

Cancer Today: Same Disease, New Hope

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Reflection: What brought you here?



Who We Are



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Course Learning Objectives

- Discuss the idea that cancer is not one disease, but many
- Describe the genetic and environmental causes of cancer
- Describe the process of cancer diagnosis and characterization
- Discuss the variety of cancer treatments currently available
- Discuss key considerations after completing cancer treatment
- Describe new developments in the field of hematology/oncology

Course Outline

- 2/22: **What is cancer?**
- 3/1: **What causes cancer?**
- 3/8: **How is cancer diagnosed?**
- 3/15: **How is cancer treated?**
- 3/22: **What happens after?**
- 3/29: **What are the newest developments?**

Each session is 90 mins (7-8:30 pm PT), including 20 mins for Q&A.

Outline for today's session: **What is cancer?**

- Course intro (10 mins)
- Lecture: What is cancer? (30 mins)
- Panel of hematologists/oncologists (30 mins)
- Q&A (20 mins)

Welcome!



Roadmap Today 2/22/22: What is cancer?

- What is cancer?
- Cancer in 2022
- Key terms
- What causes cancer?
- Workup and detection of cancer
- Modalities to treat cancer in 2022.
- Moving forward after cancer treatment.
- What is next in cancer discovery and treatment?

Definition of “cancer”

cancer noun



can·cer | \ 'kan(t)-sər \

Definition of cancer

1 capitalized

a : a northern zodiacal constellation between Gemini and Leo

b (1) : the fourth sign of the zodiac in astrology
— see [SIGNS OF THE ZODIAC TABLE](#)

(2) : one born under the sign of Cancer
// I'm a Taurus, but my best friend is a Cancer.

2 [Latin, crab, cancer]

a : a malignant tumor of potentially unlimited growth that expands locally by invasion and systemically by [metastasis](#)

b : an abnormal bodily state marked by such tumors

3 : something evil or malignant that spreads destructively
// the cancer of hidden resentment
— *Irish Digest*

4 a : an enlarged tumorlike plant growth (such as that of crown gall)

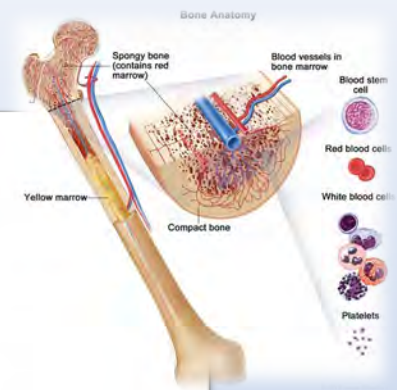
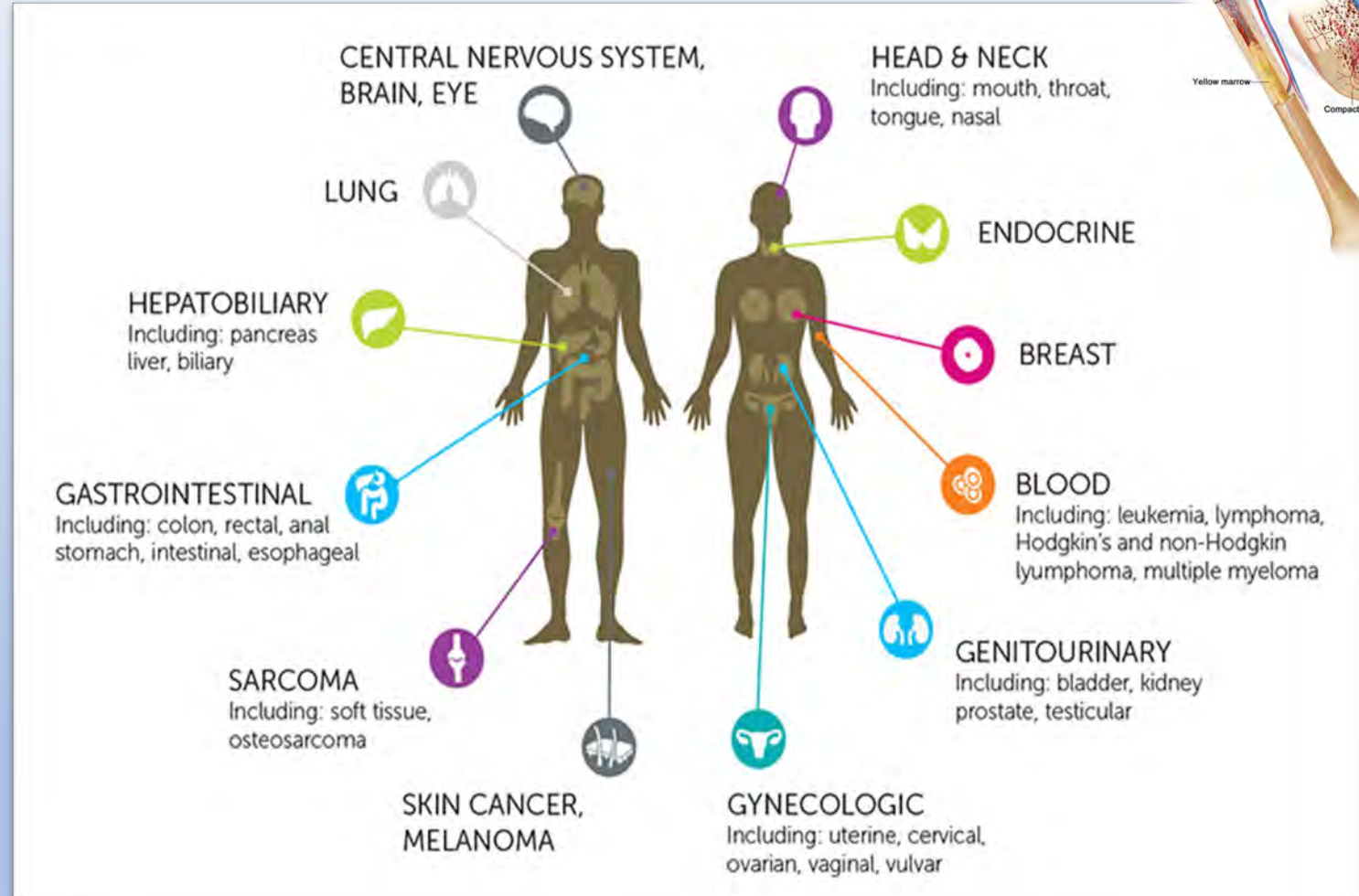
b : a plant disease marked by such growths

- The **Latin** word **cancer**, meaning “**crab**,” was also **given as a name to several diseases**.
- One of the diseases was the abnormal, spreading mass of tissue we call a **tumor**.
- A possible explanation for this is that the Romans thought some tumors looked like many-legged crabs.

Cancer is a group of >200 diseases

- Originate from different parts of the body

- Lung
- Colon
- Breast
- Prostate
- Skin
- Brain
- Bone marrow
- Lymph nodes



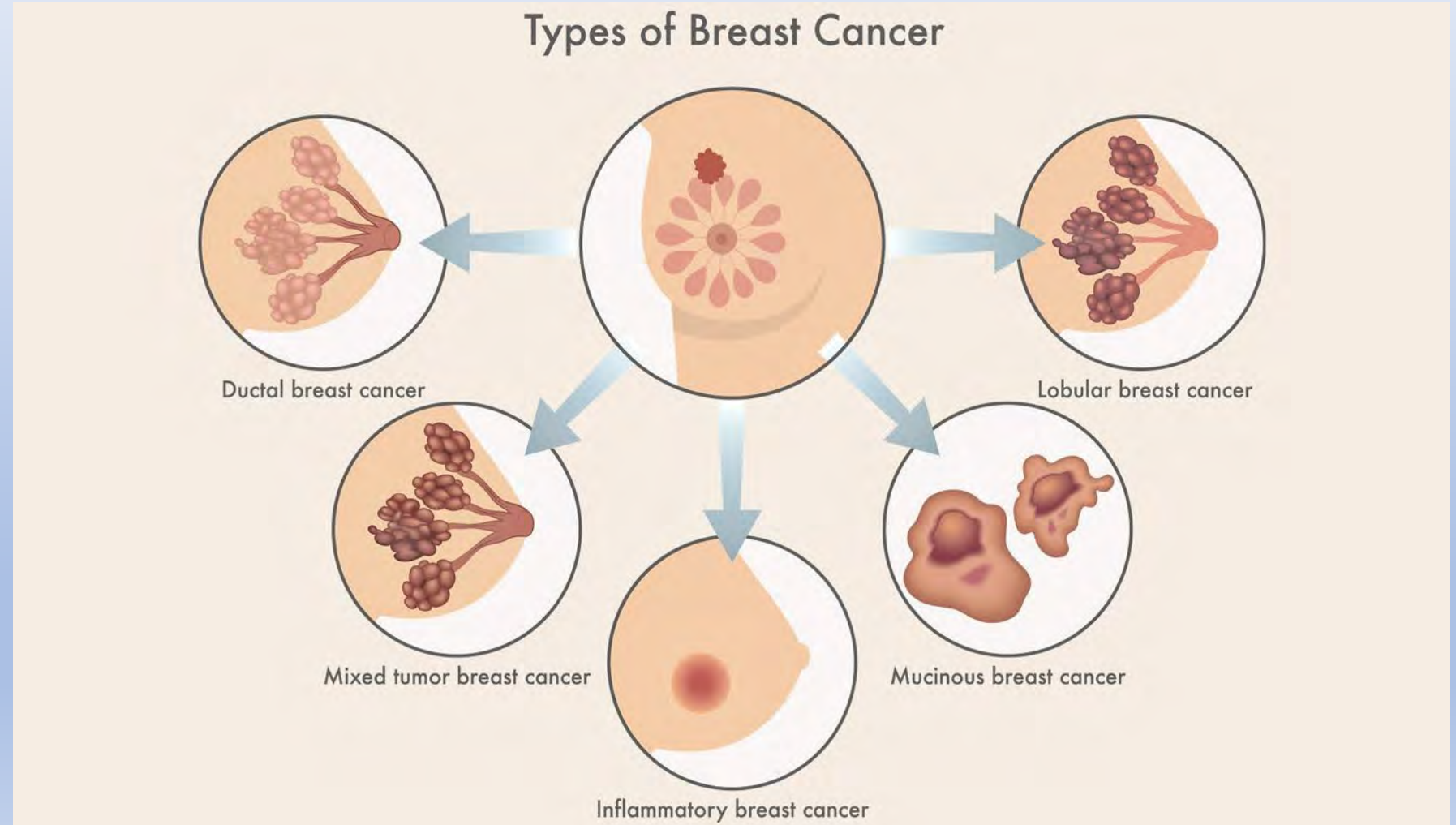
What is cancer?

Different subtypes from each organ

- Named from the 'cell of origin'

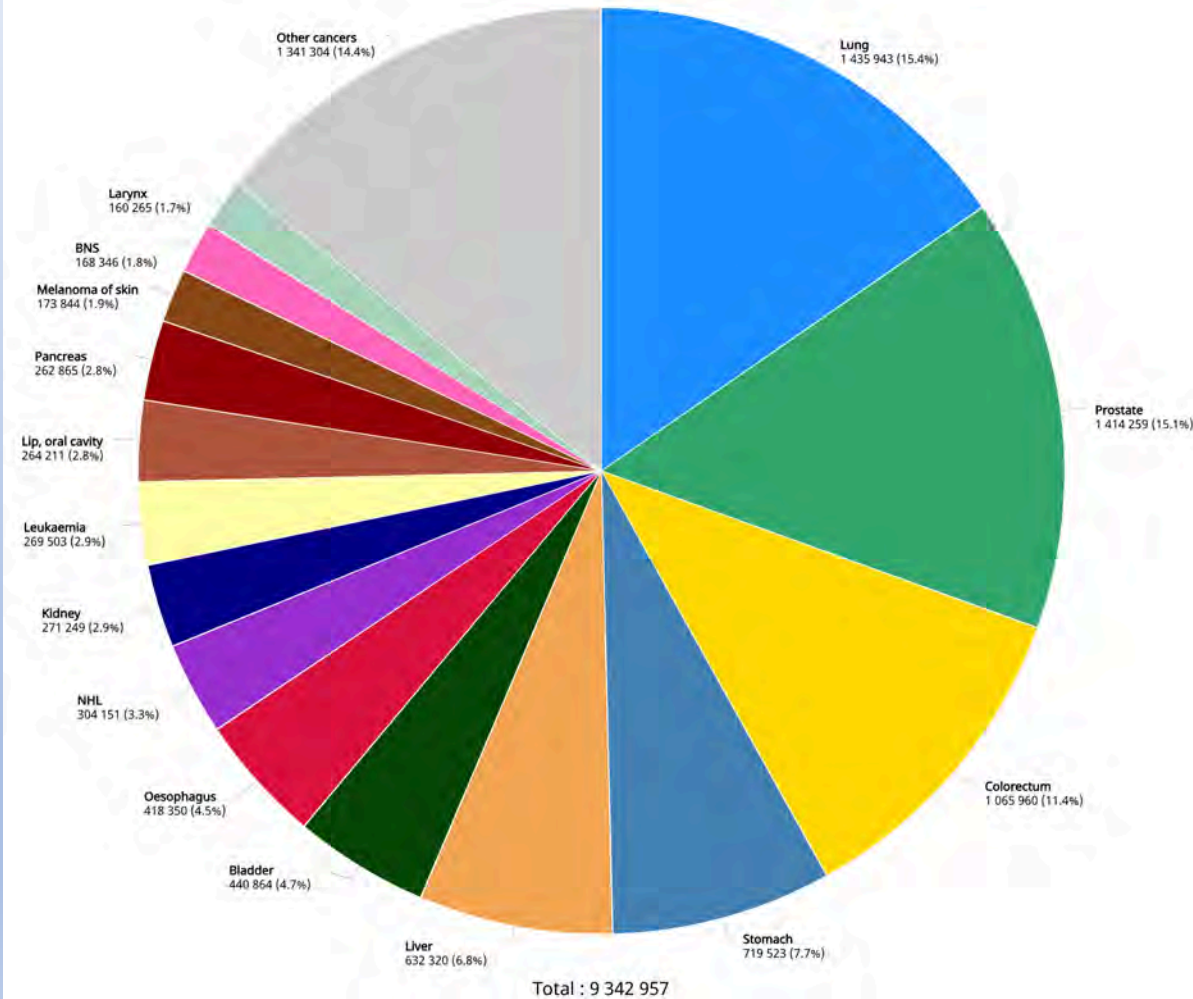
Breast (*example*)

- Ductal
- Lobular
- Mixed
- Inflammatory
- Mucinous



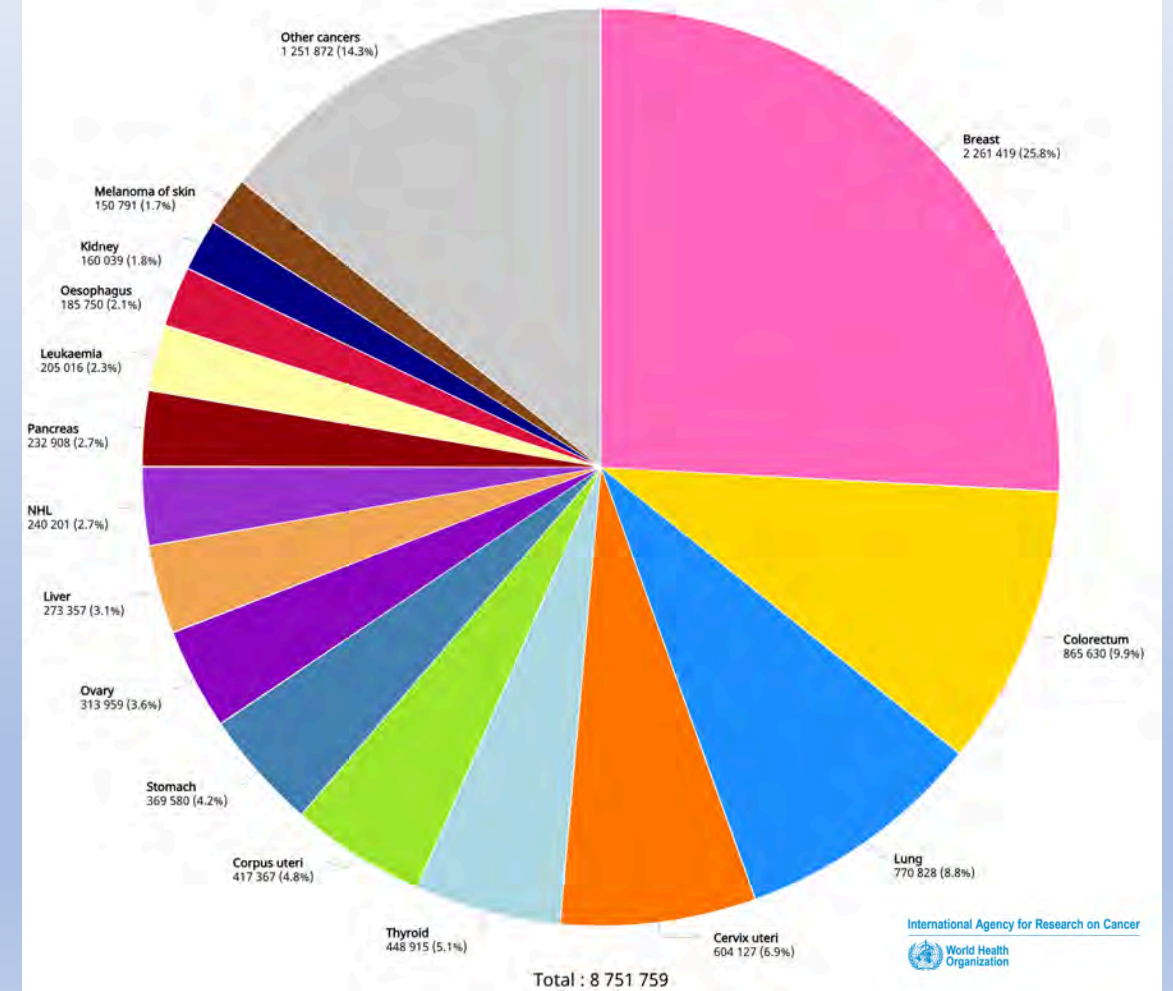
Cancer in 2020's, worldwide

Estimated number of new cases in 2020, worldwide, males, all ages (excl. NMSC)



males



Estimated number of new cases in 2020, worldwide, females, all ages (excl. NMSC)



females

Cancer in 2020's, USA

Estimated New Cases

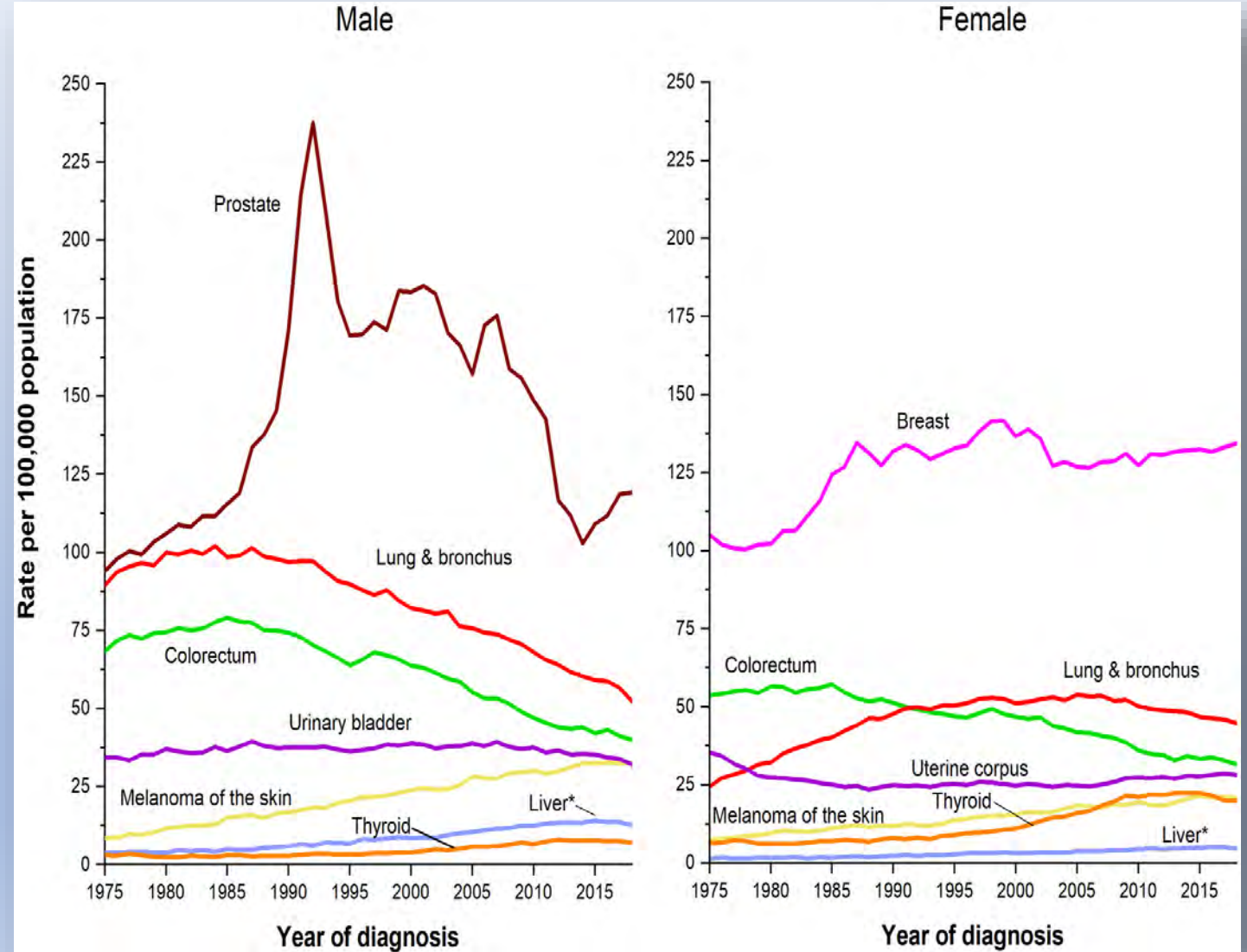
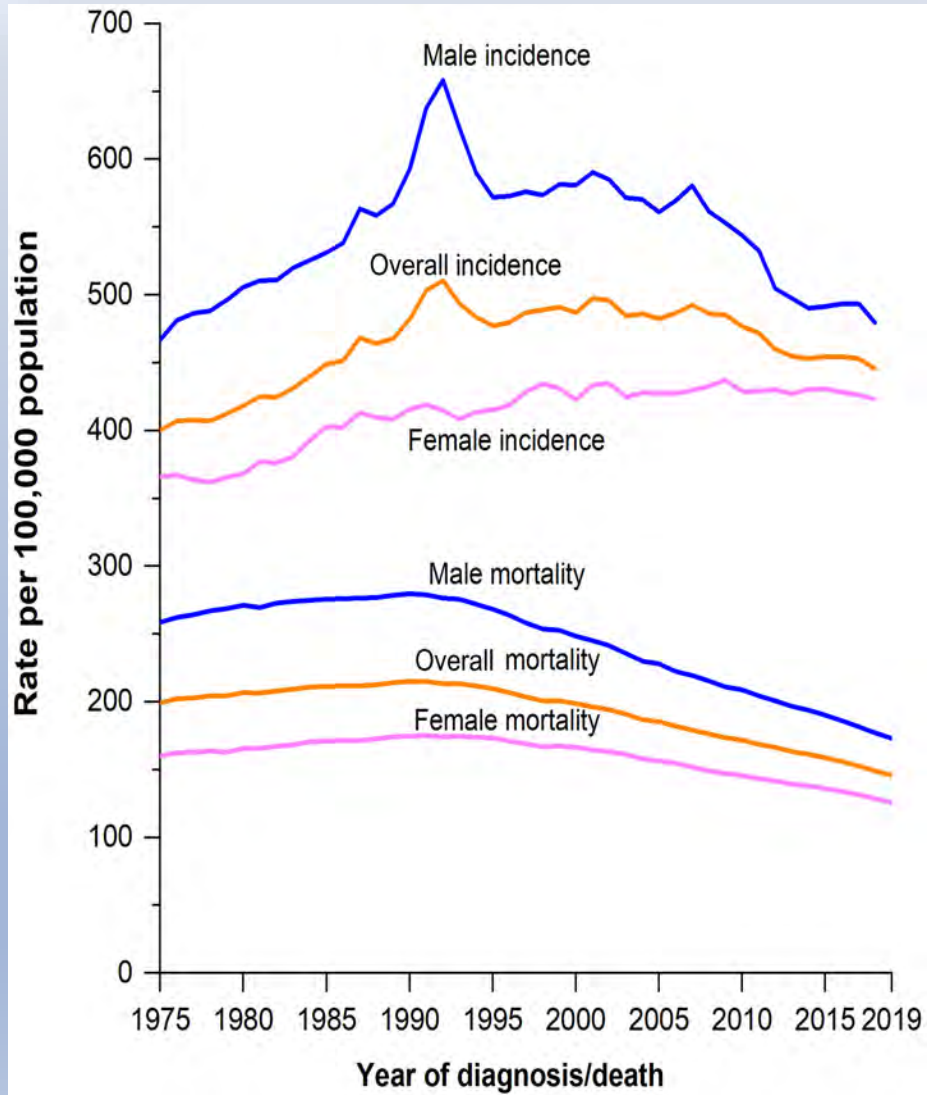
			Males	Females			
Prostate	191,930	21%			Breast	276,480	30%
Lung & bronchus	116,300	13%			Lung & bronchus	112,520	12%
Colon & rectum	78,300	9%			Colon & rectum	69,650	8%
Urinary bladder	62,100	7%			Uterine corpus	65,620	7%
Melanoma of the skin	60,190	7%			Thyroid	40,170	4%
Kidney & renal pelvis	45,520	5%			Melanoma of the skin	40,160	4%
Non-Hodgkin lymphoma	42,380	5%			Non-Hodgkin lymphoma	34,860	4%
Oral cavity & pharynx	38,380	4%			Kidney & renal pelvis	28,230	3%
Leukemia	35,470	4%			Pancreas	27,200	3%
Pancreas	30,400	3%			Leukemia	25,060	3%
All Sites	893,660	100%			All Sites	912,930	100%

Cancer in 2020's



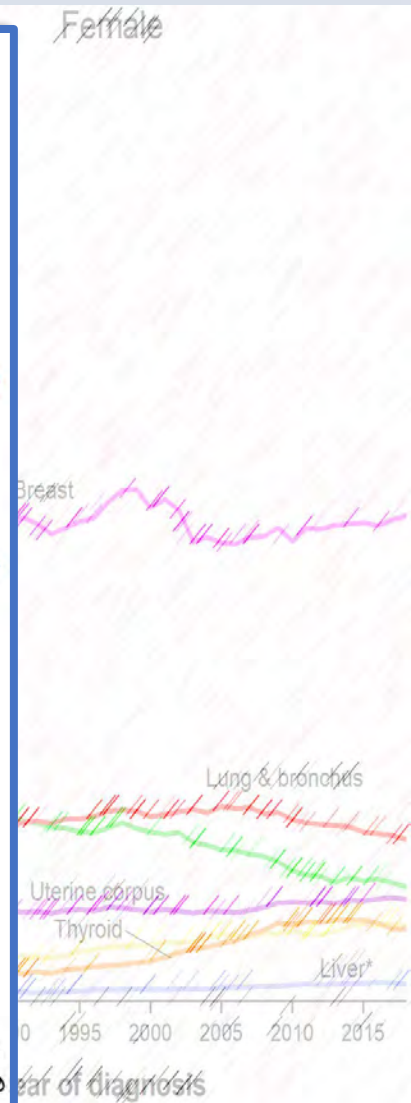
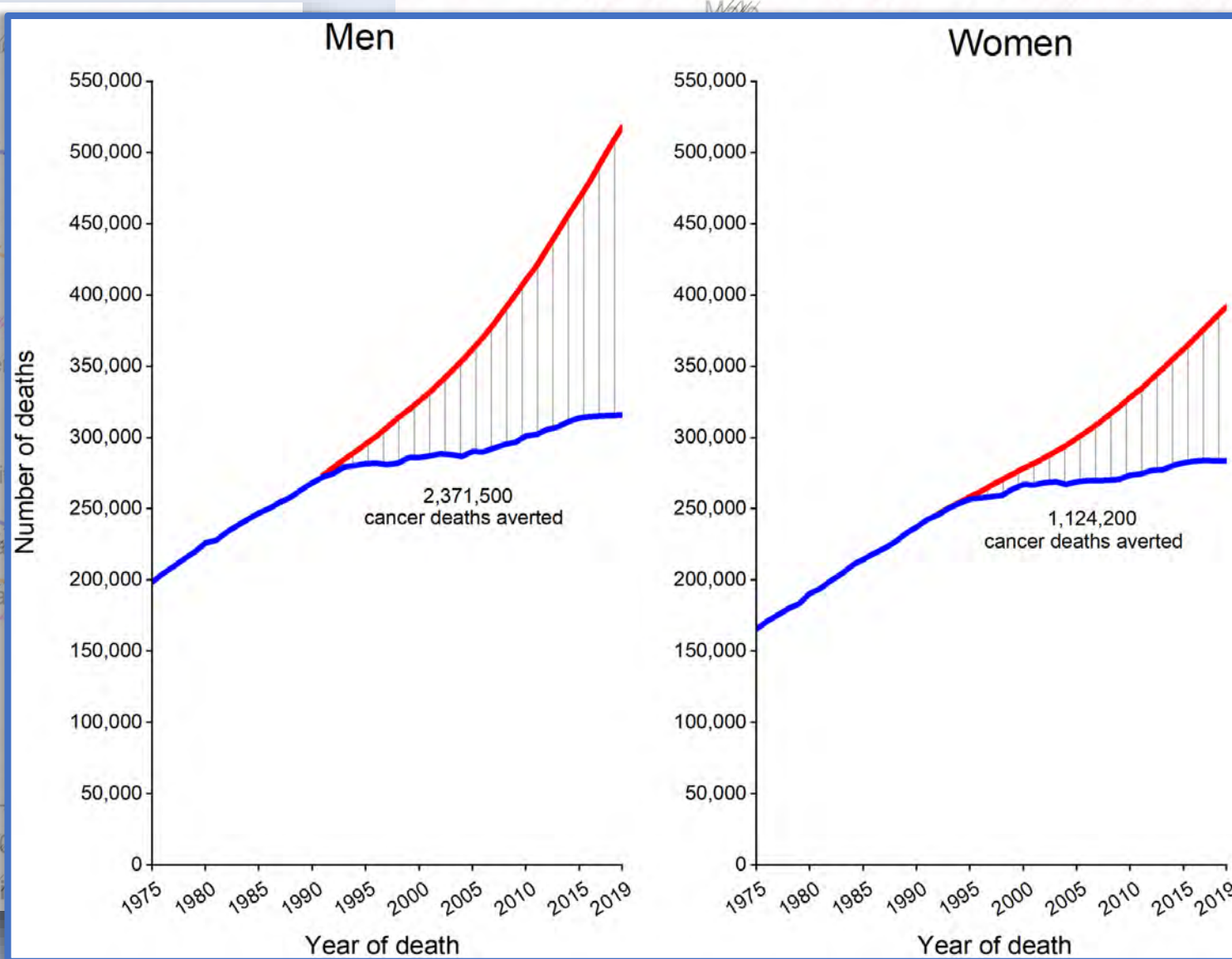
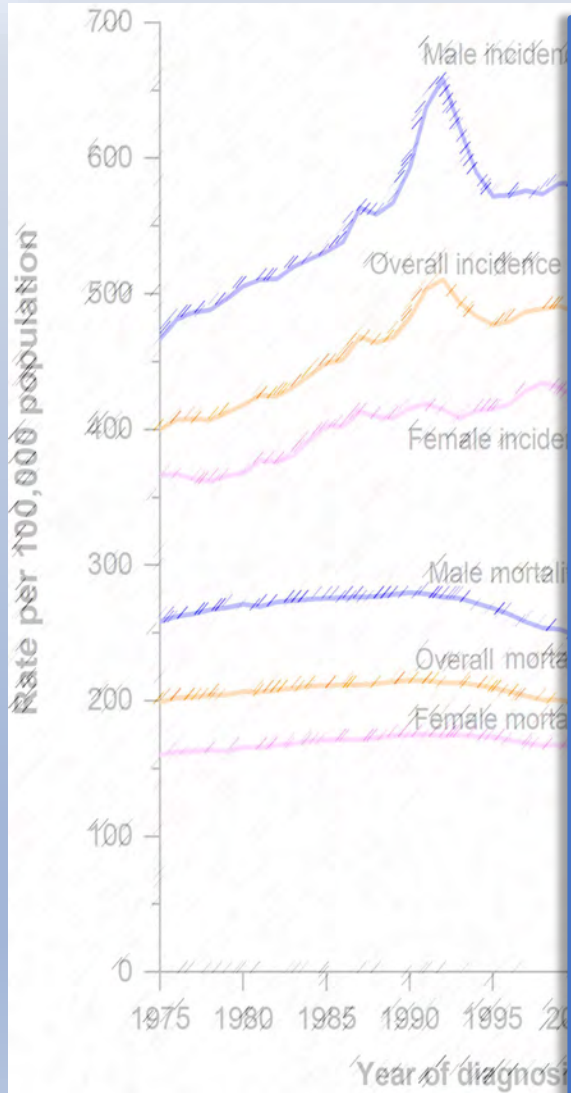
Cancer in 2020's, USA

SEER database



Cancer in 2020's, USA

SEER database



Key terms

Cancer	a group of diseases which cause cells in the body to change and grow out of control
Tumor	an abnormal lump or mass of tissue. Tumors can be benign (not cancer) or malignant (cancer)
Benign Tumor	an abnormal growth that is not cancer and does not spread to other areas of the body
Malignant Tumor	a mass of cancer cells that may invade nearby tissues or spread (metastasize) to distant areas of the body
Metastatic	cancer that has spread from a primary site (where it started) to other organs
Biopsy	the removal of a sample of tissue
Chemotherapy	treatment that kills cancer cells
Immunotherapy	treatment that use the body's immune system to fight cancer.
Monoclonal Antibody Therapy	lab-made antibodies designed to target unique cell surface antigens (cancer specific)

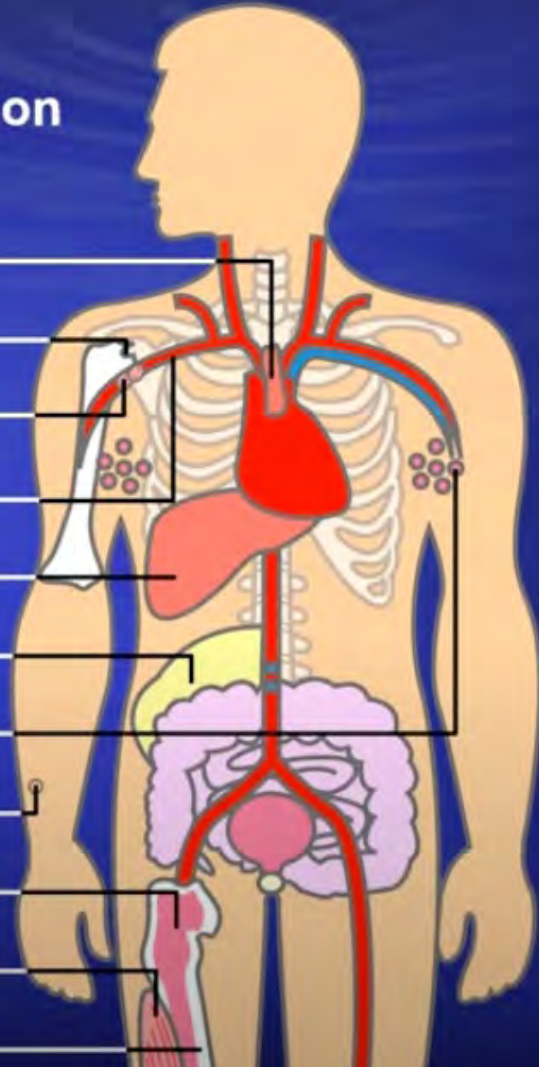
Key terms

Solid Tumor Oncology	study of solid tumors
Malignant Hematology	study of cancers of blood or lymphatic system – also known as liquid tumors
Carcinomas	solid cancers that occur from the skin or tissues that line internal organs.
Sarcomas	solid cancers that occur from the bone, cartilage, fat, muscle, blood vessels, or other connective tissue.
Leukemias	liquid cancers from the cells of the blood and bone marrow.
Lymphomas	‘liquid’ cancers from the cells of the immune system and typically appear within the lymphatic system.

Key terms: Naming Cancers

Cancer Prefixes Point to Location

<i>Prefix</i>	<i>Meaning</i>
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

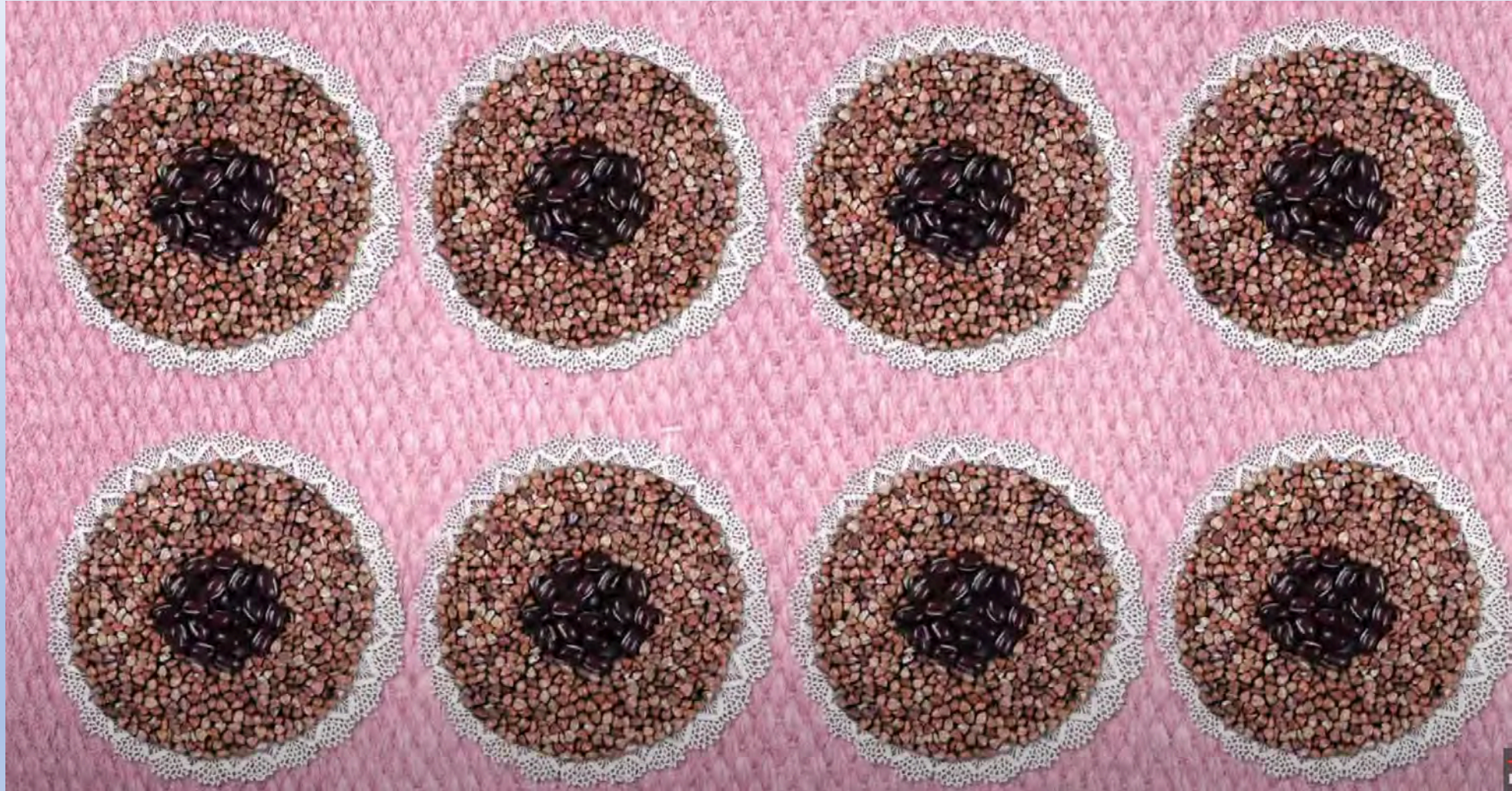


The diagram shows a human torso with various internal organs and structures. Lines connect the prefixes in the table to their corresponding locations in the body: adeno- points to the thyroid gland; chondro- points to the cartilage of the rib cage; erythro- points to the red blood cells in the bloodstream; hemangio- points to the heart and major blood vessels; hepato- points to the liver; lipo- points to the yellow adipose tissue; lympho- points to the lymphatic system; melano- points to the skin; myelo- points to the bone marrow in the spine; myo- points to the skeletal muscle; and osteo- points to the bones.

What causes cancer?



What causes cancer?



What causes cancer?



What causes cancer?

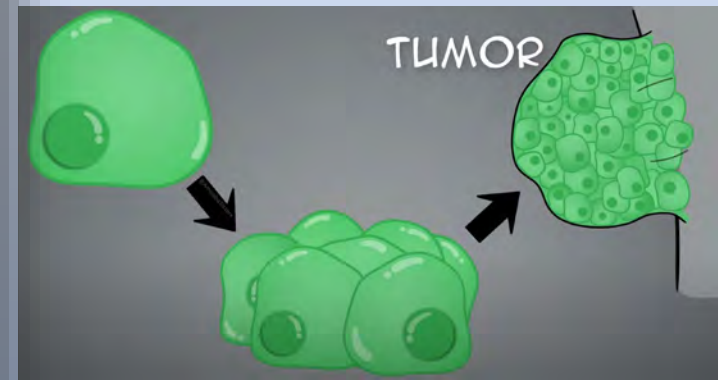
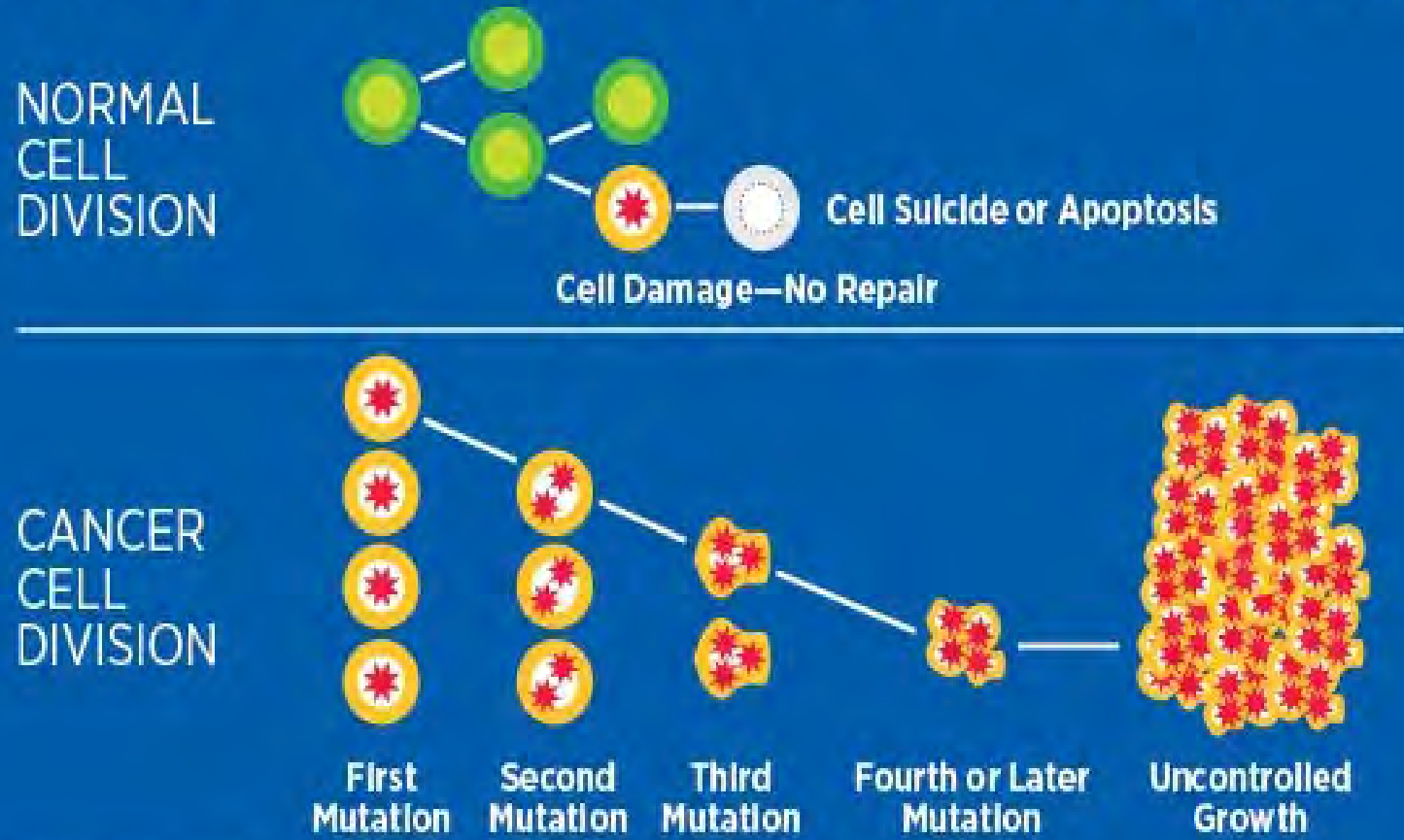


What causes cancer?



What causes cancer?

LOSS OF NORMAL GROWTH CONTROL



Adapted from the National Cancer Institute

What causes cancer?

Chemical or Environmental Factors

- Tobacco > Lung cancer
- Sun exposure (UV radiation) > Squamous cell carcinoma of the skin
- Radiation exposure (Chernobyl) > many types of carcinomas
- Asbestos exposure > Mesothelioma
- Alcohol > Squamous cell carcinoma of the esophagus

What causes cancer?

Viral Factors

- Human Papilloma Virus (HPV) > Cervical Cancer
- Epstein-Barr virus (EBV) > Nasopharyngeal cancer, Non-Hodgkin Lymphoma
- Hepatitis B Virus (HBV) > Hepatocellular carcinoma
- Human Immunodeficiency Virus (HIV) > Kaposi's Sarcoma

What causes cancer?

Genetic mutations that are **inherited** - one is **born** with (**germline**) (~5-10%)

- BRCA1 and BRCA2 mutation > Breast, Ovarian, Pancreatic Cancers
- DNA Mismatch Repair Genes > Lynch-Syndrome with Colo-Rectal Cancers
- TP53 mutation > Li-Fraumeni Syndrome

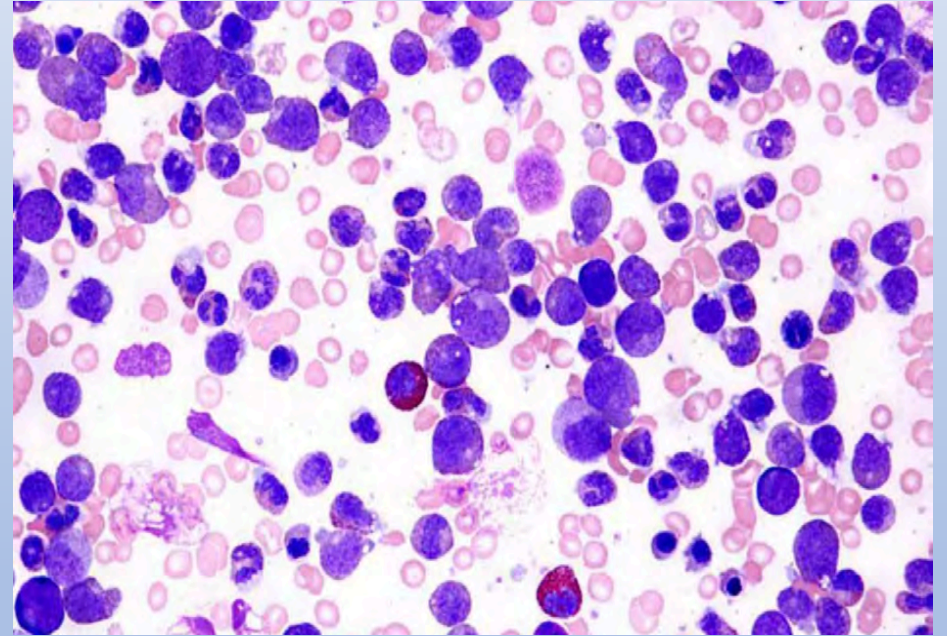
What causes cancer?

Genetic mutations that are **randomly acquired (somatic)** in an individual cell; not hereditary

- **The most common cause of cancer**

How do you get a diagnosis of Cancer?

Tissue is the Issue

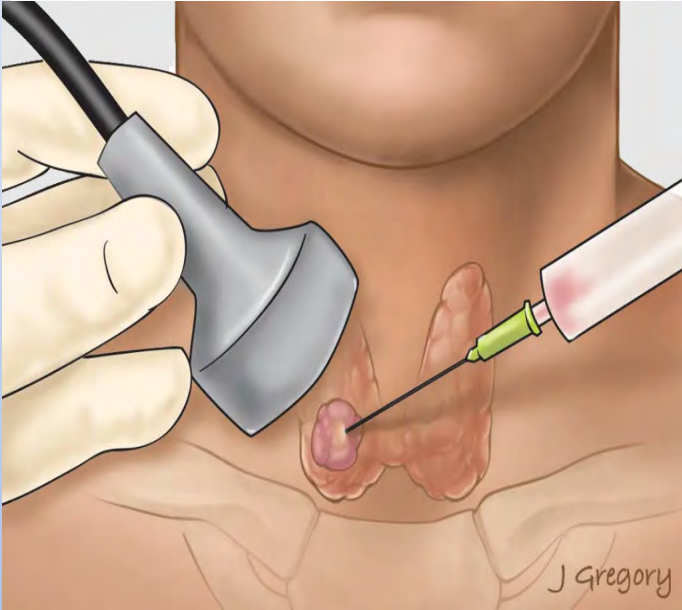


How do you get a diagnosis of Cancer?

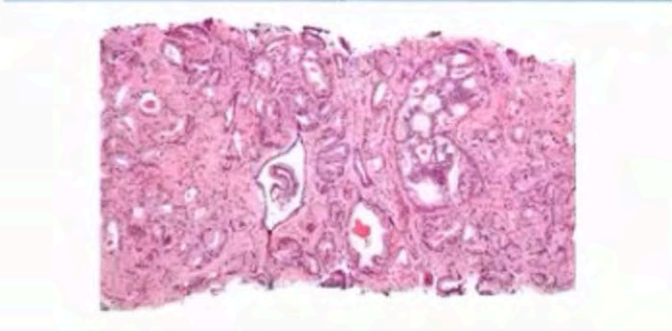


How is 'tissue' obtained?

Fine Needle



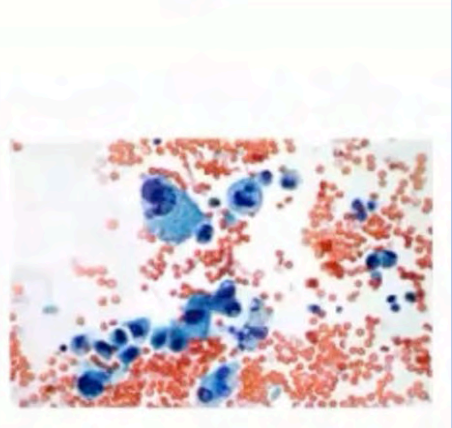
Core Needle



Surgical Biopsy

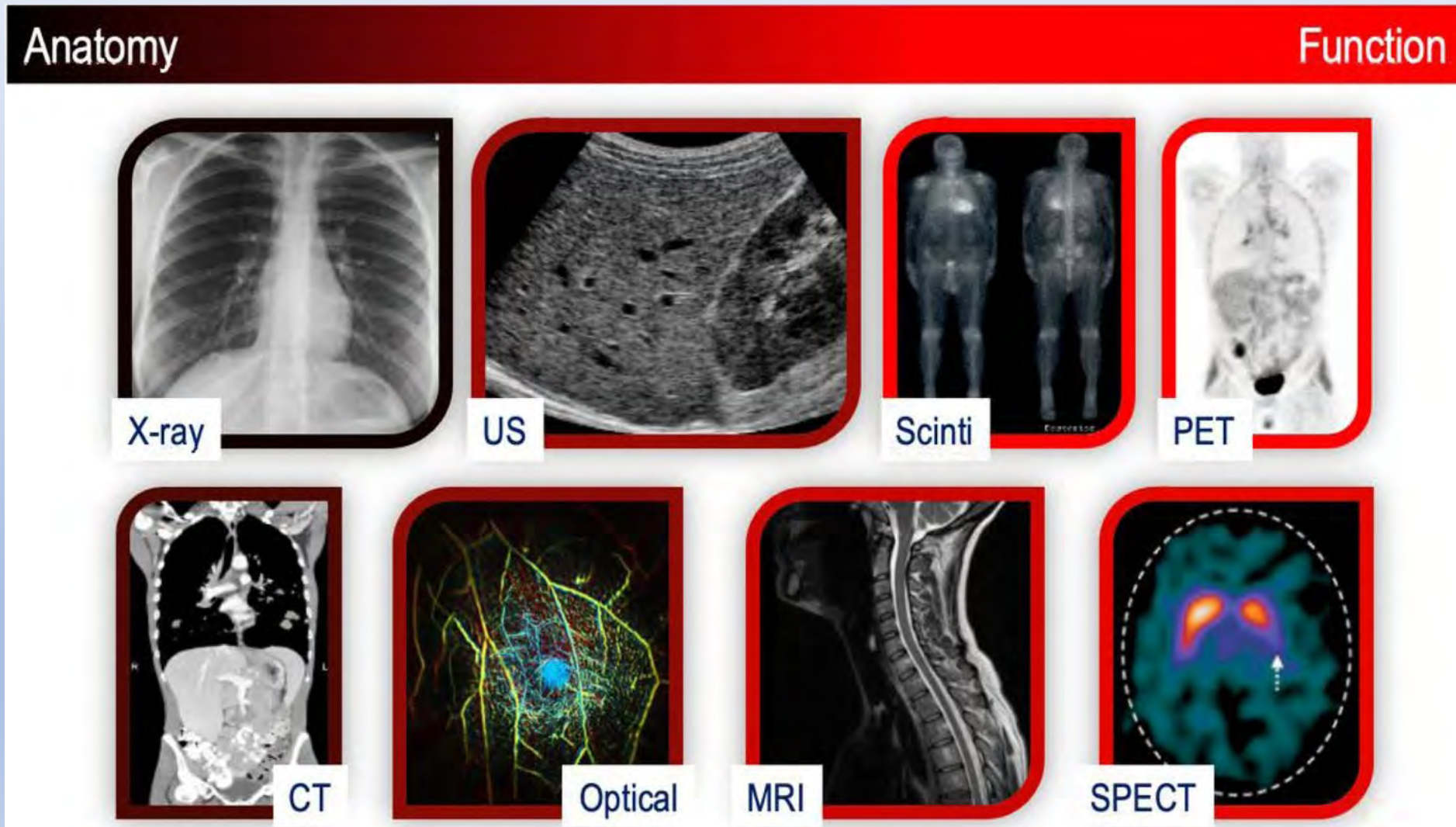


Shed / Blood



How do you get a diagnosis of Cancer?

Imaging Modalities – defines the extent of the disease



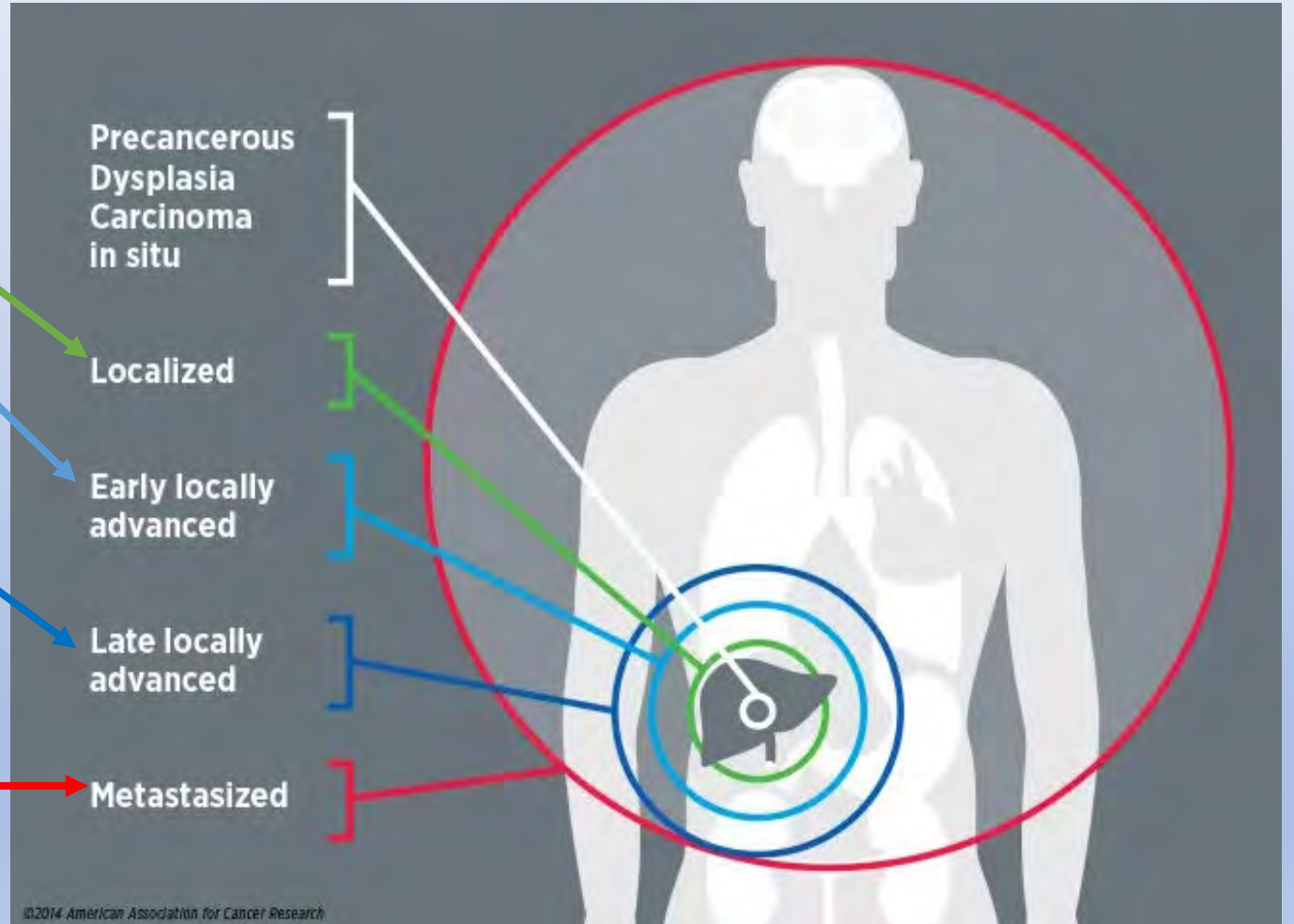
How do we stage solid organ tumors?

Tumor, lymph Node, Metastases → *TNM Staging*

- Stage 1, 2 = Localized Disease

- Stage 3 = Lymph Nodes

- Stage 4 = Beyond Lymph Nodes



How is
Cancer
Treated?

MAY 26, 2008 www.time.com AOL Keyword: TIME

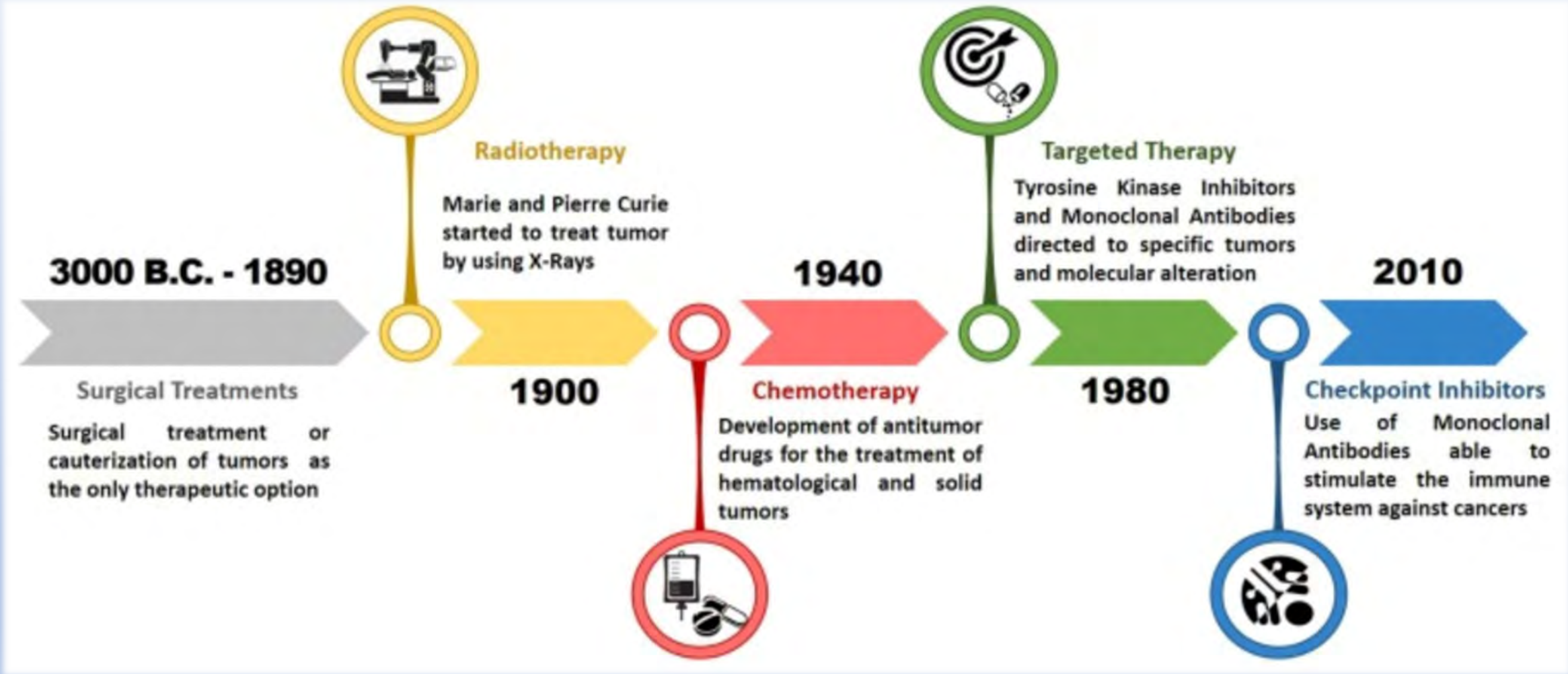
TIME

THERE IS NEW **AMMUNITION**
IN THE WAR AGAINST
CANCER.
THESE ARE THE BULLETS.

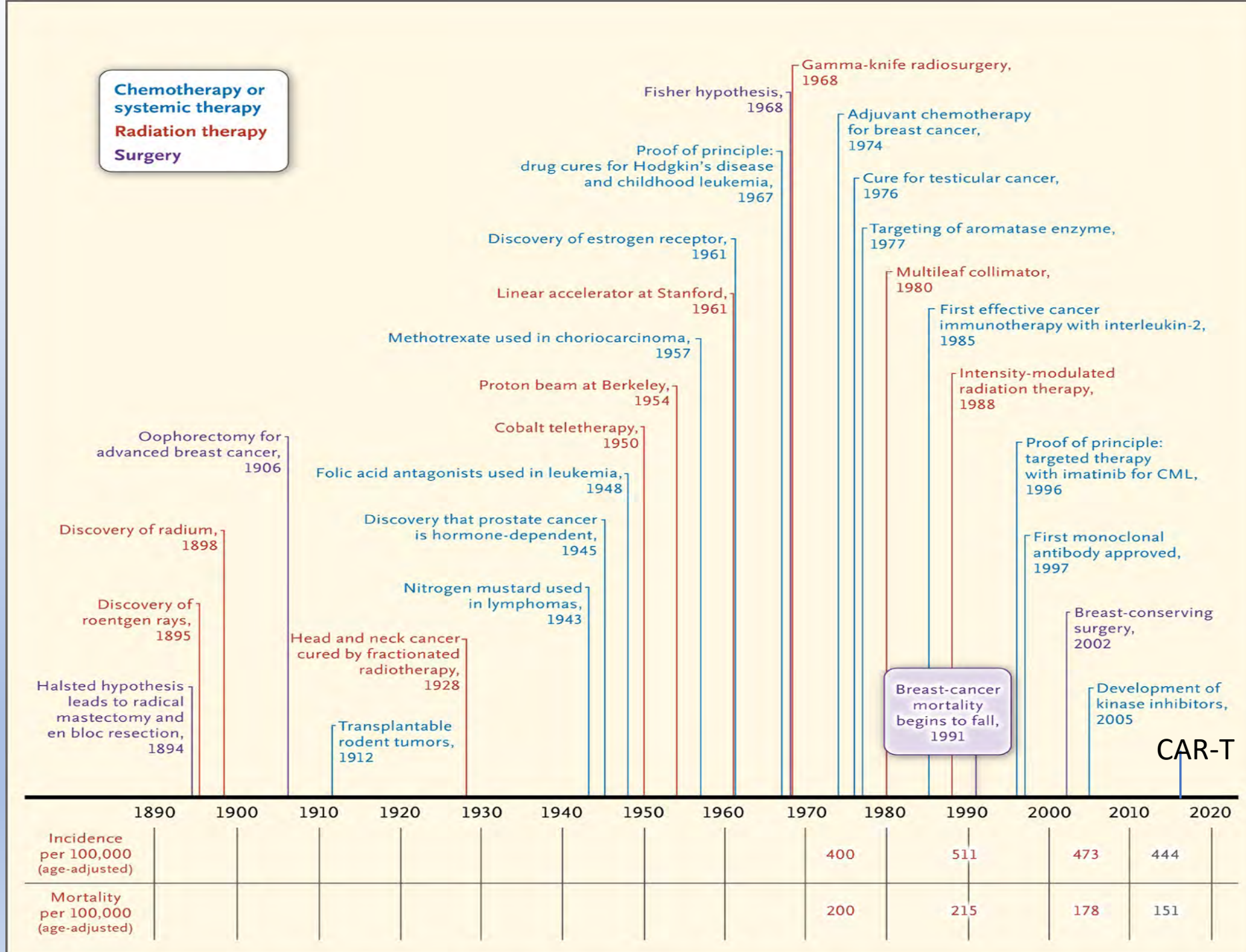
Revolutionary new pills like **GLEEVEC** combat cancer by targeting only the diseased cells. Is this the breakthrough we've been waiting for?



Milestones in oncology treatment



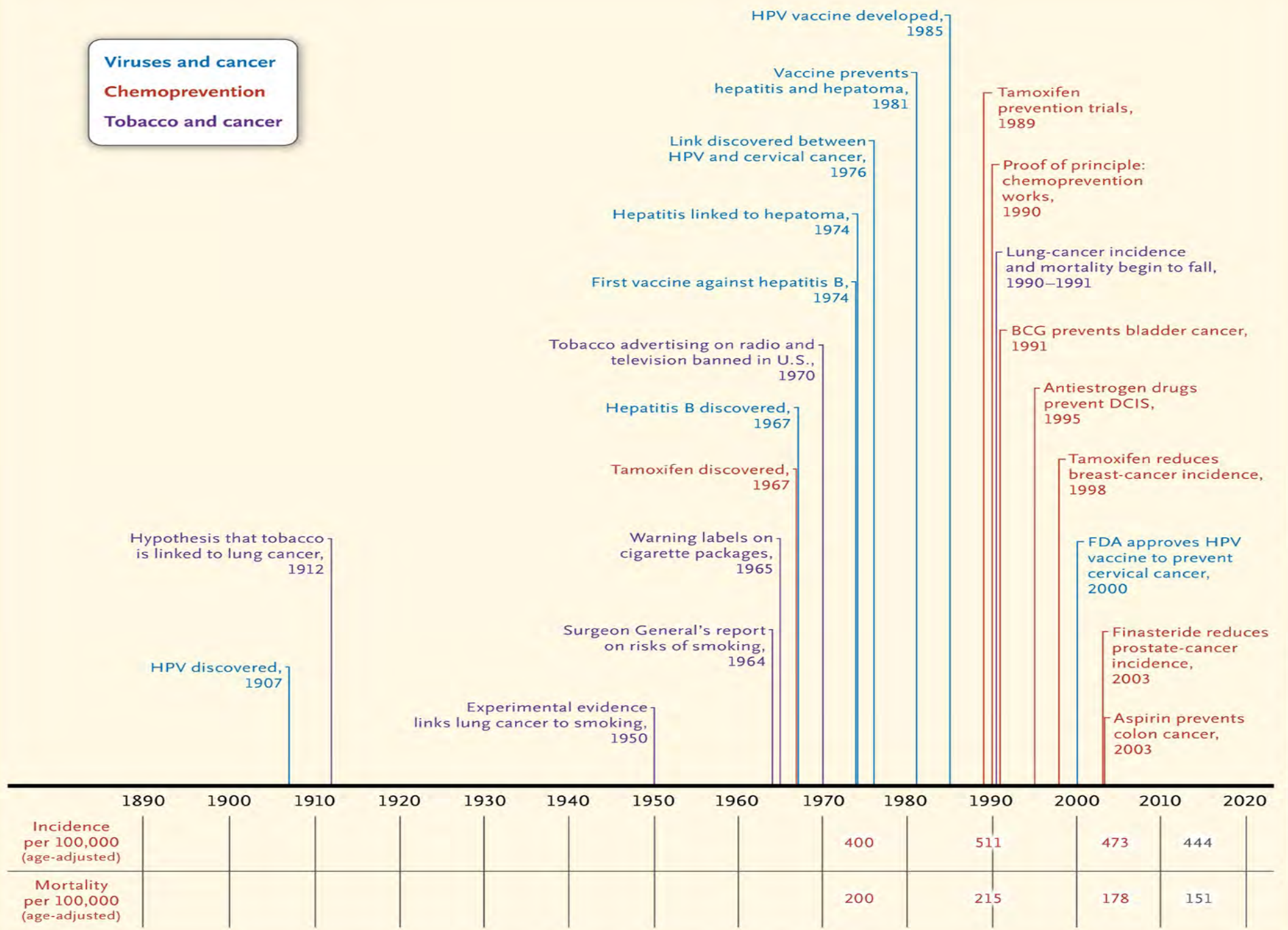
Milestones in Cancer Treatment



Pivotal events in Cancer Prevention

When the cause of cancer is known, its prevention becomes a problem in modifying human behavior.

Viruses and cancer
 Chemoprevention
 Tobacco and cancer



How is Cancer Treated?

- Depends on the type of cancer, stage, history
- Individualized and Team-Based Approach
- Tumor Board Presentations

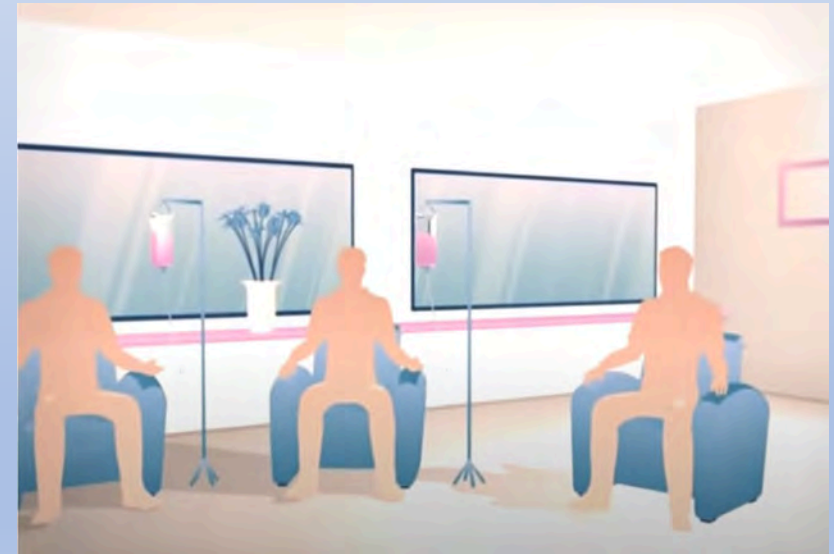
3 traditional types of treatment:



Surgery

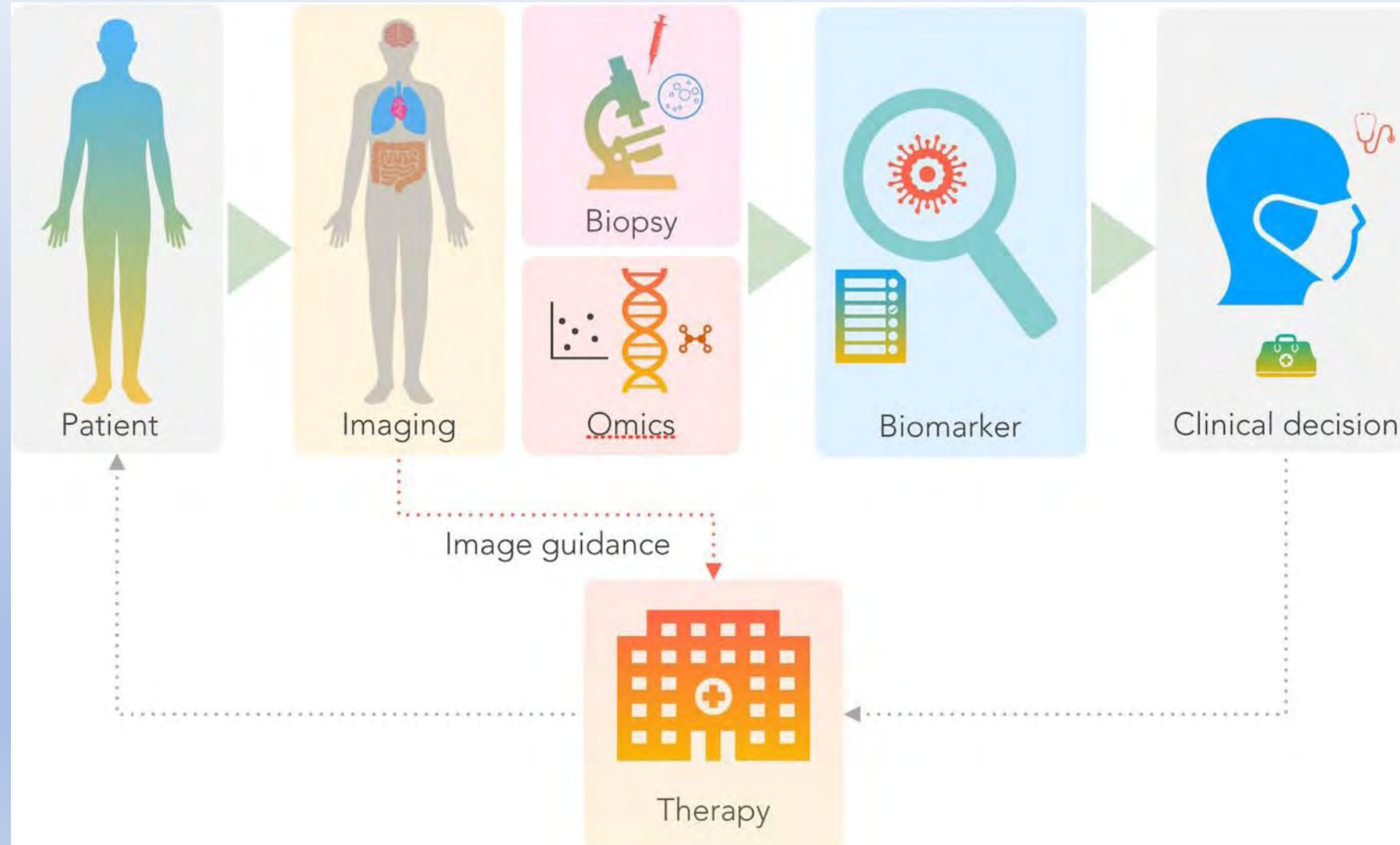


Radiation



Systemic Therapy

From presentation to diagnosis to treatment



What happens after treatment?

- Surveillance
- Survivorship
- Outcome Disparities

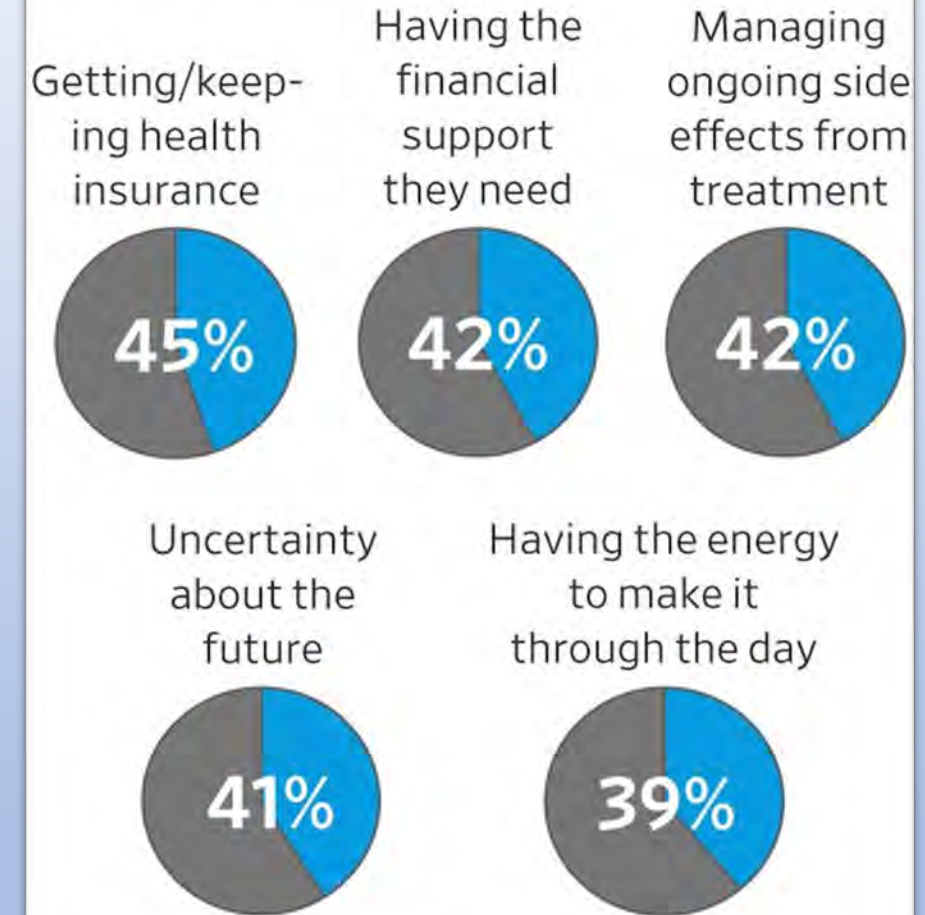
Cancer Monitoring Recommendations

- 1 Talk with your doctor (oncologist) about your risks.
- 2 Keep your scheduled follow-up visits.
- 3 Ask your care team about new tests.
- 4 Find out about survivorship and wellness clinic availabilities.
- 5 Talk to your medical team about your fears and anxiety.

 colonial cancer alliance

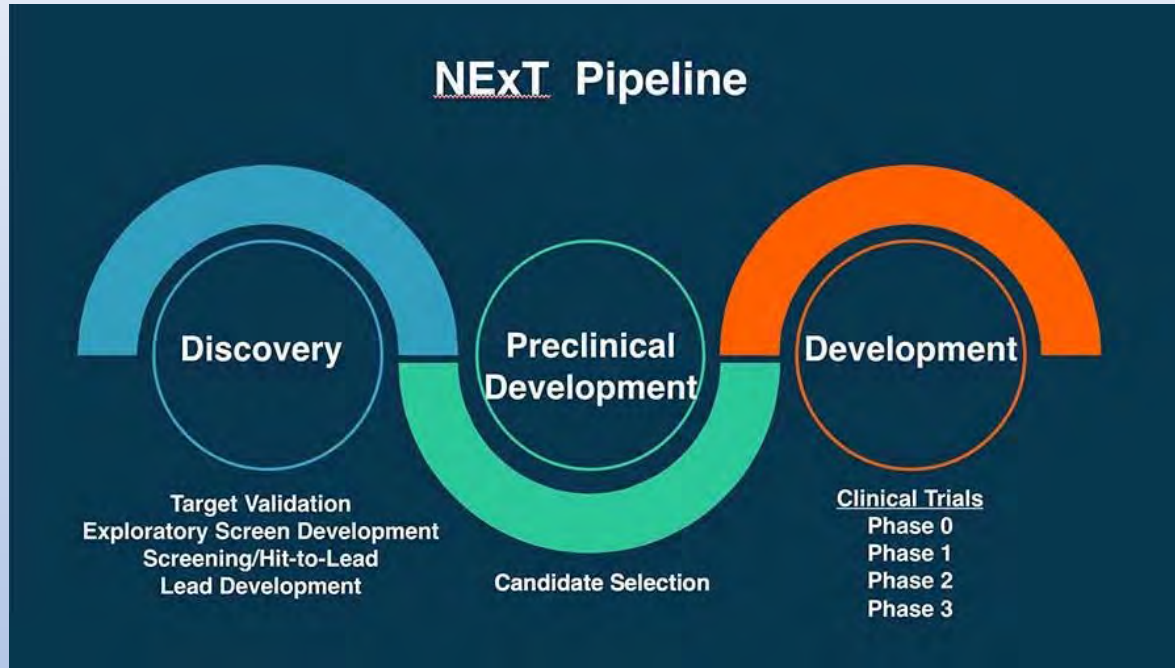
On Patients' Minds

The top five concerns in a survey of adult cancer patients and survivors



Source: Edge Research/National Coalition for Cancer Survivorship online survey of 1,380 cancer patients, about half of whom had completed treatment, January 2019

What is next in cancer discovery and treatment?



looking forward to next week



Outline for today's session: **What is cancer?**

- Course intro (10 mins)
- Lecture: What is cancer? (30 mins)
- **Panel of hematologists/oncologists (30 mins)**
- Q&A (20 mins)

Next

Physician Panel

- Head and Neck: Dr Hyunseok Kang
- Breast: Dr Laura Huppert
- Thoracic: Dr Meera Ragavan
- GI: Dr Andrew Ko
- Geriatric-Oncology: Dr Li-wen Huang
- GU: Dr Daniel Kwon
- Hematology: Dr Shagun Arora
- ZSFG/underserved population: Dr Niharika Dixit
- Melanoma: Dr Katy Tsai
- Hospital Based Oncology: Dr Sam Brondfield