malignant tumor of melanocytes
- **Hepatoma** - malignant tumor of hepatocytes
- **Lymphoma –** malignant tumor of lymphoid cells
- **Seminoma** - malignant tumor of testis

Special categories of tumors

- **Mixed tumors**

- Mixed tumor of salivary gland



Special Categories of Tumors

- **Teratomas**

  --arise from totipotent cells

  -- totipotent cells differentiate along various germ lines.

  -- can give rise to structures derived from the 3 germ cell layers i.e.

  ectoderm, mesoderm and endoderm.

  -- principally seen in gonads but can be extragonadal ,mainly midline – mediastinum , retro peritoneum.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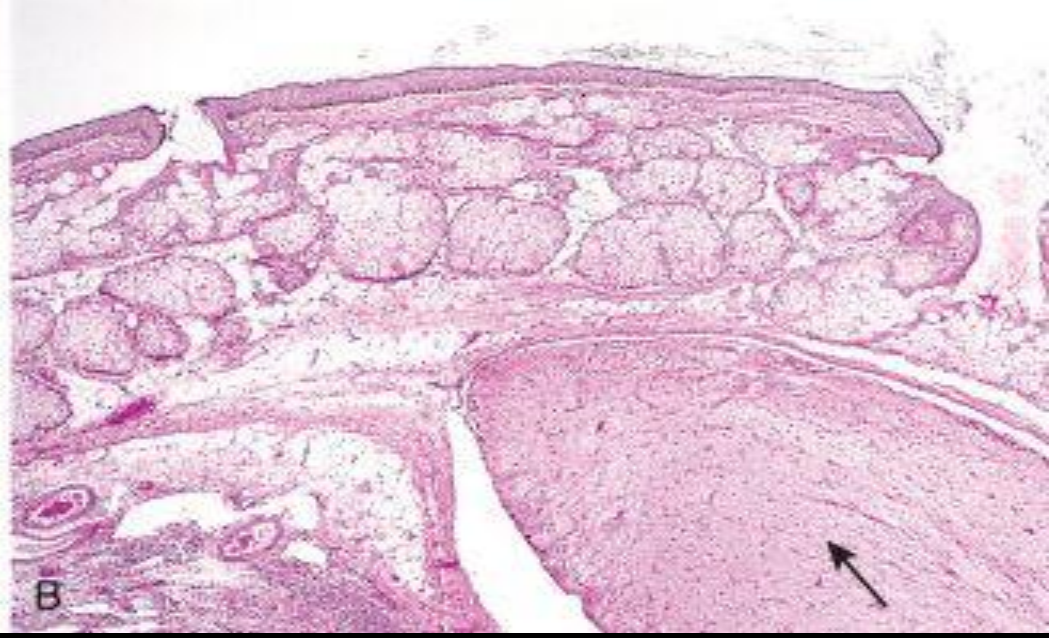
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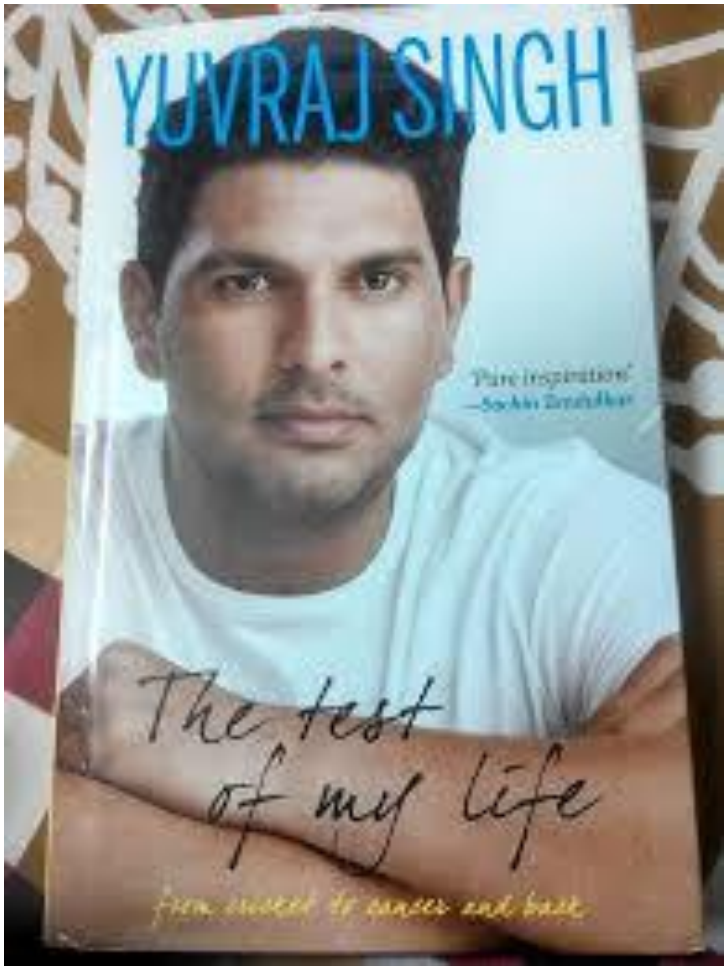

YUVRAJ SINGH
The test of my life


Do You Know ?
YUVRAJ SINGH
was diagnosed with
MEDIASTINAL SEMINOMA
Know more about this disease

- **Choristoma**

  - ectopic rest (misplaced rests) of normal tissue.

  - rests of adrenals under kidney capsule.

  - heterotopia and not true tumor

- **Hamartoma**

  - benign tumor made up of mature but disorganized cells of tissues indigenous to the particular organ .

  - hamartoma of lung consists of mature cartilage, mature smooth muscle and epithelium.

- **Blastomas** (embryomas)

  - a group malignant tumors which arise from the embryonal or partially differentiated cells which would normally form the blastema of organs and tissues during embryogenesis.

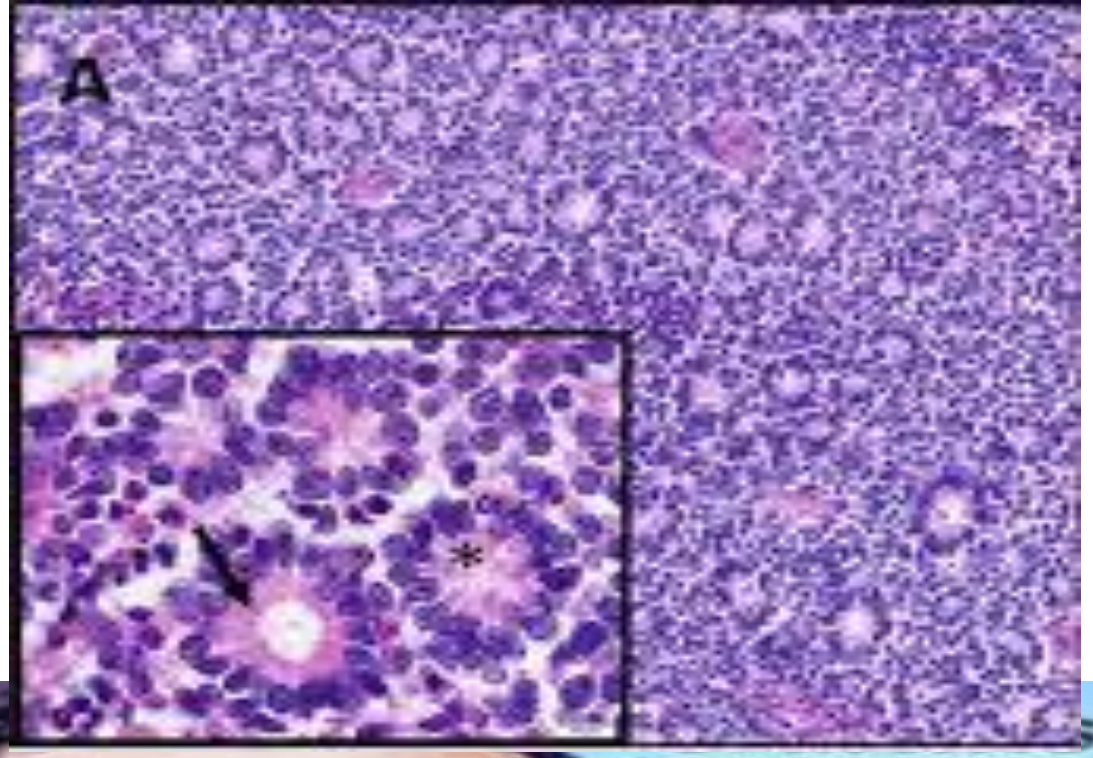
  - infants and children below 5 yrs of age

  e.g. – neuroblastoma

  nephroblastoma

  hepatoblastoma

  retinoblastoma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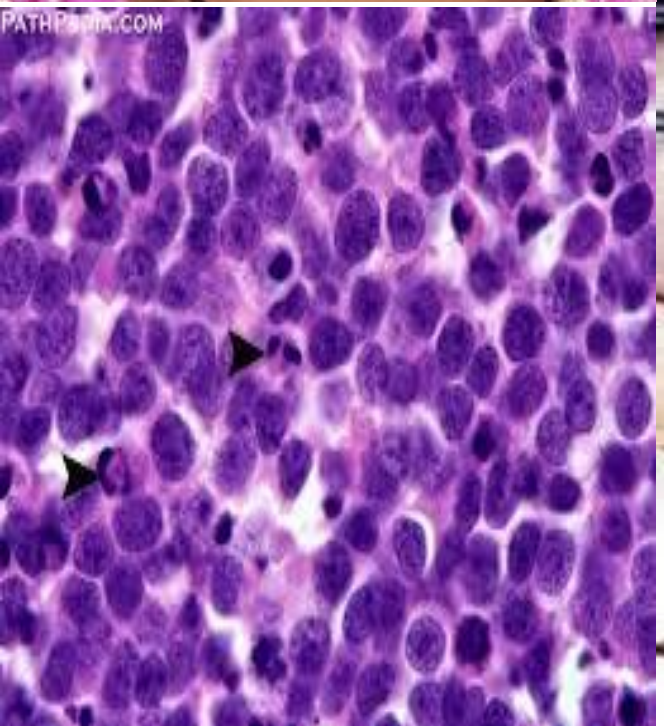
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Based on true story from India
প্রভাব

Tissue of Origin	Benign	Malignant
COMPOSED OF ONE PARENCHYMAL CELL TYPE		
Tumors of Mesenchymal Origin		
Connective tissue and derivatives	Fibroma	Fibrosarcoma
	Lipoma	Liposarcoma
	Chondroma	Chondrosarcoma
	Osteoma	Osteogenic sarcoma
Endothelial and Related Tissues		
Blood vessels	Hemangioma	Angiosarcoma
Lymph vessels	Lymphangioma	Lymphangiosarcoma
Synovium		Synovial sarcoma
Mesothelium		Mesothelioma
Brain coverings	Meningioma	Invasive meningioma
Blood Cells and Related Cells		
Hematopoietic cells		Leukemias
Lymphoid tissue		Lymphomas
Muscle		
Smooth	Leiomyoma	Leiomyosarcoma
Striated	Rhabdomyoma	Rhabdomyosarcoma
Tumors of Epithelial Origin		
Stratified squamous	Squamous cell papilloma	Squamous cell carcinoma
Basal cells of skin or adnexa		Basal cell carcinoma
Epithelial lining of glands or ducts	Adenoma	Adenocarcinoma
	Papilloma	Papillary carcinomas
	Cystadenoma	Cystadenocarcinoma
Respiratory passages	Bronchial adenoma	Bronchogenic carcinoma
Renal epithelium	Renal tubular adenoma	Renal cell carcinoma
Liver cells	Liver cell adenoma	Hepatocellular carcinoma
Urinary tract epithelium (transitional)	Transitional-cell papilloma	Transitional-cell carcinoma
Placental epithelium	Hydatidiform mole	Choriocarcinoma
Testicular epithelium (germ cells)		Seminoma
		Embryonal carcinoma
Tumors of Melanocytes	Nevus	Malignant melanoma
MORE THAN ONE NEOPLASTIC CELL TYPE—MIXED TUMORS, USUALLY DERIVED FROM ONE GERM CELL LAYER		
Salivary glands	Pleomorphic adenoma (mixed tumor of salivary origin)	Malignant mixed tumor of salivary gland origin
Renal anlage		Wilms tumor
MORE THAN ONE NEOPLASTIC CELL TYPE DERIVED FROM MORE THAN ONE GERM CELL LAYER—TERATOGENOUS		
Totipotential cells in gonads or in embryonic rests	Mature teratoma, dermoid cyst	Immature teratoma, teratocarcinoma

Characteristics of Benign & Malignant Tumors

I <u>Rate of growth</u> –

- doubling time of tumor cells
- fraction of tumor cells that are in a proliferative pool
- rate at which the cells are shed & destroyed

- Tumor cells grow more rapidly than normal cells.
- Benign tumors grow slowly than malignant cells.

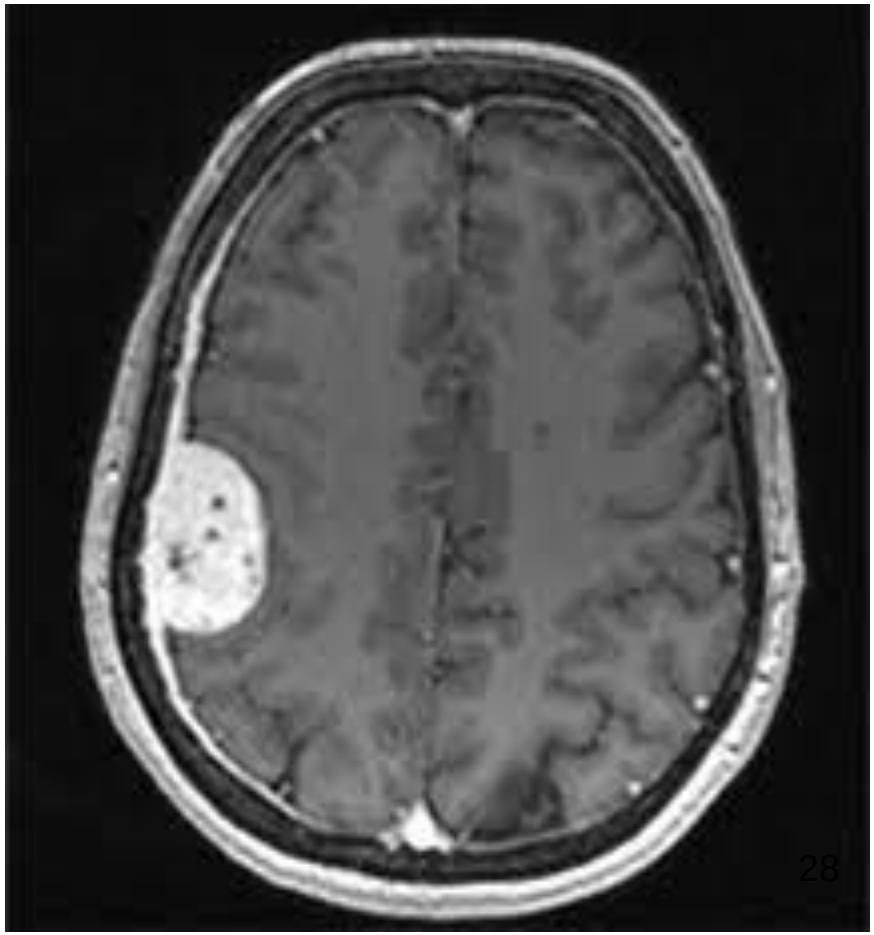
II Clinical & gross features

Benign tumors –

- slow growing & asymptomatic e.g.lipoma
- serious symptoms e.g meningioma

Malignant tumors –

- grow rapidly
- invade locally
- spread to distant sites
- produce systemic features e.g. wt loss, anorexia



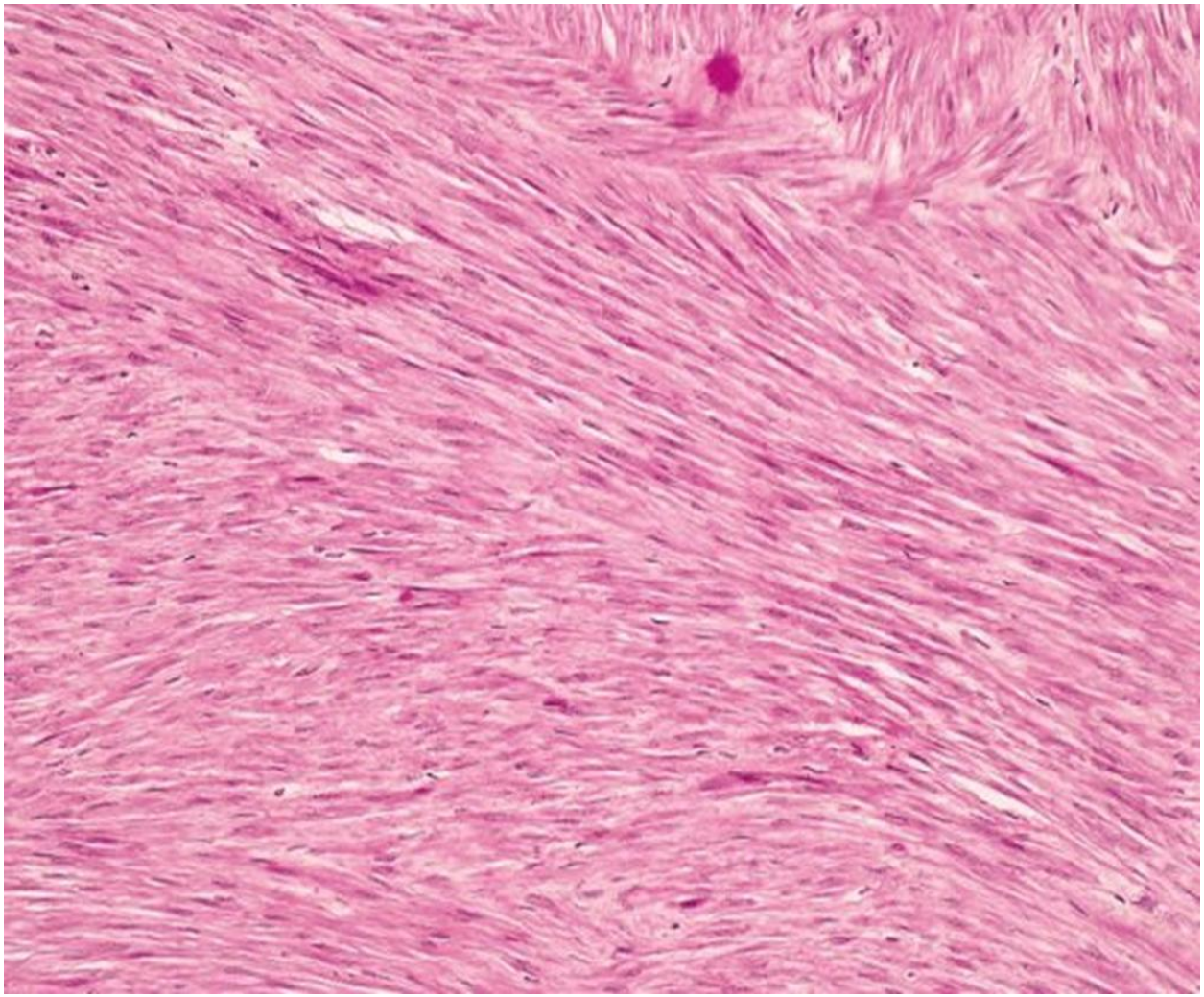
III. Microscopic features

A) Differentiation & Anaplasia

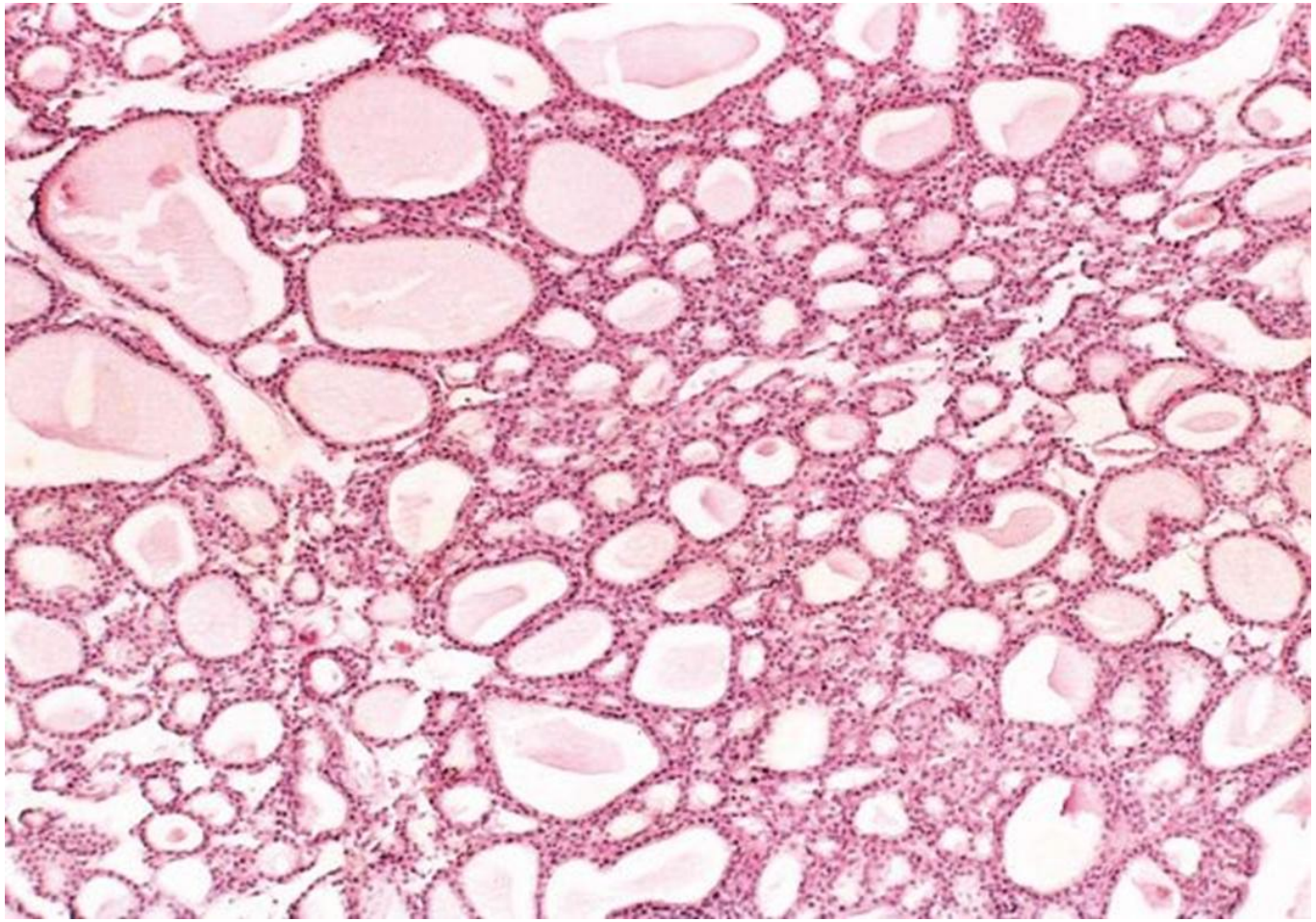
Differentiation refers to the extent to which the neoplastic cells resemble comparable normal cells both morphologically & functionally.

- Lack of differentiation – Anaplasia
- Benign Tumors – well differentiated
- Malignant Tumors – well/ moderately/ poorly differentiated / undifferentiated: Anaplastic

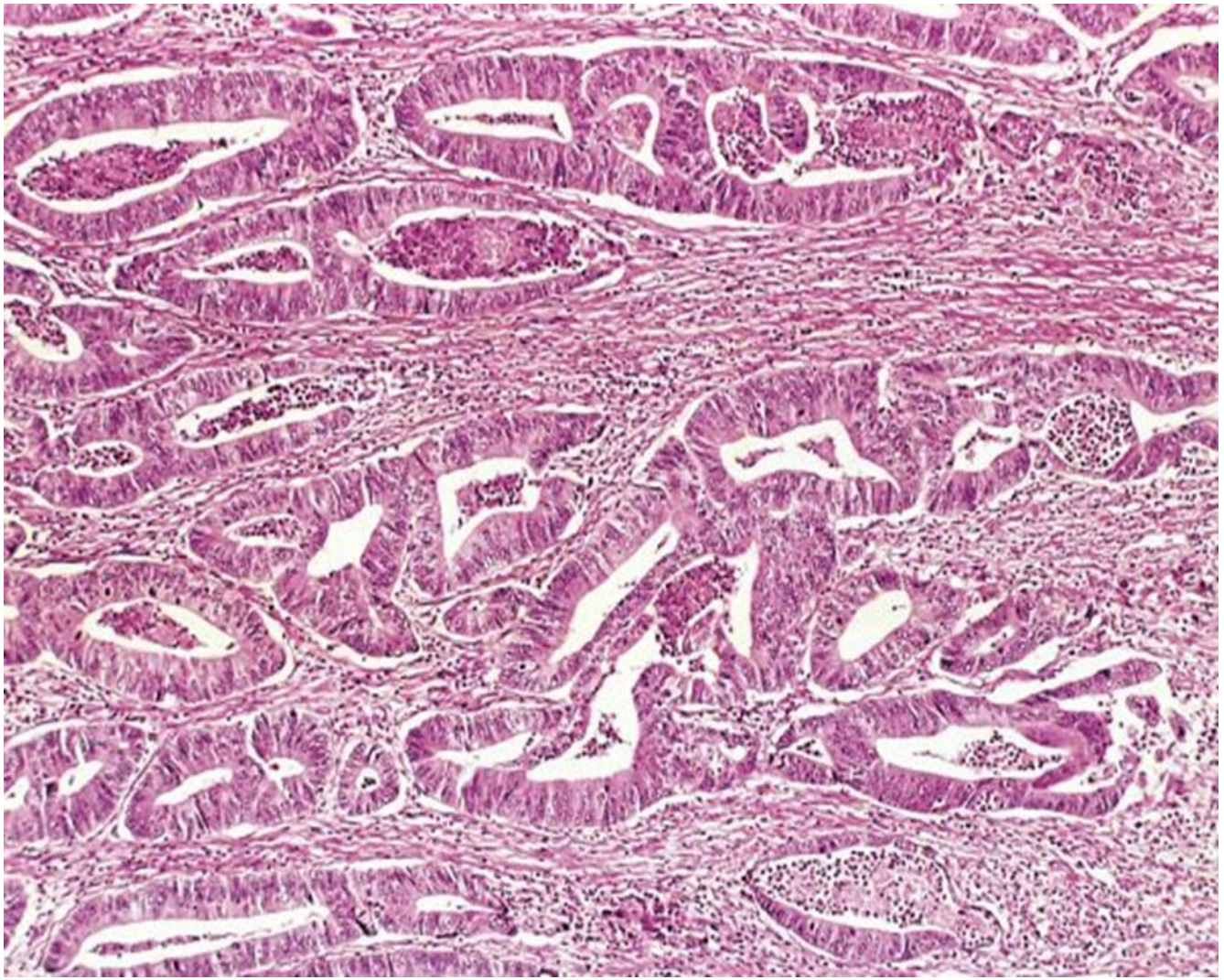
Leiomyoma of the uterus



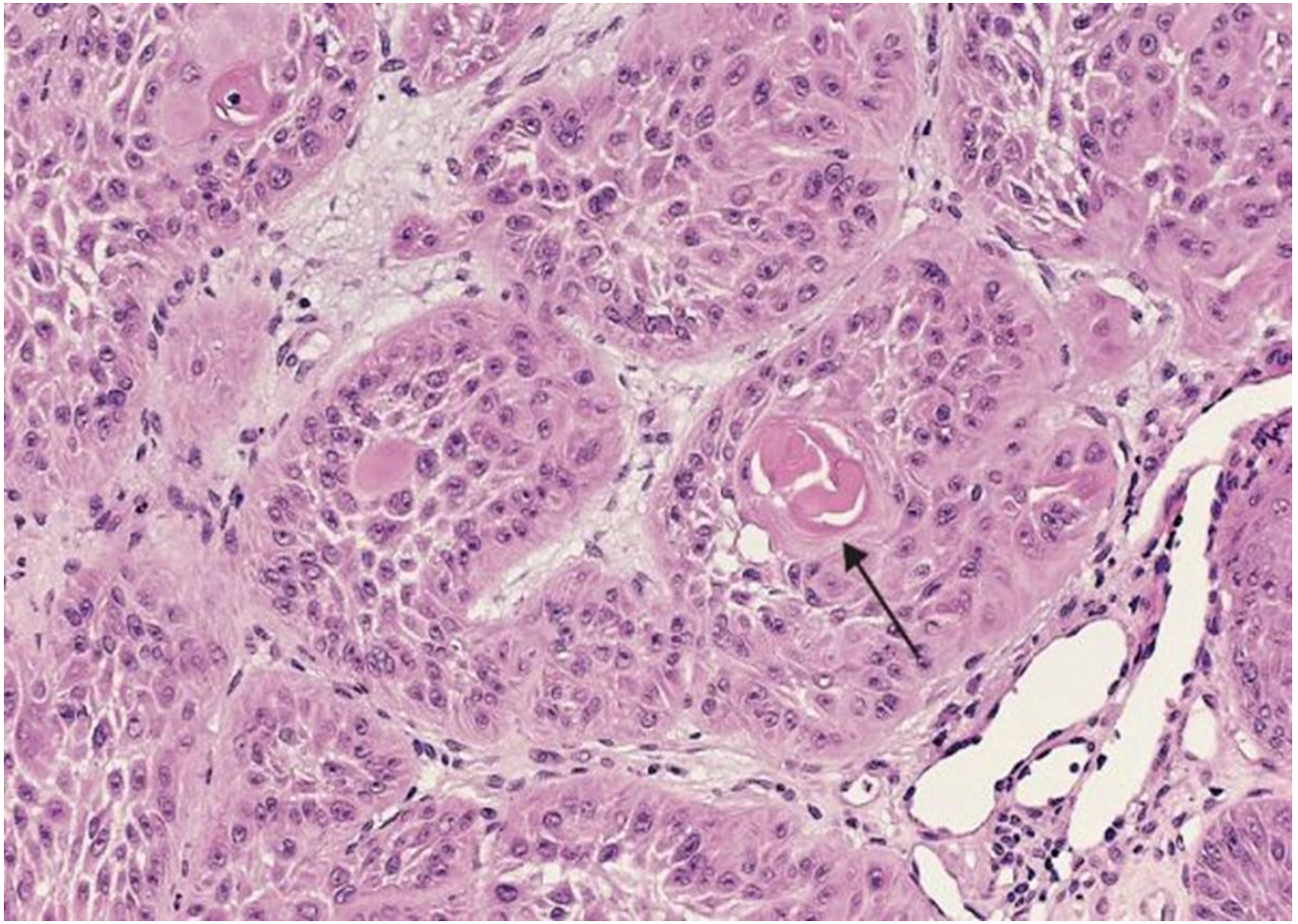
Benign tumor(adenoma) of the thyroid



Malignant tumor(Adenocarcinoma) of the colon



Well differentiated Squamous cell carcinoma of Skin



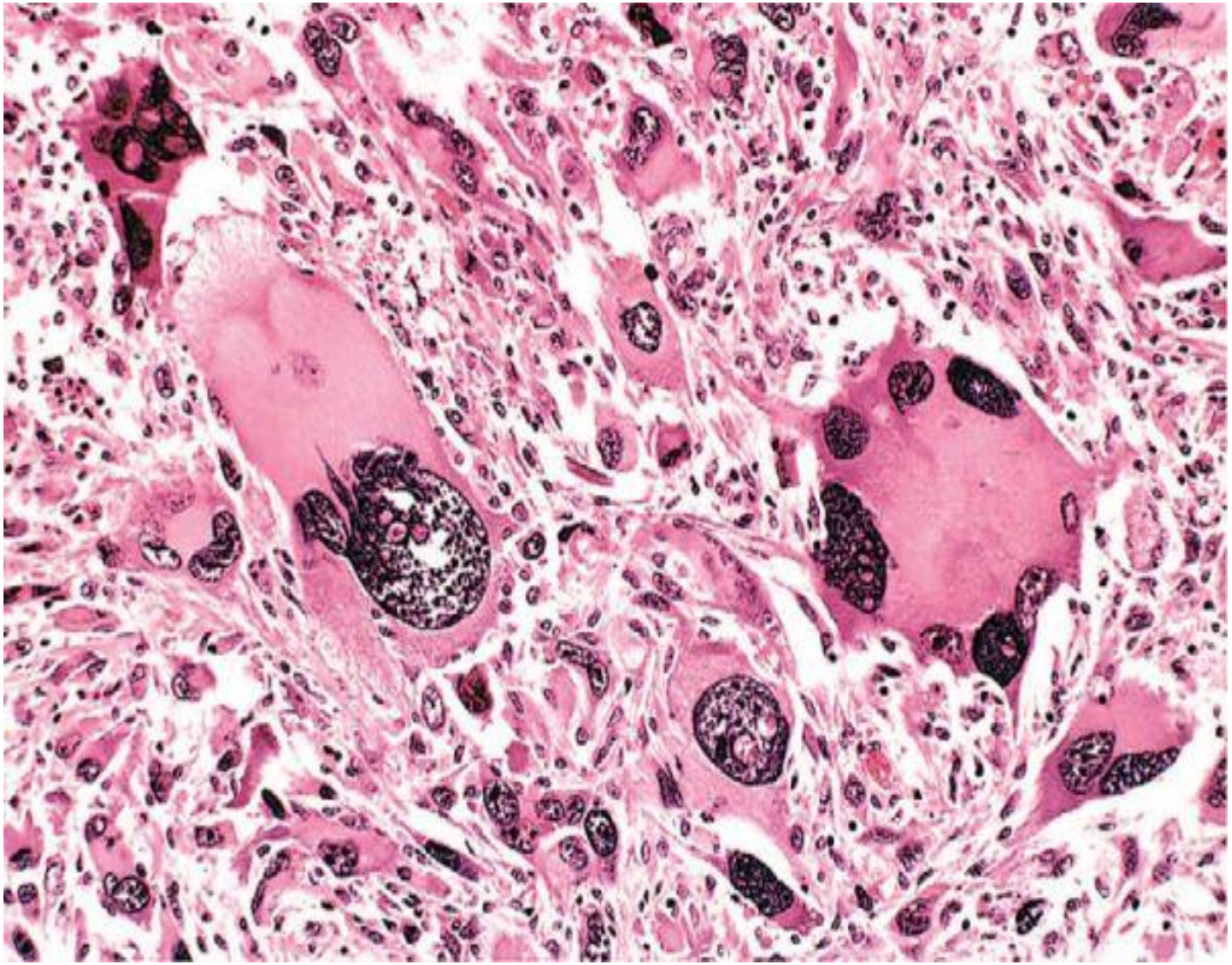
Anaplasia

a) Pleomorphism

- Variation in size & shape
- Cells & nuclei display pleomorphism

b) Abnormal Nuclear Morphology

- Hyperchromatic – dark ,abundant DNA
- N/C ratio – N 1:4 or 1:6
- Malignancy – 1:1,increased.
- Anisonucleosis
- Chromatin – coarsely clumped
- Prominent nucleoli



Anaplasia

c) Mitosis

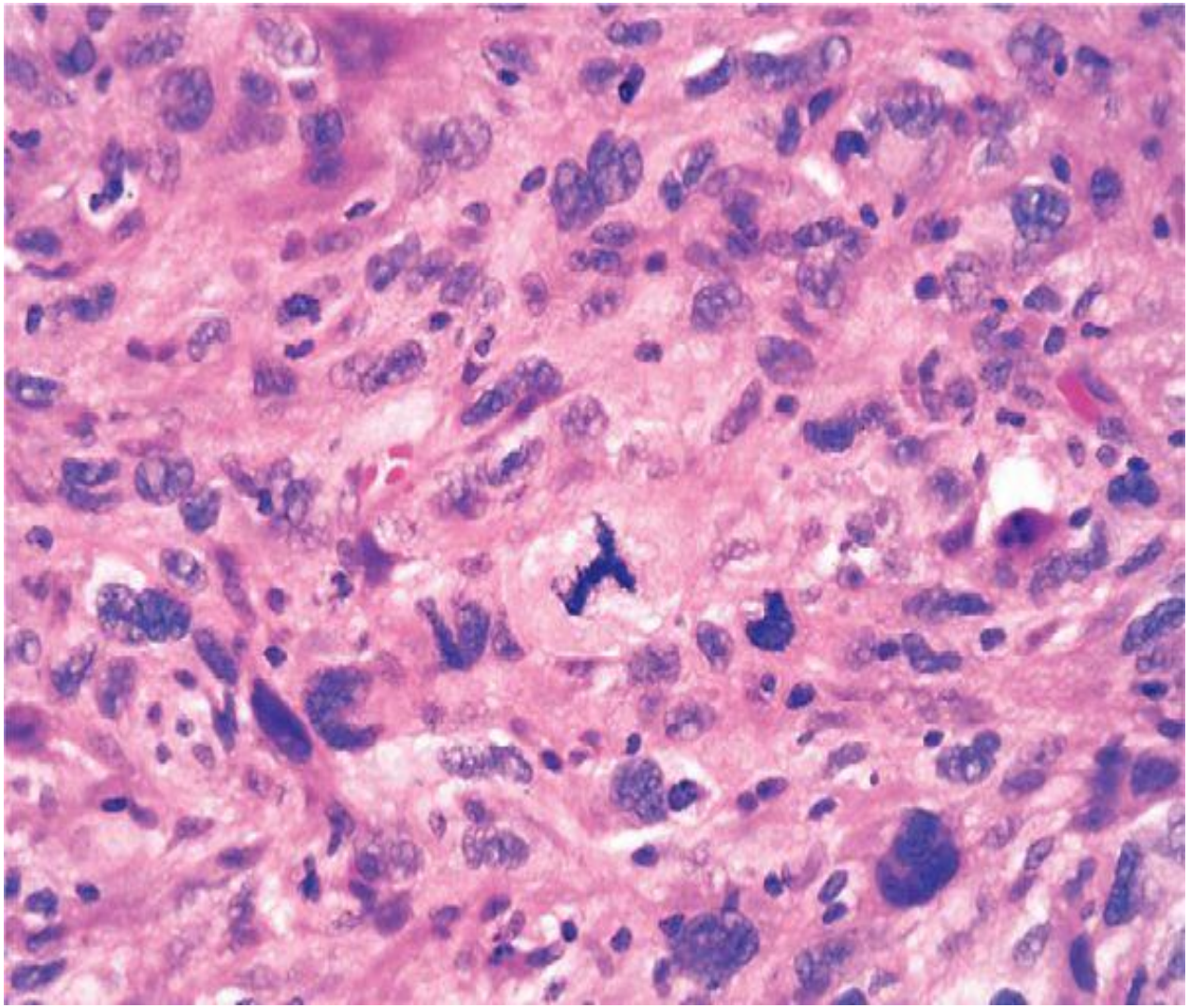
malignant tumors more no. compared to benign

↑ proliferative activity of parenchymal cells

Atypical, bizzare mitotic figures- tripolar,quadripolar or multiple spindles

d) Loss of polarity

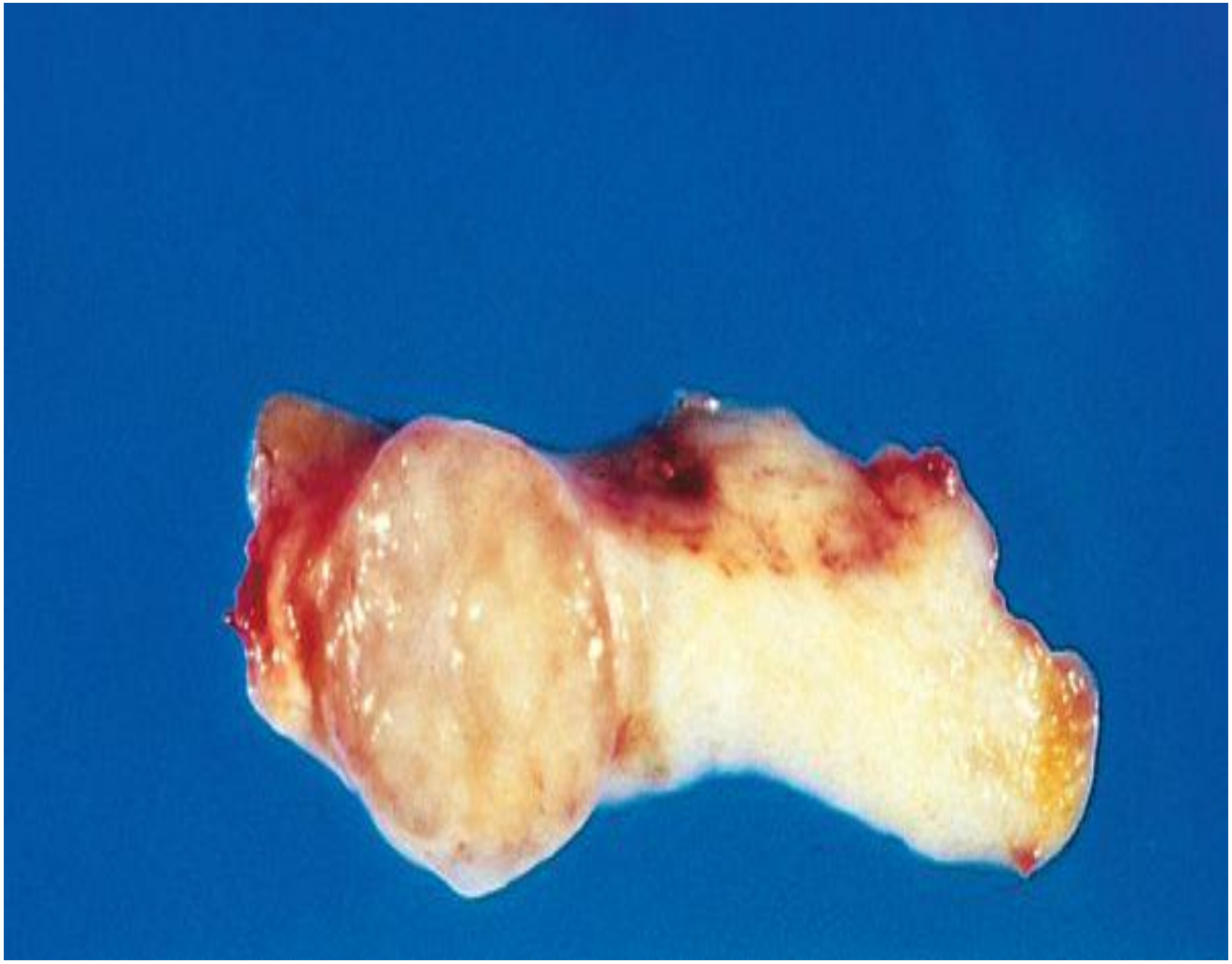
e) Tumor giant cells

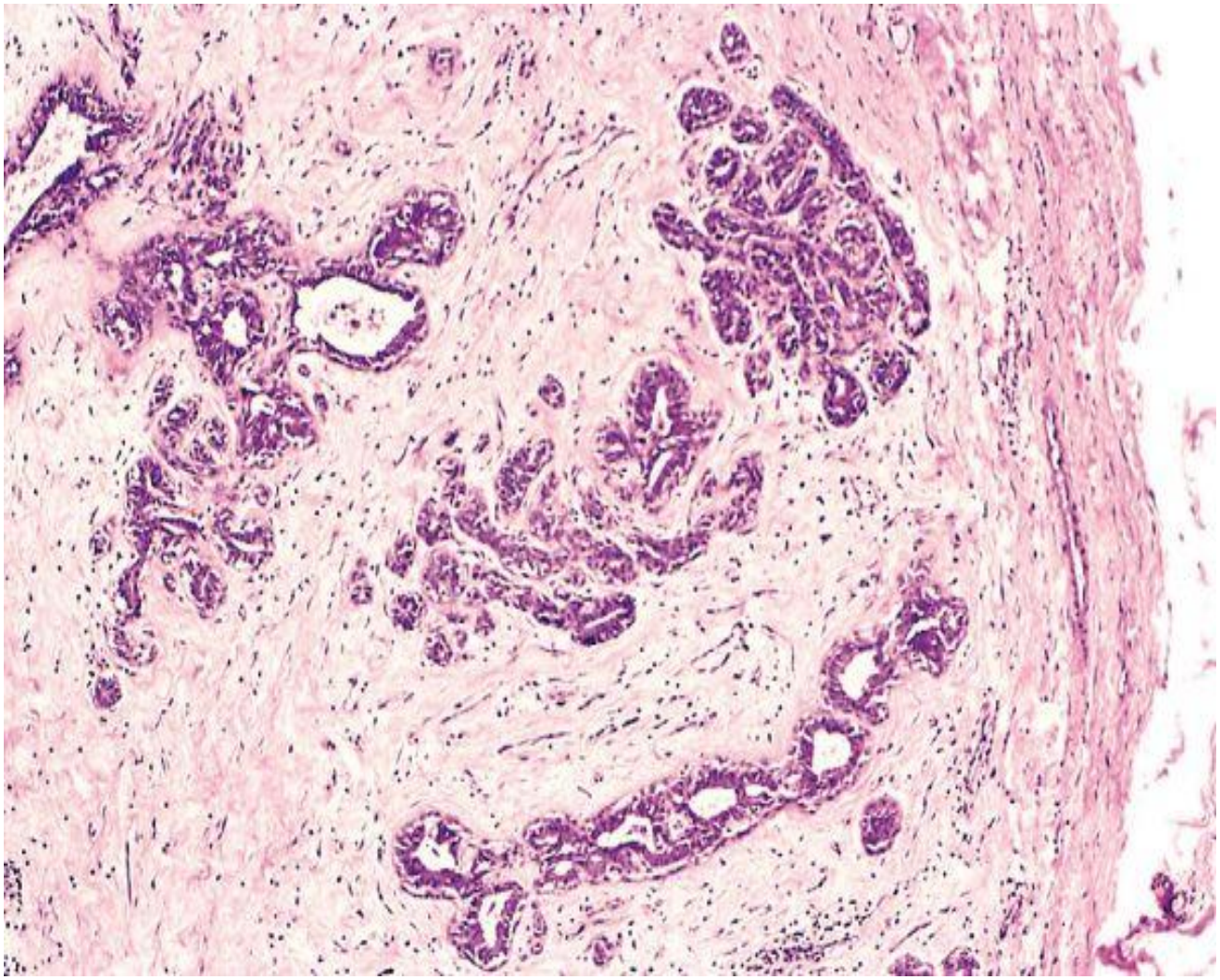


IV Local invasion

Benign tumors –

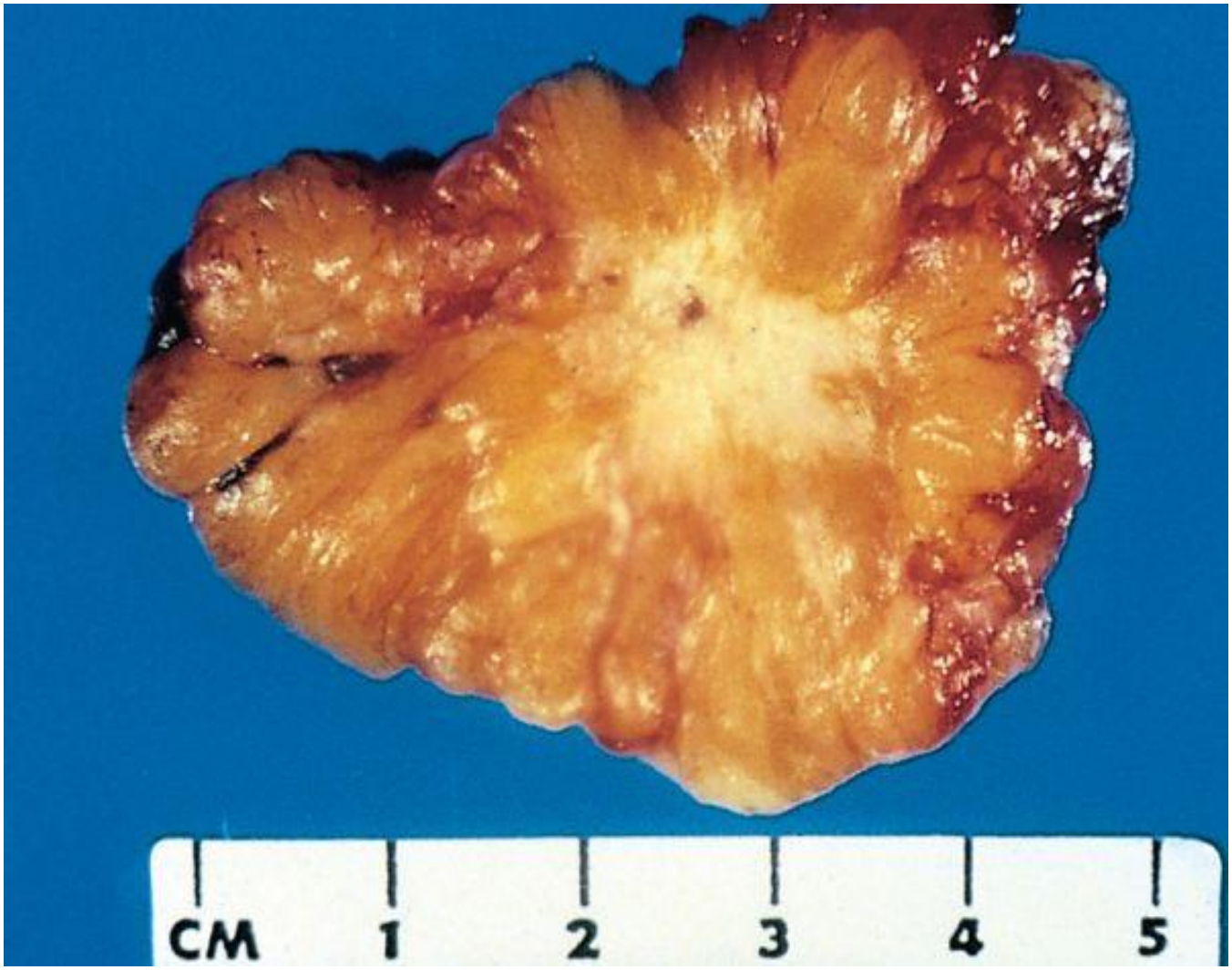
- grow as cohesive expansile masses
- localised to site of origin
- expand & push aside surrounding tissue
- donot have capacity to infiltrate,invade or metastasize
- grow slowly, encapsulated, circumscribed masses
- develop a rim of compressed connective tissue
- (fibrous capsule) which separetes them from host tissue





Malignant tumors –

- growth by progressive infiltration, invasion & destruction of surrounding tissue.
- Surgical removal difficult
- Poorly circumscribed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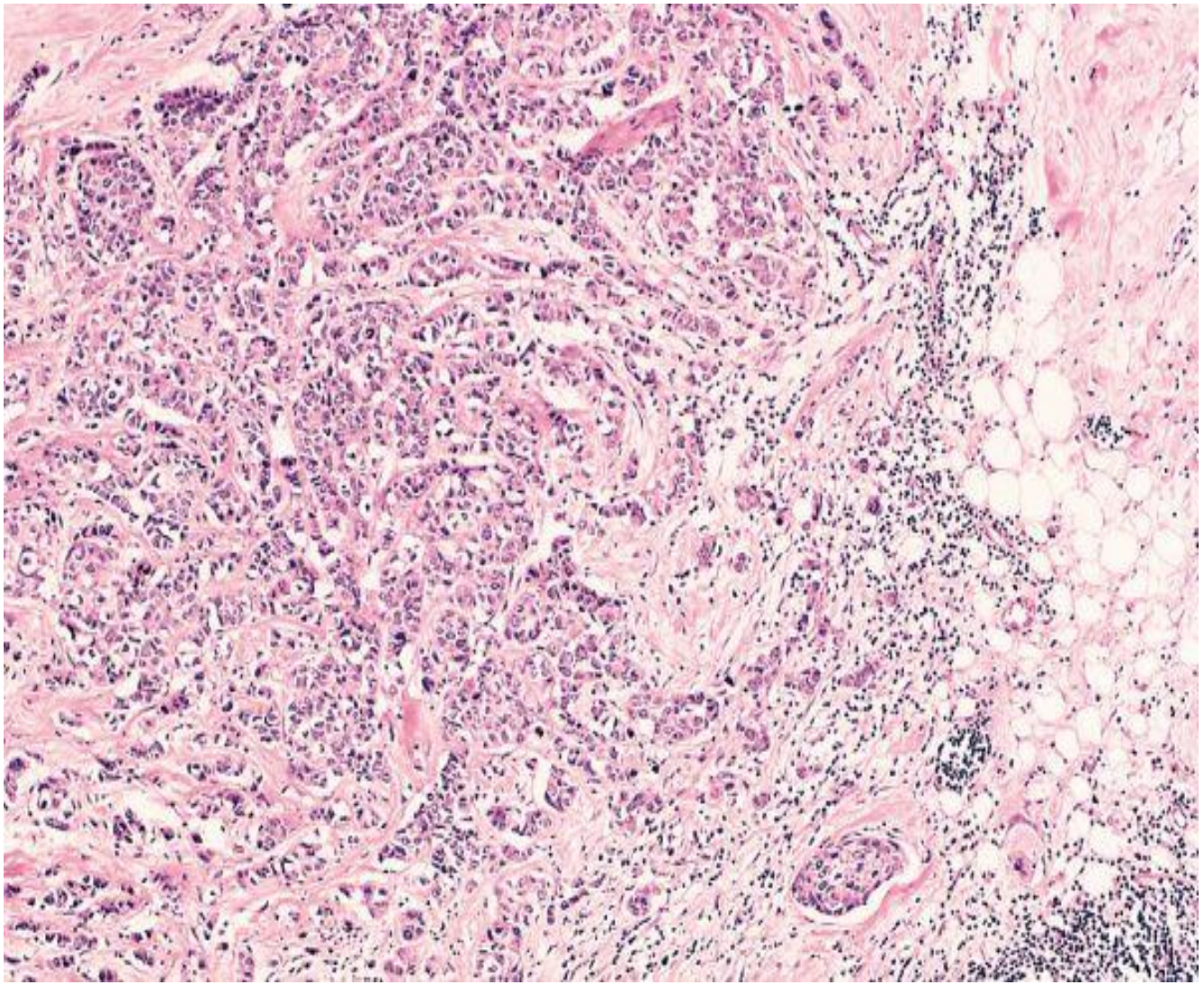

V Metastasis –

Metastases are tumor implants discontinuous with the primary tumor.

- Benign tumors -- do not metastasize
- Malignant tumors – metastasize

  Invade into blood vessals,lymphatics or body cavities.

Exceptions – Gliomas

Basal Cell Carcinoma of skin


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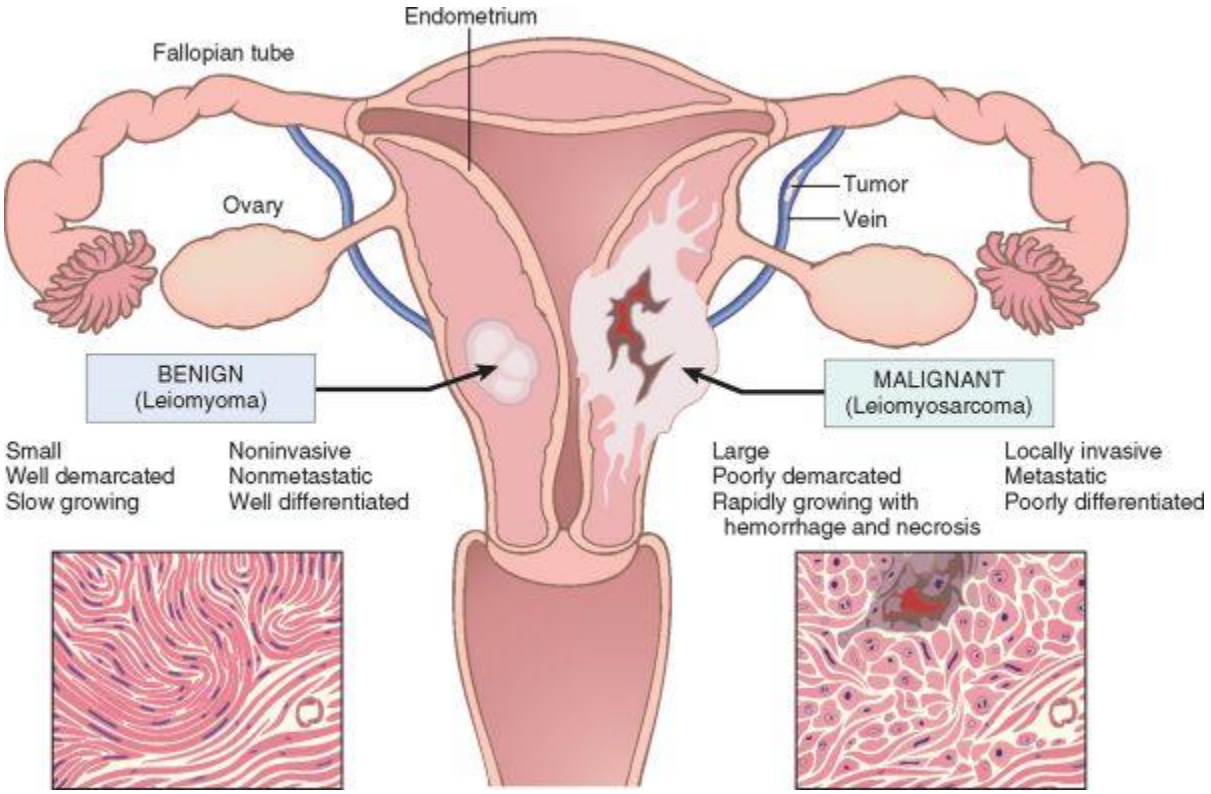
Characteristics	Benign	Malignant
Differentiation/anaplasia	Well differentiated; structure sometimes typical of tissue of origin	Some lack of differentiation with anaplasia; structure often atypical
Rate of growth	Usually progressive and slow; may come to a standstill or regress; mitotic figures rare and normal	Erratic and may be slow to rapid; mitotic figures may be numerous and abnormal
Local invasion	Usually cohesive expansile well-demarcated masses that do not invade or infiltrate surrounding normal tissues	Locally invasive, infiltrating surrounding tissue; sometimes may be seemingly cohesive and expansile
Metastasis	Absent	Frequently present; the larger and more undifferentiated the primary, the more likely are metastases


Endometrium
Fallopian tube
Ovary
Tumor
Vein
BENIGN
(Leiomyoma)
MALIGNANT
(Leiomyosarcoma)
Small
Well demarcated
Slow growing
Noninvasive
Nonmetastatic
Well differentiated
Large
Poorly demarcated
Rapidly growing with
hemorrhage and necrosis
Locally invasive
Metastatic
Poorly differentiated

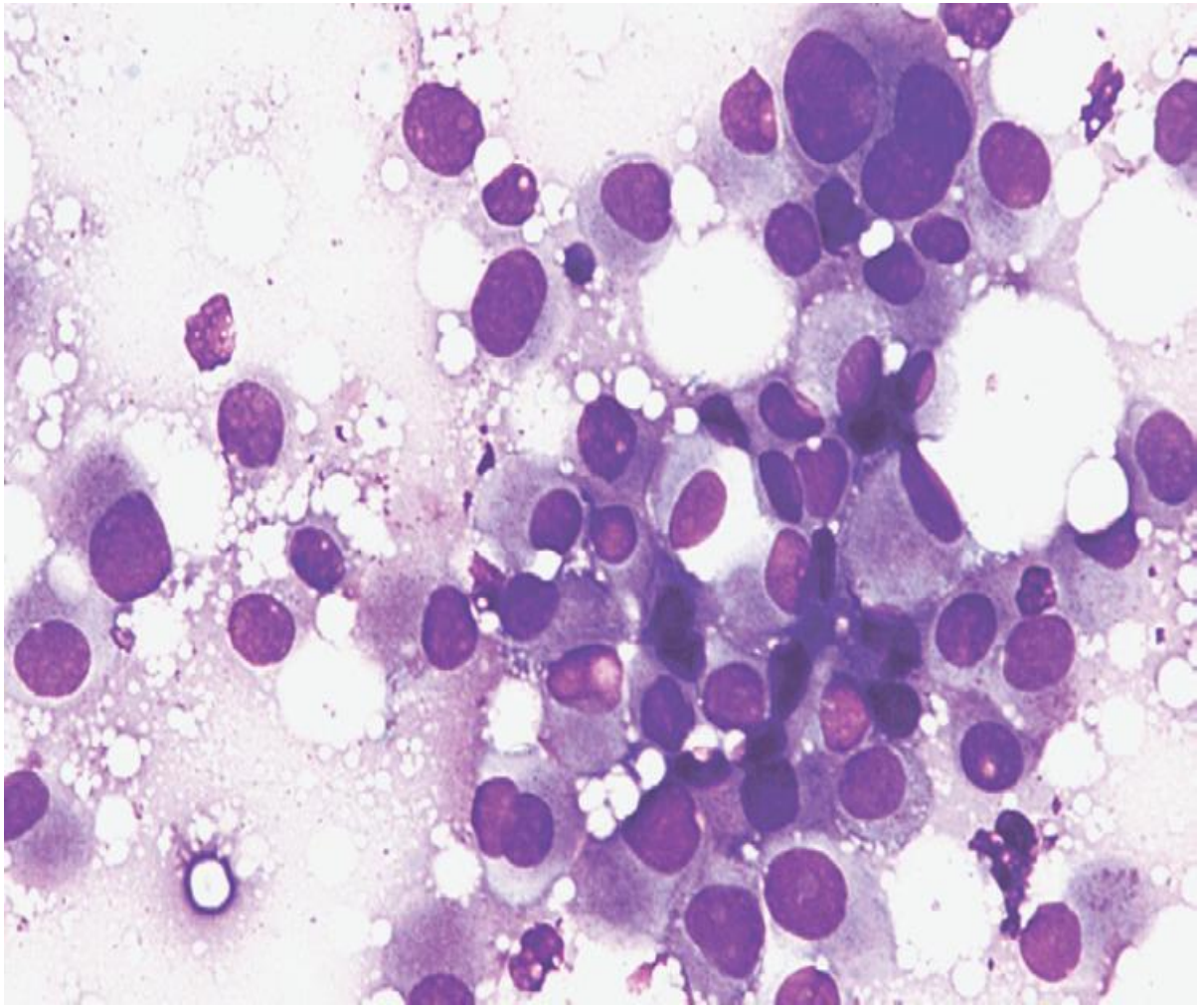
Breast lump

Case courtesy: Dr Vinaya Shah

- A 43 year old woman complained of lump in left breast noticed 1 week ago.
- Physical examination of mass was nontender, immobile, fixed, firm on palpation. Axillary lymph node enlarged.
- Based on this history,

What is your Clinical Impression ?

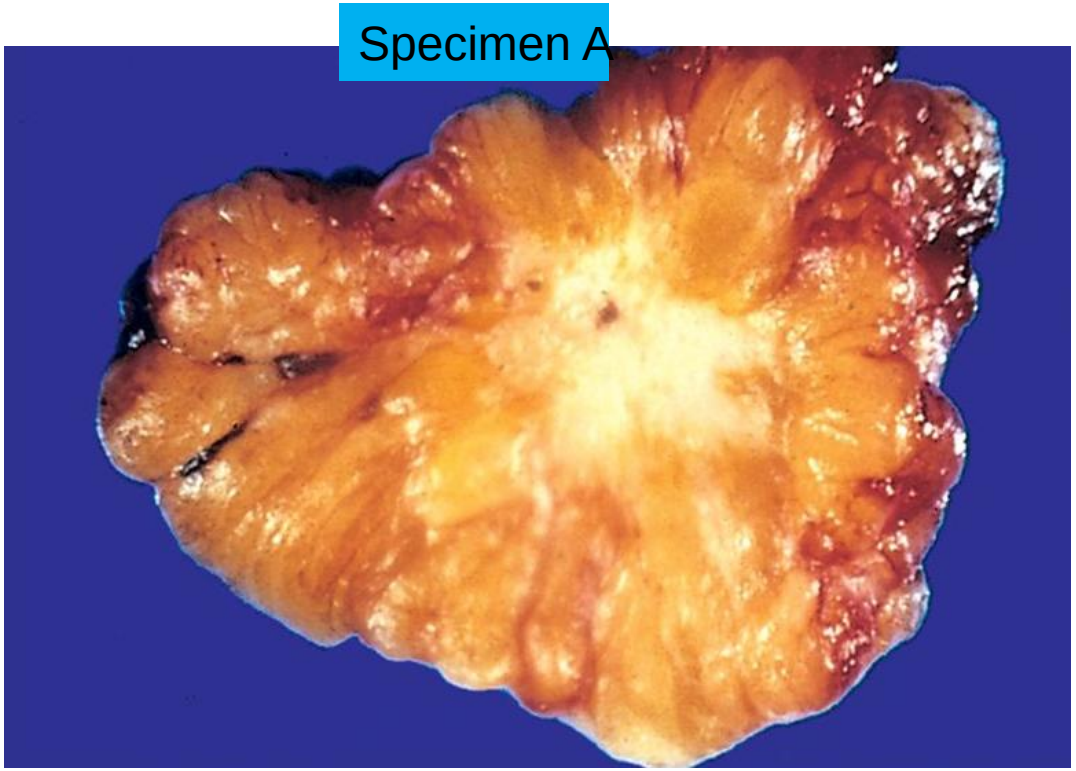
FNAC of breast lump done.



- Is it Benign or Malignant
- _____

- If so, Explain.
- _____

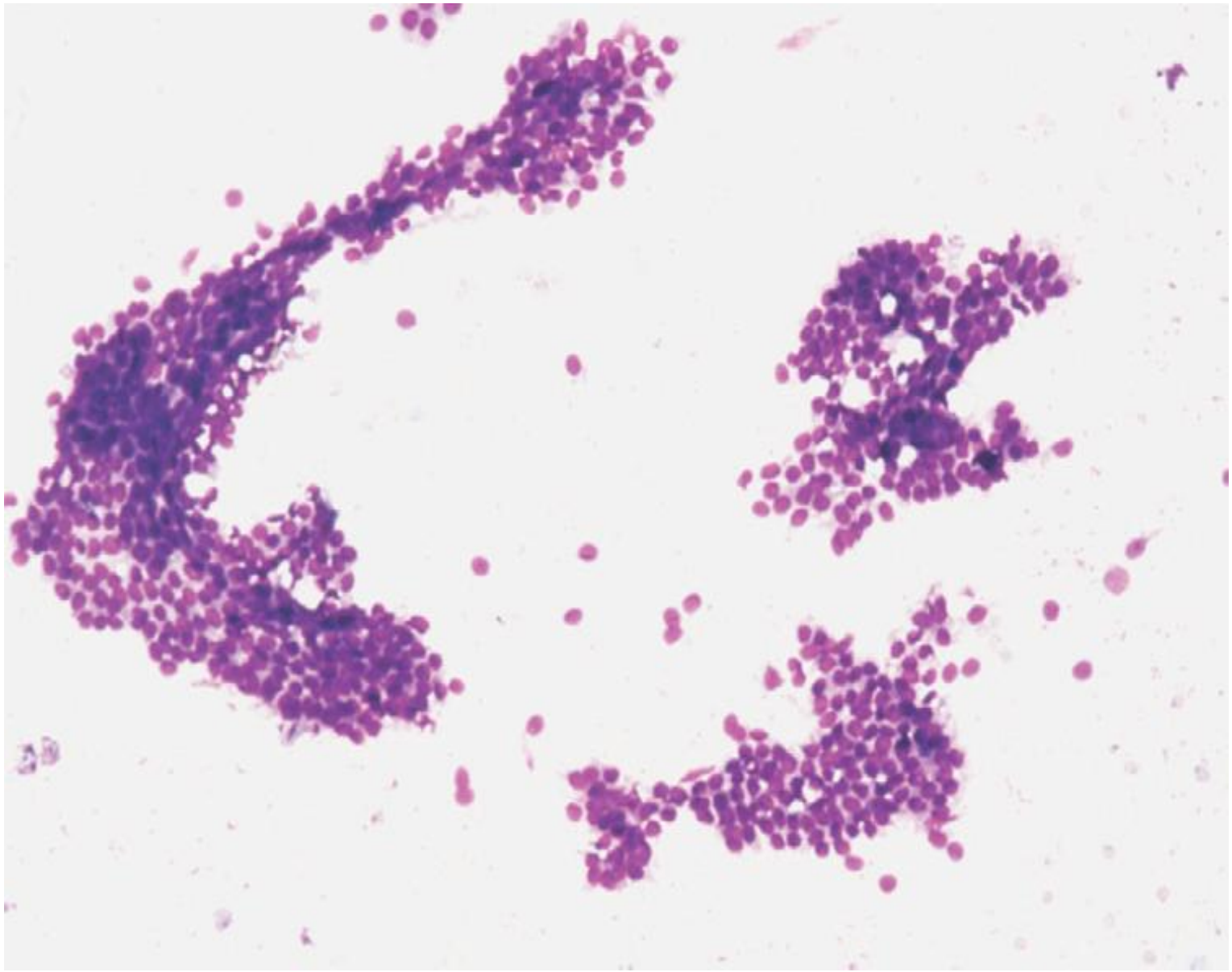
- Mastectomy specimen: Gross examination



Describe Gross features of the specimen.

Case 2

A 44 year old female came with right breast lump. On examination the lump is non tender, mobile, soft in consistency. No axillary lymphadenopathy noted. FNAC of Right breast lump done.



- What is the impression?
- _____

With this cytology report (Fibroadenoma) what is the next step advised by her surgeon?

- She was operated and surgeon did the lumpectomy of the Right breast mass.
- Specimen received at the Surgical laboratory.

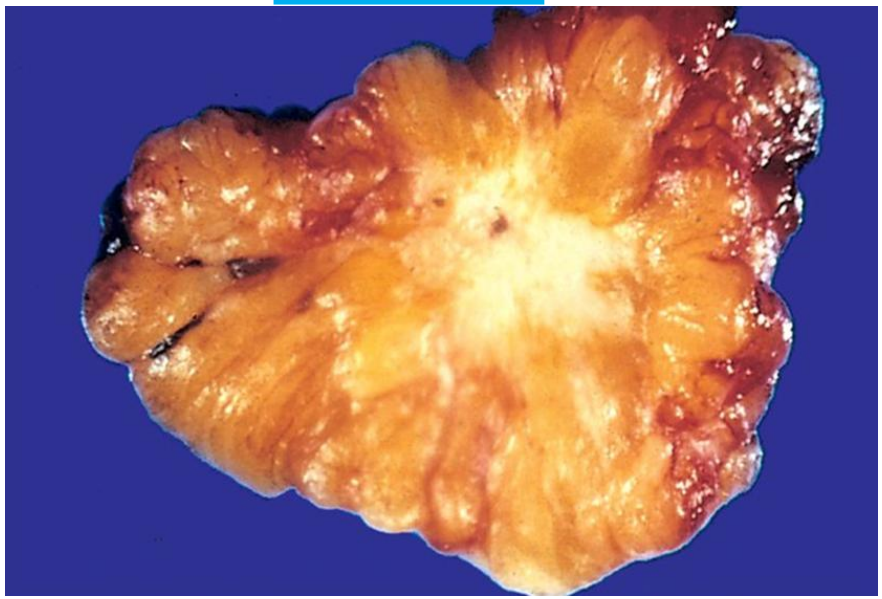
Gross of Lumpectomy Specimen

Describe the Gross

Specimen B

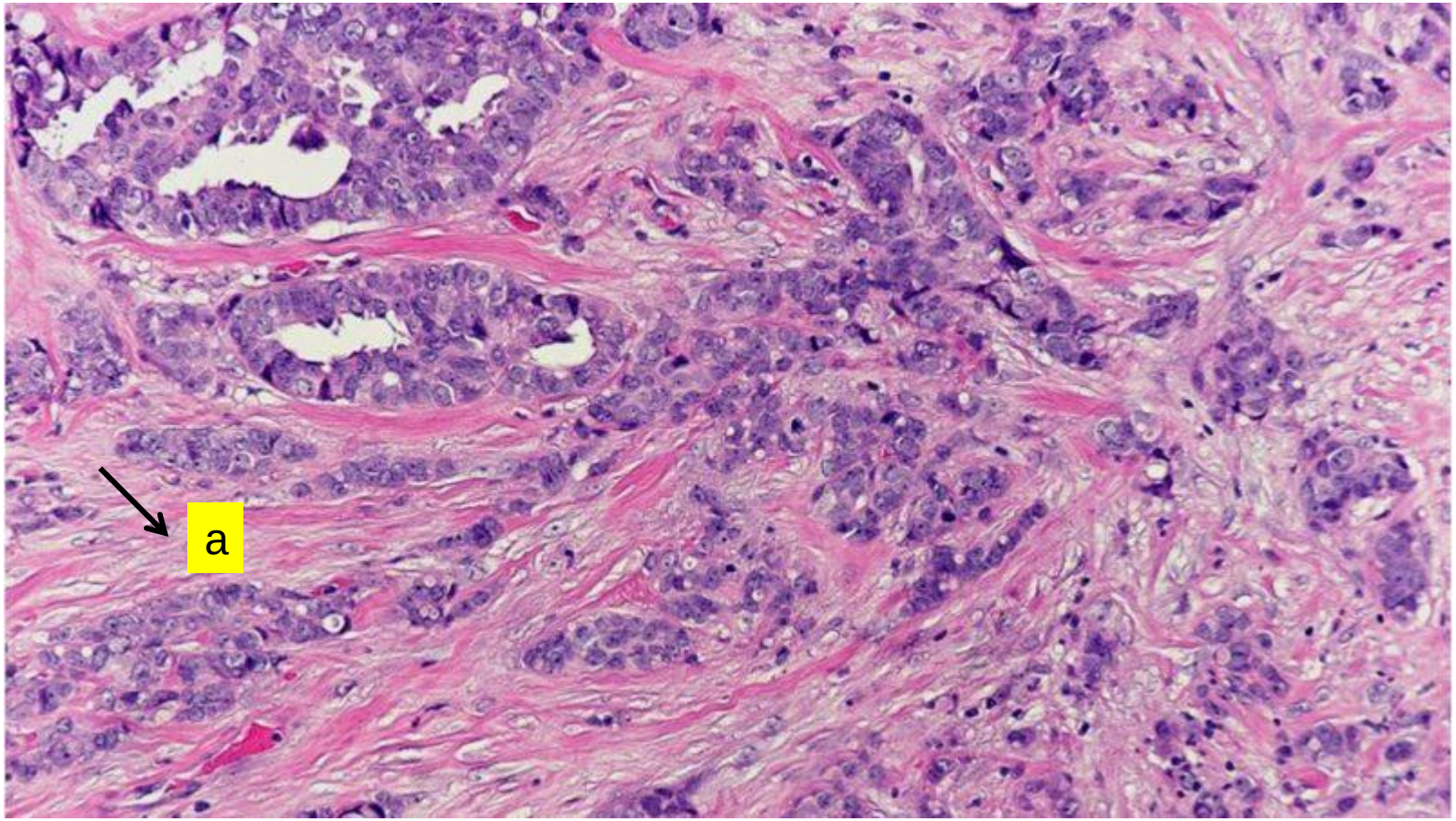
- What are the differences noted in Specimen A and Specimen B.?
- Explain. _____

Specimen A



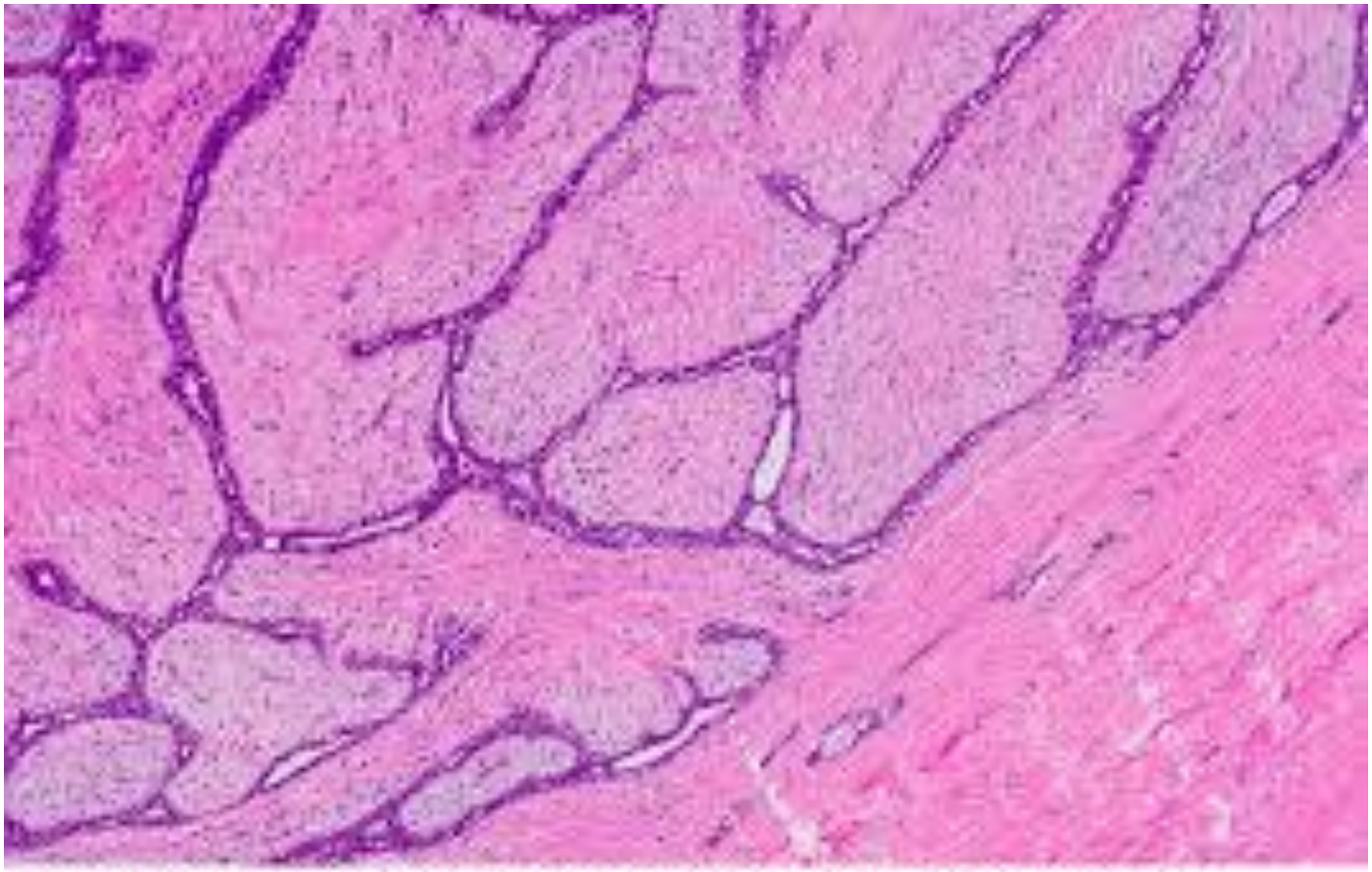
Specimen B

Microscopy from Specimen A



Describe the general microscopy features of Malignant cell.

Microscopy from Specimen B



Fibroadenoma (H&E 20x): uniform low stromal cellularity with no stromal cellular atypia


CLOSE THE
CARE GAP
World
CANCER DAY
February 4th

Aim to observe World Cancer Day

- to reduce misconceptions about cancer
- to help people in getting the right information about it
- It also offers a chance to make an impact in the betterment of the life of cancer patients and survivors