In The Name of God

NEOPLASIA

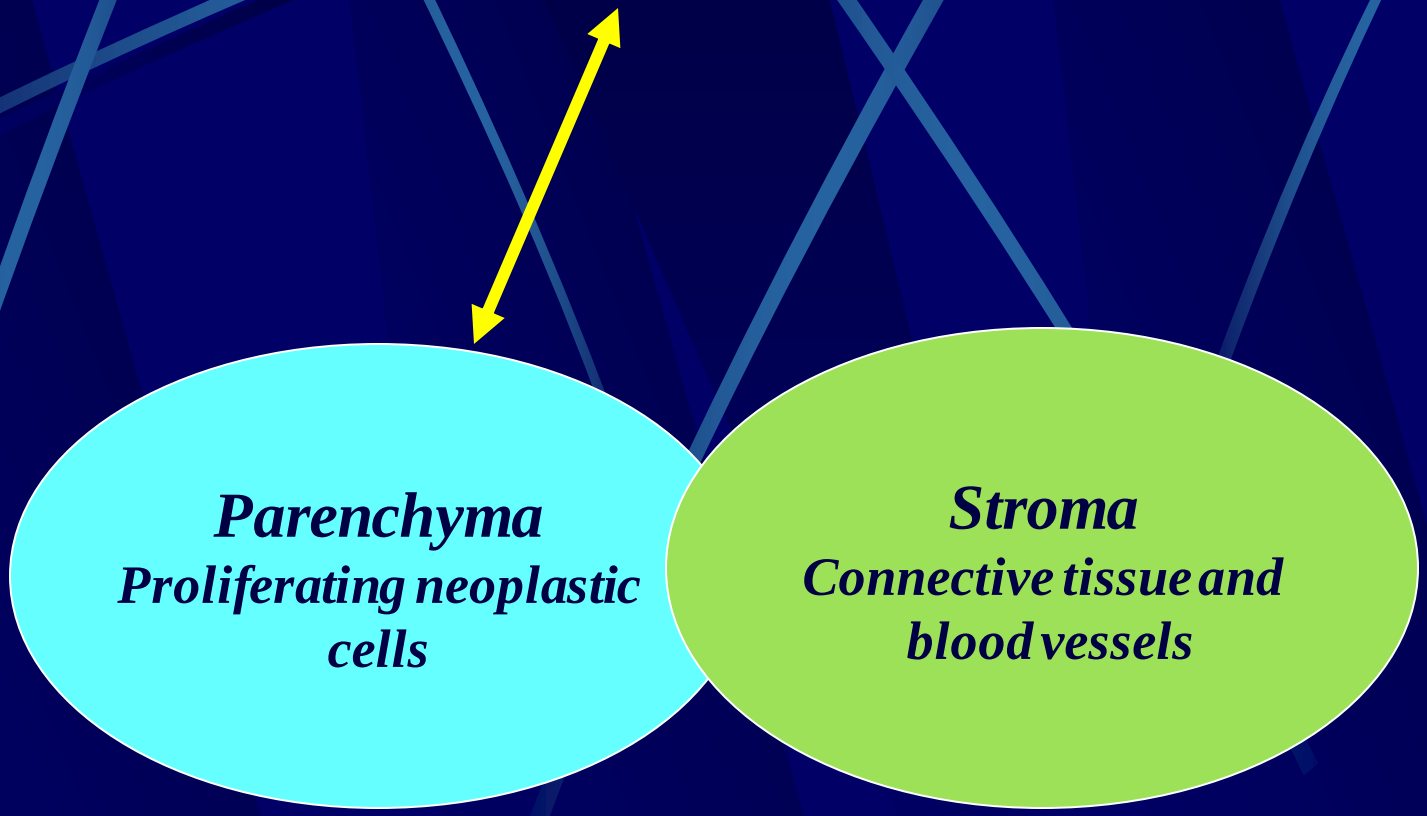
Why do we need a lecture about neoplasia?

- *To understand patients better*
- *To understand oral neoplasms better*
- *This lecture covers:*
  - *the nature of benign and malignant neoplasms*
  - *how neoplasms start and grow*
  - *how these neoplasms affect the patient*

- *Tumor nomenclature*
- *Tumor characteristics*
- *Cancer pathogenesis*

- *Neoplasm = mass of tissue that grows excessively, and keeps growing even if you remove the stimulus that started it off!*
- *Neoplasm is an abnormal mass of tissue, the growth of which exceeds and is uncoordinated with that of the normal tissues and persists in the same excessive manner af"A neoplasm ter cessation of the stimuli which evoked the change"*
- *Tumor = neoplasm*
- *Neoplasia = new growth*
- *Tumor= swelling due to inflammation*
- *Oncology= oncos is tumor, logy is study*
- *Cancer= malignant tumors (crab)*

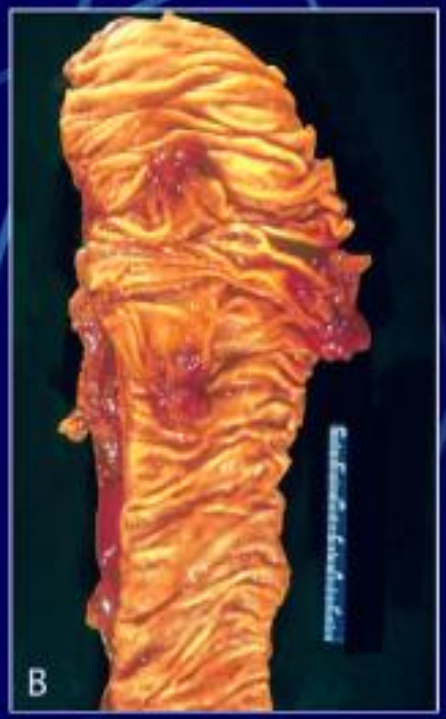
Nomenclature

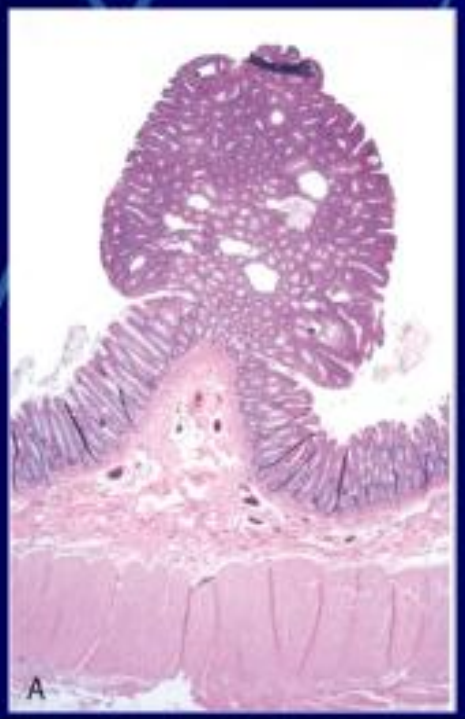


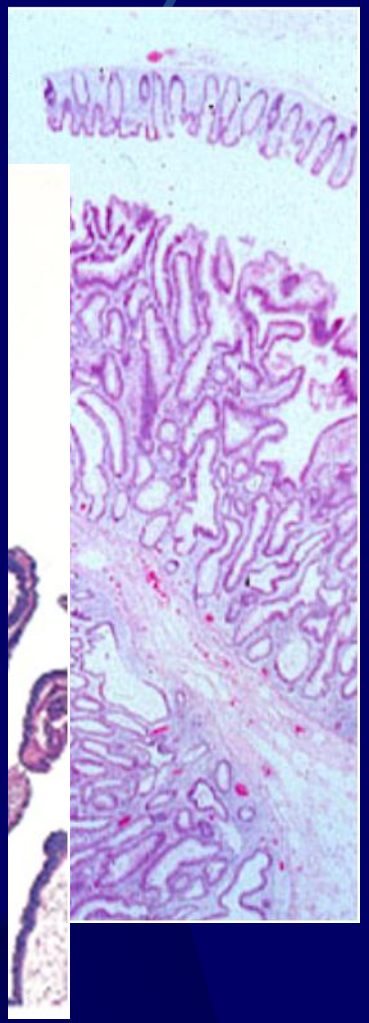
Benign Neoplasm

Cells grow as a compact mass and remain at their site of origin

- *Polyp: macroscopic → projection of mucosal surface*





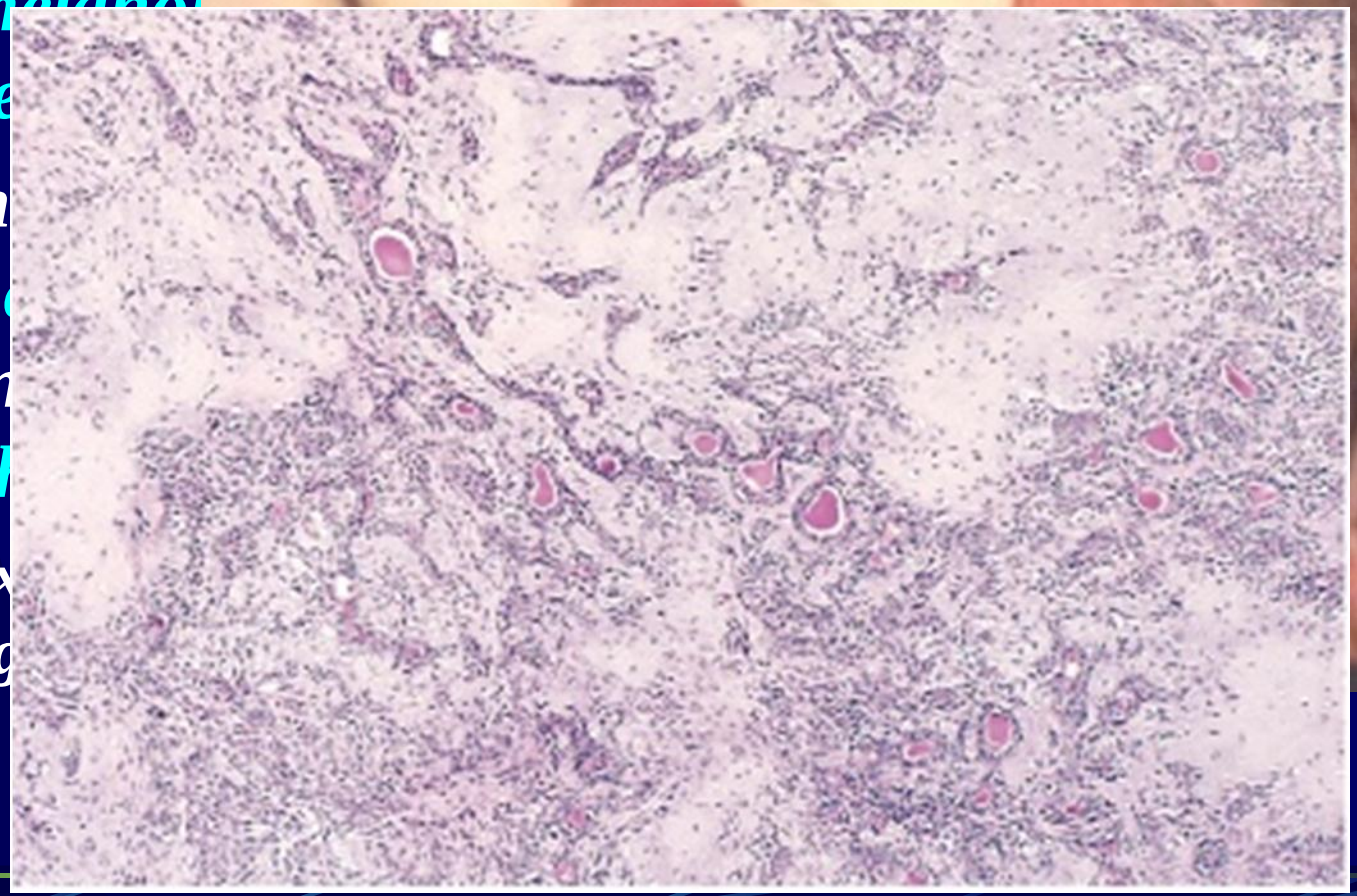


- ***polyp** – projects upward, forming a lump*

Confusing Terms

- *Malignant tumors*
  - *Lympho*
  - *melano*
  - *se*
- *Non*
  - *h*
    in
  - *cl*

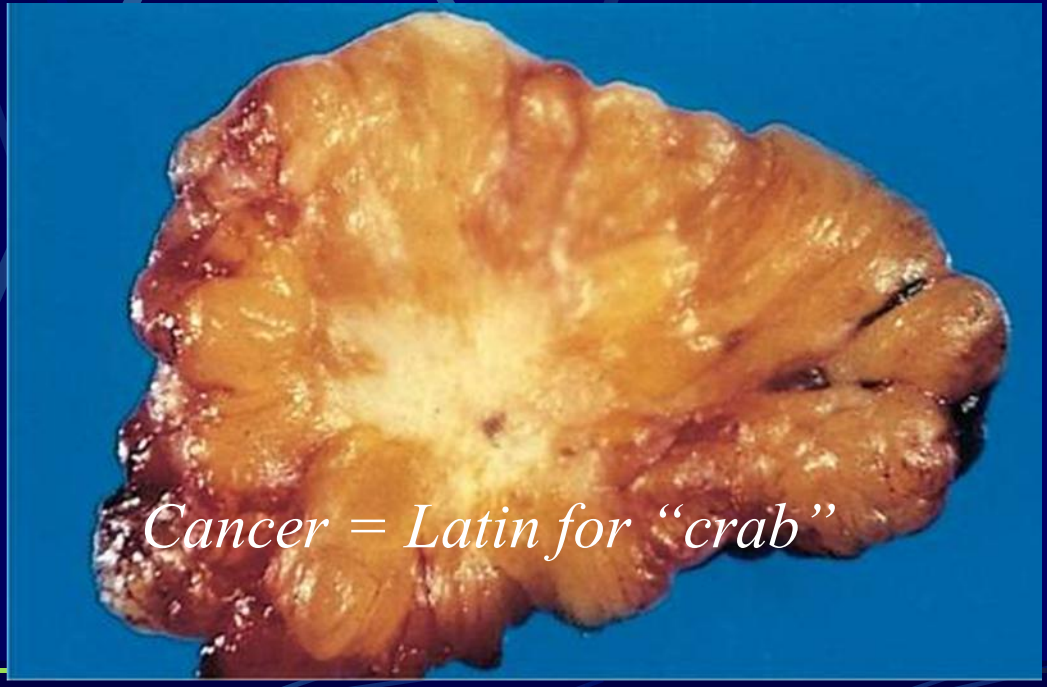
Mix
orig



Malignant Neoplasm

Growth of cells is uncontrolled Cells can spread into surrounding tissue and spread to distant sites

Cancer = a malignant growth



Malignant tumors

- *Mesenchymal = sarcomas (sar, fleshy). Fibrosarcoma, liposarcoma, leiomyosarcoma*
- *Epithelial = carcinomas,*
- *glandular – adenocarcinoma,*
- *squamous – squamous cell carcinoma*

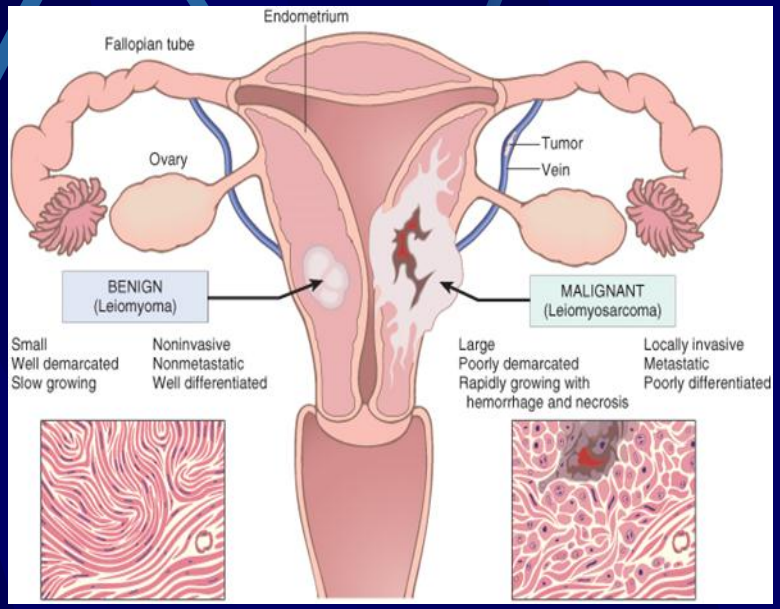
Benign . Malignant

- *Slow growing*
- *Encapsulated*
- *Expansile growth*
- *No Metastasis*
- *Well Differentiated*

- *Rapidly growing*
- *Non encapsulated*
- *Infiltrative growth*
- *Metastasis*
- *Well-Poorly differentiated*

Differences between Benign and Malignant neoplasms

- *Size*
- *Growth characteristics*
- *Vascularity/necrosis*
- *Function*
- *Invasion/metastasis*



The only indisputable quality of malignancy is

metastasis!

Benign tumors CANNOT metastasize; malignant tumors CAN.

If it is metastatic, it MUST BE malignant.

Differentiation

- *"Poorly-differentiated" refers to tumors that show only minimal resemblance to the normal parent tissue they are derived from.*
- *"Anaplastic" means the tumor shows no obvious similarity to it's parent tissue, usually associated with aggressive behavior*

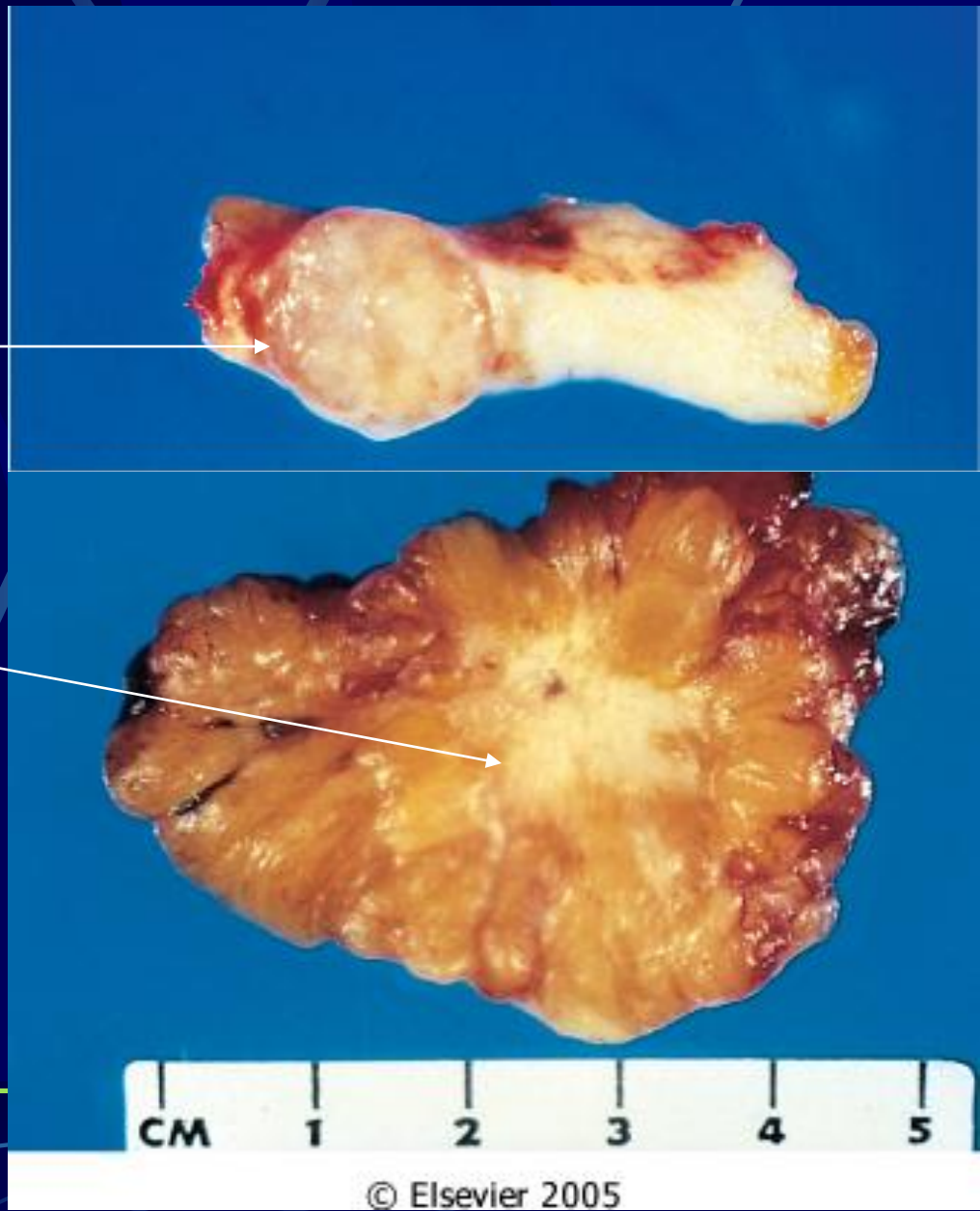
So what?

- *Differentiation often provides clues as to the clinical aggressiveness of the tumor*
- *Tumors often lose differentiation features over time as they become more "malignant" and as they acquire more cumulative genetic mutations*
- *Differentiation often predicts responsiveness to certain therapies, eg estrogen receptors and Tamoxifen in breast cancers*

Gross (macroscopic) features of two breast neoplasms

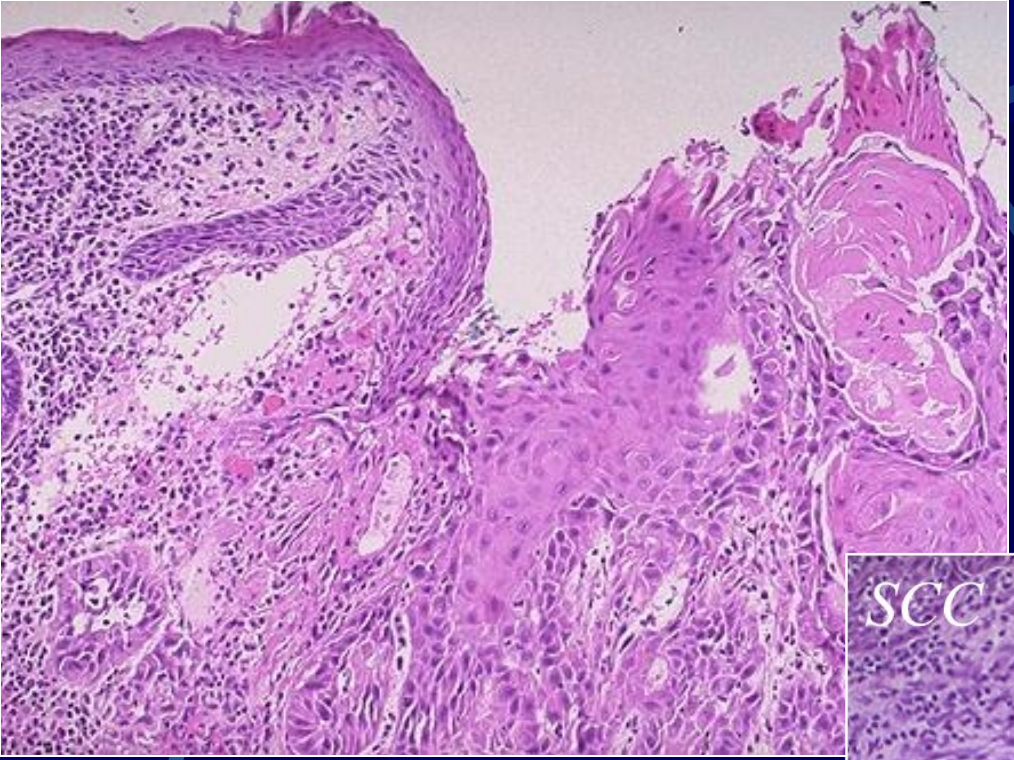
Benign – circumscribed, often encapsulated, pushes normal tissue aside

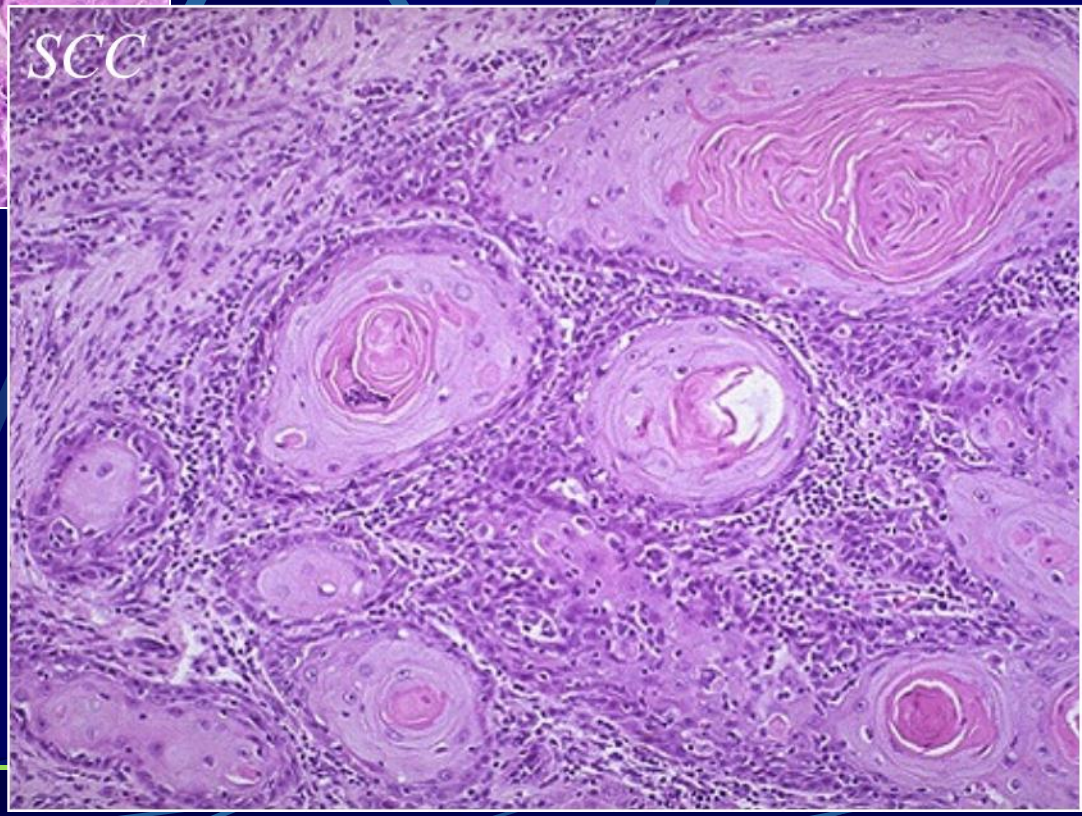
Malignant – infiltrative growth, no capsule, destructive of normal tissues



Anaplasia

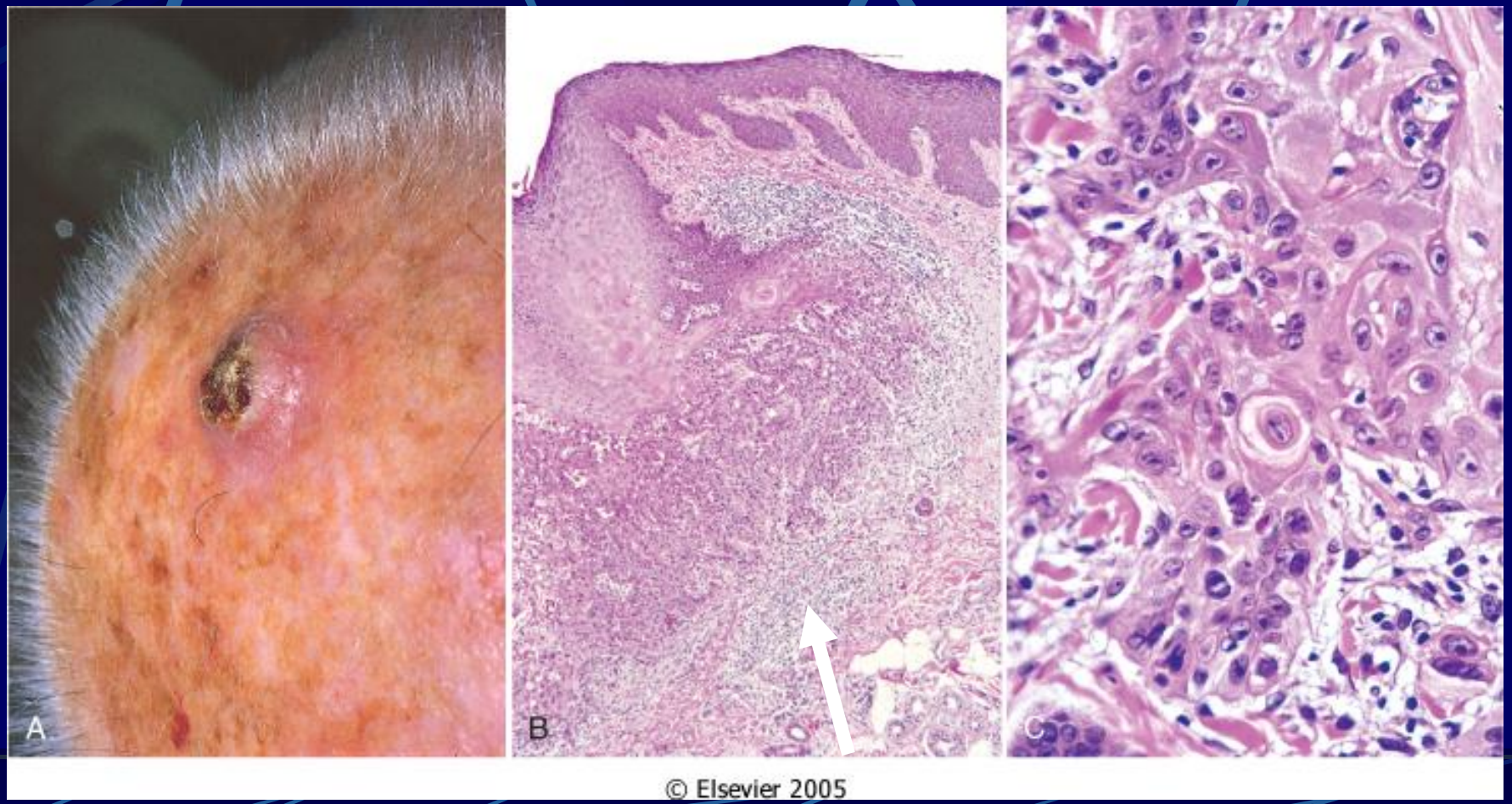
- *Lack of differentiation*
- *Hallmark of malignant transformation*
- *Numerous morphologic changes*




SCC

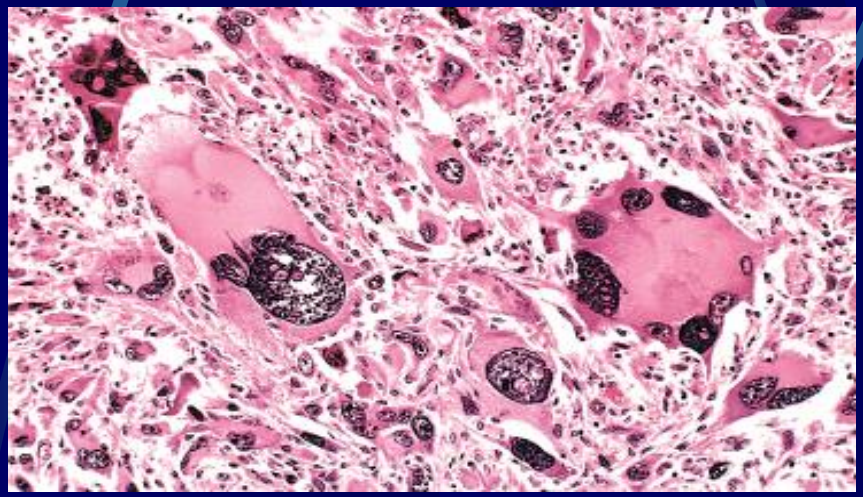
Microscopic features of tumors

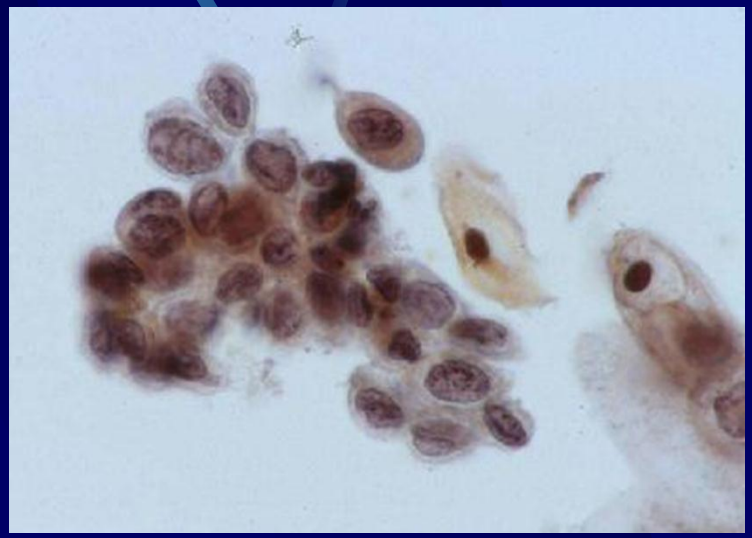
- Loss of normal architectural arrangement



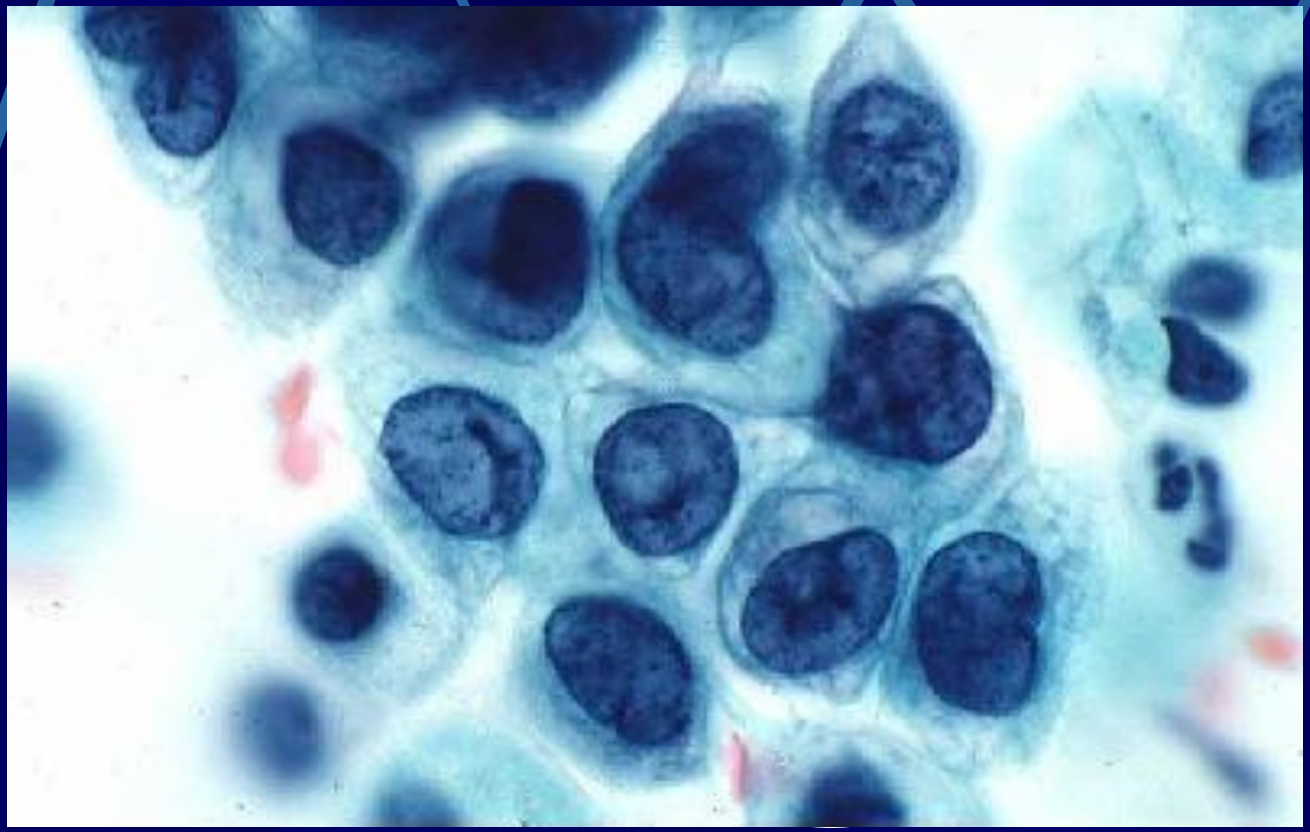
Microscopic features of tumors

- ***Pleomorphism – variation in size and shape of cells within the neoplasm***

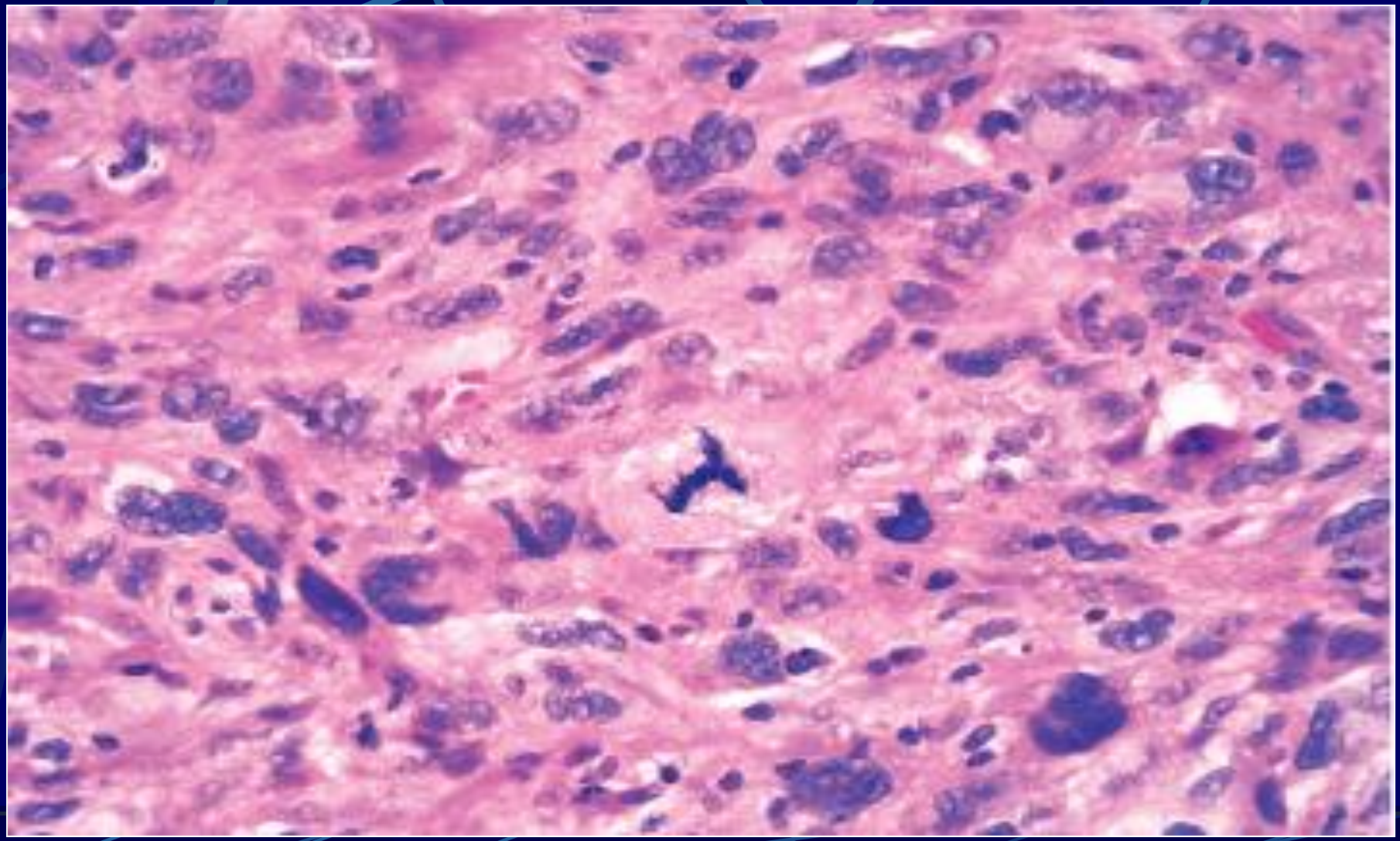




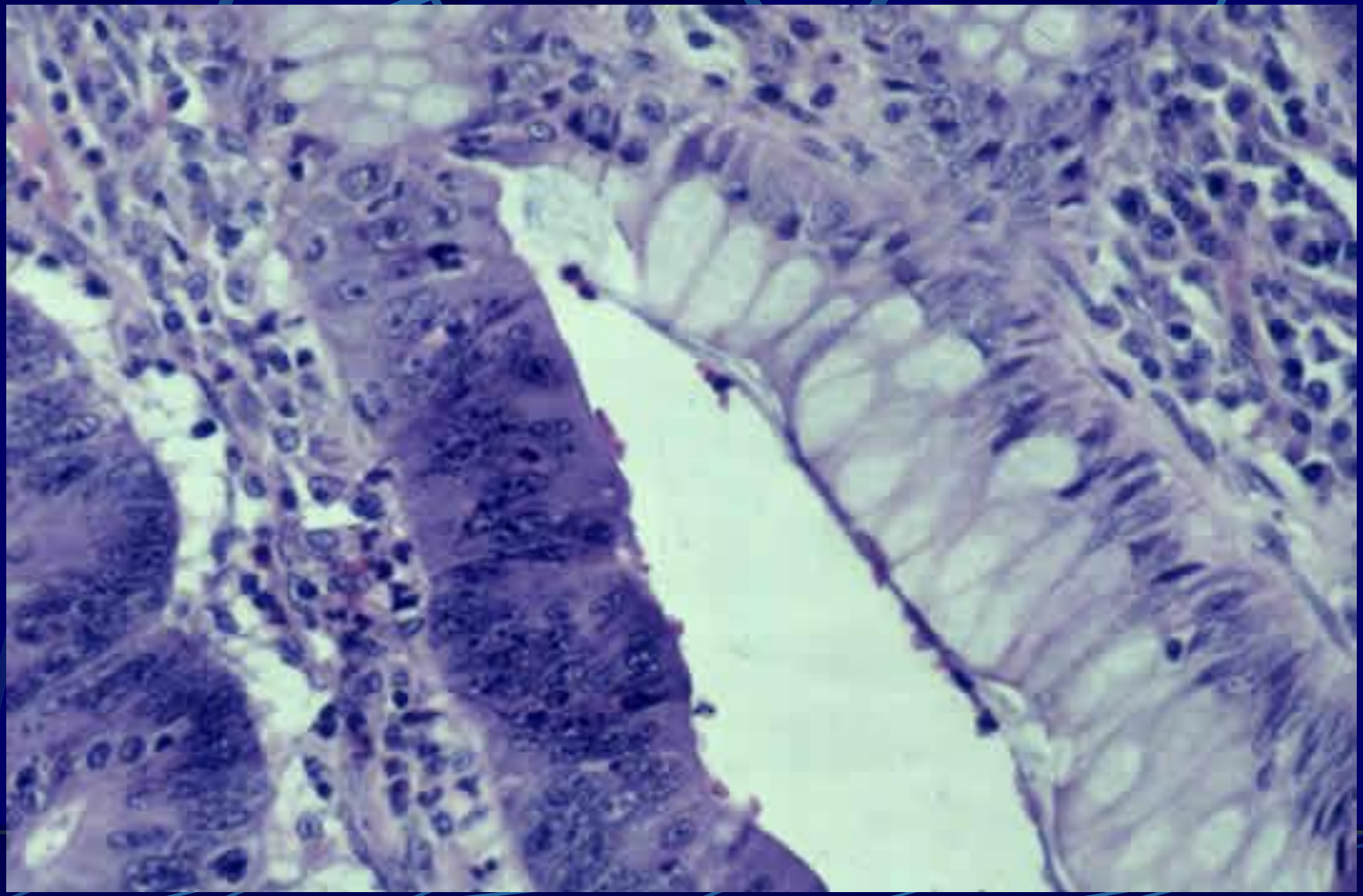
- ***Abnormal nuclear morphology: hyperchormatic (abundant DNA), increased N:C ratio (normal 1:4- 1:6)***



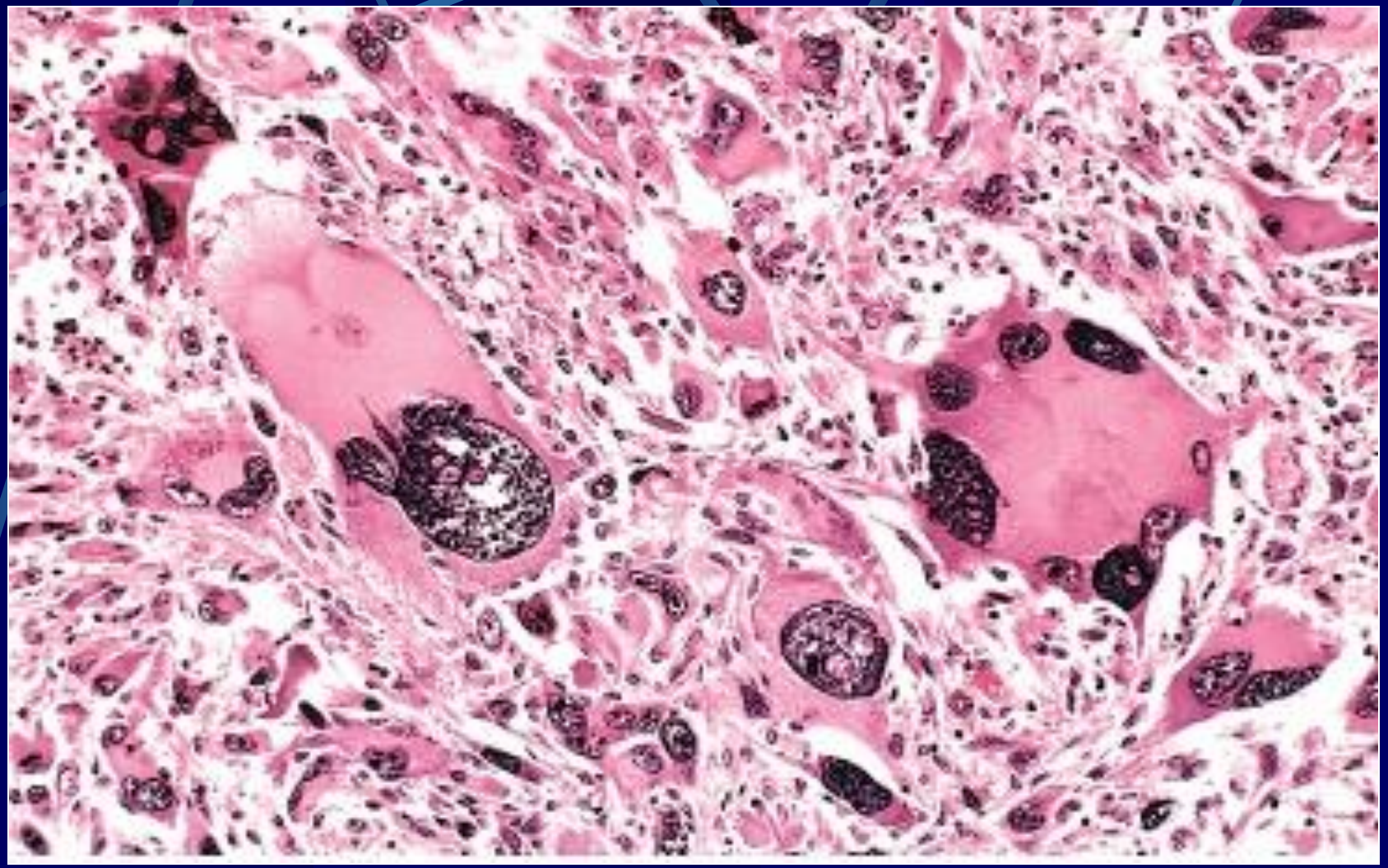
- ***Mitoses: increased, bizarre***



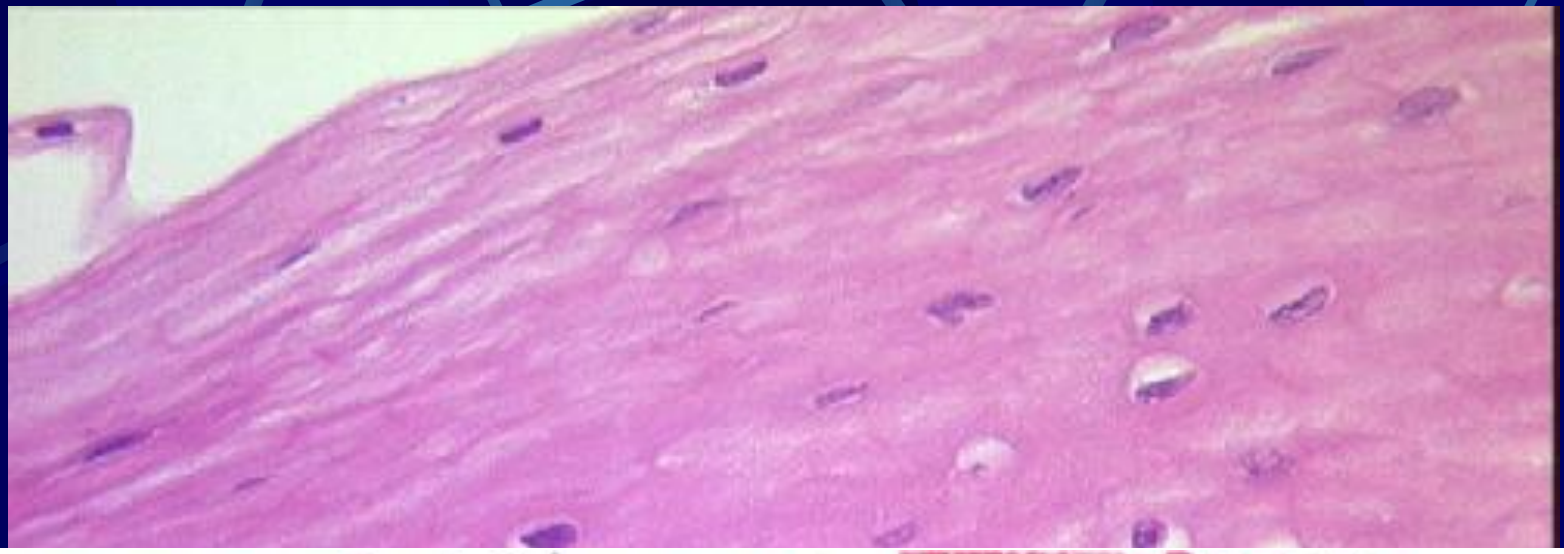
- *Loss of polarity*

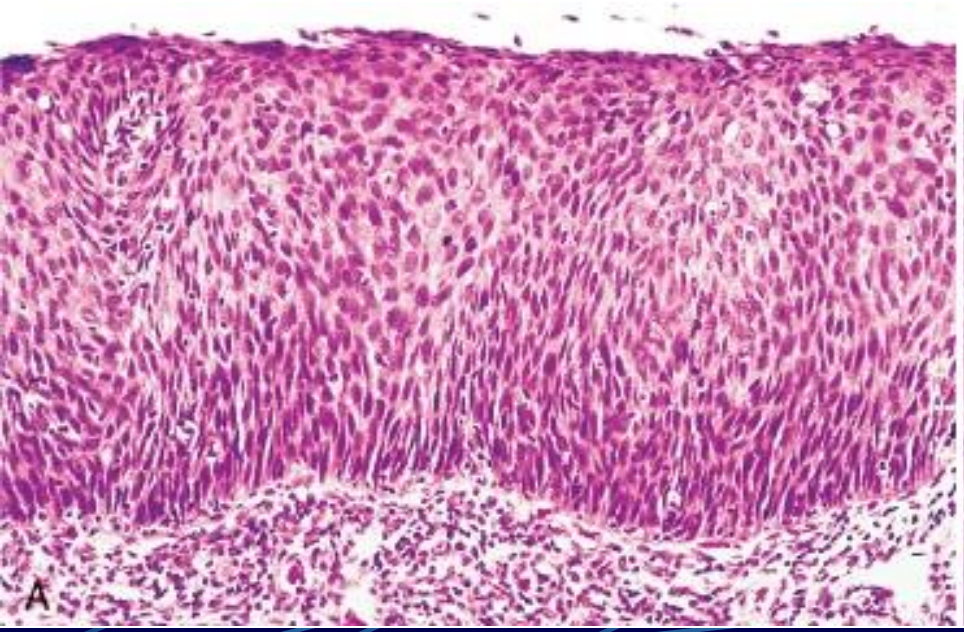


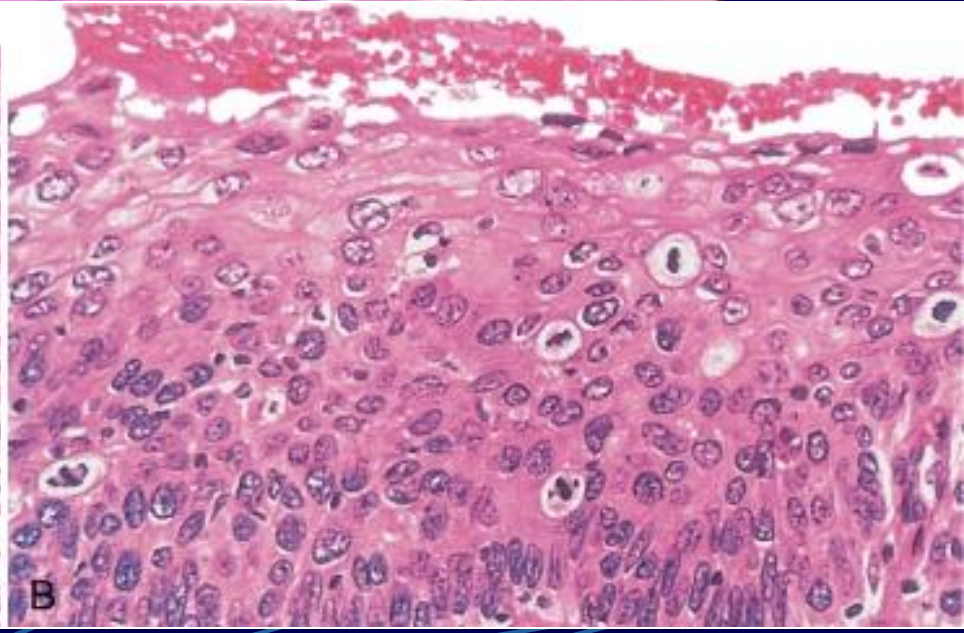
- *Tumor giant cells*

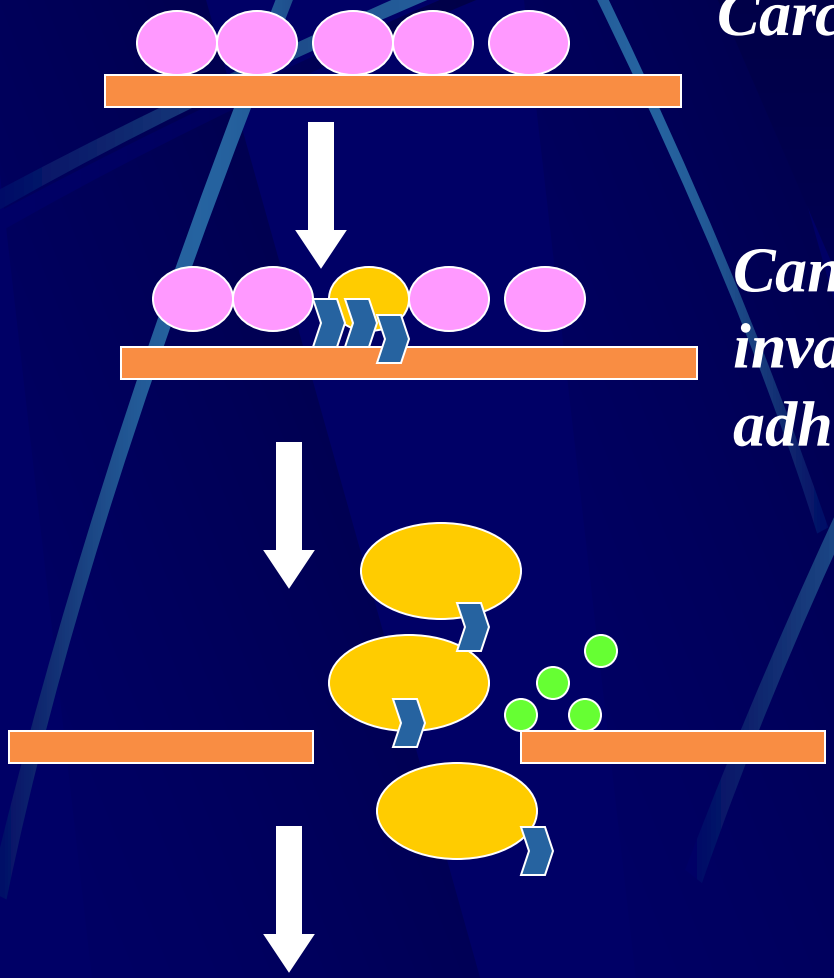


- ***Dysplasia: disordered growth***









Carcinoma in situ

Cancer cell becomes capable of invasion (expresses surface adhesion molecules)

Tumor cells release proteolytic enzymes, disruption of ECM

Invade ECM

- *Malignant tumors:*

1. *Malignant change in target cell-transformation*
2. *Growth of transformation cells*
3. *Local invasion*
4. *Distant metastases*

How do neoplastic cells differ from normal cells?

Alterations in growth control

- *proliferation*
- *cell death*
- *factors regulating growth and response*

Alterations in cellular interactions

- *cell-cell*
- *cell-stroma*

Differences between Benign and Malignant neoplasms

Benign	*Malignant*
Structural differentiation retained	*Structural differentiation shows wide range of changes*
Organised	*Not organised*
Functional differentiation usually	*Functional differentiation often lost*

Causes of Cancer

Environmental

- ***Chemical: aromatic hydrocarbons (smoked meat, cigarettes), azo dyes (bladder), aflatoxin (liver), asbestos (mesothelioma)***
- ***Radiation: UVB and UVC***
- ***Viral: HPV (16,18, 31, 33, 35, 51), EBV (Burkitt), HBV, HTLV I***

- *Age: >55y*
- *Hereditary: 5-10%*

Gene	Inherited predisposition
RB	Retinoblastoma
P53	Li-Fraumeni syndrome
p12INK44	Melanoma
APC	Familial adenomatous polyposis colon CA
NF1,NF2	Neurofibromatosis 1 &2
BRCA1, BRCA2	Breast and ovarian tumors
MEN 1, RET	Multiple endocrine neoplasia 1&2
MSH2, MLH1, MSH6	Herditary non polyposis colon CA
PATCH	Nevoid BCC syndrome
Familial CA: Breast, ovarian , pancreatic	
Inherited AR syndromes, defective repair Xeroderma pigmentosum Ataxia-telangiectasia Bloom syndrome Fanconi anemia	

Effects Of Tumor On The Host

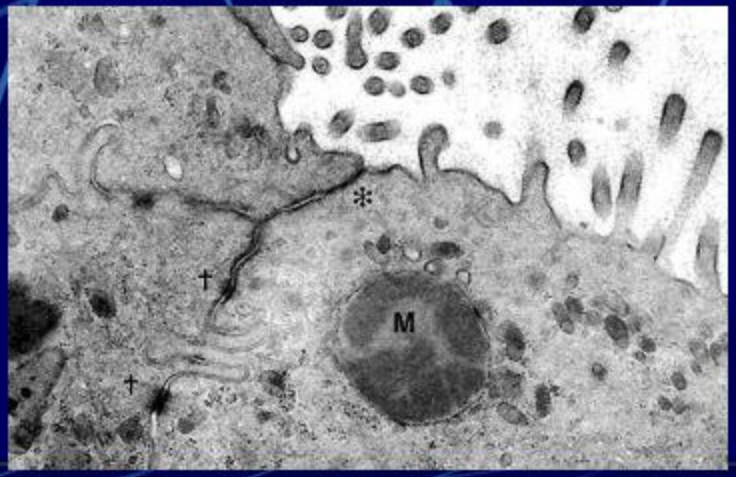
- *Local and hormonal effects*
- *Cachexia: loss of body fat and lean boy mass with profound weakness, anorexia and anemia. IL1- TNF α*
- *Paraneoplastic syndromes: sx cannot be explained by local or distant spread, tumor elaboration of hormones.*

What Are The Final Complications Of Malignancy (Causes Of Death)

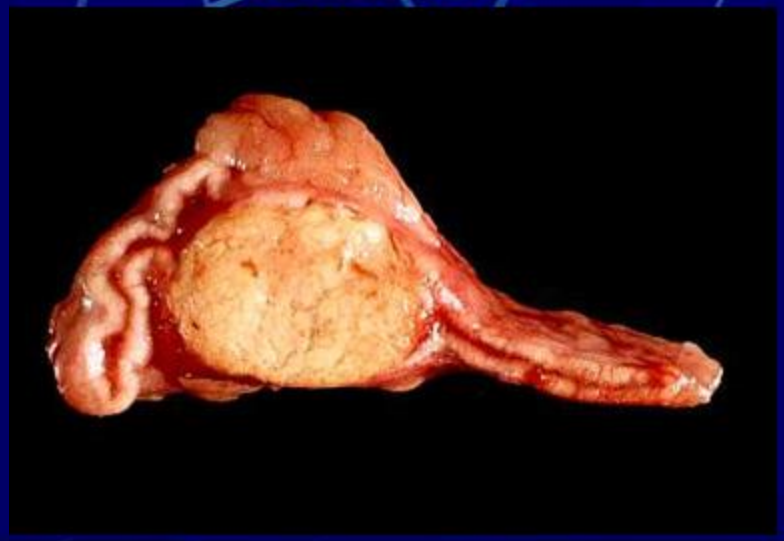
- *Pneumonia*
- *Cachexia*
- *Renal Failure*
- *Bleeding*
- *Severe Anemia, Throbocytopeina*
- *Infections*
- *Hypercoagulability*
- *DIC*
- *Pain more of devastating symptom than a complication…has to be controled*

Malignant cervical Pap smear

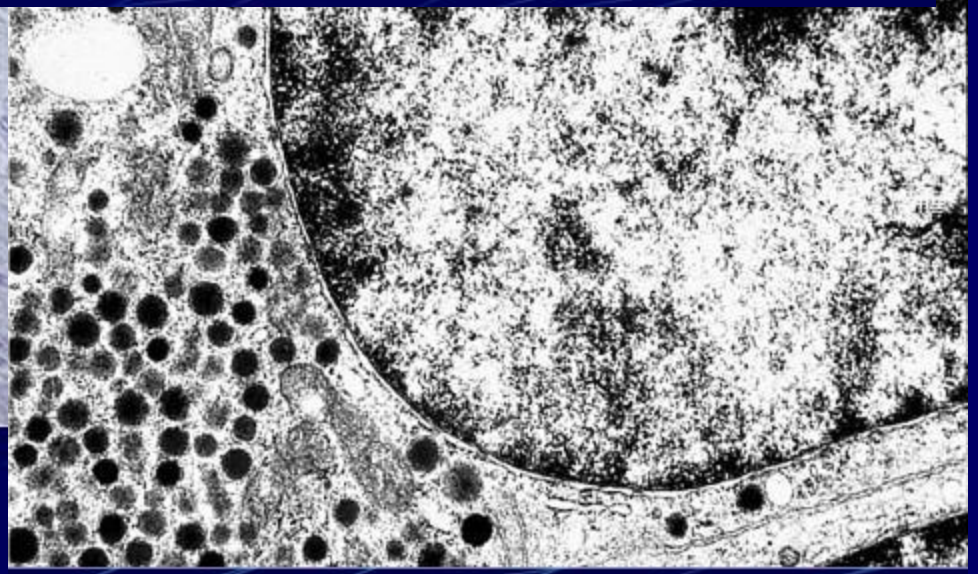
EM: microvilli, tight junction in an adenocarcinoma



adenoma



- *MOLECULAR BIOLO CYTOGENETICS*
- *MOST IMPORTANT, SCREENING*



Biochemical assays

- *tumor markers: sometimes diagnostic or prognostic*
- *can be helpful in monitoring effectiveness of therapy or in detecting relapses/recurrences*

some serological markers associated with malignant tumors

HCG	Chorio carcinoma
AFP	hepatocellular carcinoma
calcitonin	thyroid medullary carcinoma
prolactin	pituitary adenomas
CA 125	ovarian carcinoma
PSA	prostate carcinoma
chromogranin A	endocrine neoplasias

Treatment

- *Surgery*
- *Radiotherapy*
- *Chemotherapy*
- *Immunotherapy*
- *Hormontherapy*
- *Gene therapy*

summary

- *neoplasia- an abnormal mass of tissue which has lost its responsiveness to growth controls*
- *benign neoplasms tend to be slow-growing, well-differentiated tumors which lack the ability to metastasize*
- *benign neoplasms, in general, remain localized and are amenable to surgery*

summary

- *malignant neoplasms tend to be fast-growing lesions which invade normal structures*
- *malignant neoplasms vary in the degree of differentiation and some show anaplasia*
- *malignant neoplasms are capable of metastasis*

summary

- *The prognosis of a patient with any type of neoplasm depends on a number of factors including: the rate of growth of the tumor, the size of the tumor, the tumor site, the cell type and degree of differentiation, the presence of metastasis, responsiveness to therapy, and the general health of the patient.*

Thanks.....