Cancer Prevention and Survival

First

Annual Memorial Cancer Awareness Lecture

Organised by EAA Cancer Foundation

Presented by

Prof. Oyeronke A. Odunola

Tuesday 7th July, 2020

Ellen Adeyinka Anjorin

1962 - 2019

Appreciation

Immediate family of Ellen Adeyinka Anjorin

&

Members, Board of Trustees, EAACF

Ellen Adeyinka Anjorin Cancer Foundation

VISION

- To create awareness on
  - primary and secondary prevention of cancer,
  - screening
    and
  - testing.

STRATEGIC MISSION

- To establish a world-class cancer centre which would be affordable and accessible to all.

First
Annual Memorial Cancer Awareness Lecture

Theme

Cancer Prevention and Survival

A message of hope from EAAC-Foundation

Tuesday 7th July, 2020

Cancer

Deep Thinking & Fear

Tumours Or Swellings

Courtesy: National Cancer Institute (Adapted)

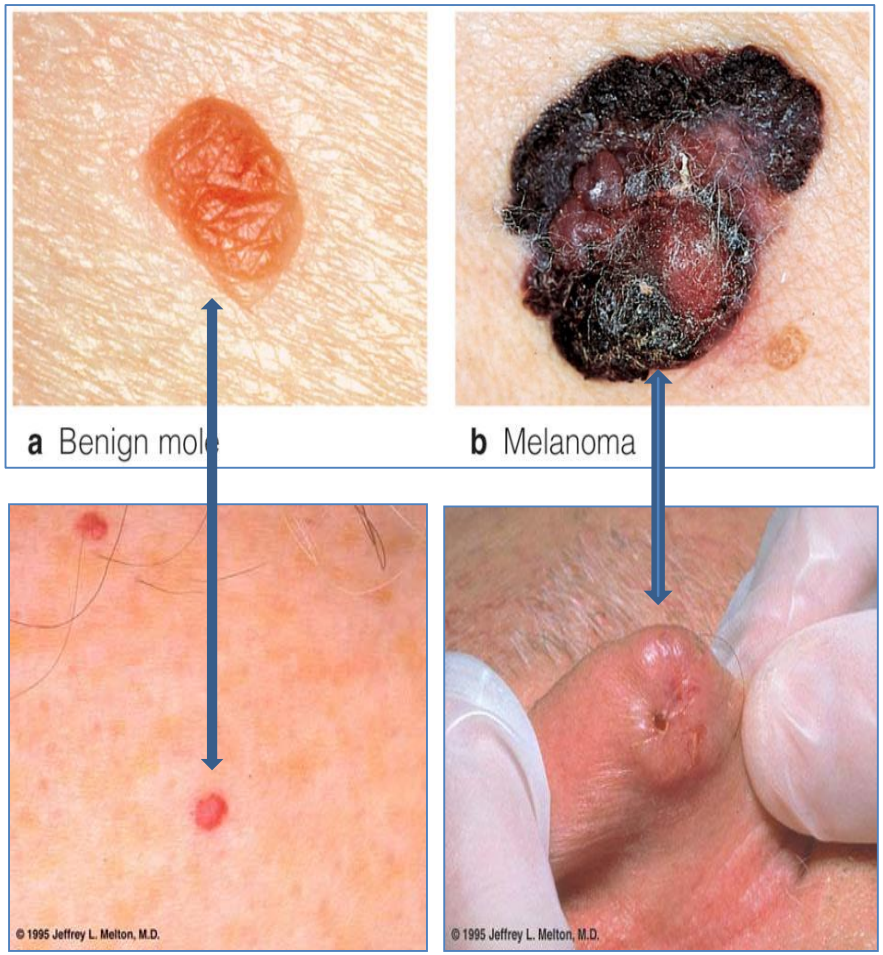
Tumour Types

A **tumour** (neoplasm) is a 'lump' or 'growth', swelling or lesion formed by an abnormal growth of cells in a tissue.

A **tumour** could be

- benign
- pre-malignant

  or
- malignant (cancerous)



Benign Tumours

Benign tumours are diverse, grow slowly and are encapsulated. They look and feel smooth and regular, with well defined edges. Examples include moles & uterine fibroids.

Symptoms include:

- Bleeding or occult blood loss
- Pressure causing pain or dysfunction
- Cosmetic changes
- Itching
- Hormonal syndromes
- Obstruction e.g. of the intestines
- Compression of blood vessels or vital organs

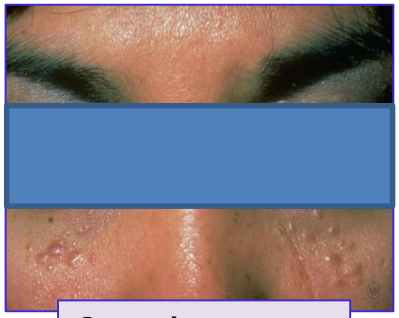
Treatment

- If symptomatic, surgery is usually the most effective approach
- Once treated, benign tumours don't usually grow back.
- Many type of benign tumours have the potential to become malignant e.g teratomas.

Skin tags (Acrochordon)

Keloid

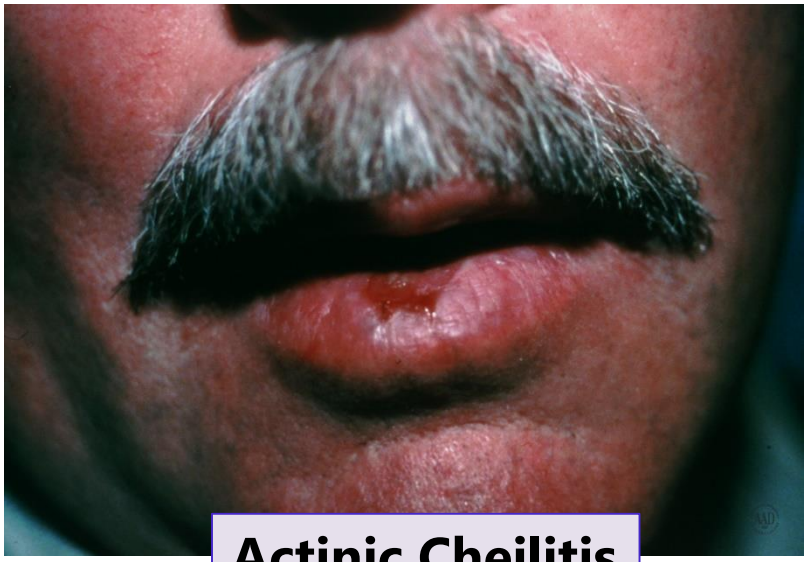
Keratoacanthoma



Sweat duct tumours (Syringomas)

Premalignant Tumours

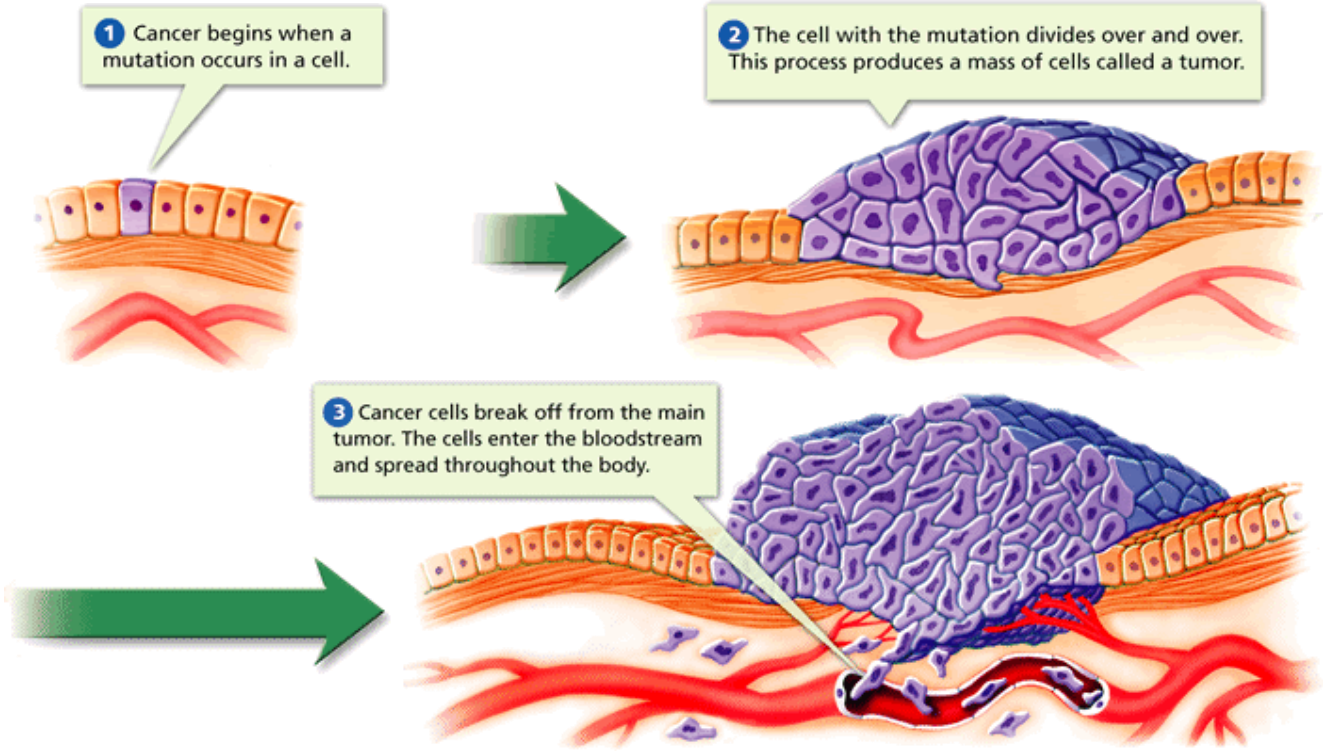
- Premalignant condition
- Increased cell growth
- Cellular atrophy
- Altered differentiation
- Could range from mild to severe
- May exist in the premalignant state for years
- Some common sites include cervix, bladder, stomach etc.



Actinic Cheilitis

Malignant Tumours or Cancer

- **Cancer is a terminology used for a group of diseases in which cells grow and divide uncontrollably, damaging the parts of the body around them.**
- **It is caused by a mutation that leads to uncontrolled mitosis.**
- **Cancer is as a major public health problem globally.**



Malignant Tumours or Cancer

POSERS

- What is cancer?
- Is cancer infectious or contagious?
- How is cancer diagnosed?
- What are the treatment modalities?
- What are the chances of survival?
- Can cancer be prevented?

Pigmented Nodular Basal Cell Carcinoma

Superficial Spreading Melanoma

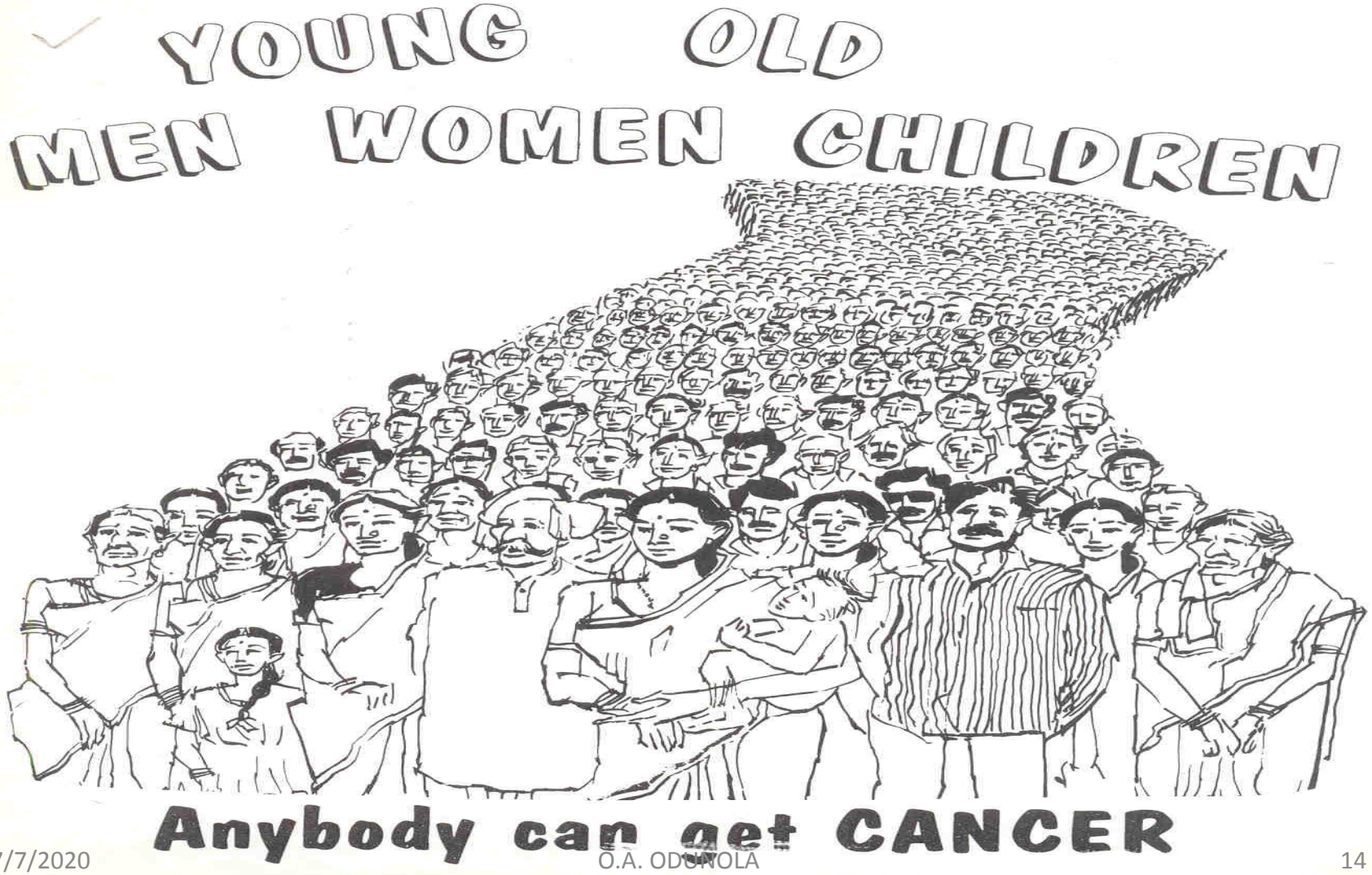
Features of Malignant Cells (Hallmarks of Cancer)

- Self-sufficiency in growth signals
- Insensitivity to growth-inhibitory signals
- Resistant to apoptosis
- Limitless replicative potential
- Stimulation of angiogenesis for self nourishment
- Ability to invade and metastasize
- Promotion of inflammation
- Destruction/remodeling of extracellular matrix
- Escape from immune system surveillance
- Genomic instability resulting from defects in DNA repair

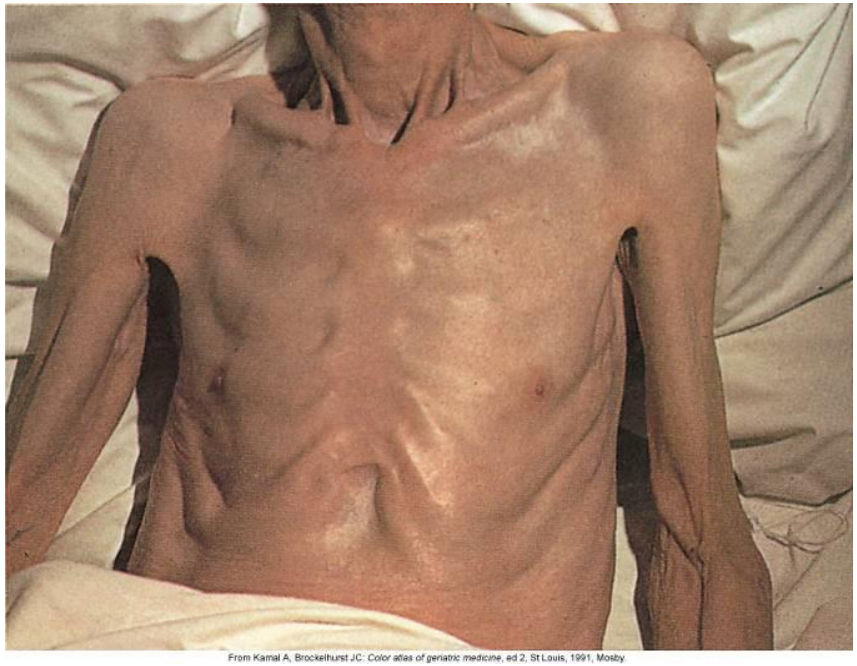
Seven Warning Signs of Cancer

- **C**hange in bowel or bladder habits
- **A** sore throat or wound that does not heal
- **U**nusual bleeding or discharge from body orifices
- **T**hickening or lump in breast or elsewhere
- **I**ndigestion or difficulty in swallowing
- **O**bvious change in warts or moles
- **N**agging cough or hoarseness

WHO CAN GET CANCER?



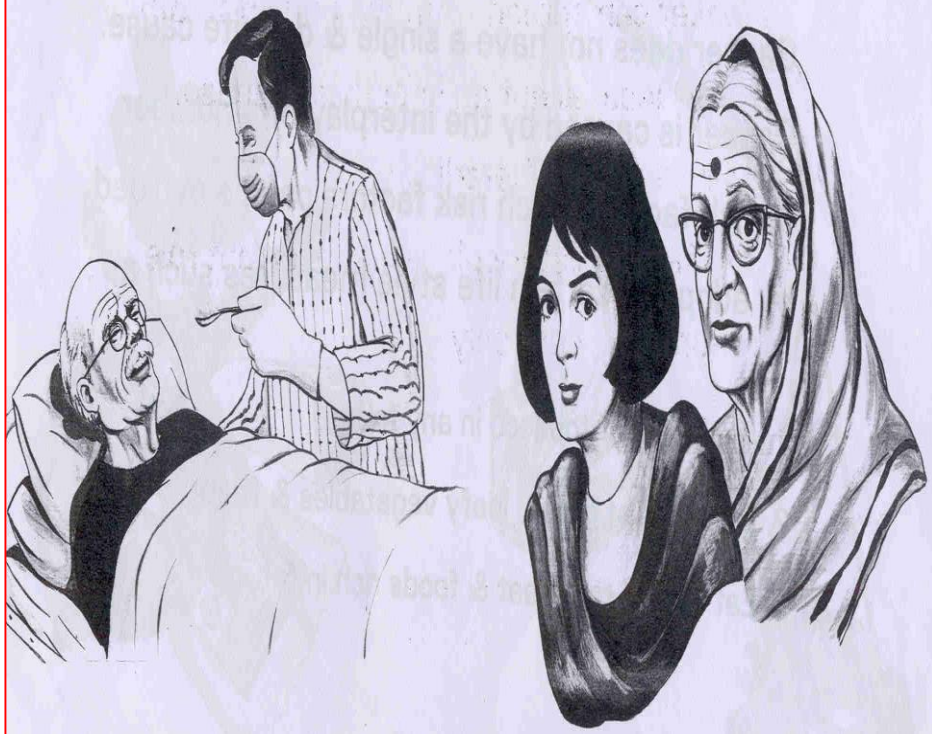
Tumour Effect on the Host – Cachexia (Local Effects)



From Kamal A, Brockelhurst JC: *Color atlas of geriatric medicine*, ed 2, St Louis, 1991, Mosby.

Cancer Cachexia- Seen in advanced cancer. It includes body wasting, weakness, anorexia, and anemia.

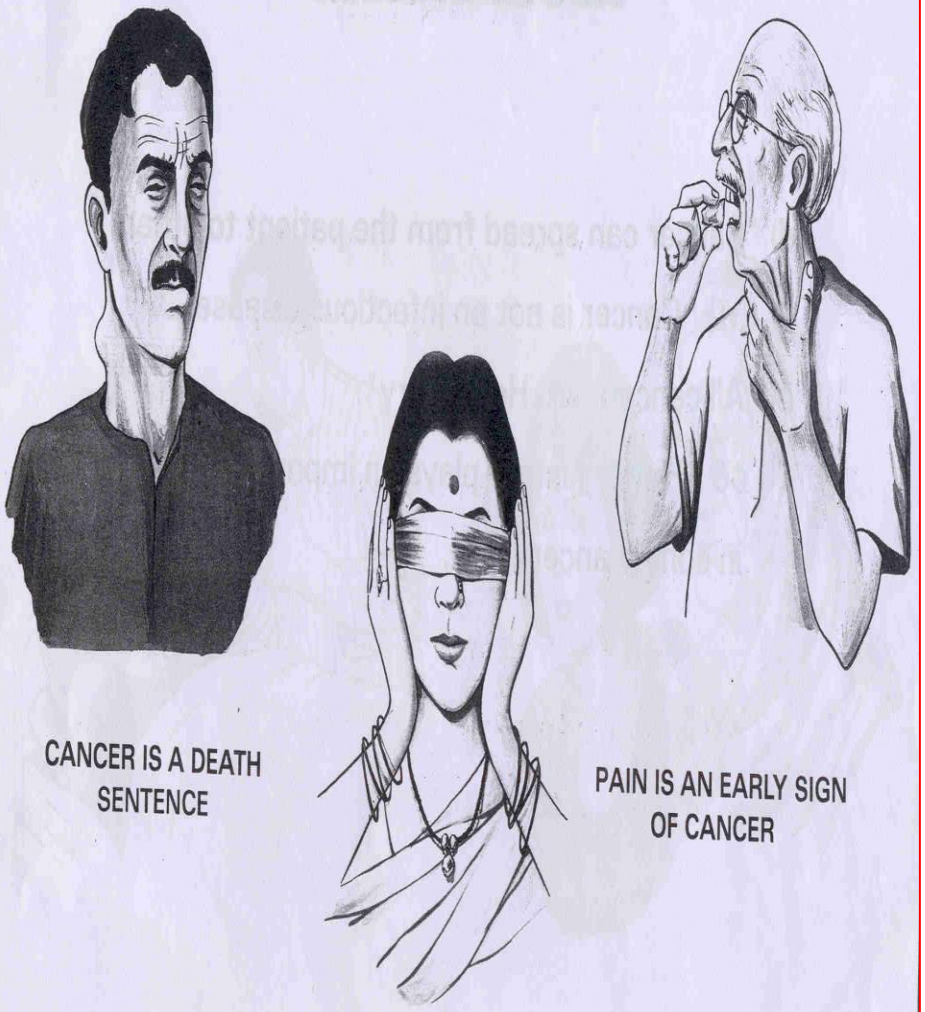
MYTHS & MISCONCEPTIONS ABOUT CANCER



CANCER IS A COMMUNICABLE DISEASE

ALL CANCERS ARE HEREDITARY

MYTHS & MISCONCEPTIONS ABOUT CANCER



CANCER IS A DEATH SENTENCE

PAIN IS AN EARLY SIGN OF CANCER

IF YOU IGNORE THE SYMPTOMS THEY WILL GO AWAY

GLOBAL CANCER BURDEN

MOST COMMON CANCERS

- Lung (2.09 million cases)
- Breast (2.09 million cases)
- Colorectal (1.80 million cases)
- Prostate (1.28 million cases)
- Skin cancer (non-melanoma) (1.04 million cases)
- Stomach (1.03 million cases)

Globally, about 1 in 6 deaths is due to cancer

MOST COMMON CAUSES OF CANCER DEATH

- Lung (1.76 million deaths)
- Colorectal (862 000 deaths)
- Stomach (783 000 deaths)
- Liver (782 000 deaths)
- Breast (627 000 deaths)

Approximately 70% of deaths from cancer occur in low- and middle-income countries

@ WHO Reports, (Sept, 2018)

Trends in Cancer Mortality
Developed vs. Less Developed Countries

- **Cancer mortality in more developed countries**
  - ***projected decrease by <30% by 2030***
- **Cancer mortality in less developed countries**
  - ***projected to increase by >70% by 2030***

By 2030 - 85% of all cancer deaths may be occurring in low-middle income countries

- **The increase In cancer mortality in LMIC is largely due to:**
  - ***Delay in accurate diagnoses***
  - ***Lack of unawareness about cancer and potential value of therapy***
  - ***Lack of access and ability to deliver potentially curative therapy***
  - ***Abandonment of therapy***

Courtesy: National Cancer Institute

Trends in Developed Countries

Estimated New Cancer Cases* in the US in 2015

Men		Women	
848,200		810,170	
Prostate	26%	29%	Breast
Lung & bronchus	14%	13%	Lung & bronchus
Colon & rectum	8%	8%	Colon & rectum
Urinary bladder	7%	7%	Uterine corpus
Melanoma of skin	5%	6%	Thyroid
Non-Hodgkin lymphoma	5%	4%	Non-Hodgkin lymphoma
Kidney & renal pelvis	5%	4%	Melanoma of skin
Oral cavity & pharynx	4%	3%	Pancreas
Leukemia	4%	3%	Leukemia
Liver & intrahepatic bile duct	3%	3%	Kidney & renal pelvis
All other sites	21%	21%	All other sites

*Excludes basal cell and squamous cell skin cancers and in situ carcinoma except urinary bladder.

Estimated New Cancer Cases* in the US in 2018

Males		Females	
856,370		878,980	
Prostate	19%	30%	Breast
Lung & bronchus	14%	13%	Lung & bronchus
Colon & rectum	9%	7%	Colon & rectum
Urinary bladder	7%	7%	Uterine corpus
Melanoma of skin	6%	5%	Thyroid
Kidney & renal pelvis	5%	4%	Melanoma of skin
Non-Hodgkin lymphoma	5%	4%	Non-Hodgkin lymphoma
Oral cavity & pharynx	4%	3%	Pancreas
Leukemia	4%	3%	Leukemia
Liver & intrahepatic bile duct	4%	3%	Kidney & renal pelvis
All other sites	22%	21%	All other sites

*Excludes basal cell and squamous cell skin cancers and in situ carcinoma except urinary bladder.

Cancer Statistics – 2015 & 2018

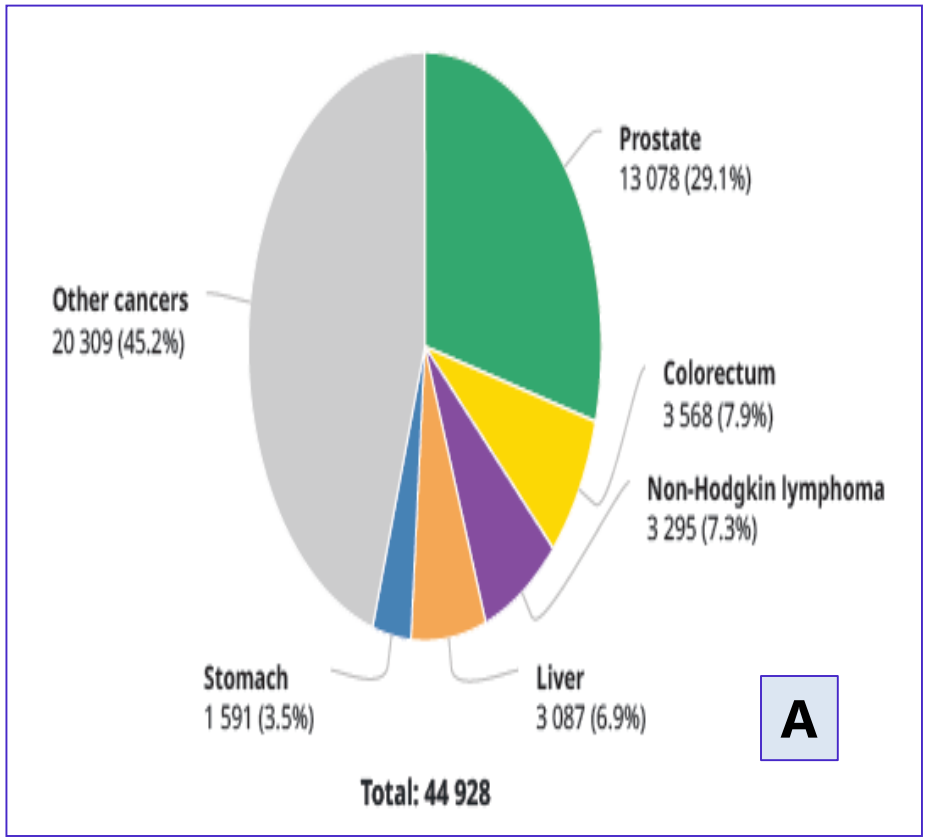
© *American Cancer Society Inc*

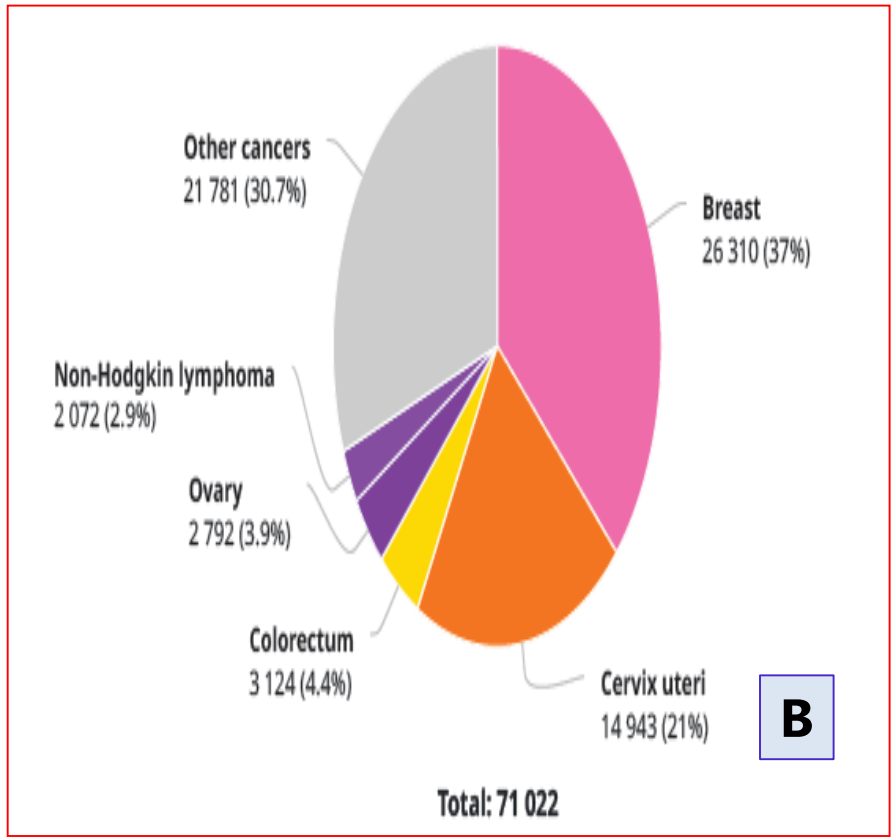
Top Five Cancers of greatest burden in Nigeria

Male	Female	Both sexes
Prostate	Breast	Breast
Liver	Cervix uteri	Cervix uteri
Non-Hodgkin lymphoma	Liver	Liver
Colorectal	Colorectal	Prostate
Pancreas	Non-Hodgkin lymphoma	Colorectal

Globocan 2012 Data

Nigeria – New Cases in 2018 (Male; Female - all ages)

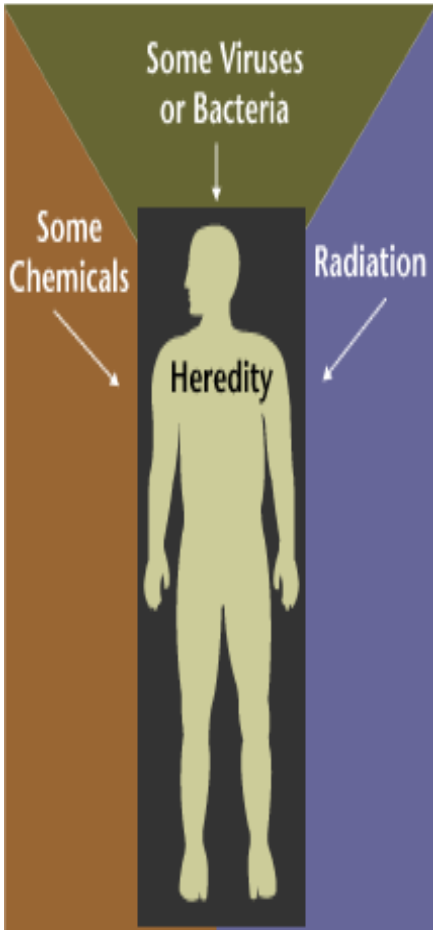




© IARC GLOBOCAN, 2018

What causes Cancer?

- **Environmental causes: (Carcinogens)**
  - **Chemicals (Tobacco smoke, Environmental (PCBs), Occupational (coal tar, asbestos, aniline dye); Diet (aflatoxin)**
  - **Viruses and Bacteria (Infection - EBV, hepatitis B, papilloma virus; Bacteria (Helicobacter)**
  - **Radiation - (UV, ionizing)**
- **Hereditary causes- Genetic defects.**
- **Combination – common**
- **Nutritional**
- **Hormonal**
- **Obscure defects**



DNA Tumour Viruses In Human Cancer

Epidermodysplasia verruciformis

Papilloma virus

205

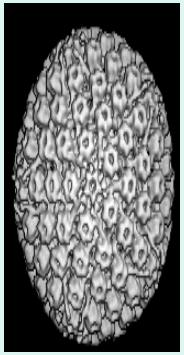
DNA Tumour Viruses In Human Cancer

Herpes Viruses

Considerable evidence for role in human cancer

- Some very tumorigenic in animals
- Viral DNA found in small proportion of tumor cells: “hit and run”

- Epstein-Barr Virus
  - Burkitt’s Lymphoma
  - Nasopharyngeal cancer
  - Infectious mononucleosis
  - Transforms human B-lymphocytes *in vitro*



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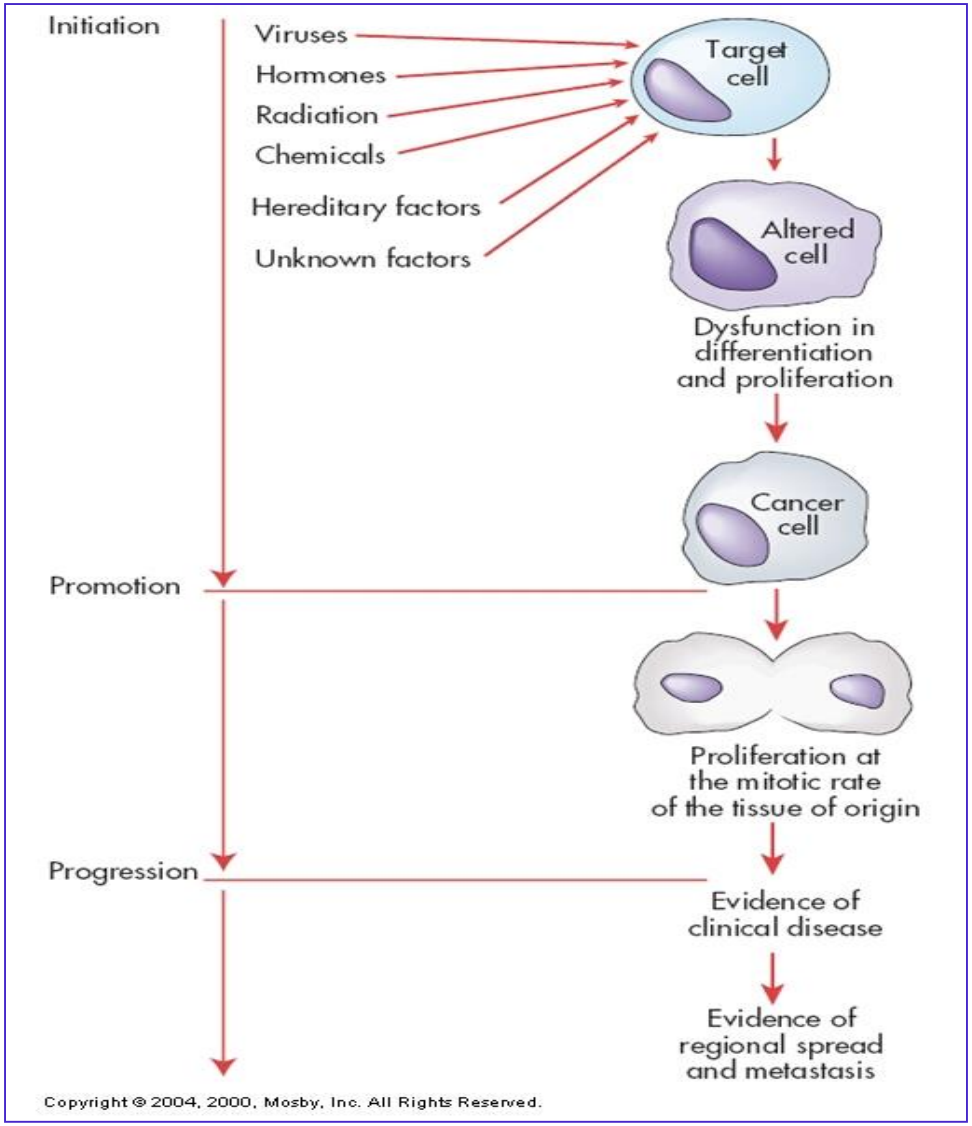
Genes involved in Carcinogenesis

- **Genes control cell division by cytokines.**
- **Four classes of regulatory genes**
  - **Promotors – Proto-oncogenes**
  - **Inhibitors – Tumour-suppressor genes**
  - **Genes regulating Apoptosis.**
  - **DNA repair genes.**
- **Other genes include:**
  - **genes that regulate telomerase,**
  - **genes that promote vascularization and the spread of tumour, and Mitosis-promoting factor (MPF).**

Process of Carcinogenesis



Risk Factors for Cancer Development

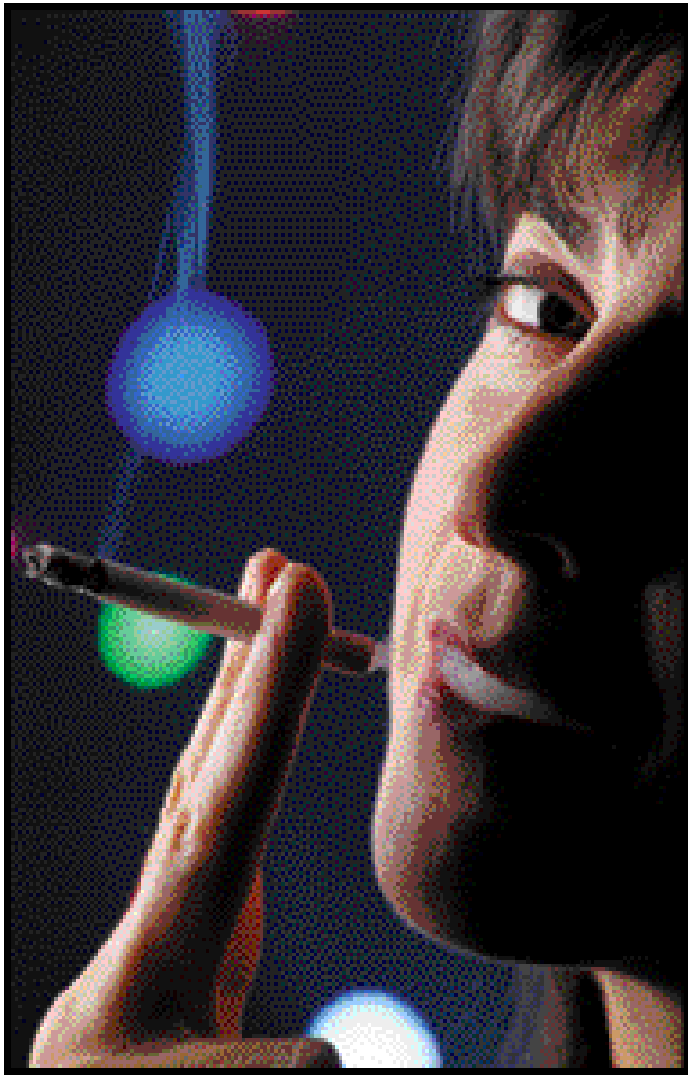
Risk factors increases a person's chance of developing cancer. Avoidance is key to prevention & reduction of cancer burden.

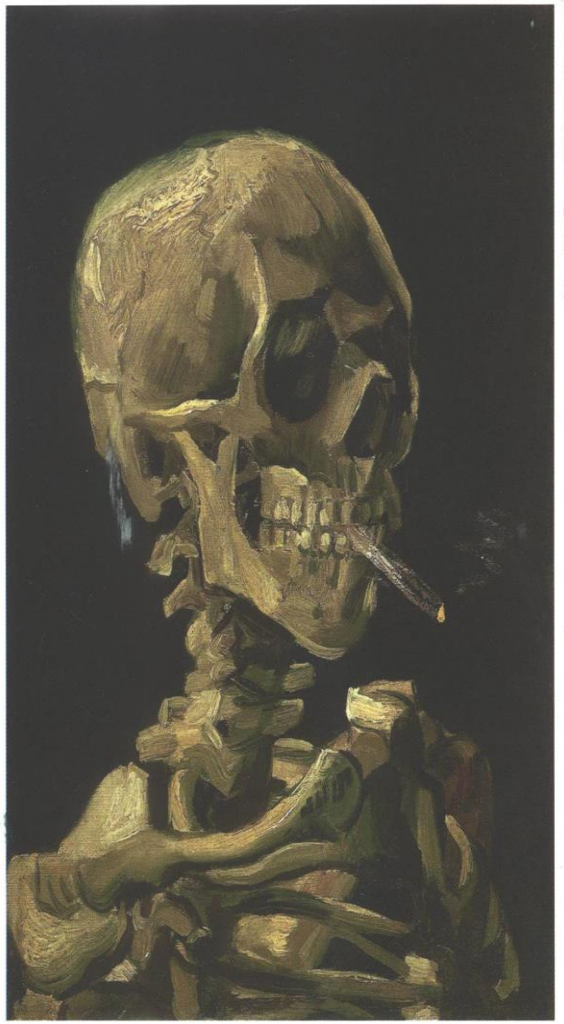
- **Age, Gender, Race, Genetic predisposition (NMFs)**
- **alcohol use and abuse**
- **cigarettes and smokeless tobacco use**
- **indoor smoke from household use of solid fuels**
- **wood dust**
- **being overweight or obese**
- **unhealthy diet with low fruit and vegetable intake**
- **sedentary lifestyle with lack of physical activity**
- **sexually transmitted HPV-infection**
- **infection by other biological carcinogens e.g. hepatitis B virus**
- **ionizing and ultraviolet radiation (e.g. medical diagnostic imaging)**
- **occupational hazards e.g. Coke-Oven emissions**
- **urban air pollution, etc.**
- **Electromagnetic fields e.g. mobile phones, microwaves,**

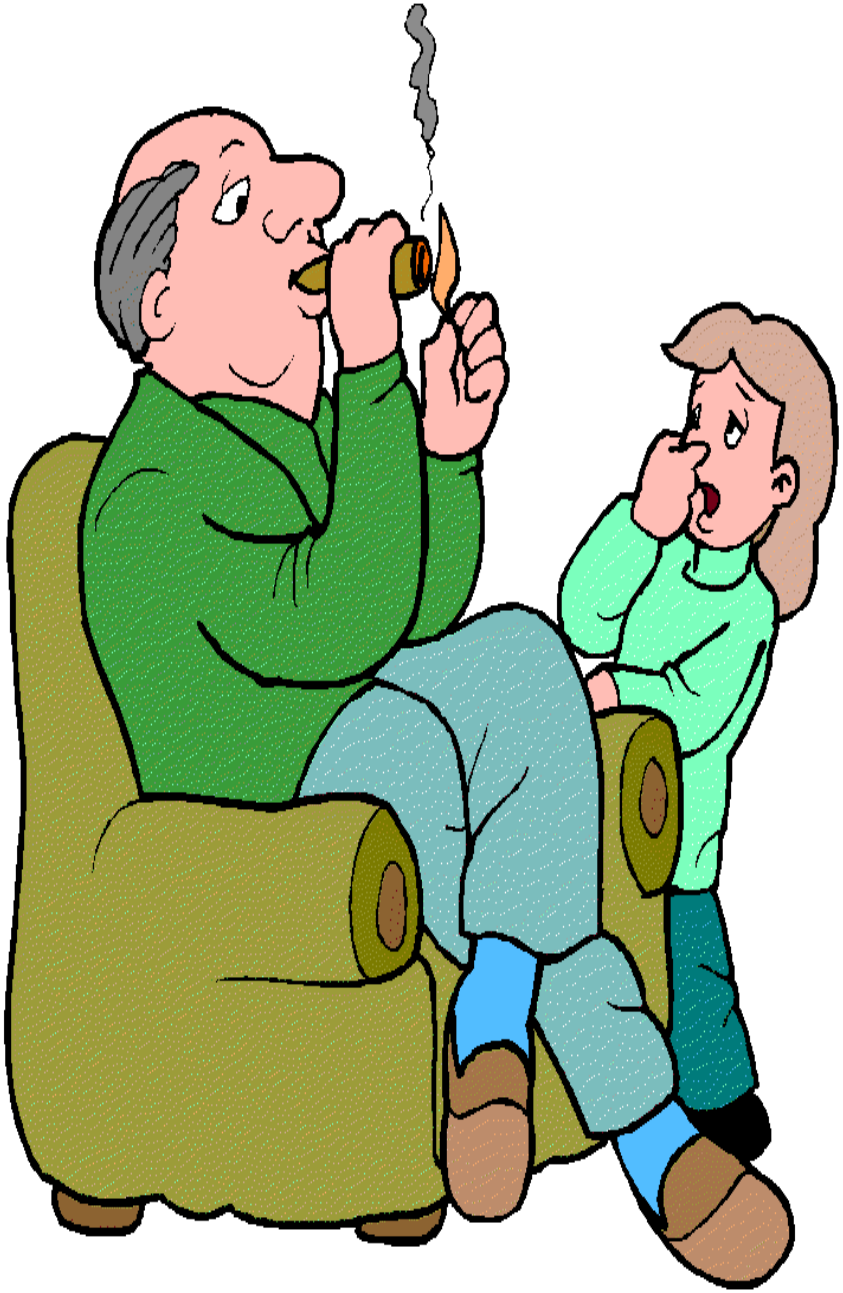
@ Plummer *et al*, 2012; GBD, 2015, NCI, 2019

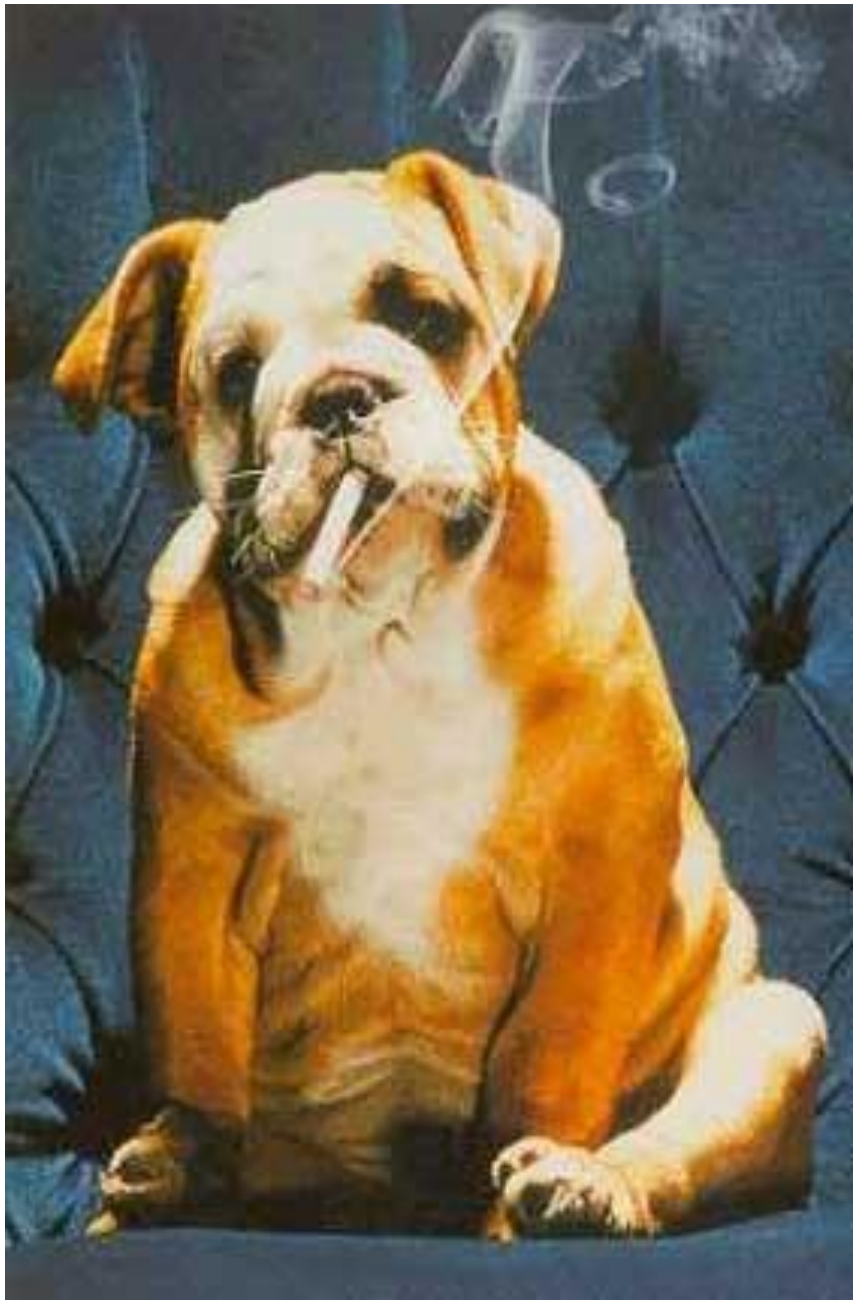
Tobacco use & Abuse

From Suffrage to Suffering

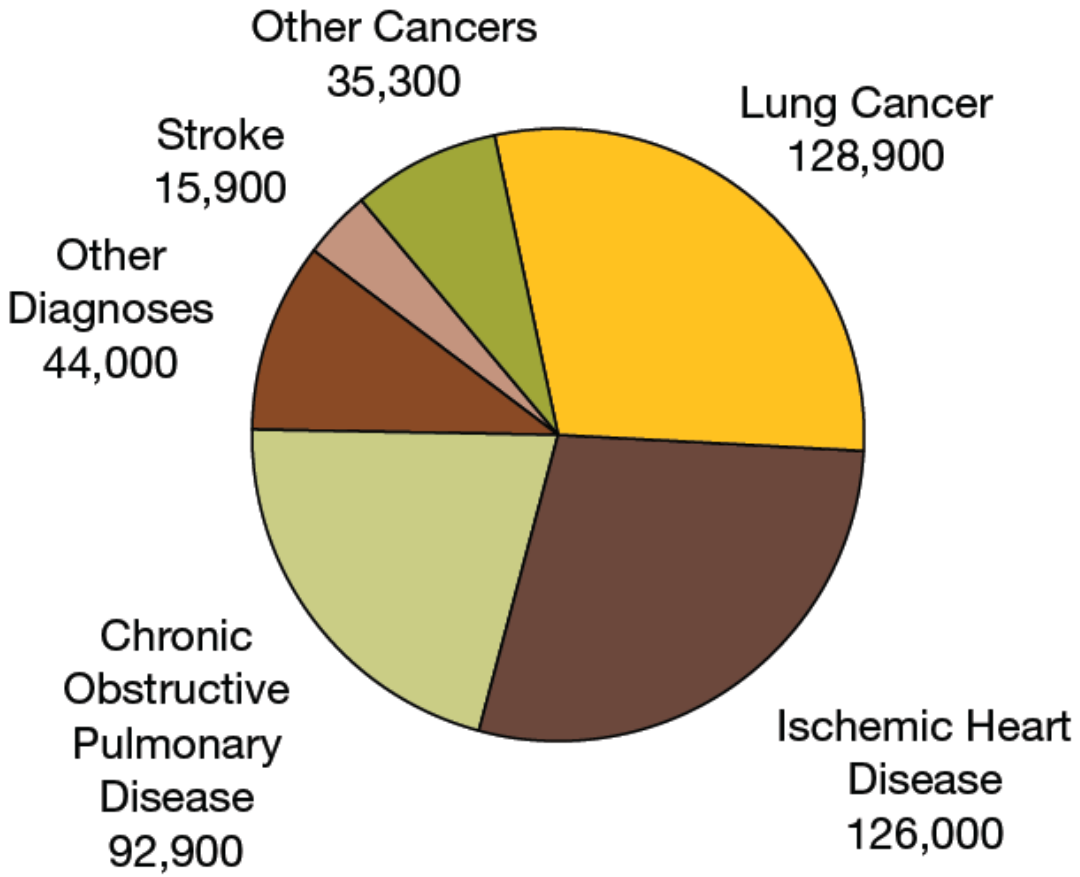






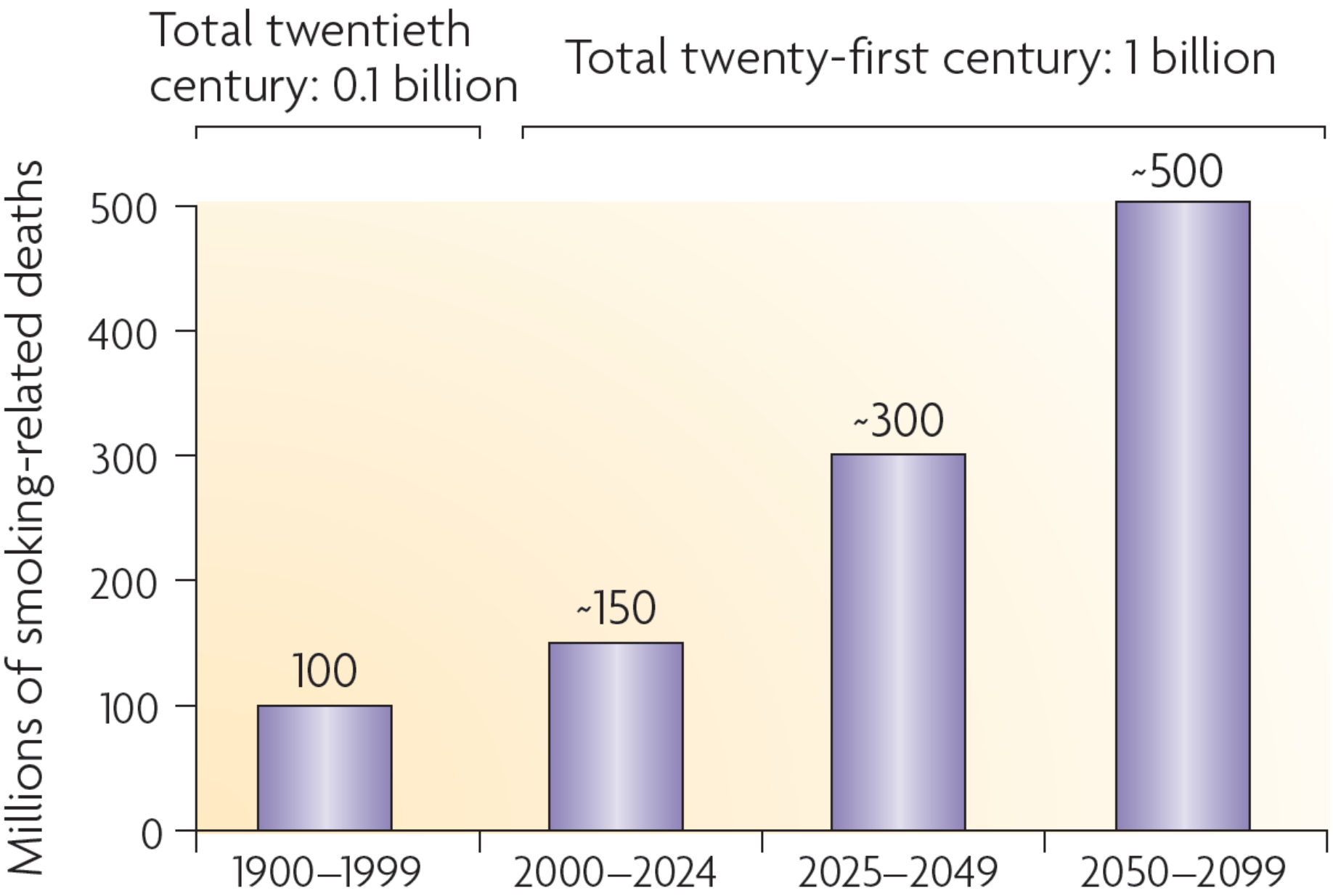


About 443,000 U.S. Deaths Attributable Each Year to Cigarette Smoking*



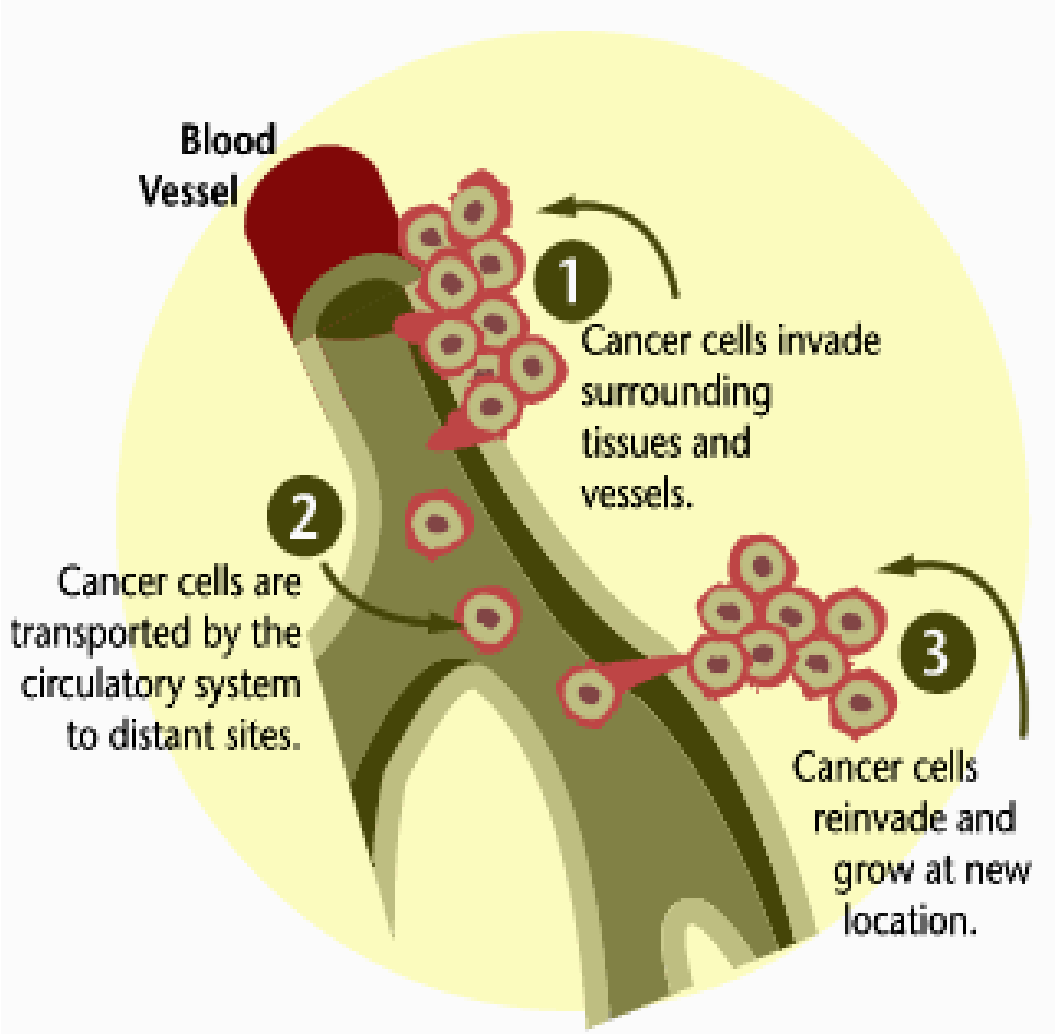
* Average annual number of deaths, 2000–2004. Includes deaths from secondhand smoke.

Source: *MMWR* 2008;57(45):1226–1228.


Total twentieth century: 0.1 billion
Total twenty-first century: 1 billion
Millions of smoking-related deaths
500
400
300
200
100
0
100
~150
~300
~500
1900–1999
2000–2024
2025–2049
2050–2099

How do cancers kill?

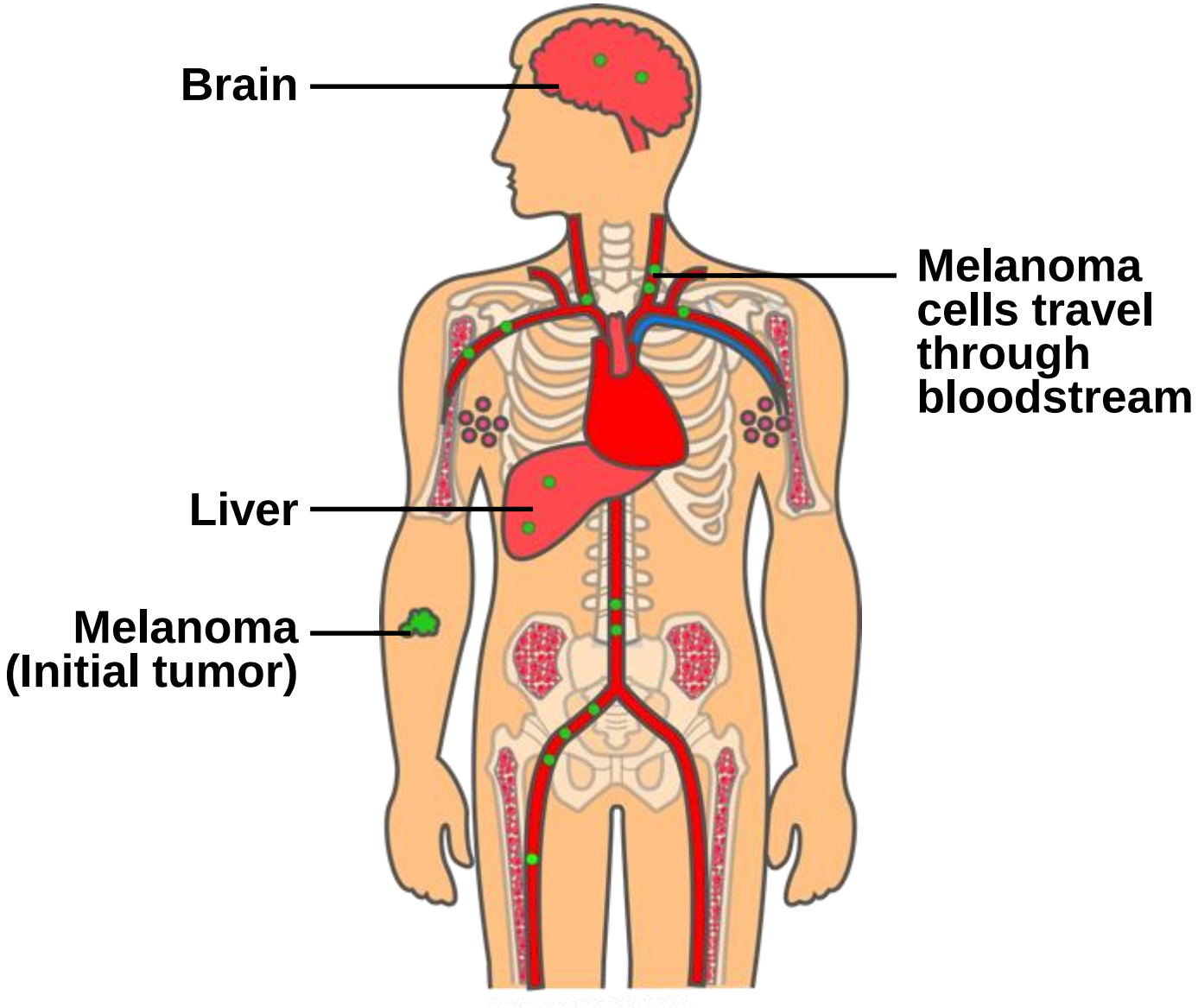
Mechanism: Invasion and Metastasis



- **Abnormal cells proliferate and spread to other parts of the body**
- **Invasion - direct migration and penetration into neighboring tissues**
- **Metastasis - cancer cells penetrate into lymphatic system and blood vessels and spread**

1. **Direct spread into natural cavities. Such as peritoneum, pleura, etc**
2. **Lymphatic spread (via lymphatic vessels)**
3. **Haematogenous spread (via veins)**

Why are malignant tumors dangerous?



Courtesy: National Cancer Institute

Metastatic tropism

Where do they go?

Cells find their way to the target tissue via

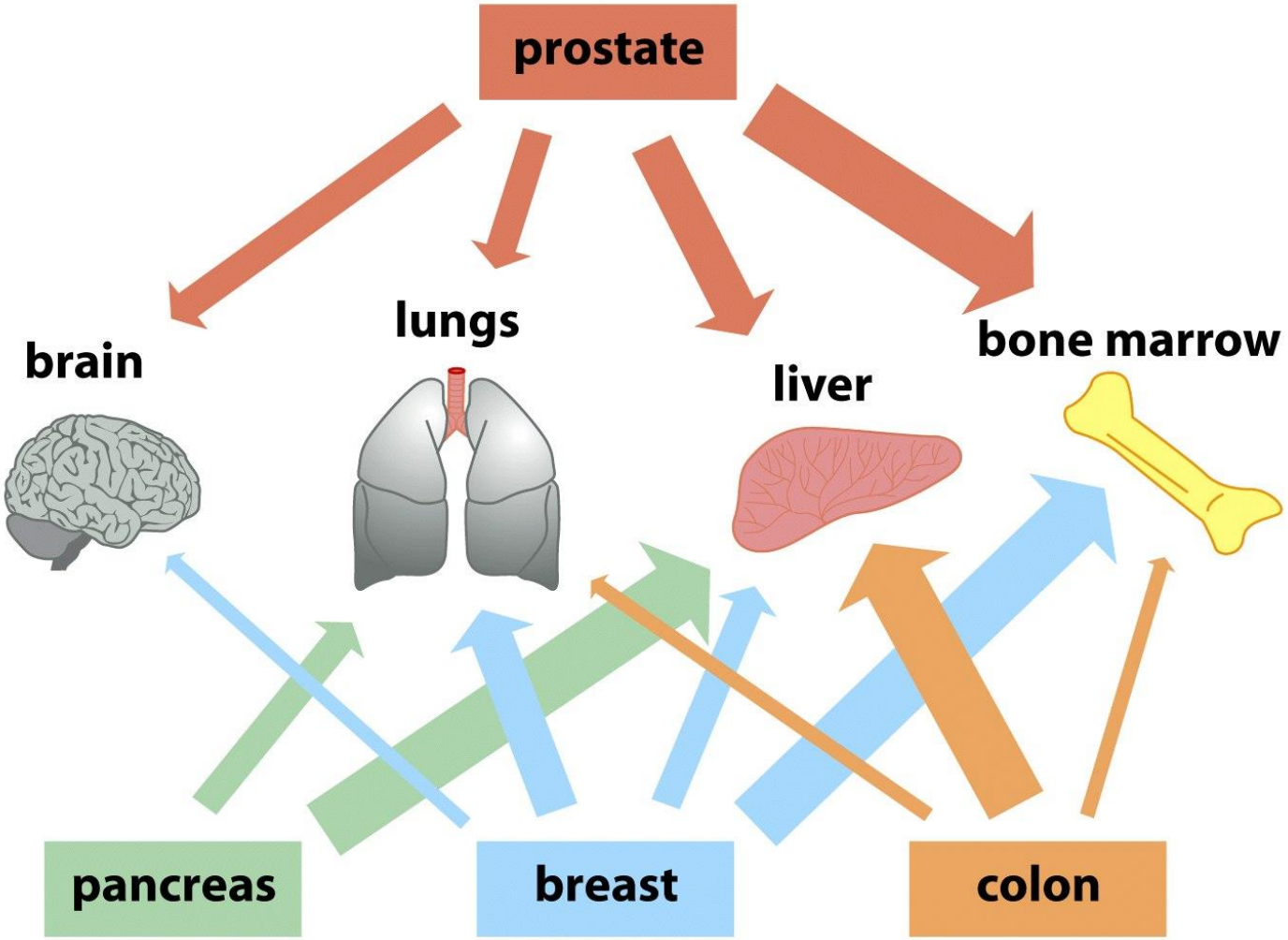
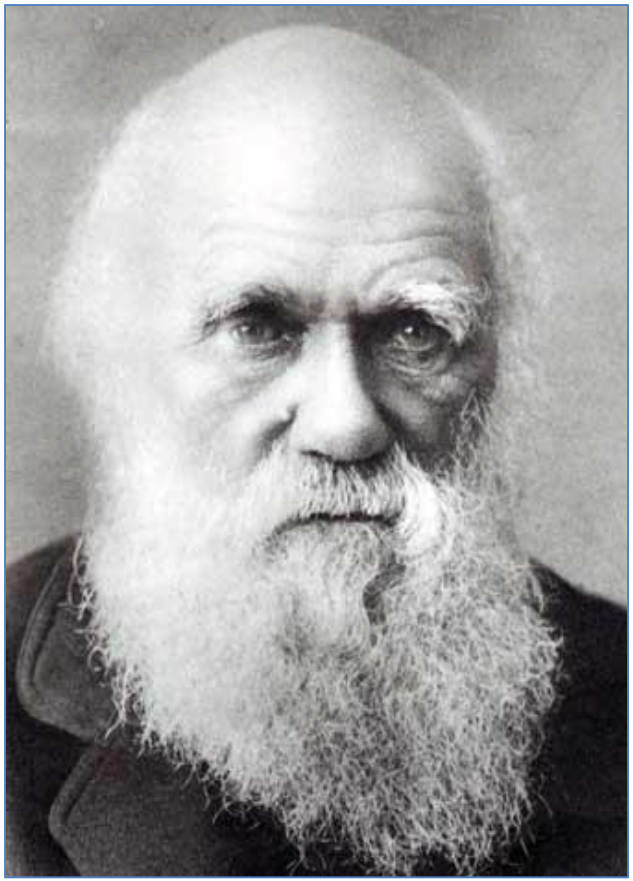


Figure 14.42 *The Biology of Cancer* (© Garland Science 2007)

Cancers *evolve*

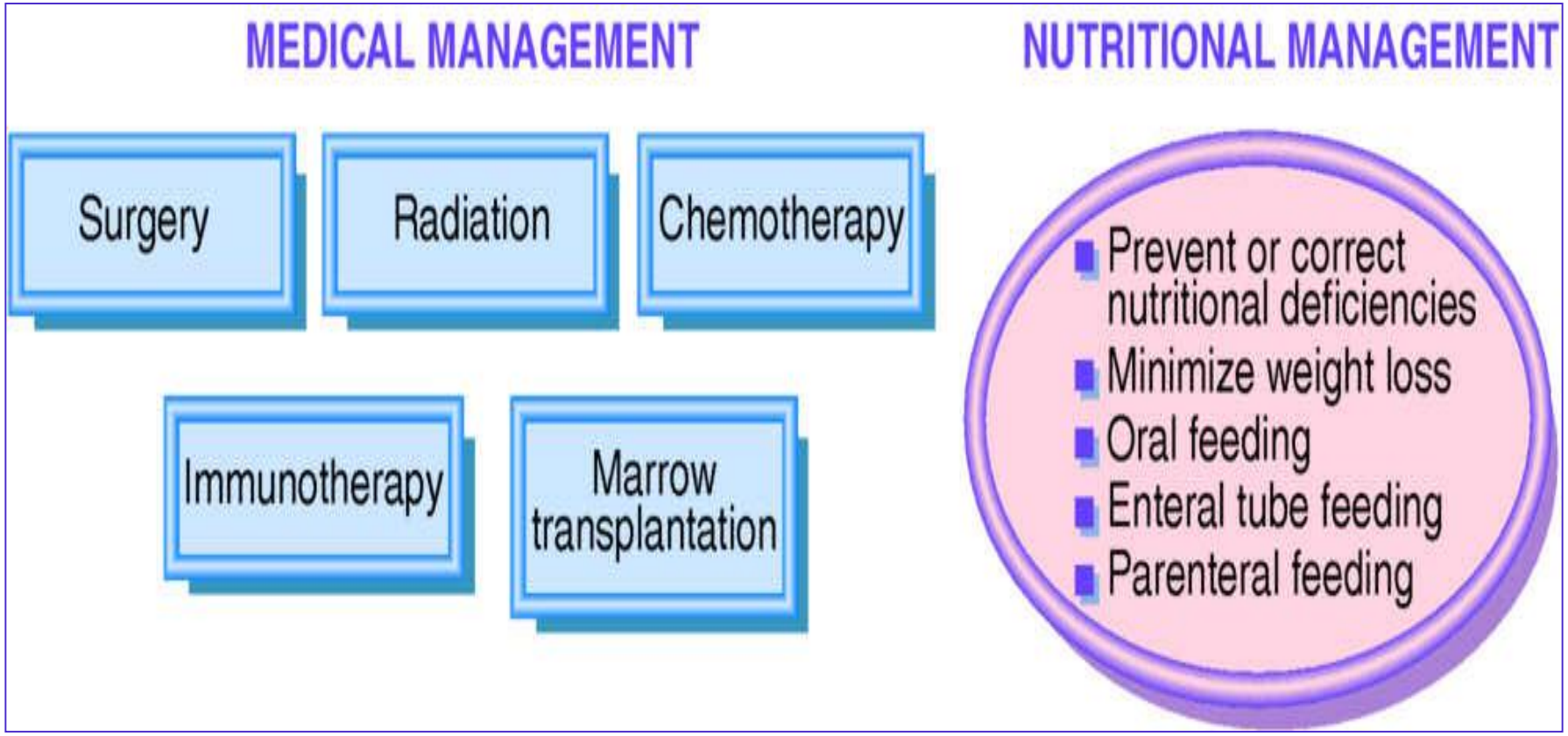
Evolution by natural selection at the organism level - speciation



Evolution by natural selection at the cellular level inside a multicellular body - Cancer

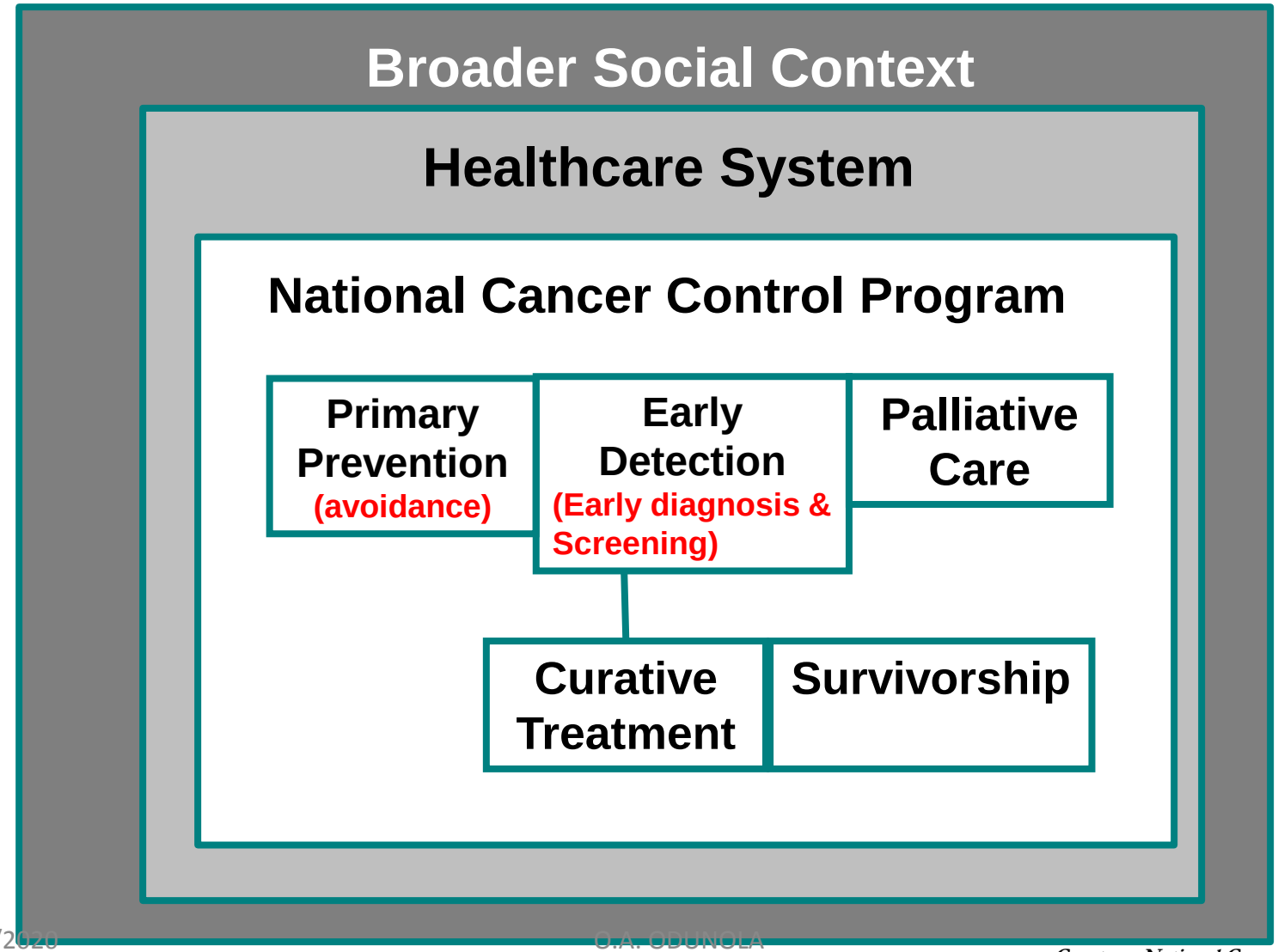
- **"It is not the strongest species that survives, nor the most intelligent, but the one most responsive to change". (Charles Darwin)**
- **"It is not the fastest growing cell clone that survives, nor the most useful to the organism, but the one most adaptable to change". (i.e., changing in the body's environment or therapeutic agents)**

Cancer — Medical and Nutritional Management



Algorithm content developed by John Anderson, PhD, and Sanford C. Garner, PhD, 2000. Courtesy:2004, 2002, Elsevier

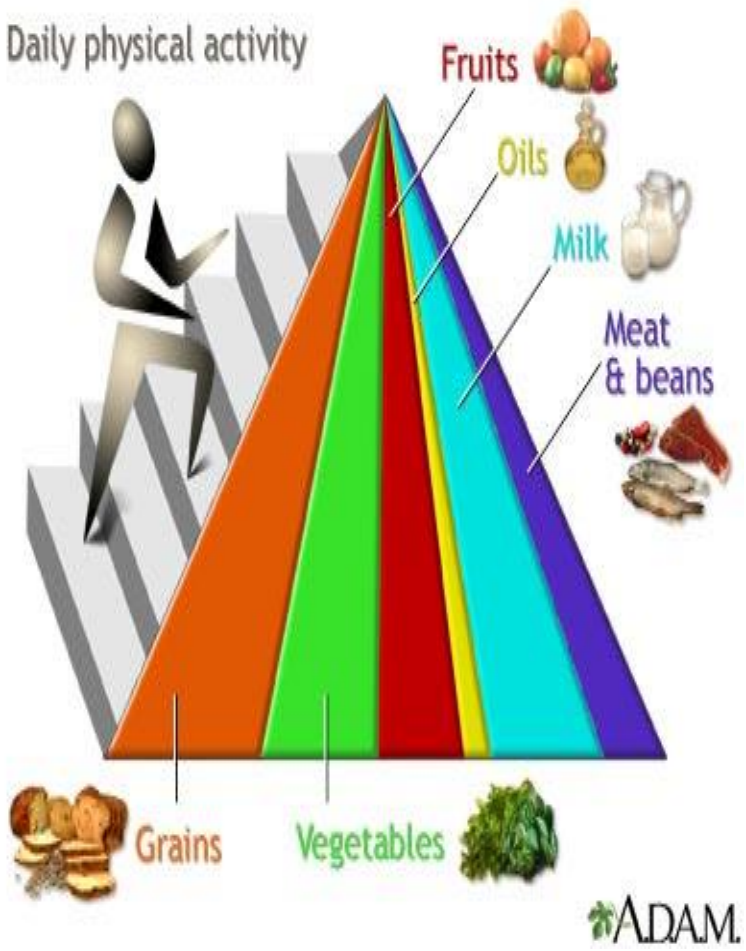
Cancer Prevention and Survival: A National Cancer Control Program in Context



Courtesy: National Cancer Institute (Adapted)

Cancer Prevention

1. **Be active and maintain a healthy weight: Physical activity can help control weight and reduce body fat. Moderate physical activity (such as brisk walking) for at least 30 minutes on 5 or more days each week is recommended.**
2. **2/3 of all cancers may be prevented by Avoiding tobacco, Avoiding/limiting alcohol consumption, Eating adequate fruits and vegetables daily, Knowing family history of cancer, Limiting exposure sun/radiation.**
3. **Choosing healthy food reduces cancer risk by 30 – 40%: Eating a low fat diet (such as butter, whole milk, fried foods, and red meat).**



Why is cancer screening important?

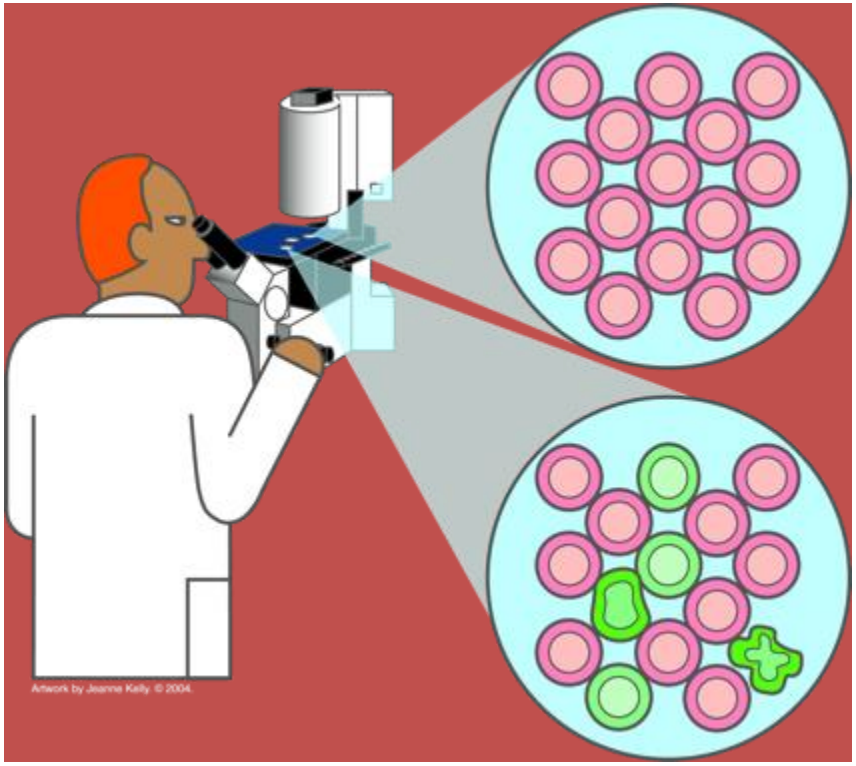
Early Cancer May Not Have Any Symptoms

Screening methods are designed to check for cancer in people with no symptoms.

Courtesy: National Cancer Institute

What are some types of cancer screening?

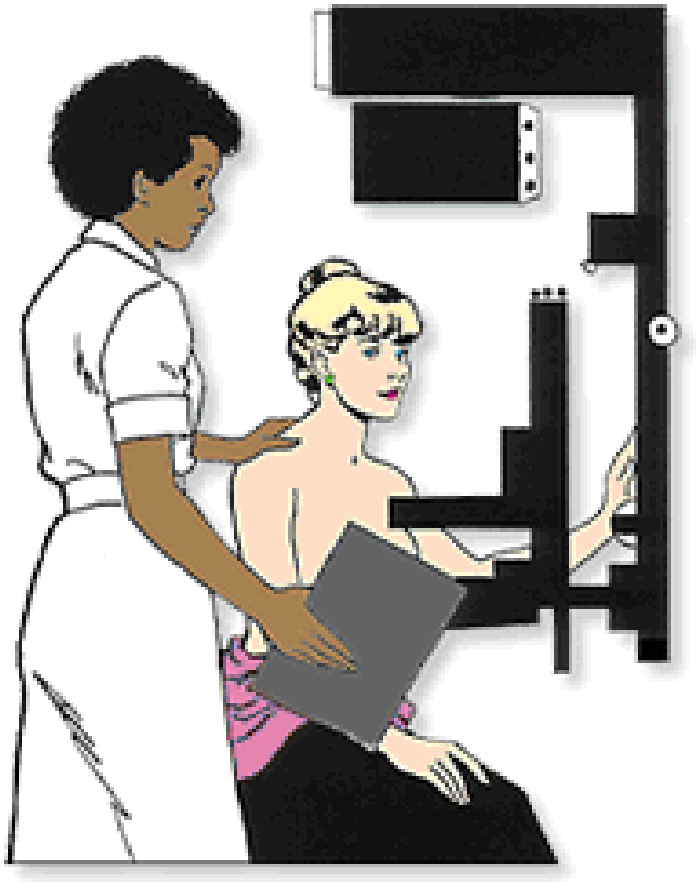
Cervical Cancer Screening (Pap Smear or Pap test)



Normal Pap smear

Abnormal Pap smear

What are some types of cancer screening?



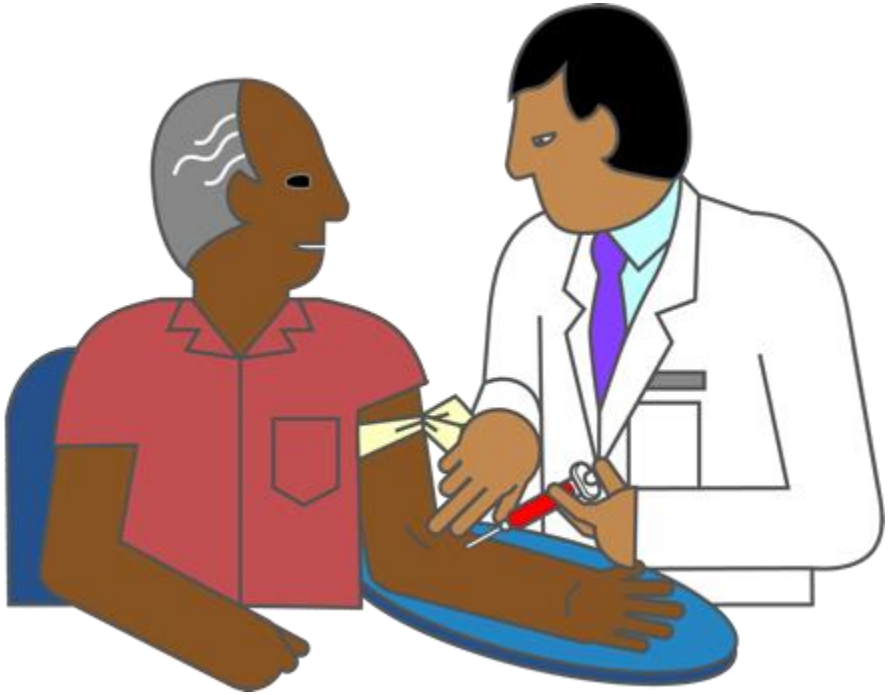
Breast Cancer Screening (Mammogram)

Mammography is most beneficial for women as they age and undergo menopause.

What are some types of cancer screening?

Prostate and Ovarian Cancer Screening

(Blood Tests)



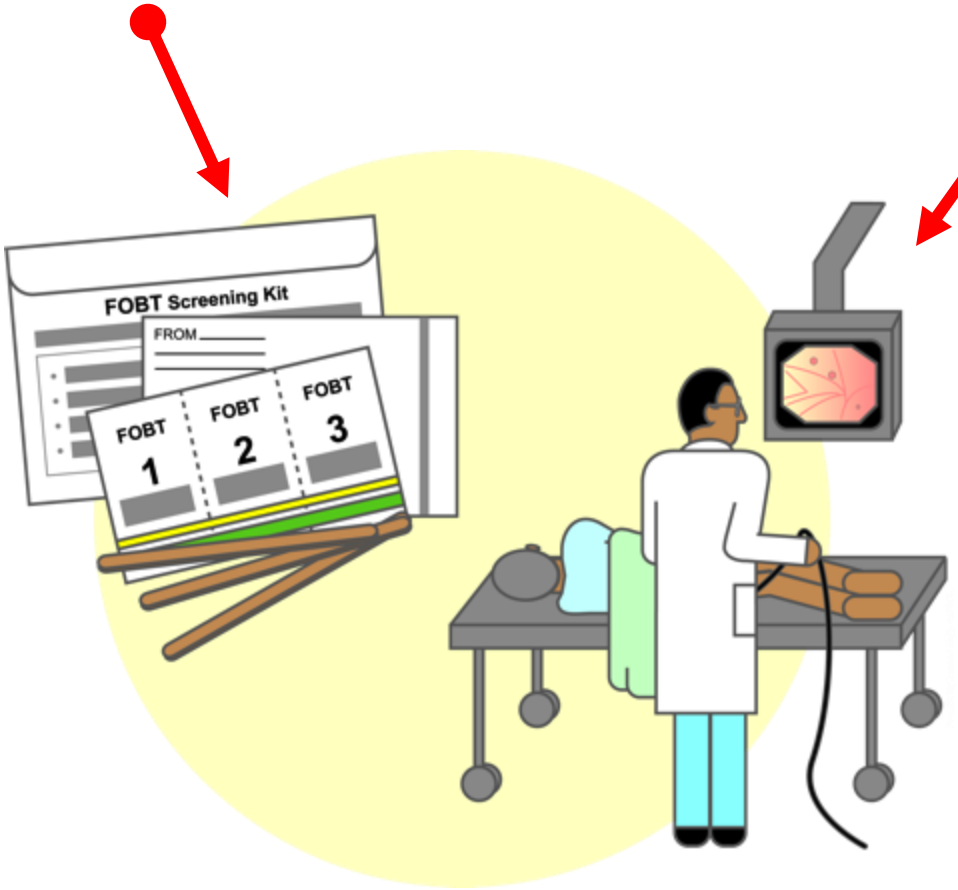
The U.S. Food and Drug Administration has approved the PSA test along with a digital rectal exam to help detect prostate cancer in men age 50 and older. Doctors often use the PSA test and DRE as prostate cancer screening tests; together, these tests can help doctors detect prostate cancer in men who have no symptoms of the disease.

What are some types of cancer screening?

Colon Cancer Screening

Fecal Occult Blood Test and Colonoscopy

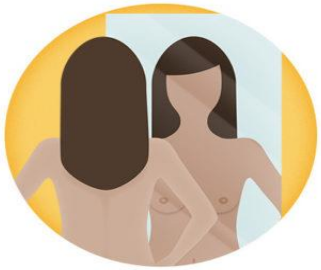
Fecal occult blood test (FOBT) detects invisible amounts of blood in the feces, a possible sign of several disorders, including colon cancer.



Colonoscopy: uses a lighted instrument called a colonoscope to find precancerous or cancerous growths throughout the colon, including the upper part.

Breast self-examination

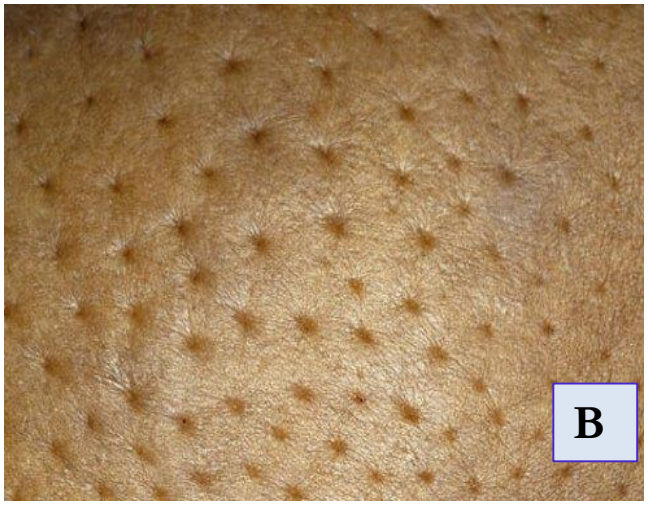
In the shower



In front of a mirror

Lying down

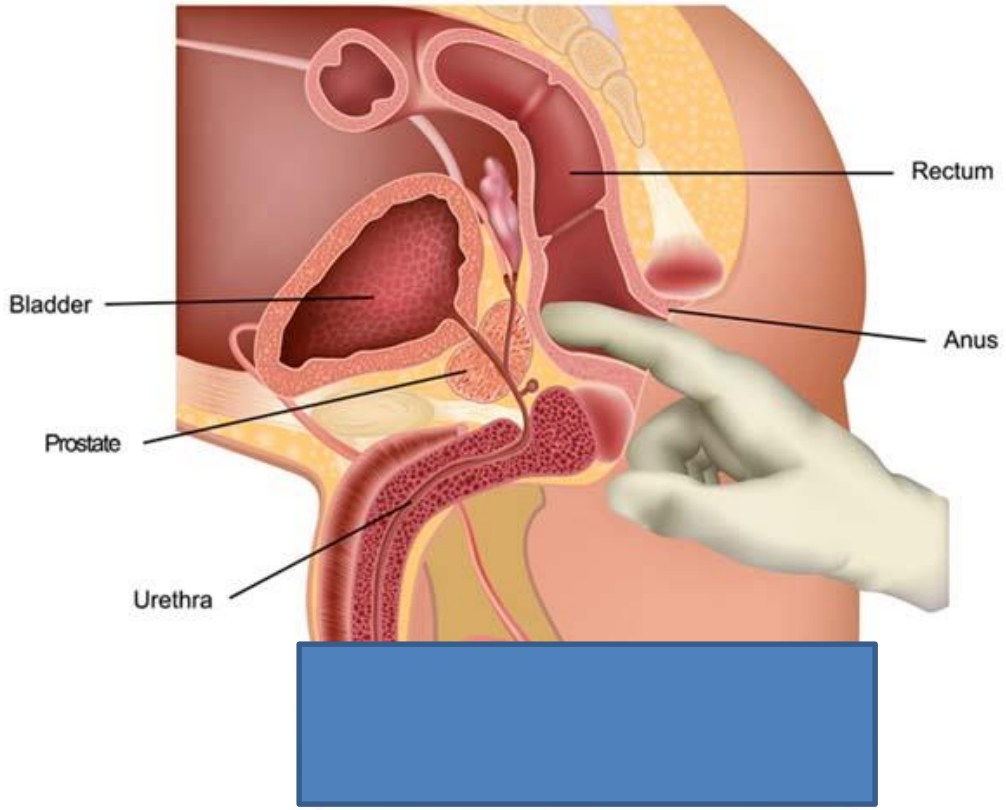
A



B

A - Step-by-Step Breast Self-Examination © *http://notjustoctober.org*
B - Inflammatory-breast-cancer © *https://images.onhealth.com*

Prostrate self-examination



[Prostate Examination © http://www.prostatehealth.online]

Cancer Prevention and Survival: AICR Global Report Recommendations

- Be as lean as possible without becoming underweight.
- Be physically active for at least 30 minutes every day.
- Avoid sugary drinks. Limit consumption of energy-dense foods.
- Eat more of a variety of vegetables, fruits, whole grains and legumes such as beans.
- Limit consumption of red meats (such as beef, pork and lamb) and avoid processed meats.
- If consumed at all, limit alcoholic drinks to 2 for men and 1 for women a day.
- Limit consumption of salty foods and foods processed with salt (sodium).
- Don't use supplements to protect against cancer.
- It is best for mothers to breastfeed exclusively for up to 6 months to reduce breast cancer in mother and obesity in child
- **After treatment, cancer survivors should follow the recommendations for cancer prevention.**

Some References

- **Prickril B. NCI's International Perspective, International Programs Officer, Office of International Affairs, National Cancer Institute.**
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- *Free Online Medical Transcription Training.* http://ishwaryatechnosolutions.com/cancer.aspx
- http://www.who.int/topics/cancer/en
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Thank You!