Principles of Surgical Oncology

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Notes , IMP!

Types of Tumors:

- Benign
- Malignant : 2 main types :

✓ **Carcinoma** :arise in the epithelial tissue **ex**: Adenocarcinoma of the stomach , transitional cell carcinoma of the bladder, squamous cell carcinoma of the skin , follicular carcinoma of the thyroid.

✓ **Sarcoma** :in the connective tissue **ex**:, lipoma(Benign), liposarcoma (Malignant), Fibroma(Benign) Fibrosarcoma (Malignant), Myoma (Benign),myosarcoma (Malignant), *Rhabdomyosarcomas* are tumors of the skeletal muscles, *Leiomyosarcomas* are smooth muscle sarcomas.

- Teratoma
- Hamartoma

Teratoma and Hamartoma share that all of these conditions are types of different cell growth disturbances **"tissues arranged haphazard"** ملخبط

The differences b\w them?

1- Main difference: that many of the Teratoma tissues not usually present in that organ But tissues in the hamartoma already percent in the organ.
2- Teratoma have the potential to become malignant .
3- Teratomas derived from embryonic cells "totipotential cell" that capable of developing into any variety of body cells.
4- Examples :
    - ✓ Hamartoma: **Angiomyolipoma of the kidney which "**composed of blood vessels, smooth muscle cells and fat"
    - ✓ Teratoma : **dermoid cyst of ovary** " is a cystic teratoma that contains developmentally mature skin complete with hair follicles and sweat glands, hair, bone ,cartilage, which not found in the ovary normally. "

- Benign growth is controlled but malignant growth is uncontrolled that's why it can invade the same organ, go to adjacent organs, go to lymph or blood "metastasis" .For example cancer in lung goes to brain, cancer of colon goes to lung ,cancer of prostate goes to vertebral column.

- Loss of contact phenomena in the malignant tumors IMP!.

***contact phenomena:** الخلية لما تجي عند الخلية الاخرى توقف

Important Differences IMP!:

-Benign

- Encapsulated
- No invasion
- No metastasis

-That's why in lipoma we just open skin removing it by simple excision opposite to liposarcoma when we have to remove the skin and adjacent tissues.

-Malignant

- Non encapsulated. sometimes there is capsule but " false capsule" which is a fibrous capsule from the same tissue .
- Usually invade b/c growth is uncontrolled
- Metastasis b/c growth is uncontrolled

✓ The difference b\w Metastasis and direct invasion IMP! :

- Direct invasion: tumor enlarge to invade the adjacent organ with continuity of primary tumors . EX) bladder cancer goes to colon or uterus.
- Metastasis: tumor invades other organ with discontinuity of primary tumors.

Tumor Grading & Differentiation:

- Grading: Describes the <u>histologic characteristics of cancer cells</u> mainly talk about cell layers IMP!.

e.g. grade I, II, III.

- Differentiation: Describes the characteristics of cancer cells in reference to their <u>resemblance to the cell of origin</u> IMP!.

-The cell usually differentiate from being "blast" in beginning till it becomes "cyte", if u see blast means still growing, if we see "cyte" closed to mother cell الخلية الأم الرئيسة ☺

e.g. - well differentiated ex: if we found an enlarged lymph node but we did not know the origin then we send it to the lab the result show well differentiated tumor like colon cells ! but if it poorly differentiated or anaplastic the pathologist will say , well it's metastasis cancer but I cannot tell u what's the origin .

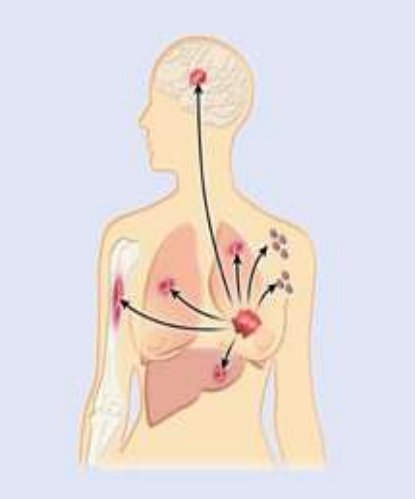
- moderately differentiated

- poorly differentiated : the more poorly differentiation of cancer, the worse the cancer and malignancy b/c it indicates that the cancer is rapidly growing with no time to be differentiated.. also most of them are more Susceptible to chemotherapy agent b\c it weak due to rapid development and growth. > لسى ما استفوت:p

- anaplastic

- Both describe the histological features of the tumor.

IMP To differentiate b/w Grading , Differentiation and Staging!



Spread of Malignant Tumor

- **Local invasion:**
  - within the organ
  - adjacent organs ex: tumor in the stomach can go to the duodenum, OR tumor in kidney can go to posterior abdominal wall, OR bladder cancer does to colon, uterus, lateral pelvic wall .
- **Metastasis :**

-In general, the most organs that got metastasized is liver, lung and bone, however each tumor has its own places where they love to metastasize .

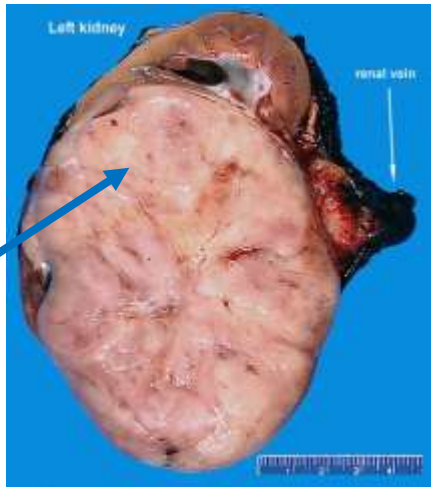
-But the brain is rarely metastasized due to presence of BBB and can be metastasized from bronchogenic carcinoma.

- Lymphatic : Regional & distant lymph nodes.
- Haematogenous e.g. liver, lung, bones.
- Transcoelomic e.g peritoneal & pleural cavity "body fluids" > When cancer cell reach the serosa or fascia which cover the organ and then goes to the fluid " sometimes call it carcinomtosis"

- " يكون حبيبات منتشرة بالبطن"

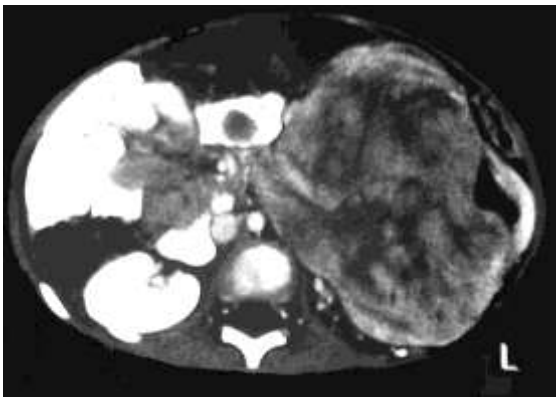
- e.g (stomach cancer metastasis to ovary although there is no anatomical relation between ovary and stomach "lymph or bl. Vessel or direct" > We call it **Krukenberg tumor**)

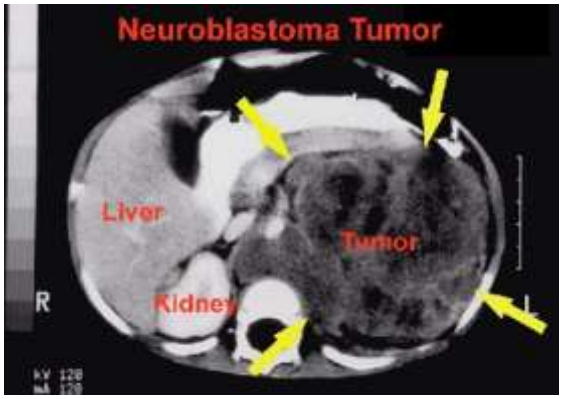
- Implantation e.g. needle tracks, wounds. Very rare> لو لم تكن الإحتمالية ضعيفة لما استخدم needle biopsy to diagnose tumors :)



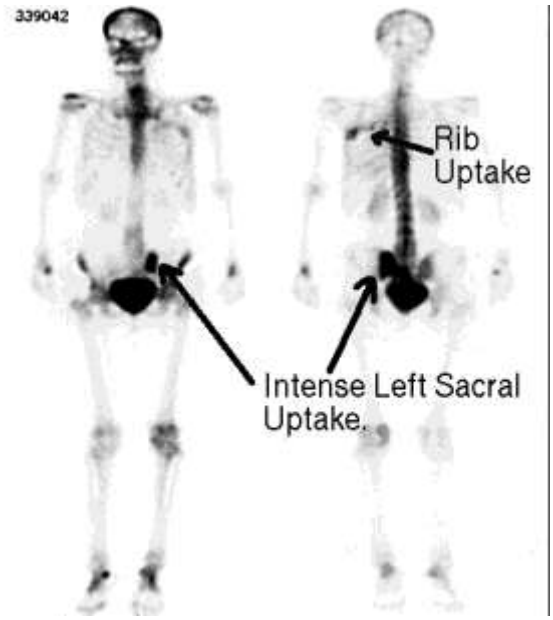
False capsule :)

Local invasion

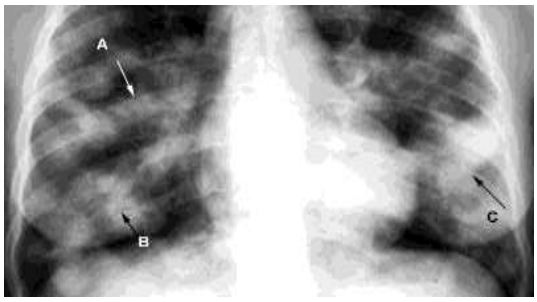




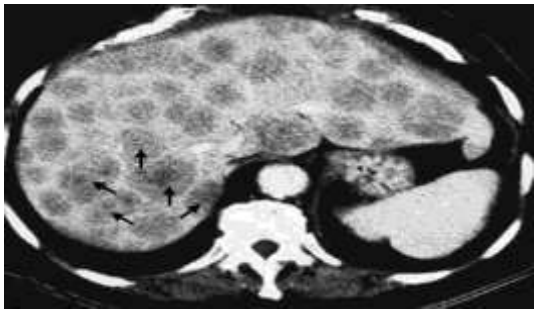
Distant Metastasis:



Black areas: Hot spots in bone scan indicate metastasis



Cannonball metastasis



Tumor Staging

Staging:

describes the primary tumor, the relation of the primary tumor with the organ of origin, with the adjacent organs and with the distant organs and lymph node.

Types of Staging:

Classical staging : e.g. stage I and II =confide to organ

III =direct invasion

IV= metastasis

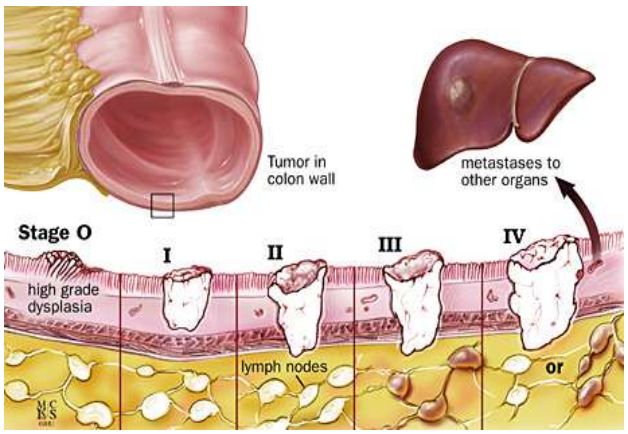
TNM Classification more specific:e.g. T1, No, Mo

T – Tumor : T1,2,3…., Tis, Ta, Tb….

N – Node : N0, 1, 2, 3 ….

M – Metastasis : M0,1,2,3…

Duke classification for colon cancer only > اختبار الزمن
D: اثبت جدارته



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

- **These are only examples, no need to memorize just to know what is the meaning of classical , TNM staging !**

Why Do We Stage Malignant Tumors?

- To decide the treatment (treatment for primary tumor is differ from secondary ,localized is differ from metastasis , for example, renal cancer that metastasize to other organ and the doctor decide to do nephrectomy .. did he benefit the pt? NO)
- To plan the treatment (b/c the treatment of tumors are multimodality , if the patient needs surgery only or with chemotherapy , Radiotherapy and duration according to patient case) "sometime they refer to tumor board to plan the treatment" (surgery, radiotherapy, chemotherapy)
- To assess the prognosise.g if we have patient with localized kidney tumor and patient with metastasized kidney, the second patient had poor prognosis

"Our expectations, according to Statistics but not necessarily applied to the patient himself " So When we talk about certain tumor and its high percentage for bad prognosis this is a statistical study for population but when we talk for a person, s/he has 50% for having bad or good prognosis .

Whenever you deal with malignant tumor, always remember that there is primary tumor & there may be secondries (presentation, investigation, treatment).

- **Presentation of Malignant Tumors** (different from organ to organ but general characteristic) **:**

✓ Asymptomatic incidental finding (for exampleU/S for other problem then detect tumor)
✓ Symptoms related to the primary e.g bleeding per rectal or intestinal obstruction for colon cancer , OR Dysphagia for esophageal cancer , OR Hematuria for bladder tumor , OR Hemoptysis for lung cancer .
✓ Symptoms related to the secondaries e.g 60 y/o female had sudden low back pain with the investigation she had breast cancer ,Hemoptysis when do x-ray they find metastasis from other site.
✓ Incidental finding
✓ Weight loss and Cachaxia are late manifestations of most of tumor if pt had advanced tumor of most malignant tumors except GI because it interferes with digestion and absorption (highest level of tumor "ex. Esophageal " more clear than stomach, and stomach more clear than lowest level "colon carcinoma" b\c it's the way for food and Lung cancer (bronchogenic carcinoma)

So remember Weight loss and Cachaxia are late manifestations except in GI and lung cancer IMP!

Investigation of Malignant Tumors:

✓ **Investigate for the primary**

- For primary we have to define histological feature.
- 99% of cases we have to know (tissue diagnosis (to determine tumor type)
    - 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** >> Accordingly, the treatment plan will be determined

- Treating Malignant tumor expose the pt to big surgery, dangerous chemotherapy or troublesome radiotherapy, So make sure that it is a malignant then the define the type of this tumor (each malignant has specific way to treat)

How we define the histology:

✓ **Cytology :** morphology of individual cells.

-Exfoliative (urine,sputum,….) the epithelial layer Multiply and the superficial cells falling down so try to collect & get benefit from it "without any effort from doctor "as in sputum or urine sample" .

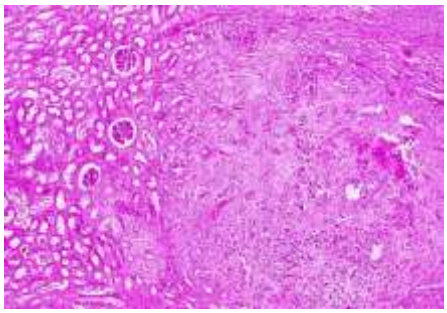
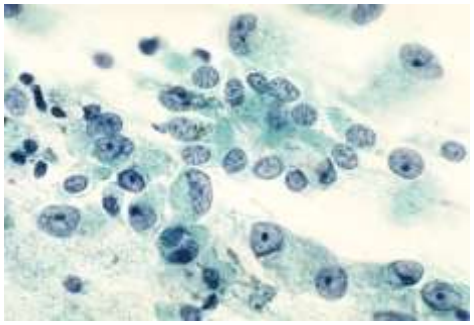
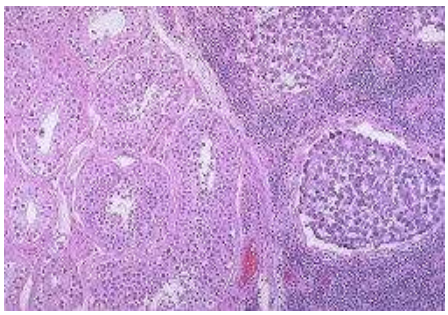
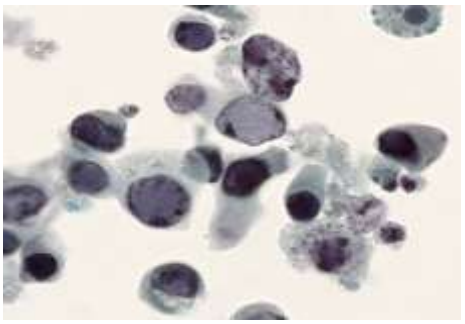
-Fluid aspiration (ascitic fluid,pleural fluid) acidic fluid or plural effusion draw out and send to cytology

-Fine needle aspiration (FNA)- very common nowadays-: in solid tissue and draw out cells, then stain the cells in slide and look under microscope for any malignant cells .

✓ **Biopsy :** histological (tissue) characteristics

- -Incisional biopsy (open, needle, forceps..) Eradicate part of tumor
  many way to take it:
  1) like the ulcer take a small sample by knife then send it to histology
  2) needle eg:if having breast cancer for example under x-ray, US or CT control
  3) gastroscope : if we Suspect gastric ulcer is malignant OR colonoscope
- -Excisional biopsy : Eradicate the whole tumor that we see (ex. In lymph node)

- tricot needle biopsy two needle between them groove, first insert the inner part then the upper part the biopsy will become in between.

- the difference b/w benign and malignant cells :

malignant cells characterize by deeply stained nuclei (darker) ,divide nucleus and large in size in comparison to cytoplasm, and the shape of cells not identical (polymorphism), the cells in different stages of growth.

Tumor Markers:"وبالنجم هم يهتدون "

- Substances which if present in the blood or tissue fluid may indicate malignancy.
- Most of markers are cells from normal cells or malignant cell (primitive)
- The concept is very important ,, why? b/c if the tumor markers was specific ,,we will take blood or tissue sample & if it's **+** ,, that's mean he has cancer ! but the truth is the tumor markers are non-specific.
- Most are non-specific (not enough for diagnose)
- Important in diagnosis (general finding & tumor markers ,, then we can diagnose) e.g. patient with testicular tumor "clinically" r and found the tumor marker was high ,, so the patient has teratoma not seminoma
- Important in follow up e.g. patient has testicular tumor and high **α** –fetoprotein,, after remove the tumor,, **α** –fetoprotein decrease . if after 6 month the **α** –fetoprotein return high ,, that's mean recurrence of tumor.
- Important for screening (The early detection, incidence of disease) e.g.male over 40 years old do PSA. Also female in specific age do mammogram, pap smear For cervix.
- Examples: CEA, PSA, **α** -fetoprotein, HCG

- Tumor marker not just in blood, could be present in tissue and now some time the pathologists when they examine tissue under microscope they don't reach the type of tumor so they the pathologists use histochemical stain for specific tumor marker in tissue, then we can determine type of tumor.
- In patient with high PSA but in histology we don't find any tumor " false positive"
- Patient have cancer but PSA was normal "false negative"

The dr. said: Examples are just for more explanation !

Hormones & Cancer:

- ✓ **The cancer for two organs related to hormones:** breast & prostate
- ✓ **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
  - e.g. in breast cancer ask the histologist to find any estrogen receptor, that's will affect in treatment plan and prognosis.
  - also prostate need testosterone to live,, so if we stop testosterone secretion like by drugs ,, the tumor will stop (this concept used in treatment)
- ✓ **Hormones may be produced by tumors:**
  - Originally hormone producing organ e.g. adrenals (cushing…)
  - Originally non hormone producing organ e.g. lung (bronchogenic carcinoma)