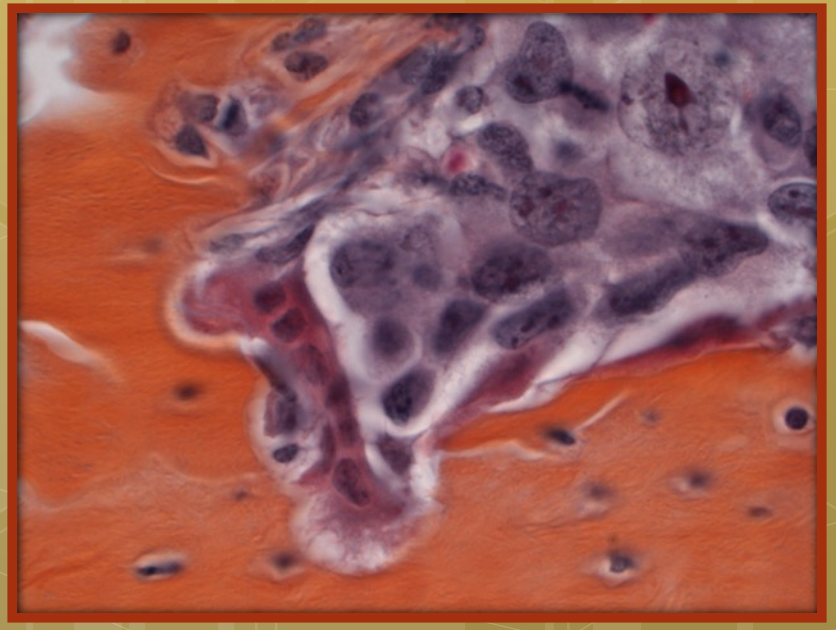


Cancer

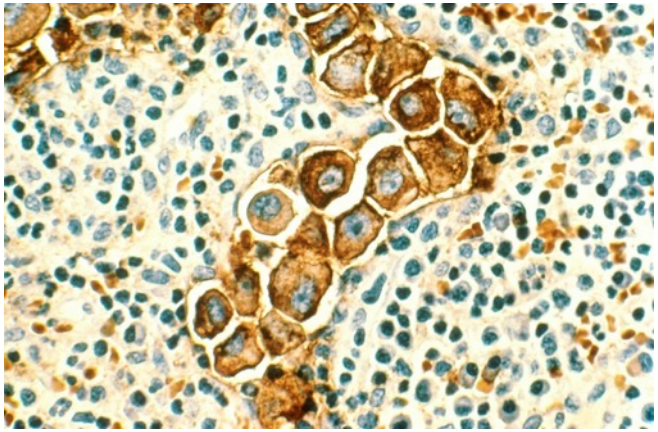
From a normal cell to a cancer cell…..What is different?

It grows when it is not supposed to

It looks different

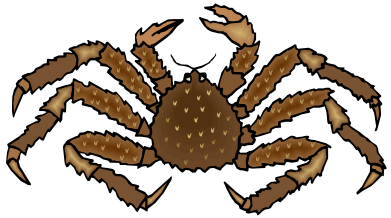
It can avoid the immune system

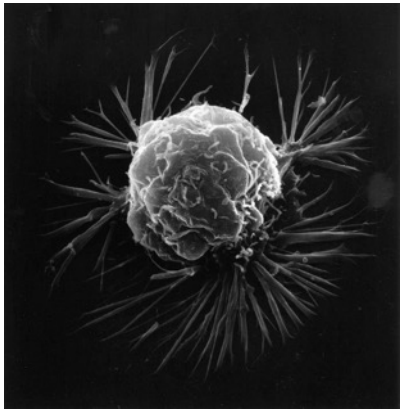
It has the ability to invade & spread



Cancer

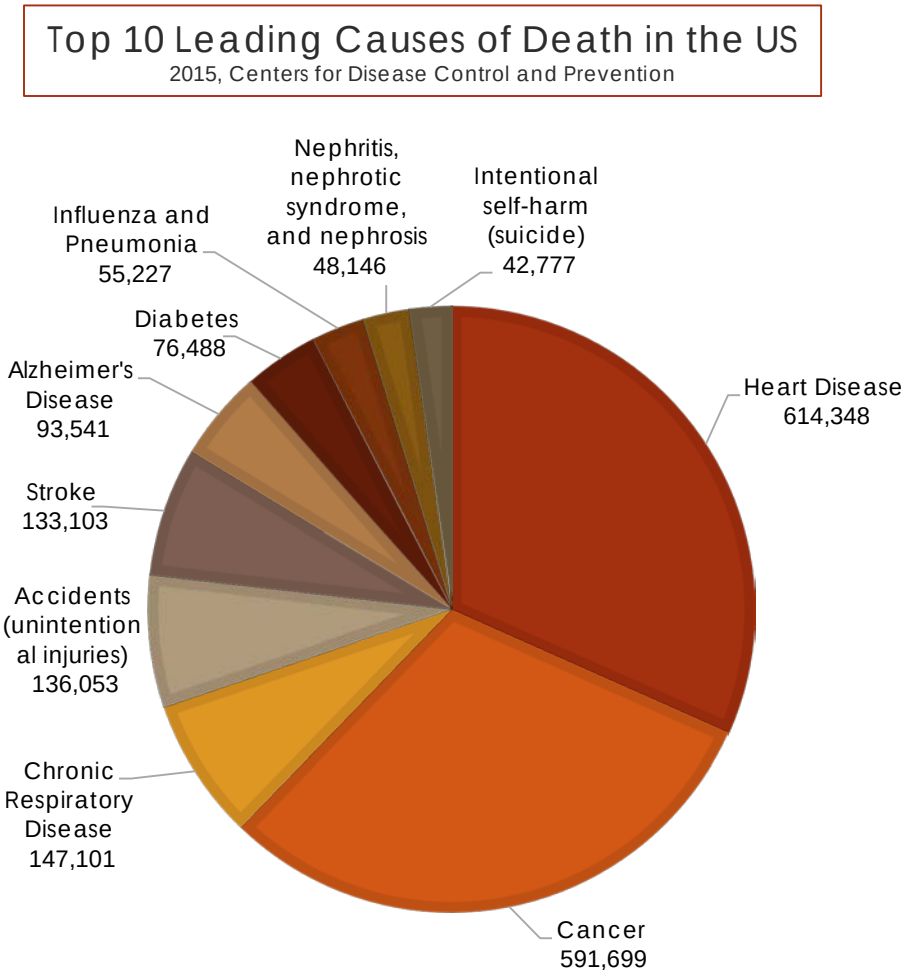
The word ‘Cancer’ comes from a description that the first Ancient Greek Doctor, Hippocrates, named for the streaks of hard gray tissue that extend from a tumor into the normal tissue, which look a little like a crab (*karkinos* – Greek for crab*).*





Some cancer statistics

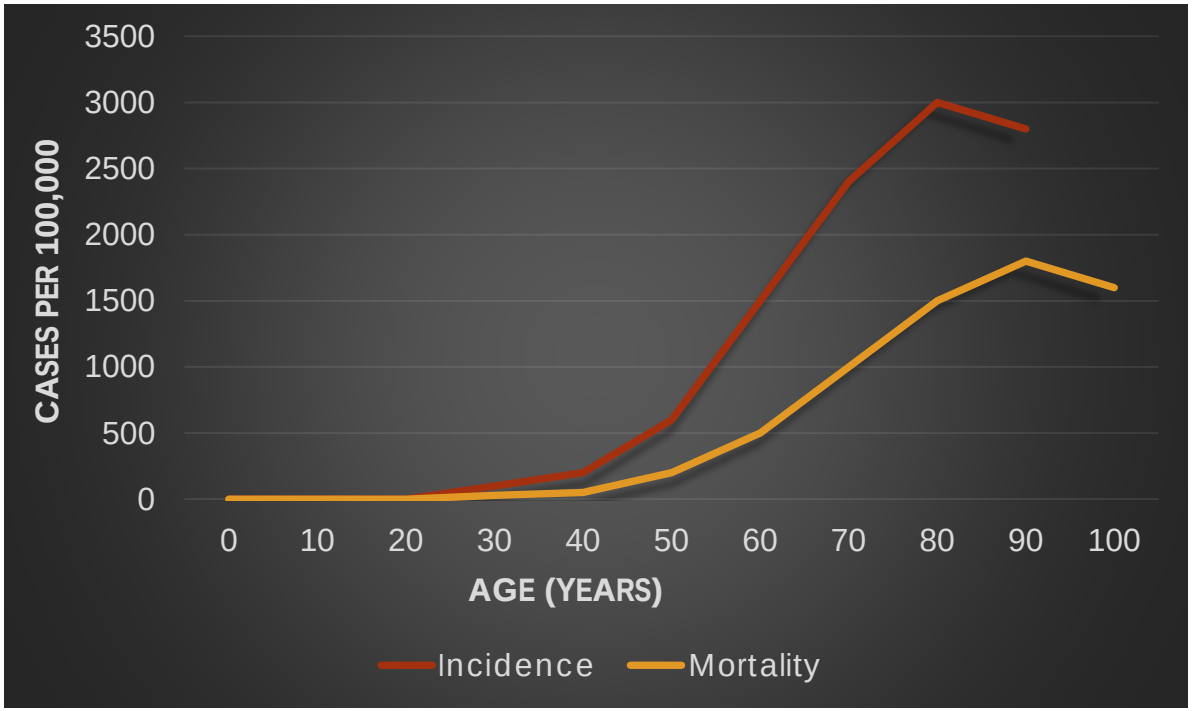
- It is second leading cause of death in the US, second to heart disease.
- In 2017, an estimated 1,688,780 new cases of cancer will be diagnosed in the United States and 600,920 people will die from the disease.
  - That's about 1,650 people/day!



Cancer rates

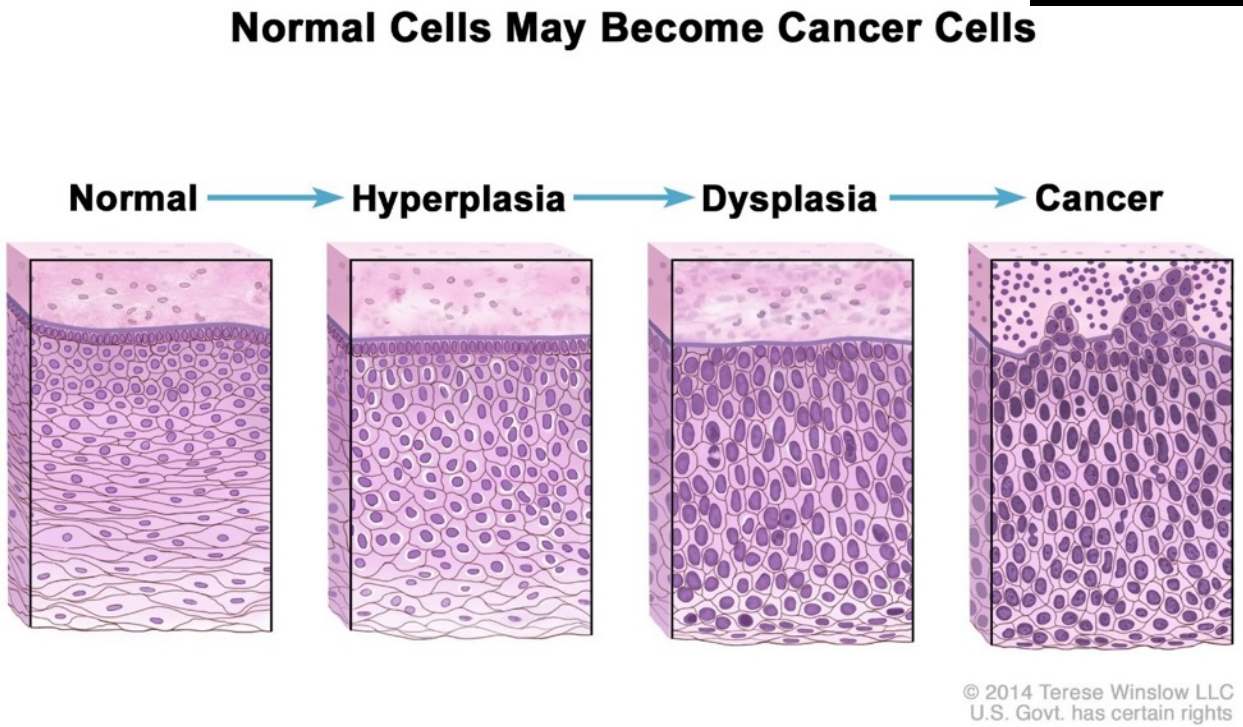
Mortality: The number of deaths during a specific time period

Incidence: The rate or frequency of a disease



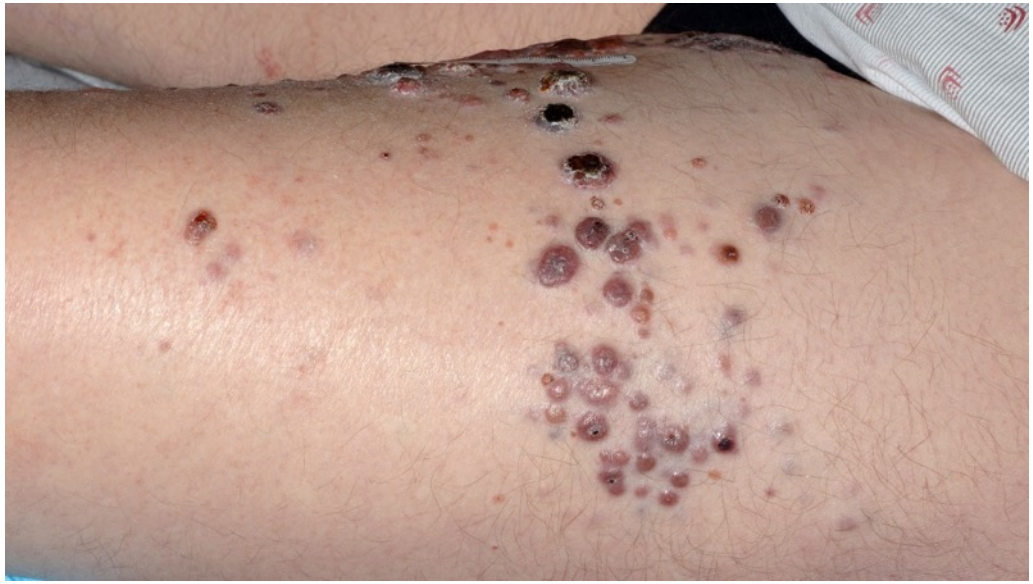
What about cancer?

- Cancer arises from normal tissues.



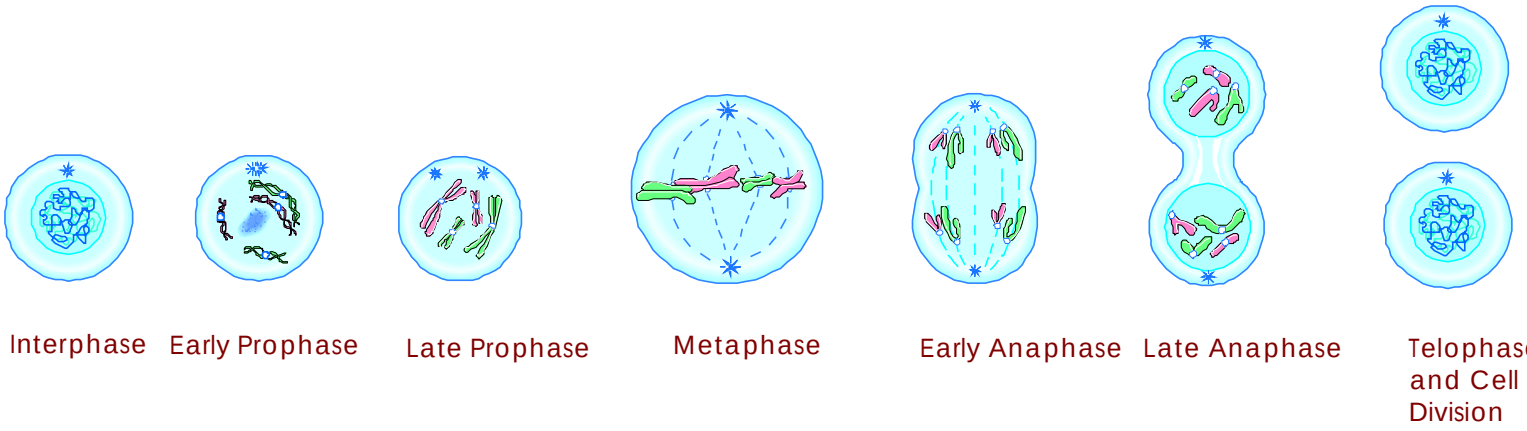
What about cancer?

- Cancer arises from normal tissues.
- It is the uncontrolled growth and spread of **abnormal** cells anywhere in the body.



Why do cells divide?

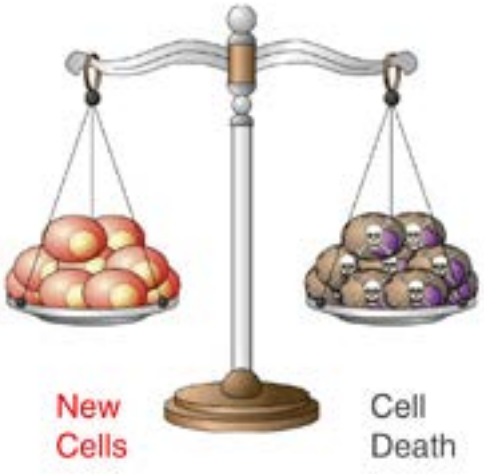
- Grow & reproduce: To make an organism larger and more complex.
- Repair: Tissues that have been damaged.
- Replace: Lost or broken down cells



Cell growth

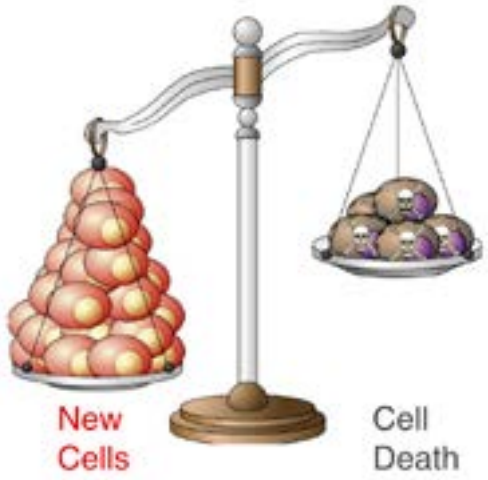
- Controlled by a delicate balance between growth-promoting and growth-inhibiting factors.
- Cancer is a disruption in this balance.

Normal



Cell Death = Cell Growth

Cancer

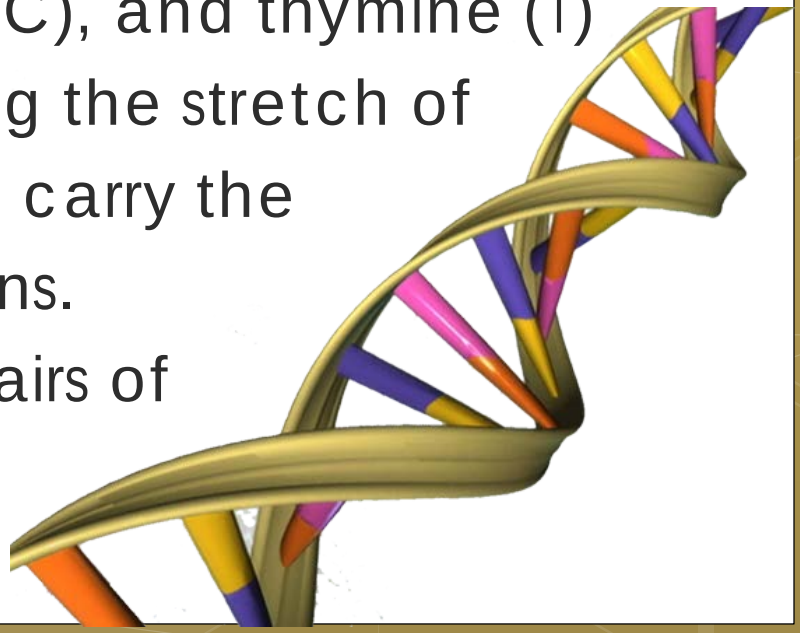


Cell Growth > Cell Death

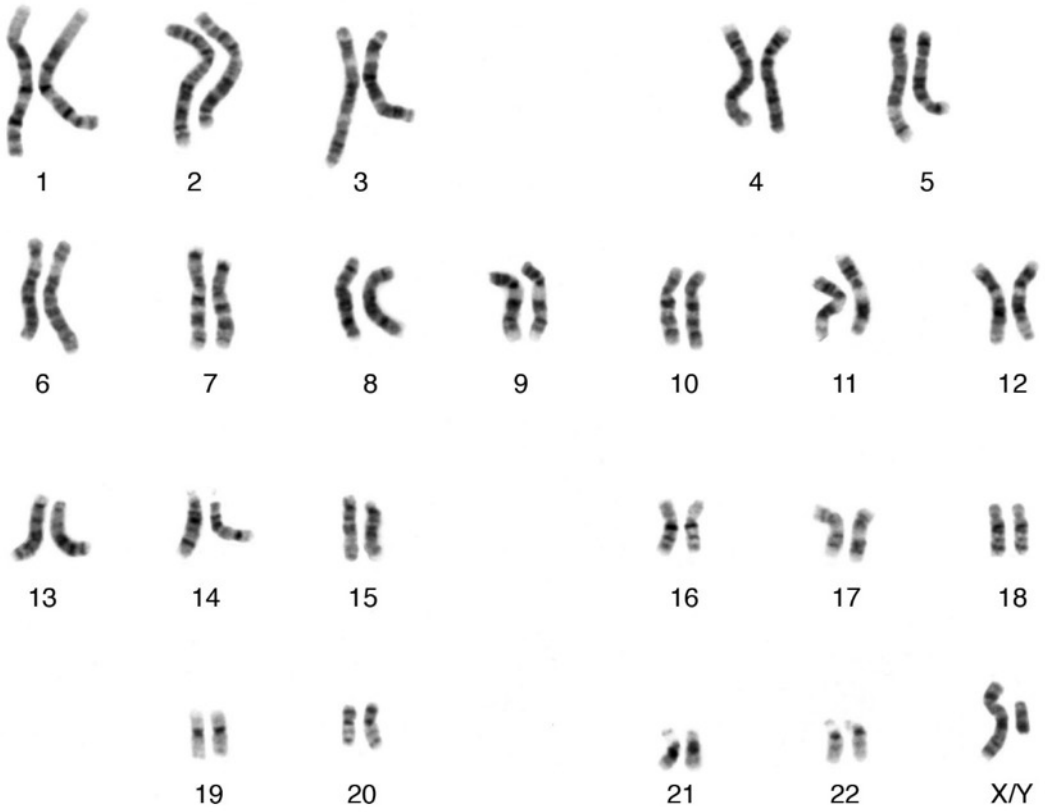
L D Walensky. *Cell Death and Differentiation* (2006) **13,** 1339–1350

A review of the cell & DNA

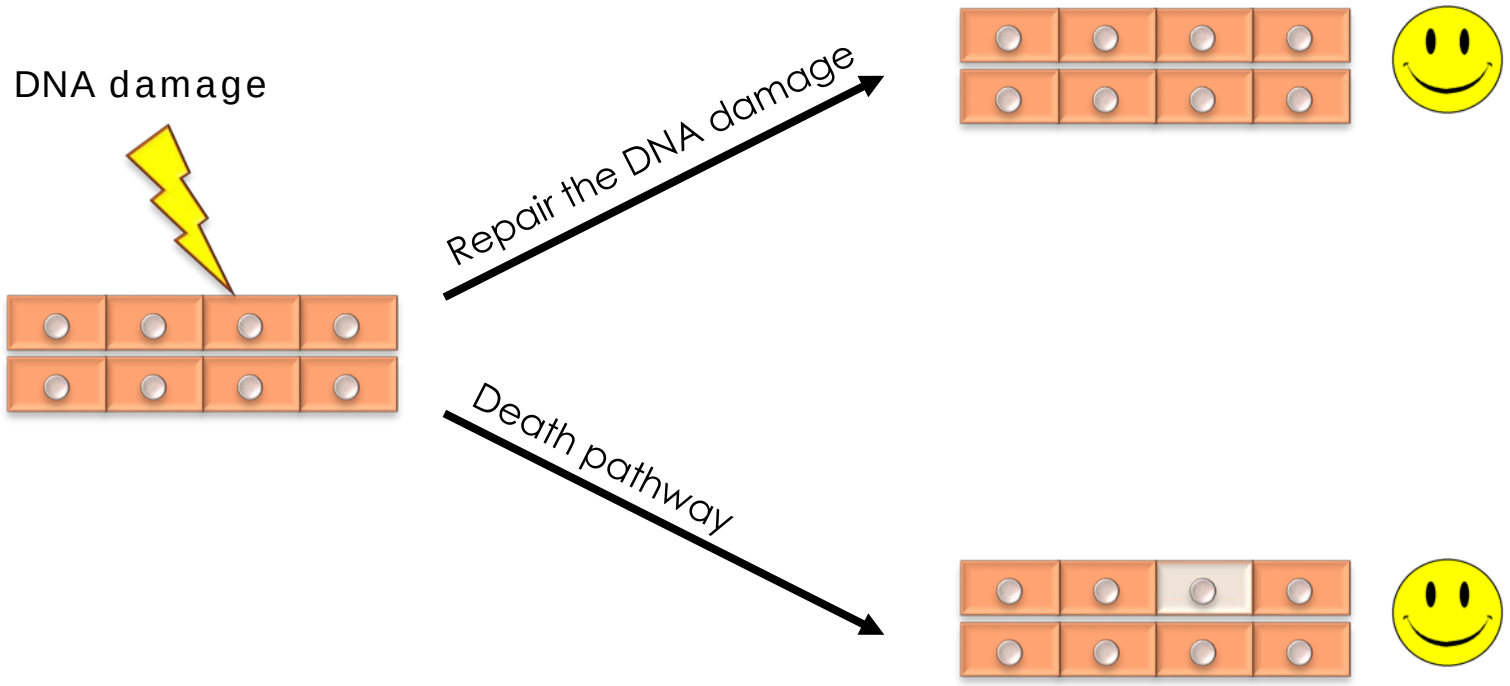
- Each cell in your body has a nucleus.
- DNA is stored inside the nucleus.
- DNA is the instruction book of life.
- DNA is made up of 4 chemical bases: adenine (A), guanine (G), cytosine (C), and thymine (T)
- The order of the bases along the stretch of DNA code for genes which carry the instructions to make proteins.
- DNA is packaged into 23 pairs of chromosomes.



Cytogenetics – a normal cell

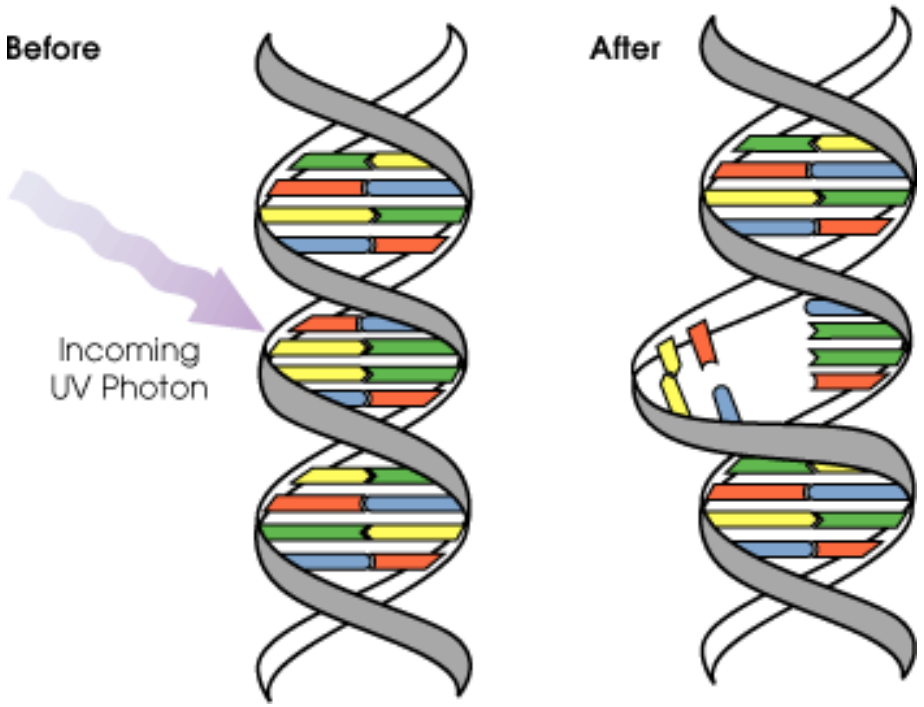


This is normal



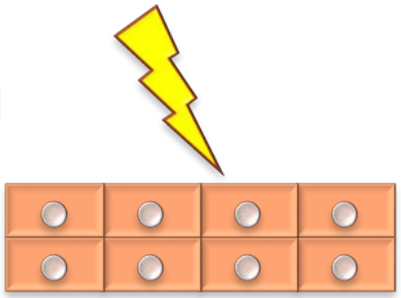
Damage to DNA causes cancer

Cancer arises from damage to the DNA that gives the cell a growth advantage.

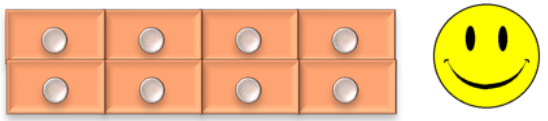


Normal

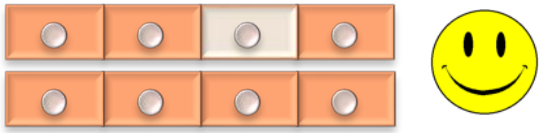
DNA damage



Repair the DNA damage

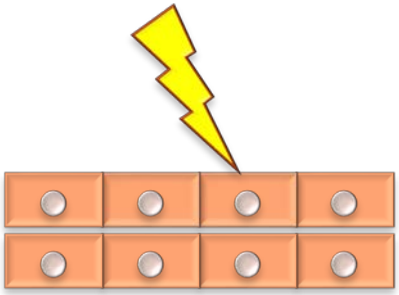


Death pathway



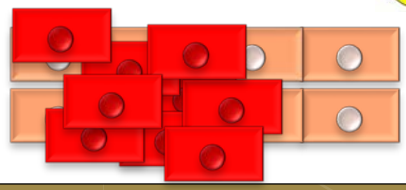
Cancer

DNA damage



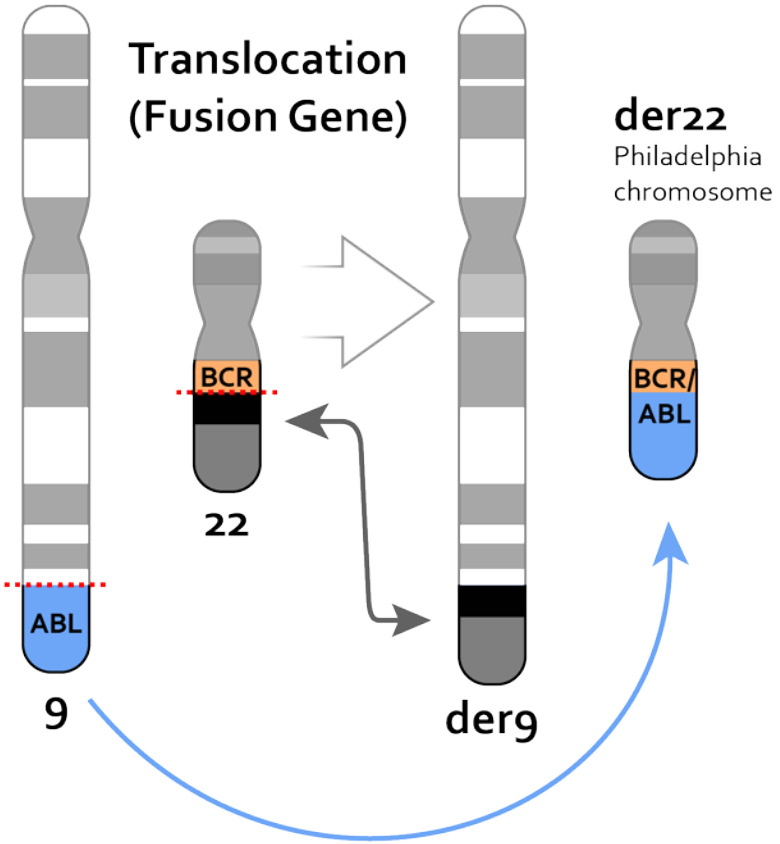
Damage not repaired

No cell death



Consequences of chromosome alterations?

Chronic Myelogenous Leukemia (CML)



Take home message

- Cancer is an imbalance in cell growth and/or cell death
- Cancer arises from an accumulation of mutations in genes that control cell division, cell death, and DNA repair. It takes years for DNA mutations to accumulate.
- The DNA mutations can result in changes in protein structure and function.
- Cancer can be treatable by targeting the altered proteins.