Hela cell story

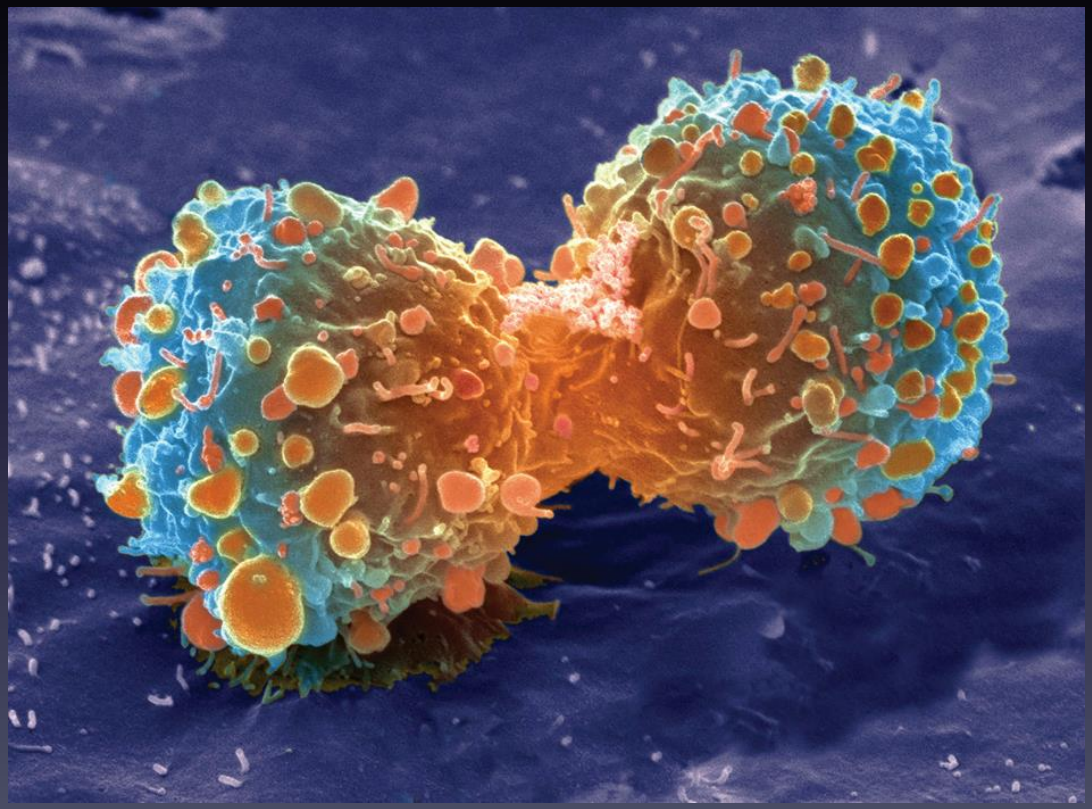
Healthy to Cancer Cell

Cancer Intro Video

Cancer Intro

Cancer: Ted Ed

Cancer Intro

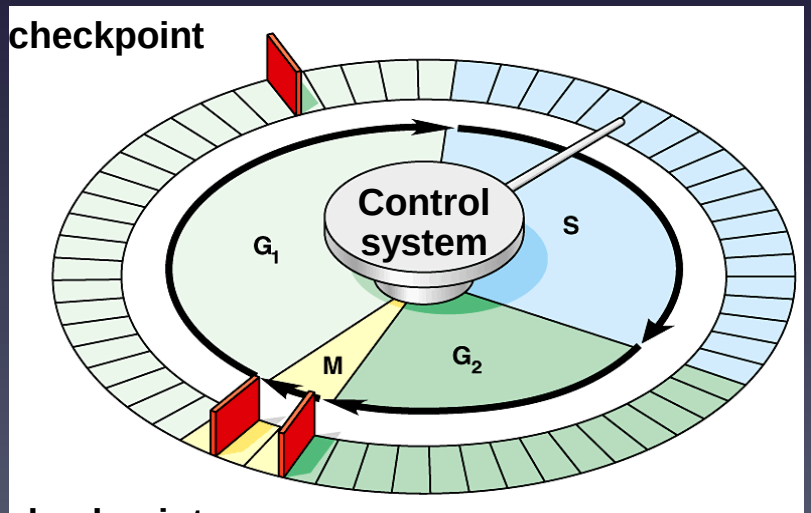


What do these two have in common?

NOTES: Unit 5B (Cancer)

Topic 2: Sometimes healthy cells begin to stop obeying the cell cycle **"rules"**, start to divide **out-of-control**, and refuse to **die** = **CANCER**

- Healthy cells move through the stages of cell division in an **organized** way as they obey a complex set of START and STOP **"Traffic Signals"**



- Cancer is caused by the accumulation of DNA **mutations** to various **"Traffic Signal"** and **"Safety System"** genes in a cell.

A) Cancer has many **tricks**: Here are a few **strategies** cancer loves to use.

- Activate **oncogenes** =  cell division (i.e., step on the cell division **accelerator**)

- Deactivate **Tumor suppressor** genes = ↓ cancer-fighting **"cops"**

  (i.e., break the cell division **brakes**)

- Deactivate **apoptosis** gene (i.e., avoid programmed cell **death** for broken cells)

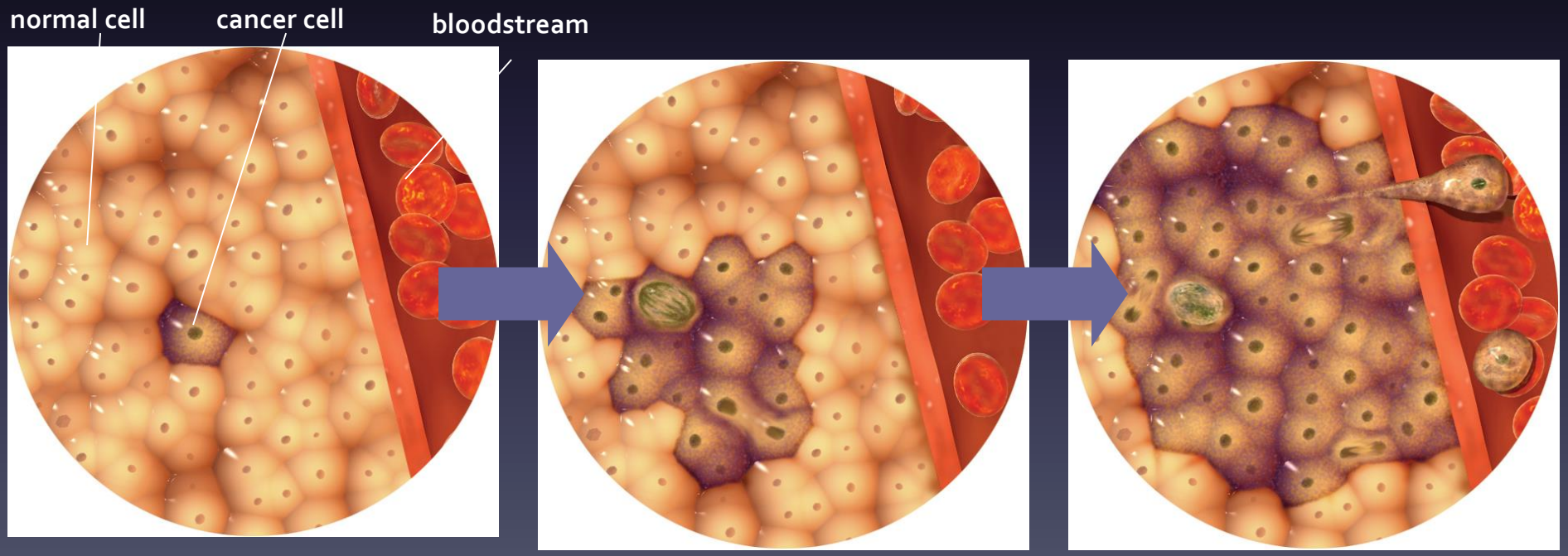
- Deactivate **Repair enzyme** genes = ↑ mutation rate → ↑ loss of control

- Build a large network of Blood vessels = ↑ resources and fuel for growth
- Rebuild "coupons" for unlimited cell division = never reach the limit of ~50 cell divisions

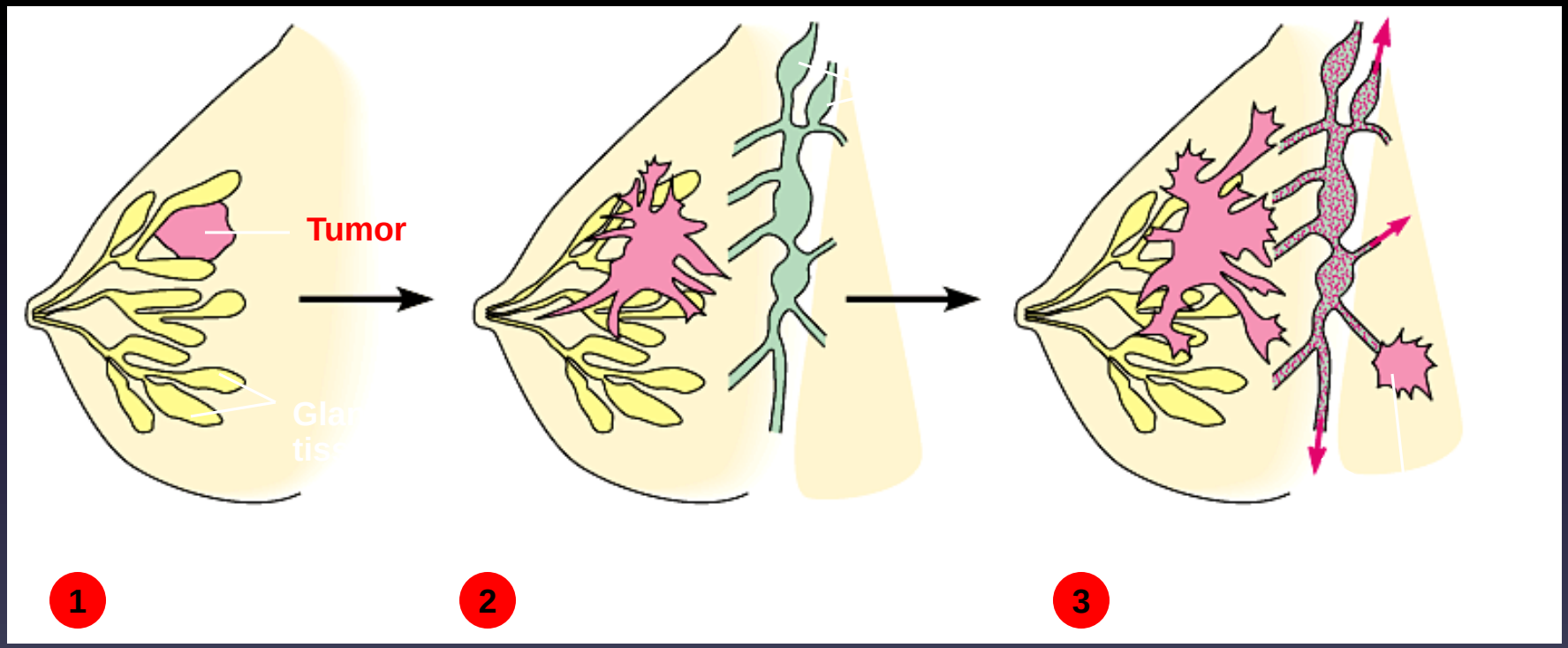
Let's Review:

Cell division is uncontrolled in cancer.

- Cancer cells form disorganized clumps called tumors.
  - Benign tumors remain clustered and can be removed.
  - Malignant tumors metastasize, or break away, and can form more tumors.



- **Malignant** _____ tumors can invade other tissues and may kill the organism



A tumor grows from a single cancer cell.

Cancer cells invade neighboring tissue.

Cancer cells spread through lymph and blood vessels to other parts of the body.

Figure 8.10

- Scientists are busy researching **cell division** to better understand the CAUSES of many human diseases in hopes of developing better treatments.
- One area of intense cell research is the quest to cure **cancer** by examining how healthy body cells are transformed into rebel cells that divide **out-of-control**.
- Researchers are trying to understand how various combinations of **DNA damage** can lead to many different types of cancer.

B) Statistics

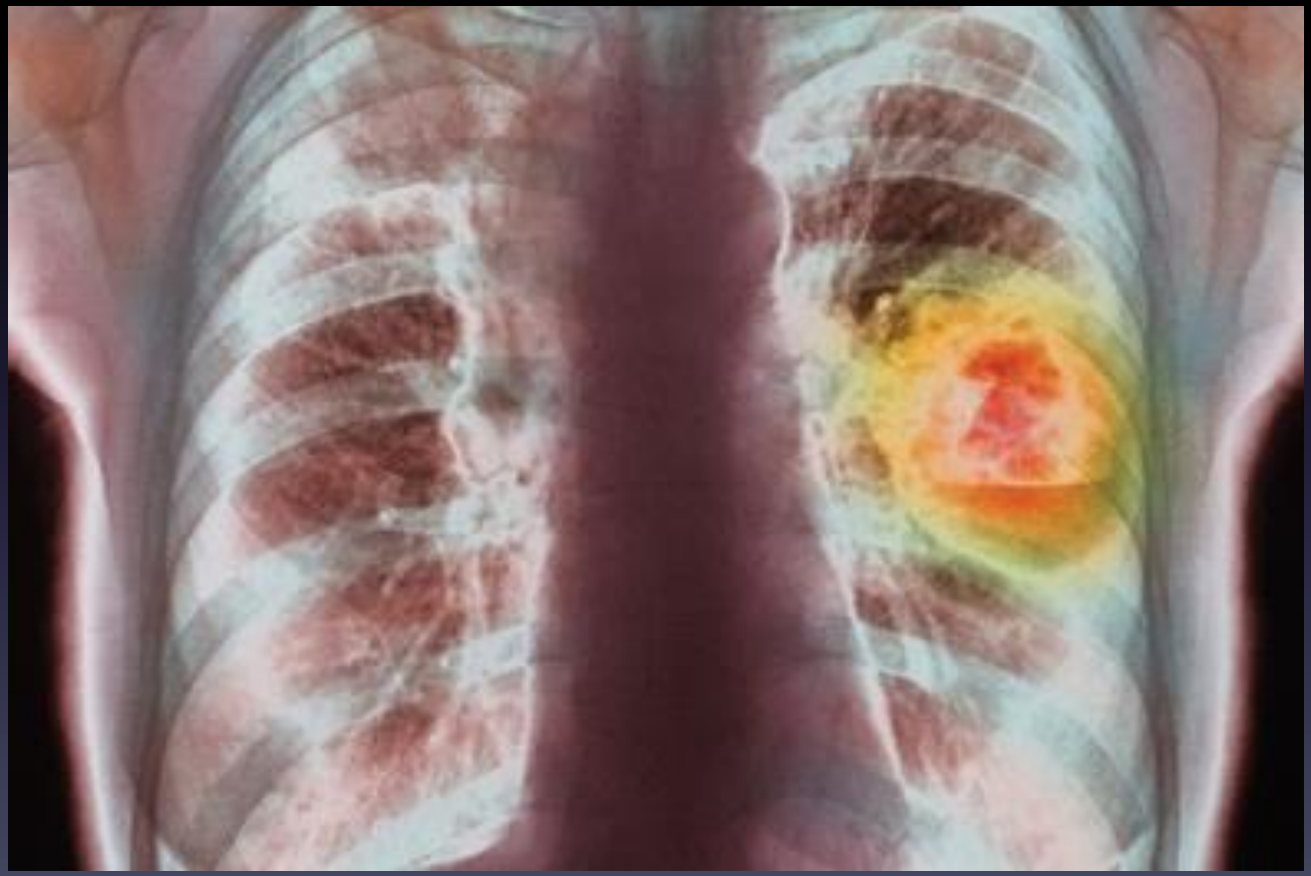
- **1 of 2 men** and **1 of 3 women** will be diagnosed with cancer
- **1,500** Americans die from cancer every day
- One American dies of cancer **every minute**
- The most **common** type of cancer is? **Prostate**
- The **deadliest** type of cancer is ? **Lung**

TABLE 11.21 CANCER IN THE UNITED STATES

Cancer	Risk Factors	Estimated Number of Cases in 2007
Prostate	African heritage; possibly dietary fat	218,900
Lung	Tobacco smoke	213,400
Breast	Estrogen	180,500
Colon, rectum	High dietary fat; smoking; alcohol	153,800
Lymphomas	Viruses (for some types)	71,400
Urinary bladder	Cigarette smoke	67,200
Melanoma of skin	Ultraviolet light	59,900
Kidney	Cigarette smoke	51,200
Leukemias	X-rays; benzene; virus (for one type)	44,200
Uterus	Estrogen	39,000
Pancreas	Tobacco smoke; obesity	37,200
Mouth and throat	Tobacco in various forms; alcohol	34,400
Ovary	Obesity; many ovulation cycles	22,400
Stomach	Table salt; cigarette smoke	21,300
Liver	Alcohol; hepatitis viruses	19,200
Brain and nerve	Trauma; X-rays	20,500
Cervix	Sexually transmitted viruses; tobacco	11,200
All others		179,400

C) Diagnosing Cancer

- Cancer tumors can be **seen**:



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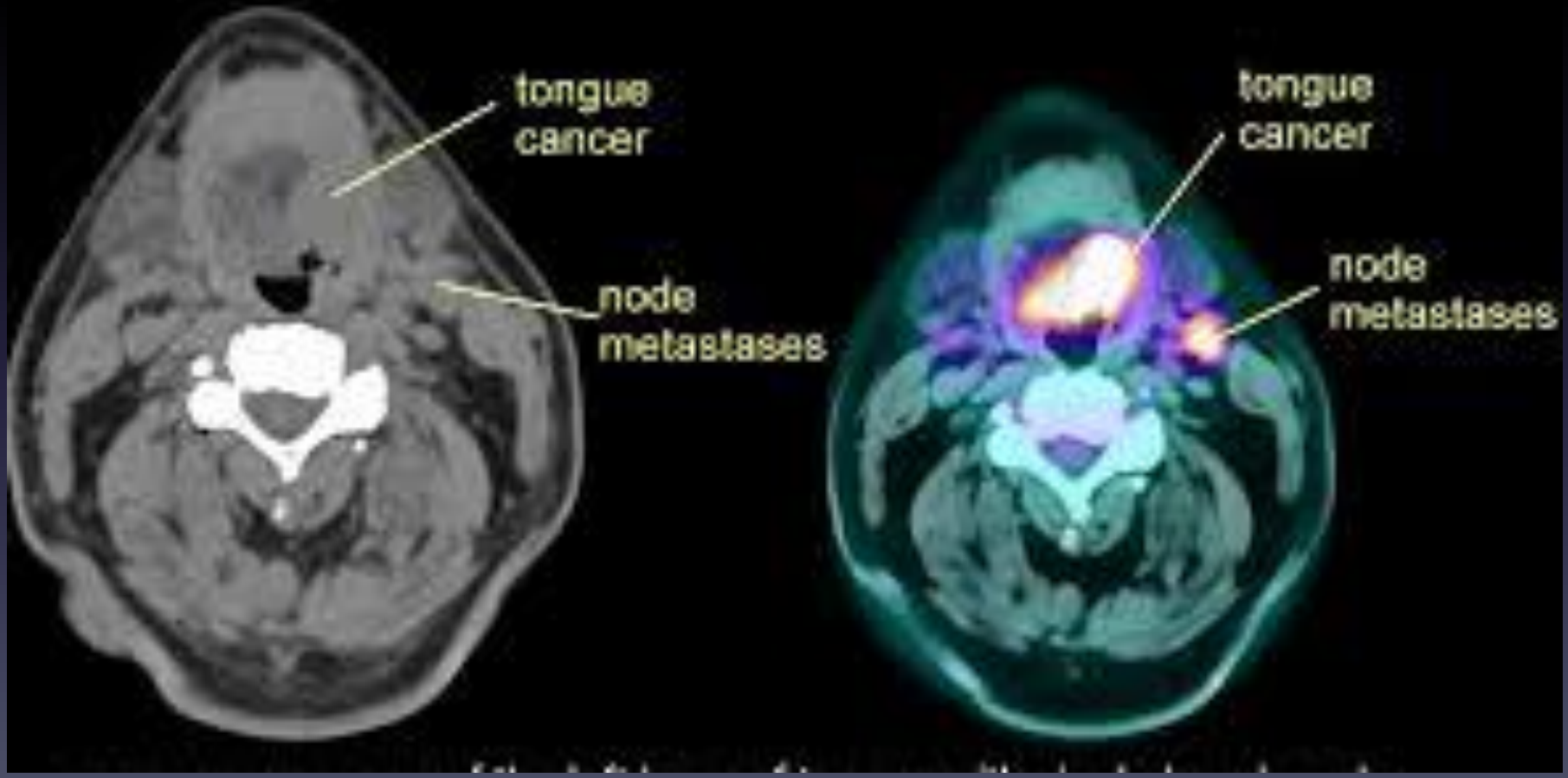

C) Diagnosing Cancer

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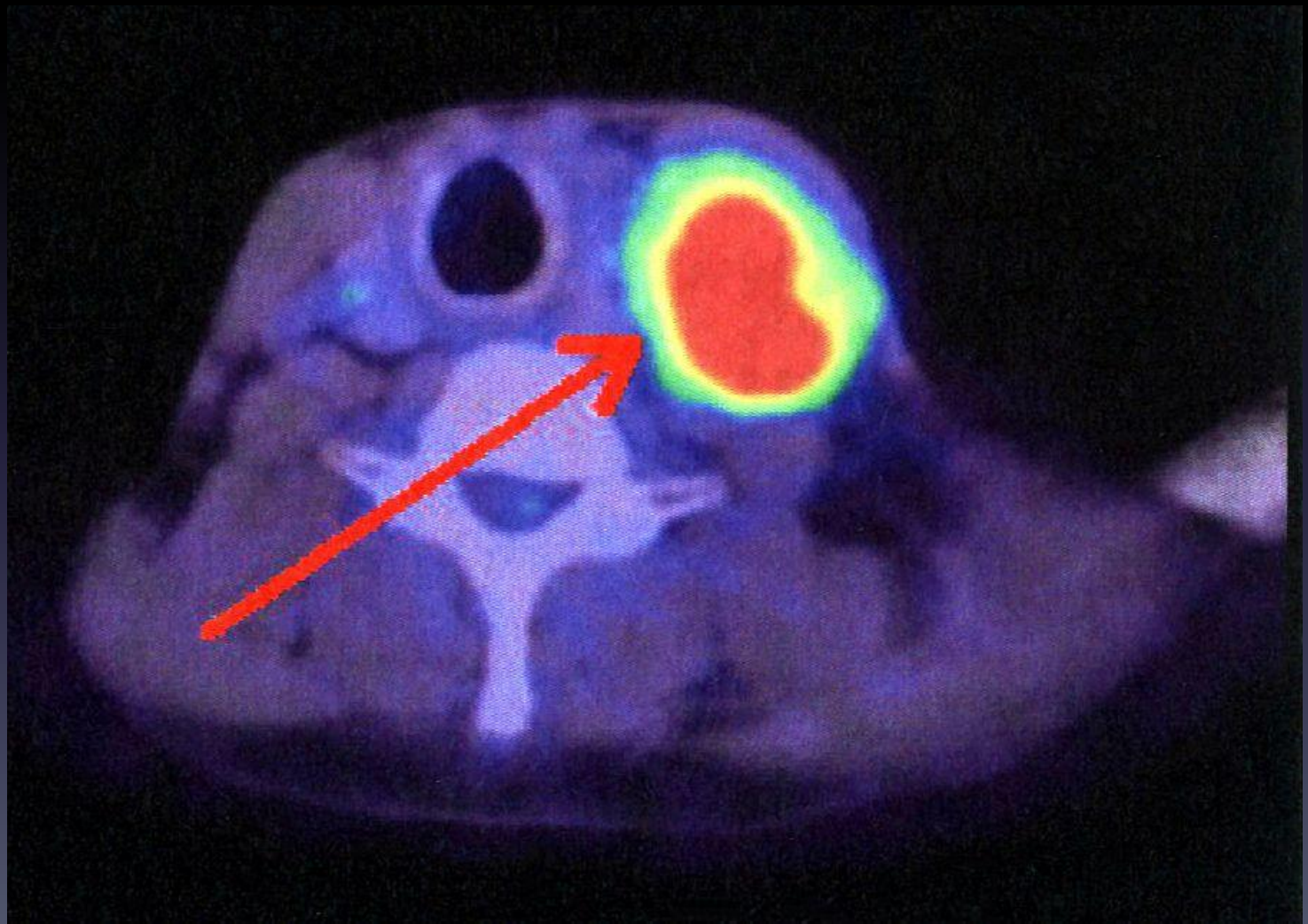


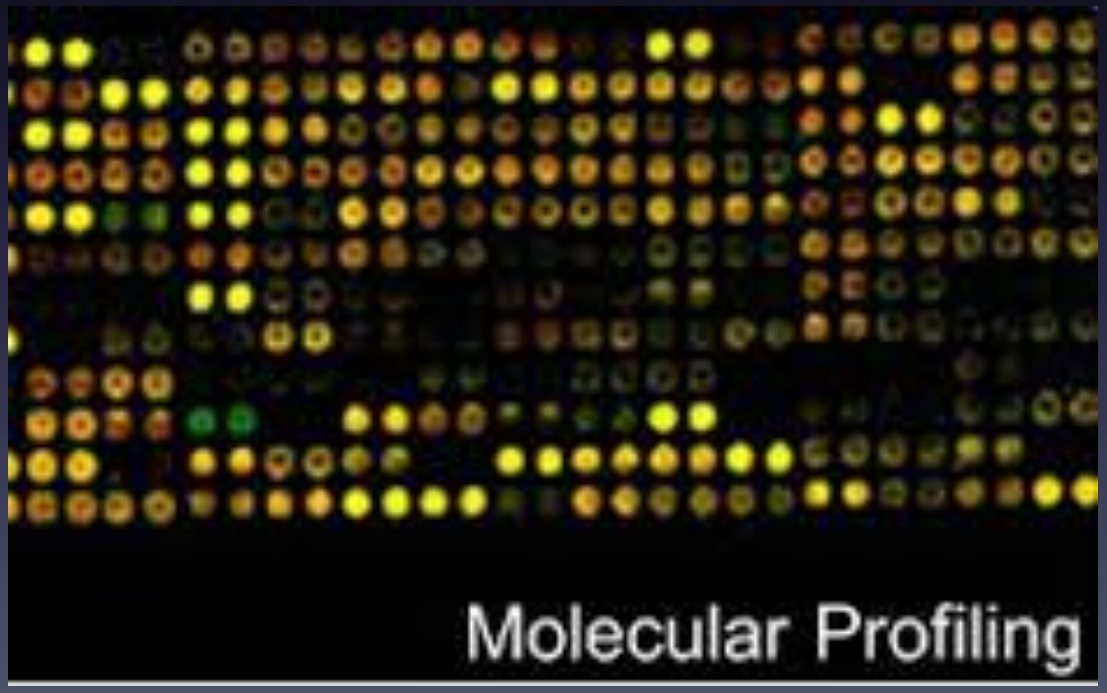
C) Diagnosing Cancer

- Cancer tumors have a **smell**: Dogs Detection (42:00)
- Cancer **"crumbs"** (DNA & Proteins) and free-floating cancer **cells** are recently being detected in the **Blood and urine**

CTC Chip

C) Diagnosing Cancer

- Doctors are even beginning to diagnose cancer by determining the exact combination of **mutations** in the cancer = **Molecular profile**

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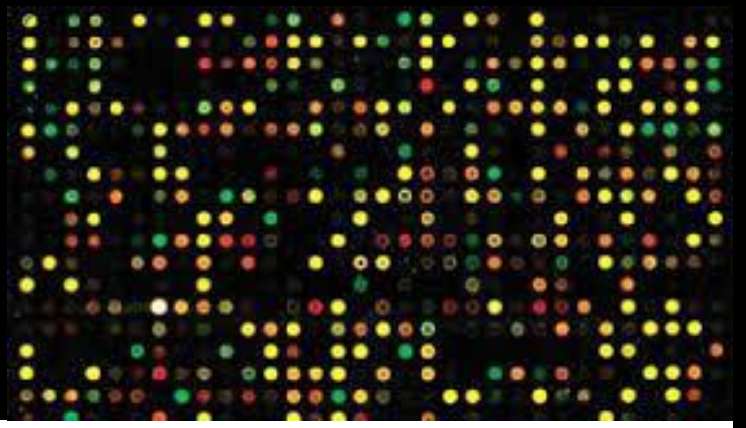
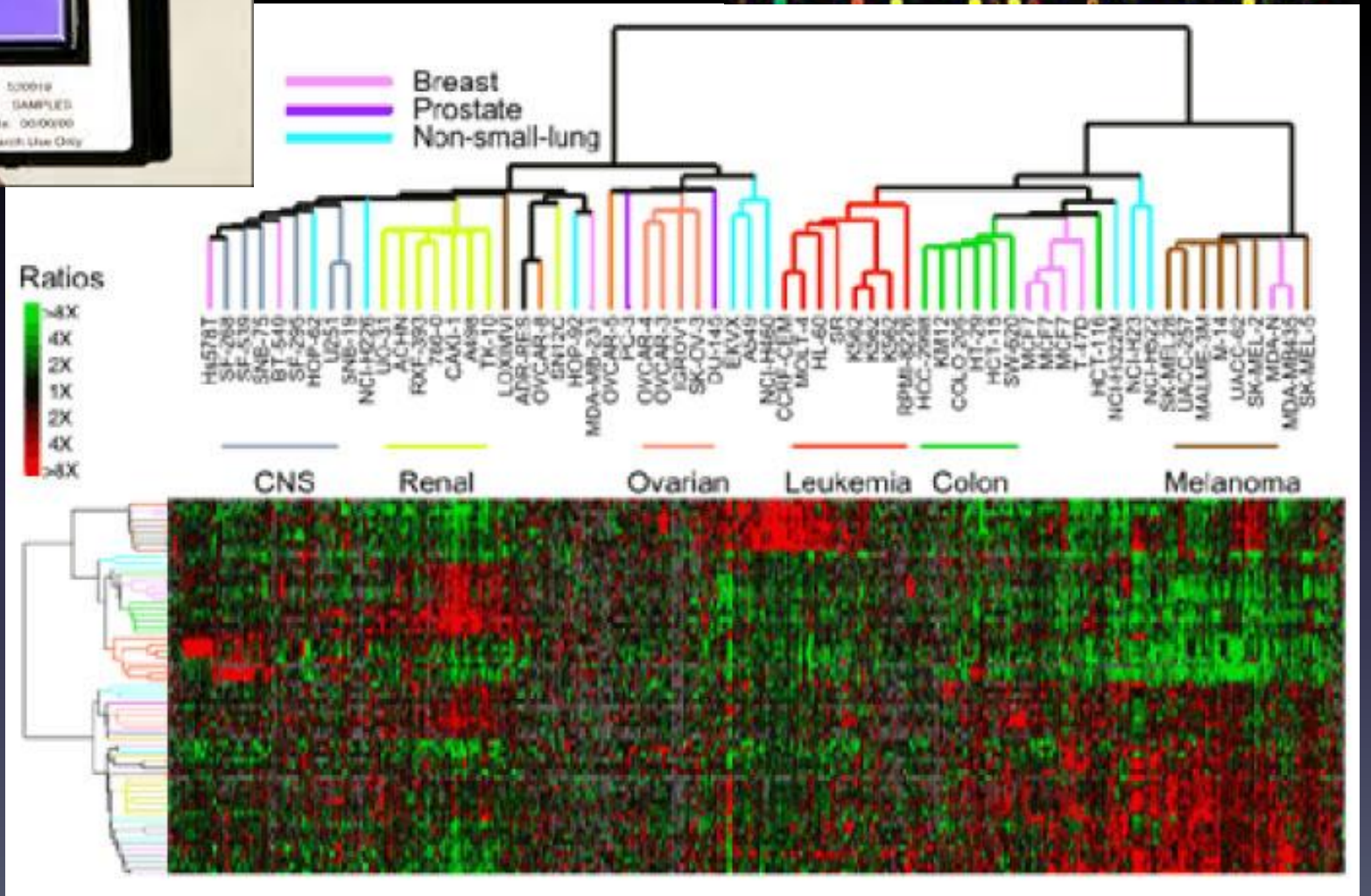
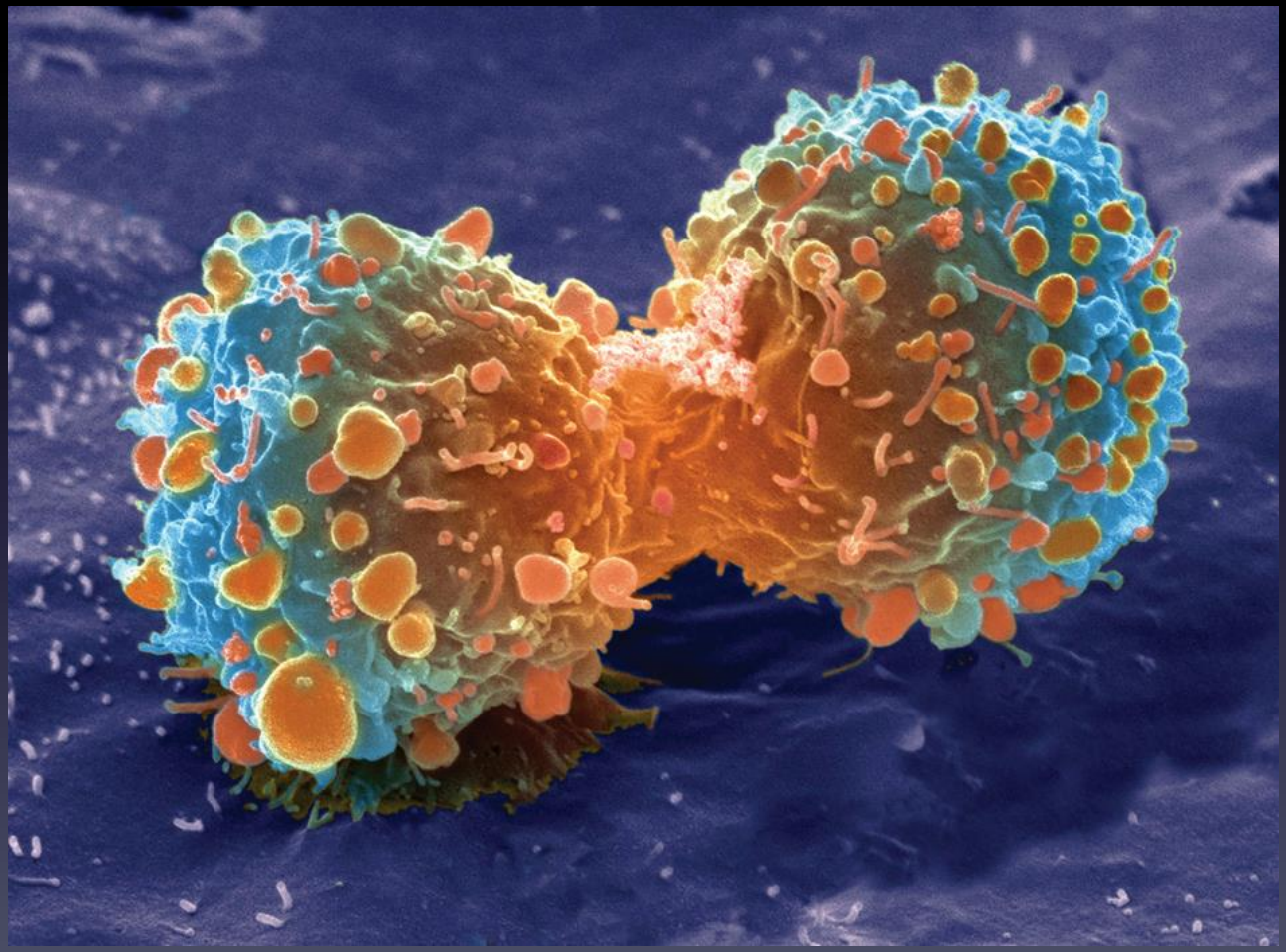



Breast
Prostate
Non-small-lung
Ratios
>8X
4X
2X
1X
2X
4X
>8X
CNS
Renal
Ovarian
Leukemia
Colon
Melanoma

Here what cancer looks like on the **inside** of your body



- Here is what skin cancer might look like on the **outside** of your body

Do You Know Your ABCDs of Skin Cancer?

Asymmetry	One half of the mole does not match the other half in size, shape, color, or thickness.
Border	The edges are ragged, scalloped, blurred, or poorly defined.
Color	The color of the moe is not the same throughout or it has shades of tan, brown, black, red, white, or blue.
Diameter	Melanomas are usually greater than 6mm in diameter.

Lesions with asymmetry are more likely to be serious

Symmetrical

Asymmetrical

Regular border

Irregular border

Do You Know Your ABCDs of Skin Cancer?

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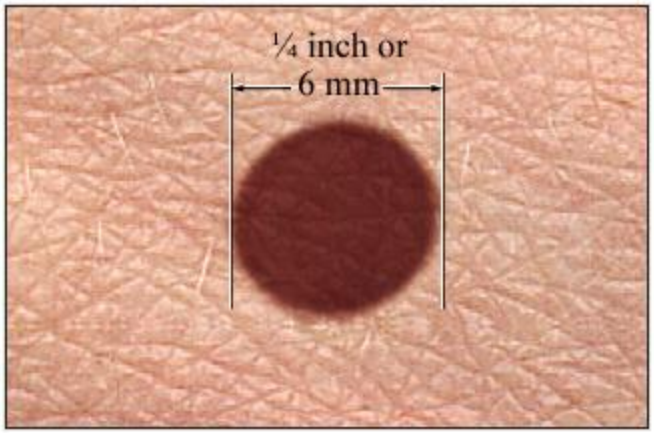
Lesions with color variation are more likely to be serious

One color

Color variation



Cancer or Healthy?

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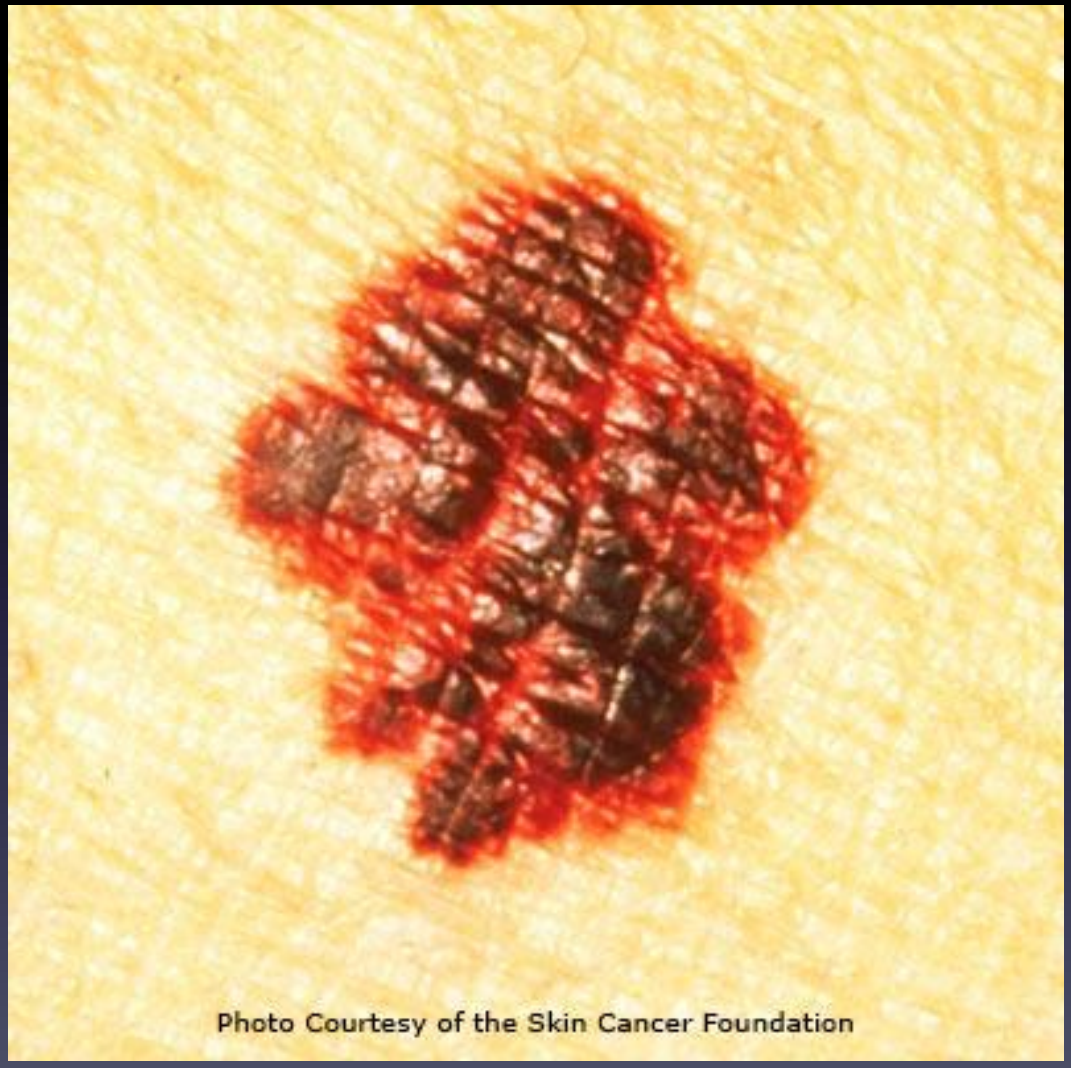


Cancer or Healthy?

D) Treating Cancer

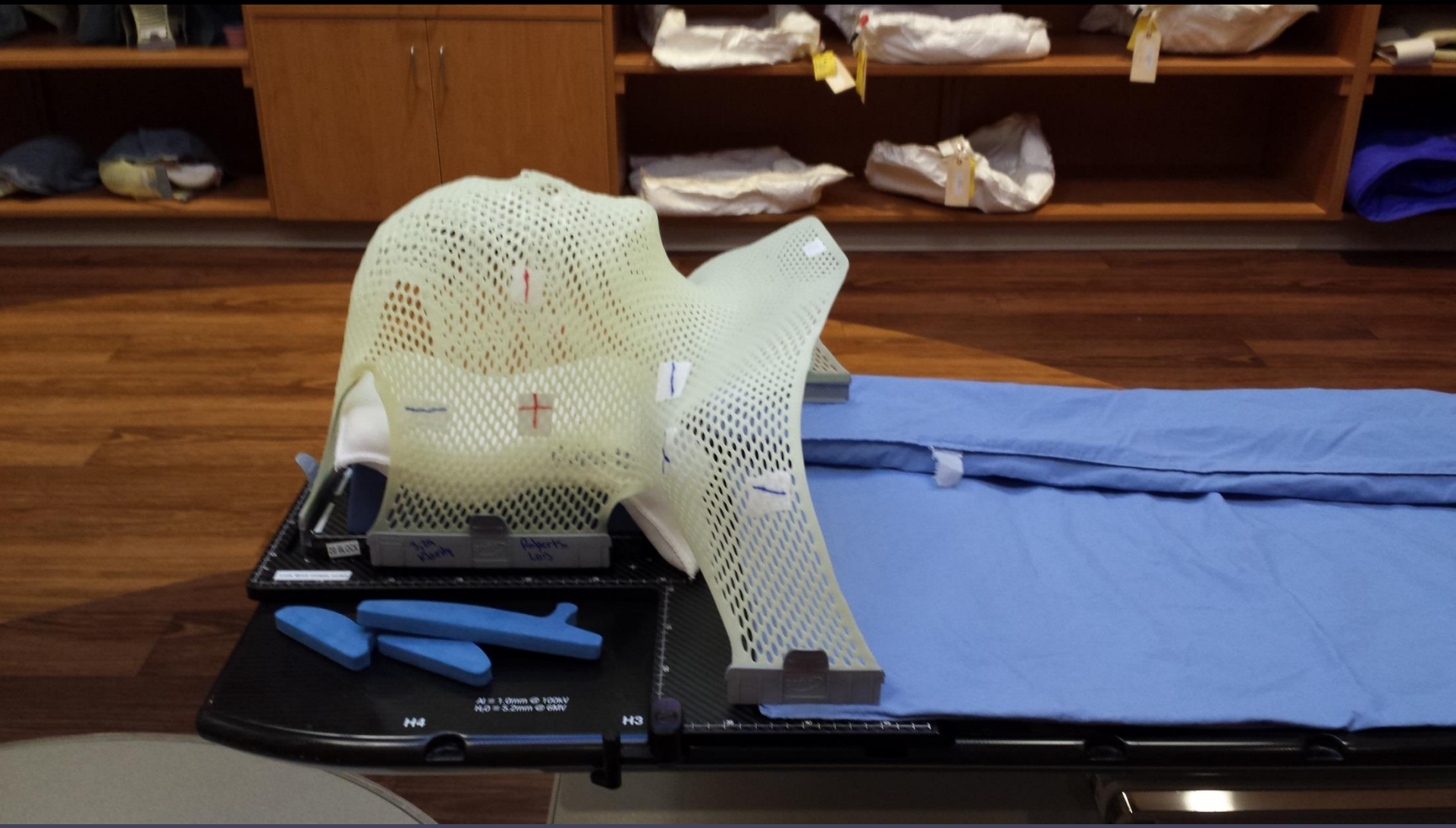
- Several traditional weapons are often used to treat cancer:

1. **Surgical removal**
2. **Chemotherapy**

D) Cancer Treatments

- Several traditional weapons are often used to treat cancer:

3) **Radiation treatments**


H4
H3


trueBEAM

D) Cancer Treatments

- A variety of new genetic -based weapons are emerging

1) Targeted Therapies

- Some attack Cancer-ONLY proteins
- Others deliver medicine by attaching to a cancer-only surface protein with an antibody

2) Vaccines

- Train the immune system to attack cancer

D) Cancer Treatments

- A variety of new genetic -based weapons are emerging

3) Virus Therapies

- Use Altered viruses to attack cancer

Measles virus fights MM

Dogs Detection (42:00)

SUTC Breast Cancer UPdate

Antibody video 1

CTC Chip

CTC Chip 2