



Introduction to Hematology/Oncology

Objectives:

- Aim at a better understanding and knowledge of oncology
- To appreciate the importance of the concept of multidisciplinary approach in cancer treatment.
- Be able to identify strengths, deficiencies, and limits in knowledge and needed expertise to practice oncology.

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Resources: 435 team + Davidson + kumar + Recall questions step up to medicine.

- [Editing file](#)
- [Feedback](#)



Defining Cancer

Claims that cancer is only a ‘modern, man-made disease’ are false and misleading, this is not only scientifically incorrect, but misleading to the public and cancer patients. Cancer has always been with us, from ancient civilizations to today.

Definition:

Cancer is an abnormal cellular division inside the body: **cancer is uncontrolled cell growth “neoplasm” and not every neoplasm is cancer since some are benign (neither invasive nor metastatic).**

- 1- Escaped the host control
- 2- **With loss of functions**
- 3- Ability to invade local tissues.
- 4- Ability for distant spread to other parts of the body through the blood and lymphatic systems ie; metastasis

Types of tumors:

Not all tumors are cancerous; tumors can be **benign or malignant**.

The rule is: If you find a type of tissue that should not be there, for example: epithelial cells in the brain or leukocytes in the breast it’s a neoplasm until proven otherwise. Even if the cells (in this example epithelial cells/ leukocytes) look normal.

- Benign tumors: Cells in benign tumors do not spread to other parts of the body.
- Locally malignant : have the ability for local invasion
- Malignant tumors: Cells in these tumors can **invade nearby tissues and spread to other parts of the body.** (Liver, Lung, Bones, Brain)
- **Some cancers do not form tumors (Masses).** For example, leukemia is a cancer of the bone marrow and blood.

Defining Cancer:

- Primary Tumors

Represent de novo (starting from the beginning) tumors in their initial site.

- Metastatic Tumors

Originate from the distant growth of the primary tumors. when the original tumor is in one place and some of its cancerous cells have spread to another organ.

- Unknown primary

When you have a metastatic tumor without identifying a primary after the basic work up.

You can't tell where is the primary organ and from where the cancer has originated.

Categories of malignant disorders:

1. Liquid malignancies

- a. Myeloproliferative disorders = acute myeloid leukemia (Acute and Chronic)
- b. Lymphoproliferative disorders = acute lymphatic leukemia (Acute and Chronic)

2. Solid malignancies: a- epithelial (Carcinoma) b- connective tissue (Sarcoma)

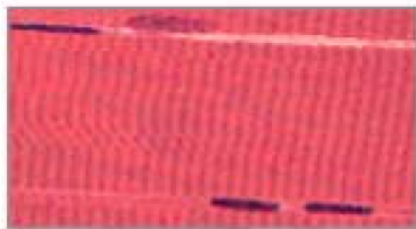
Four types of tissue



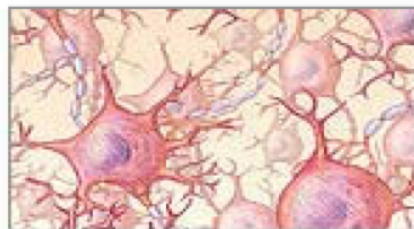
Connective tissue



Epithelial tissue



Muscle tissue



Nervous tissue

Solid malignancies

Epithelial tissues

Connective tissues

Surface glandular

Bone Soft tissues

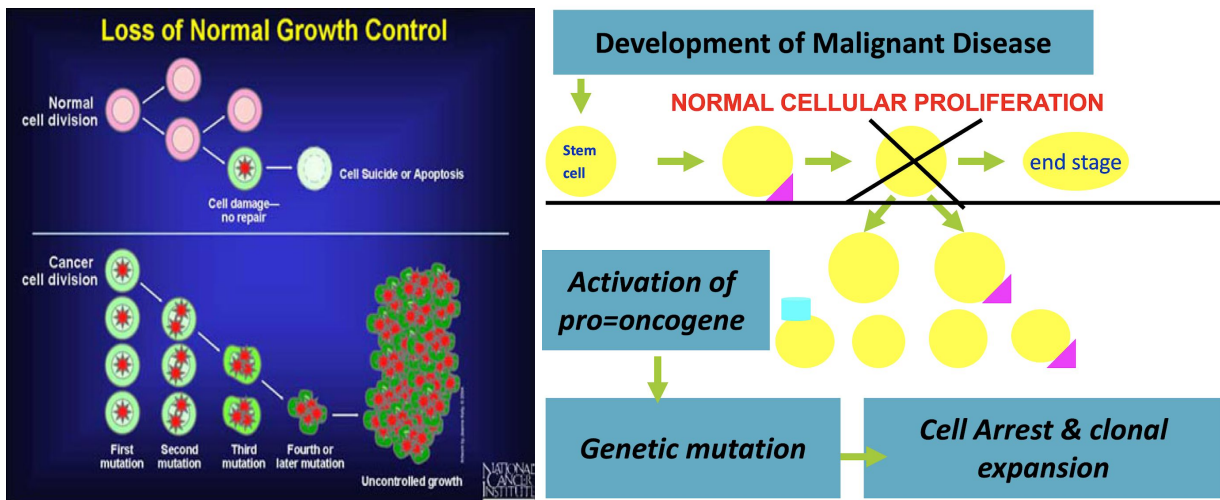
Carcinoma

Sarcoma

- carcinoma: a- squamous cell b- adenoma
- Neurons, cardiac muscles, and skeletal muscles, don't multiply; chances for mutations that lead to malignancies in them is less than the proliferative-type cells.

What causes cancer?

Mutations in the DNA (but not necessarily; the defect can happen anywhere during the proliferative process, for example: messenger DNA)





What causes cancer?

Cancer arises from the mutation of a normal genes (proto oncogenes).

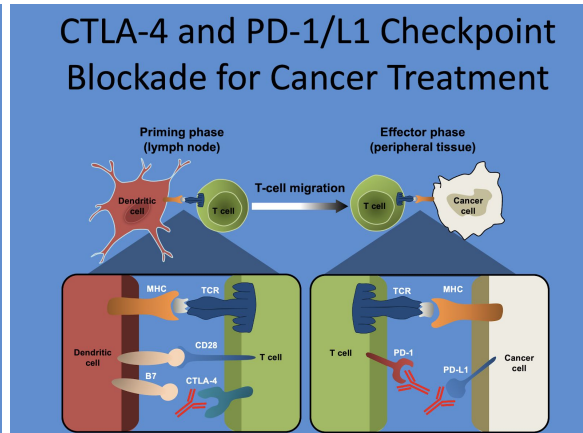
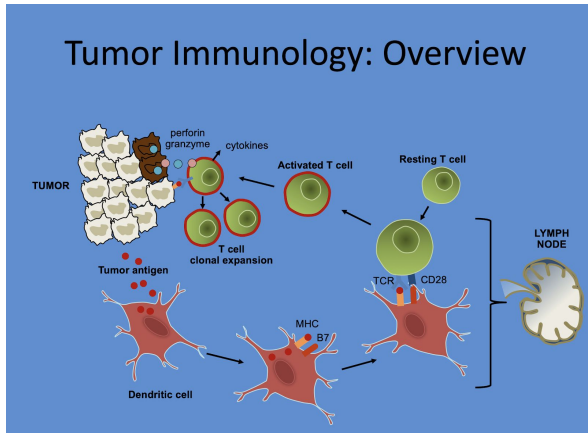
Mutated genes that cause cancer are called oncogenes.

does every defect in the DNA causes cancer? No, since the body can destroy and fix these abnormal cells before it reaches the uncontrolled level with the help of t-cells and other tumor suppressor genes.

Mutation of tumor suppressor gene will predispose to cancer

Causes of cancer or DNA mutation:

- DNA Mutations
 - Radiation usually affected by this – and other environmental factors (Tobacco, Alcohol, Radon, Asbestos, UV etc)
 - Random somatic mutations
 - Inherited germline mutations
- Genetic predisposition
 - Rb, p53, APC, CDKN2A, BRCA1, BRCA2
- Infectious agents
 - Viral
 - HPV – cervical cancer, head and neck tumors (oropharyngeal cancer)
 - Hepatitis – liver cancer
 - *EBV - Lymphoma*: the virus attacks the DNA and by chance it happens to be in the area of cell proliferation, thus causing uncontrolled proliferation (it happens only if the virus was inserted in the region that controls cell proliferation)
 - *HIV* – causing kaposi's sarcoma (indirectly, what causes it actually in **HHV8**) or non Hodgkin lymphoma (special type in the brain; primary brain lymphoma).
how does it happen? by suppressing immunity → suppressing the t- cells (which has an important role in controlling malignant cells) → making the body liable to certain types of tumors; kaposi's sarcoma)
 - Bacterial
 - *H. pylori* – *stomach cancer*: through recurrent infection → suppressing immunity → defect in the tumor suppressor genes (p53, APC)



- In most malignancies, for example melanoma, t-cells are present and not deficient, but they aren't functioning. why? because they are blocked by cancer cells. So, a new way of therapy is by removing the blockage via antibodies against the blocking agent.
- The figures are **important**.

If you decided to be an oncologist what should you know?

1. When to suspect cancer?
2. How to diagnose cancer?
3. What the essential work up for staging?
4. How to treat cancer?
5. What is the prognosis of your patient?

1- When to suspect Cancer?

Cancer Signs and Symptoms:

- Cancer gives most people no symptoms or signs that exclusively indicate the disease.
- Unfortunately, every complaint or symptom of cancer can be explained by a harmless condition as well.

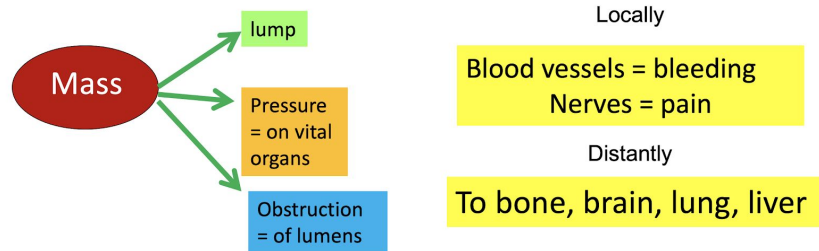
What are the clues???????

- Persistent: continuous symptoms that doesn't disappear. if the patient complains of intermittent pain consider another diagnosis. But this doesn't exclude the possibility of cancer since every rule has an exception in medicine.
- Progressive
- Disabling: interference with daily activities.

Think about the pathology and site: For example if you have bladder cancer you will have hematuria, if you have colon cancer you will have obstruction, lung cancer gives u hemoptysis and so on...

Also think about the mass effect itself which usually causes OBSTRUCTION/COMPRESSION!

- Mass that is able to invade locally and spread distantly



Cancer is a systemic disease:

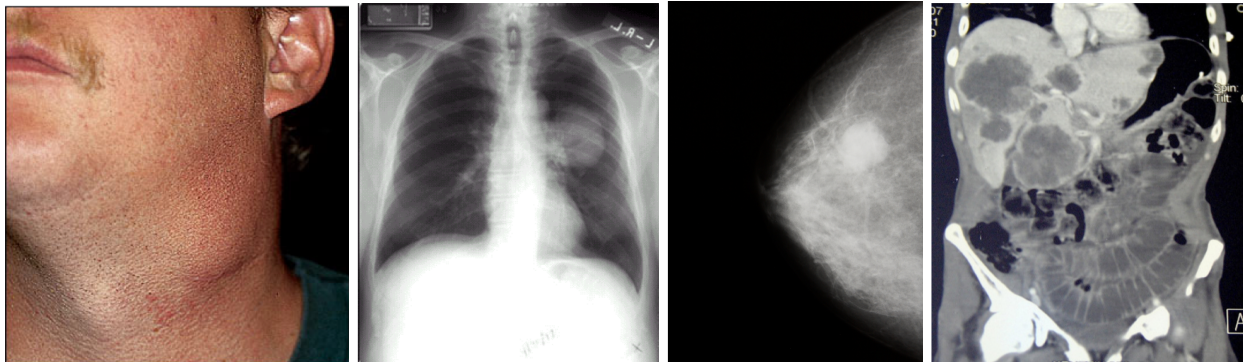
Don't forget the constitutional symptoms:

- Fatigue
- Fever
- Sweating
- Weight loss

2- How to diagnose cancer?

CANCER DIAGNOSIS

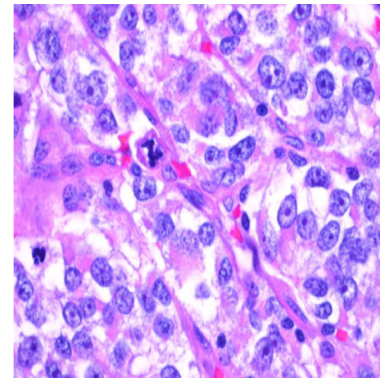
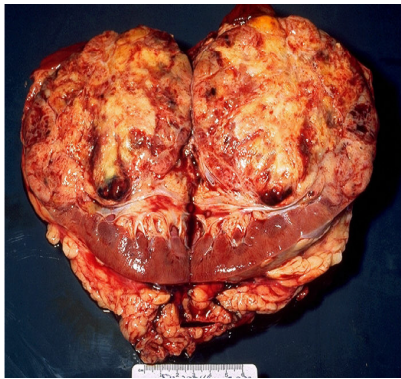
- Is **NOT** a clinical diagnosis
- It is **NOT** a radiological diagnosis
- It is **NOT** serological diagnosis
- It is a **pathological diagnosis**
- It is a **tissue diagnosis**



Efforts to get tumor tissues for pathological Diagnosis:

- Surgical biopsy
- Interventional radiology
 - FNA (fine needle aspiration) --- TRUE CUT

GROSS AND MICROSCOPIC PICTURE OF RCC:



3-What is the essential work up for staging?

T = Tumor N = Node M = Metastases

- Clinical TNM
- Radiological TNM
- Pathological TNM

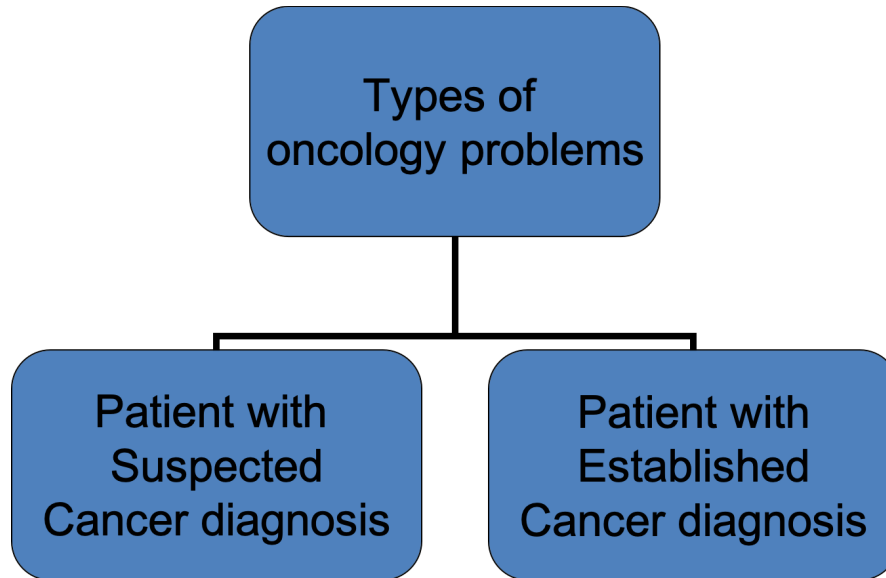
- Radiology:
 - XRAY
 - MRI
 - CT
 - US
- Surgical staging

Stage	Level of involvement
Tumor	
T1	Limited to mucosa and submucosa
T2	Extension into but not through muscularis propria
T3	Invasion of perirectal fat
T4	Invasion of adjacent structures
Nodes	
N0	No involved lymph nodes
N1	Fewer than four regional nodes involved
N2	More than four regional nodes involved
N3	Distant nodes involved
Metastasis	
M0	No metastasis
M1	Distant metastasis

The picture of staging is EXTRA

4- How to treat cancer?

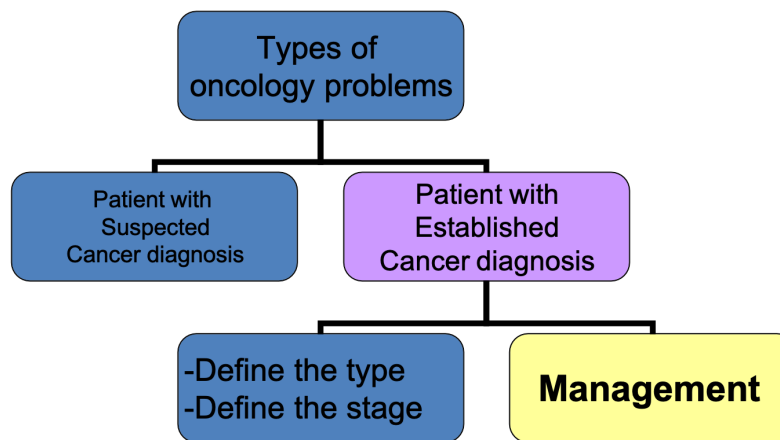
One good thing about cancer is many are curable and preventable.



Patient with suspected cancer diagnosis:

Answer the following questions:

1. Does the patient have cancer?
2. What type of cancer?
3. What stage of cancer?





Different Treatment Modalities:

- **Local therapy:**
 - Surgery & Radiotherapy

- **Systemic therapy:**
 - Chemotherapy
 - Hormones
 - Biologicals

Categories of malignant disorders:

- **Liquid malignancies**
 1. Myeloproliferative disorders: leukemia
 2. lymphoproliferative disorders: lymphoma

Systemic therapy

- **Solid malignancies**

According to stage

General staging of solid malignancies:

- **Early:**
 - local
 - +/- systemic
- **Locally advanced:**
 - local & systemic
- **Metastatic:**
 - systemic
 - +/- local

Management: vaccination and giving T cells is failure, bcz its blocked by the tumor.

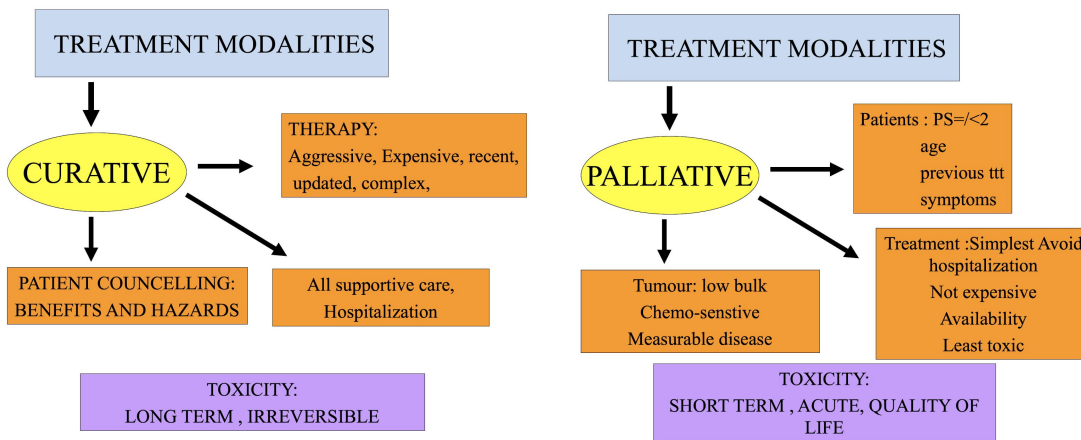
Multidisciplinary:

- Surgery
- Radiation
- Medical Oncology
- Other Disciplines:
 - Radiology, Pathology, Lab
- Combined clinics
- Tumor board

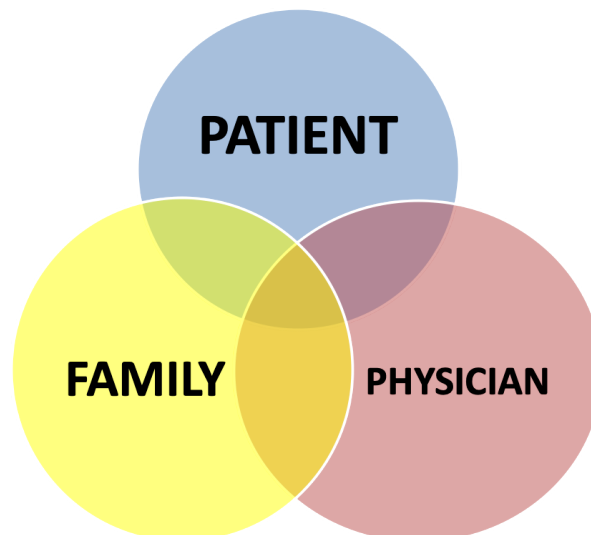
In general the Rx methods are: surgery with chemotherapy and/or radiation therapy. You may also have immunotherapy, targeted therapy, or hormone therapy.

Determine the treatment objective: Two figures are Important

- **Curative**
- **Palliative**



5- What is the prognosis of your patient?



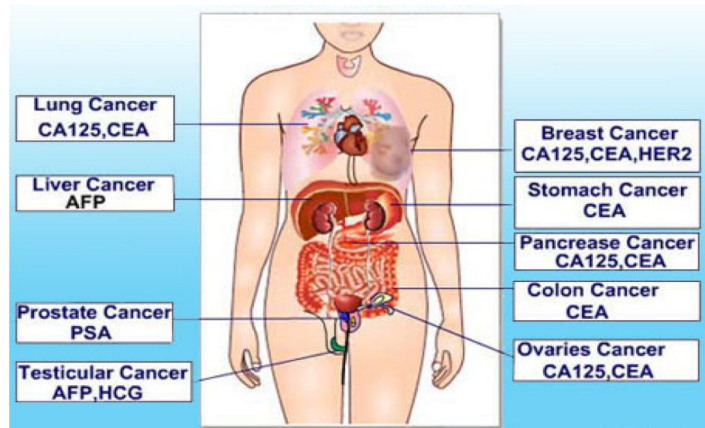
These informations are EXTRA and Special thx to surgery team <3

CEA	Colon cancer, lung cancer, breast cancer, stomach cancer, pancreas cancer and ovaries cancer
CA125	Lung cancer, breast cancer, pancreas cancer and ovaries cancer.
AFP	Testicular cancer and liver cancer
PSA	Prostate cancer
HCG	Testicular cancer
HER2	Breast cancer
CA 19-9	pancreas cancer

***remember that sometimes we use these antigens for screening AFTER treatment!!!!**

Generally, you're looking for cancer you must see the symptoms that appear in Hx and PEx. It's important to recognize few patterns of cancers and I will mention for you these:

- Colon cancer, symptoms include change in your bowel habits, Rectal bleeding or blood in your stool, Persistent abdominal discomfort, such as cramps, gas or pain, Tenesmus. **Colorectal cancer used for screening** in this case
- Lung cancer: Coughing up blood, pleuritic chest pain, Infections?
- Bladder cancer: Blood or blood clots in the urine, Pain or burning sensation during urination, Frequent urination.
- Breast cancer like skin changes nipple discharge, prostate cancer Frequent urination, Weak or interrupted urine, hematuria.
- CONSTITUTIONAL SYMPTOMS in most of them



1- Tumors that can be cured: lymphomas, leukemia, early solid tumors

2- Tumors that can have prolonged survival: Locally advanced and some of the metastatic tumors

3- Tumors that can be palliated: Metastatic solid tumors

Summary

Intro to Oncology & Hematology:

- Cancer is an abnormal cellular division inside the body **having 4 features** : Escaping the host control, loss of the tissue functions, able to invade local tissues and having the ability for distant spread to other parts of the body through the blood and lymphatic systems.

Classifications	Types of tumors:	Categories of malignant disorders:
	Defining Cancer:	
Causes of Cancer	<p>Genetic predisposition Rb, p53, APC, CDKN2A, BRCA1, BRCA2</p> <p>Infectious agents: HPV – cervical cancer Hepatitis – liver cancer EBV - Lymphoma H. pylori – stomach cancer</p>	DNA Mutations:
Clinical presentation and Diagnosis	Signs and Symptoms: depend on the site, but they usually are persistent , progressive, disabling and with constitutional symptoms.	Cancer Diagnosis: - It is NOT a clinical, radiological or serological diagnosis. - It is a pathological and tissue diagnosis. Work up for staging? T = Tumor N = Node M = Metastases
Management	<p>Treatment objective:</p> <ul style="list-style-type: none"> • Curative / Palliative <p>Treatment could be:</p> <ul style="list-style-type: none"> • Local therapy: <ul style="list-style-type: none"> - Surgery & RTH • Systemic therapy: 	<ul style="list-style-type: none"> • Early: local +/- systemic. • Locally advanced: local & systemic • Metastatic: systemic +/- local



- Cth , Hormones or Biologicals.

Questions

1. Which ONE of the following is a characteristic of locally malignant tumors?

- A. Invade locally but cannot send distant metastasis
- B. Invade locally and can send distant metastasis
- C. Cannot invade locally but can send distant metastasis
- D. Cannot invade locally and cannot send distant metastasis

2. Which ONE of the following is considered a characteristic of malignant tumors?

- A. Ability to form their own blood vessels
- B. Consuming and responding to the host growth factors
- C. High apoptotic activity
- D. Low mitotic activity

3. A 45-years old female was diagnosed to have cancer of the cervix. Which ONE of the following viruses is claimed as an etiological factor?

- A. Epstein-Barr virus
- B. Hepatitis C virus
- C. Human immunodeficiency virus
- D. Human papillomavirus

4. 66 years old male who is smoker for 35 years was diagnosed with bladder cancer. which one of the following characteristic is matching with mass effect of tumor ?

- A. Hematuria
- B. suprapubic pain
- C. Hydronephrosis and obstruction.
- D. All of them.

5. Hemoptysis, hematemesis and hematochezia, all of them are symptoms & signs of which of the following characteristics in cancer patient ?

- A. Mass effect
- B. Invade locally
- C. Send distant metastasis
- D. Both B & C



6. which one of the is not true regarding the cancer ?

- A. Every neoplasm is considered as a cancer since it is uncontrolled cell growth.
- B. The definitive diagnosis should be on pathological and tissue basis.
- C. Some Infectious agents such as EBV and HPV are known to be carcinogenic agent.
- D. A metastatic tumor without identifying a primary origin after the basic work up can be classified as Unknown primary.

Answers:

- 1. A
- 2. A
- 3. D
- 4. C
- 5. B
- 6. A