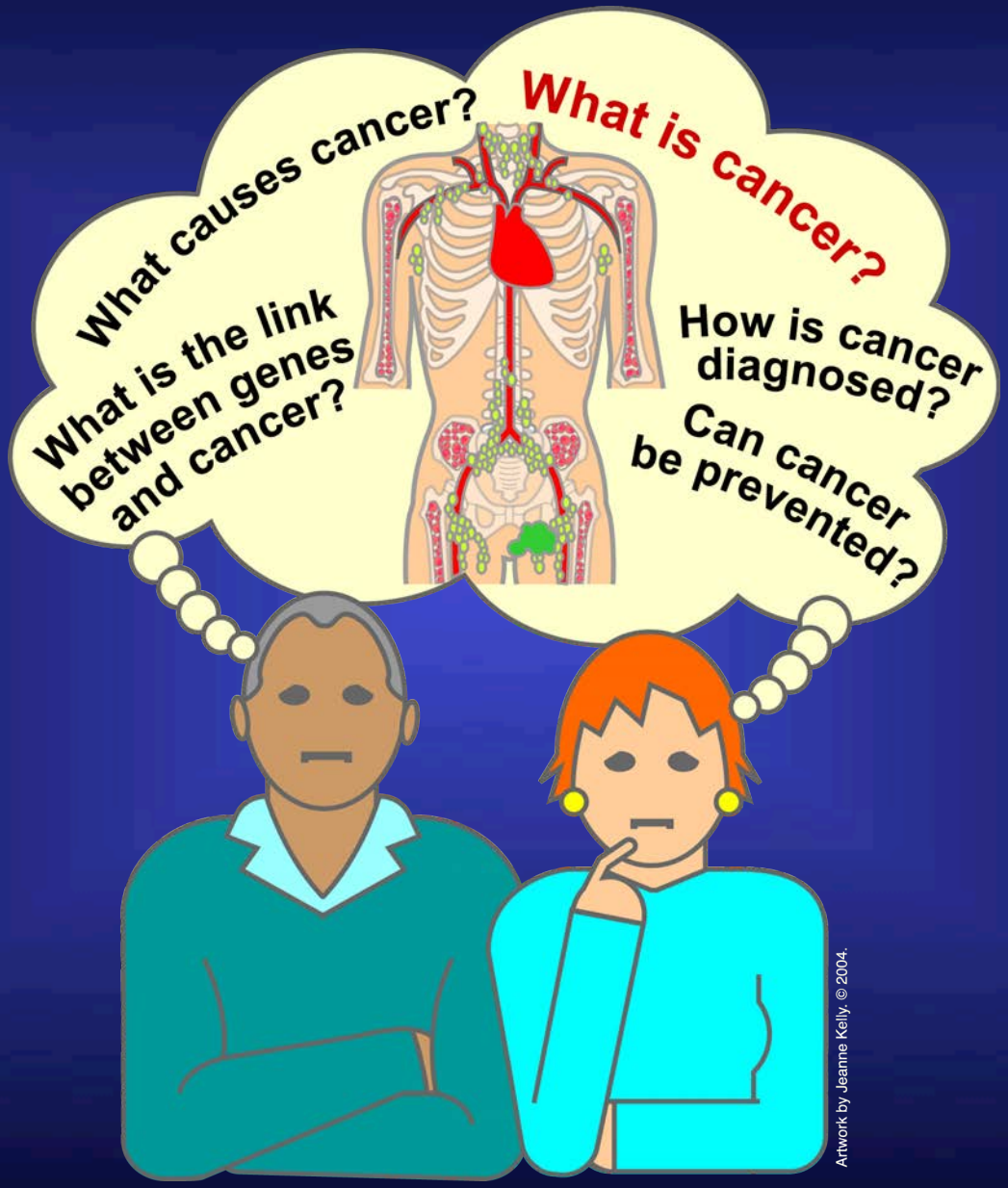
Understanding Cancer

Lauren O. Searls BSN RN OCN

What Is Cancer?



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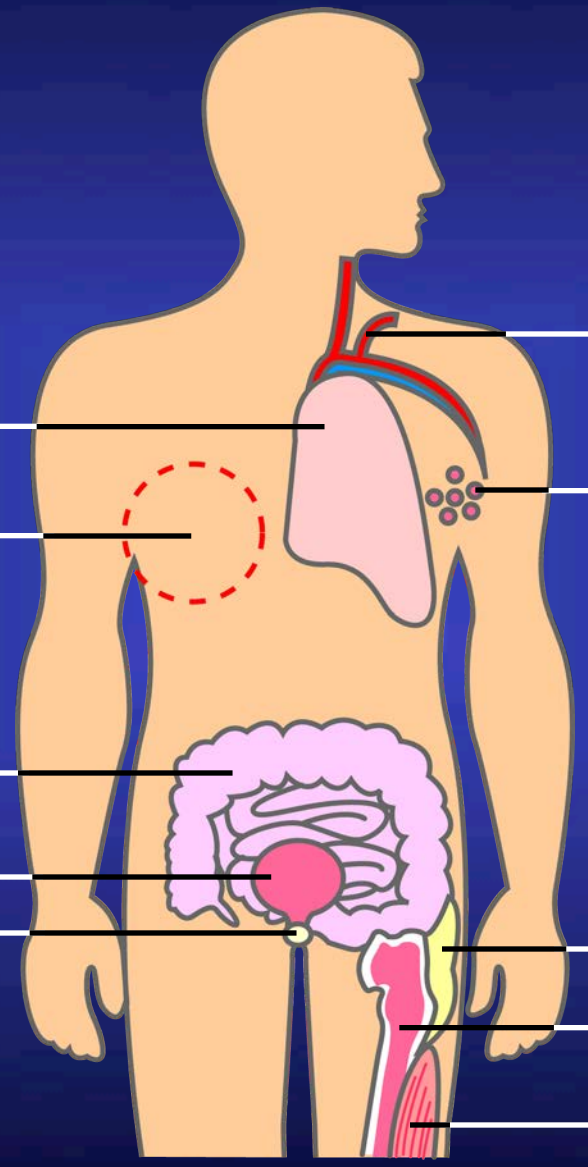
Different Kinds of Cancer

Some common carcinomas:

Lung
Breast (women)
Colon
Bladder
Prostate (men)



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Leukemias:

Bloodstream

Lymphomas:

Lymph nodes

Some common sarcomas:

Fat

Bone

Muscle

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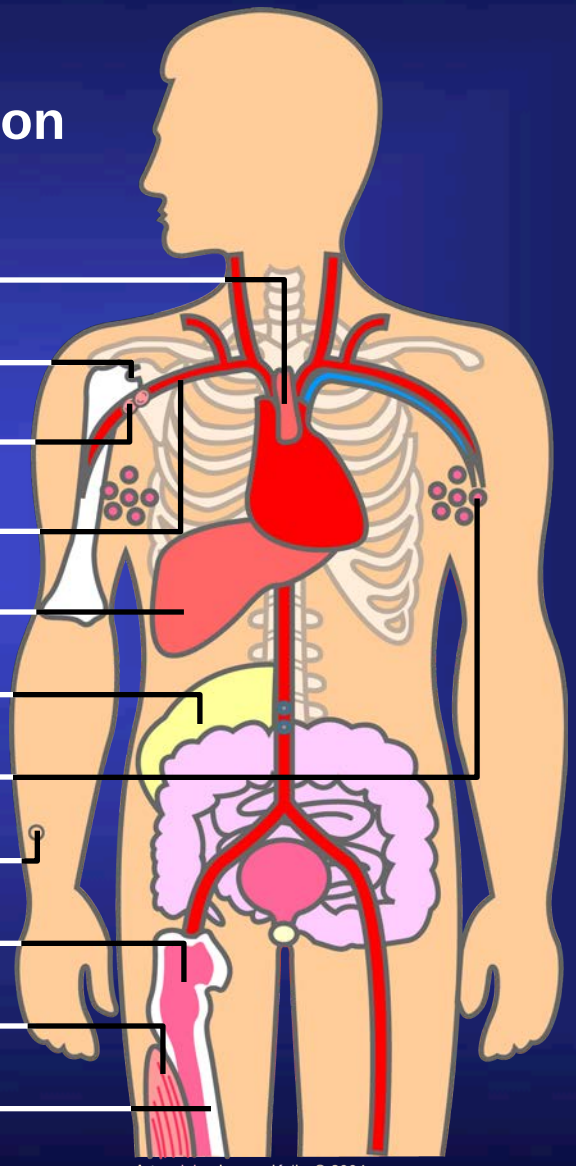
Naming Cancers

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



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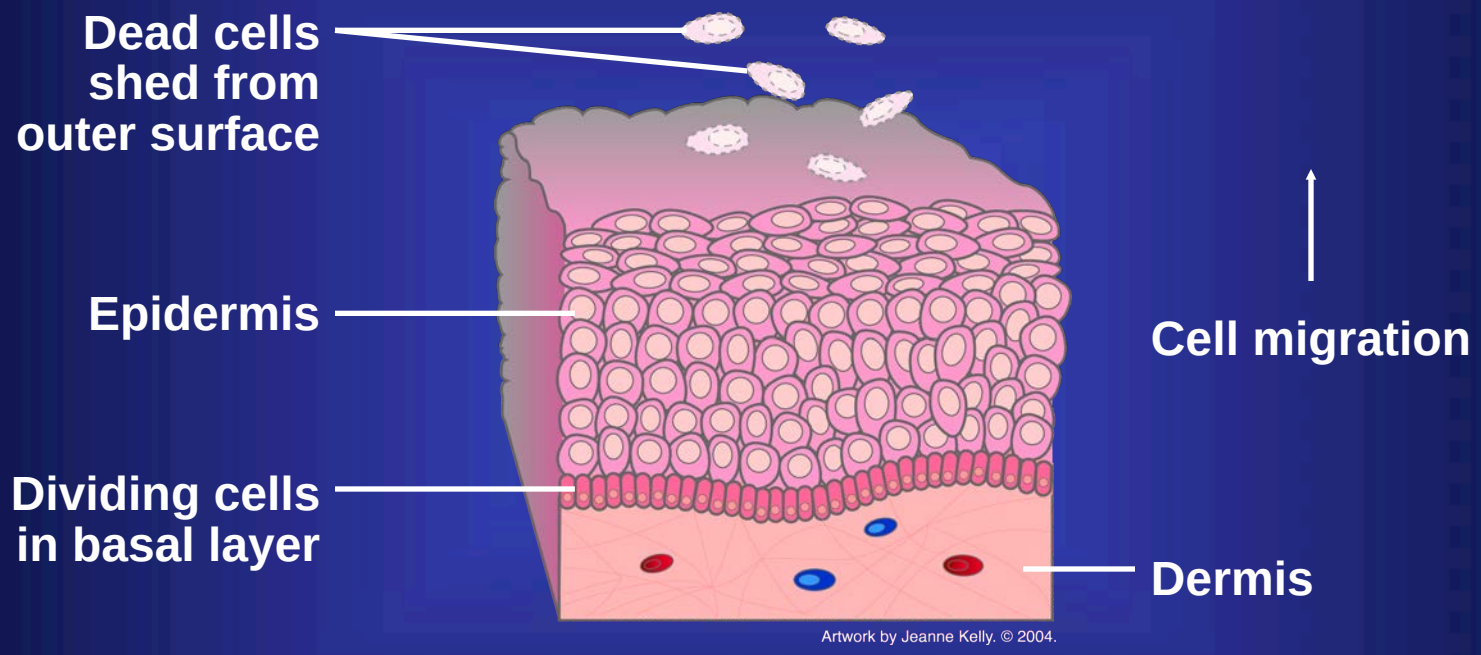
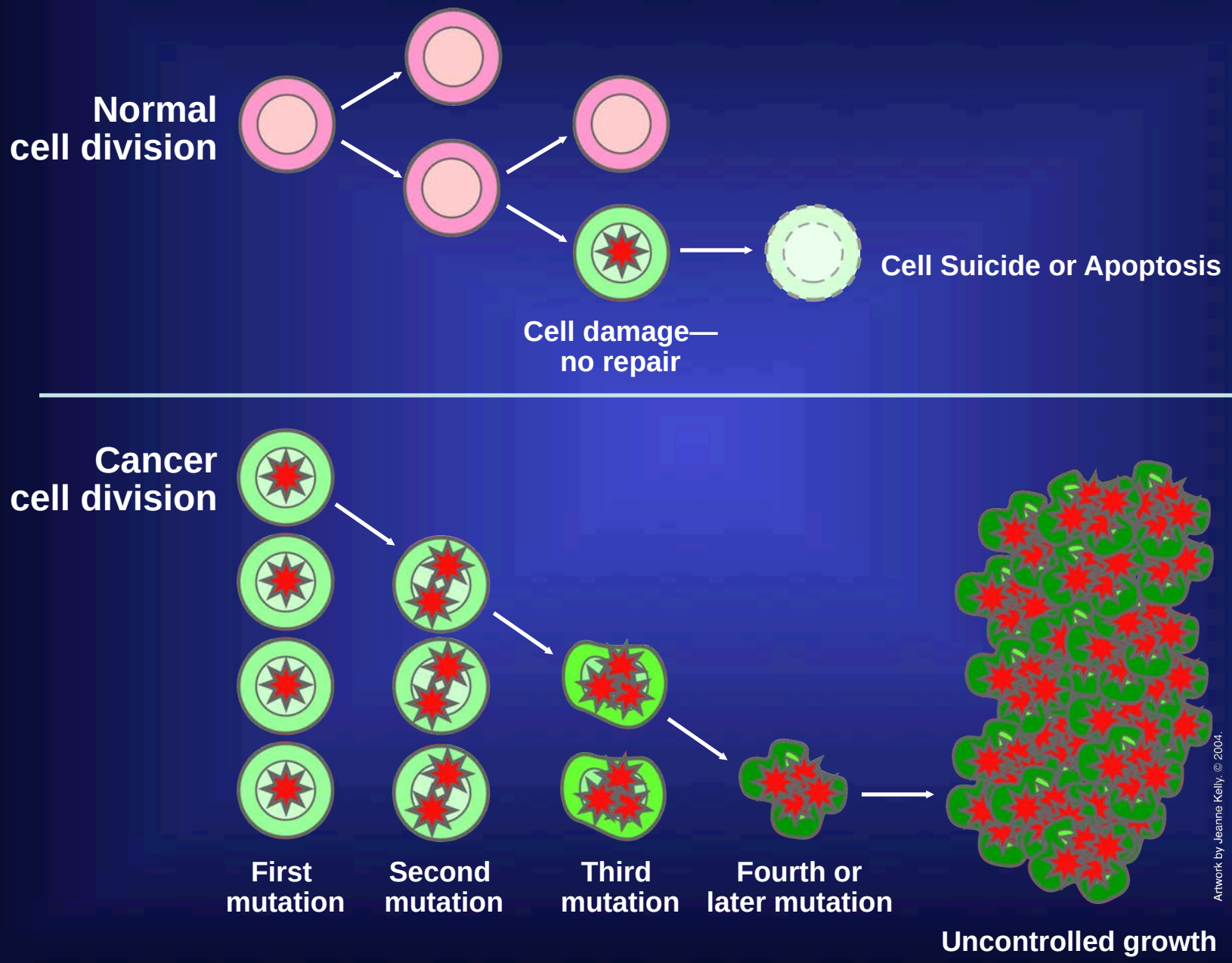
Example of Normal Growth



Loss of Normal Growth Control



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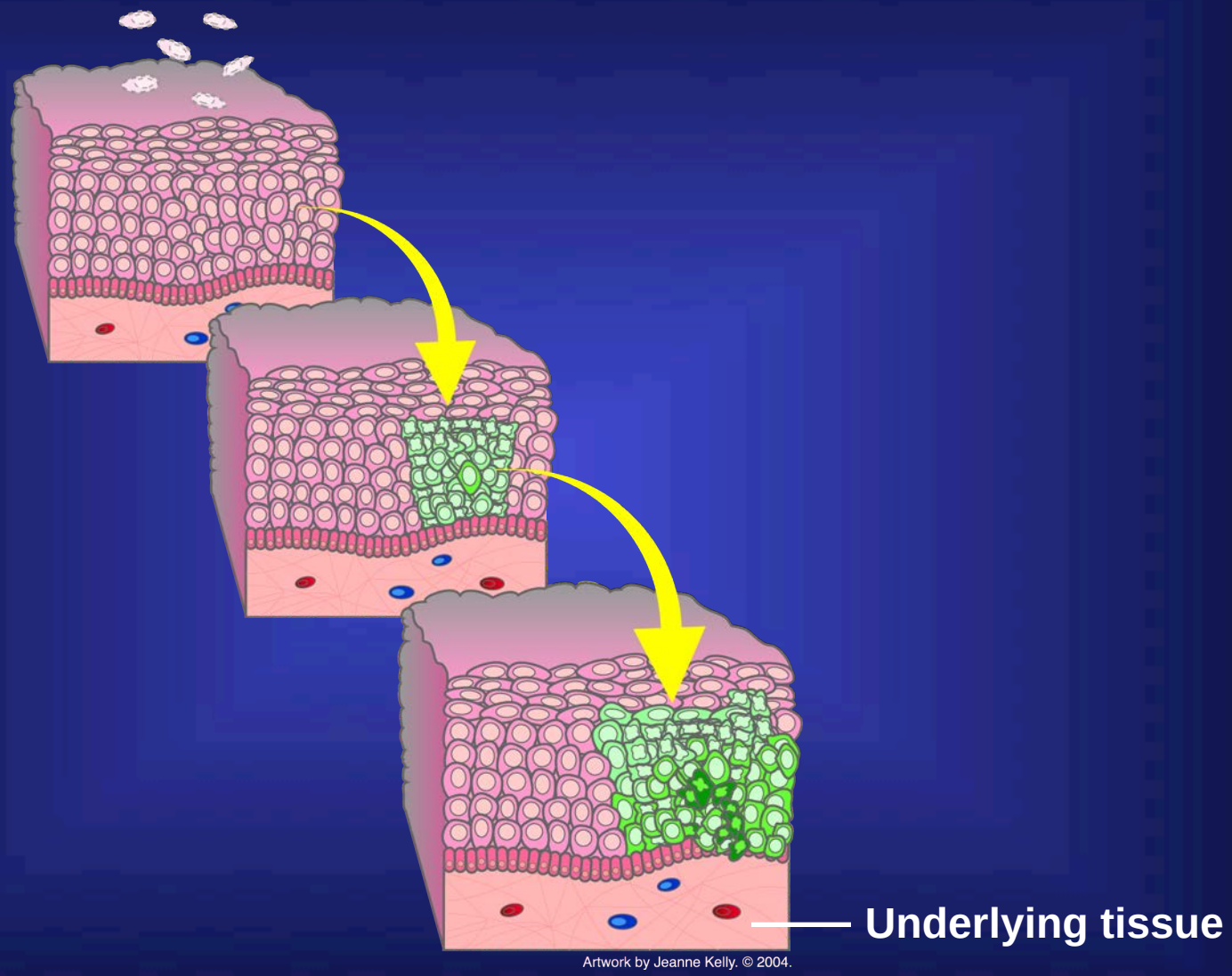
The Beginning of Cancerous Growth



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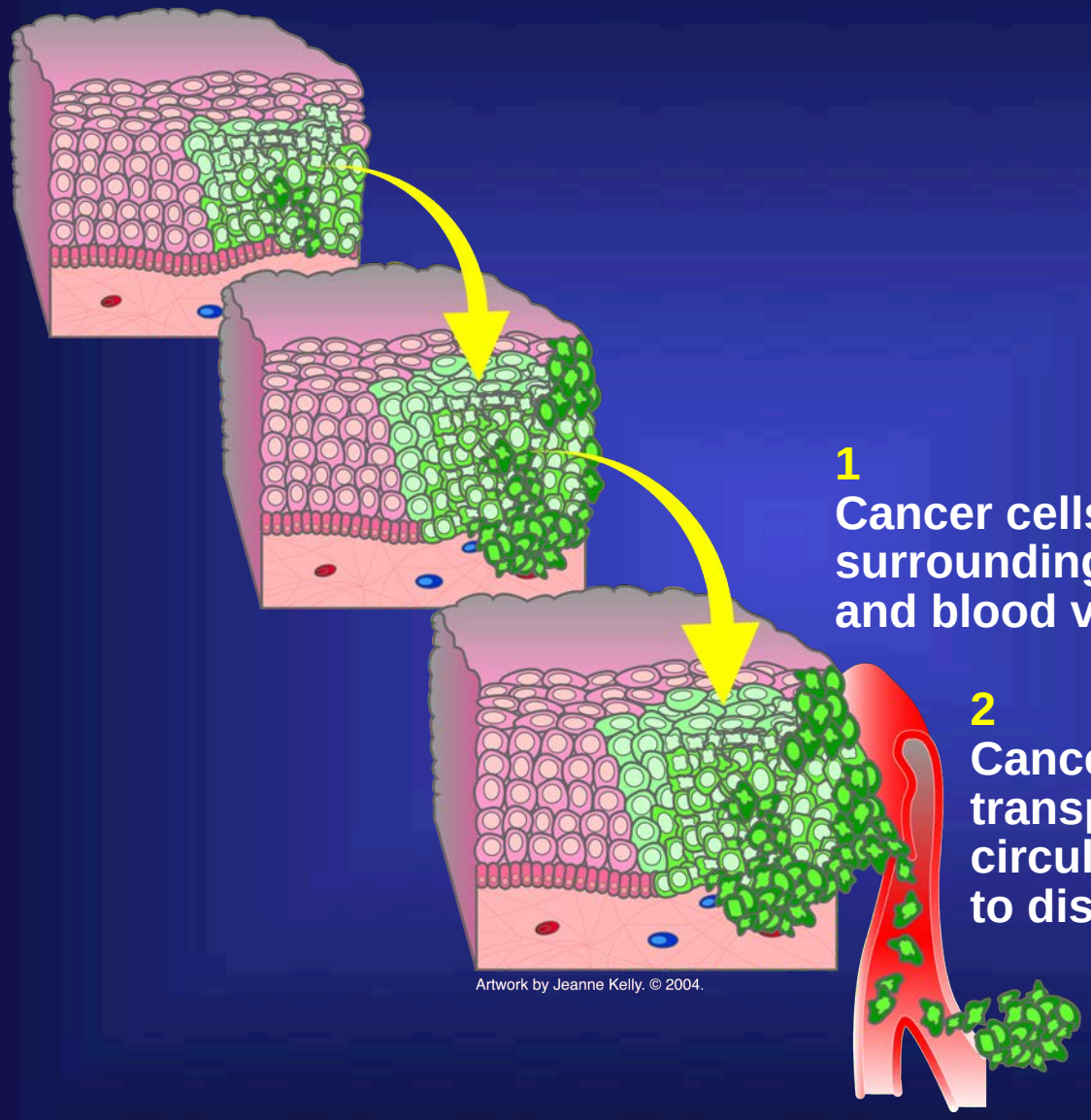
Invasion and Metastasis



1
Cancer cells invade surrounding tissues and blood vessels

2
Cancer cells are transported by the circulatory system to distant sites

3
Cancer cells reinvade and grow at new location

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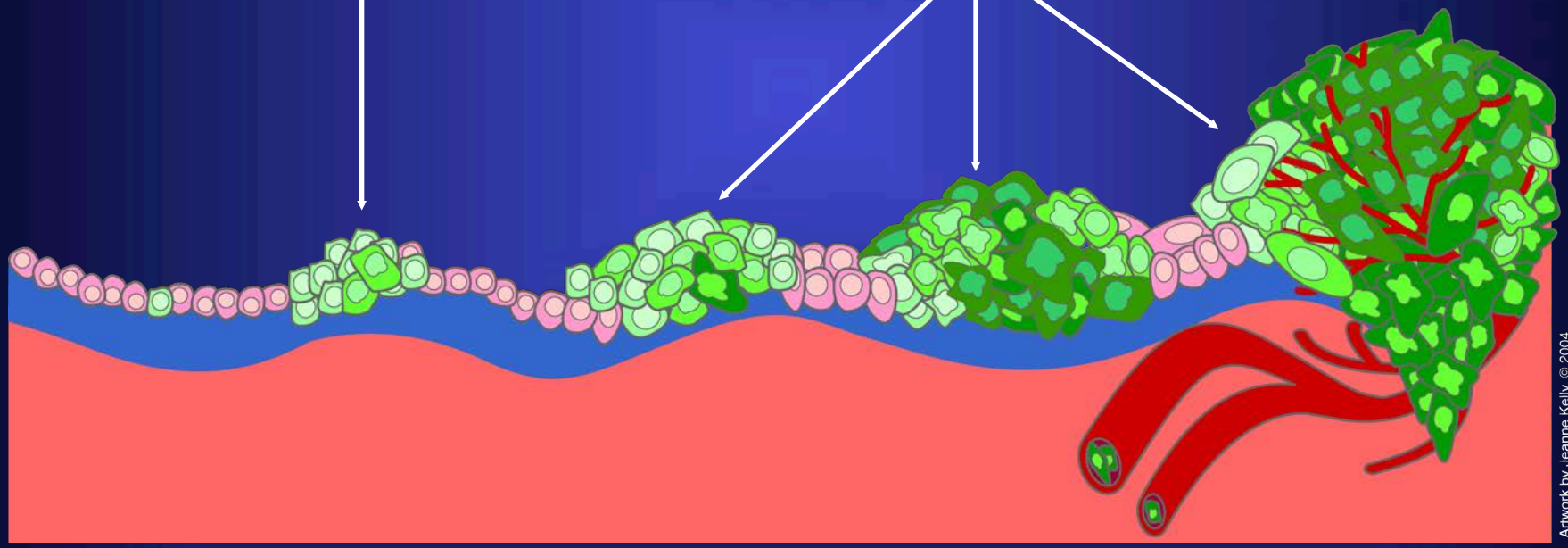
Malignant versus Benign Tumors

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



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Time

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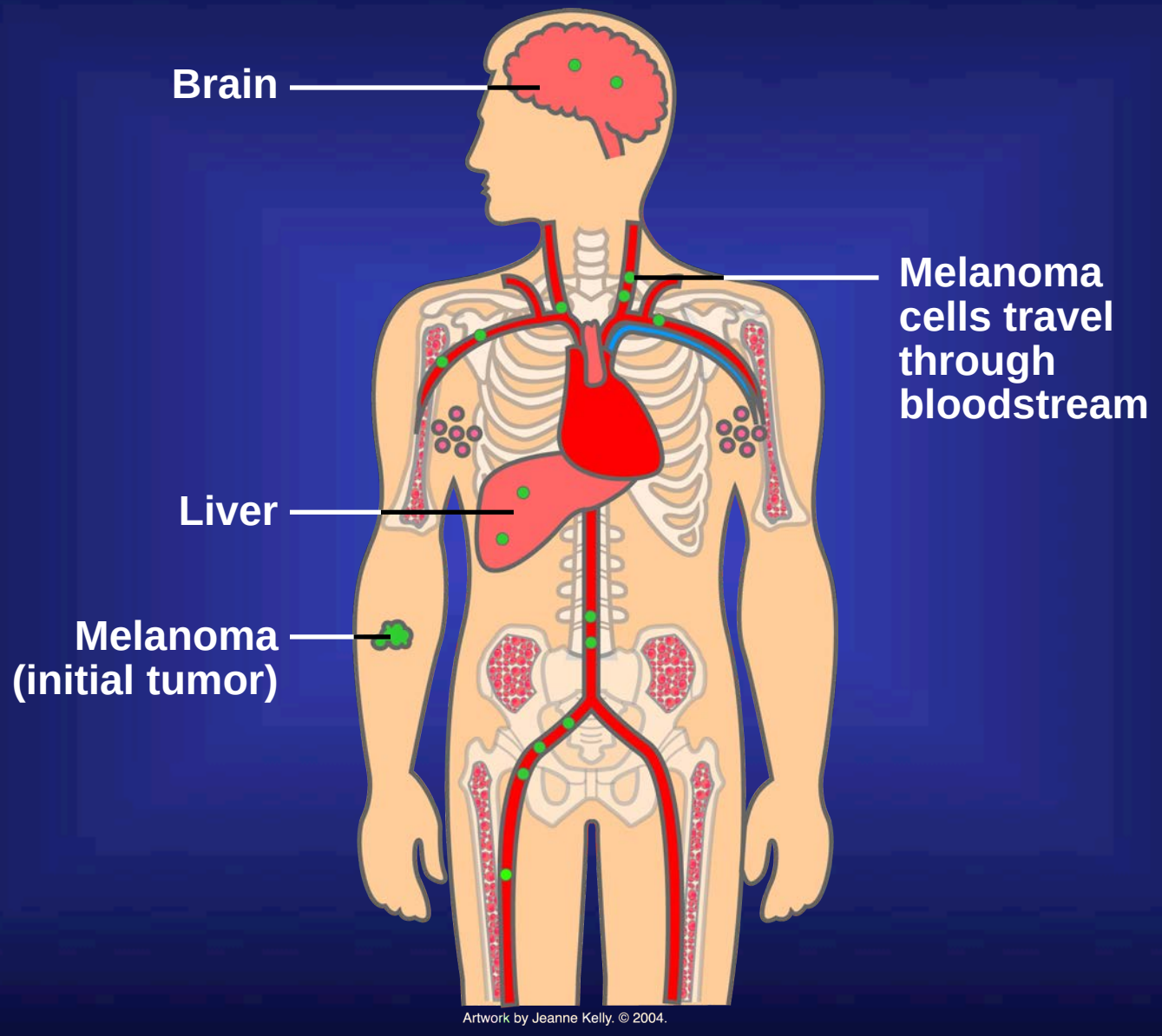
Why Cancer Is Potentially Dangerous



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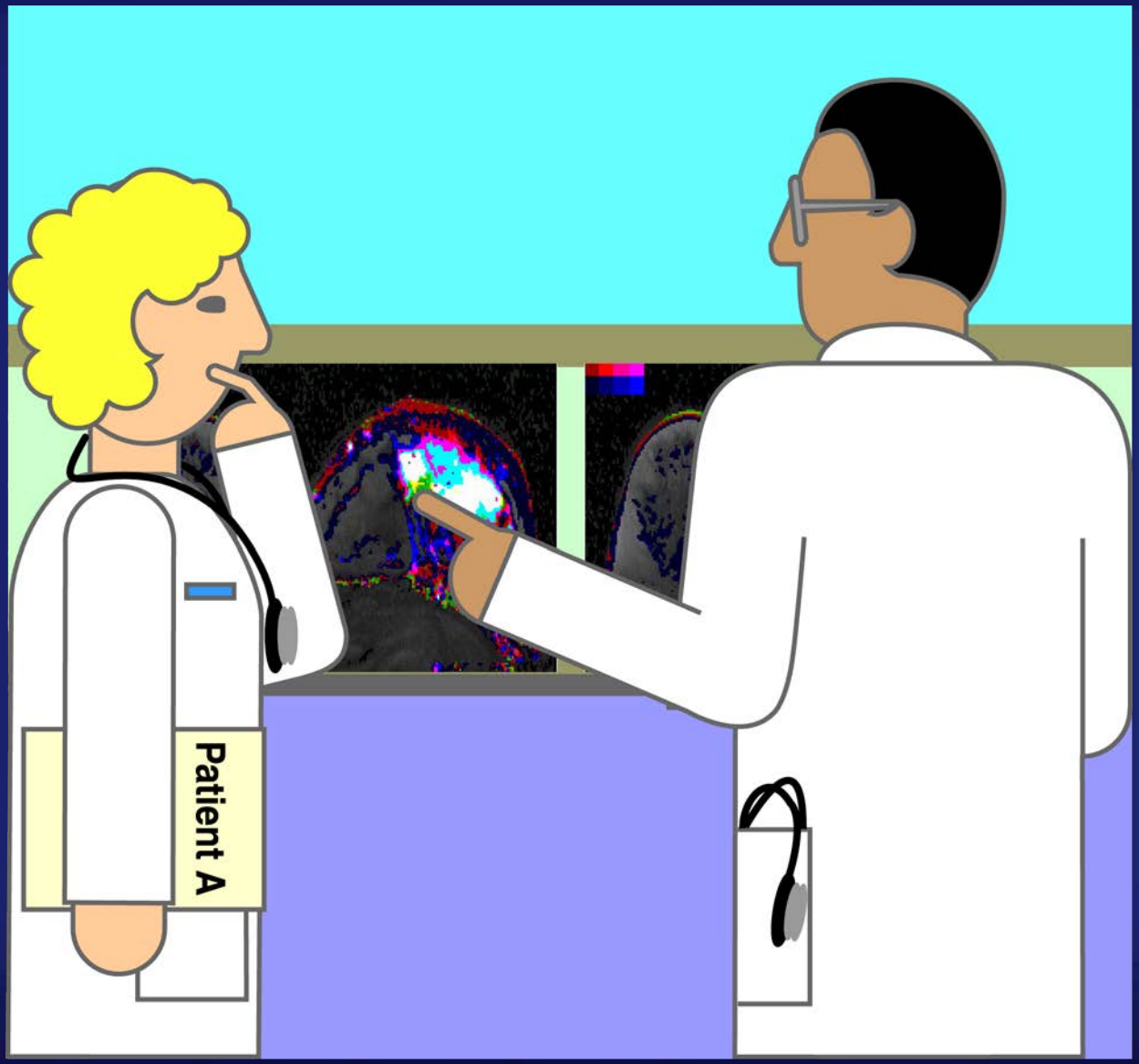
Cancer Detection and Diagnosis



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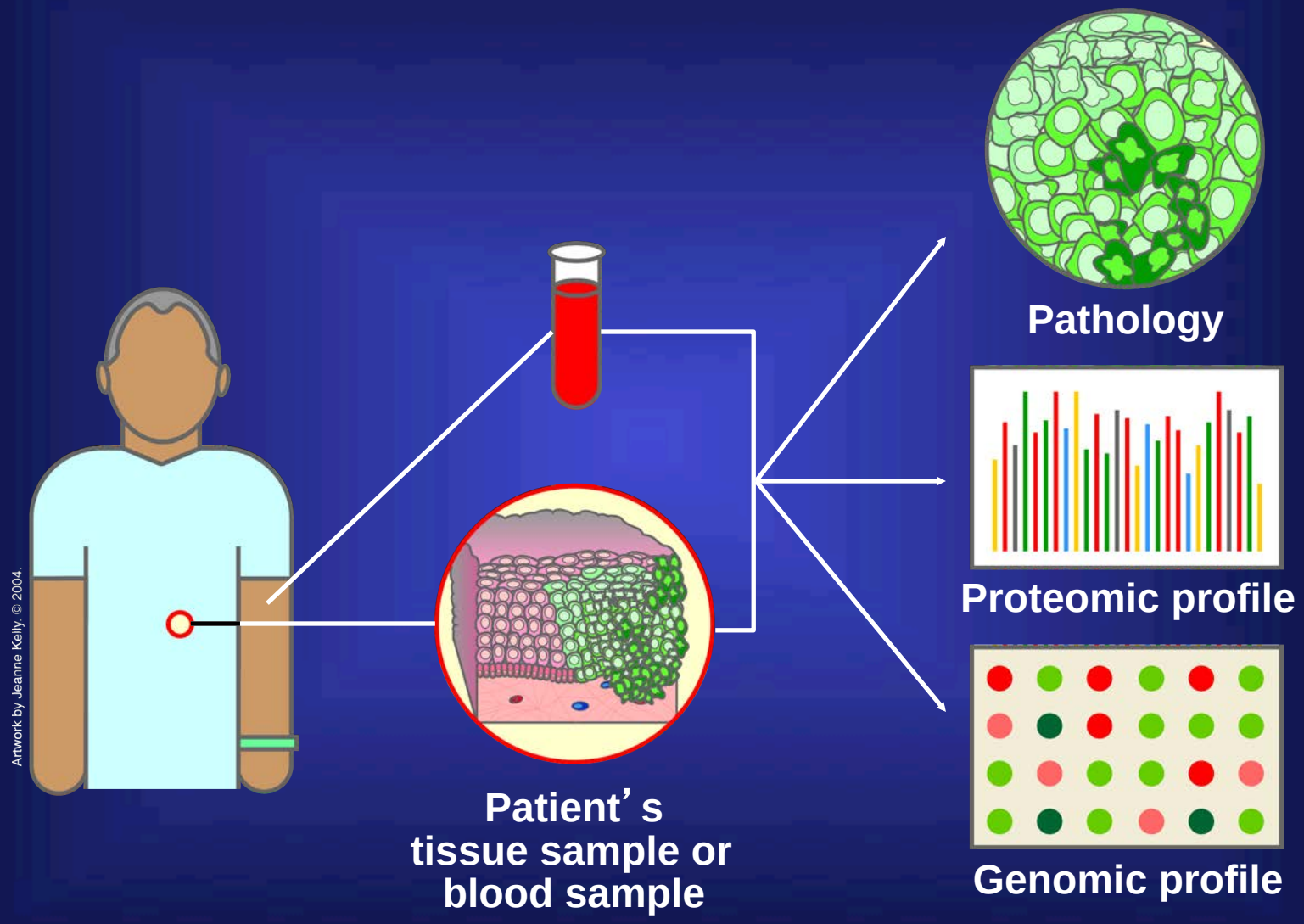
Biopsy



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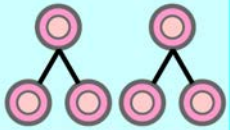
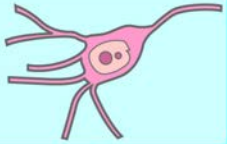
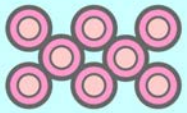
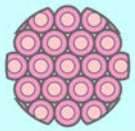
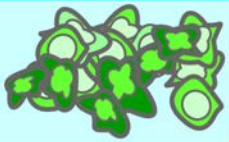
Microscopic Appearance of Cancer Cells

Normal	Cancer	
		Large number of irregularly shaped dividing cells
		Large, variably shaped nuclei
		Small cytoplasmic volume relative to nuclei
		Variation in cell size and shape
		Loss of normal specialized cell features
		Disorganized arrangement of cells
		Poorly defined tumor boundary

Cancer in 50+

WOMEN

- Lung
- Breast
- Colon

MEN

- Lung
- Prostate
- Colon

Early detection/diagnosis

- Leads to better outcomes
- Many types of cancer have vague or no symptoms
- Preventative measures
  - Don't smoke
  - Sun protection
  - Healthy diet & exercise
- Regular screenings
  - Mammograms
  - Pap smears
  - Prostate exam

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Lung cancer

LOCAL SYMPTOMS

- Cough
- Wheezing
- Difficulty breathing
- Chest pain
- Pneumonia
- Swollen lymph nodes

SYSTEMIC SYMPTOMS

- Headache
- Pain
- Anemia
- Anorexia/weight loss
- Fatigue

Lung cancer

INCIDENCE

- Most common cancer for men & women in US
- Five-year survival= 15%
- Incidence for women continues to rise
- Deaths > breast and and all other gynecologic, breast, colorectal cancers

RISK FACTORS

- Tobacco exposure
- Asbestos, arsenic, nickel exposure
- Genetic predisposition
- Inflammation (COPD, emphysema)
- Diet lacking in carotenoids
- Age 65 older

Lung Cancer

PROGNOSIS

- Clinical stage at time of diagnosis
- Size and accessibility of tumor
- Male and older = negative predictor of survival
- Co-morbidities

Prostate Cancer

SYMPTOMS

- Asymptomatic in early disease
- Decreased urinary flow
- Hesitancy
- Urinary frequency
- Nocturia
- Hematuria/pain

STATISTICS

- Second most common tumor in men
- Second-leading cause of death
- Accounts for 1/3 new cancers in men

Prostate Cancer

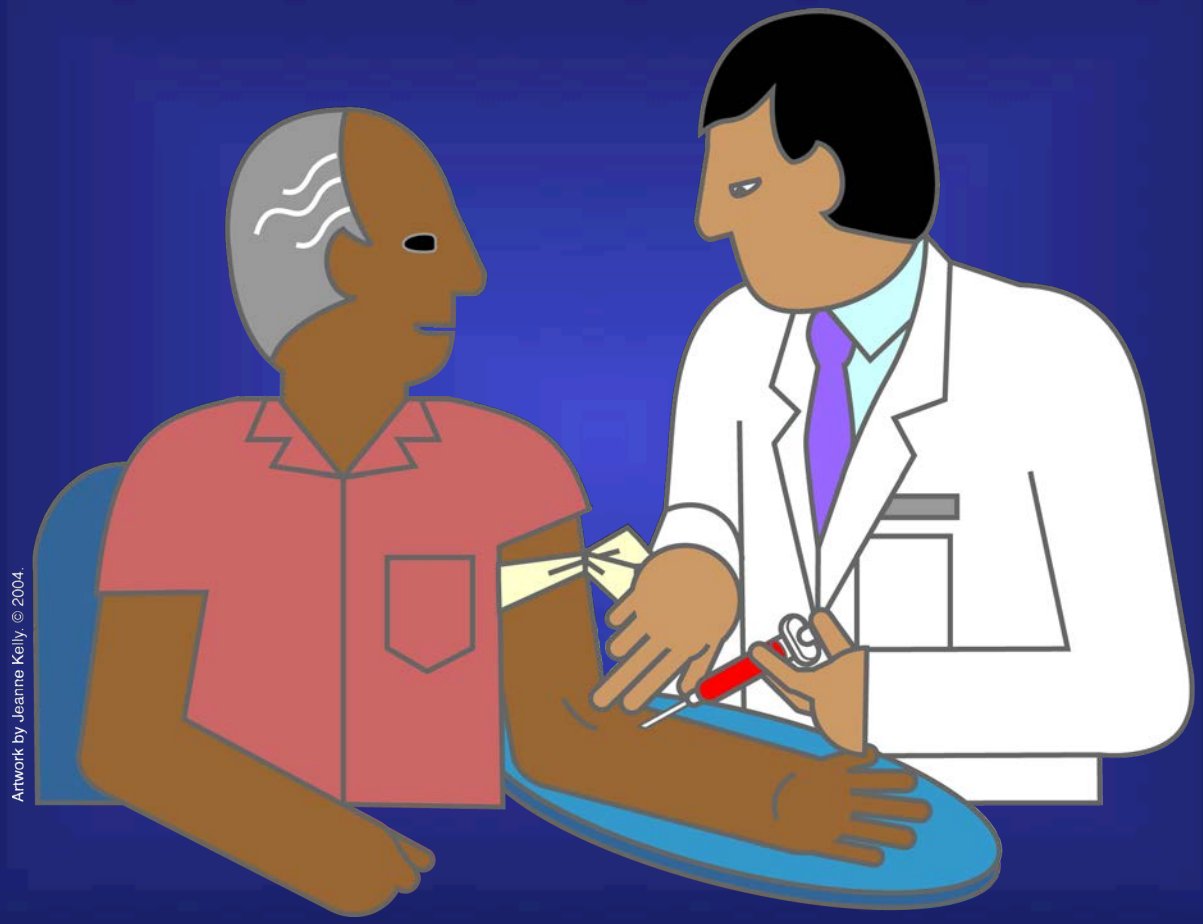
RISK FACTORS

- Age (75% in men >65)
- African American race
- Family history
- BRCA1/2 mutations in family
- High fat diet

SCREENING

- Beginning age 50, digital rectal examination
- Annual prostate-specific antigen (PSA) blood test
- For high risk individuals, screening may begin earlier

Prostate Cancer Screening



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Breast Cancer

- Signs and symptoms
- Redness, dimpling of breast
- Peau d' orange
- Changes in breast shape
- Bloody or yellow discharge from breast
- Nipple retraction or deviation
- Lump or thickening in or near breast/underarm area

Breast Cancer

INCIDENCE

- 1 in 8 women will develop breast cancer
- Men account for 1% of all breast cancer
- Survival rates are high
  - 89%= 5 years after dx
  - 82%= 10 years after dx
  - 77%= 15 years after dx

RISK FACTORS

- Female
- Increasing age
- Family/personal history
- No children, or having children later in life
- Hormone therapy after menopause
- Alcohol use
- Obesity

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Breast Cancer Screening

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Colon Cancer

STATISTICS

- Third most commonly diagnosed cancer in US
- Third leading cause of cancer deaths for both men & women

SCREENING

- Age 50+ (average risk)
  - Fecal occult blood test (FOBT) annually OR
  - Colonoscopy every 10 years
  - Contrast barium enema every 5 years

Colon Cancer

SIGNS AND SYMPTOMS

- Change in bowel habits
- Blood in stool
- Cramping pain in lower abdomen

Colon Cancer

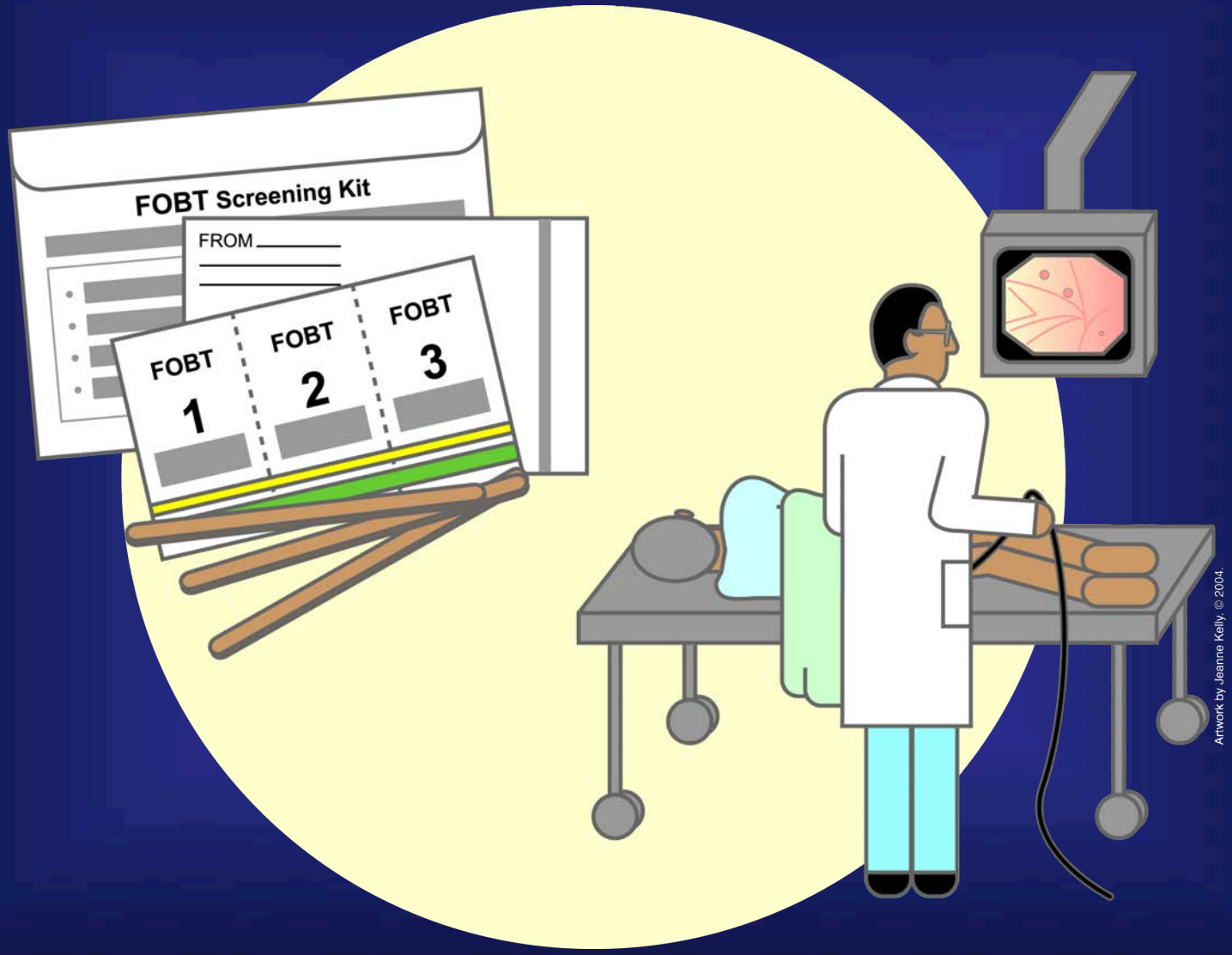
NON-MODIFIABLE

- Age
- History of polyps
- History of FAP or Lynch syndrome in family
- Inflammatory bowel disease
- Ashkenazi Jews and African Americans

MODIFIABLE

- Diet high in red & processed meat
- Diet low in fruits/ vegetables
- Obesity
- Physical inactivity
- Heavy alcohol use
- Smoking
- Diabetes

Colon Cancer Screening



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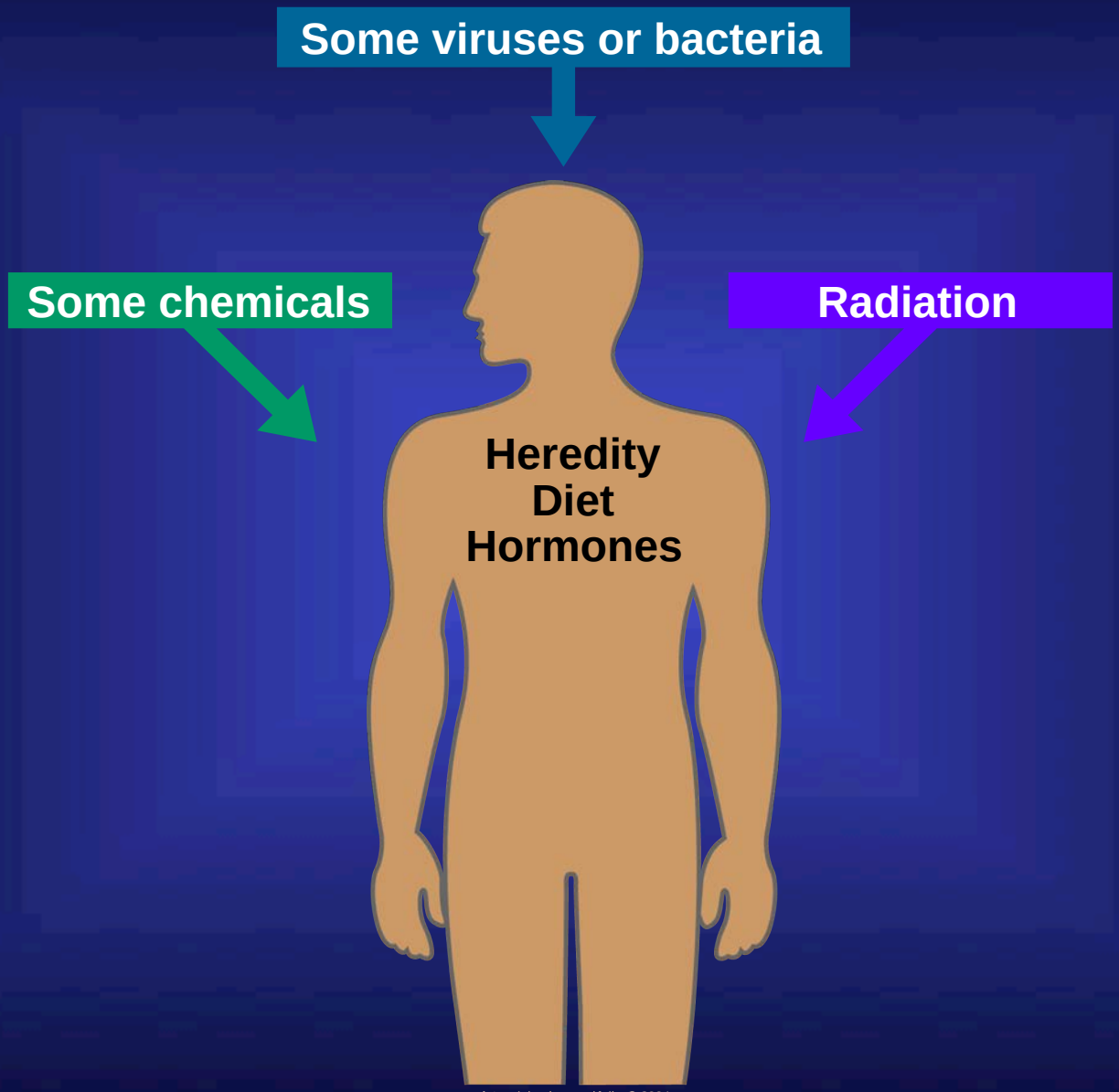
What Causes Cancer?



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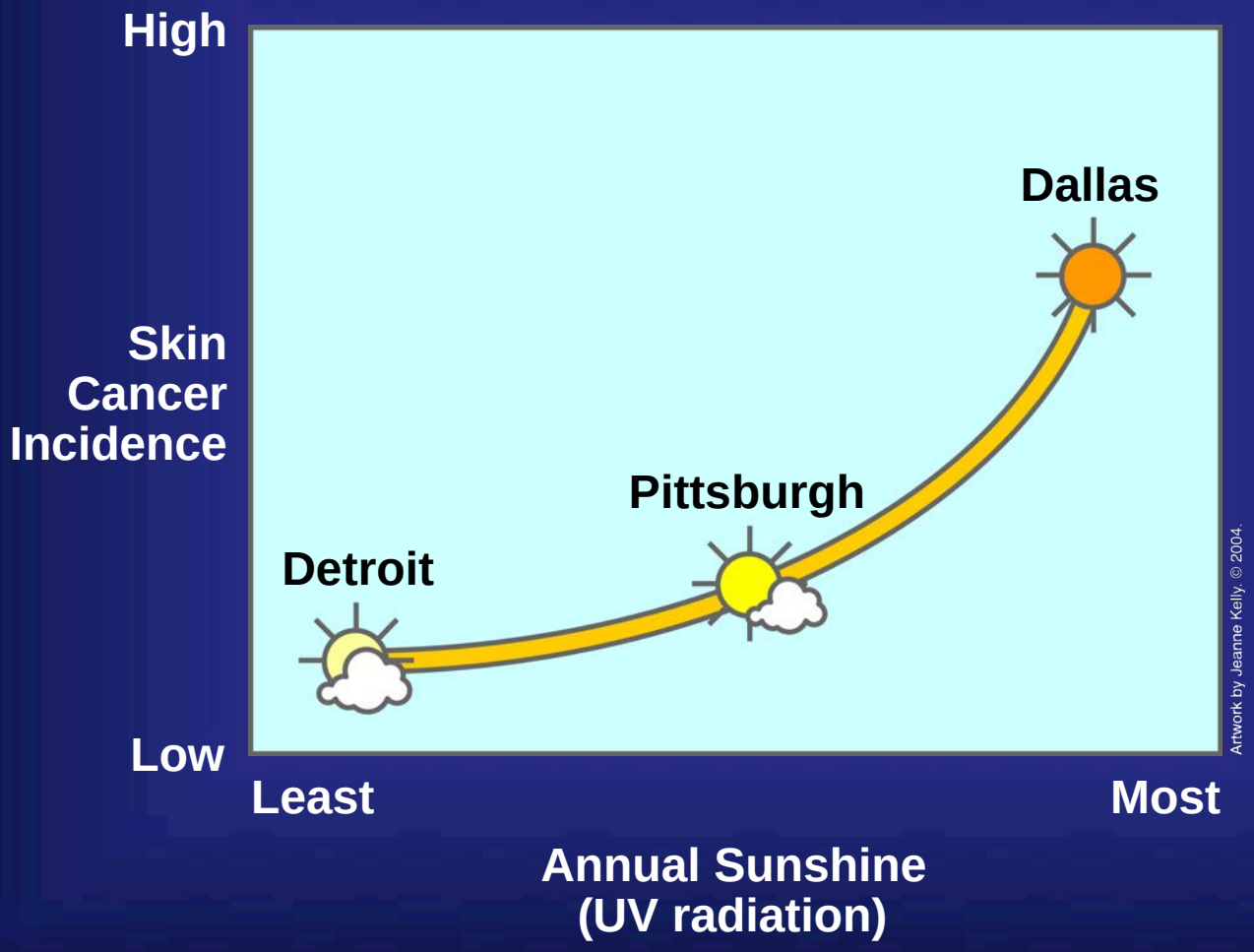
Low-Strength Radiation



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Tobacco Use and Cancer

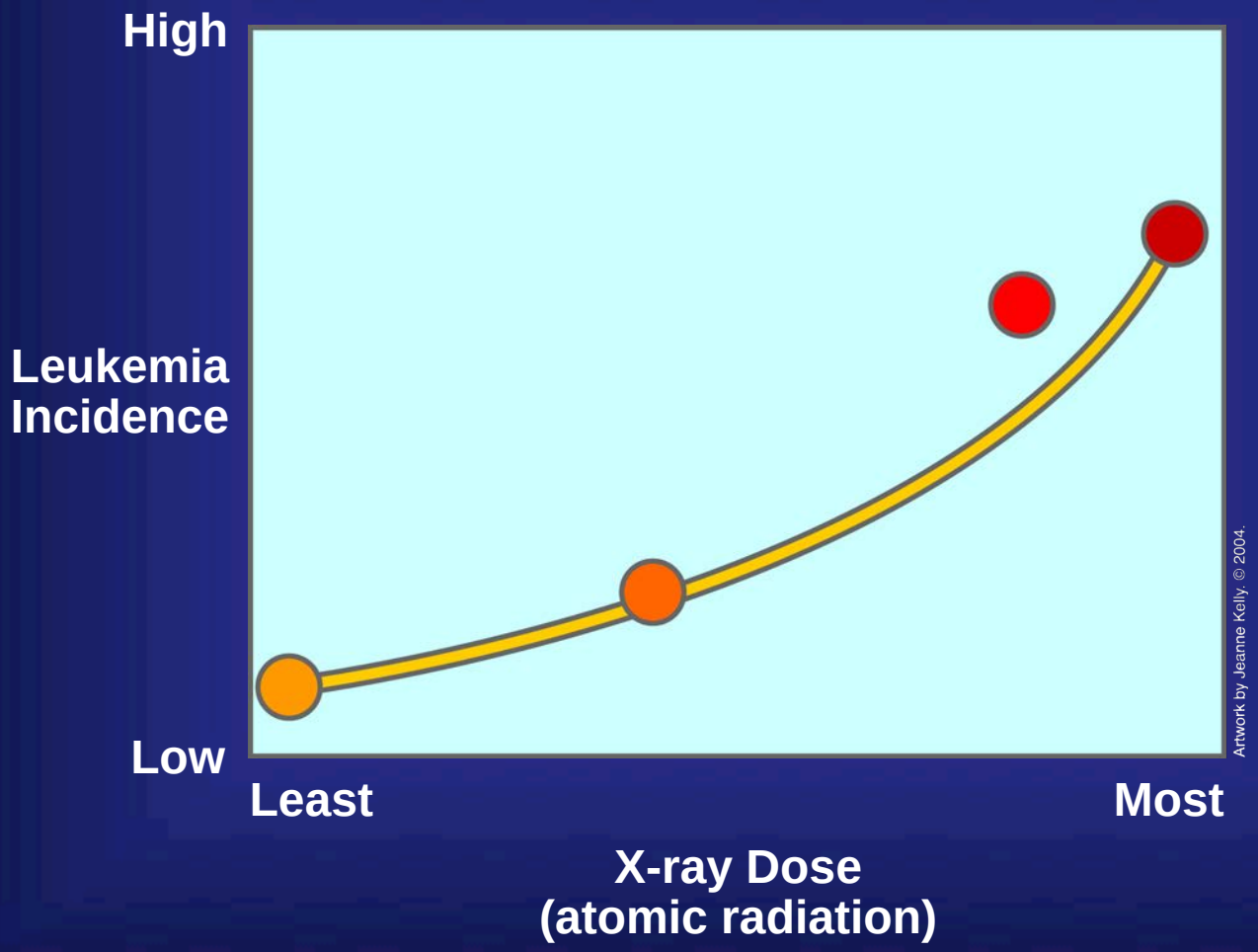
Some Cancer-Causing Chemicals in Tobacco Smoke

aminostilbene
arsenic
benz[*a*]anthracene
benz[*a*]pyrene
benzene
benzo[*b*]fluoranthene
benzo[*c*]phenanthrene
benzo[*f*]fluoranthene
cadmium
chrysene
dibenz[*a c*]anthracene
dibenzo[*a e*]fluoranthene
dibenz[*a h*]acridine
dibenz[*a j*]acridine
dibenzo[*c g*]carbazone
N-dibutylnitrosamine
2,3-dimethylchrysene

indeno[1,2,3-*c d*]pyrene
S-methylchrysene
S-methylfluoranthene
alpha-naphthylamine
nickel compounds
N-nitrosodimethylamine

N-nitrosomethylethylamine
N-nitrosodiethylamine
N-nitrosonornicotine
N-nitrosoanabasine
N-nitrosopiperidine
polonium-210

High-Strength Radiation



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Examples of Human Cancer Viruses

Some Viruses Associated with Human Cancers

Virus	*Type of Cancer*
Epstein-Barr virus	Burkitt's lymphoma
Human papillomavirus	Cervical cancer
Hepatitis B virus	Liver cancer
Human T-cell lymphotrophic virus	Adult T-cell leukemia
Kaposi's sarcoma-associated herpesvirus	Kaposi's sarcoma

Heredity Can Affect Many Types of Cancer

Inherited Conditions That Increase Risk for Cancer

Name of Condition	*Type of Cancer*
Hereditary retinoblastoma	Retinoblastoma
Xeroderma pigmentosum	Skin
Wilms' tumor	Kidney
Li-Fraumeni syndrome	Sarcomas, brain, breast, leukemia
Familial adenomatous polyposis	Colon, rectum
Paget's disease of bone	Bone
Fanconi's aplastic anemia	Leukemia, liver, skin

Genetic Testing

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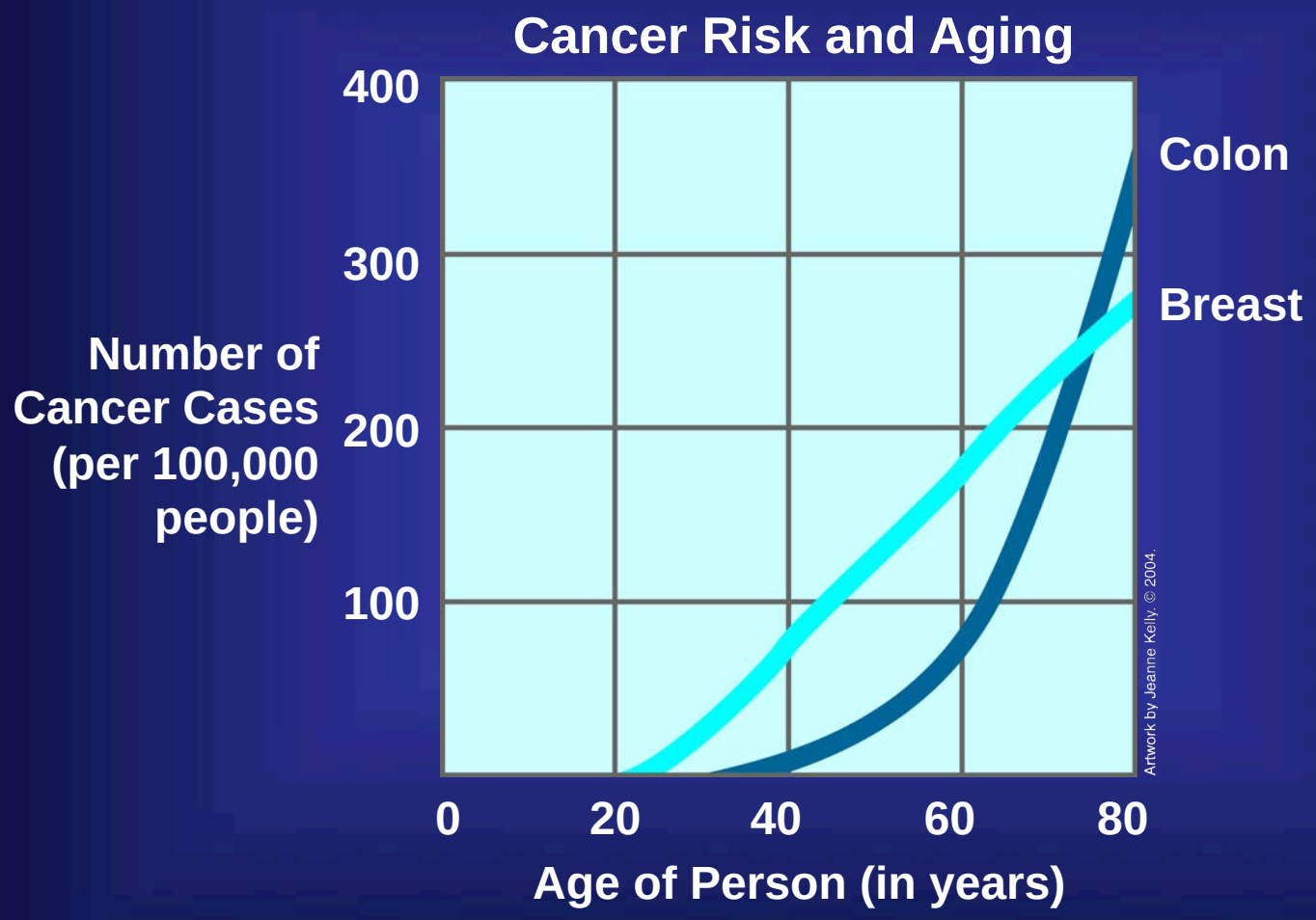
Cancer Risk and Aging



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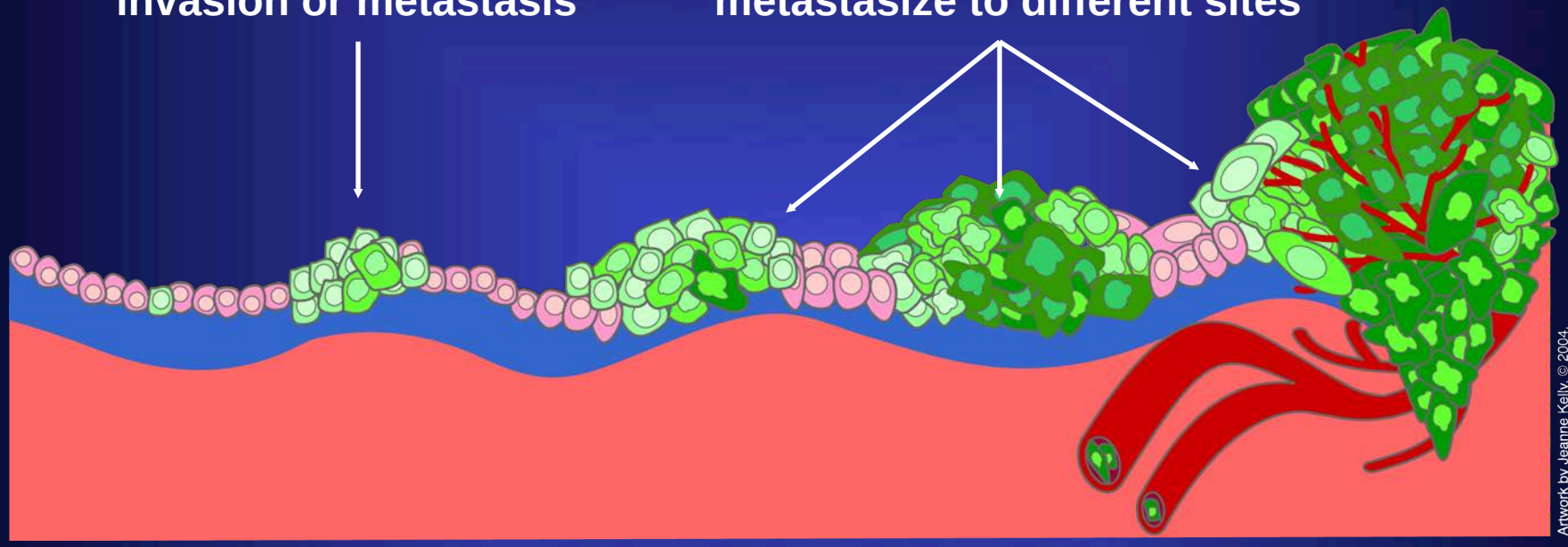
Cancer Tends to Involve Multiple Mutations

Benign tumor cells grow only locally and cannot spread by invasion or metastasis

Malignant cells invade neighboring tissues, enter blood vessels, and metastasize to different sites



Time

Mutation inactivates suppressor gene

Cells proliferate

Mutations inactivate DNA repair genes

Proto-oncogenes mutate to oncogenes

More mutations, more genetic instability, metastatic disease

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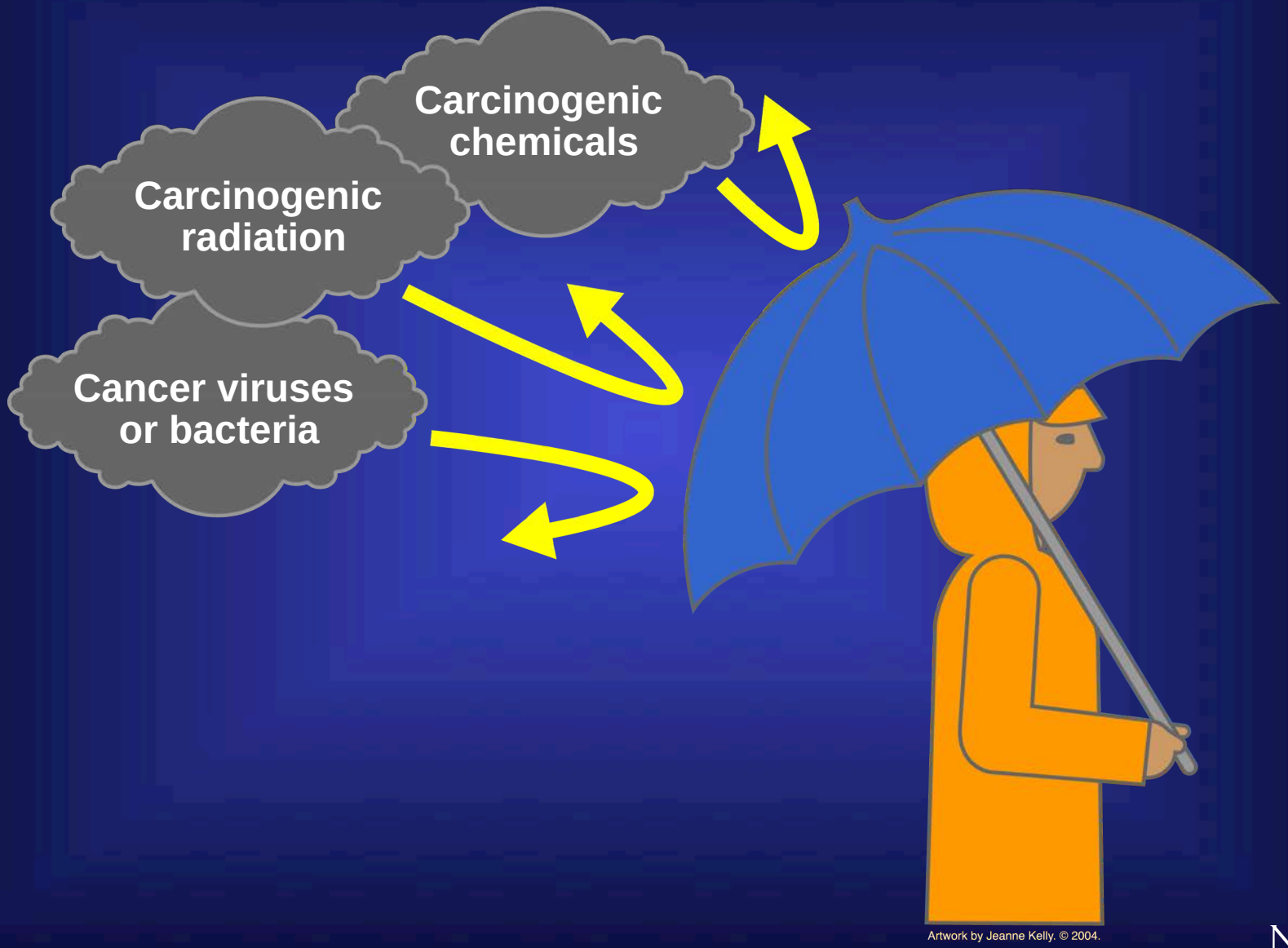
Cancer Prevention



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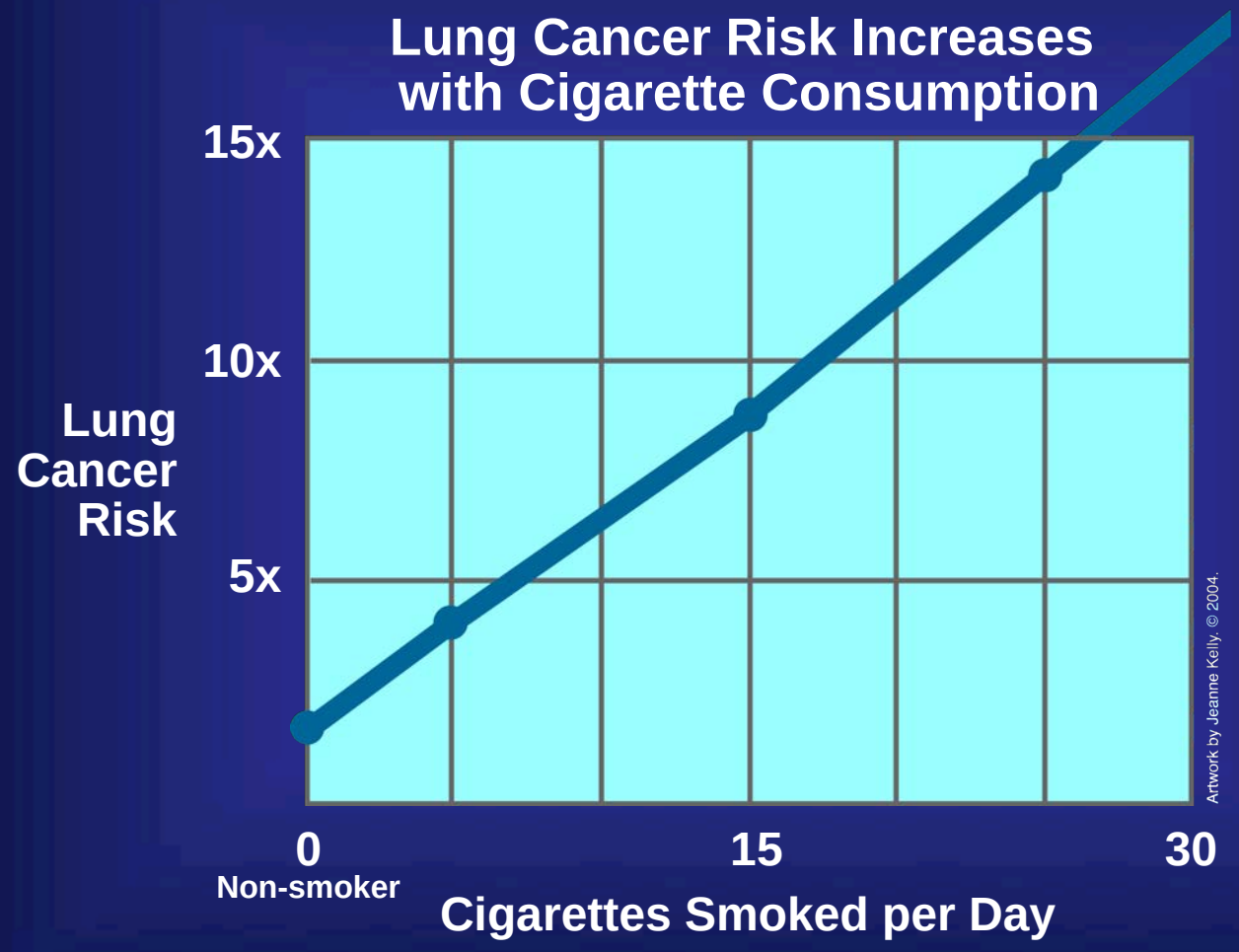
Avoid Tobacco



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Protect Yourself From Excessive Sunlight

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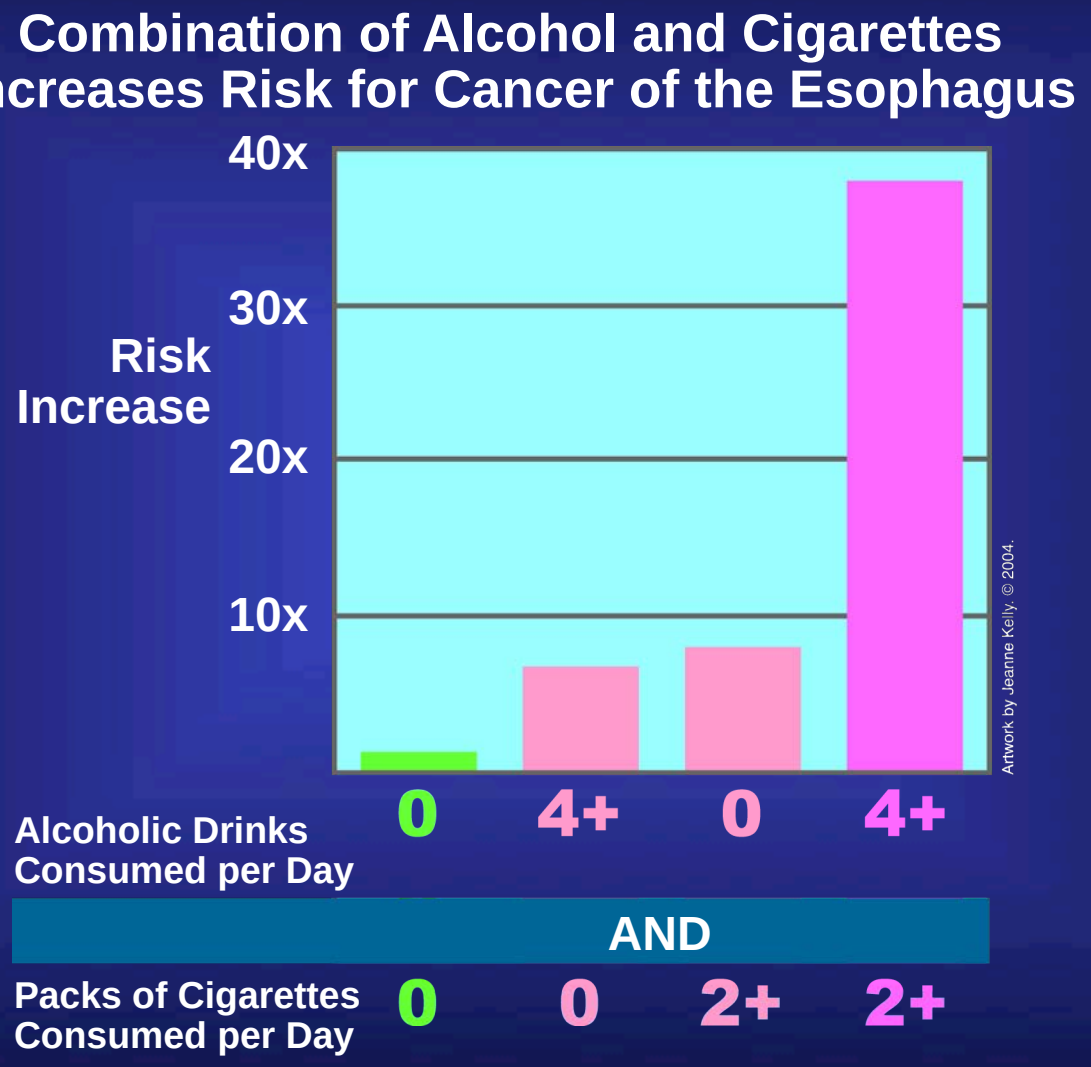
Limit Alcohol and Tobacco



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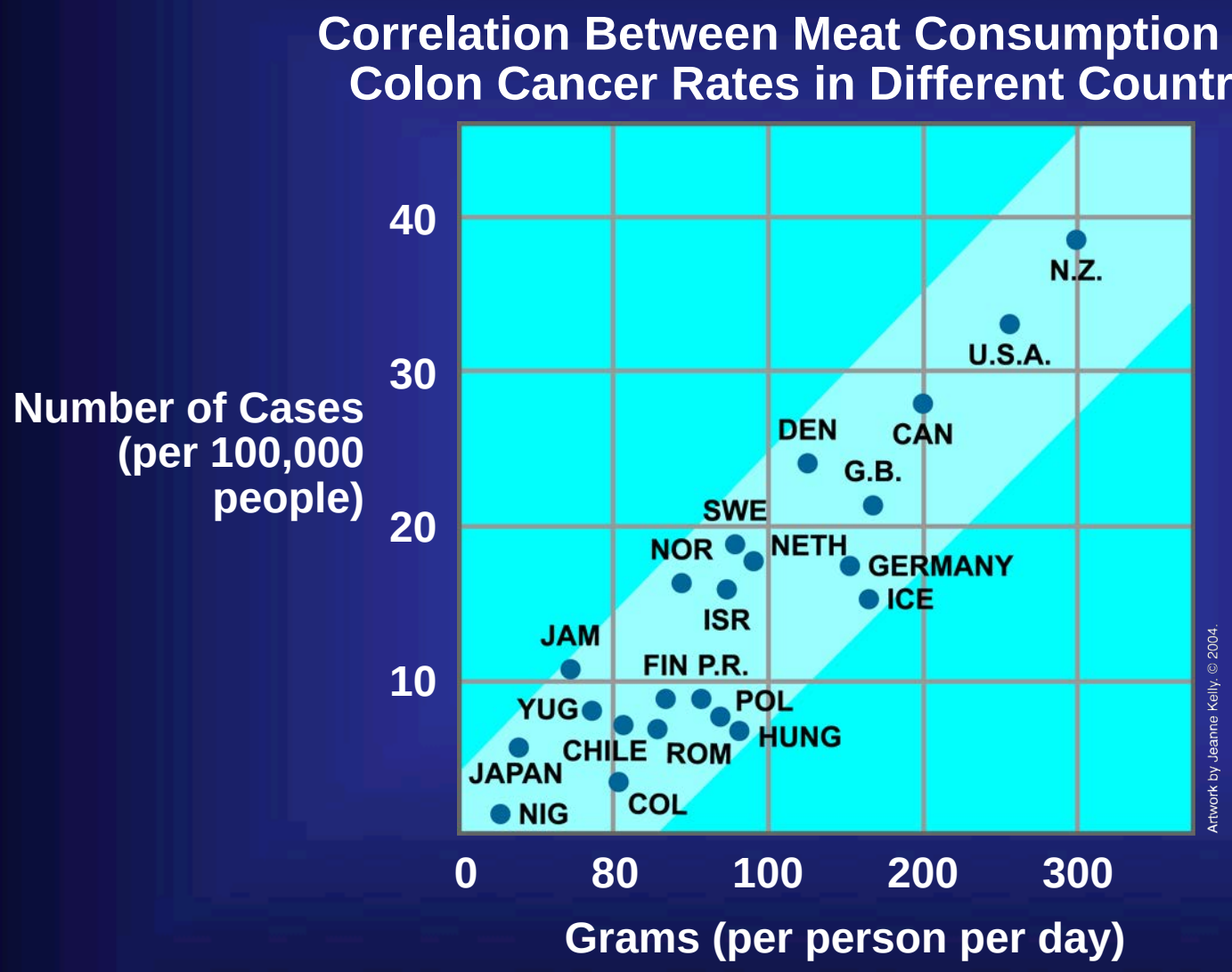
Diet: Limit Fats and Calories



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Diet: Consume Fruits and Vegetables

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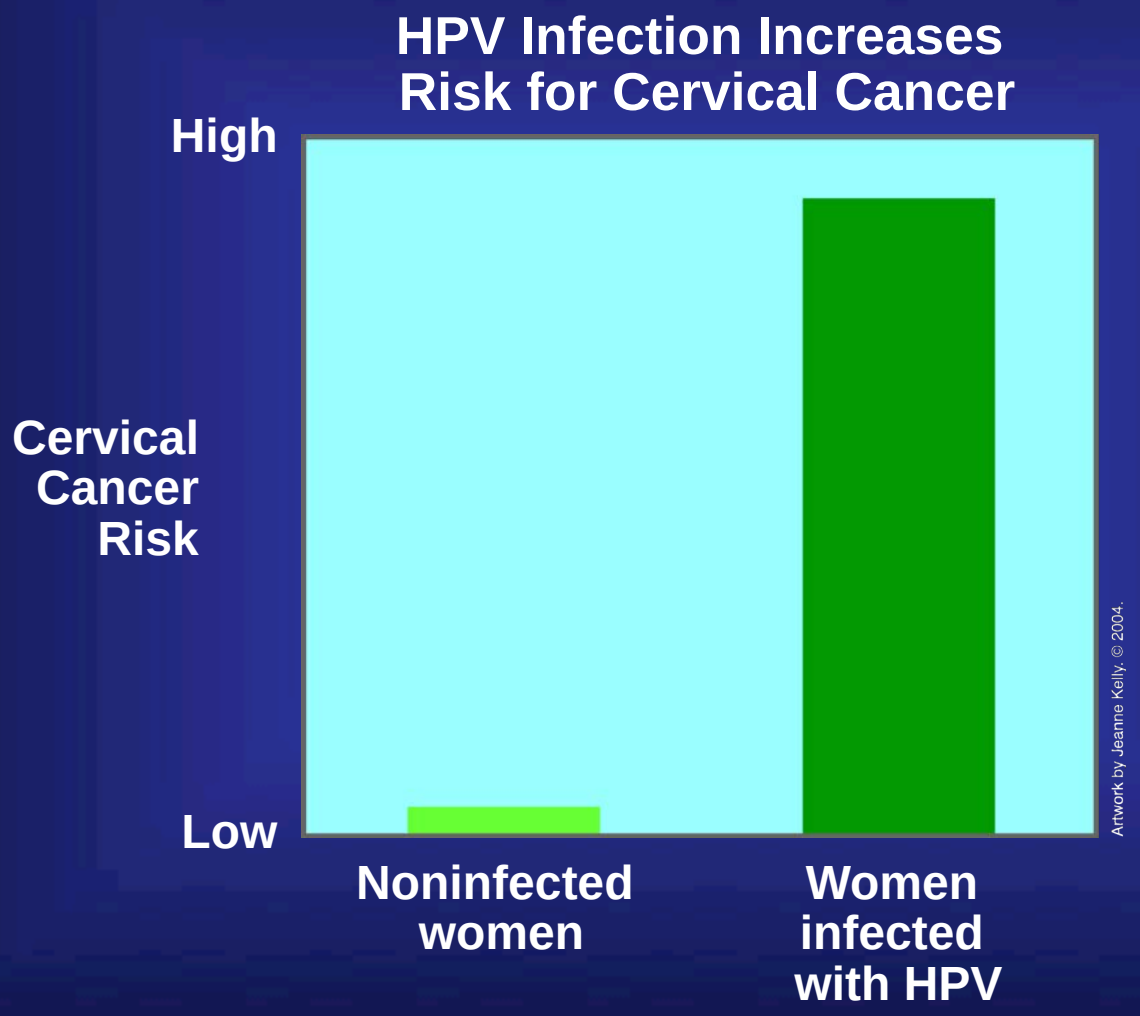
Avoid Cancer Viruses



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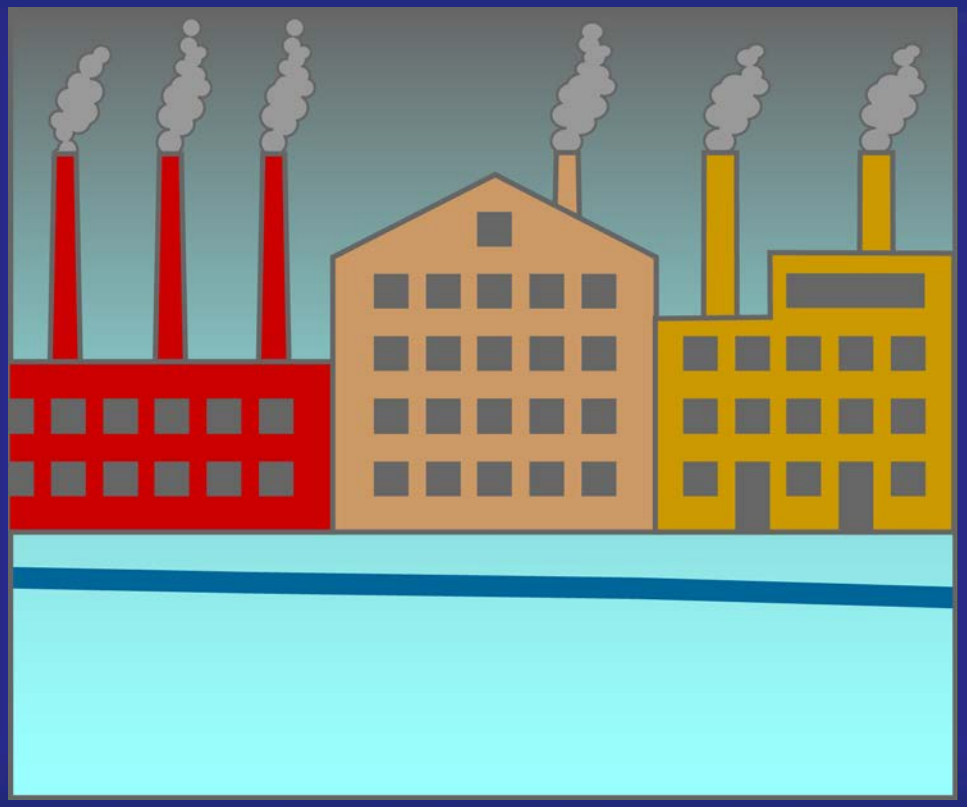
Avoid Carcinogens at Work

Some Carcinogens in the Workplace

Carcinogen	Occupation	Type of Cancer
Arsenic	Mining, pesticide workers	Lung, skin, liver
Asbestos	Construction workers	Lung, mesothelioma
Benzene	Petroleum, rubber, chemical workers	Leukemia
Chromium	Metal workers, electroplaters	Lung
Leather dust	Shoe manufacturing	Nasal, bladder
Naphthylamine	Chemical, dye, rubber workers	Bladder
Radon	Underground mining	Lung
Soots, tars, oils	Coal, gas, petroleum workers	Lung, skin, liver
Vinyl chloride	Rubber workers, polyvinyl chloride manufacturing	Liver
Wood dust	Furniture manufacturing	Nasal

Industrial Pollution

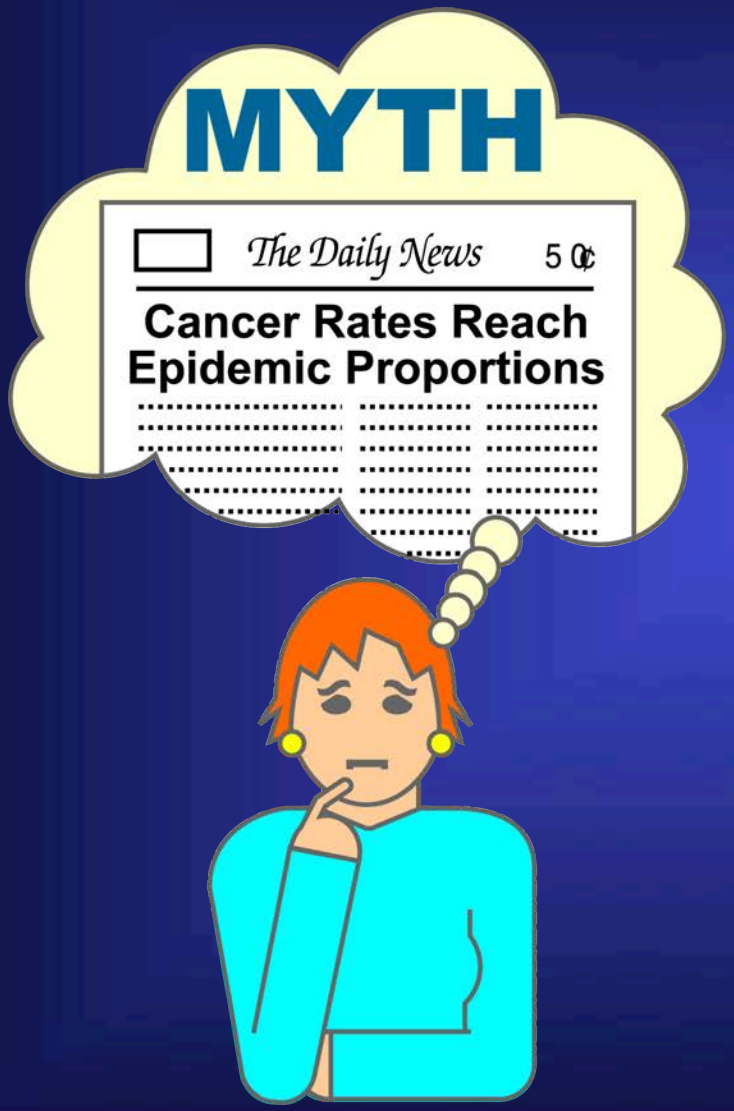


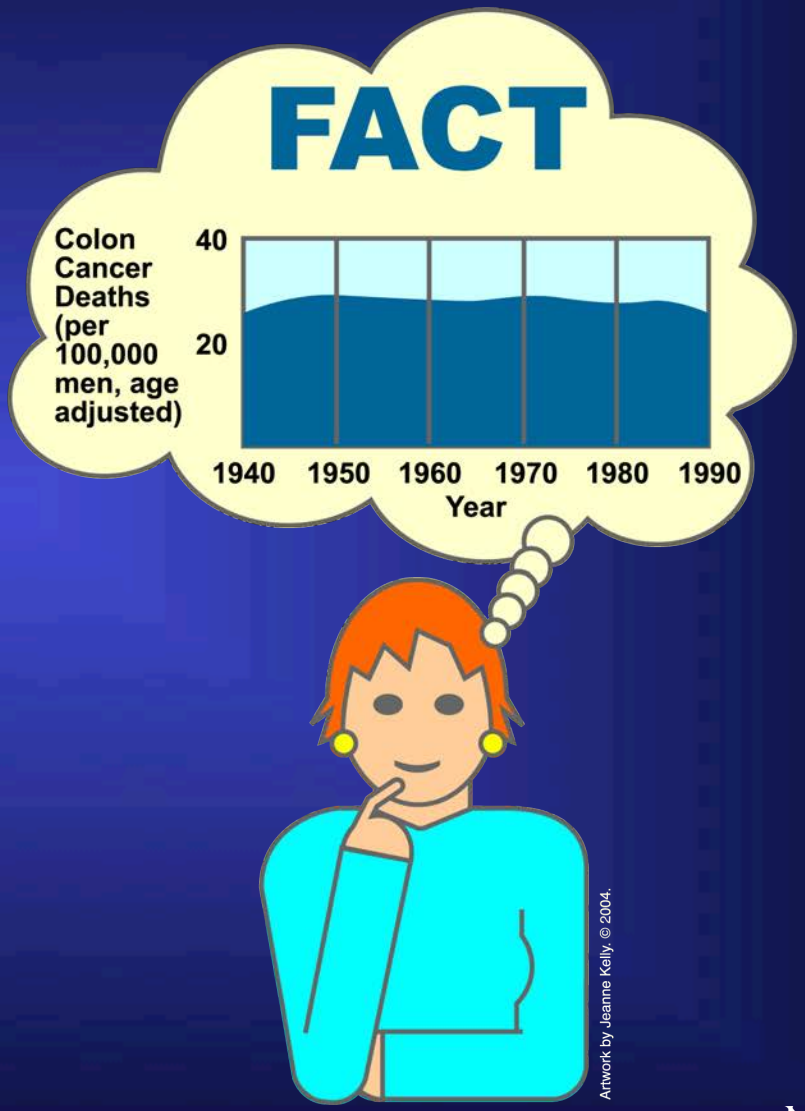
Incidence of Most Cancers

1930 1950 1970 1990

Year

Is There a Cancer "Epidemic"?





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Questions?

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