The Basic Concepts Of Cancer And Cancer Treatment

Fadi J. Zaben RN MSN
IMET2000-PAL, Ramallah
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Outline:

- What is cancer?
- Cancer terminology.
- Normal cells and cancer cells.
- Statistics (World, Palestine).
- Causes and Risk factors.
- Different types and names of Cancer.
- Cancer signs.
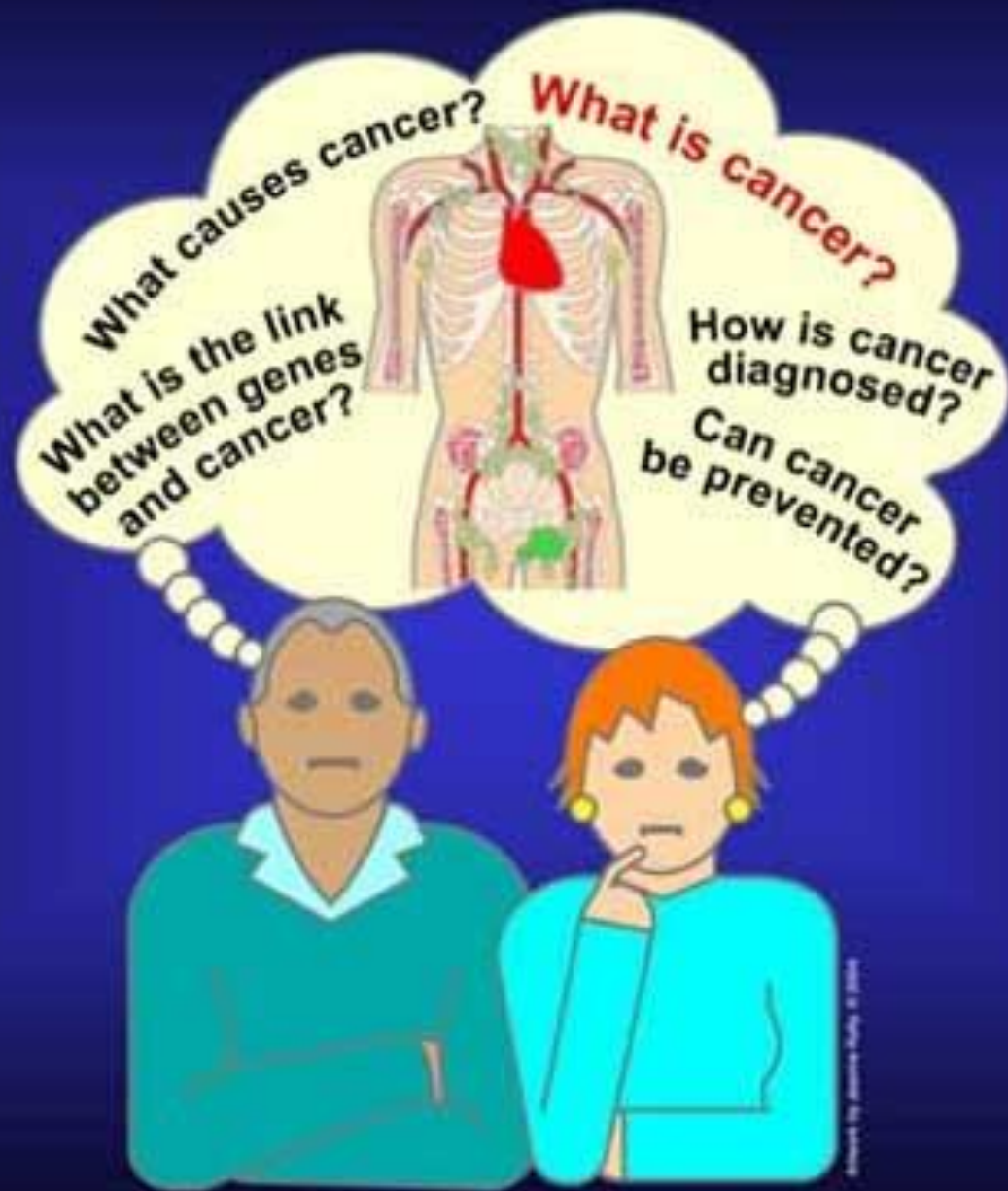- Staging And diagnosis of cancer.
- Treatment.

What is Cancer:

- It is difficult to imagine anyone who has not heard of this illness.

- Most people have been affected because either they or their loved ones or friends are cancer survivors.

- Because cancer is so prevalent, people have many questions about its biology, detection, diagnosis, possible causes, and strategies for prevention.

……..What is Cancer?

- Cancer from Greek = meaning "Crab".

- Cancer= malign tumor.

- Tumor = " any swelling" = neoplasm= " A neoplasm is a heritably altered, relatively autonomous growth of tissue".

- Arises from a change in one single cell.

- Can occur in nearly all tissues in the body.

- Leads to death untreated.

……..What is Cancer?

- Cancer is the rapid creation of abnormal cells that grow beyond their usual boundaries, and which can then invade adjoining parts of the body and spread to other organs.

- This process is referred to as metastasis.

- Metastases are the major cause of death from cancer.

- There are many types of cancer as there are different types of cells in the body (over 100 types).

Cancer Terminology:

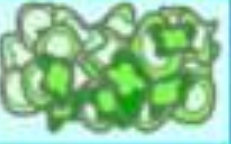|	
Cancer	A malignant tumor that has the ability to metastasize or invade into surrounding tissues.
Tumor	A general term for an uncontrolled growth of cells that becomes progressively worse with time. Tumors may be benign or malignant.
Neoplasm	Same as a tumor
Neoplasia	The growth of new tissue with abnormal and unregulated cellular proliferation.
Benign Tumor	A tumor that does not metastasize or invade surrounding tissue.
Malignant Tumor	A tumor that has the ability to metastasize or invade into surrounding tissues *(Same as cancer)*.
Metastasis	Ability to establish secondary tumor growth at a new location away from the original site
Carcinogenesis	The production of a carcinoma *(epithelial cancer)*. Sometimes carcinogenesis is used as a general term for production of any type of tumor.
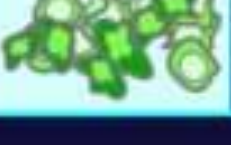
Normal and abnormal cell growth:
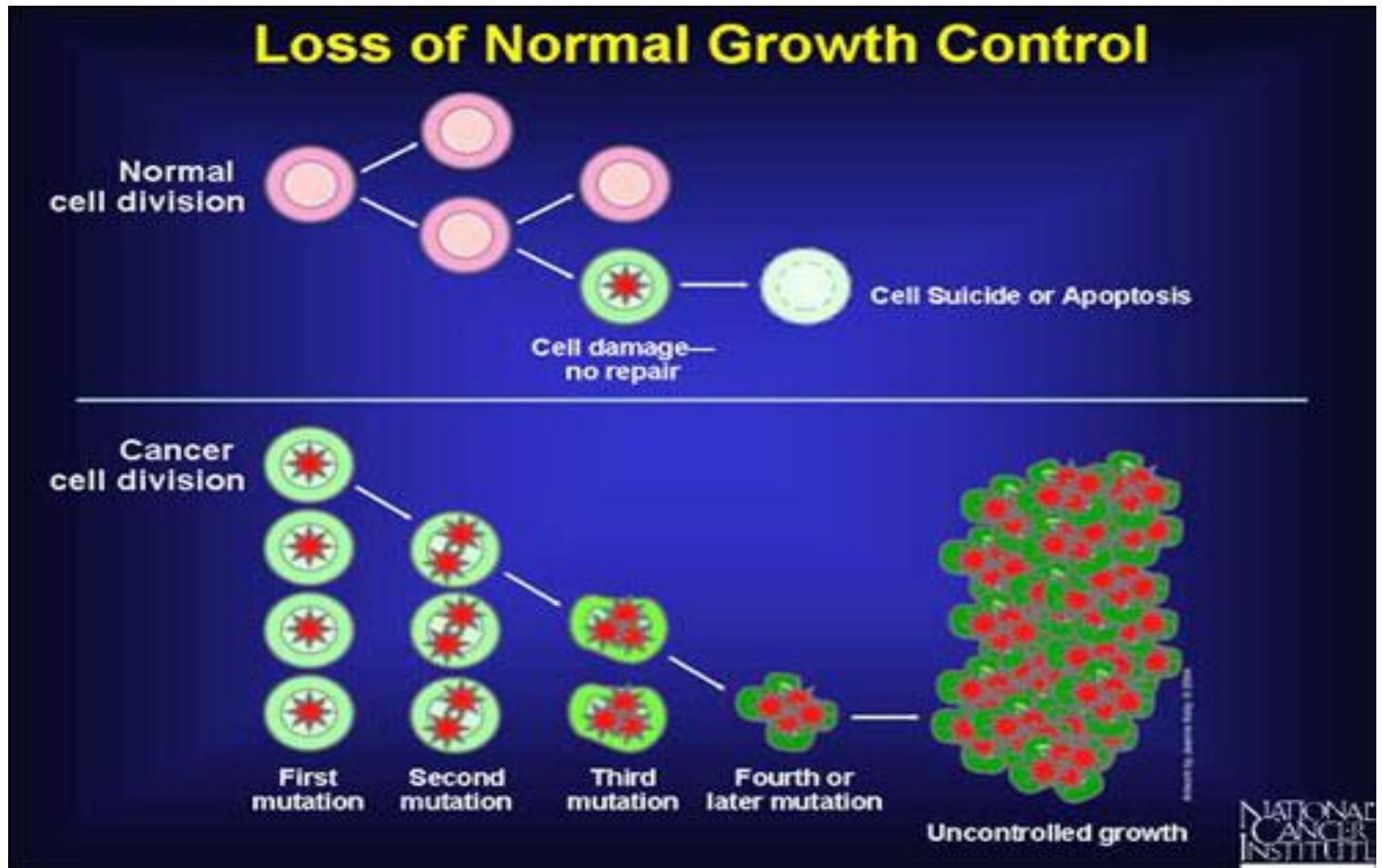
What are the differences in the features of normal and cancer cells?

- Large number of dividing cell.

- Large, variable shaped nuclei.

- Small cytoplasmic volume relative to nuclei.

- Variation in cell size ad shape.

- Loss of normal specialized cell features.

- Disorganization arrangement of cells.

- Poorly defined tumor boundiary.

Cancer Worldwide:

- Cancer is a leading cause of death worldwide, accounting for 7.6 million deaths (around 13% of all deaths) in 2008 .

- Lung, stomach, liver, colon and breast cancer cause the most cancer deaths each year.

- The most frequent types of cancer differ between men and women.

- Tobacco use is the most important risk factor for cancer causing 22% of global cancer deaths and 71% of global lung cancer deaths.

- About 70% of all cancer deaths in 2008 occurred in low- and middle-income countries.

- Deaths from cancer worldwide are projected to continue rising, with an estimated 13.1 million deaths in 2030.

Cancer Burden:

- Affects everyone: young, old, the rich and poor, men, women and children.

- Represents a tremendous burden patients, families and societies.

- Substantial financial burdens upon families and cares.

- Physical and emotional burden.

Population-Based Studies

Regions of Highest Incidence

U.K.:
Lung
cancer

JAPAN:
Stomach
cancer

CANADA:
Leukemia

CHINA:
Liver
cancer

U.S.:
Colon
cancer

BRAZIL:
Cervical
cancer

AUSTRALIA:
Skin
cancer

Artwork by Joanne Kelly © 2004

NATIONAL
CANCER
INSTITUTE

The Most Common Cancer Diagnosis:

	Men	Women	Both
Risk of getting cancer before age 75	**16.9 %**	**13.9 %**	**15.3 %**

5 most frequent cancers:

	Men	Women	Both
	Lung	Breast	Lung
	Stomach	Cervix uteri	Stomach
	Liver	Lung	Breast
	Colorectum	Stomach	Liver
	Oesophagus	Colorectum	Colorectum

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Most frequent cancers: men (2008):
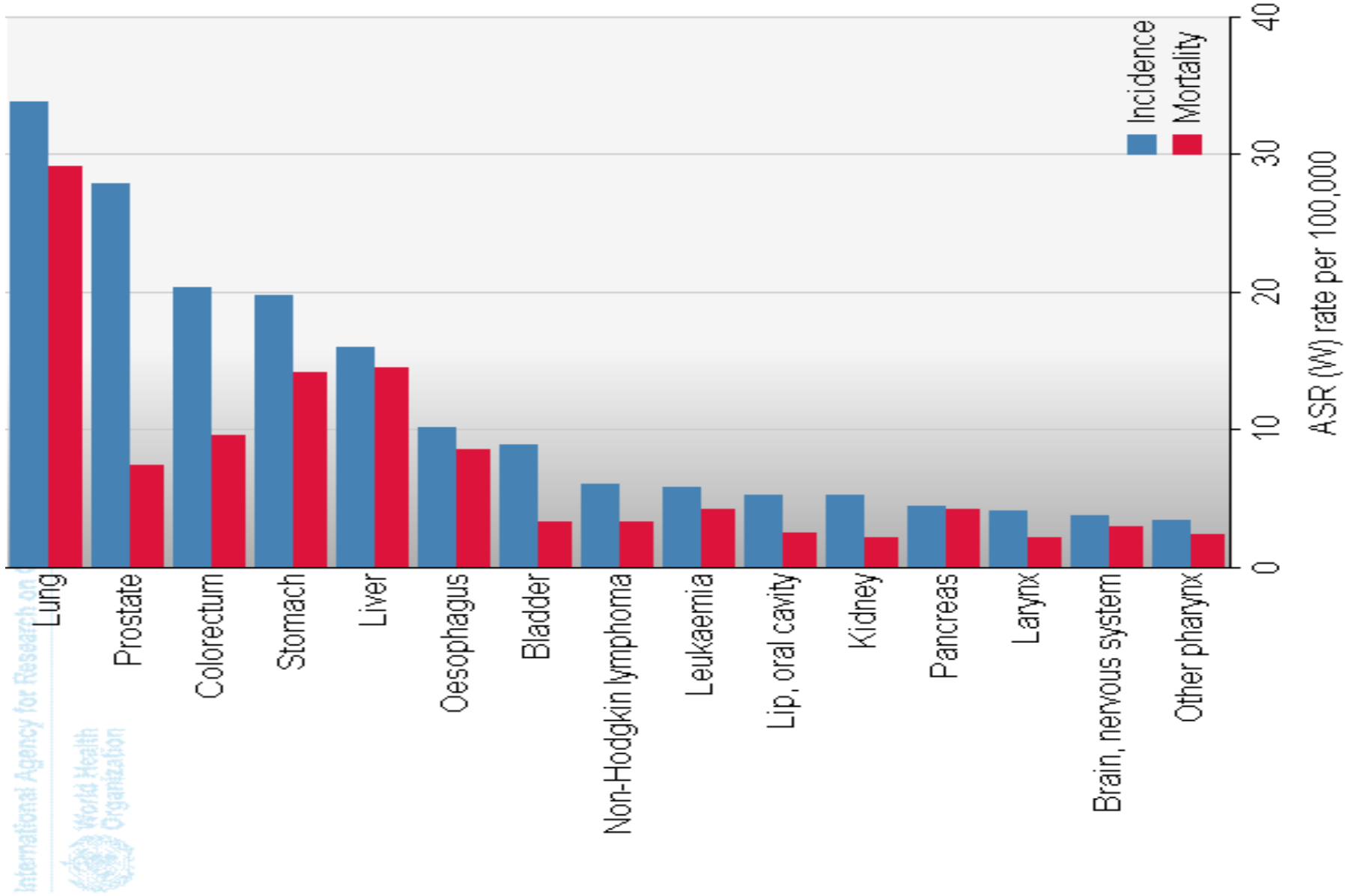
Most frequent cancers: women (2008):

Cancer Incidence:

Men

Women

Legend:
- Lung
- Prostate
- Colorectum
- Stomach
- Liver
- Oesophagus
- Bladder
- Non-Hodgkin lymphoma
- Leukaemia
- Other and unspecified
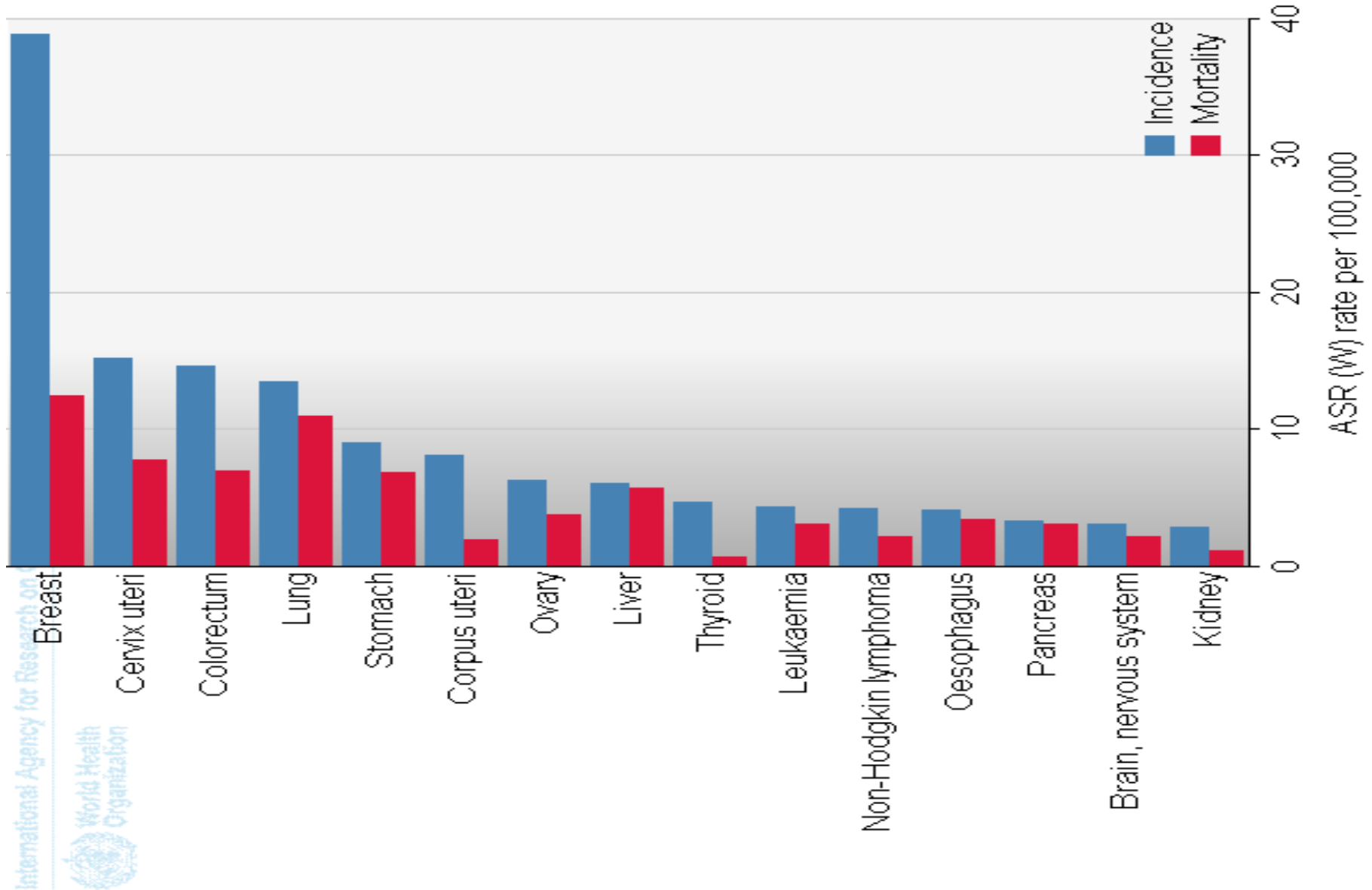
International Agency for Research on Cancer — World Health Organization

Incidence (Men):
- 1,092,056 (16.5%)
- 899,102 (13.6%)
- 663,904 (10.0%)
- 640,031 (9.7%)
- 523,432 (7.9%)
- 326,245 (4.9%)
- 294,345 (4.4%)
- 199,736 (3.0%)
- 195,456 (3.0%)
- 1,783,537 (27.0%)

Incidence (Women):
- 1,384,155 (22.9%)
- 571,204 (9.4%)
- 530,232 (8.8%)
- 515,999 (8.5%)
- 348,571 (5.8%)
- 288,387 (4.8%)
- 226,312 (3.7%)
- 224,747 (3.7%)
- 163,968 (2.7%)
- 1,791,135 (29.6%)

Cancer in Children:

- The second commonest cause of death.

- 1 of 500 children.

- Represent an important public health problem.

- Unknown causes.

- Differs from adult cancer in:

  1. Differences in site of occurrence.

  2. Differences in histological appearance.

  3. Differences on clinical behavior.

- Three main groups: (1/3 Leukemia, 1/3 CNS Sarcoma, 1/3 other tumors).

Cancer in Palestine:

- Cancer cases among Palestinians are similar to most other developed countries.
- cancer incidence rate is (53.7) per 100,000 of population.
- The 3rd leading cause of deaths in West Bank is cancer (10.8%).

Distribution of Reported Cancer Cases by Sex, West Bank, Palestine, 2010

Male 46.7
Female 53.3

Male Female
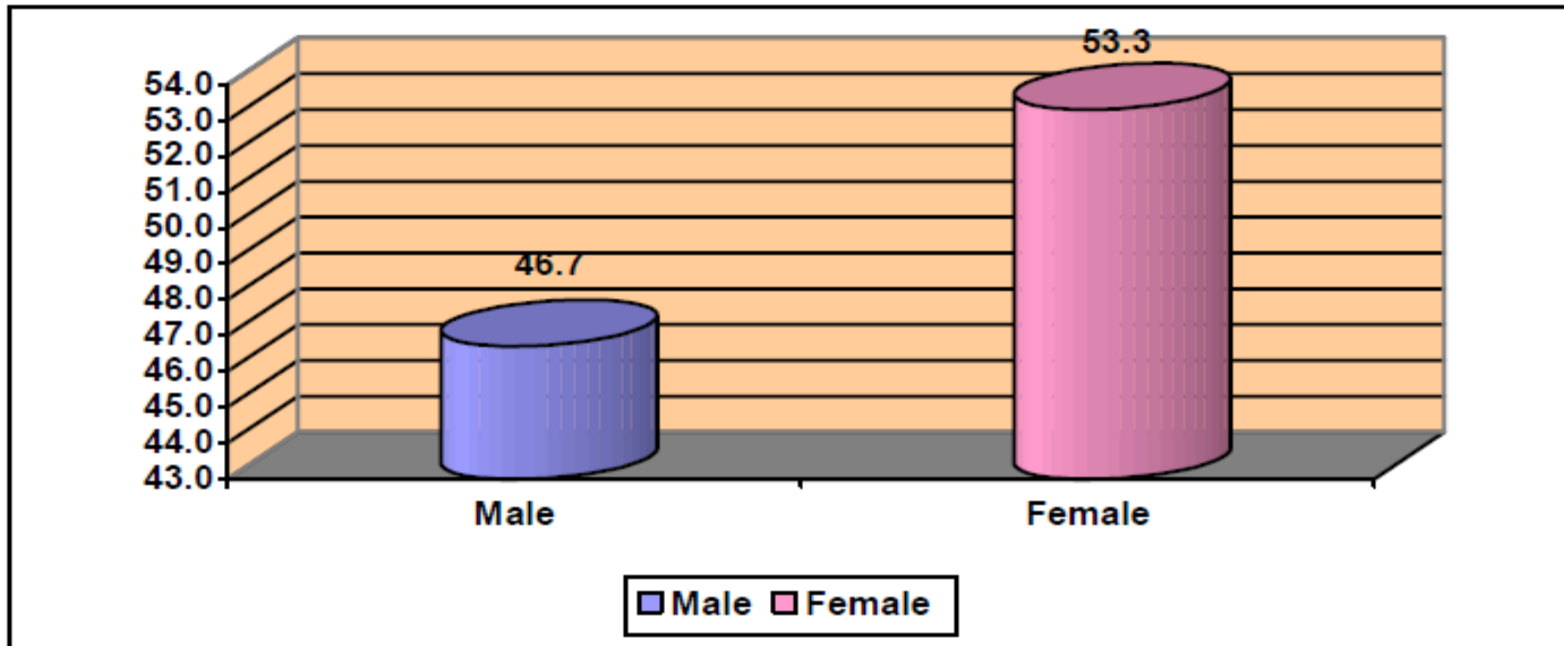
Distribution of Reported Cancer Cases by Age Group, West Bank, Palestine, 2010
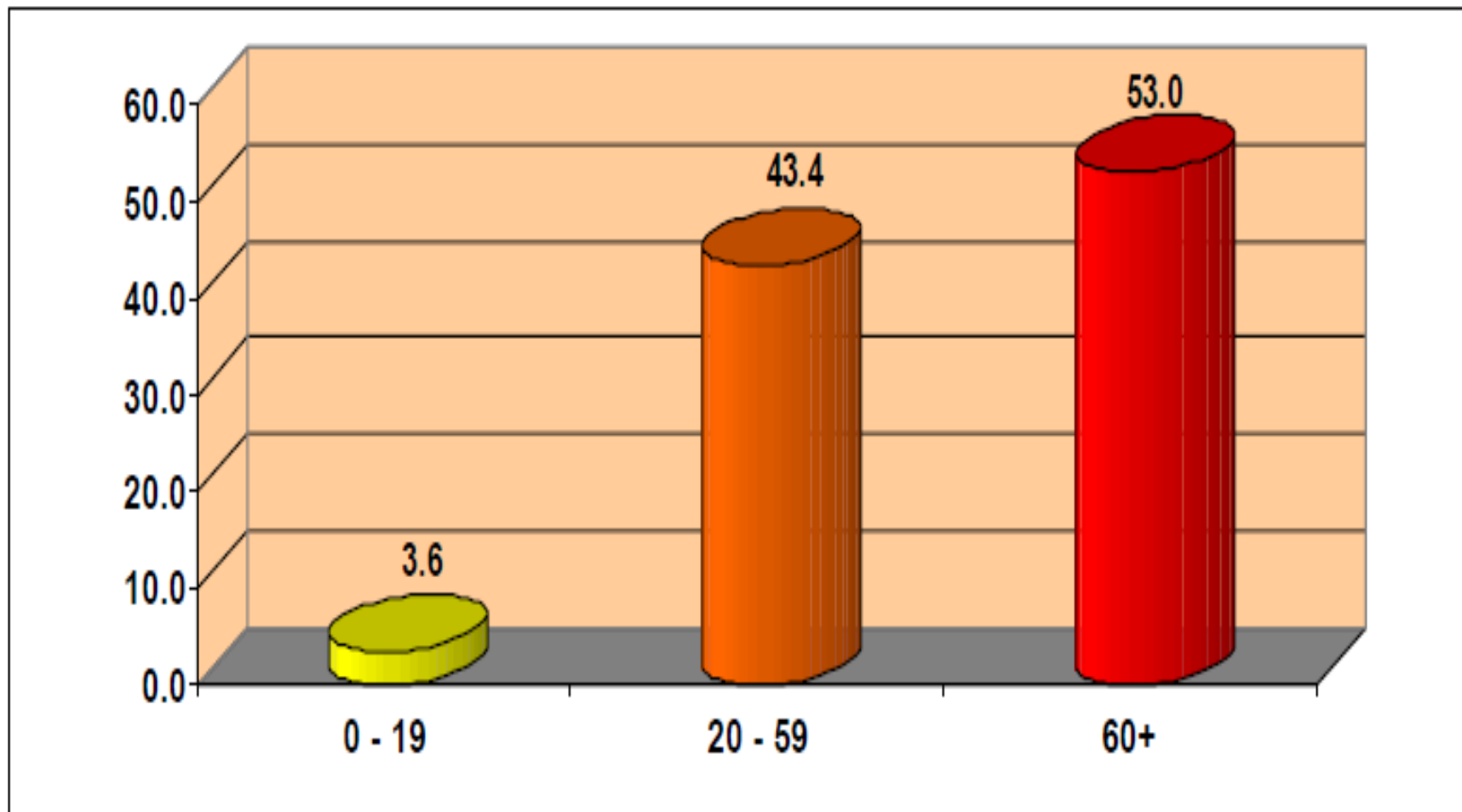
Most Common Cancer Cases, West Bank, Palestine, 2010
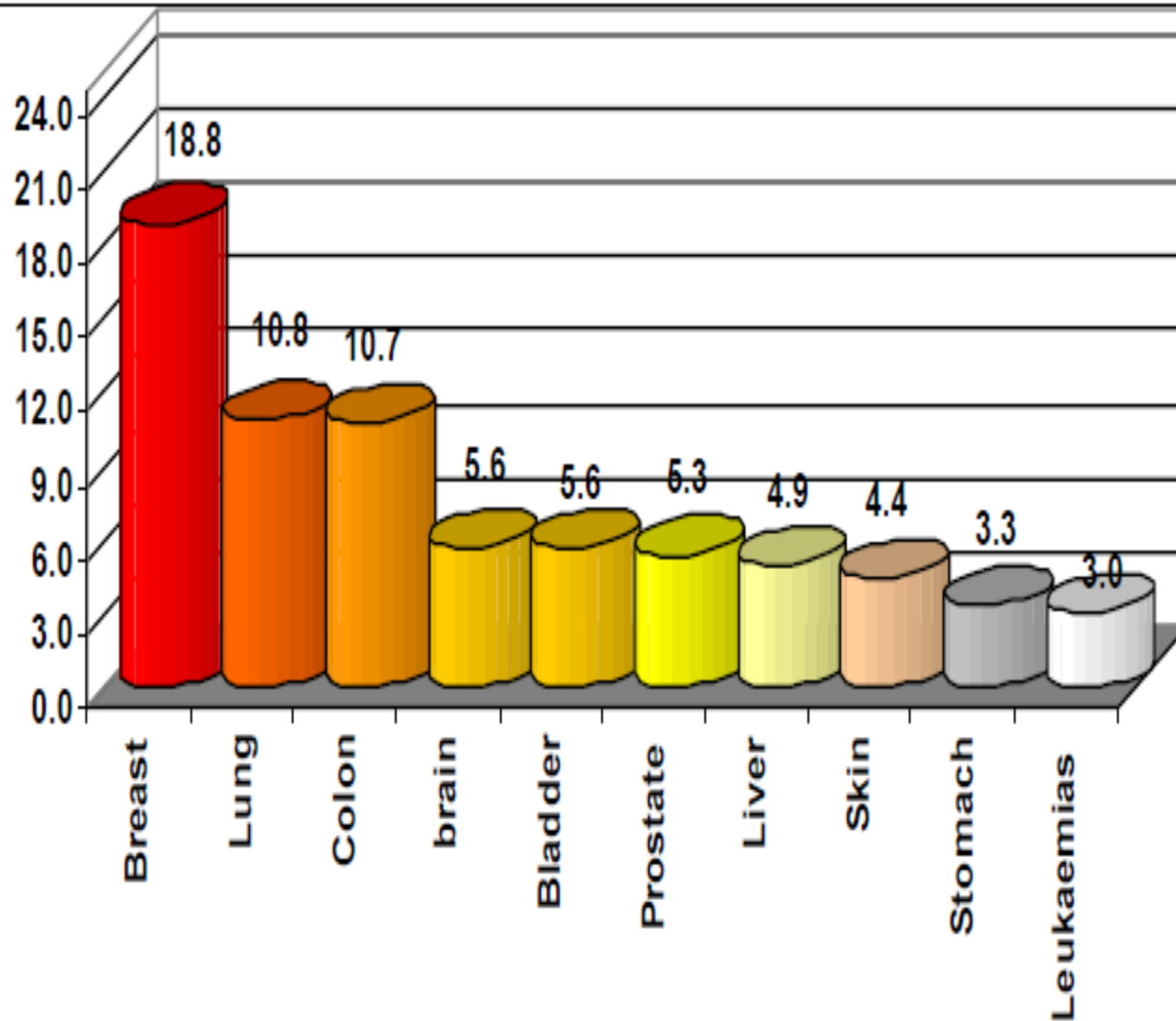
Causes to Cancer:

1. **Way of living and Environment (80%):**
   - Tobacco (33%).
   - Alchohol.
   - Nutrition.
   - Radiation.
   - virus.
   - Medications and medical treatment.
2. **Genetic Causes.**
3. **Unknown.**

Some viruses or bacteria

Some chemicals

Radiation

Heredity
Diet
Hormones

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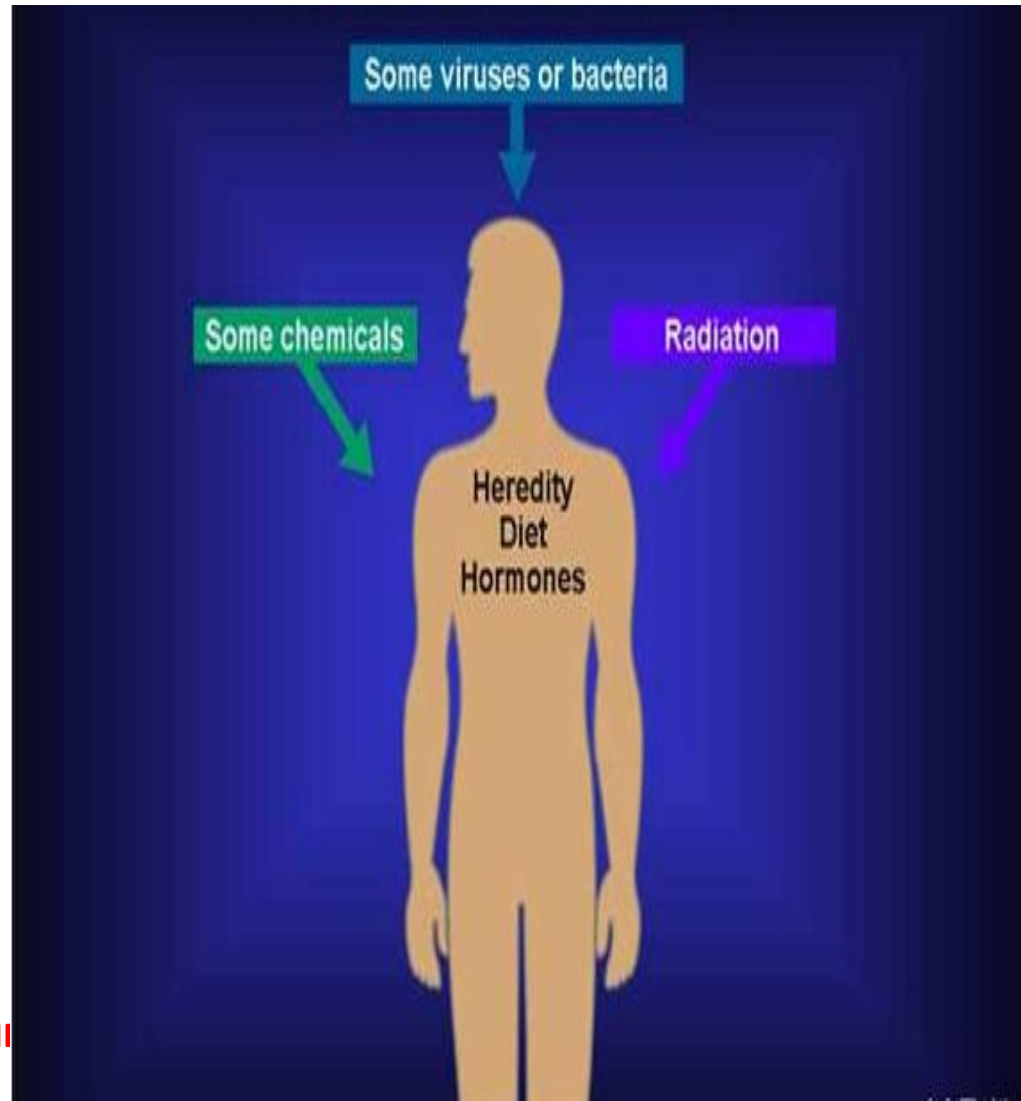
Risk Factors:

- Tobacco use.
- Being overweight or obese.
- Low fruit and vegetable intake.
- Physical inactivity.
- Alcohol use.
- Sexually transmitted infection.
- Urban air pollution.
- Indoor smoke from household use of solid fuels.

1/3 of cancer can be prevented!

Malignant Versus Benign tumors:

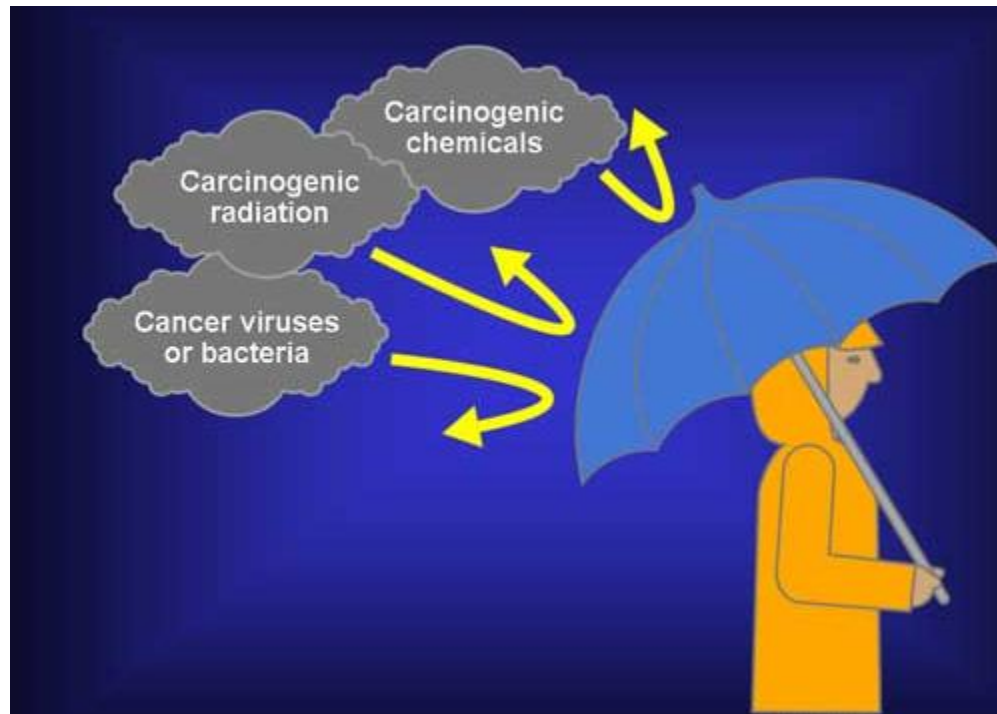|	Benign Tumors	Malignant Tumors
Cell characteristics	Similar to cell of origin *(well differentiated)*	Dissimilar from cell of origin *(poorly differentiated)*
Growth characteristics	Tumor edges move outward in a smooth manner *(encapsulated)*, grows by expansion and compresses and displaces surrounding tissues Tumor cells stay attached to the clone or mass of cells and do not break away and start new growths elsewhere in the body	The tumor edges move outward in an irregular fashion *(usually no capsule)* and can infiltrate, invade, and destroy surrounding tissues Tumor cells can break away from the cloned mass, live independently, move to other area of the body and start new clones or growths
Rate of growth	Slow growth rate	Rapid growth rate
Degree of vascularity	Slight vascularity	Moderate-marked vascularity
Recurrence after surgical removal	Seldom recurs after removal	Frequently recurs after removal
Degree of necrosis and ulceration	Necrosis and ulceration unusual	Necrosis and ulceration common
Likelihood of causing systemic effects	Systemic effects are unusual unless the tumor is a secreting endocrine neoplasm	Systemic effects are common and usually life-threatening

Malignant versus Benign Tumors

Benign (not cancer) tumor cells grow only locally and cannot spread by invasion or metastasis

Malignant (cancer) cells invade neighboring tissues, enter blood vessels, and metastasize to different sites
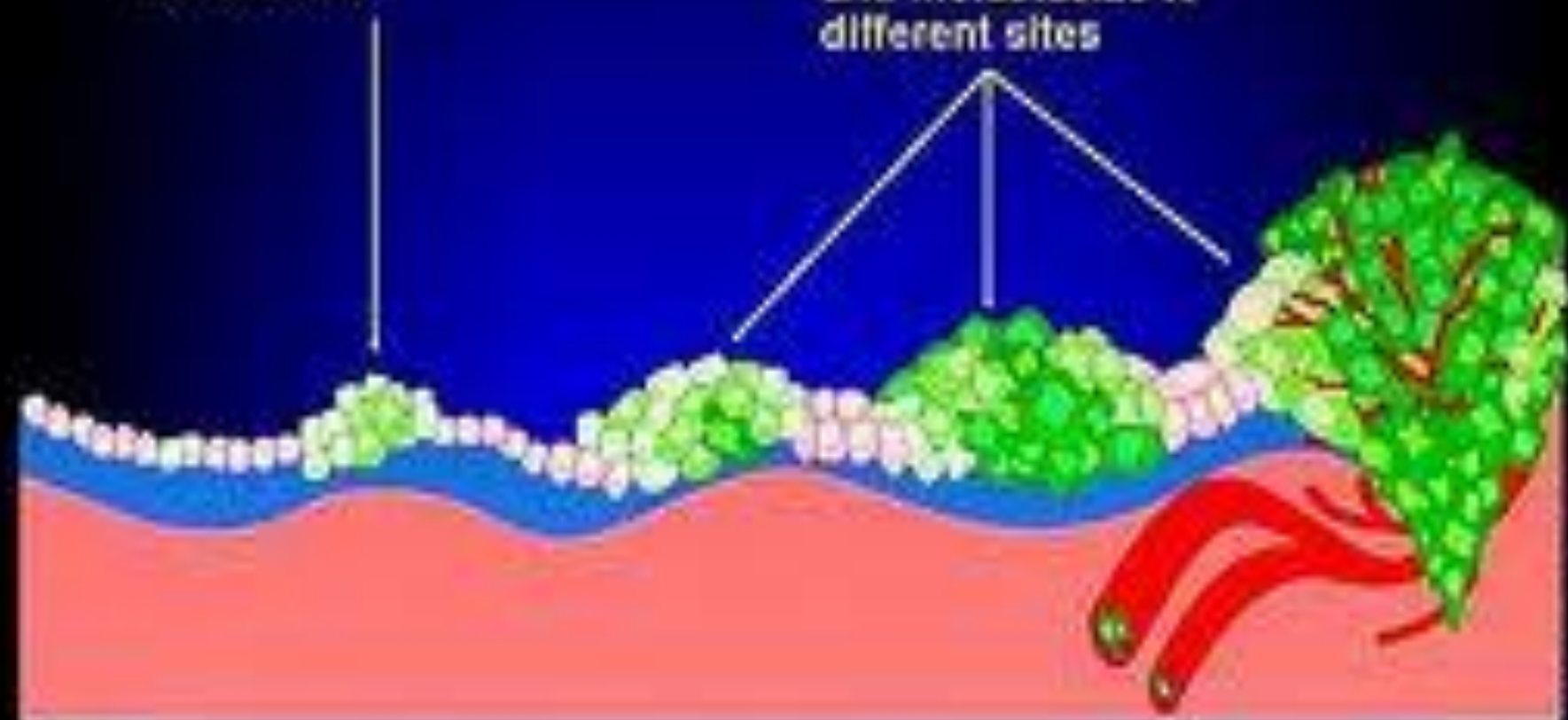
Time

Types of Cancer:

Cancer can originate almost anywhere in the body.

1. **Carcinomas**:

The most common types of cancer, arise from the cells that cover external and internal body surfaces. Lung, breast, and colon are the most frequent cancers of this type in the United States.

2. **Sarcomas:** are cancers arising from cells found in the supporting tissues of the body such as bone, cartilage, fat, connective tissue, and muscle.

3. **Lymphomas:** are cancers that arise in the lymph nodes and tissues of the body's immune system.

4. **Leukemias:** are cancers of the immature blood cells that grow in the bone marrow and tend to accumulate in large numbers in the bloodstream.

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Different Kinds of Cancer

Some common carcinomas:

Lung

Breast (women)

Colon

Bladder

Prostate (men)

Leukemias:

Bloodstream

Lymphomas:

Lymph nodes

Some common sarcomas:

Fat

Bone

Muscle
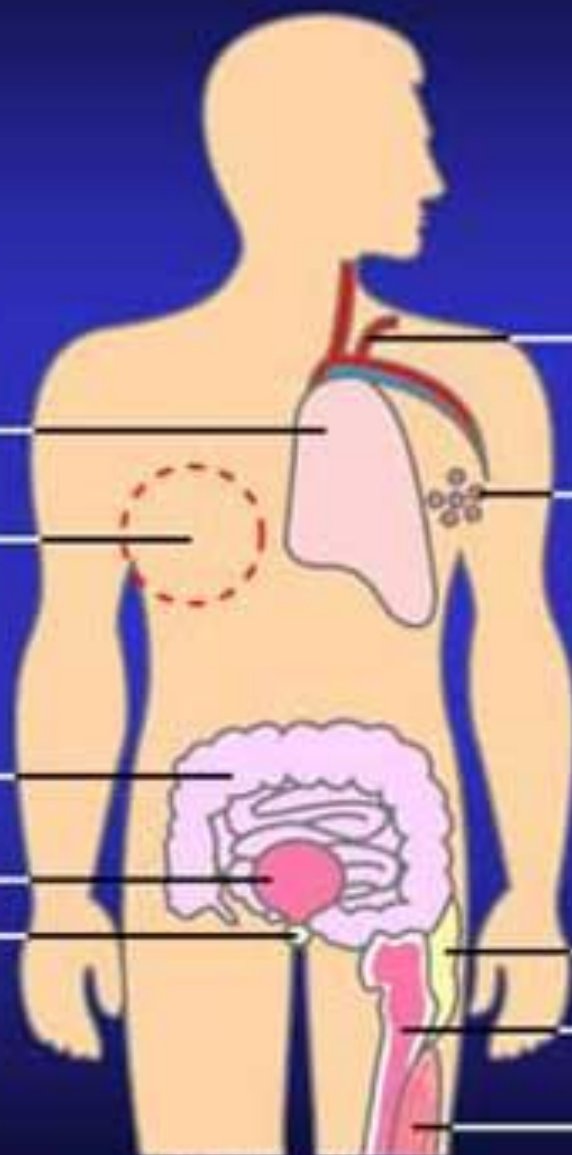
Naming Cancers

Cancer Prefixes Point to Location

Prefix	Meaning
adeno-	gland
chondro-	cartilage
erythro-	red blood cell
hemangio-	blood vessels
hepato-	liver
lipo-	fat
lympho-	lymphocyte
melano-	pigment cell
myelo-	bone marrow
myo-	muscle
osteo-	bone
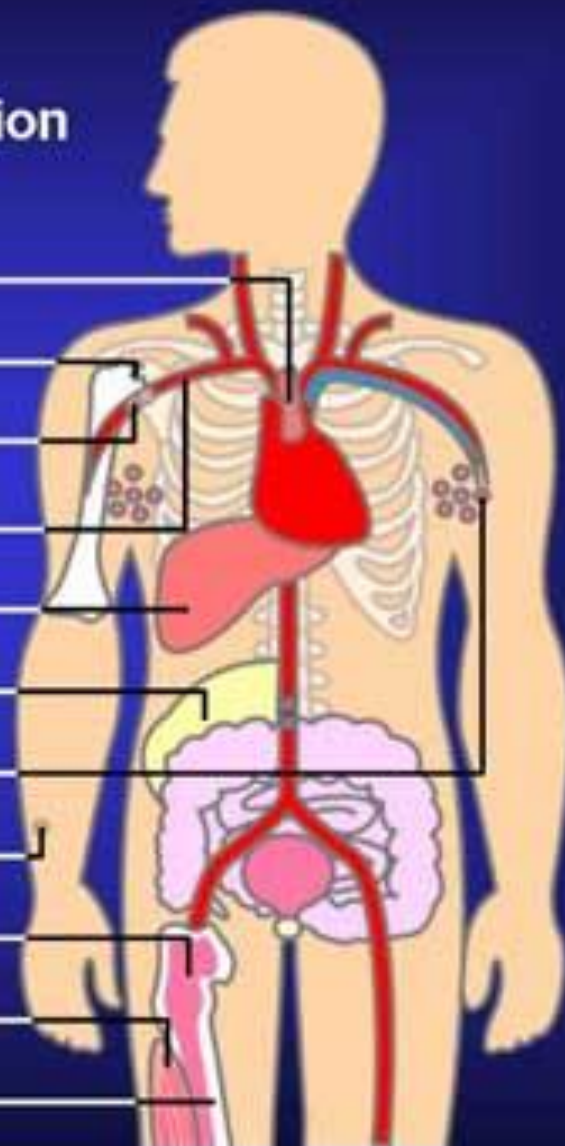
Artwork by Jeanne Kelly © 2004

Cancer Signs:

- Abnormal bleeding.

- Palpable tumor.

- Changes in urine and deface.

- Weight loss.

- Ulcers not healing.

- Continuing coughing.

- Difficulty swallowing.

- Change in look of melanomas.

Diagnosis:

- **Clinical History.**

- **Normal Diagnostic procedures:**
  - ✓X-rays- Scans.
  - ✓Blood test.
  - ✓Biopsy.

- **Pathological staging.**

Cancer Staging:

- **Different types of classifications/ staging of cancer:**
  - ✓Type of cells/tissues.
  - ✓The organ tumor origins from.
  - ✓Benignant or malignant.
- **Classification decides treatment and prognosis.**

TNM Staging:

The American Joint Committee of Cancer (AJCC) has developed a simple classification system (TNM) that can be applied to all tumor types. It is a numerical assessment of tumor size (T), presence or absence of regional lymph node involvement (N), and presence or absence of distant metastasis.

TNM Staging:

- **T: primary tumor.**
  - ✓ Tx: primary tumor is unable to be assessed.
  - ✓ T0:no evidence or primary tumor.
  - ✓ T: carcinoma in situ.
  - ✓ T1, T2, T3, T4: increasing size and/or local extent of primary tumor.

- **N: presence or absence or regional lymph node involvement.**
  - ✓ Nx: regional lymph nodes are unable to be assessed.
  - ✓ N0: no regional lymph node involvement.
  - ✓ N1, N2, N3: increasing involvement of regional lymph nodes.

- **M: absence or presence or distant metastasis.**
  - ✓ Mx: unable to assess.
  - ✓ M0: absence of distant metastasis.
 - ✓ M1: presence of distant metastasis.

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Cancer Treatment:

- **Wait and See.**
- **Surgery.**
- **Chemotherapy.**
- **Hormone treatment.**
- **Radiation treatment.**
- **Combinations.**
- **Others:**
  - ✓immunotherapy Marrow transplant.
  - ✓Alternative cancer therapies.

Target of Treatment:

- **Curative (Healing treatment): Depends on:**
  - ➢Type of cancer.
  - ➢Time of Diagnosis.
  - ➢The nature of the cancer diagnosis.
  - ➢Treatment options/ complications.
- **Palliative (relieving treatment): focus on:**
  - ➢Symptom relief.
  - ➢Symptom prevention.
  - ➢Prolonged survival.
  - ➢Combination.

The Cancer Journey:

Palliative

Prevention → Screening → Diagnosis → Treatment

Recovery

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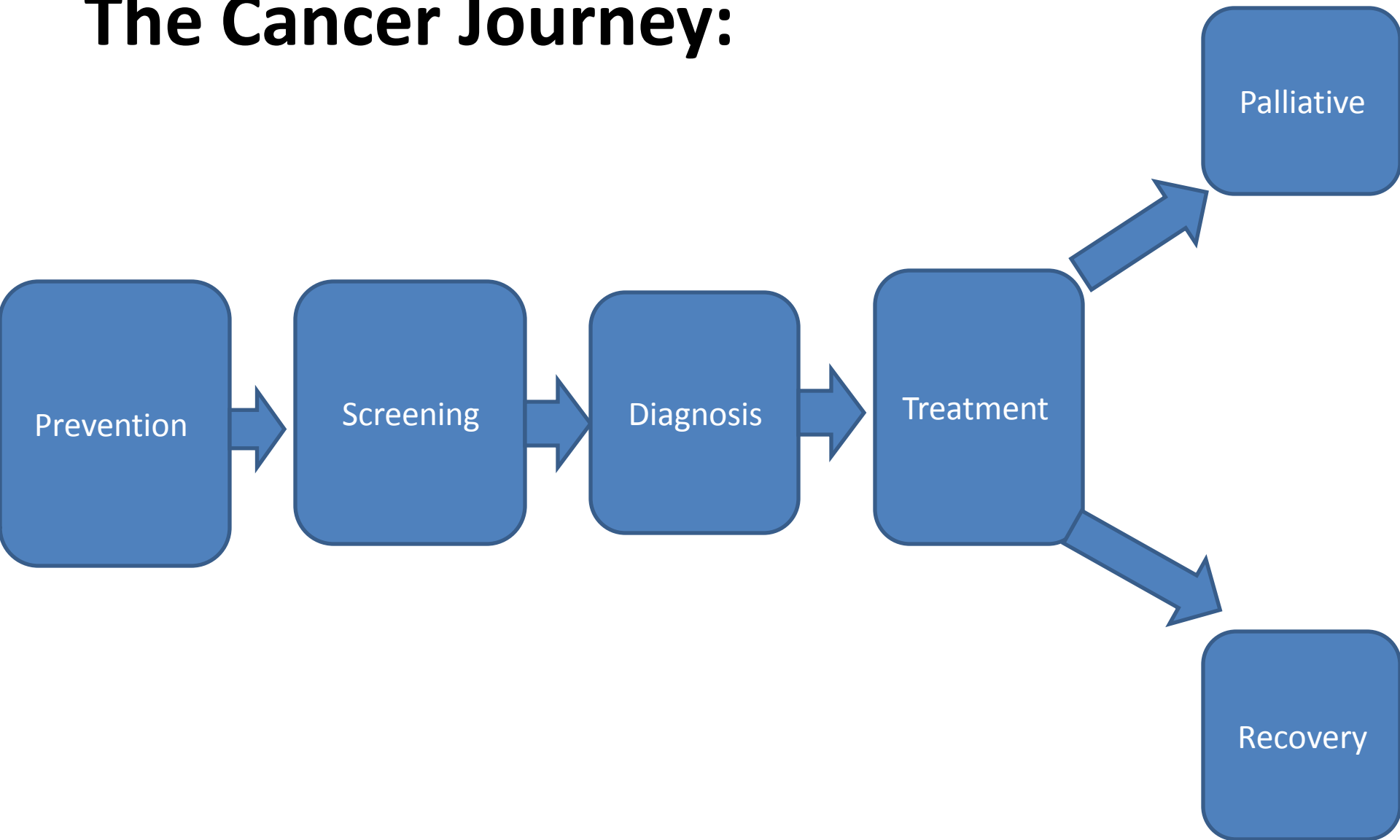
10 rules to avoid cancer:

1. Don't smoke.

2. Don't smoke.

3. Don't smoke.

4. Avoid exposure to other known carcinogens, including asbestos and UV light.

5. Enjoy a healthy diet, moderate in calories, salt and fat, and low in alcohol.

6. Eat fresh fruit and vegetables several times a day.

7. Be physically active and avoid obesity.

8. Have vaccination against, or early detection/treatment of, cancer causing chronic infections.

9. Have the right genes.

10. Have good luck!