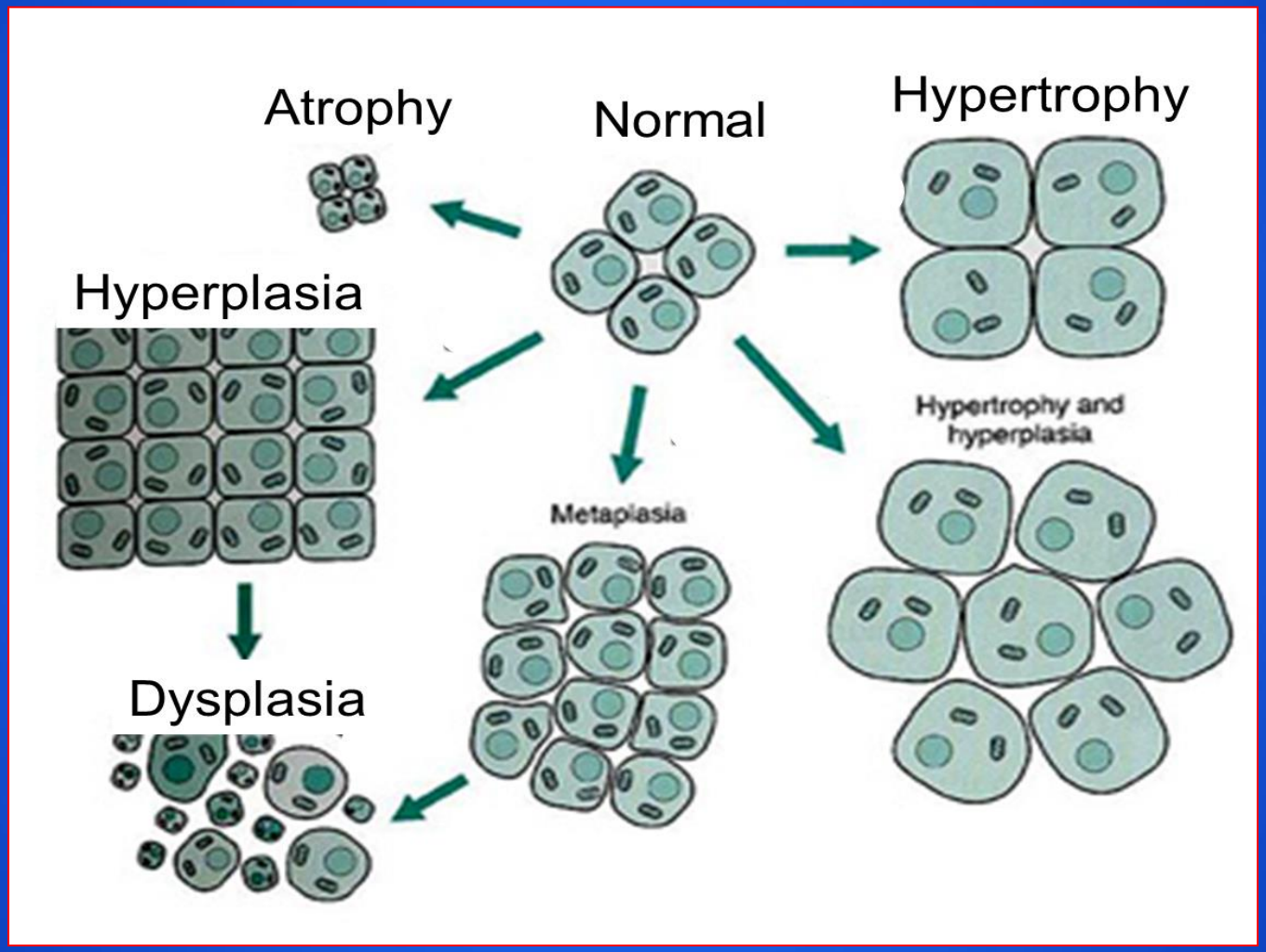
Principles of Surgical Oncology

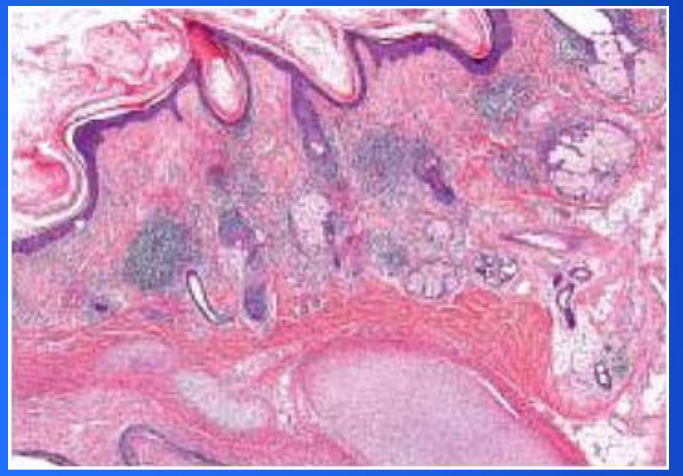
Salah R. Elfaqih

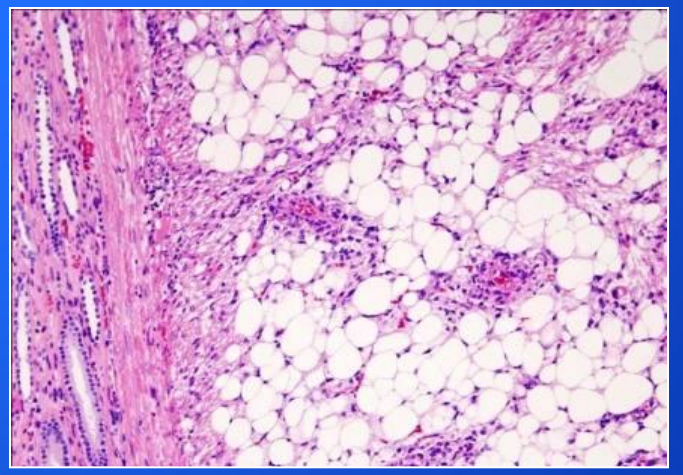
Pathological cell changes



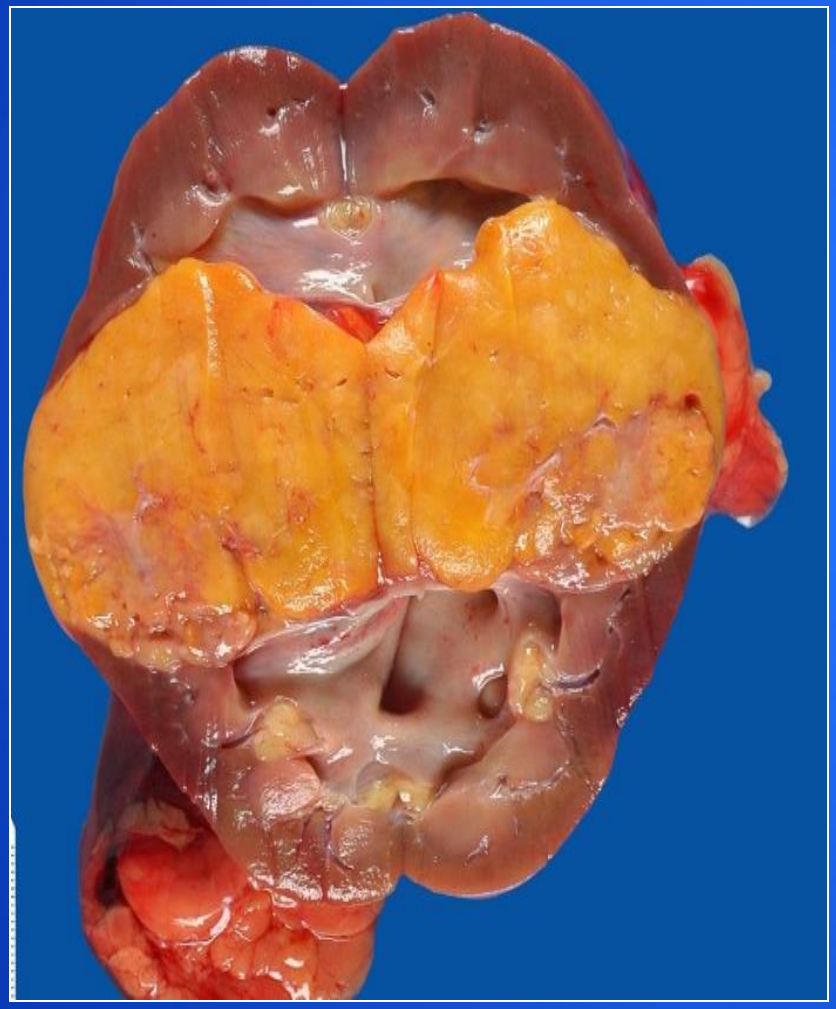
Types of Tumors

- Benign
- Malignant
  - Carcinoma
  - Sarcoma
- Teratoma
- Hamartoma

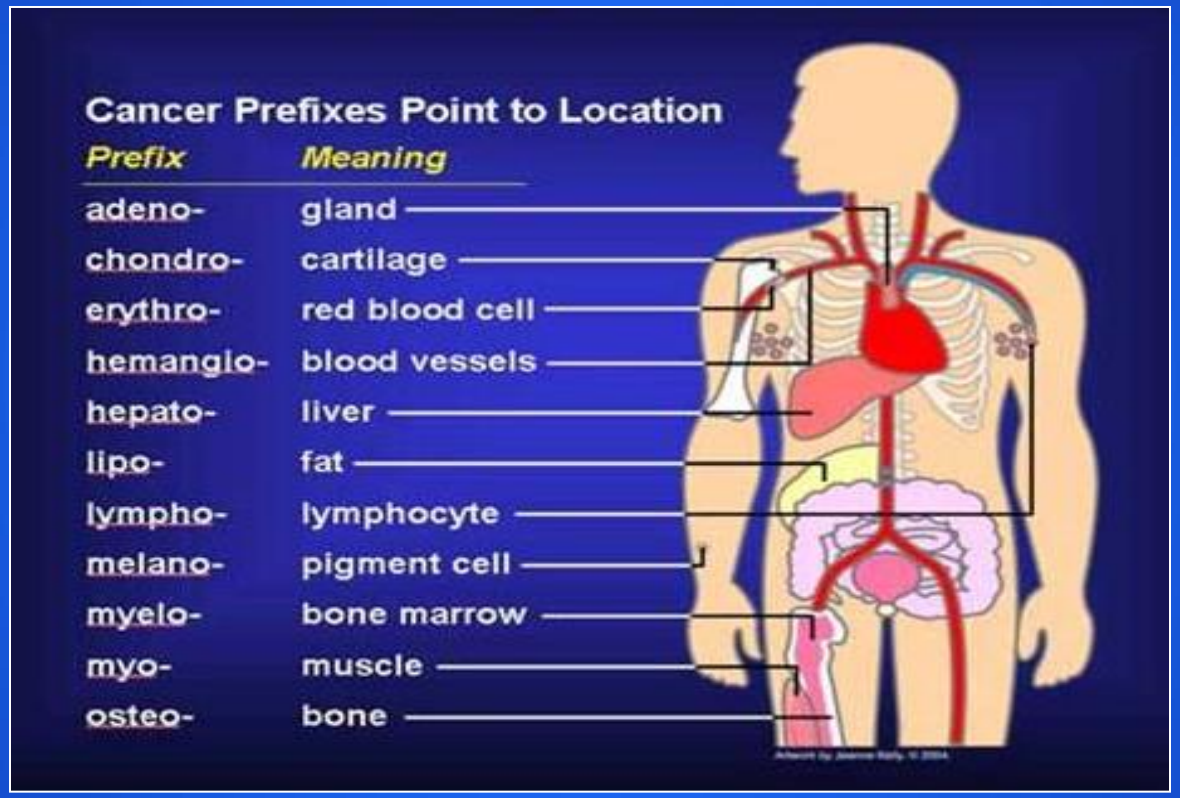




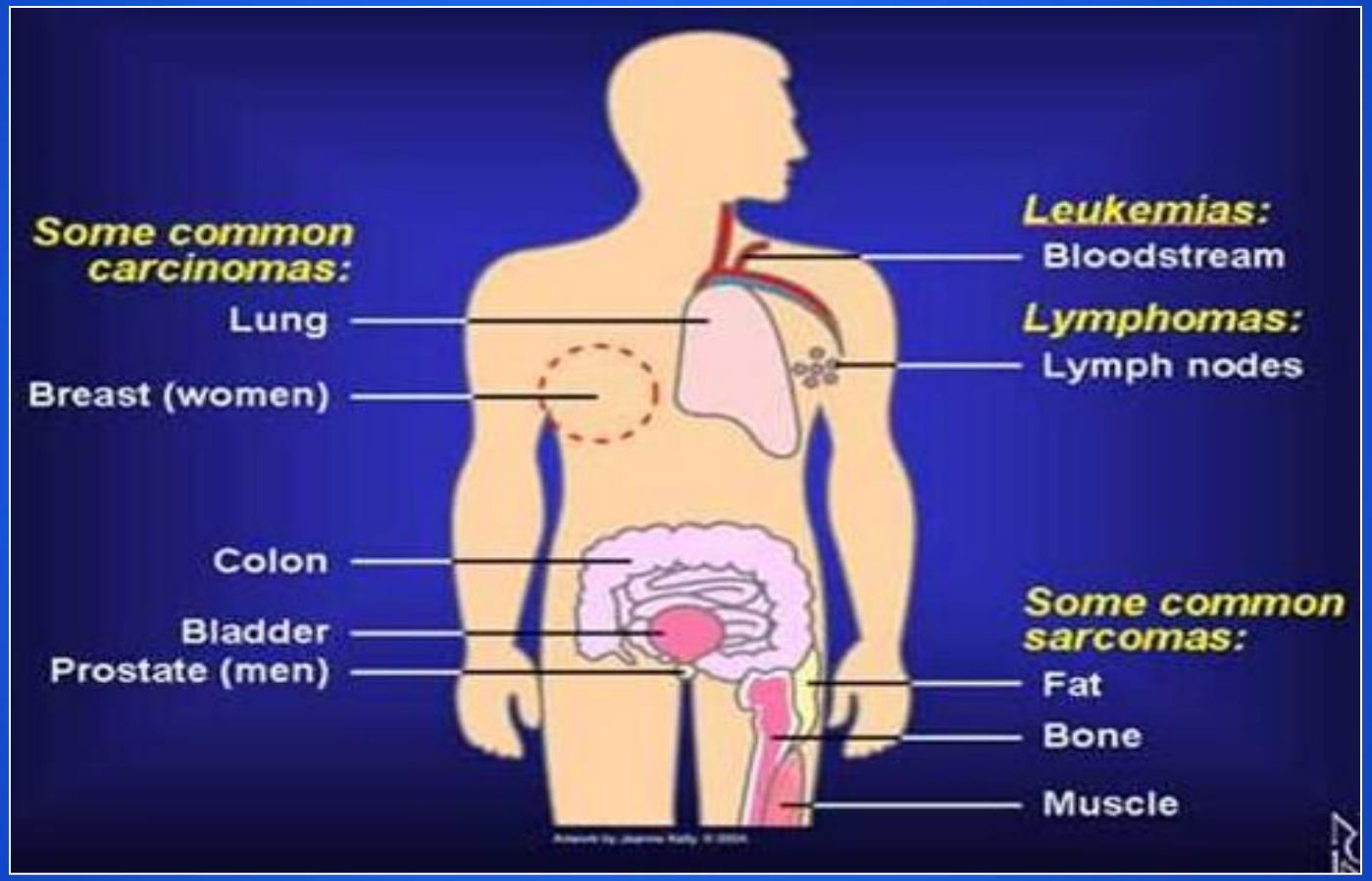
Hamartoma vs Teratoma



Cancer Nomenclature



Types of Malignancies



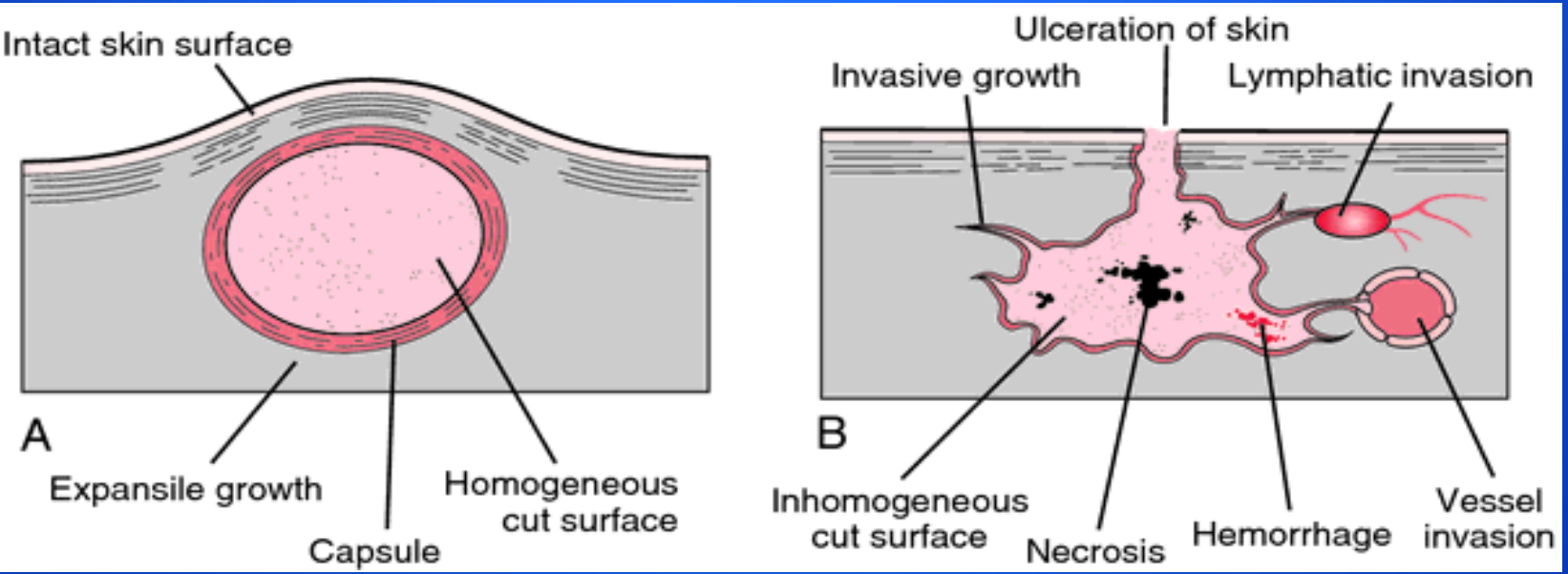
Benign vs Malignant

Benign

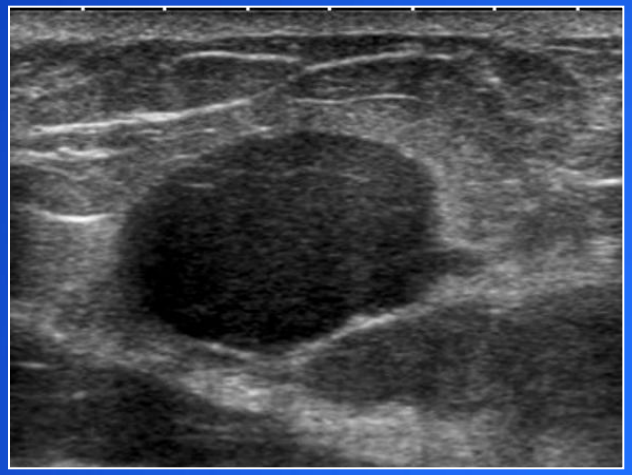
- Encapsulated
- No invasion
- No metastasis

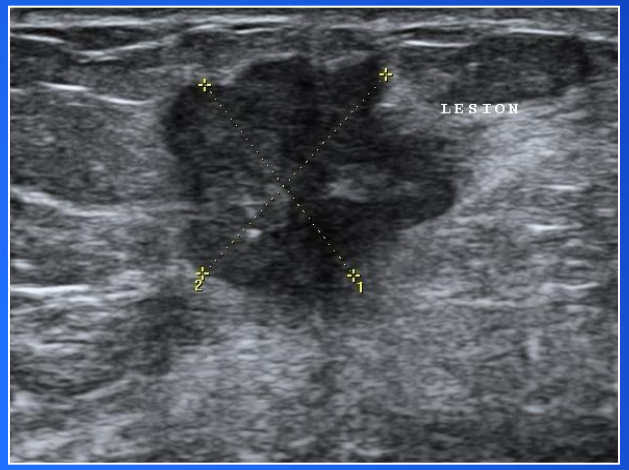
Malignant

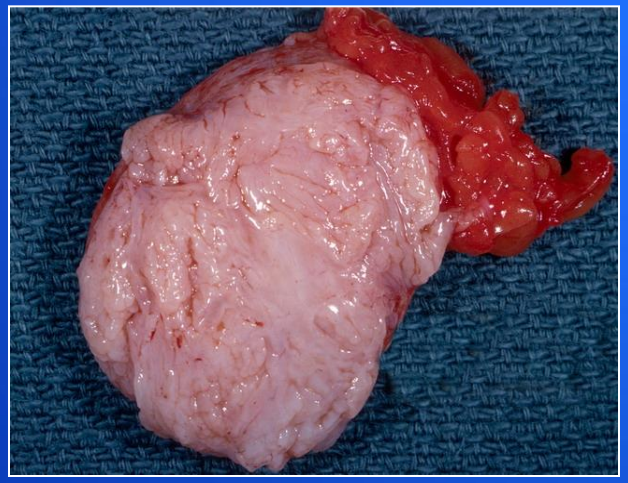
- Non encapsulated
- Usually invade
- Metastasis

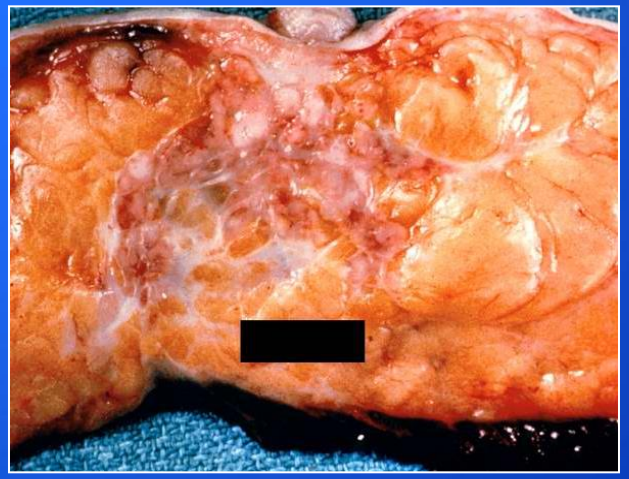


Benign vs Malignant Tumors

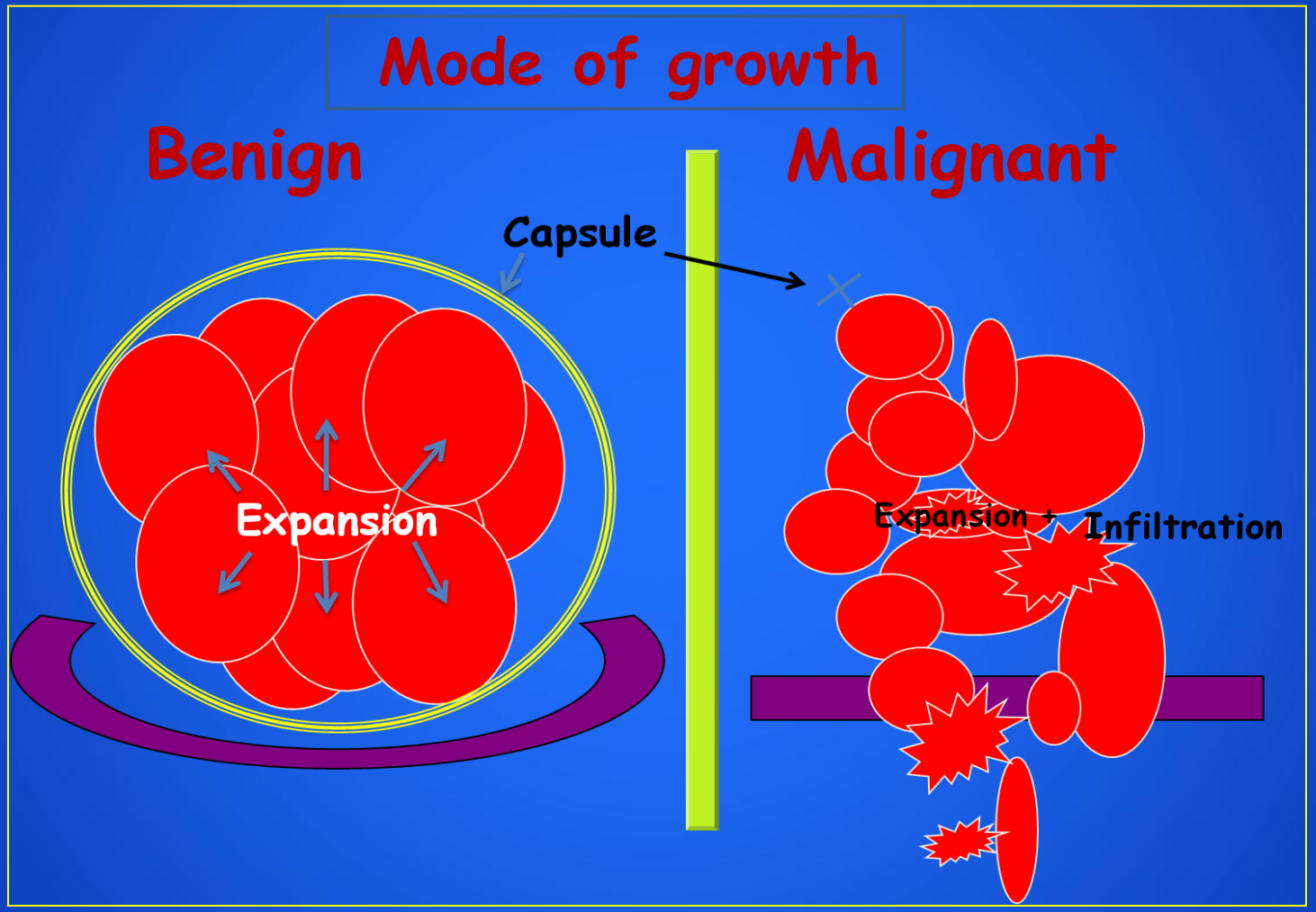




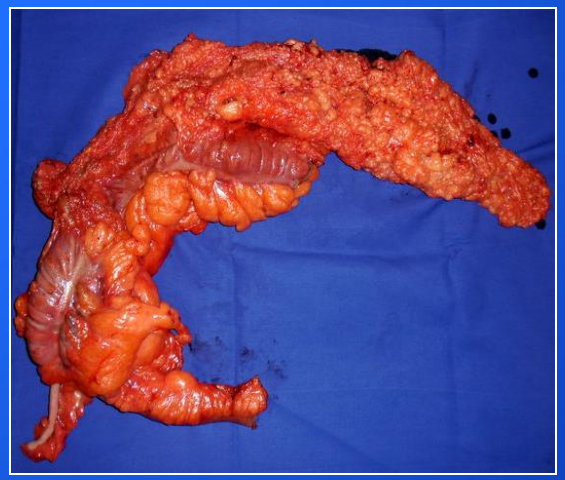




Local Effects of Tumours

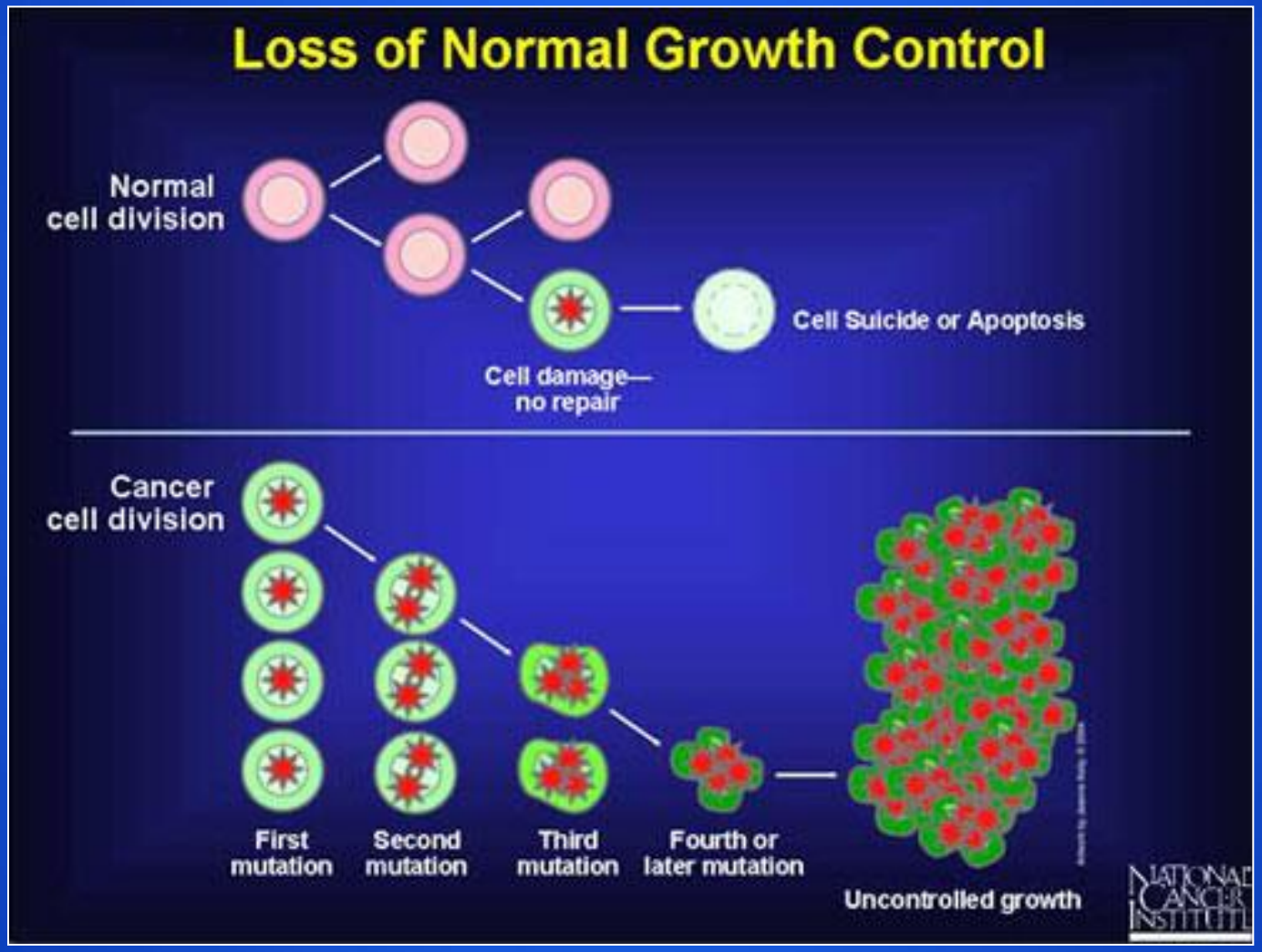


What are the treatment implications

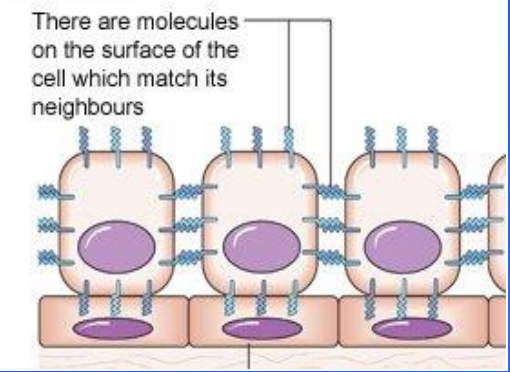


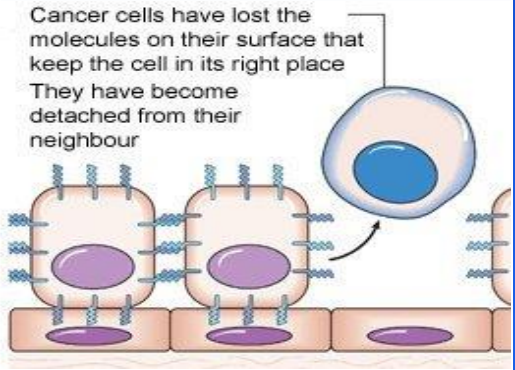
Local excision for benign tumors and radical excision for malignant

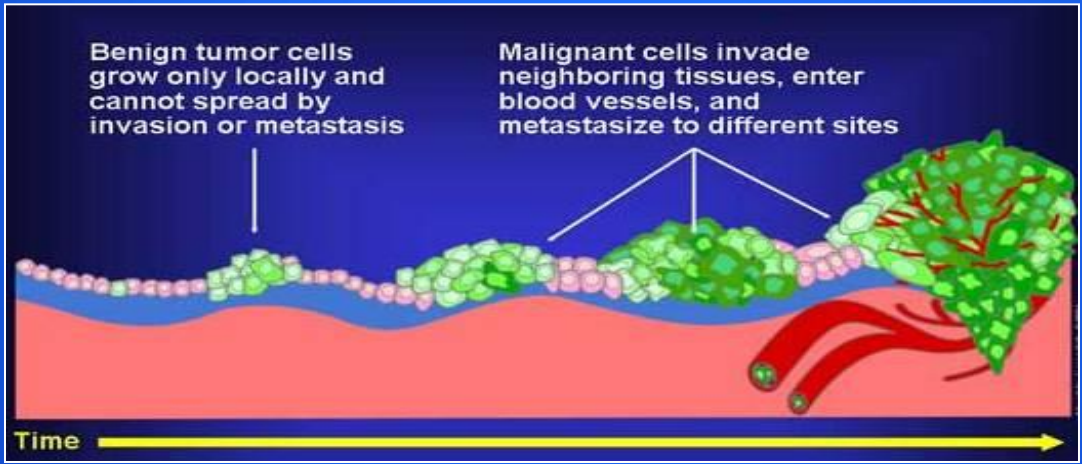
Normal cell & malignant cell



Characteristics of malignant cells

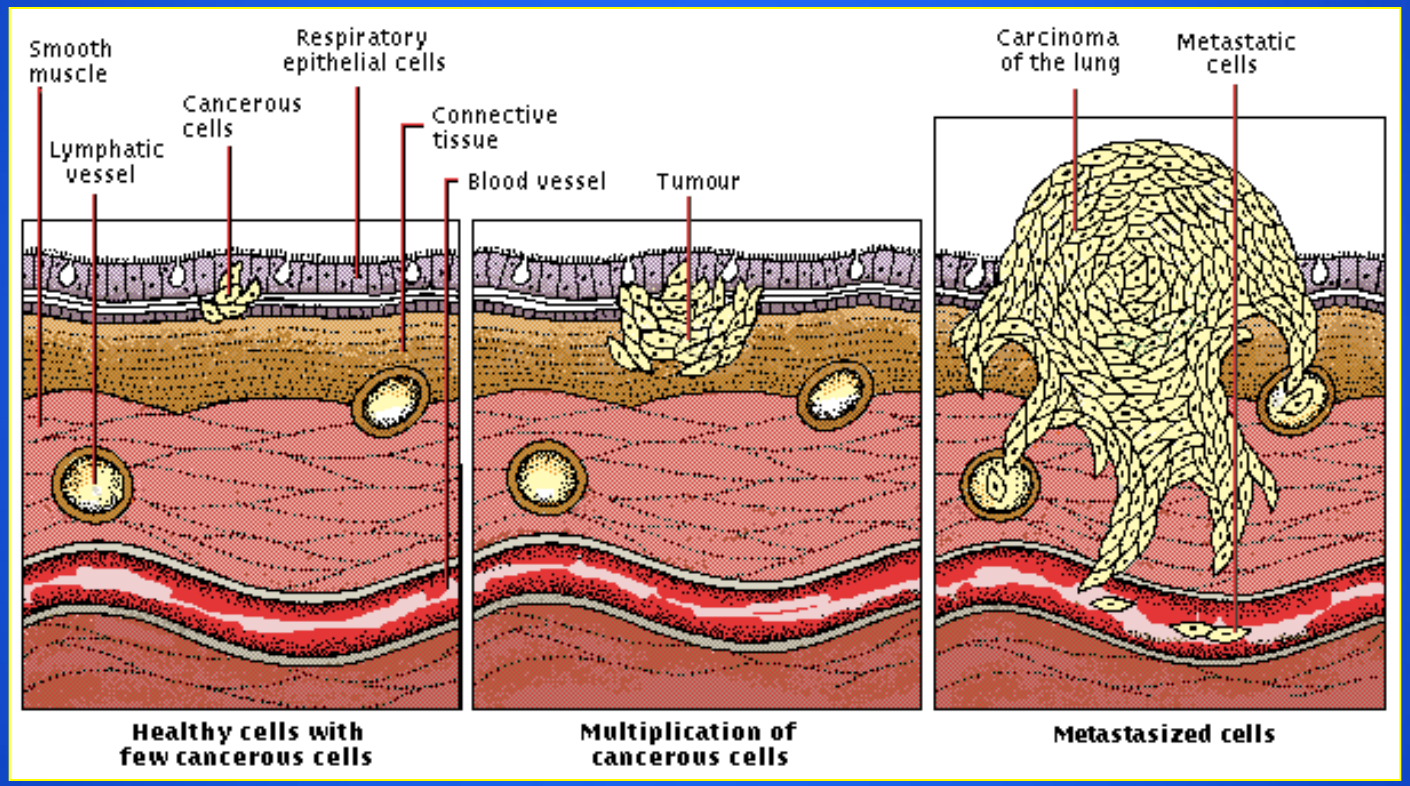




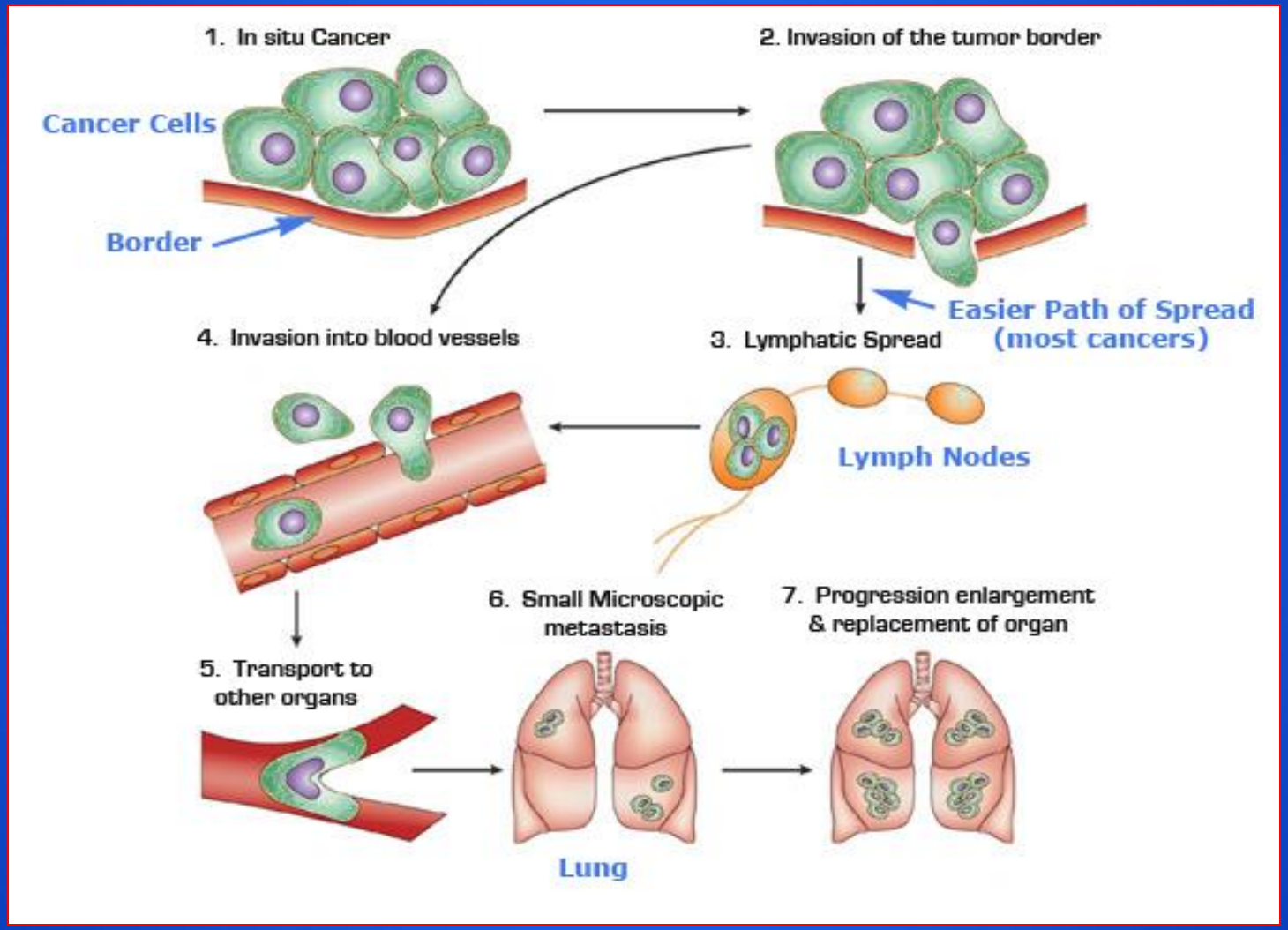


Uncontrolled growth and loss of contact phenomenan are the main characteristics of malignant cells

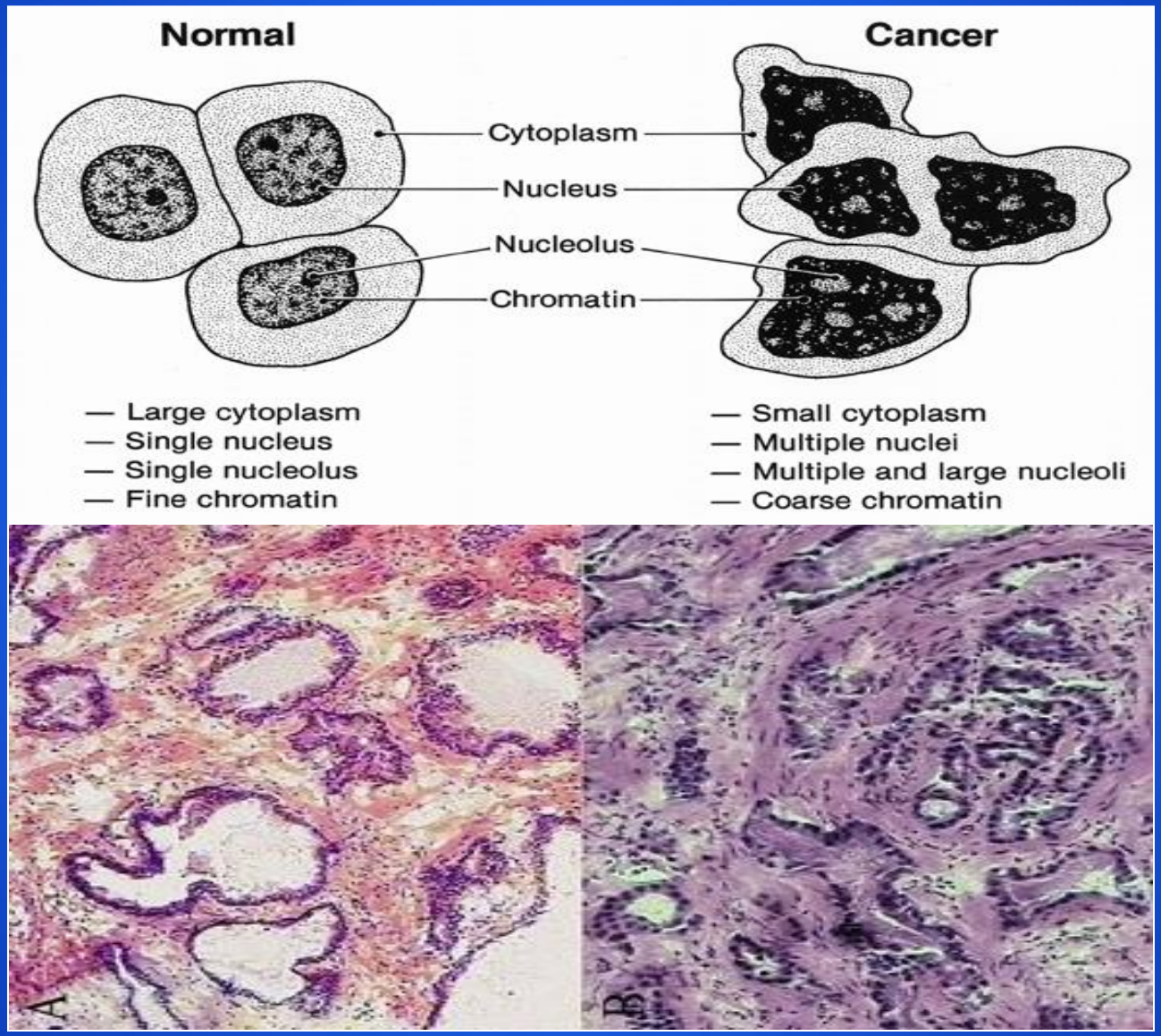
Spread of Malignant Tumours



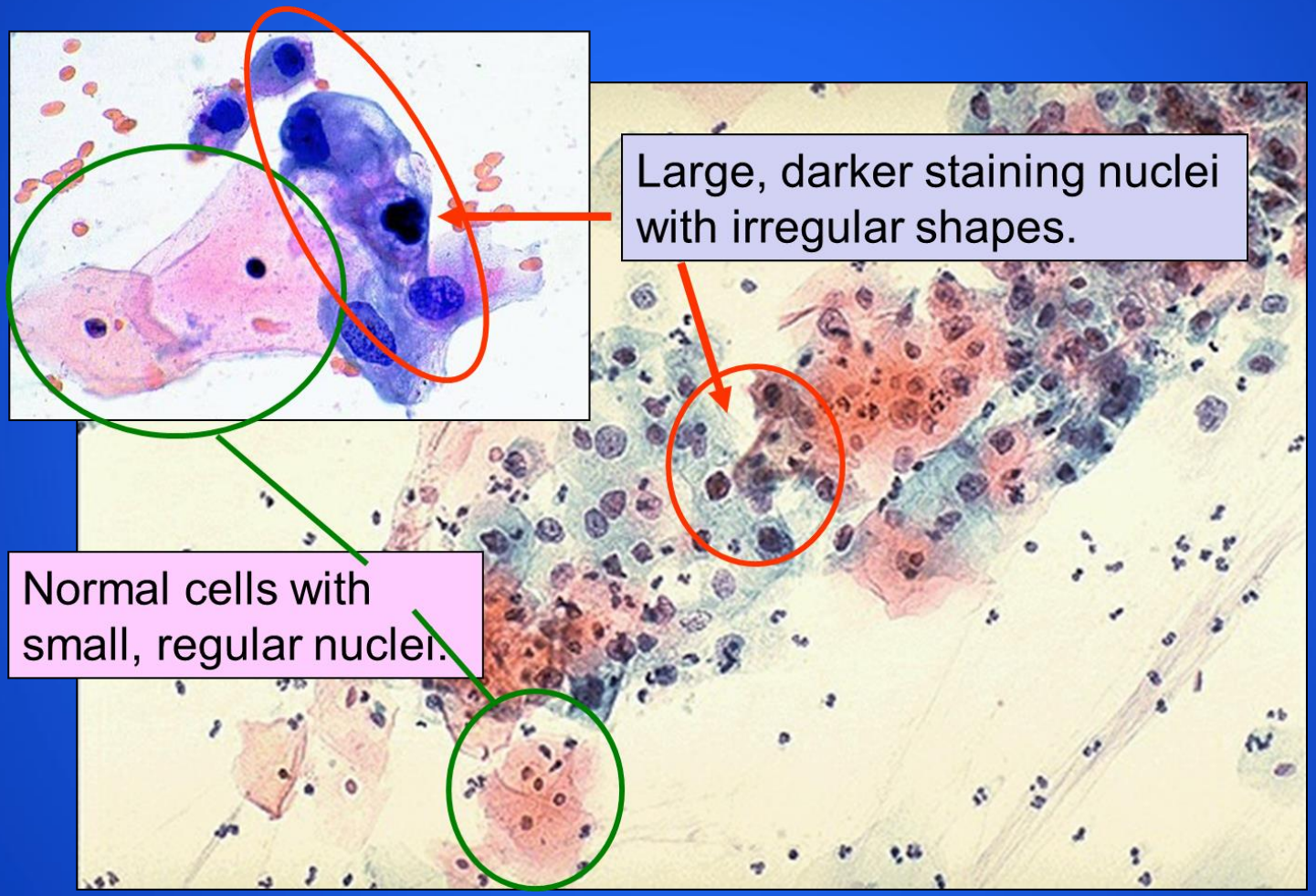
Spread of Malignant tumours



Normal versus Malignant Cells



Malignant cell morphology



Tumor Grading & Differentiation

Grading: Describes the histologic characteristics of cancer cells mainly talk about cell layers.

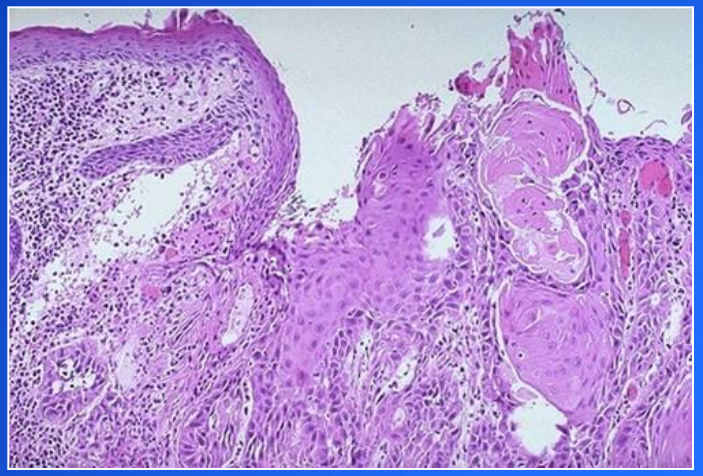
e.g. grade I, II, III.

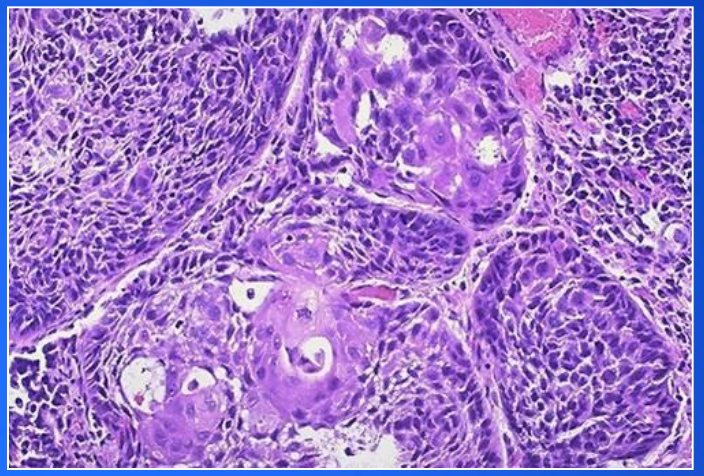
Differentiation: Describes the characteristics of cancer cells in reference to their resemblance to the cell of origin.

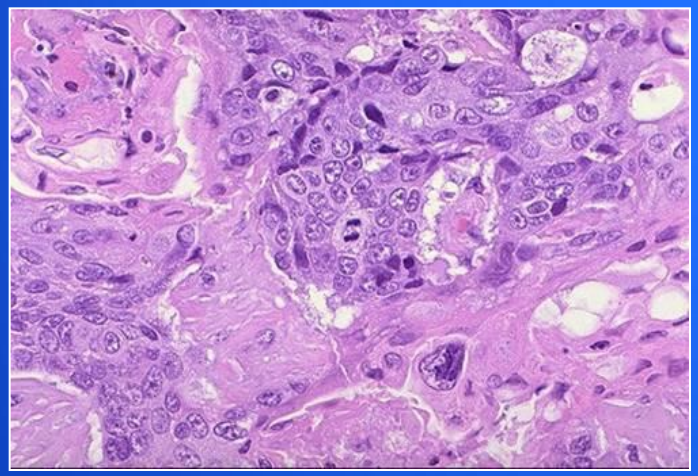
e.g. well differentiated
moderately differentiated
poorly differentiated
anaplastic.

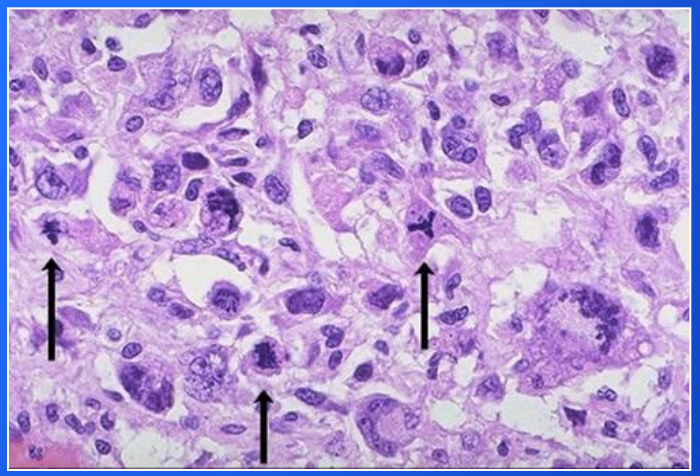
Both describe the histological features of the tumor

Tumor Grading & Differentiation



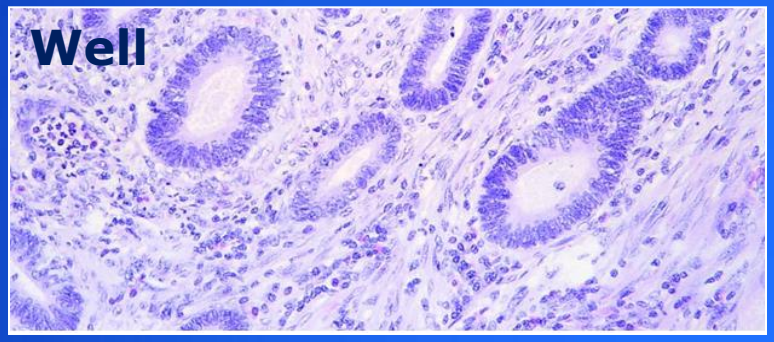


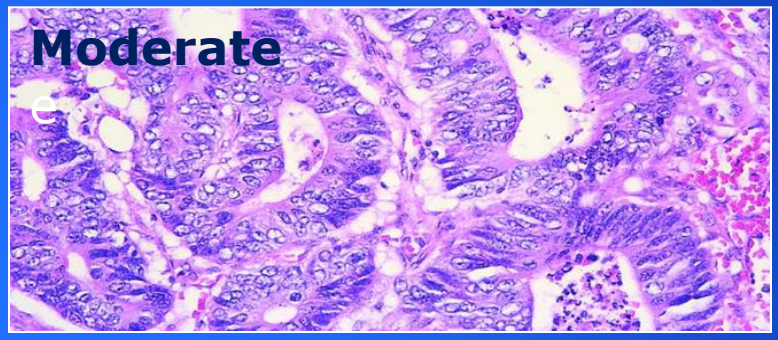


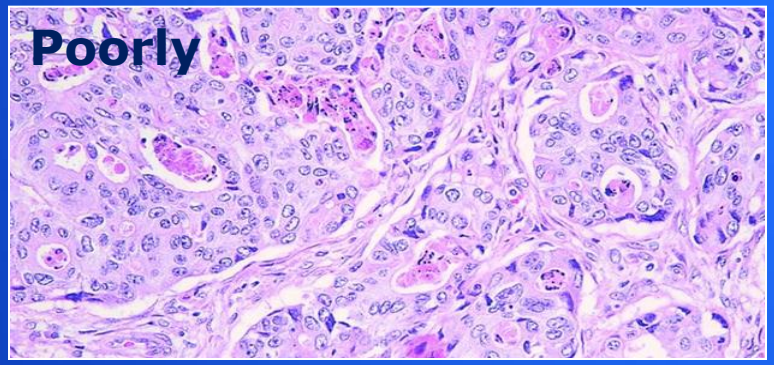


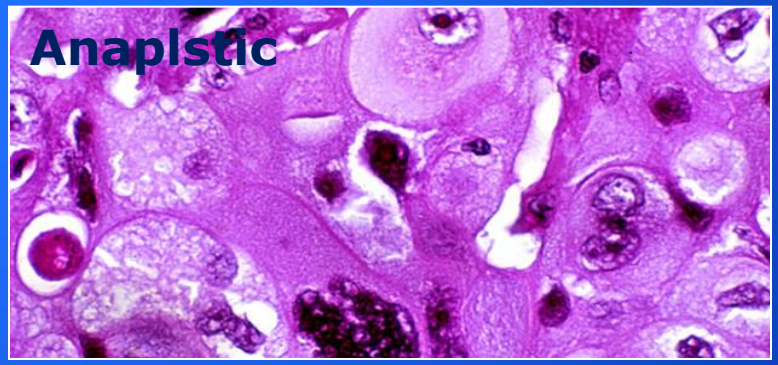
Tumor grading & tumor differentiation both describe the histological features of the tumor and not the macroscopic features , invasion or metastasis

Tumor Differentiation

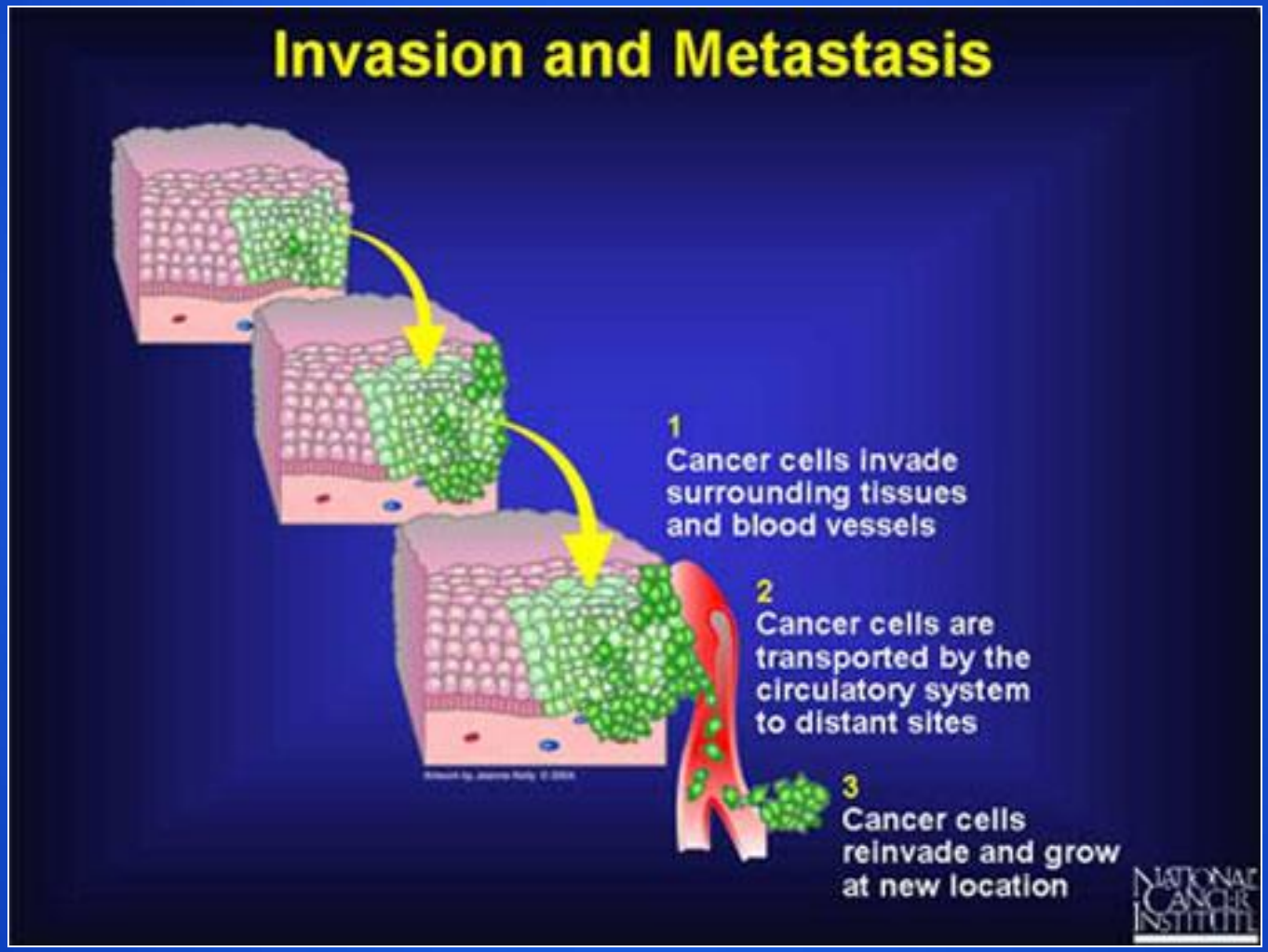




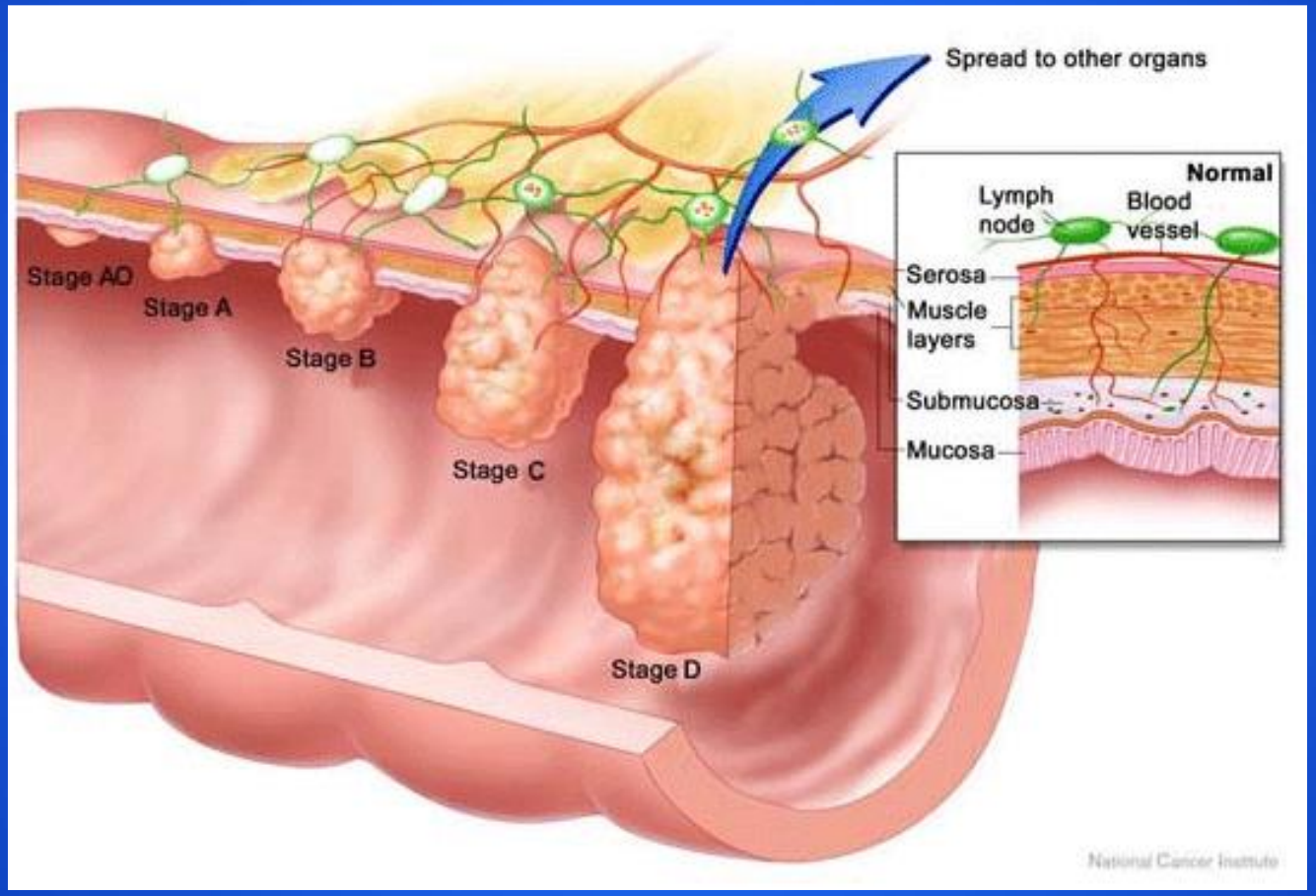




Why malignant cells are dangerous



Spread Of Malignant Tumors



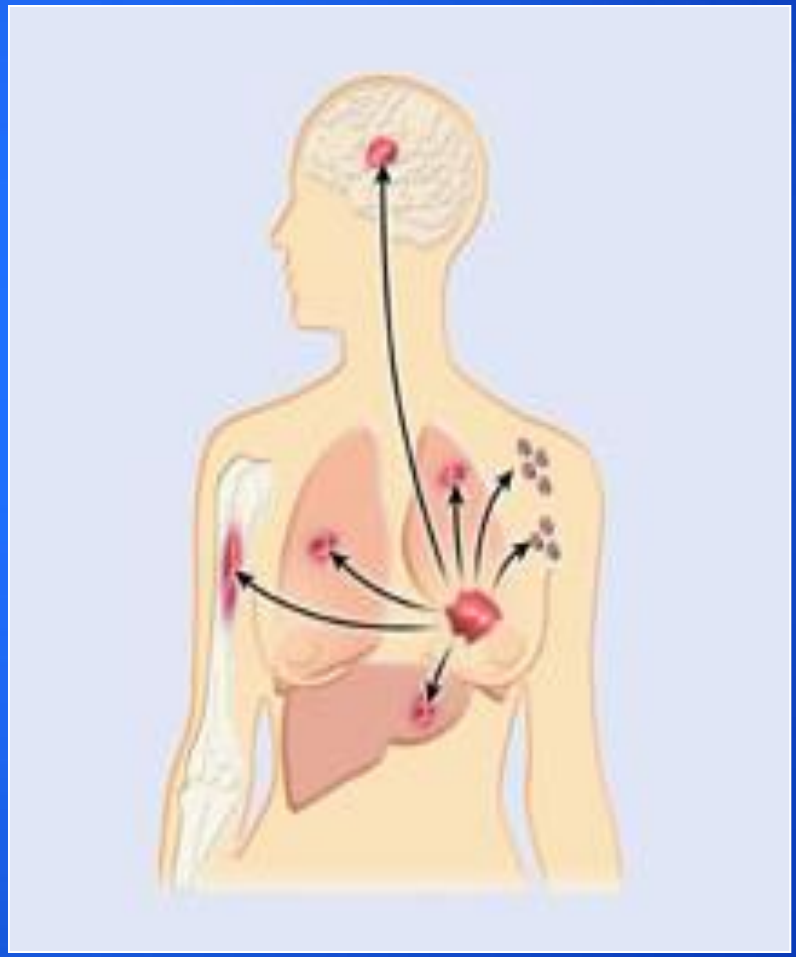
Spread of Malignant Tumor

Local invasion :

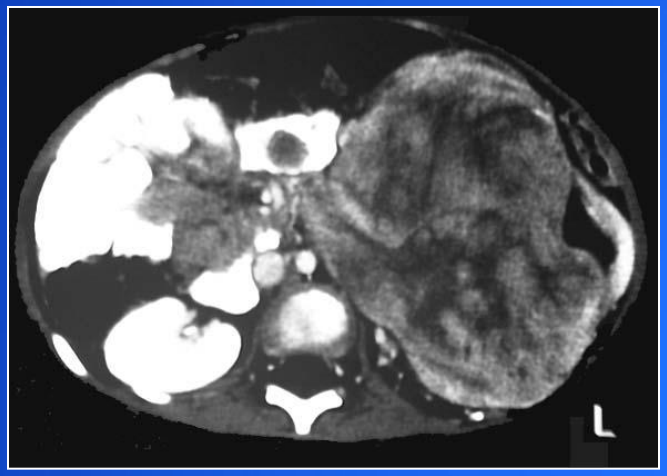
- within the organ
- adjacent organs

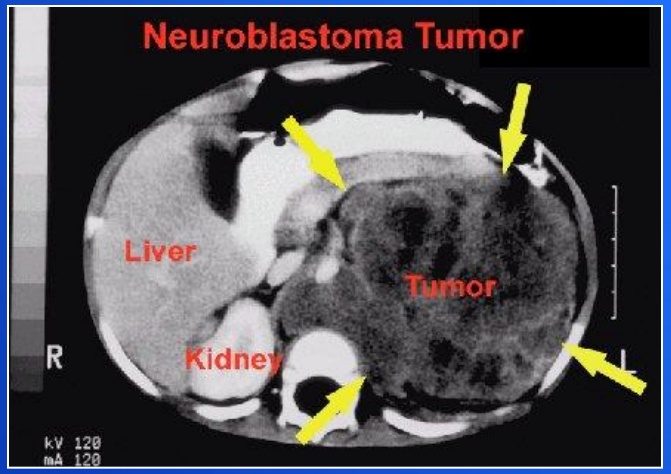
Metastasis :

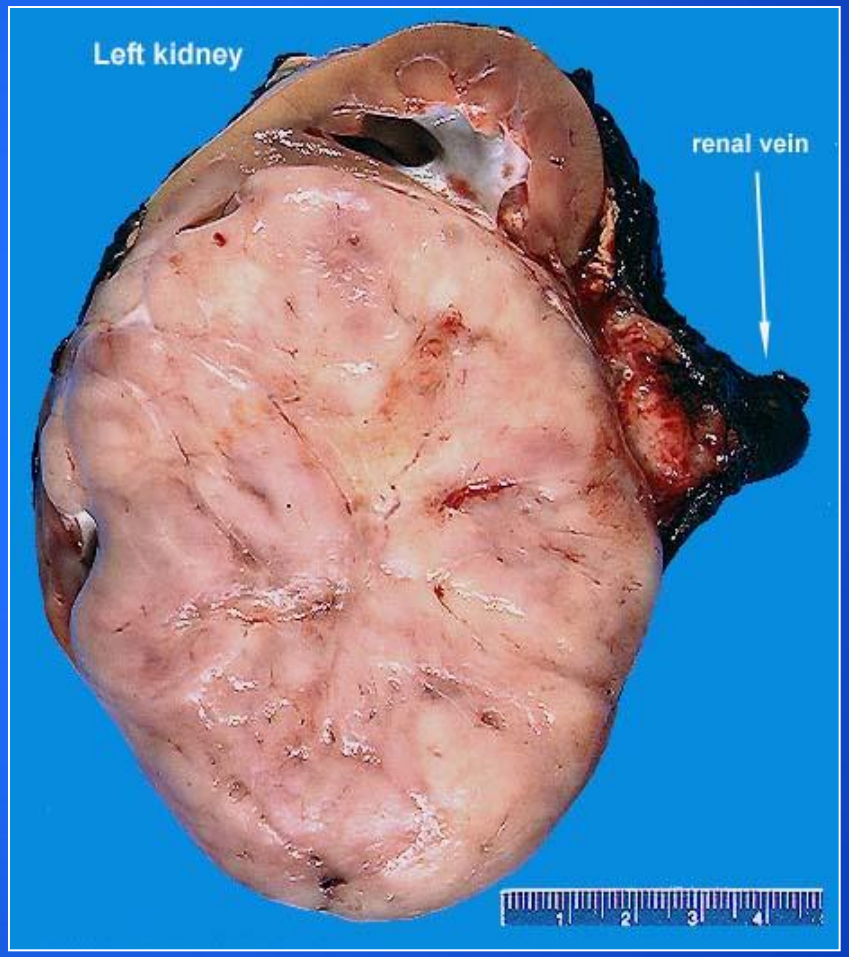
- Lymphatic : Regional & distant lymph nodes.
- Haematogenous e.g. liver, lung, bones.
- Transcoelomic e.g peritoneal & pleural cavity.
- Implantation e.g. needle tracks, wounds.



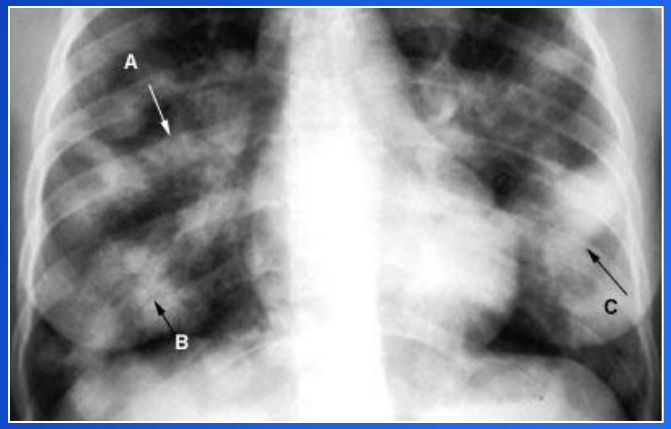
Local Invasion

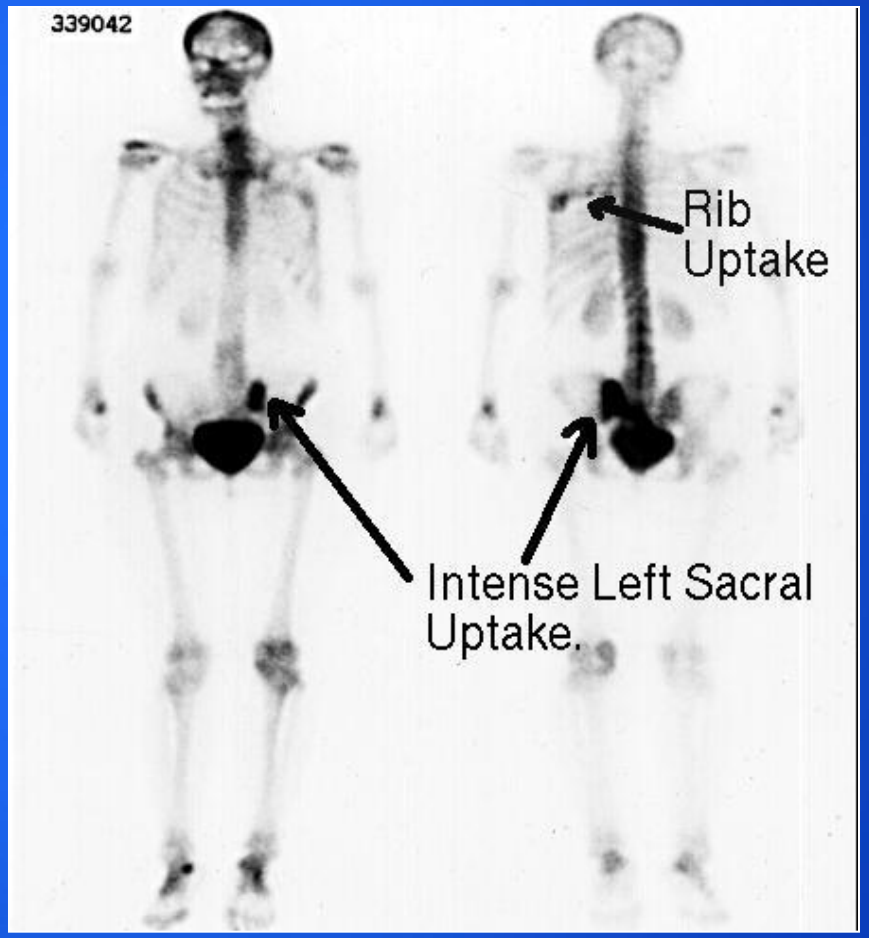




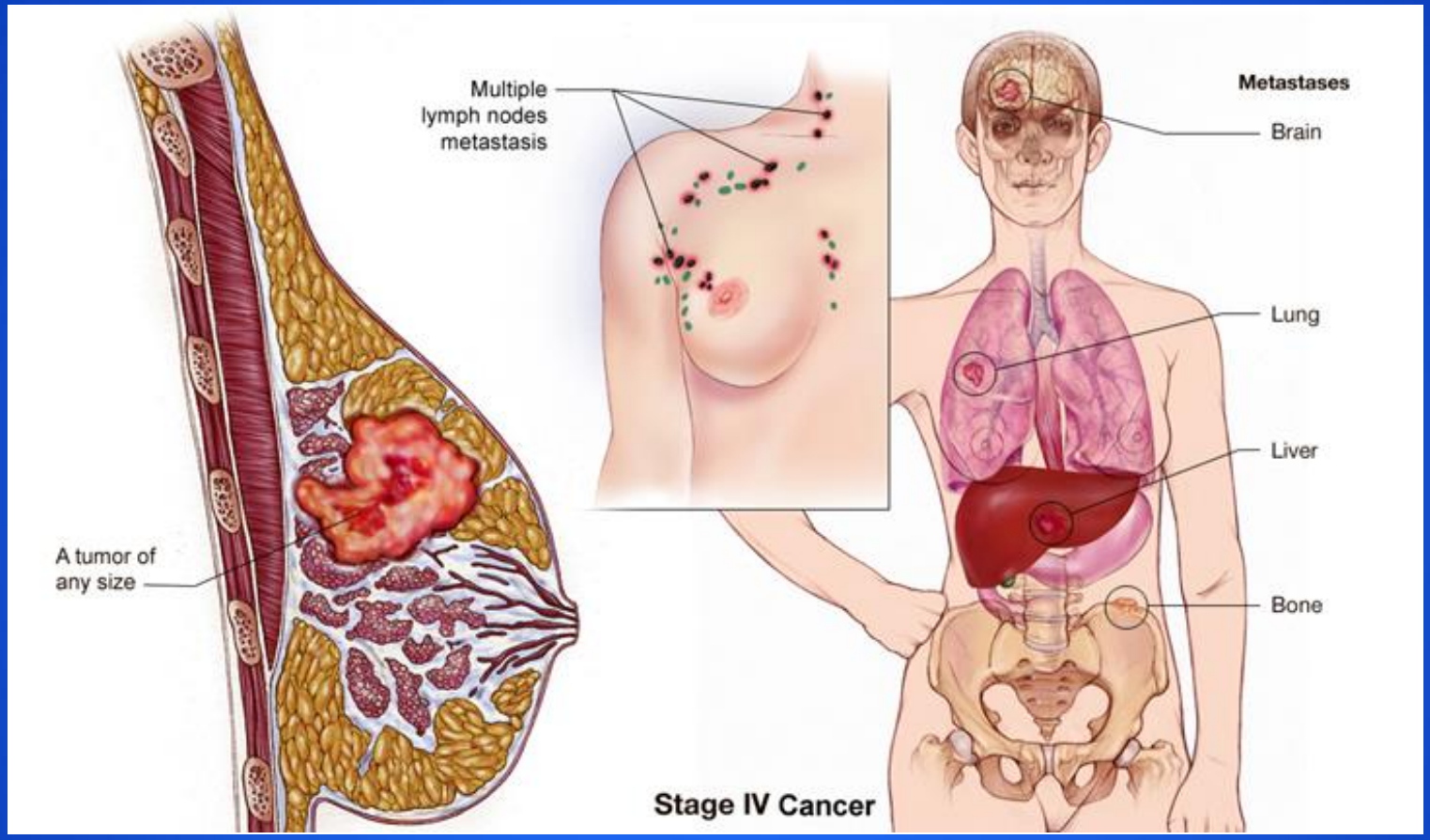


Distant Metastasis



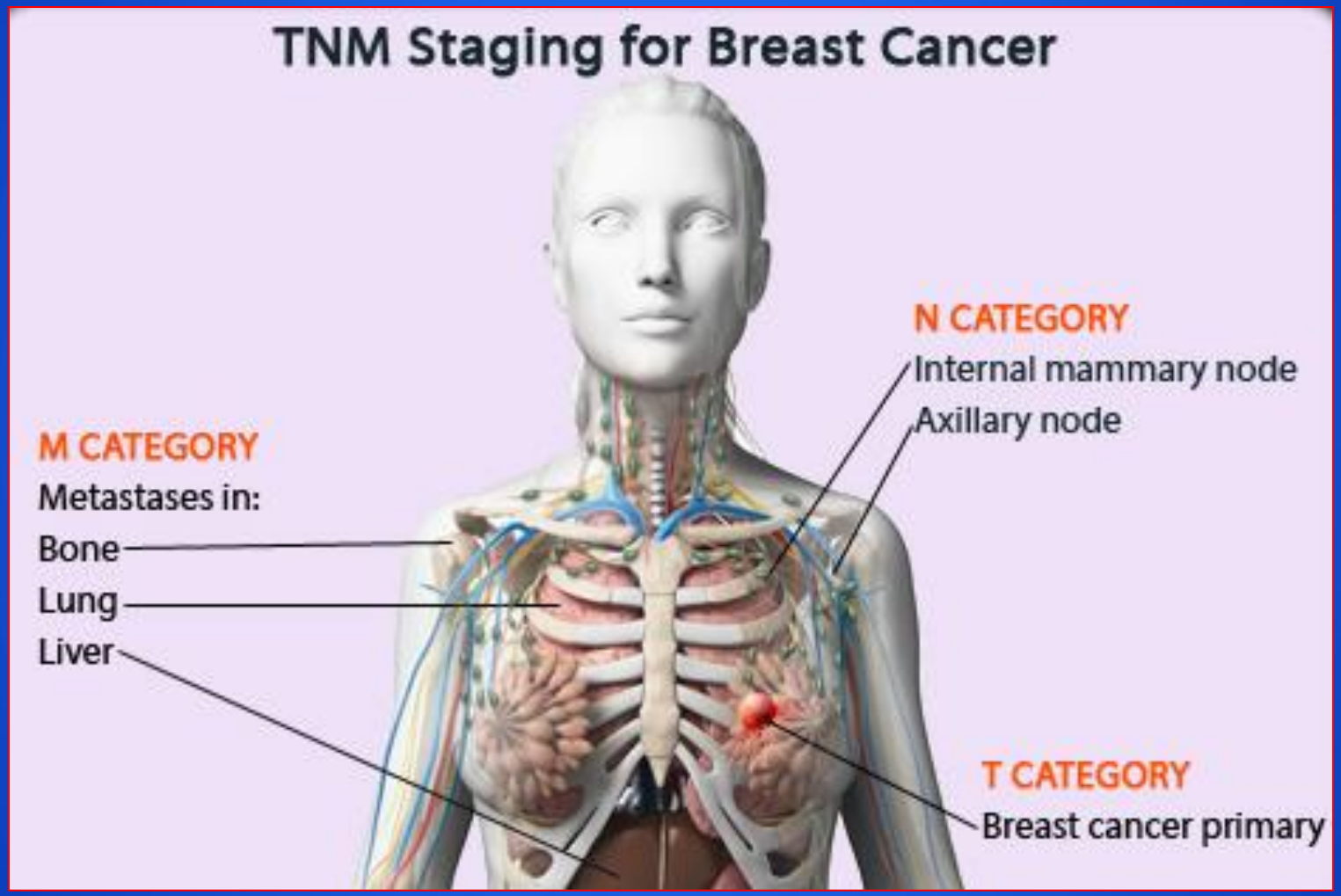


STAGING OF MALIGNANT TUMORS



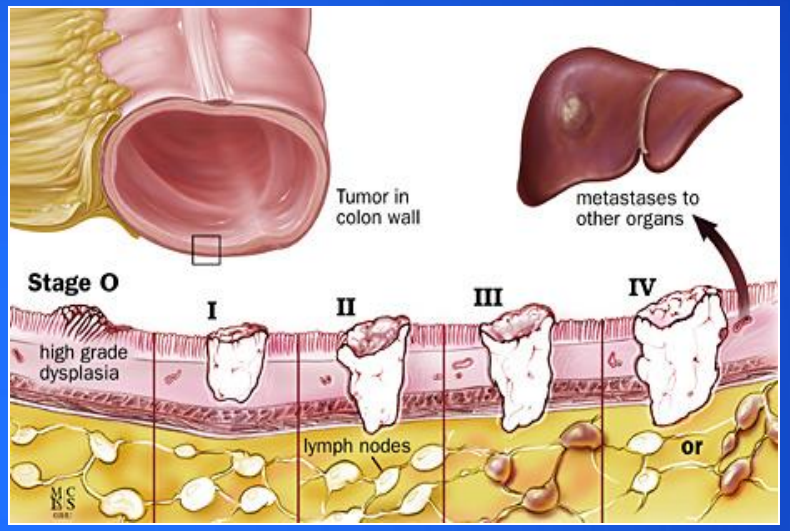
Staging describes the primary tumor, its relation with the organ of origin ,adjacent and distant organs

TNM Classification



Types of Tumor Staging

Classical: e.g.
stage I, II, III, IV
TNM:e.g
T1, No, Mo
T – Tumor :
T1,2,3, Tis, Ta, Tb
N – Node :
N0, 1, 2, 3
M – Metastasis:
M0,1,2,3



TNM Classification (American Joint Commission on Cancer)				Dukes' Classification
Stages	T	N	M	Stages
Stage 0	Tis	N0	M0	
Stage I	T1	N0	M0	A
	T2	N0	M0	B1
Stage II	T3	N0	M0	B2
	T4	N0	M0	B2
Stage III	T1, T2	N1 or N2	M0	C1
	T3, T4	N1 or N2	M0	C2
Stage IV	Any T	Any N	M1	D

Why Do We Stage Malignant Tumors?

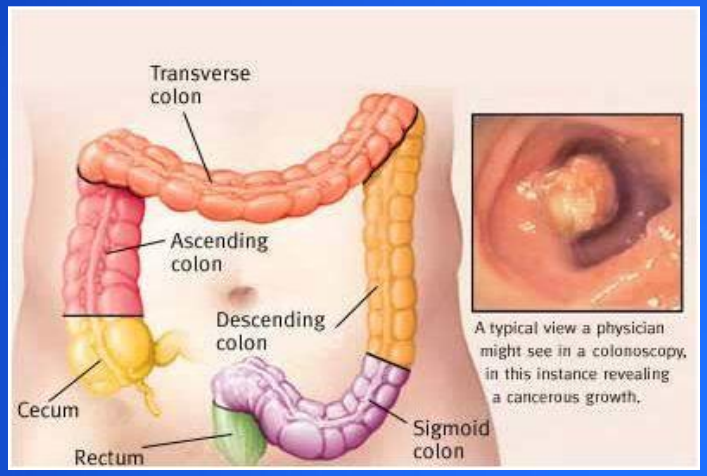
- To decide the treatment
- To plan the treatment
- To assess the prognosis

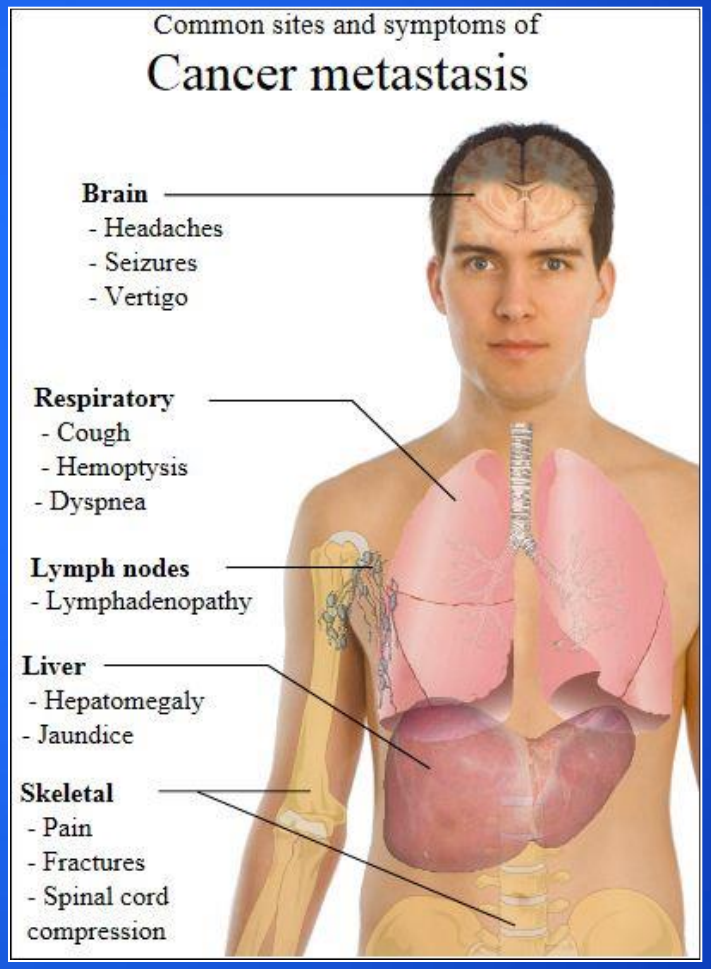
Whenever you deal with malignant tumor, always remember that there is primary tumor & there may be secondaries.

Presentation of Malignant Tumors

- Asymptomatic
- Symptoms related to the primary
- Symptoms related to the secondaries
- Incidental finding
- Weight loss and Cachaxia are late manifestations of most malignant tumors except GI and Lung cancer

Presentation of Malignant Tumors

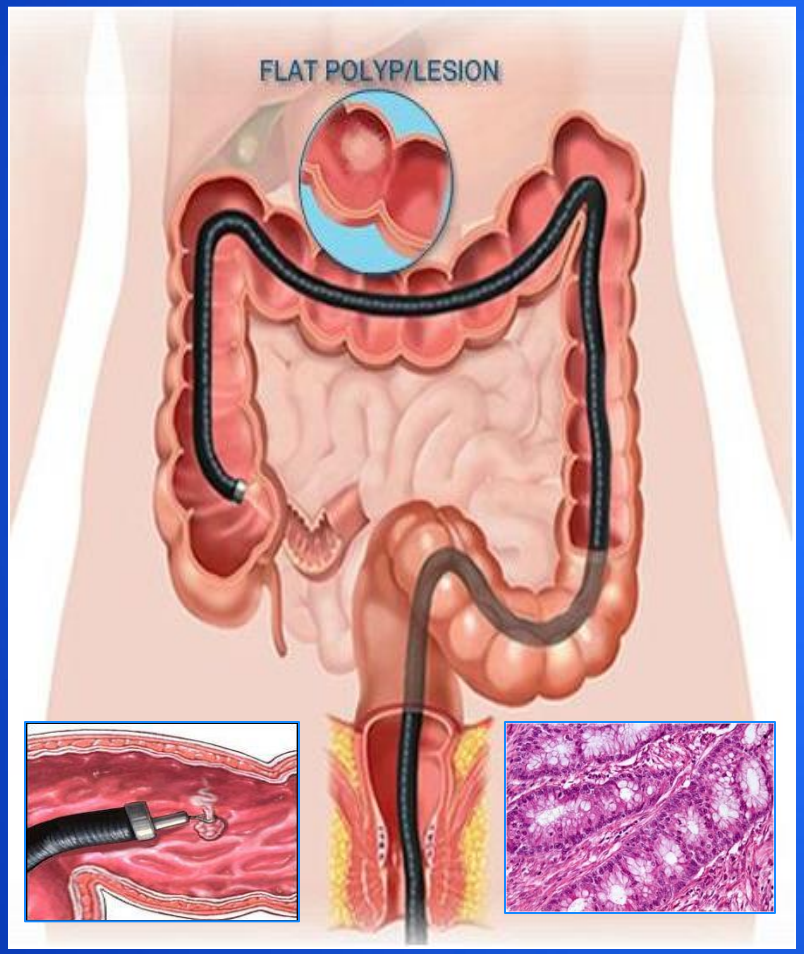


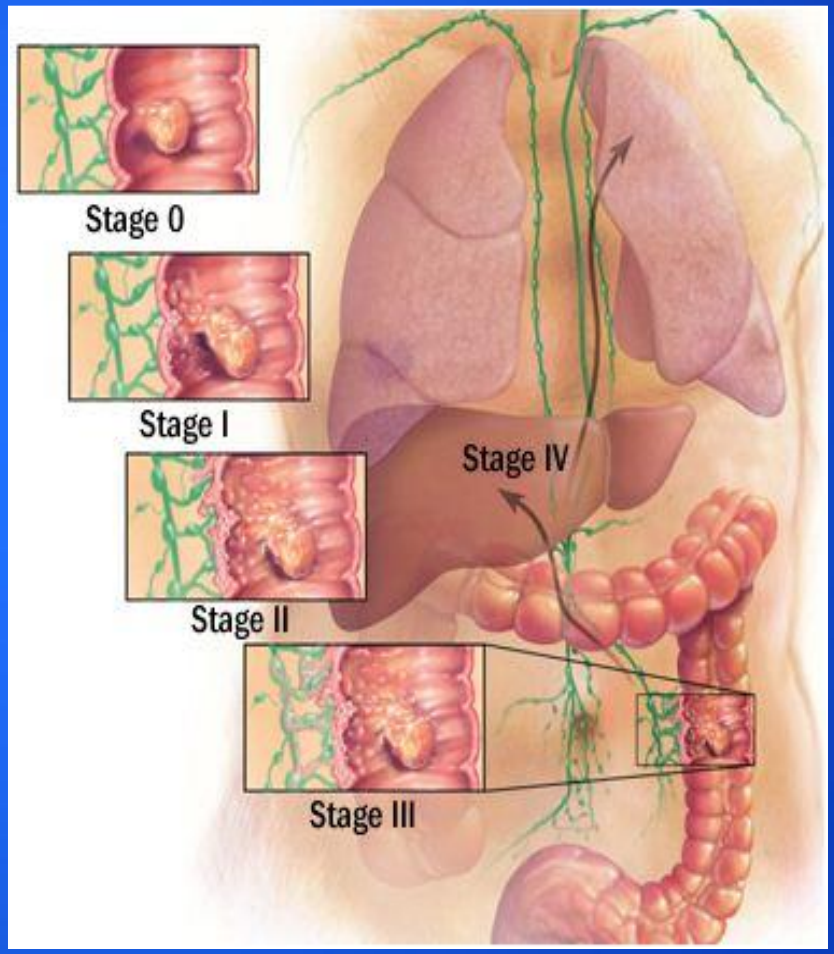


Investigation of Malignant Tumors

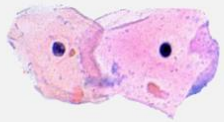
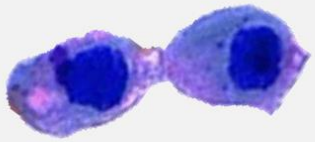
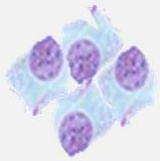
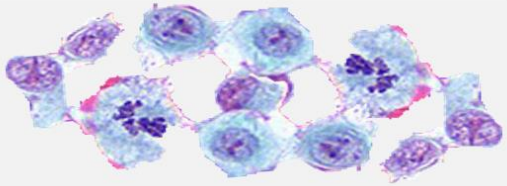
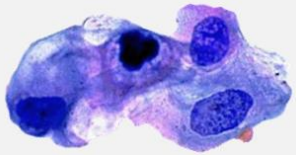
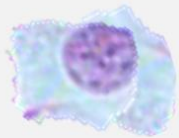
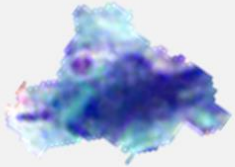
- Investigate for the primary
  - Depends on the site
  - Define the histology
  - Define the local extension
- Investigate for the secondaries
  - Look for metastasis
  - Usually liver, lung and bones
- Both will define the diagnosis & stage

Investigation of Malignant Tumors



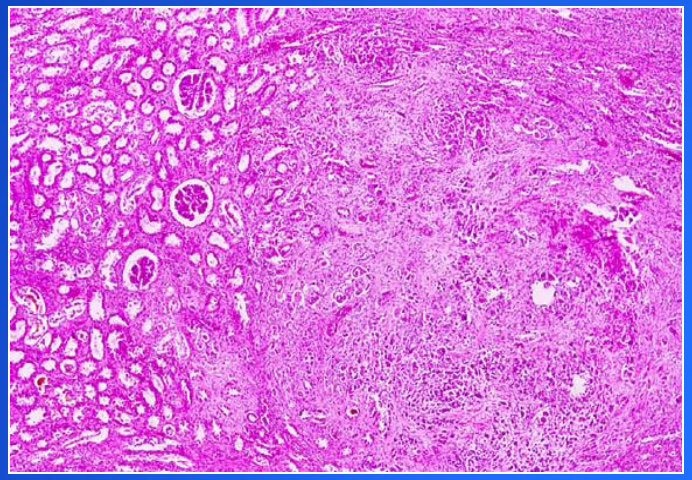


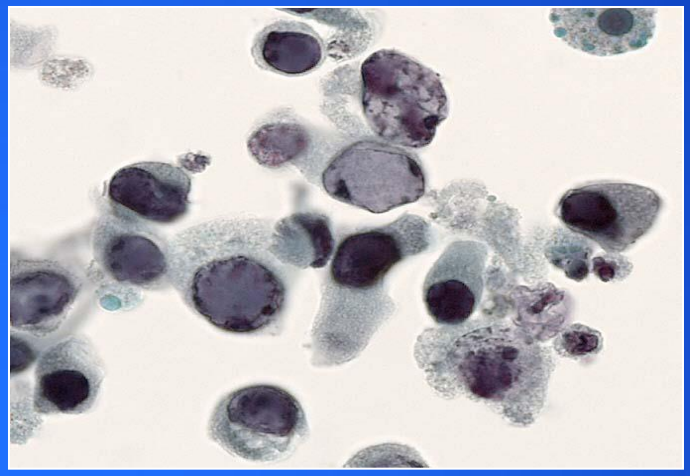
Principles of Cytology

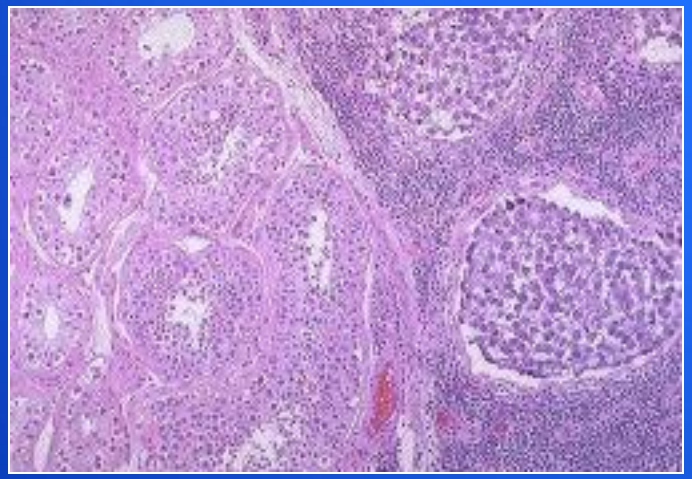
Normal	Cancer	
		Large, variably shaped nuclei
		Many dividing cells; Disorganized arrangement
		Variation in size and shape
		Loss of normal features

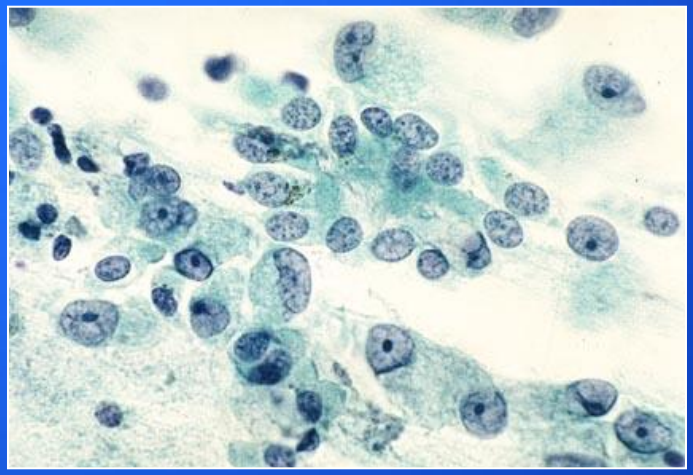
Biopsy

Cytology







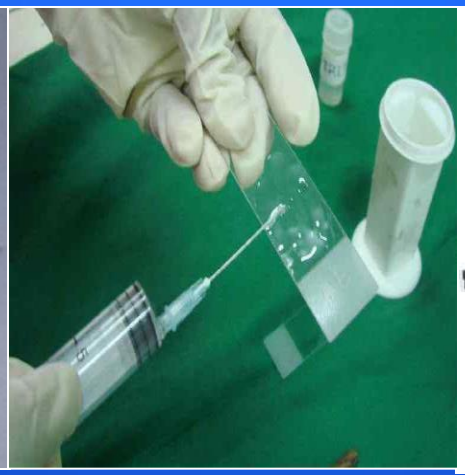


How we obtain material for histology

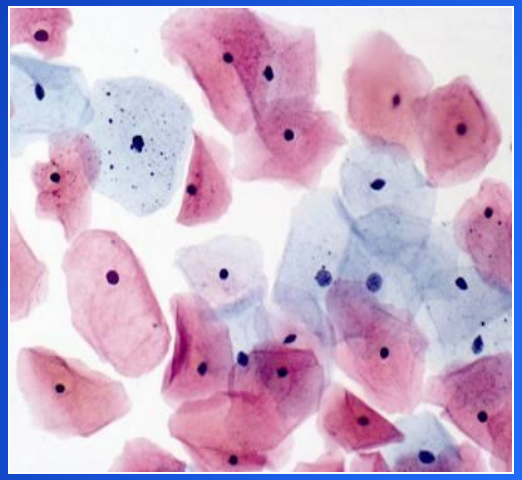
- **Cytology** : morphology of individual cells.
  - Exfoliative (urine,sputum,….)
  - Fluid aspiration (ascitic fluid,pleural fluid)
  - Fine needle aspiration (FNA)

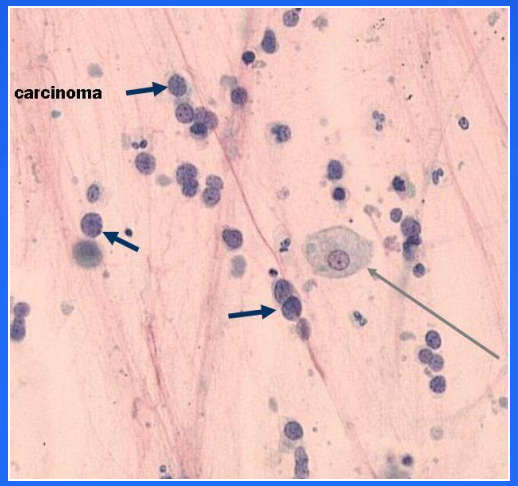
- **Biopsy** : histological (tissue) characteristics
  - Incisional biopsy (open, needle, forceps..)
  - Excisional biopsy

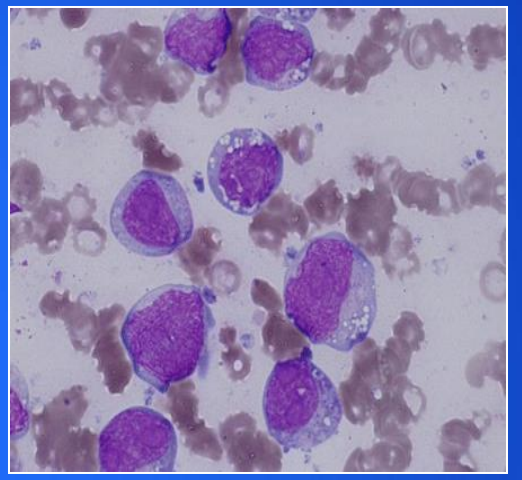
Cytology

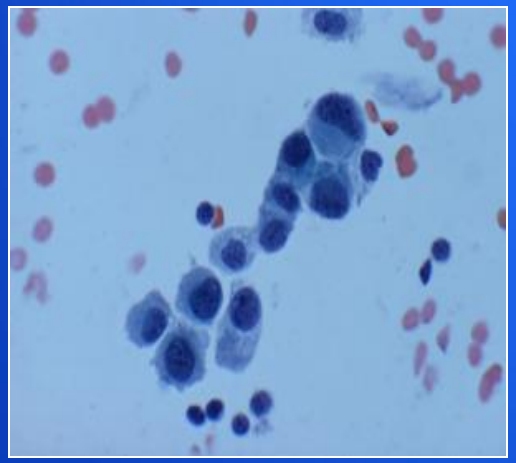


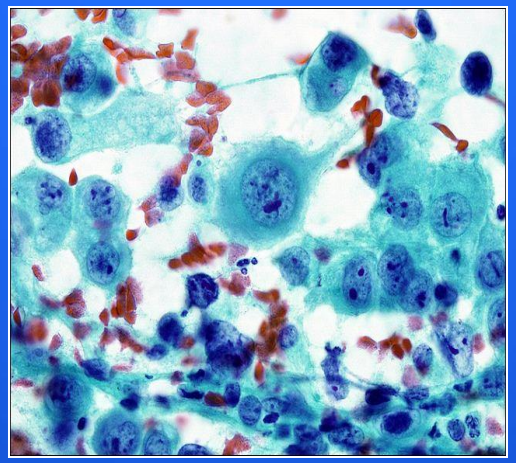
Cytology : Examples

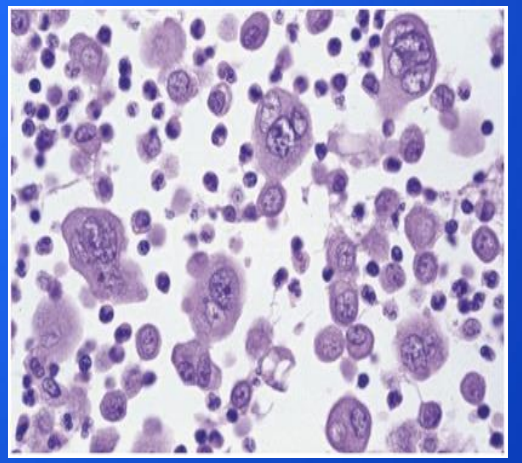




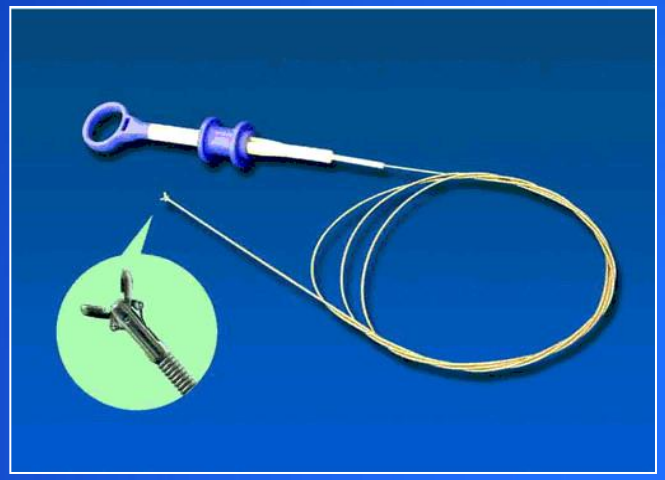


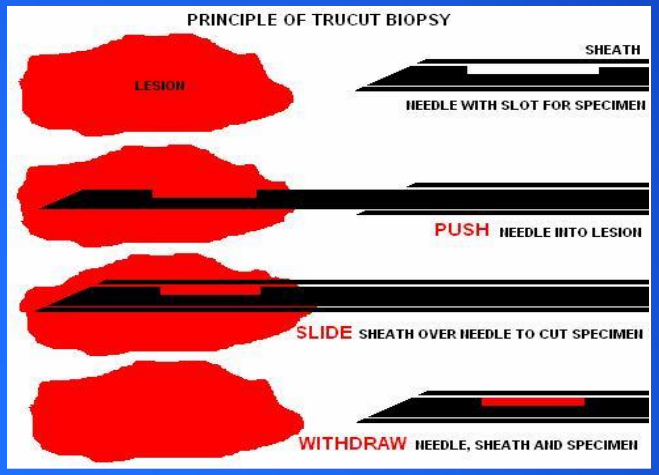


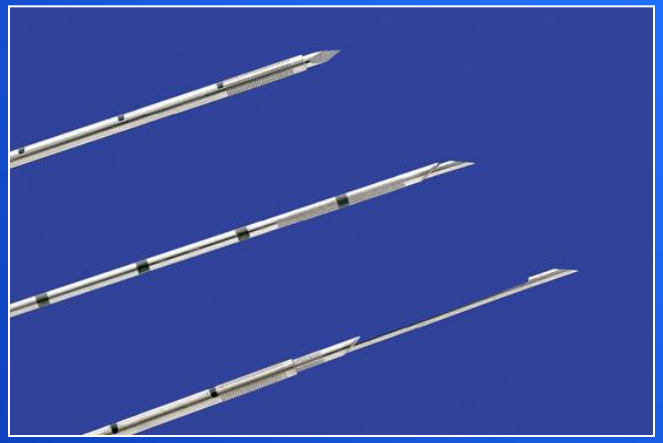


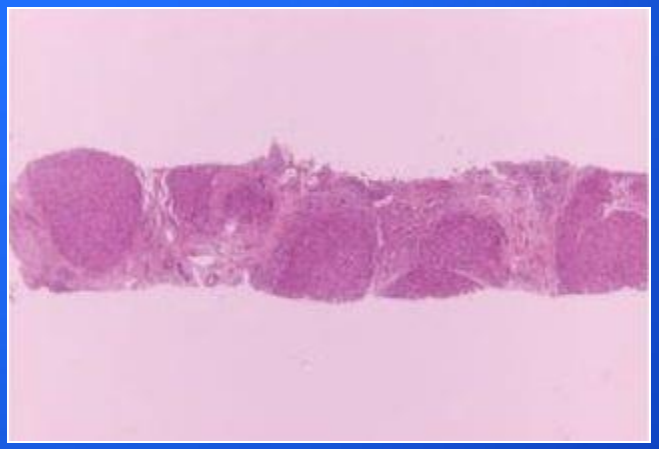


Tissue Biopsy

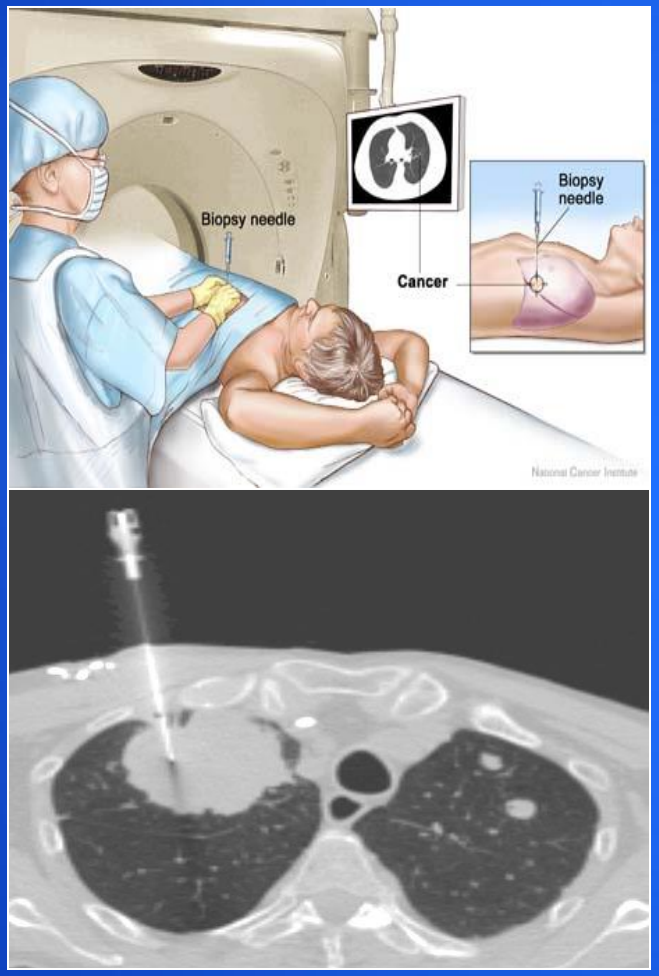


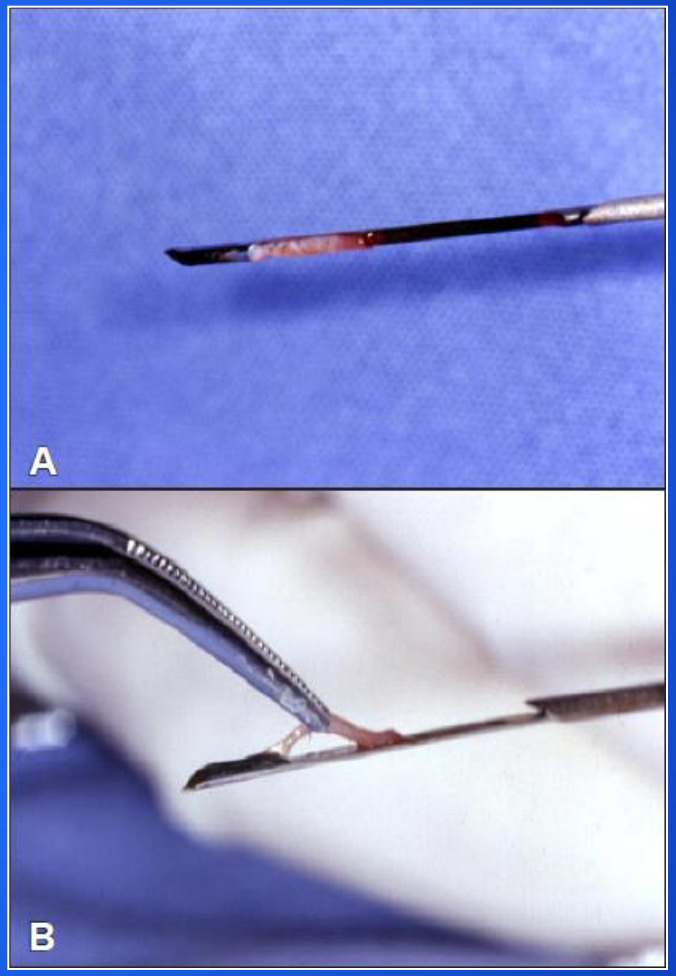




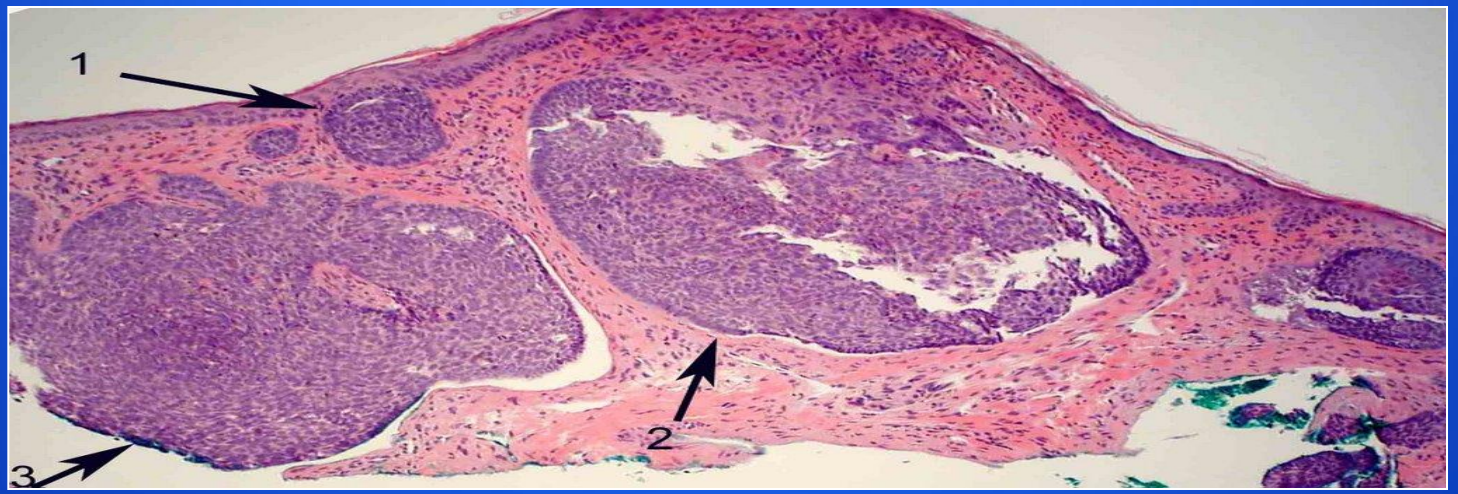


CT- guided Trucut needle biopsy





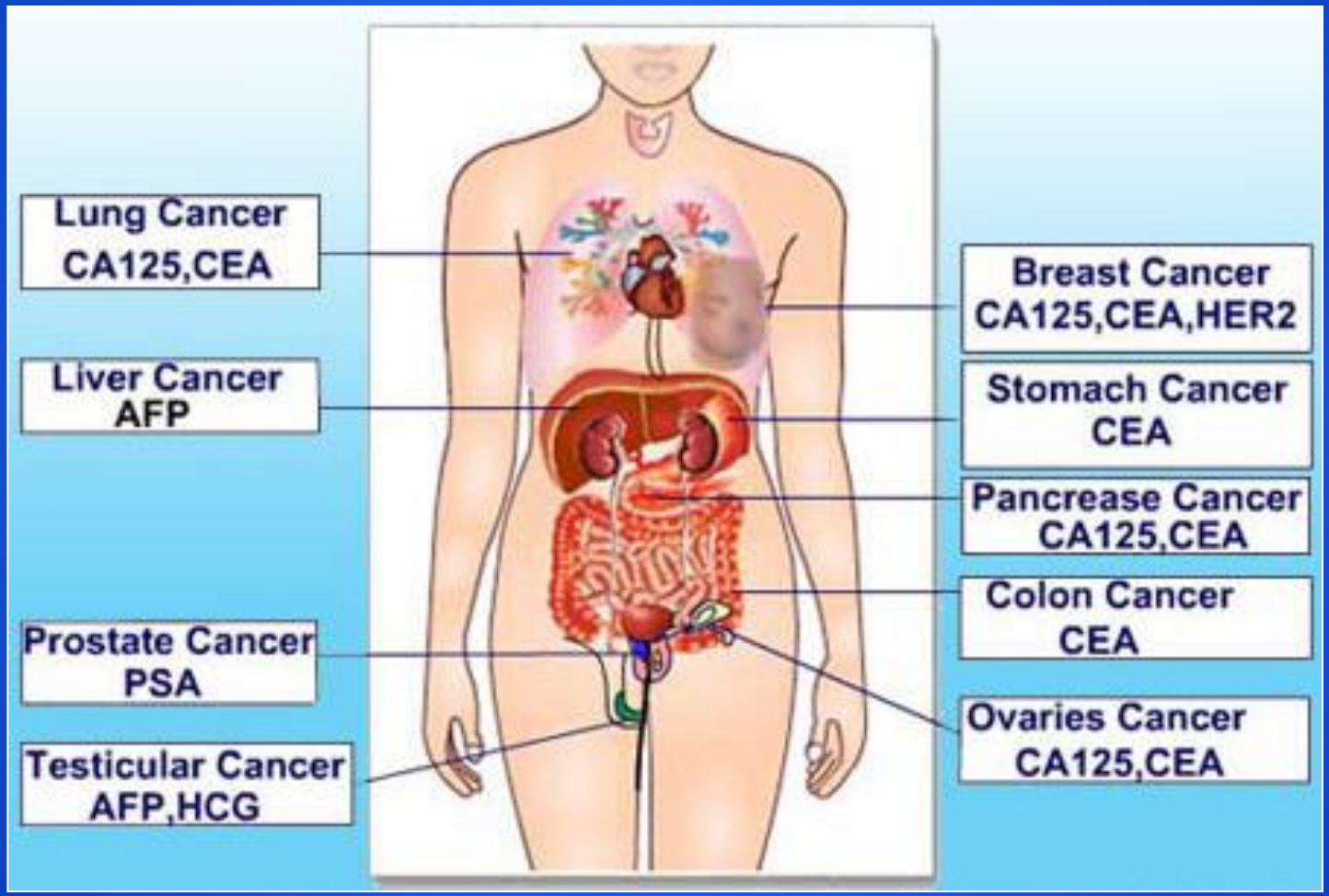
Excisional & Incisional Biopsy



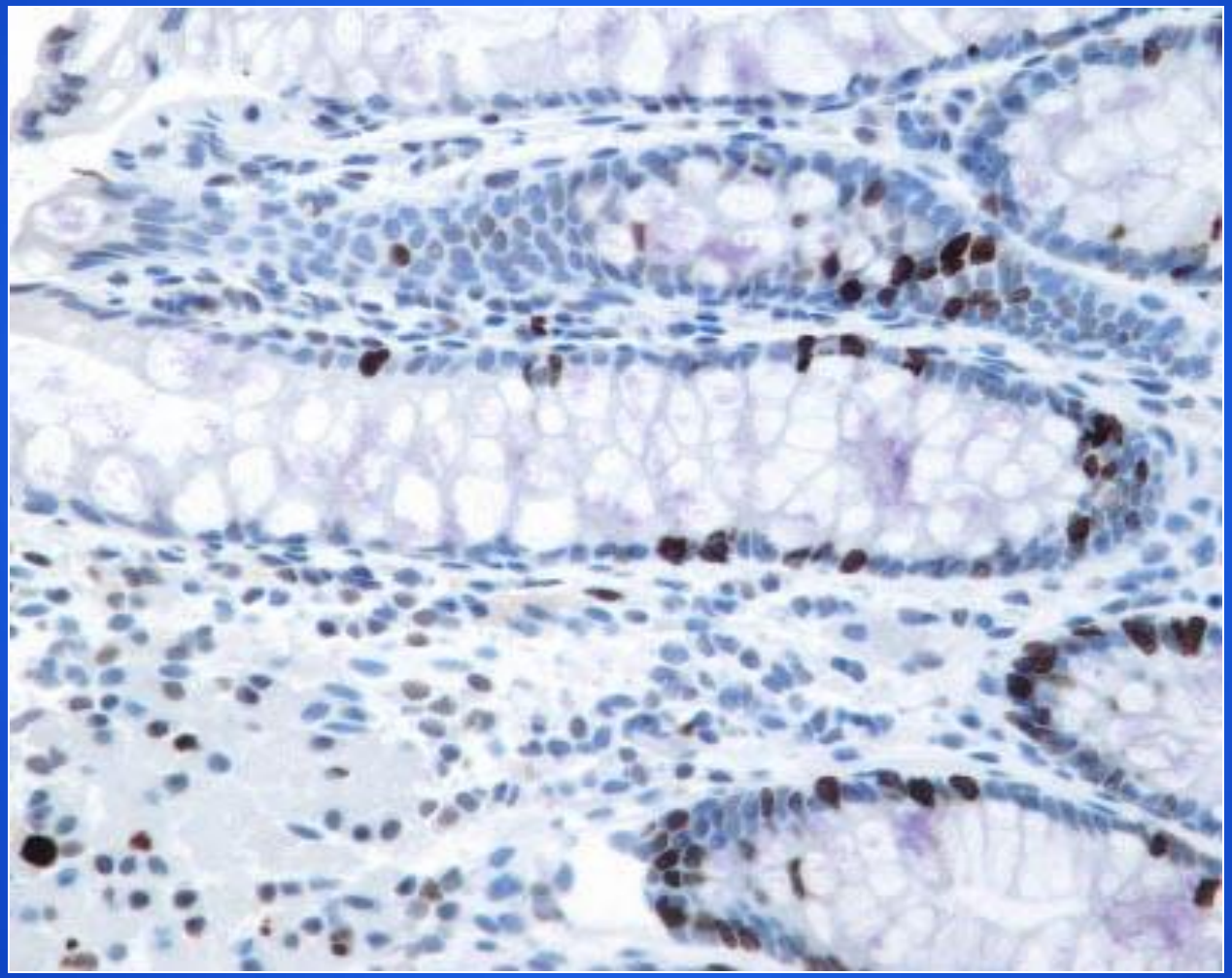
Tumor Markers

- Substances which if present in the blood or tissues may indicate malignancy.
- The concept is very important
- There are many tumor markers
- Most are non-specific
- Important in diagnosis
- Important for screening
- Important in follow up

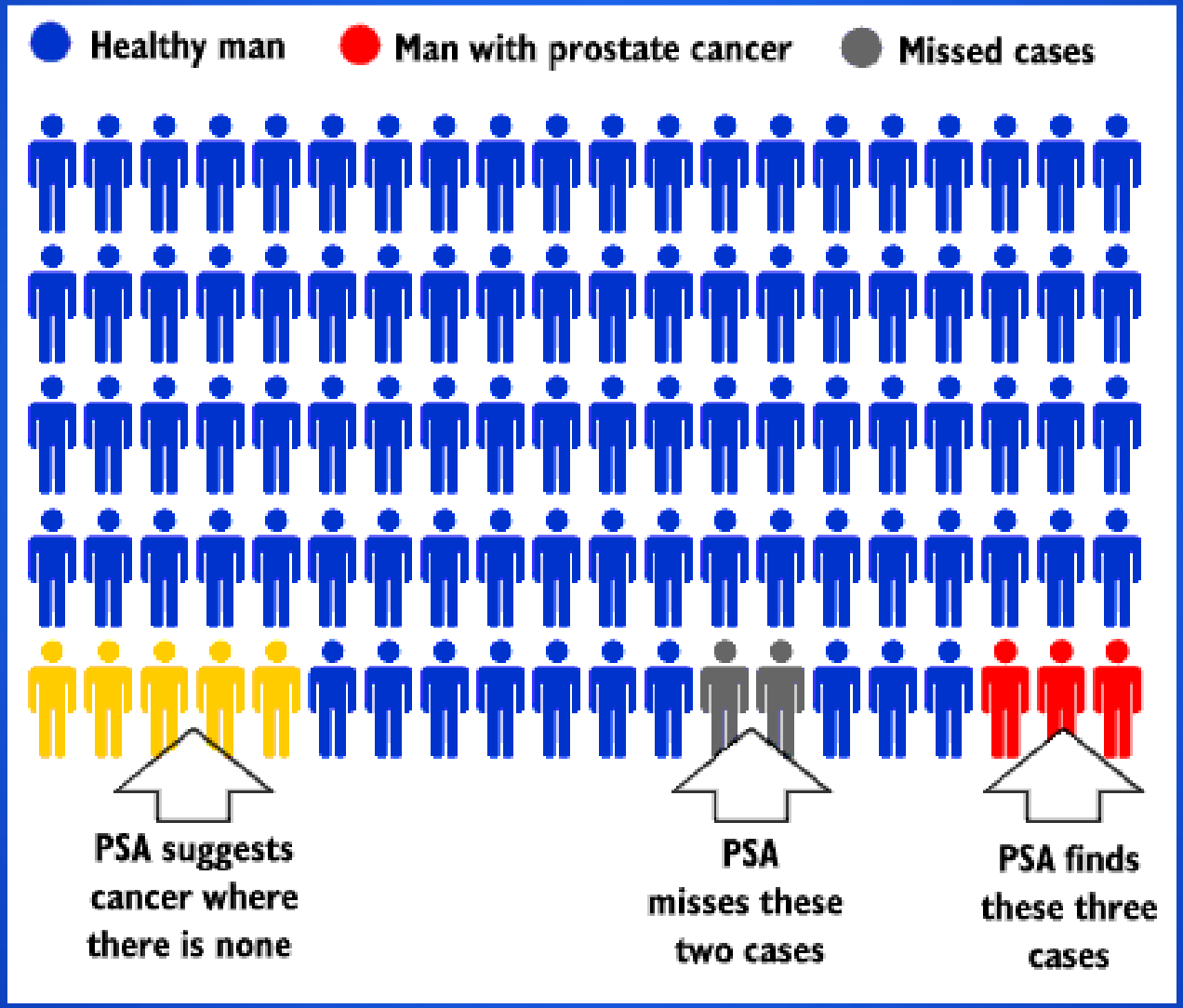
Tumor Markers-examples



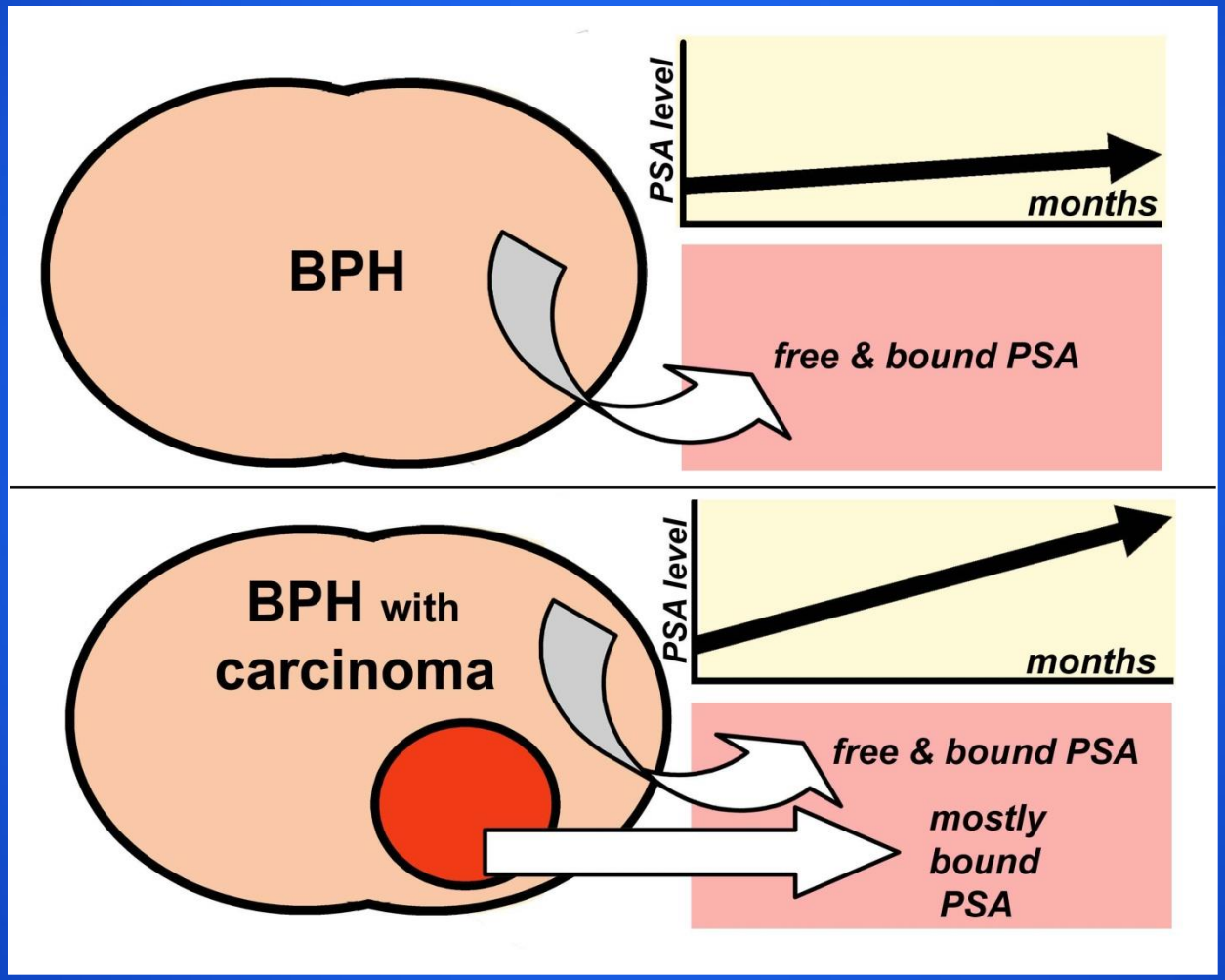
Tumor Markers in tissues



Tumor Markers-non specific

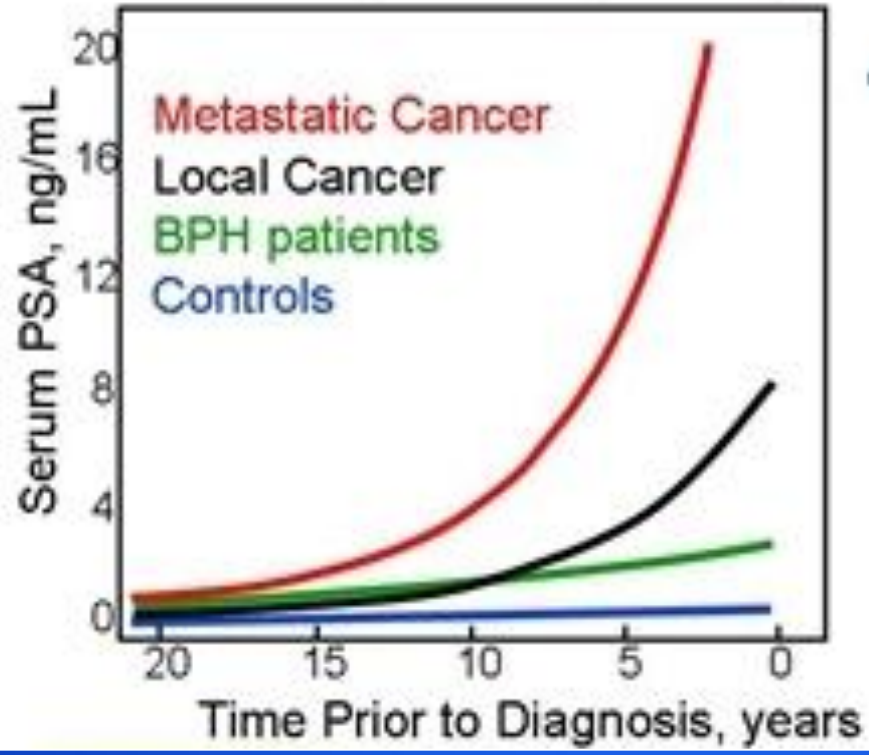


Tumor Markers-screening



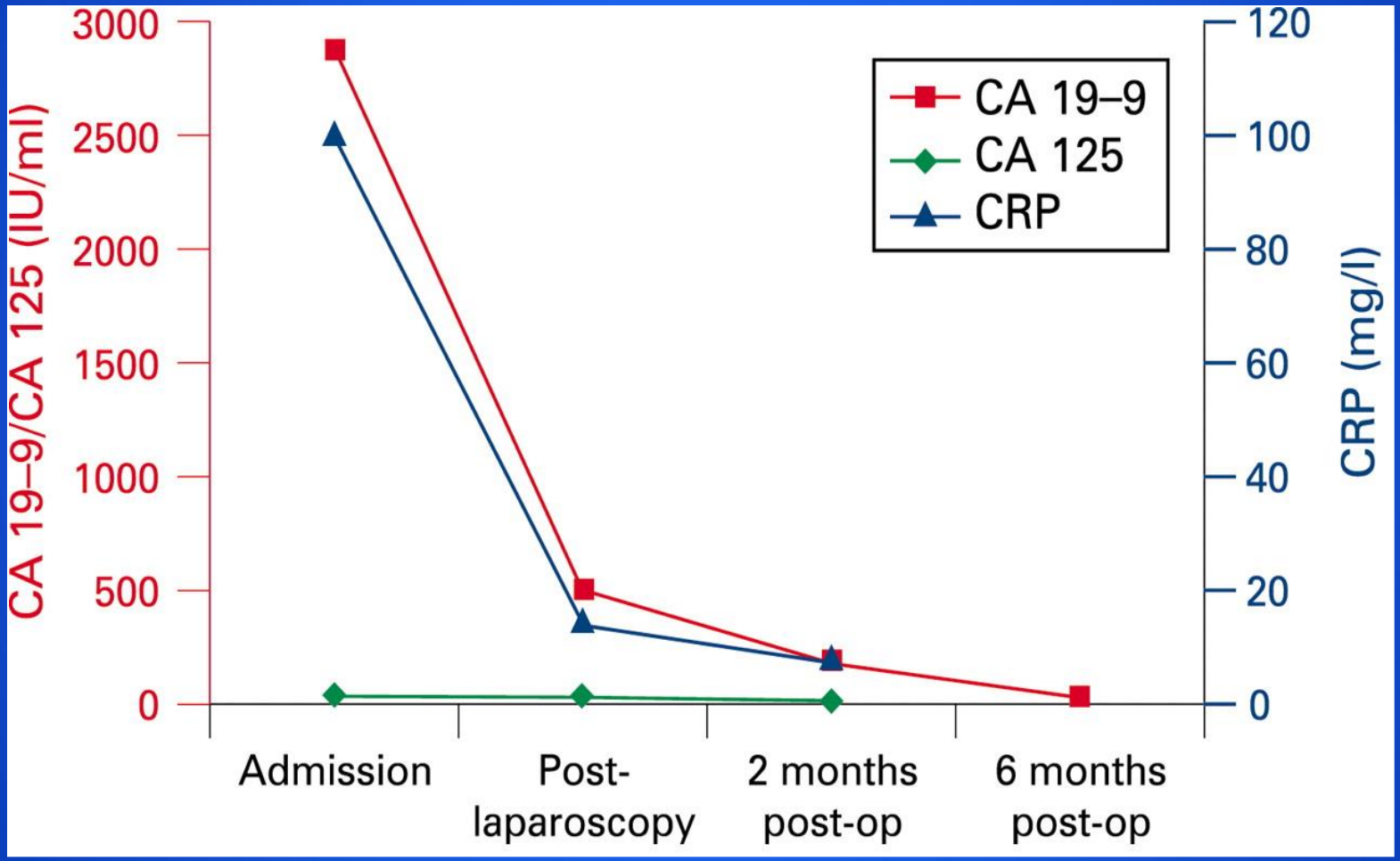
Tumor Markers-diagnosis

Increase Specificity Using PSA Velocity[8]

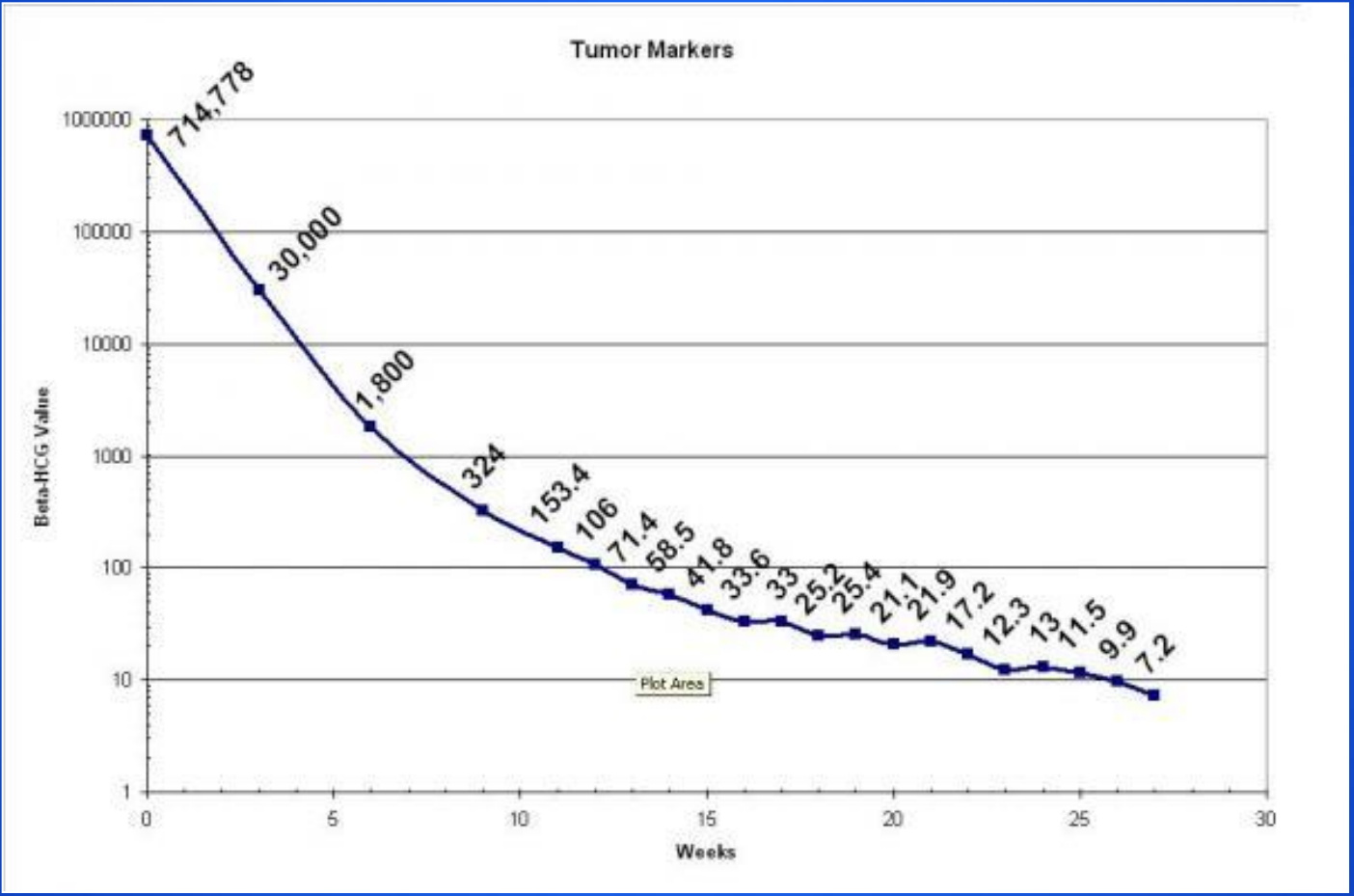


- NCCN Guidelines (2009) calculate the change in PSA over a 1-year period
  - For PSA <4, an increase of ≥0.35 ng/mL/yr is suspicious
  - For PSA 4-10, an increase of ≥0.75 ng/mL/yr is suspicious
  - Use 3 specimens over 18-24 month interval

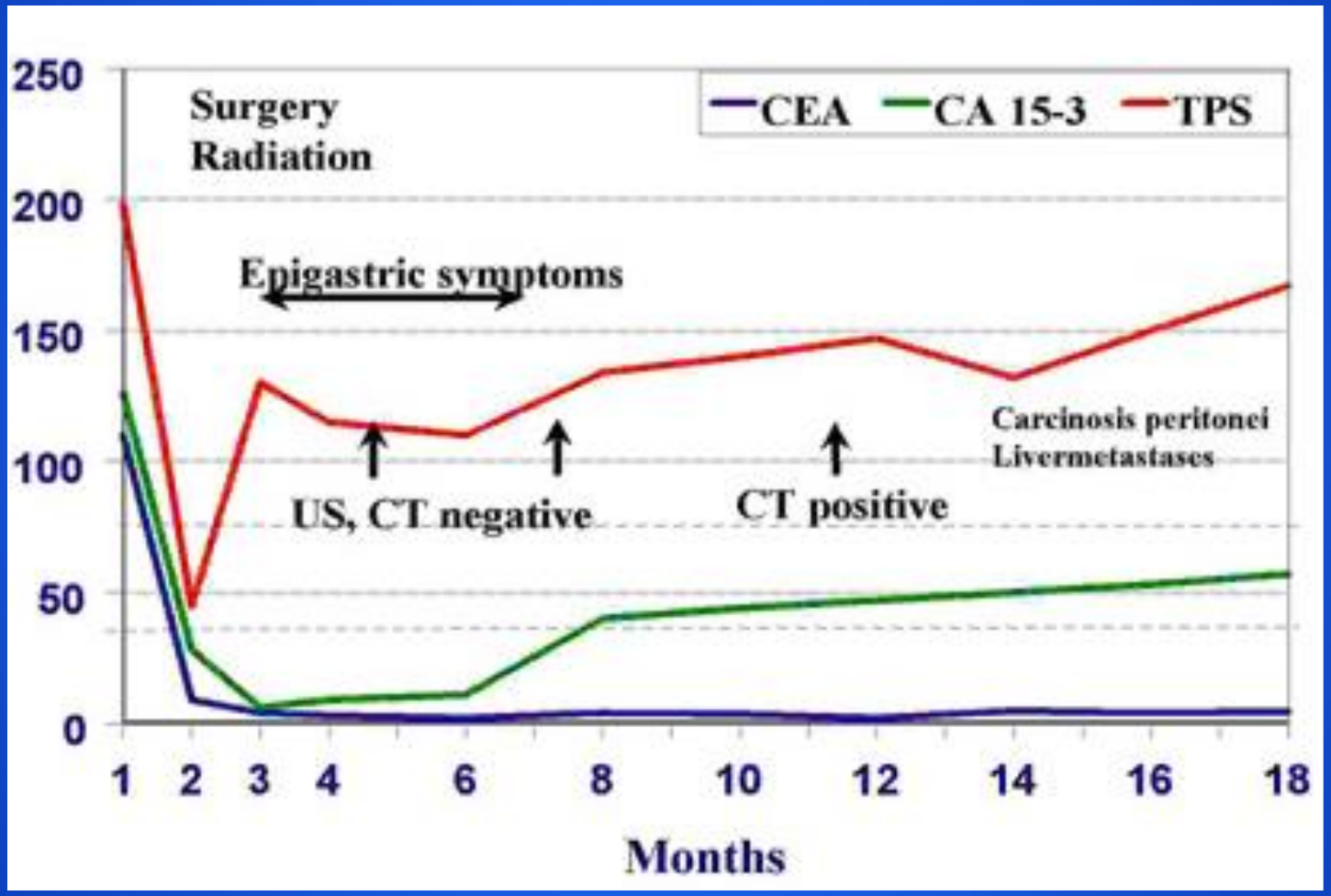
Tumor Markers-follow up



Tumor Markers-follow up



Tumor Markers-follow up



Hormones & Cancer

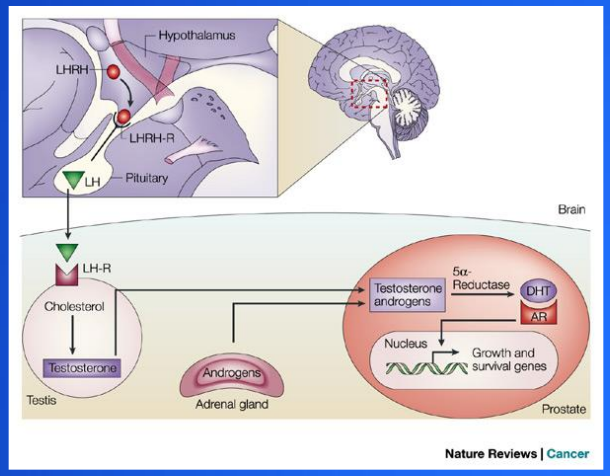
Hormones related to tumor growth:

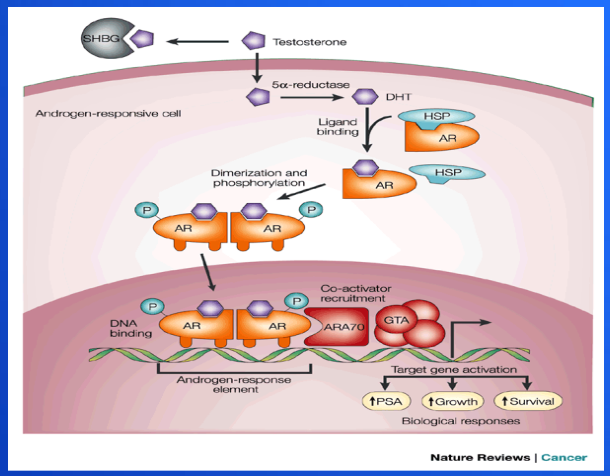
- Usually sex hormones (testosterone,estrogen)
- They may have a relation to tumor growth
- Hormone receptors
- The concept can be used in treatment

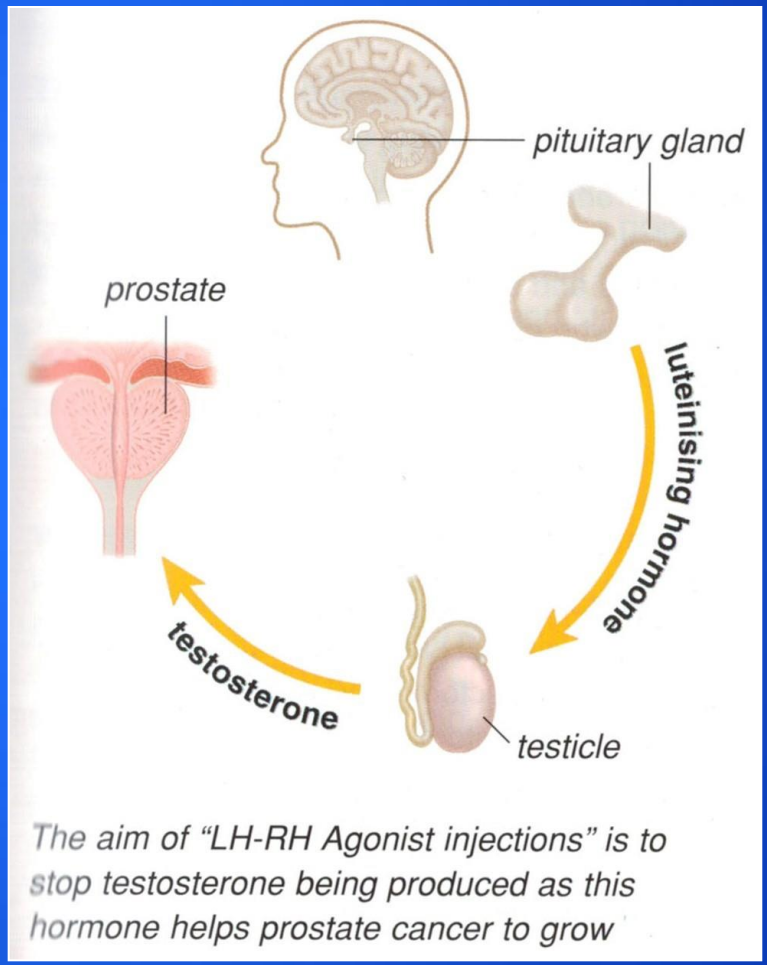
Hormones may be produced by tumors:

- Originally hormone producing organ e.g. adrenals
- Originally non hormone producing organ e.g. lung

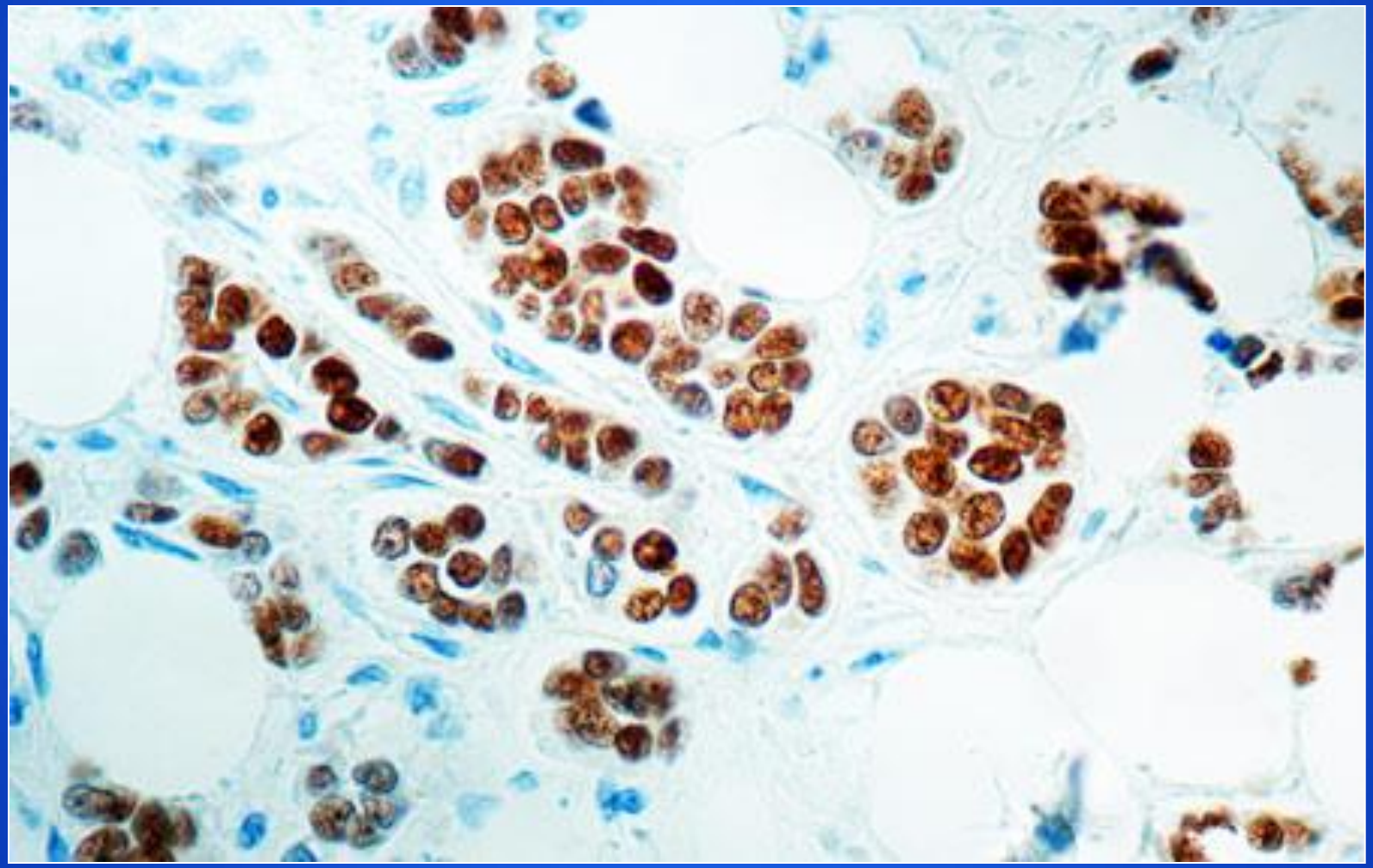
Testosterone and Prostate Cancer







Estrogen receptors-breast cancer



Estrogen receptors-breast cancer