

Different Kinds of Cancer

Some common carcinomas:

- Lung
- Breast (women)
- Colon
- Bladder
- Prostate (men)

Leukemias:

Bloodstream

Lymphomas:

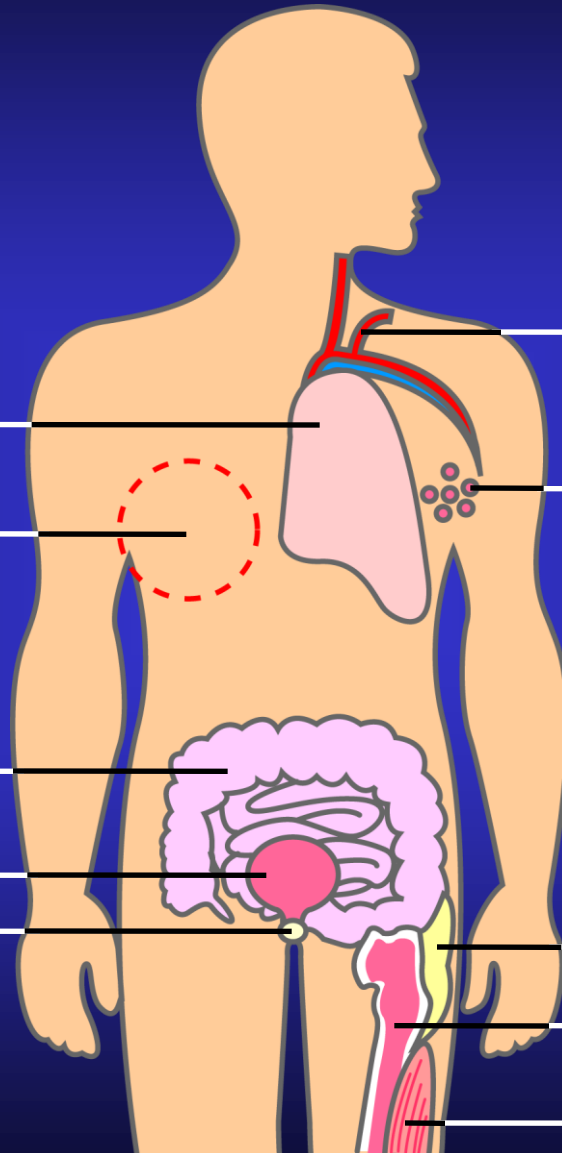
Lymph nodes

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-

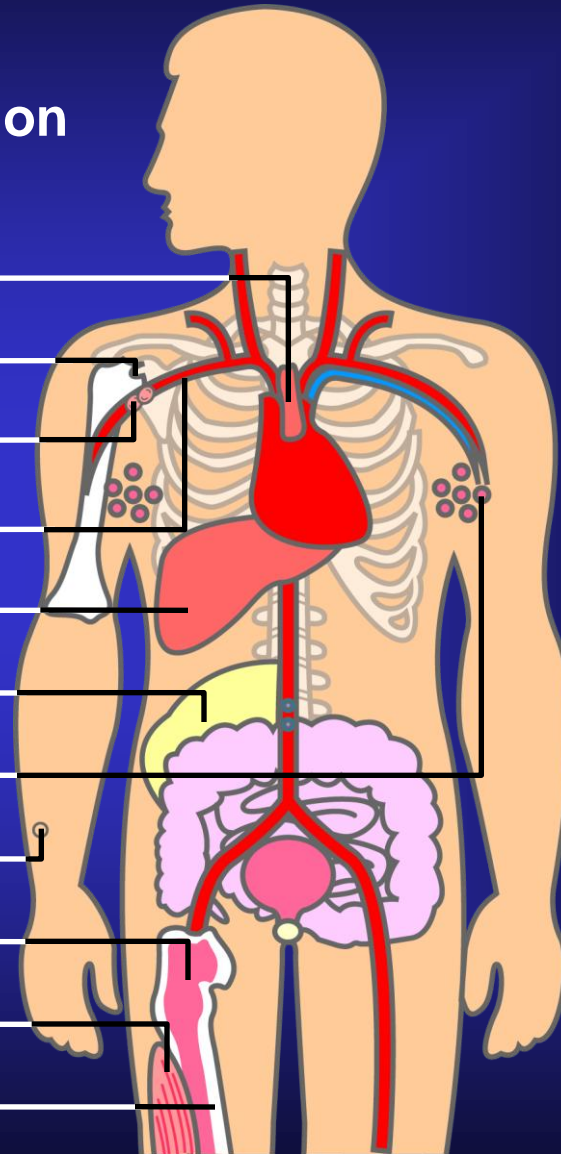
bone marrow

myo-

muscle

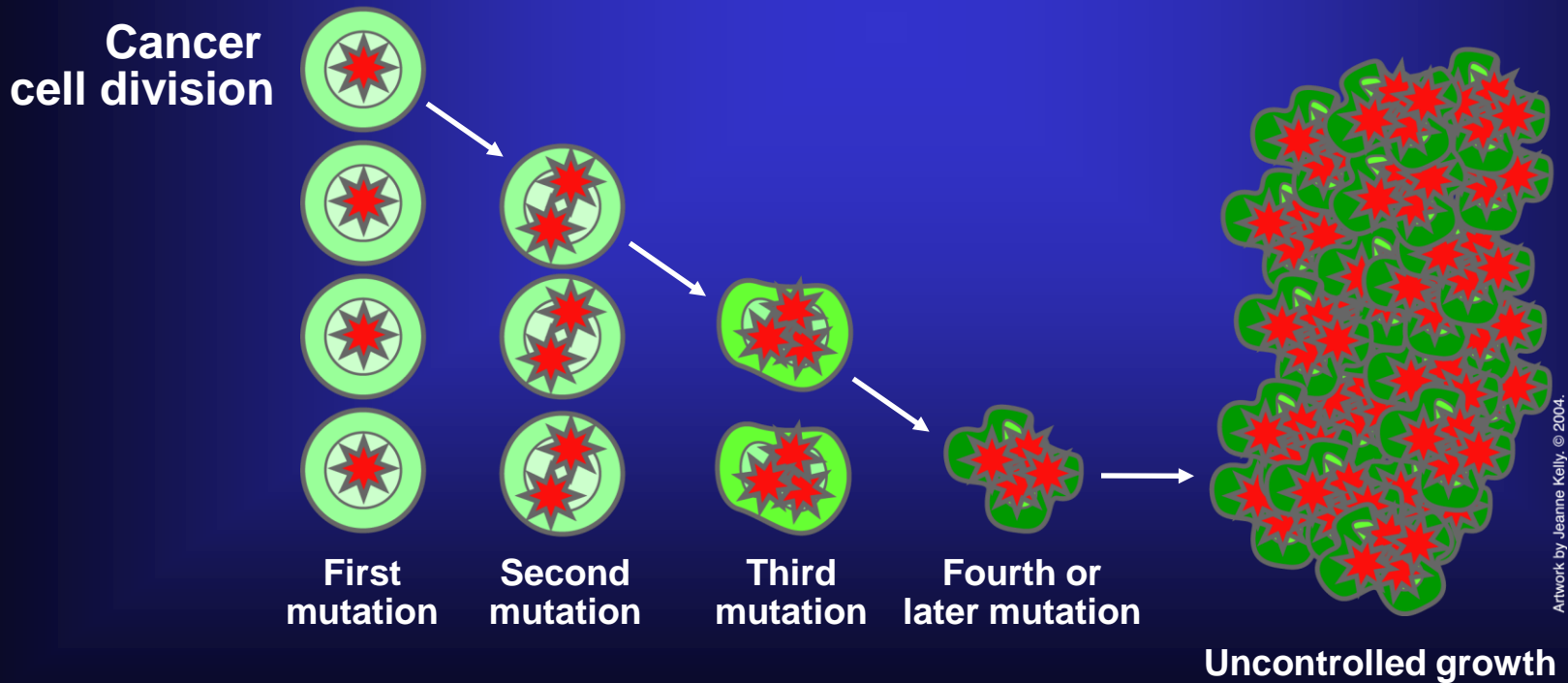
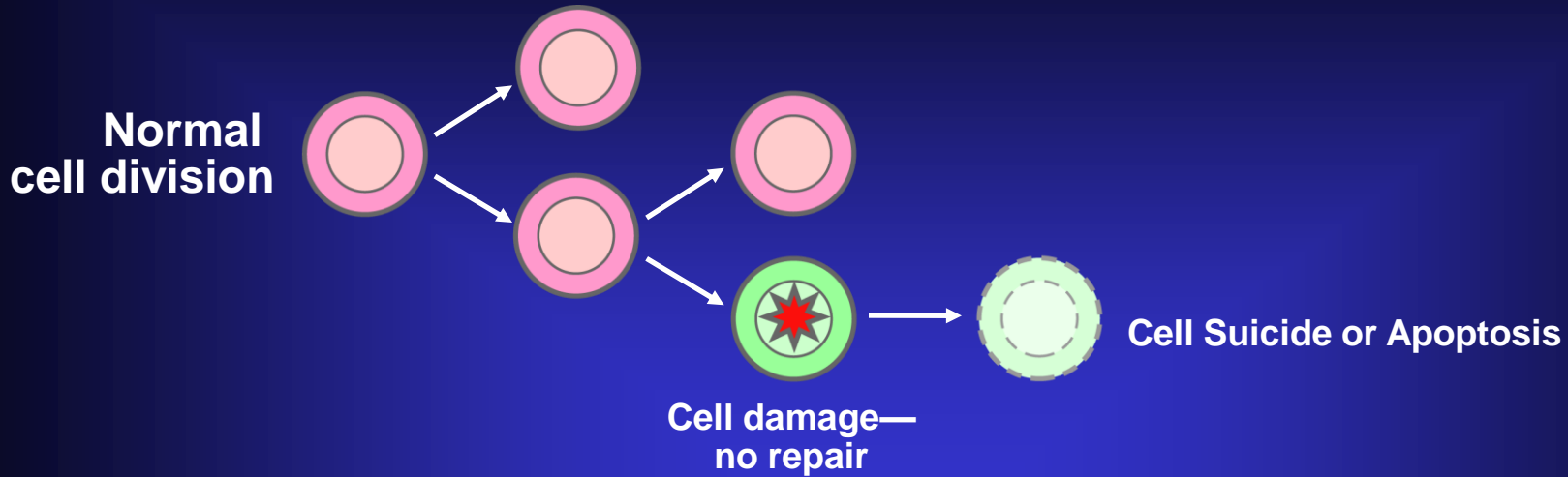
osteo-

bone



Artwork by Jeanne Kelly. © 2004.

Loss of Normal Growth Control

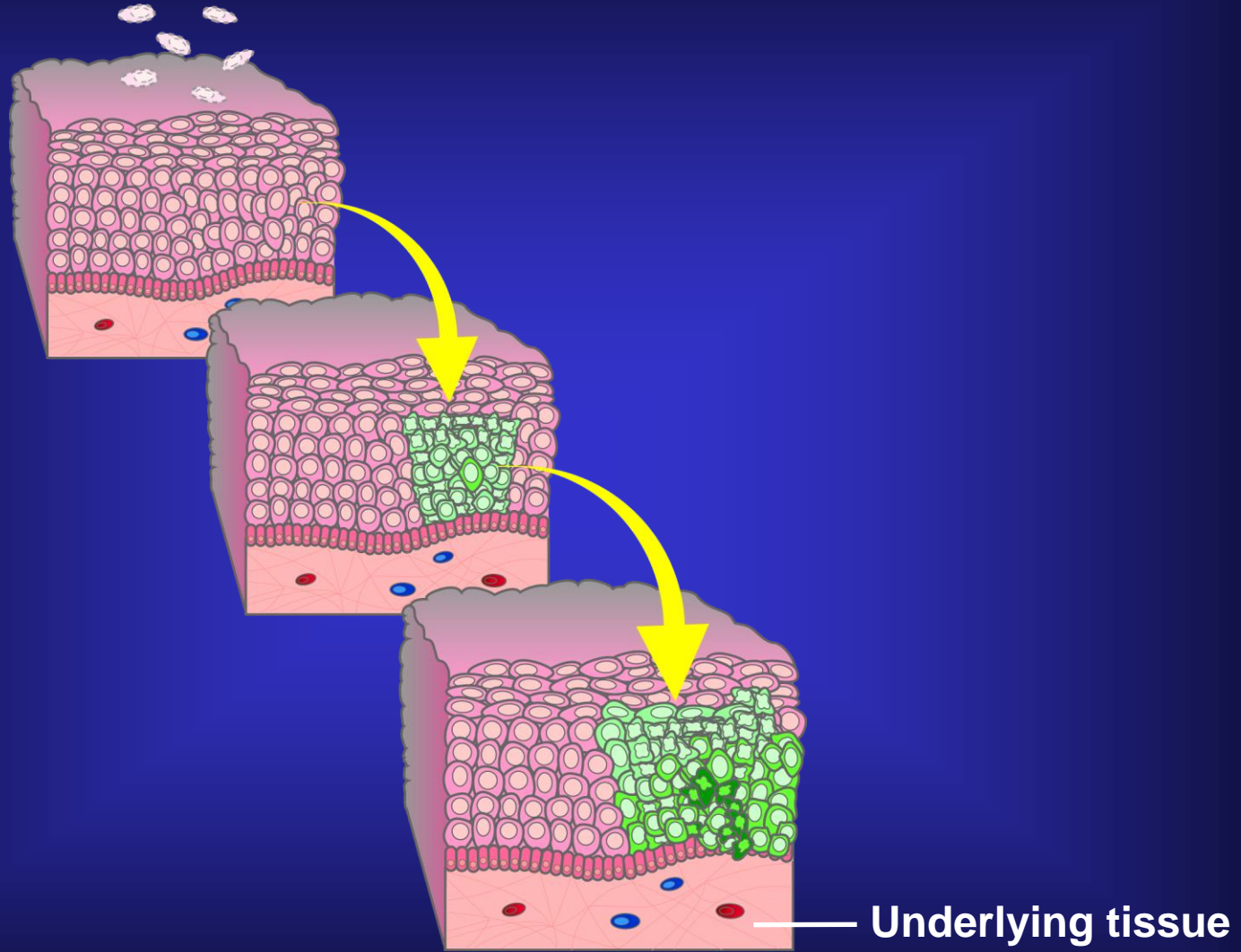


Mitosis = Cell Division

Cells Divide for several reasons:

- Organism is growing
- Cell has been damaged
- Cell is too old to function properly
- Cell has become too large to be efficient

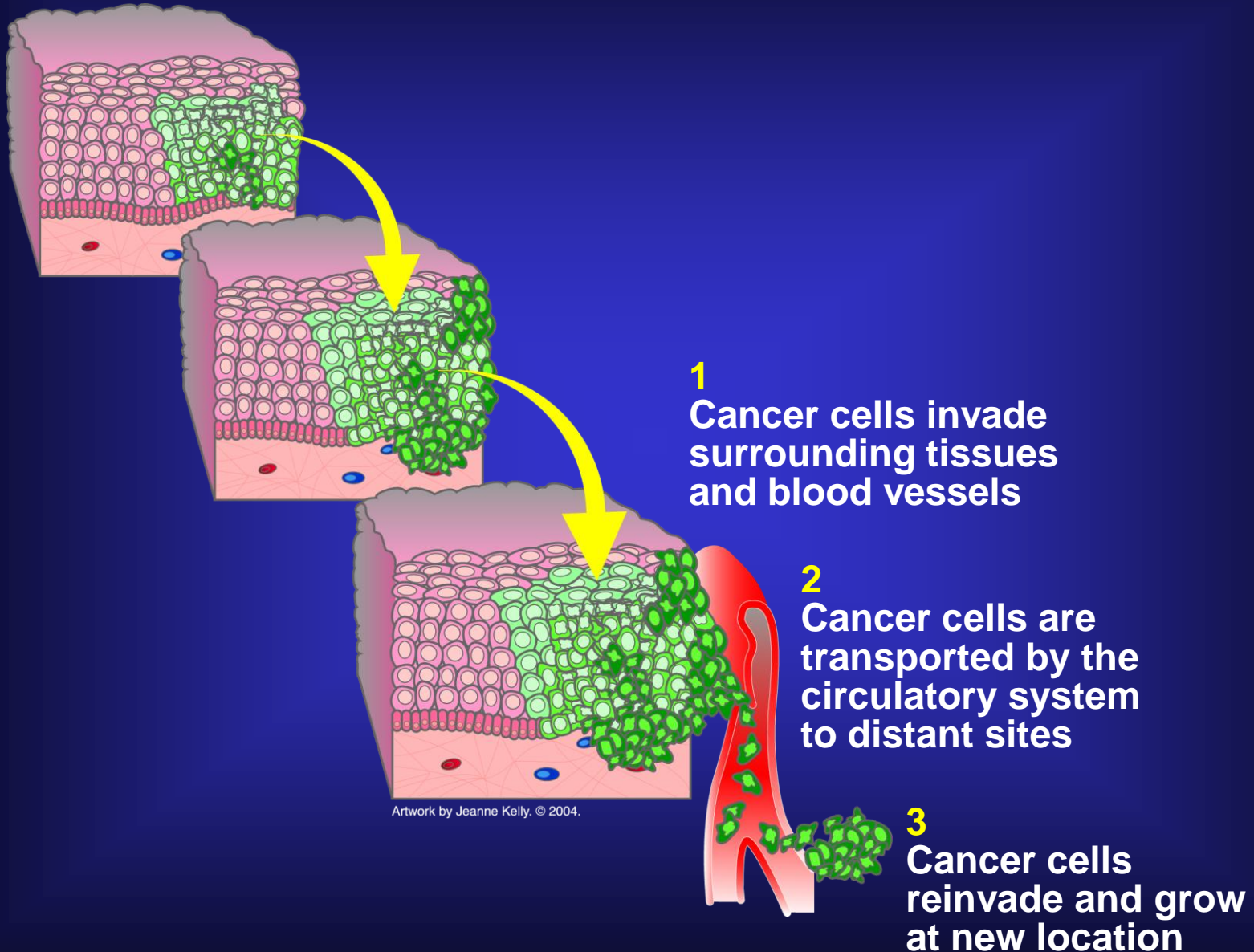
The Beginning of Cancerous Growth



Artwork by Jeanne Kelly. © 2004.



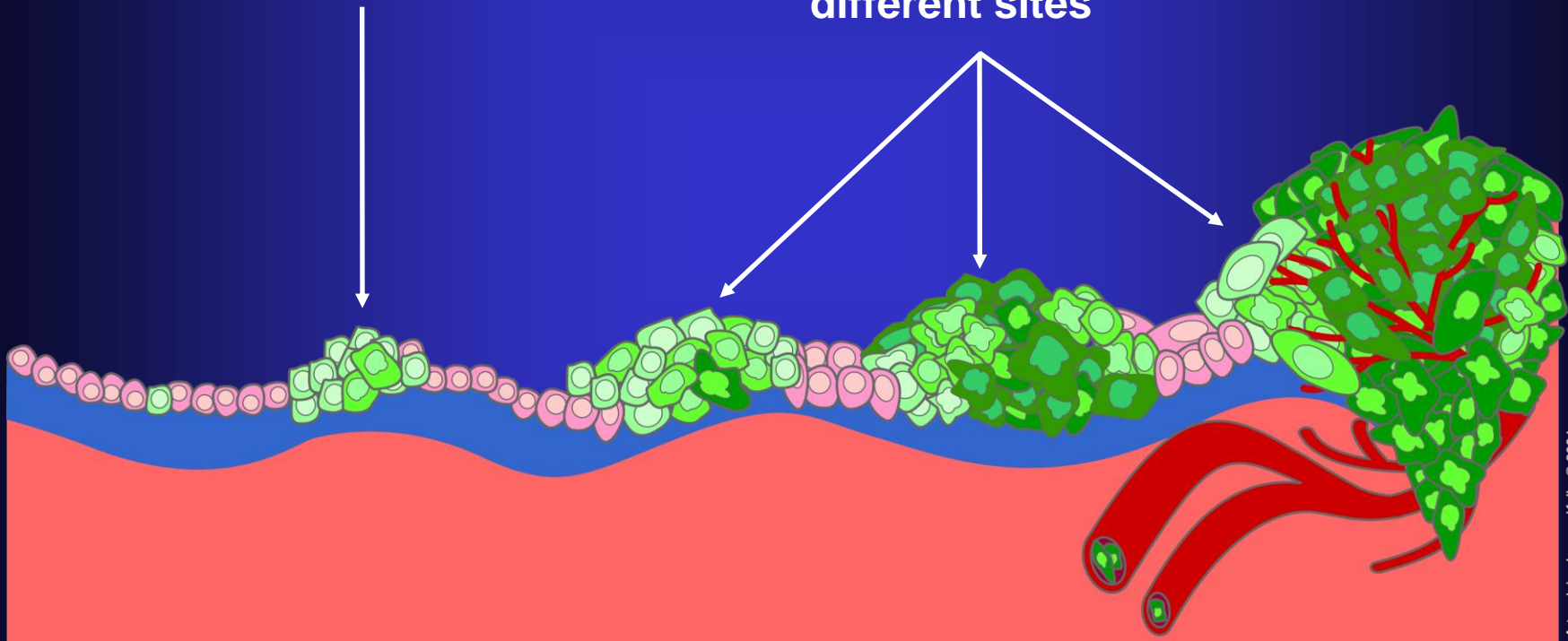
Invasion and Metastasis (Spreading)



Malignant versus Benign Tumors

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

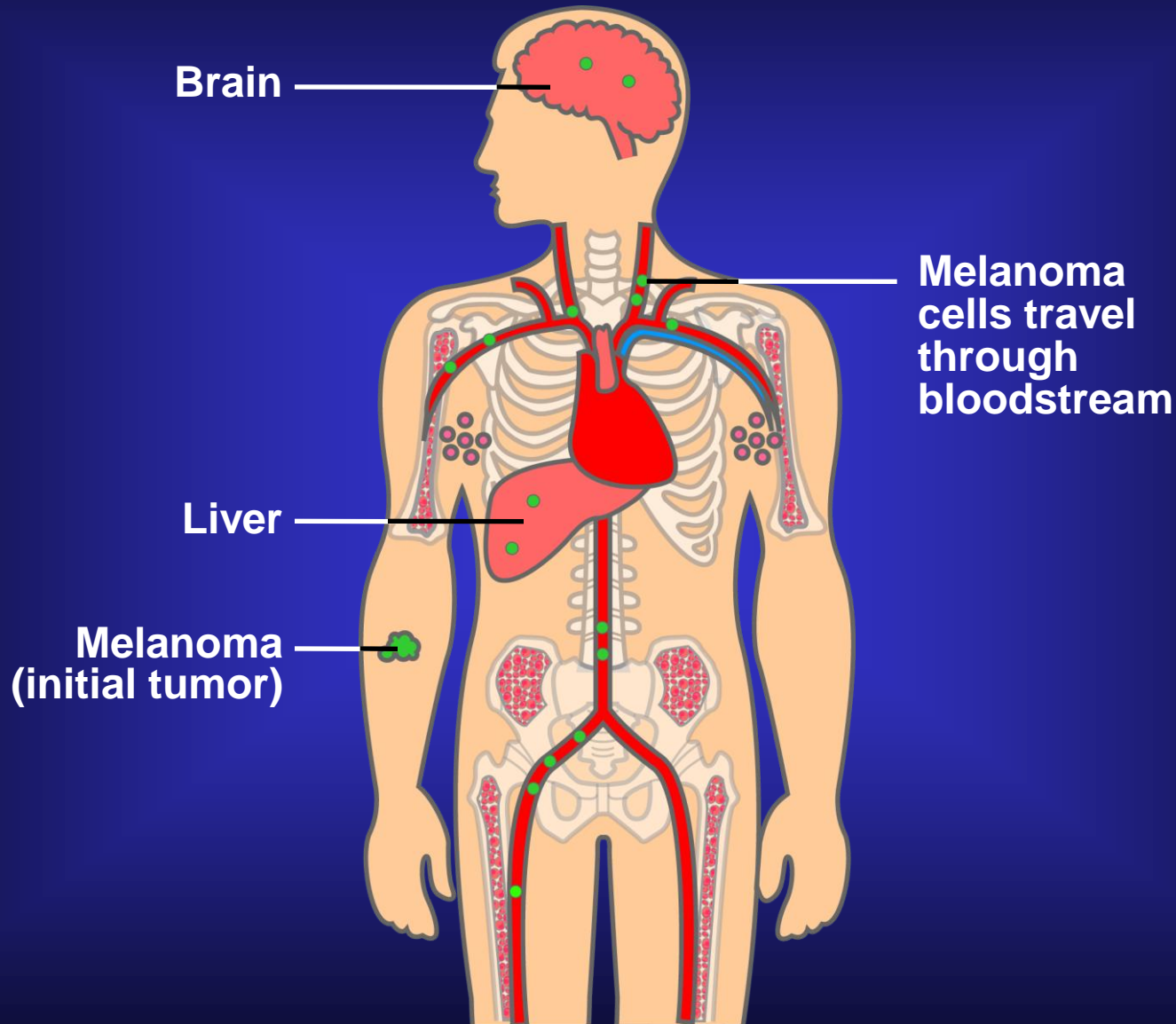
Malignant (cancer)
cells invade
neighboring tissues,
enter blood vessels,
and metastasize to
different sites



Time



Why Cancer Is Potentially Dangerous



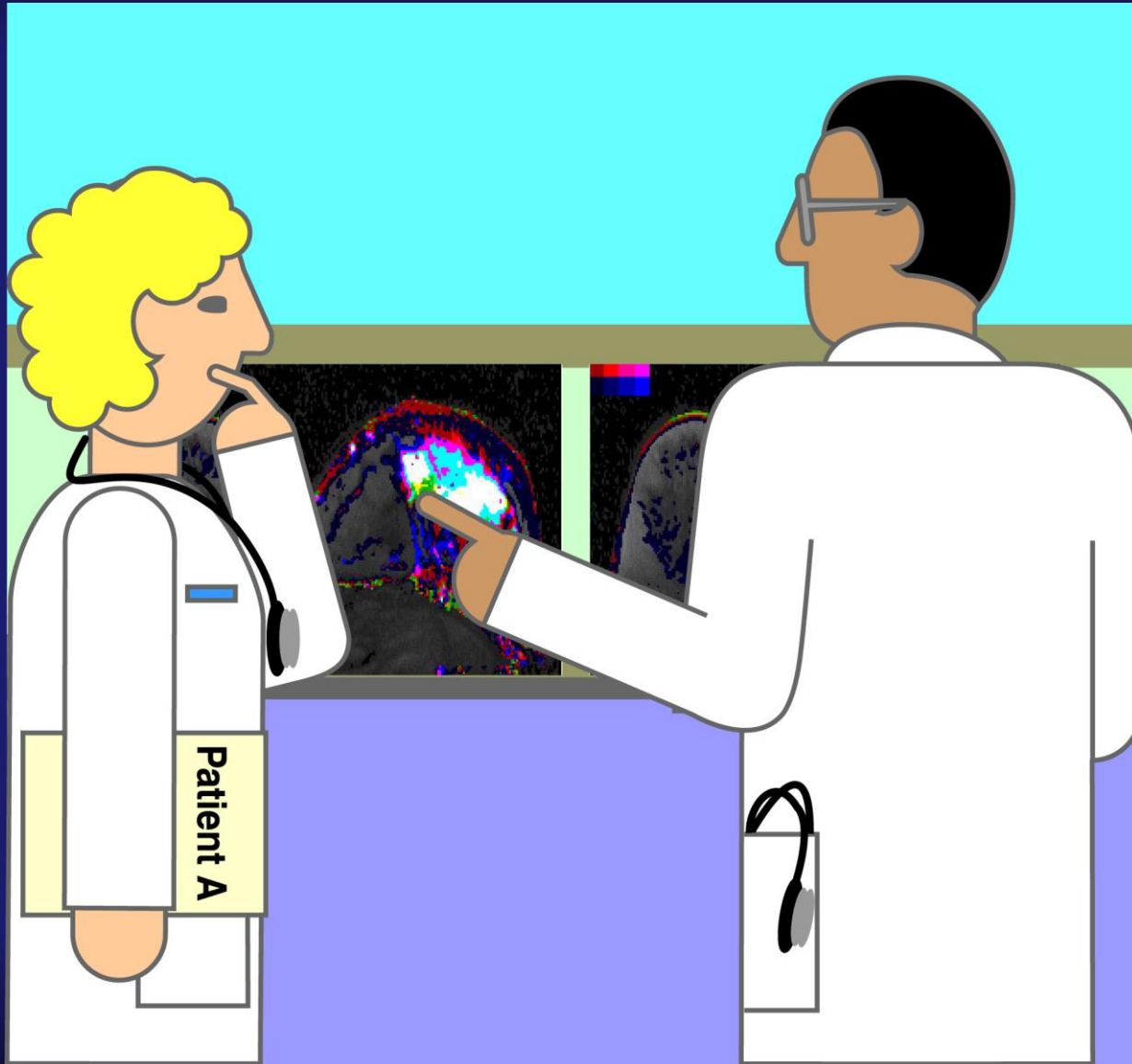
Brain

Melanoma cells travel through bloodstream

Liver

Melanoma (initial tumor)

Cancer Detection and Diagnosis



Artwork by Jeanne Kelly, © 2004.

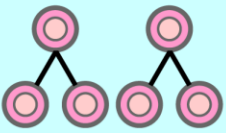
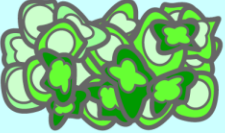




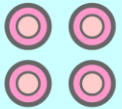



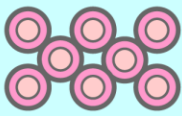
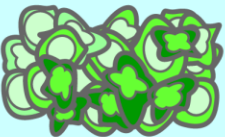
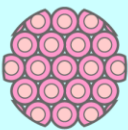
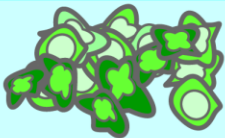
Early Cancer May Not Have Any Symptoms



Artwork by Jeanne Kelly. © 2004.



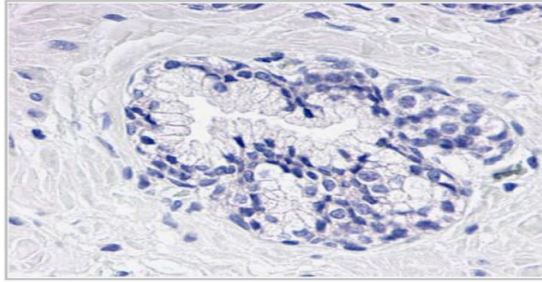
Microscopic Appearance of Cancer Cells

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

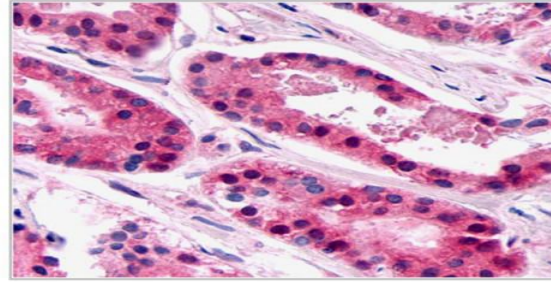
Artwork by Jeanne Kelly. © 2004.

B

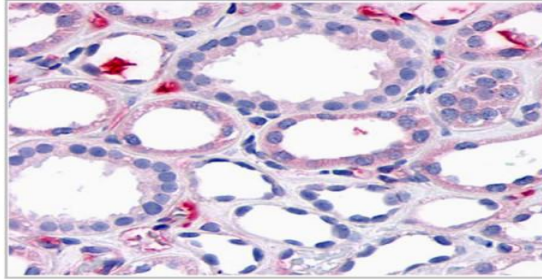
Normal prostate



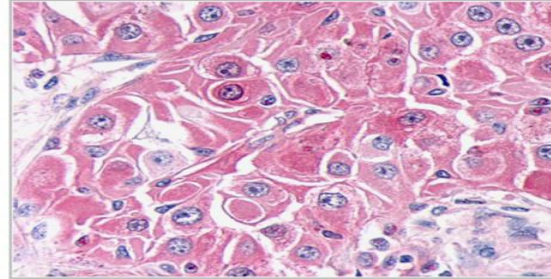
Prostate carcinoma



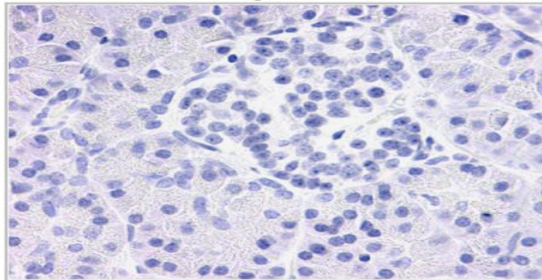
Normal kidney



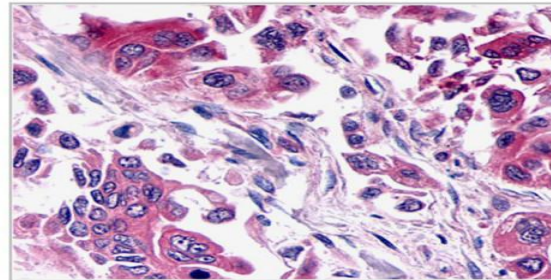
Renal cell carcinoma



Normal pancreas

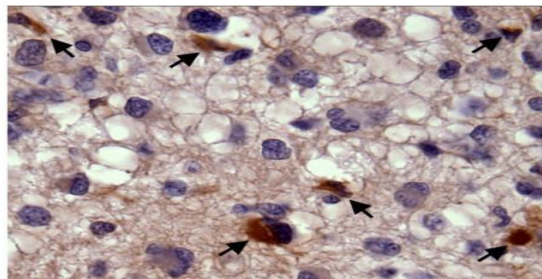


Pancreatic carcinoma

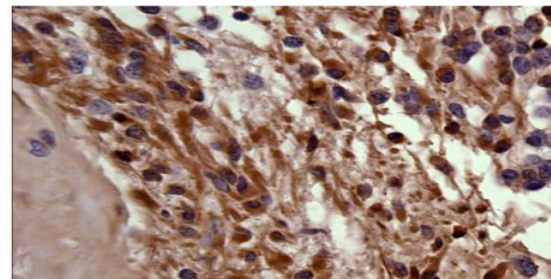


C

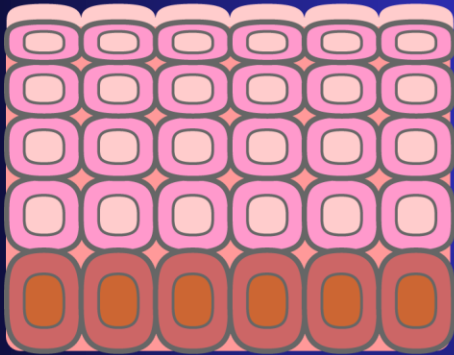
GBM - scattered



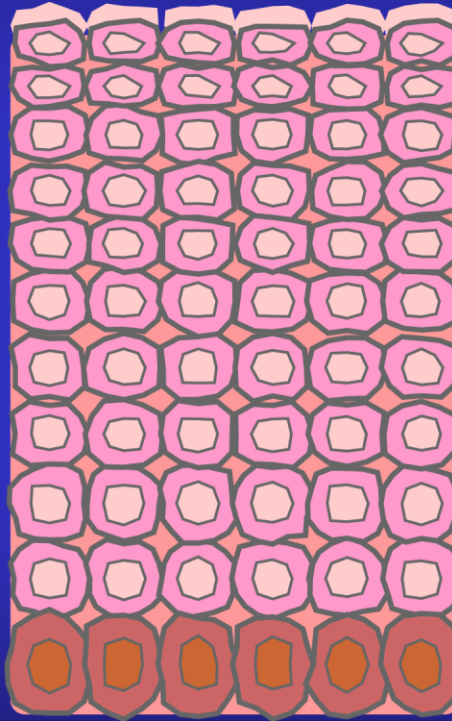
GBM - diffuse



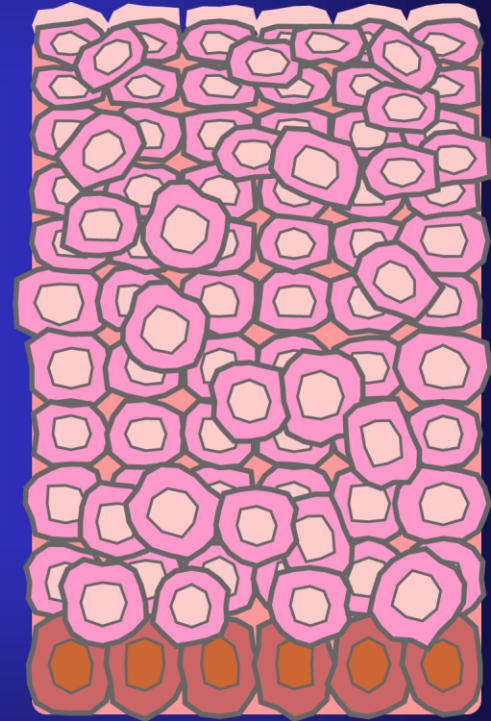
Dysplasia



Normal



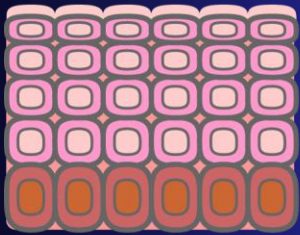
Hyperplasia



Mild dysplasia

Artwork by Jeanne Kelly. © 2004.

Carcinoma in Situ



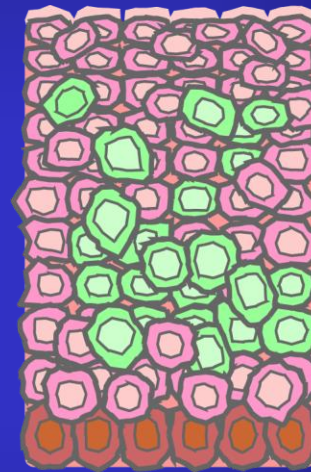
Normal



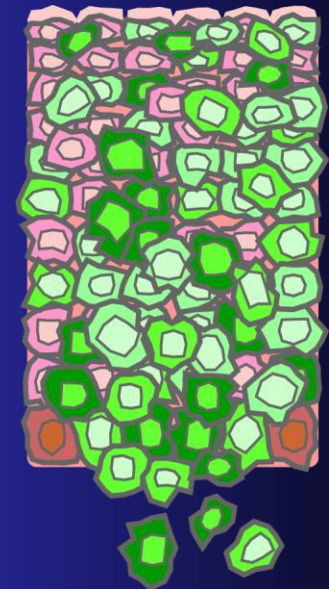
Hyperplasia



Mild
dysplasia



Carcinoma in
situ (severe
dysplasia)

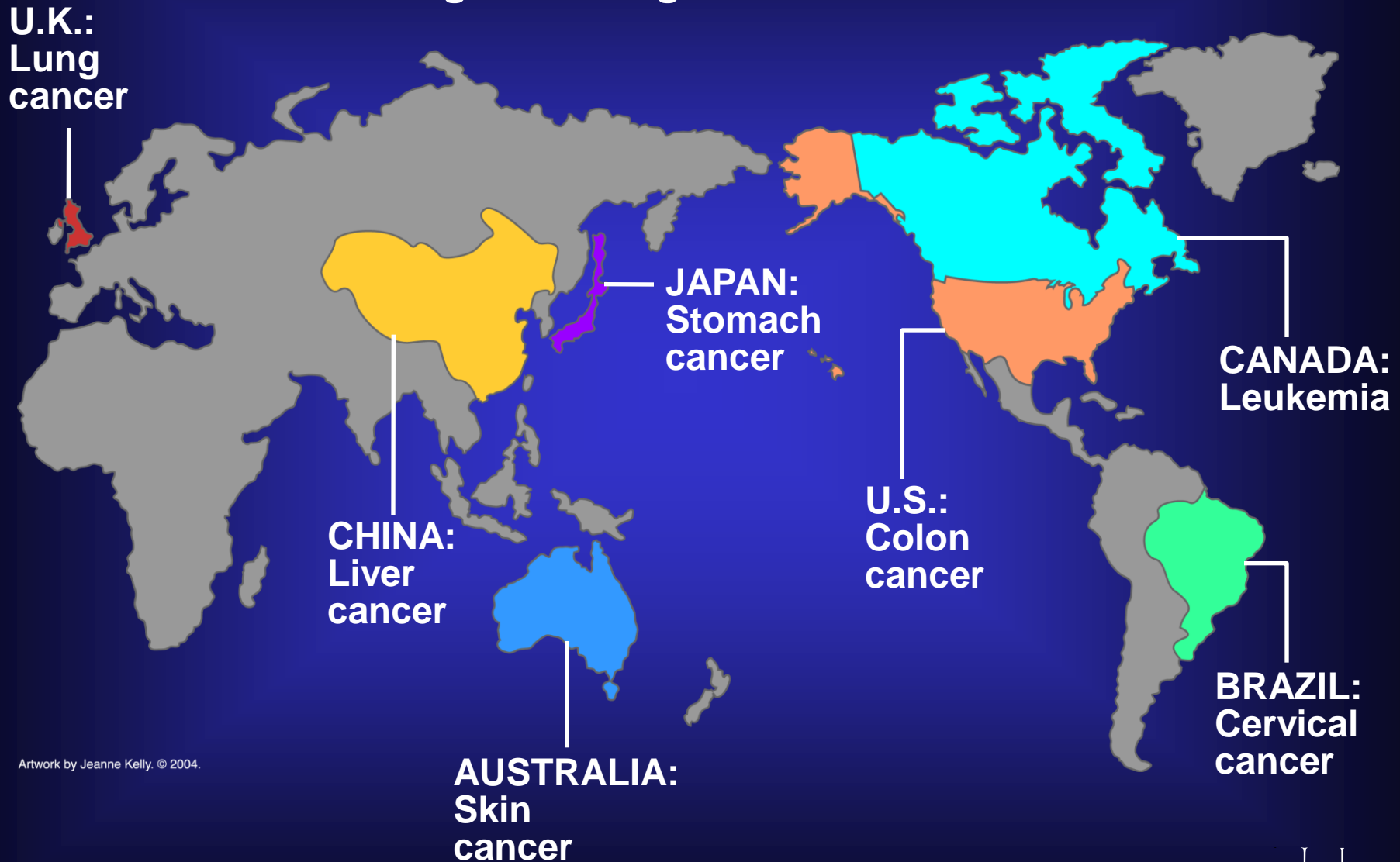


Cancer
(invasive)



Population-Based Studies

Regions of Highest Incidence

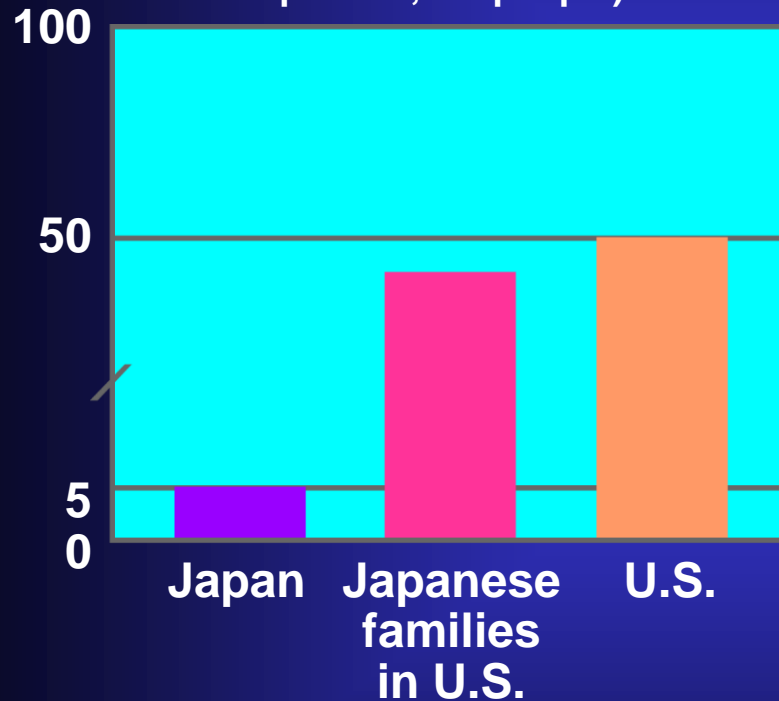


Artwork by Jeanne Kelly. © 2004.

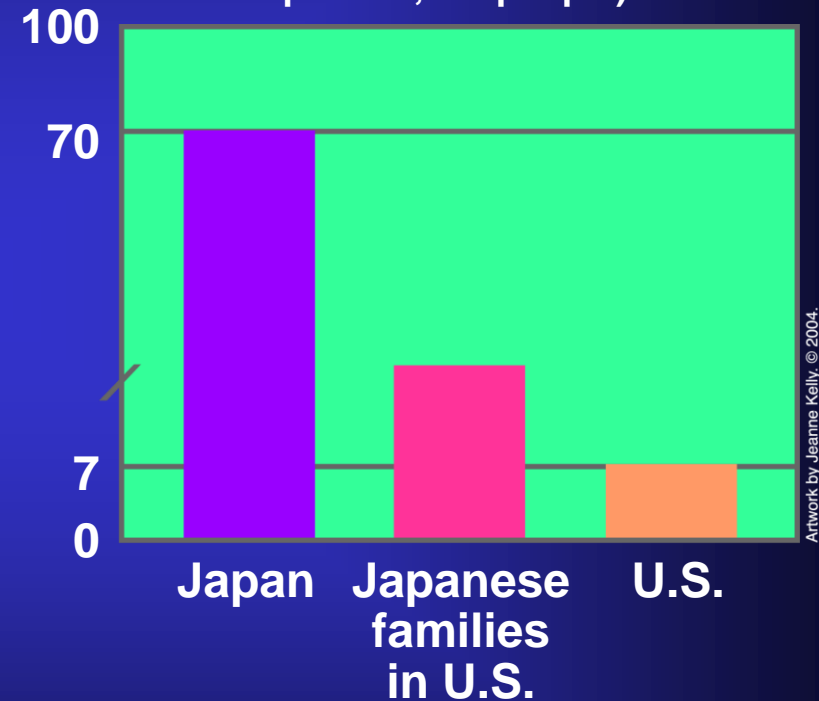


Heredity? Behaviors? Other Factors?

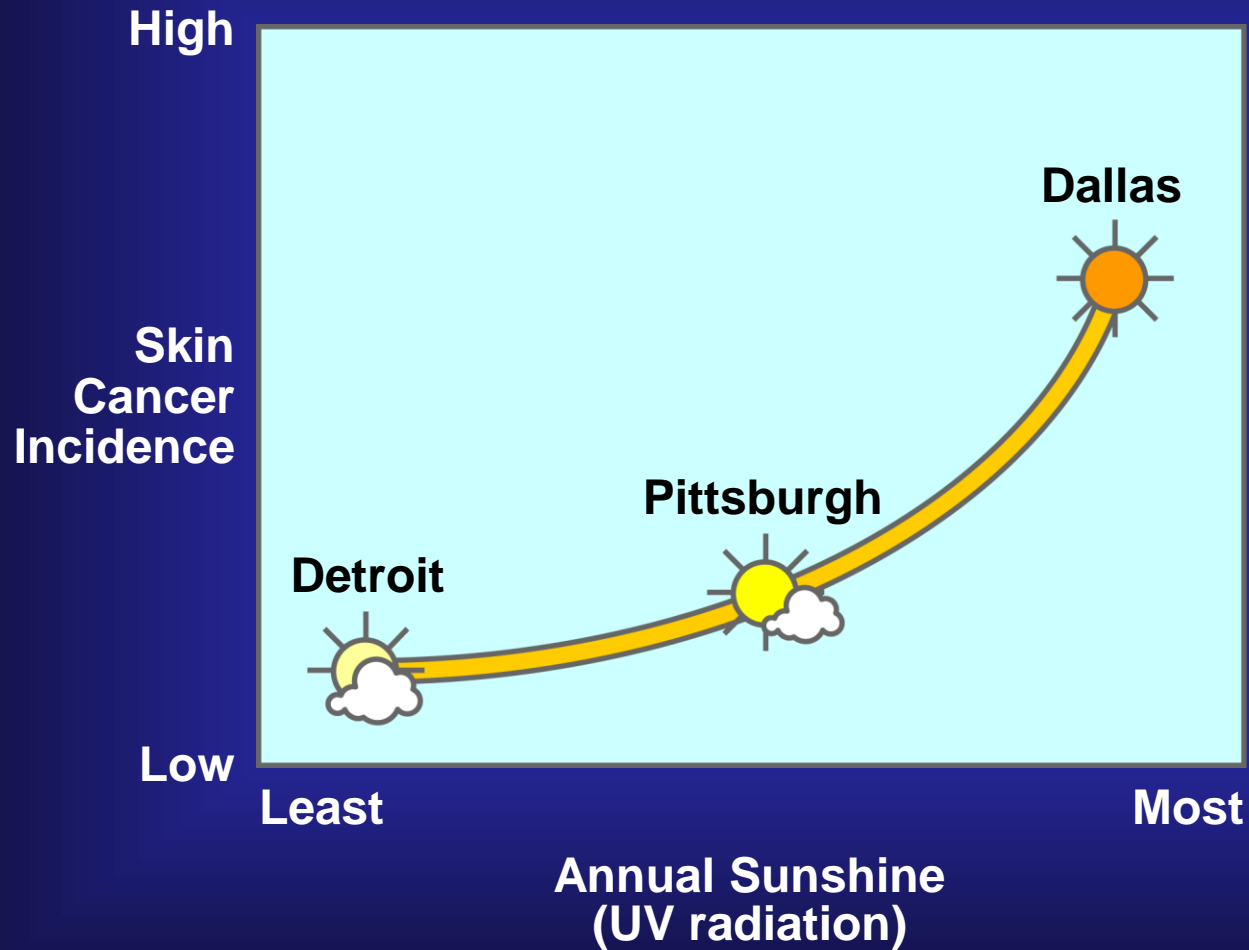
Colon Cancer
(Number of new cases
per 100,000 people)



Stomach Cancer
(Number of new cases
per 100,000 people)



Low-Strength Radiation



Artwork by Jeane Kelly, © 2004.

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

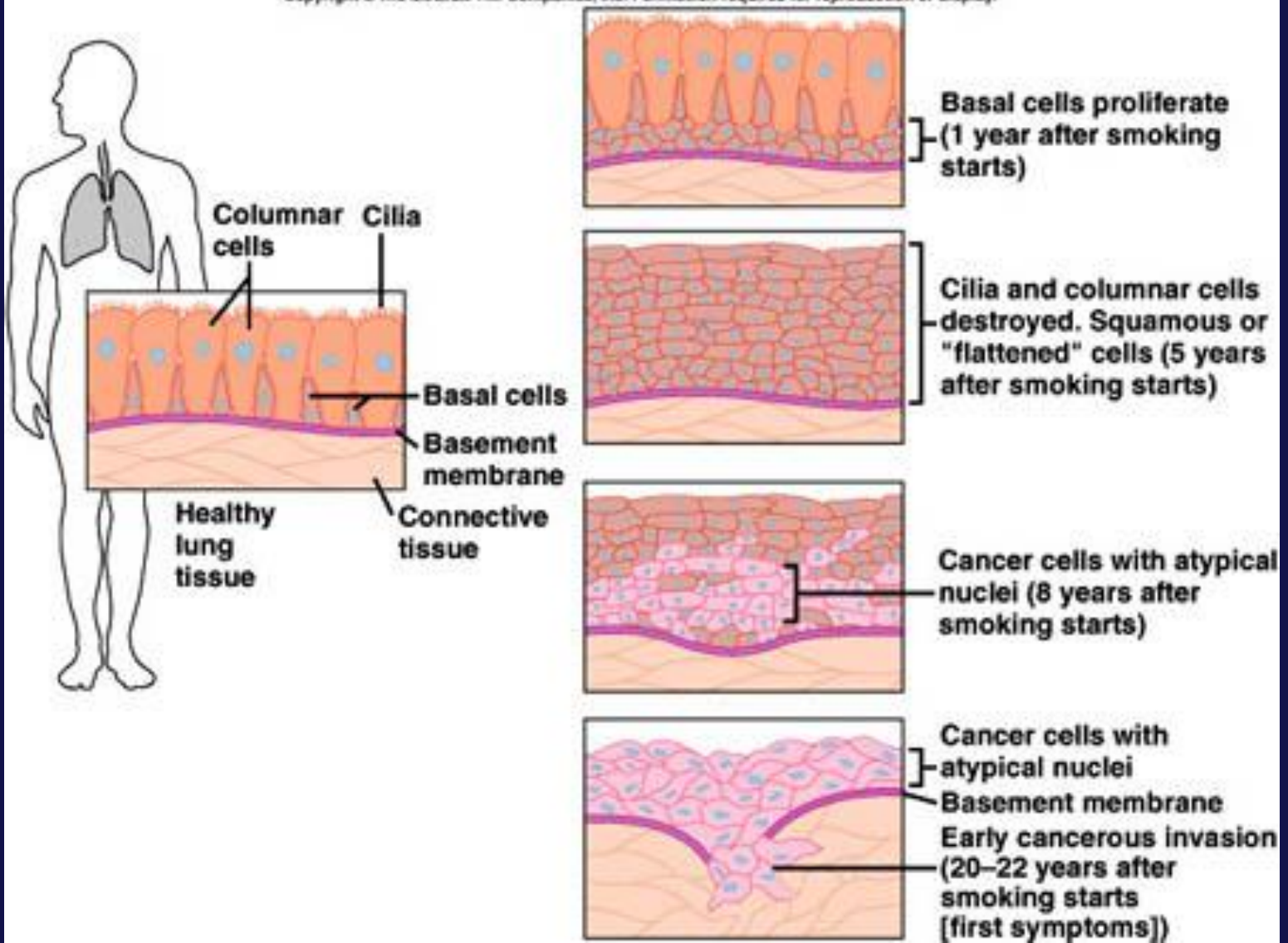
chrysene
dibenz[a c]anthracene
dibenzo[a e]fluoranthene
dibenz[a h]acridine
dibenz[a j]acridine
dibenzo[c g]carbazone
N-dibutyl nitrosamine
2,3-dimethylchrysene

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

N-nitrosomethylethylamine
N-nitrosodiethylamine
N-nitrosornicotine
N-nitrosoanabasine
N-nitropiperidine
polonium-210

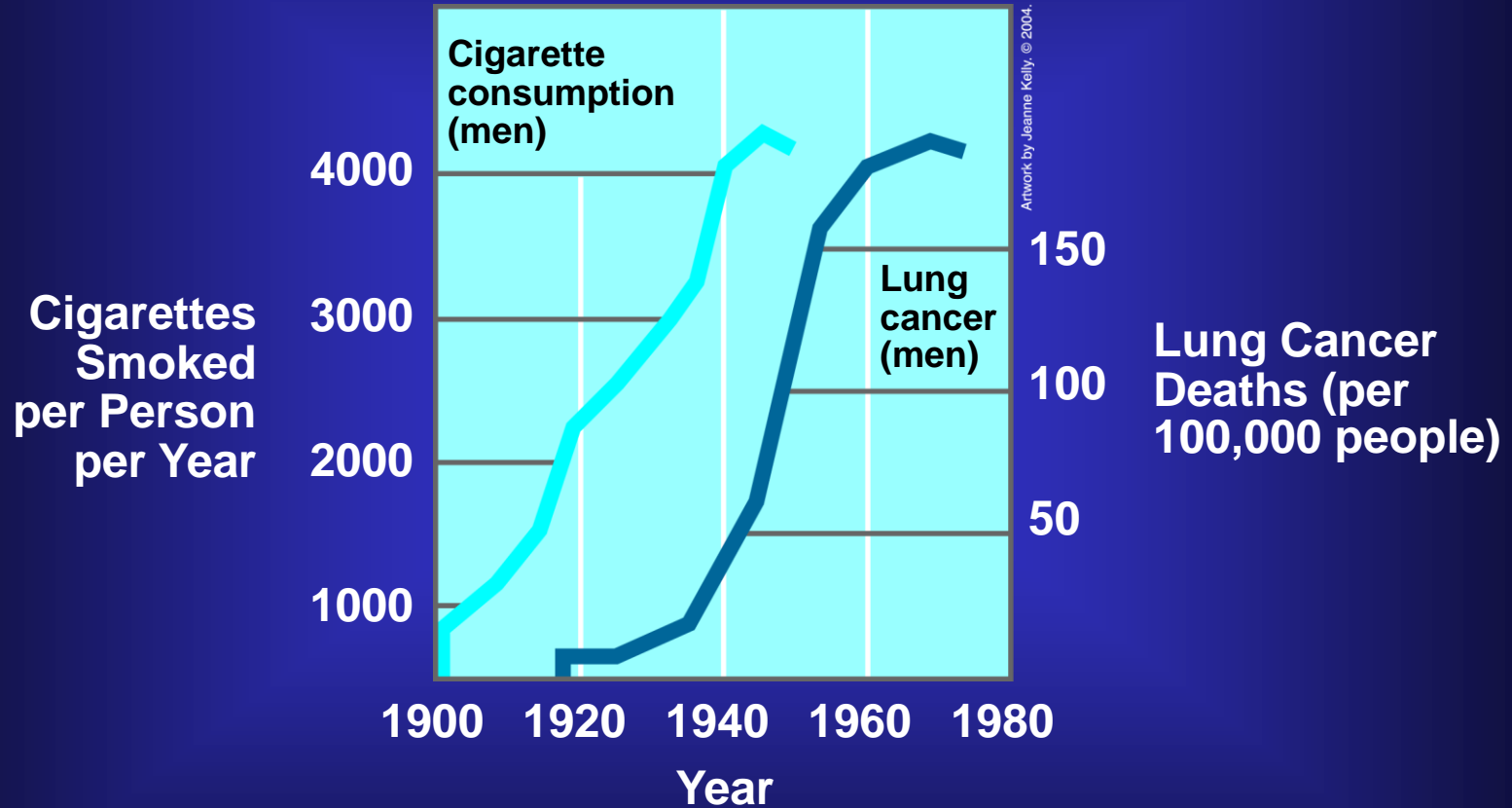


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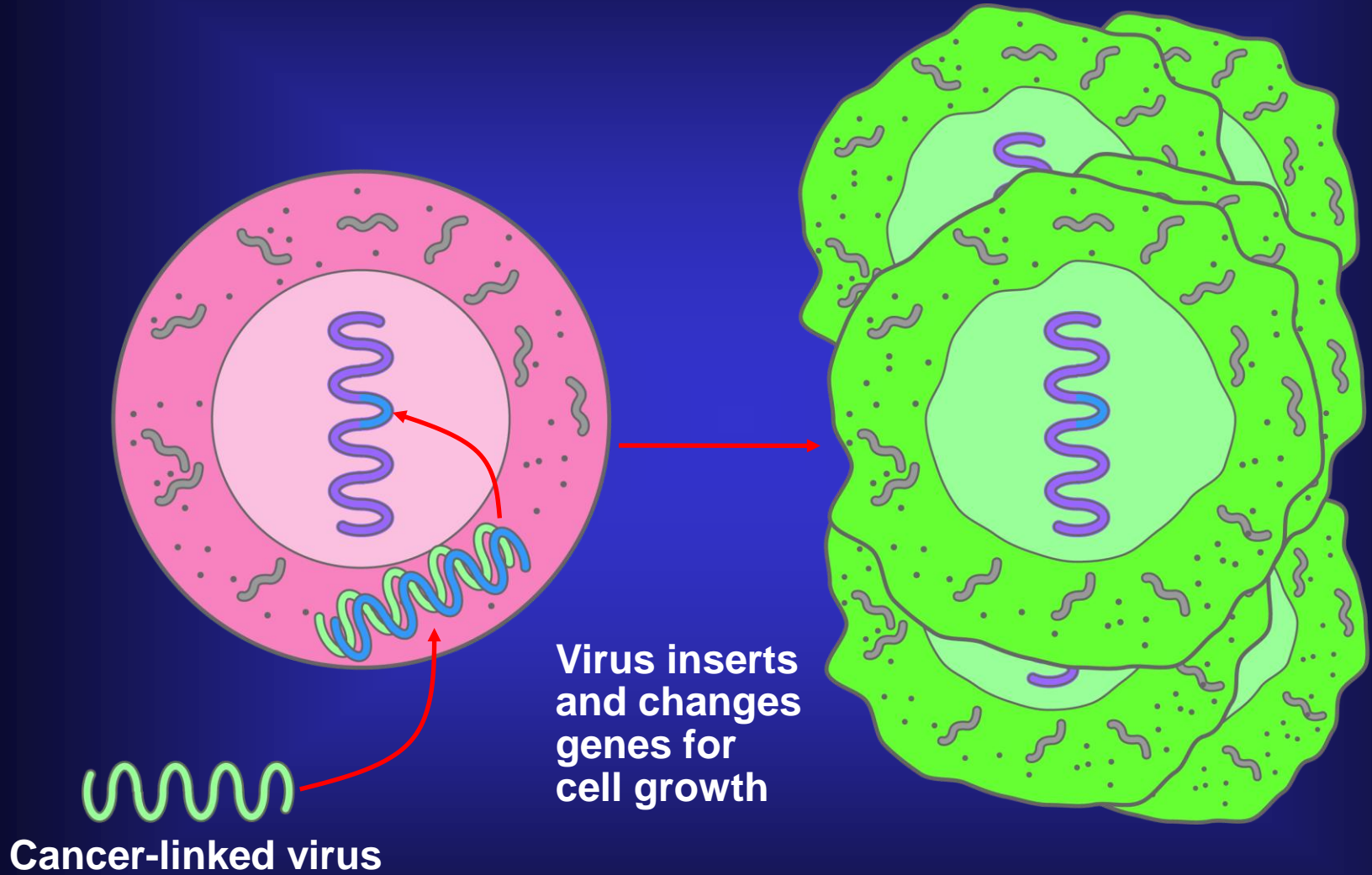


Lag Time

20-Year Lag Time Between Smoking and Lung Cancer



Viruses



Examples of Human Cancer Viruses

Some Viruses Associated with Human Cancers

<i>Virus</i>	<i>Type of Cancer</i>
Epstein-Barr virus	Burkitt's lymphoma
Human papillomavirus	Cervical cancer
Hepatitis B virus	Liver cancer
Human T-cell lymphotropic virus	Adult T-cell leukemia
Kaposi's sarcoma-associated herpesvirus	Kaposi's sarcoma

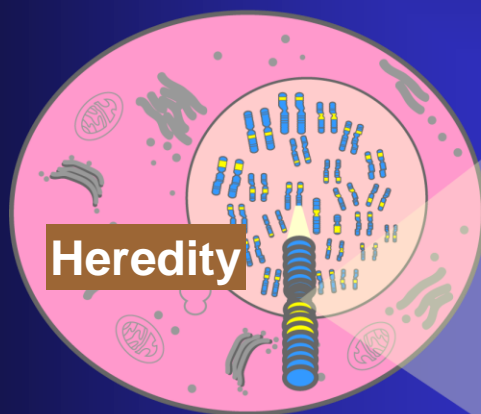
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Genes and Cancer

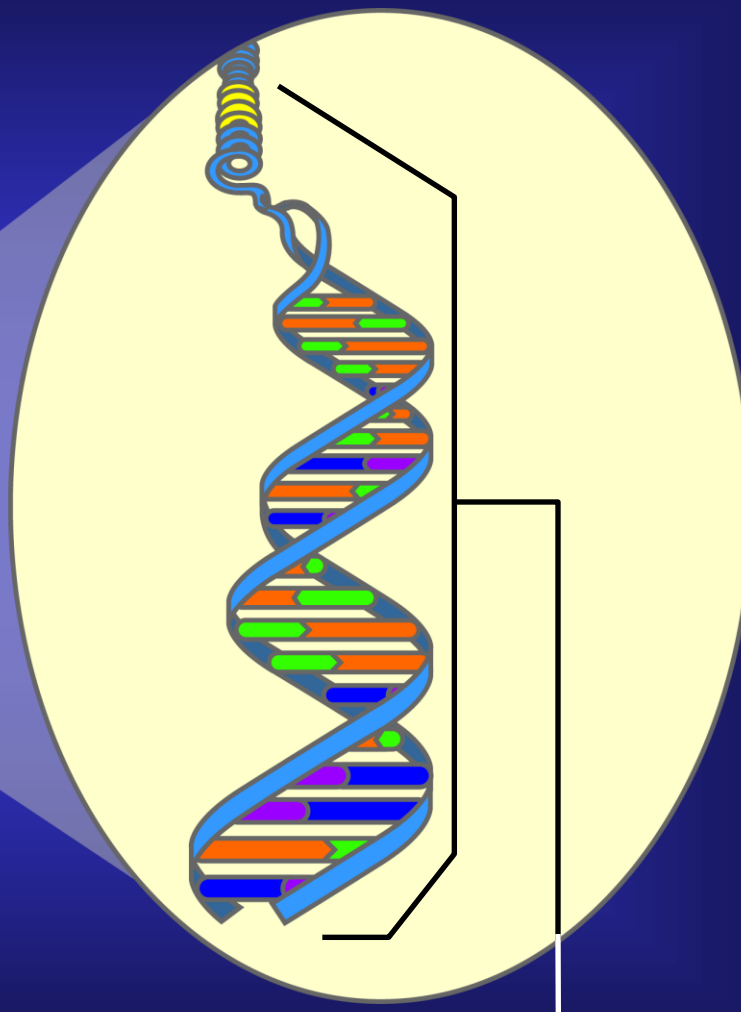
Viruses

Chemicals

Radiation



Heredity

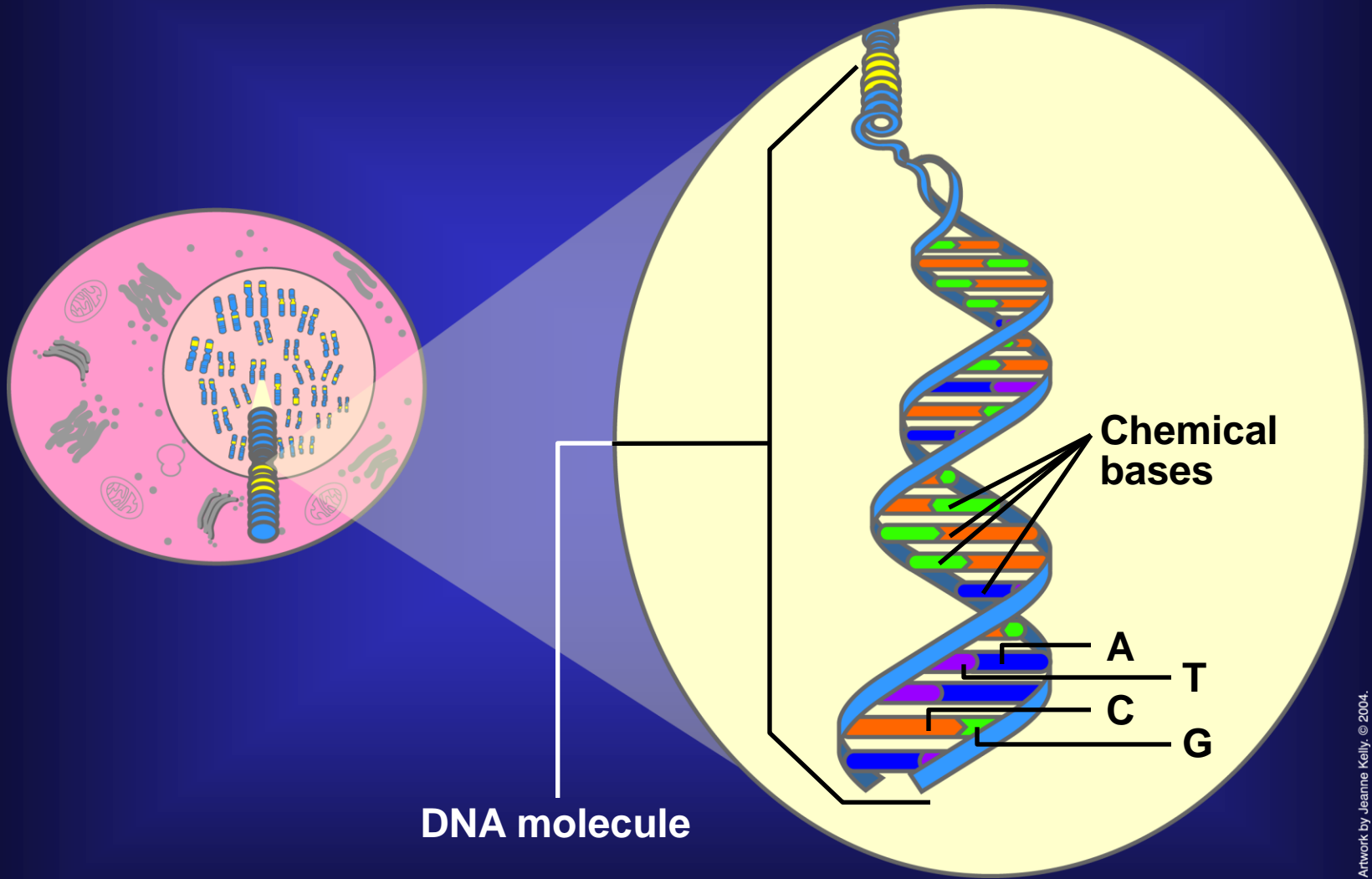


Chromosomes
are DNA
molecules

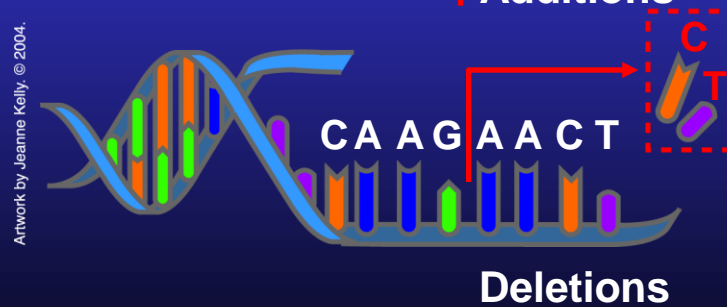
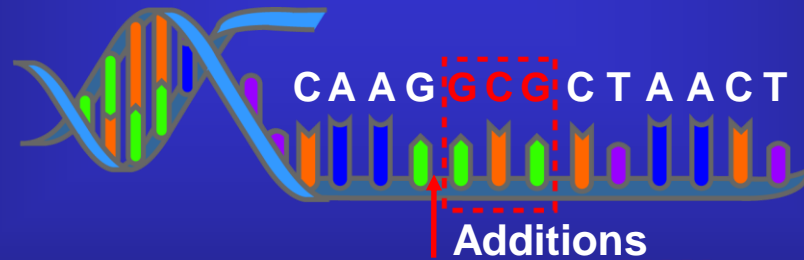
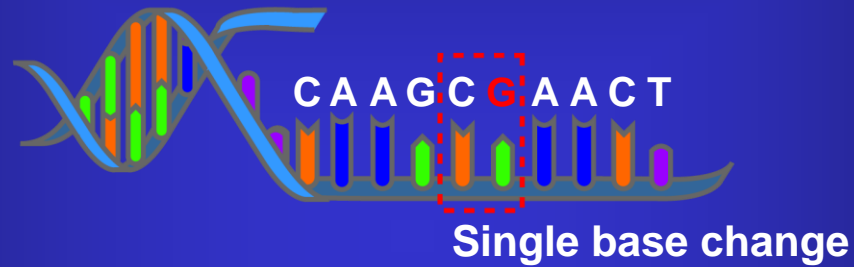
Artwork by Jeanne Kelly. © 2004.



DNA Structure

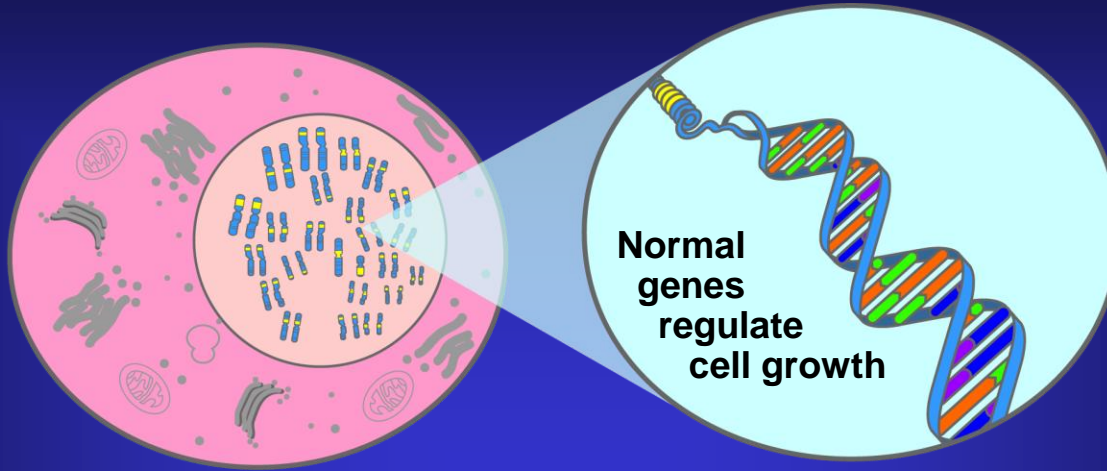


DNA Mutation



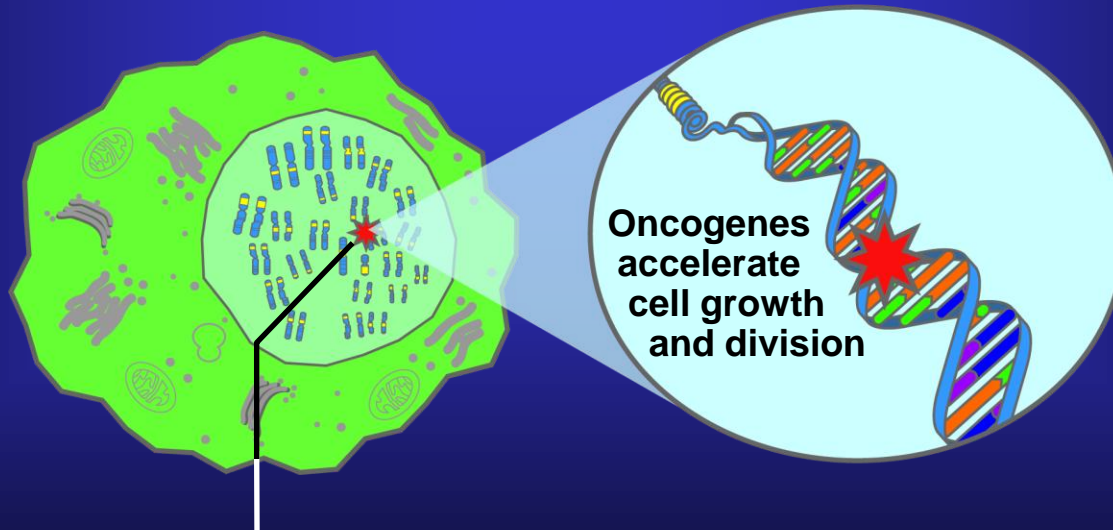
Oncogenes

Normal cell



Normal genes regulate cell growth

Cancer cell



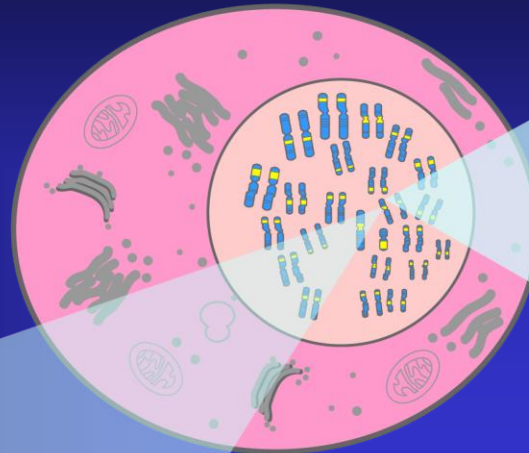
Oncogenes accelerate cell growth and division

Mutated/damaged oncogene

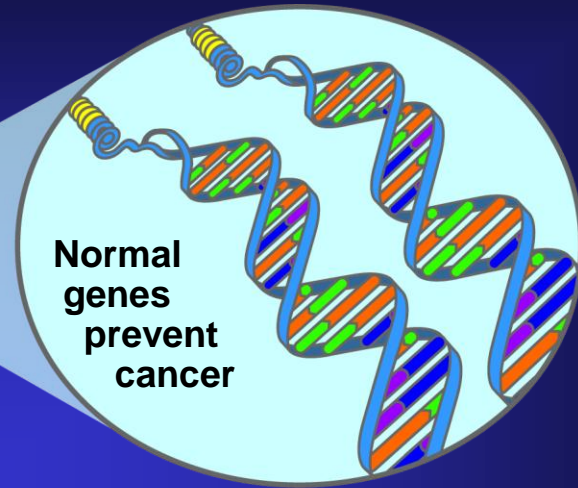


Tumor Suppressor Genes

Normal cell

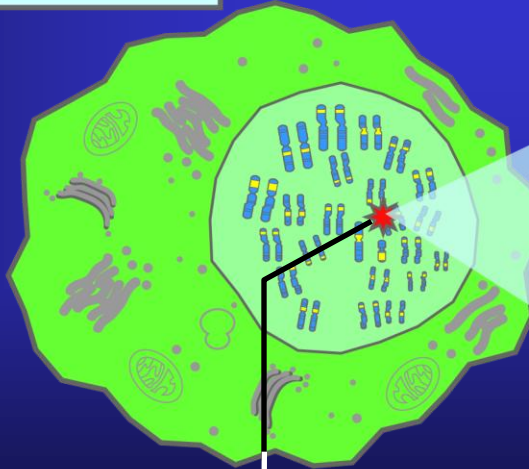


Normal genes prevent cancer

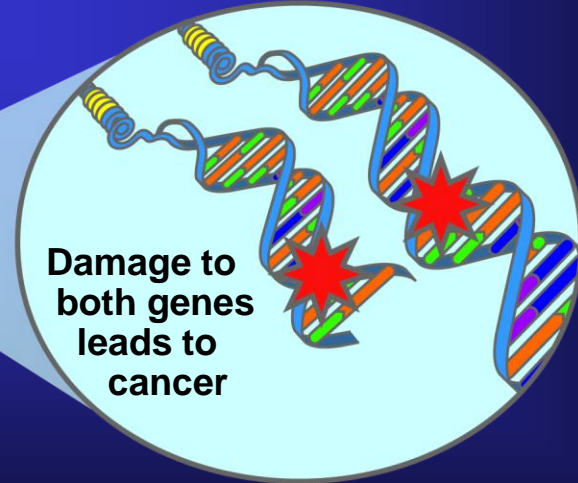


Remove or inactivate tumor suppressor genes

Cancer cell



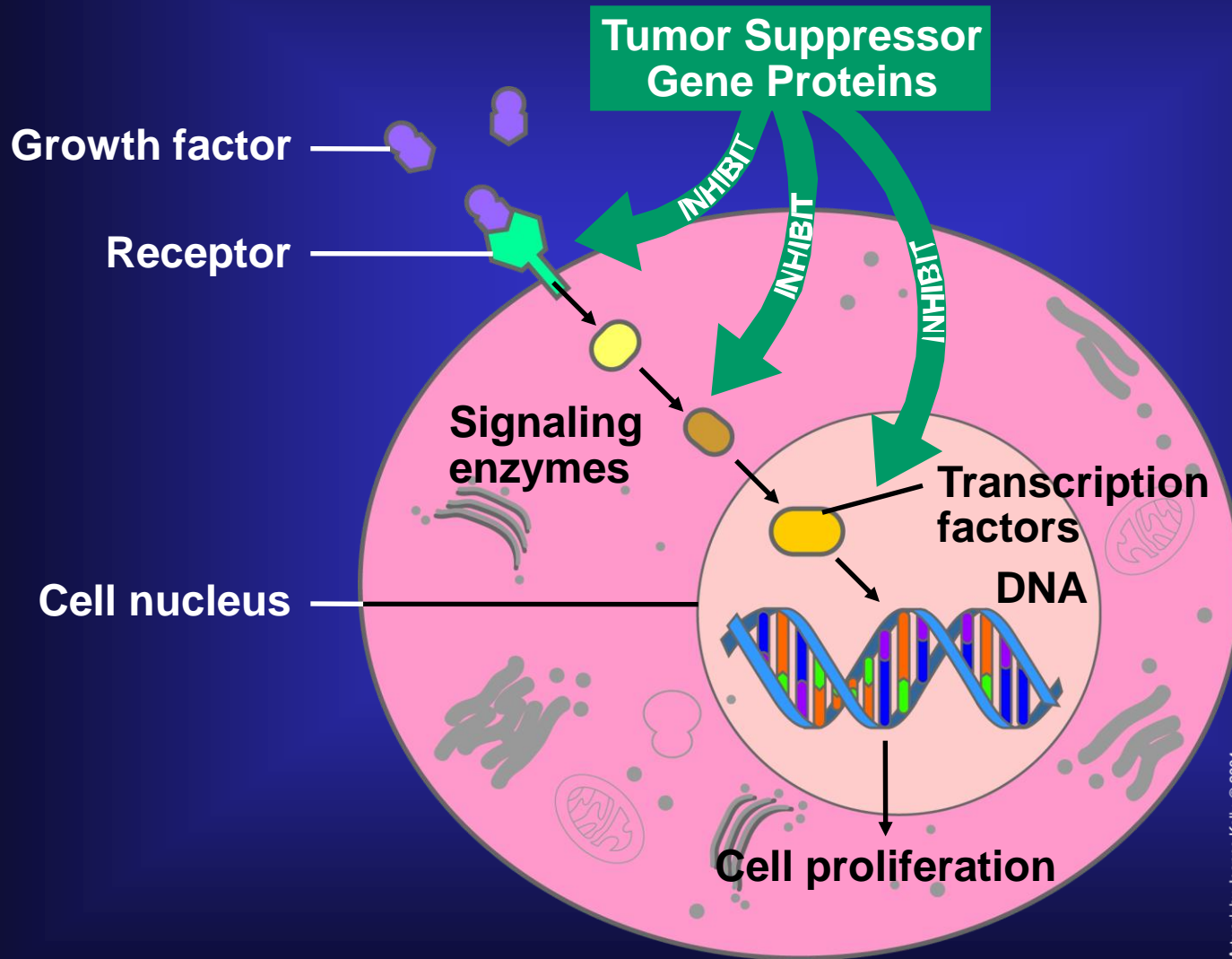
Damage to both genes leads to cancer



Mutated/inactivated tumor suppressor genes

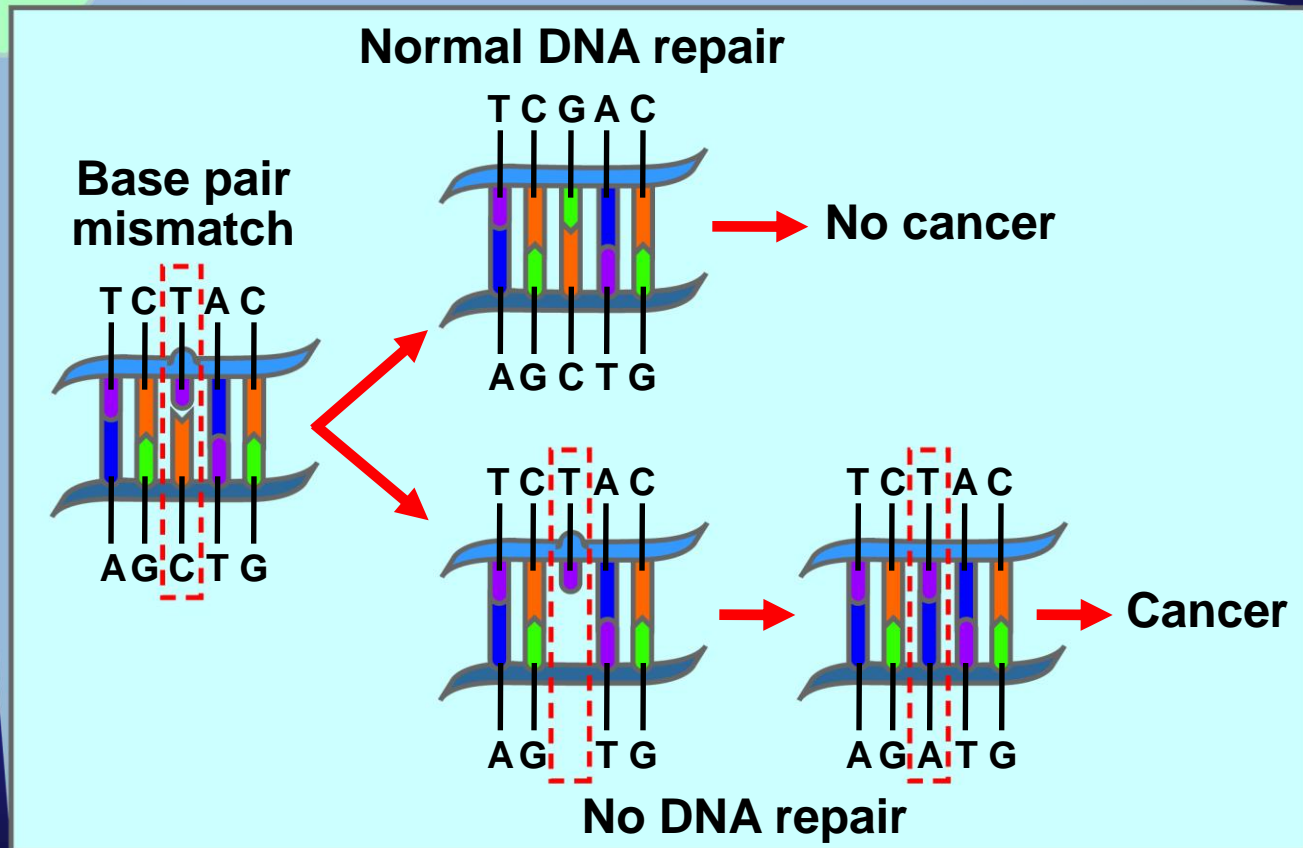
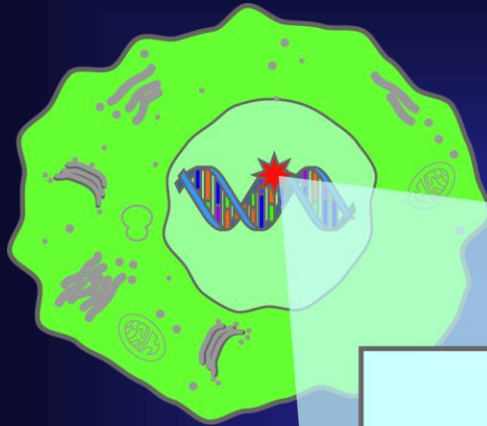


Tumor Suppressor Genes Act Like a Brake Pedal



Artwork by Jeanne Kelly © 2004.

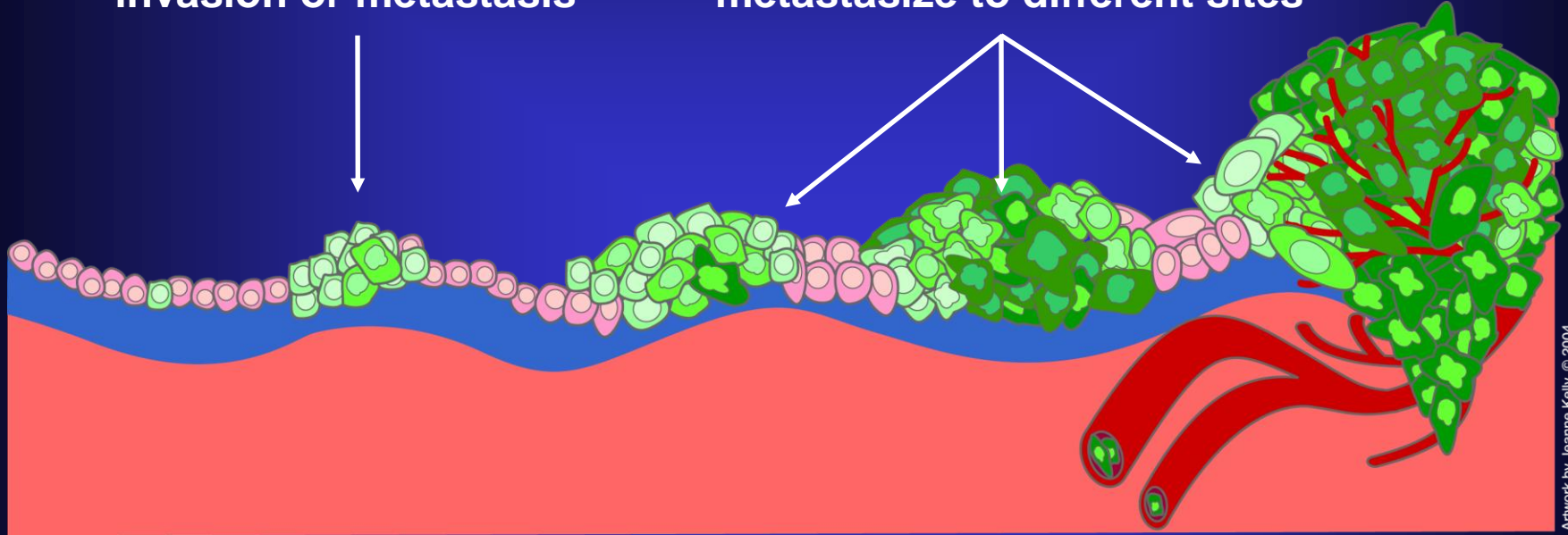
DNA Repair Genes



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



Artwork by Jeanne Kelly © 2004.

Time →

Mutation inactivates suppressor gene

Cells proliferate

Mutations inactivate DNA repair genes

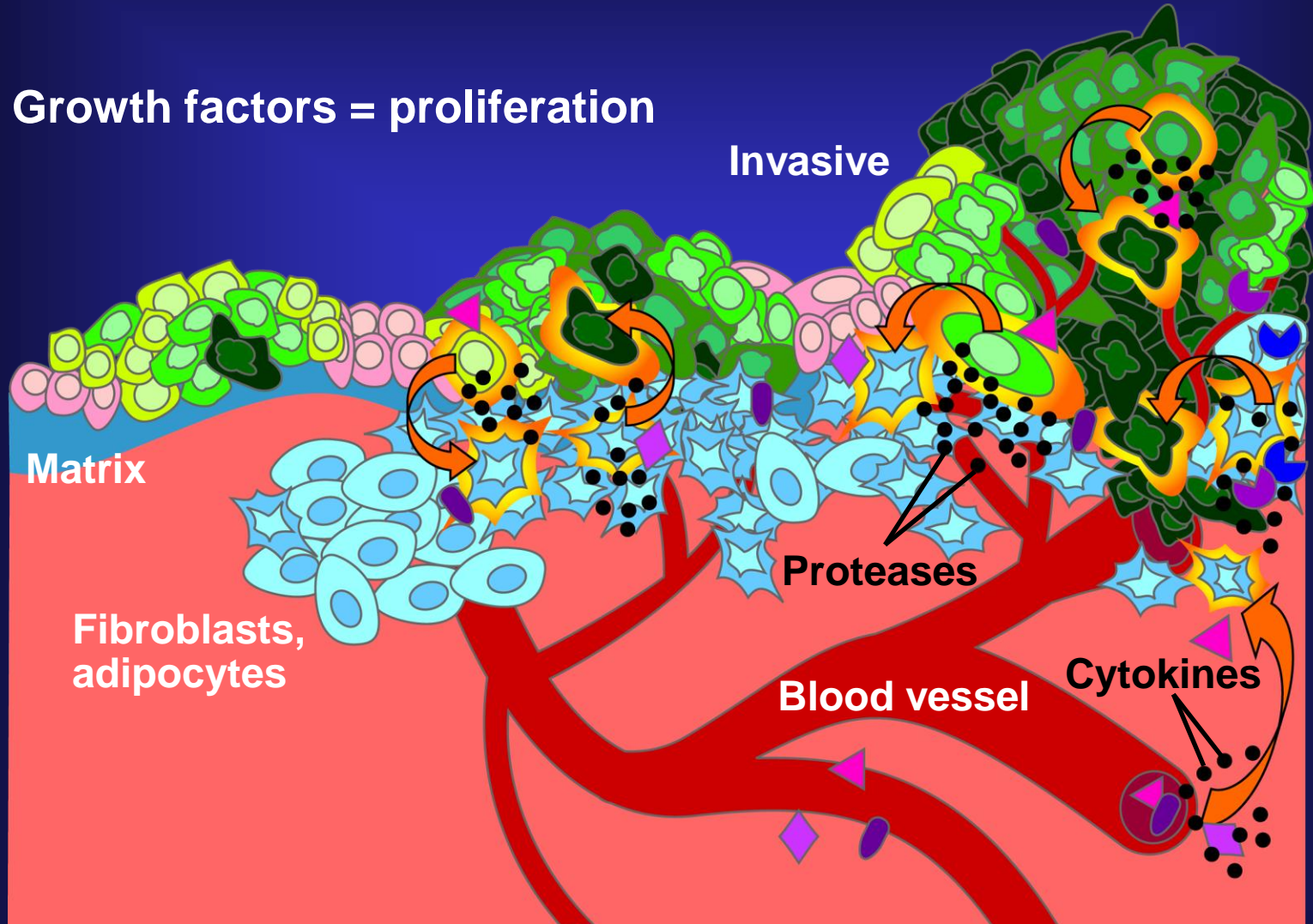
Proto-oncogenes mutate to oncogenes

More mutations, more genetic instability, metastatic disease



Cancer Tends to Corrupt Surrounding Environment

Growth factors = proliferation



Artwork by Jeanne Kelly. © 2004.

Cytokines, proteases = migration & invasion

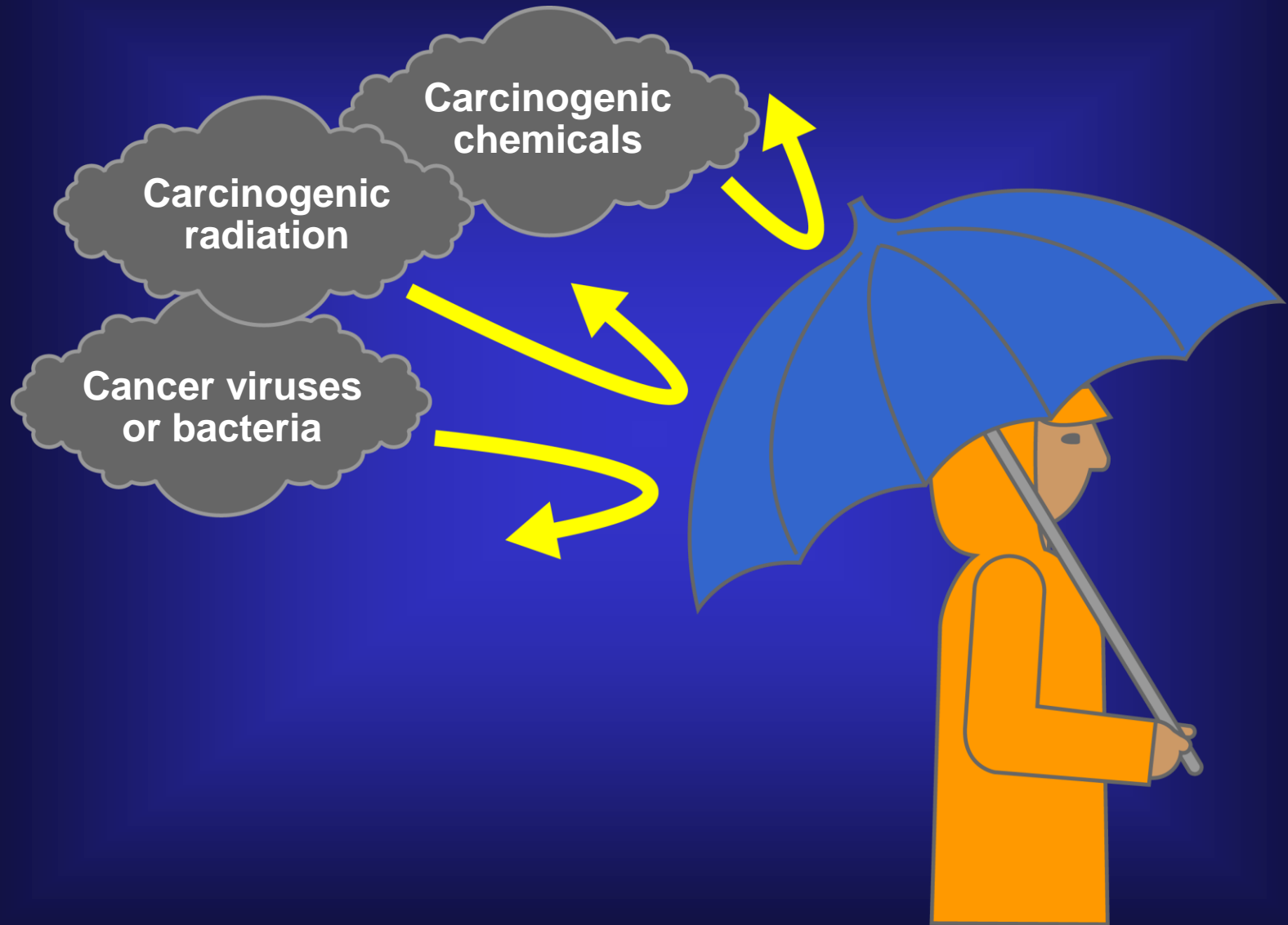
How is Cancer Treated?

Surgery: Operation to remove cancerous tumor and affected tissues

Chemotherapy: Chemicals are injected into the body that kill cancer cells.

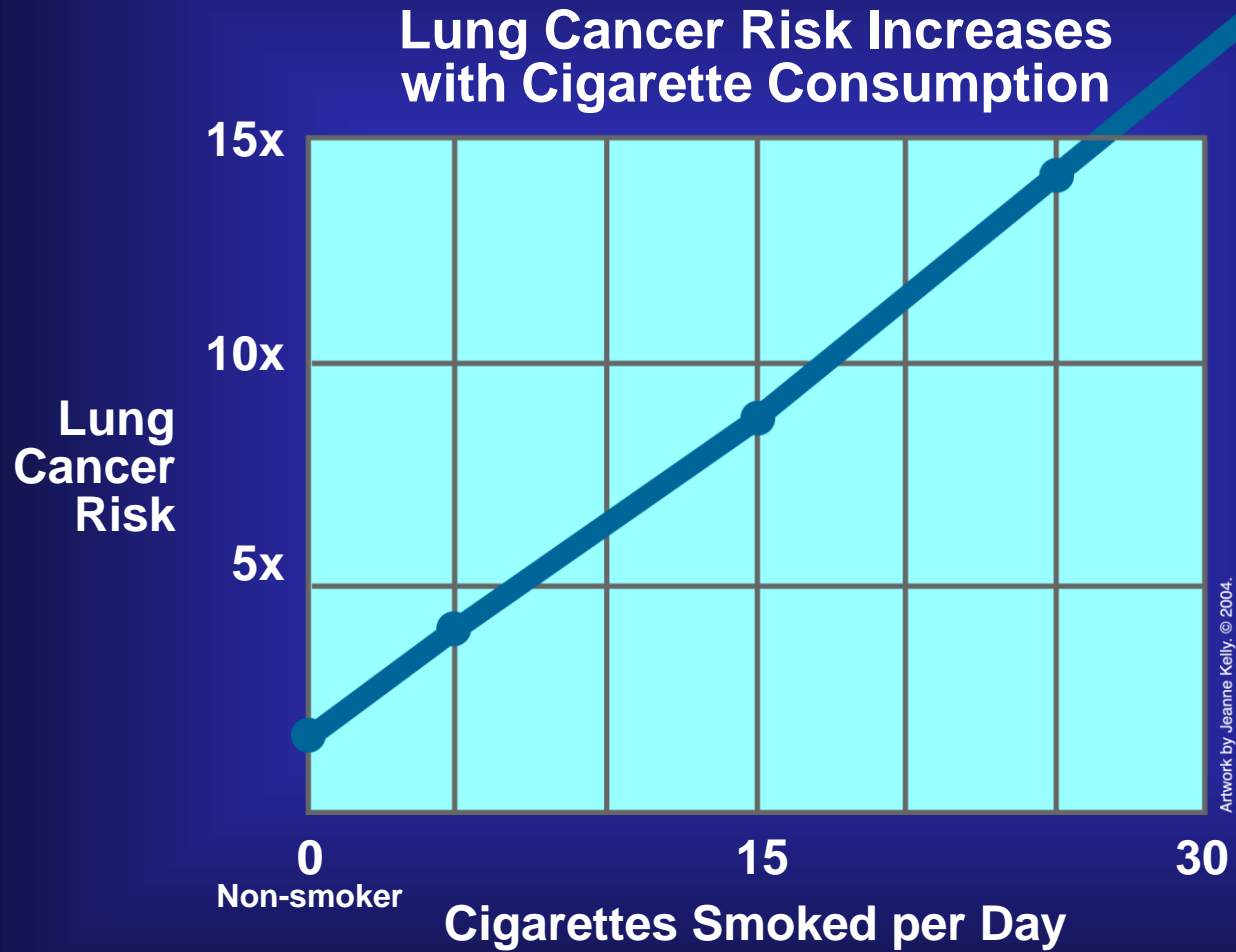
Radiation: Strong electromagnetic waves are focused on the cancerous cells, killing them.

Cancer Prevention



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Avoid Tobacco



Protect Yourself From Excessive Sunlight

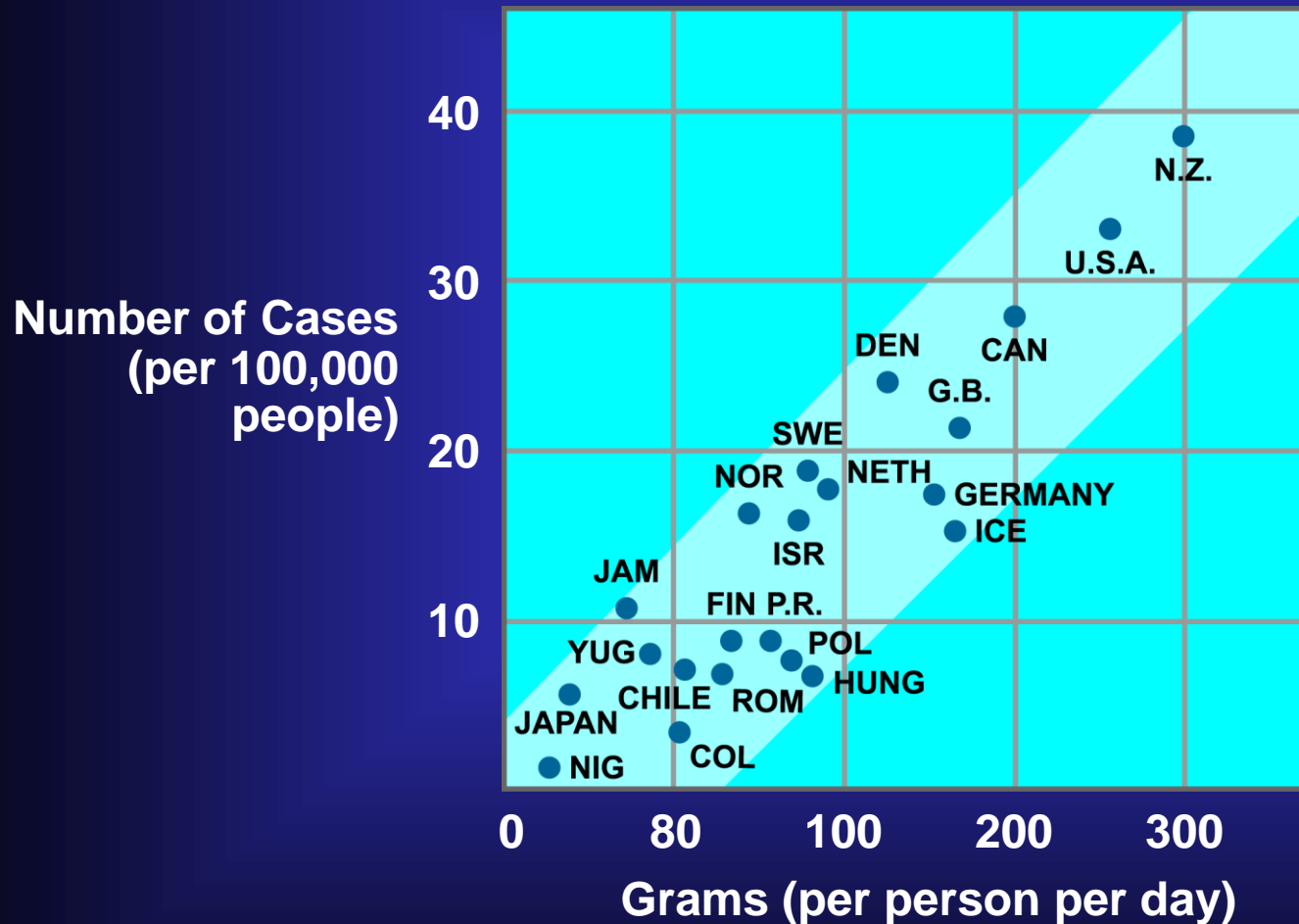


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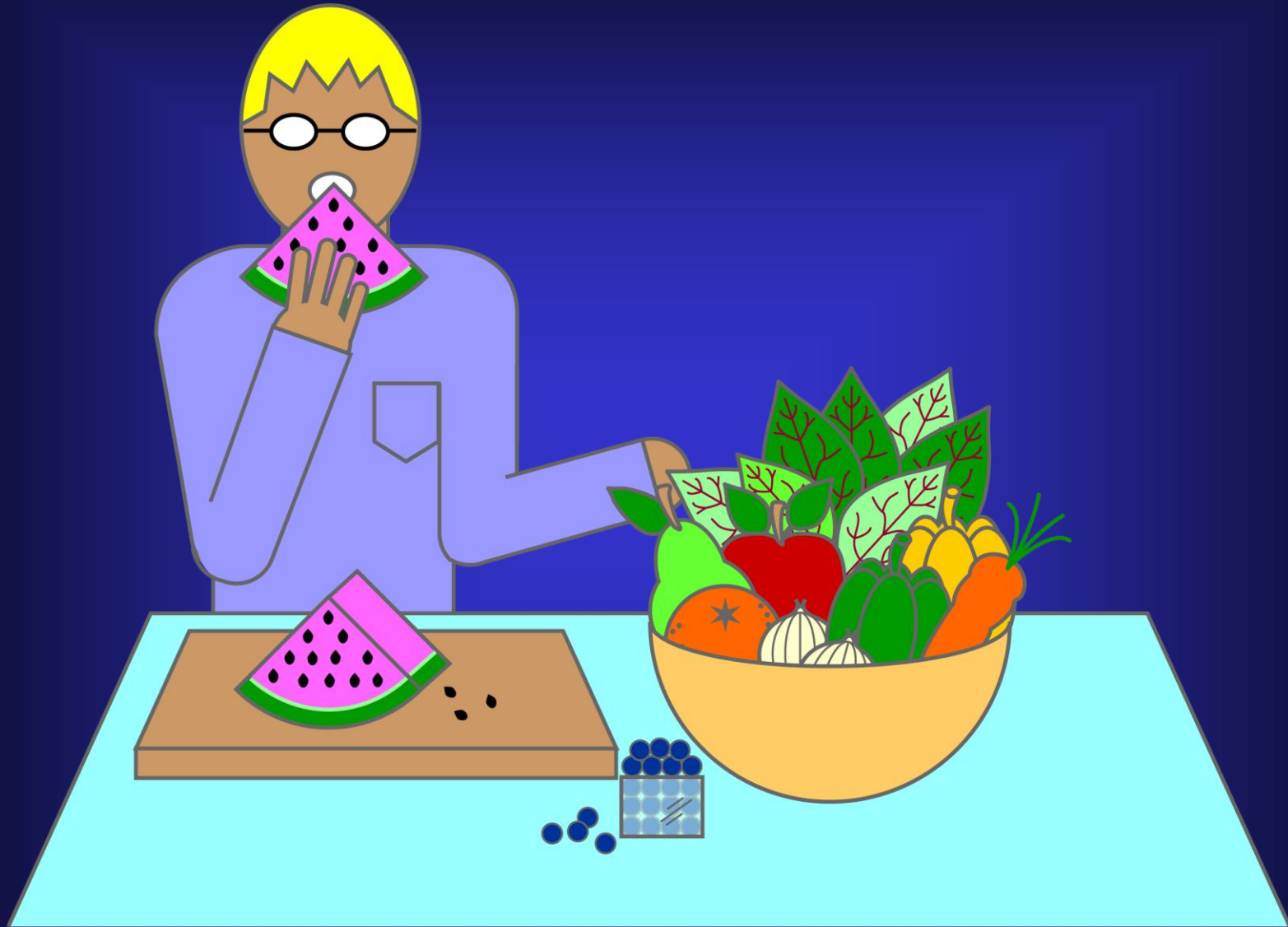
Diet: Limit Fats and Calories

Correlation Between Meat Consumption and Colon Cancer Rates in Different Countries



Artwork by Jeanne Kelly © 2004.

Diet: Consume Fruits and Vegetables



Artwork by Jeanne Kelly. © 2004.



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

Artwork by Jeanne Kelly. © 2004.



Cancer Statistics

- One in three people will develop cancer.
- One in four people will die of cancer.
- In 2005, about 1.4 million new cases of cancer were diagnosed.
- More than 1500 Americans died each day of cancer this year.
- Over 1,000,000 cases of skin cancer will be diagnosed this year.
- Cancer is the leading cause of death among Americans under the age of 85.

Is There a Cancer "Epidemic"?

MYTH

 *The Daily News* 50¢

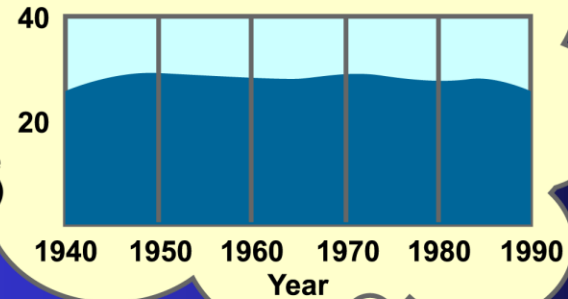
Cancer Rates Reach Epidemic Proportions

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FACT

Colon Cancer Deaths (per 100,000 men, age adjusted)



Artwork by Jeanne Kelly. © 2004.