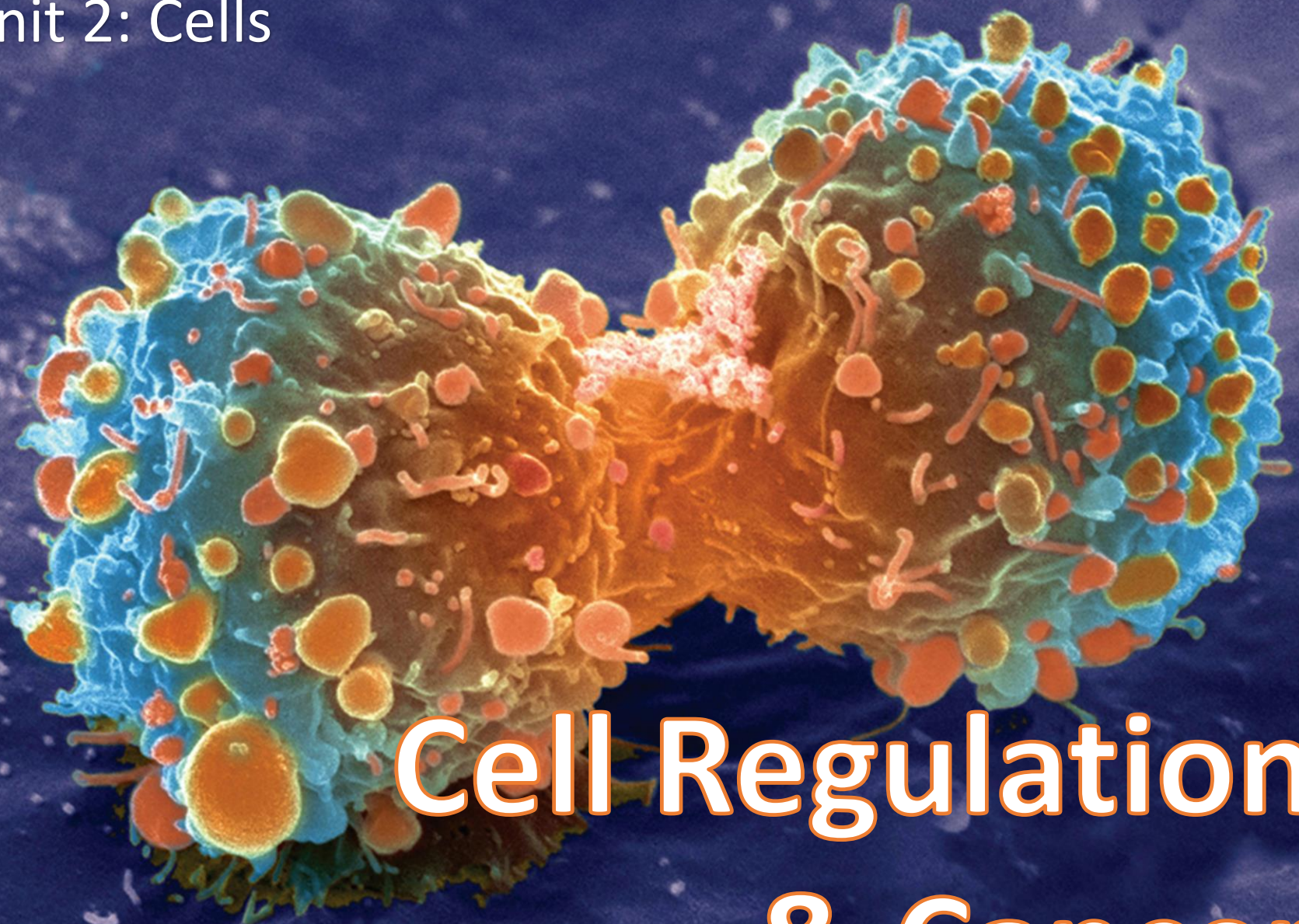


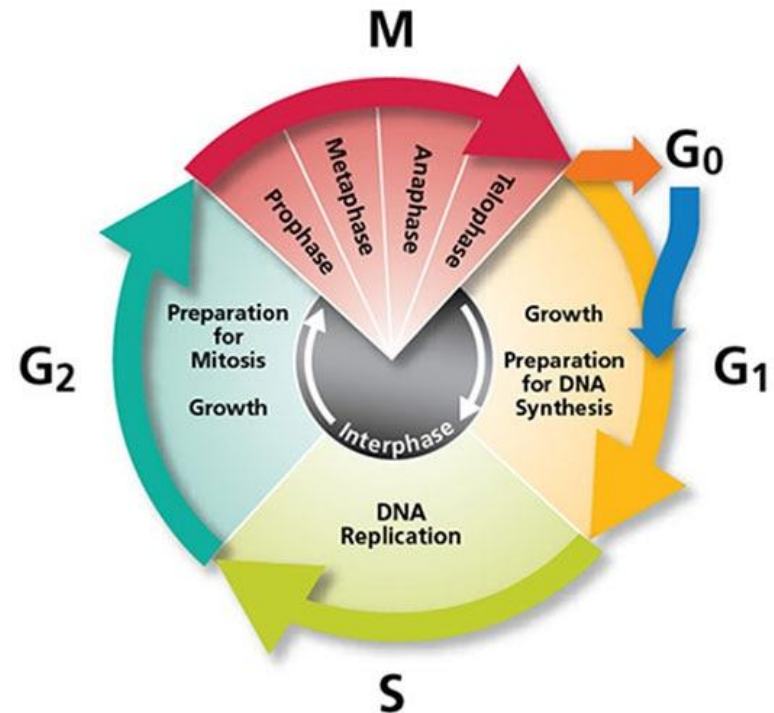
Unit 2: Cells



Cell Regulation & Cancer

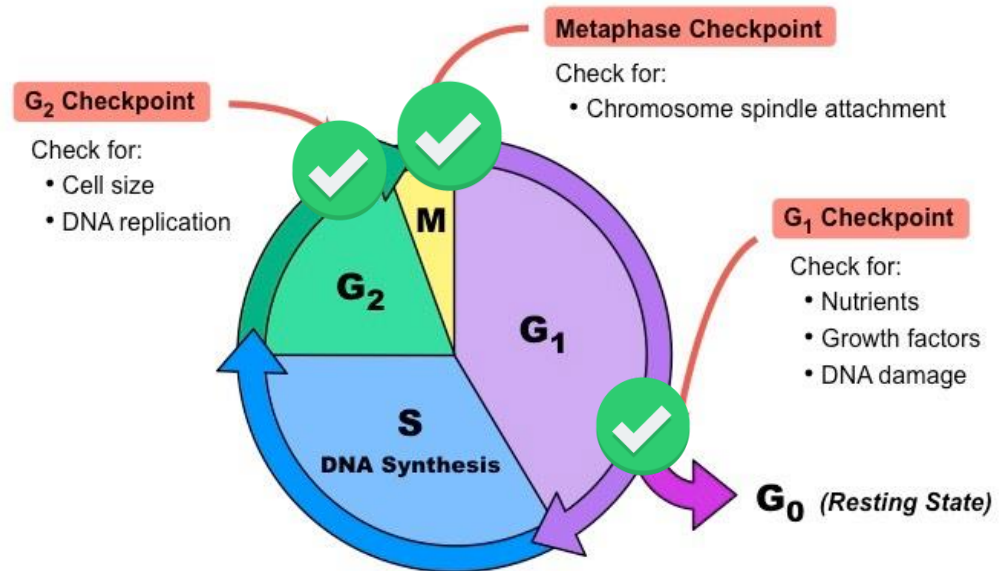
Key Concept

- The cell cycle is a very controlled process.
- Regulation of the cell cycle is important for healthy cell growth.
- To **regulate** means “to control.”
- Throughout the cell’s cycle, there are built in “checkpoints” that are designed to be a check and balance system for the cell.



Regulation

- Information from both inside and outside the cell (internal and external) help regulate the cell cycle.
- Along the cell cycle, there are checkpoints to ensure that the cell is:
 - Growing Replicating DNA
 - Cell functions



Regulation

- **External Factors**

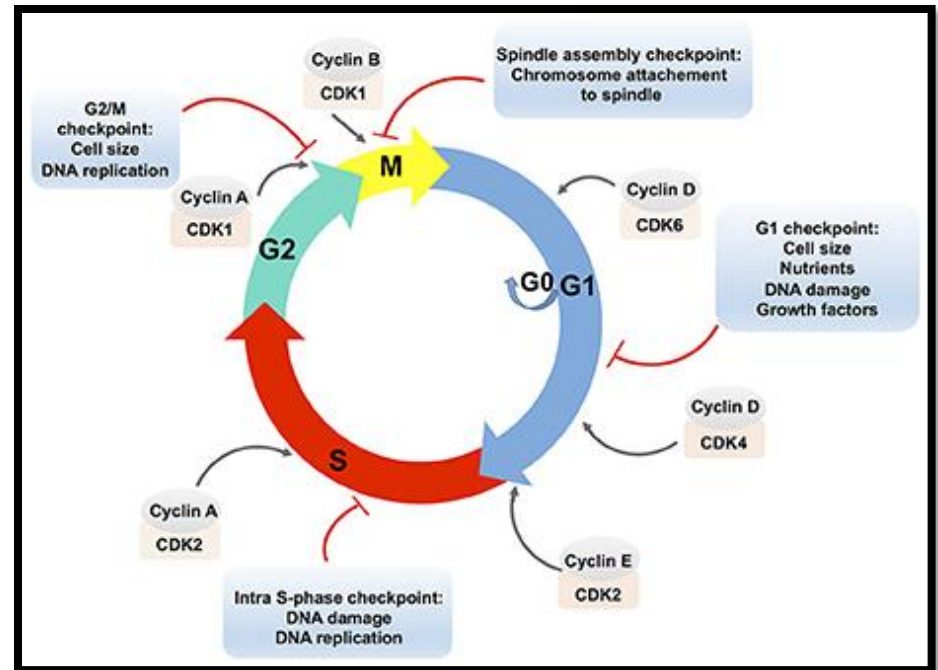
- There are external physical and chemical signals that help regulate the cell cycle.
- Many cells release chemical signals that tell other cells to grow.
- ***Growth factors*** are proteins that stimulate cell division.
 - Cut skin



Regulation

- **Internal Factors**

- External factors bind to a receptor on the cell membrane.
- This starts a response inside the cell.
- These internal factors include enzymes and proteins that help a cell move through the cell cycle.



Regulation

- What happens if a cell fails at a checkpoint?

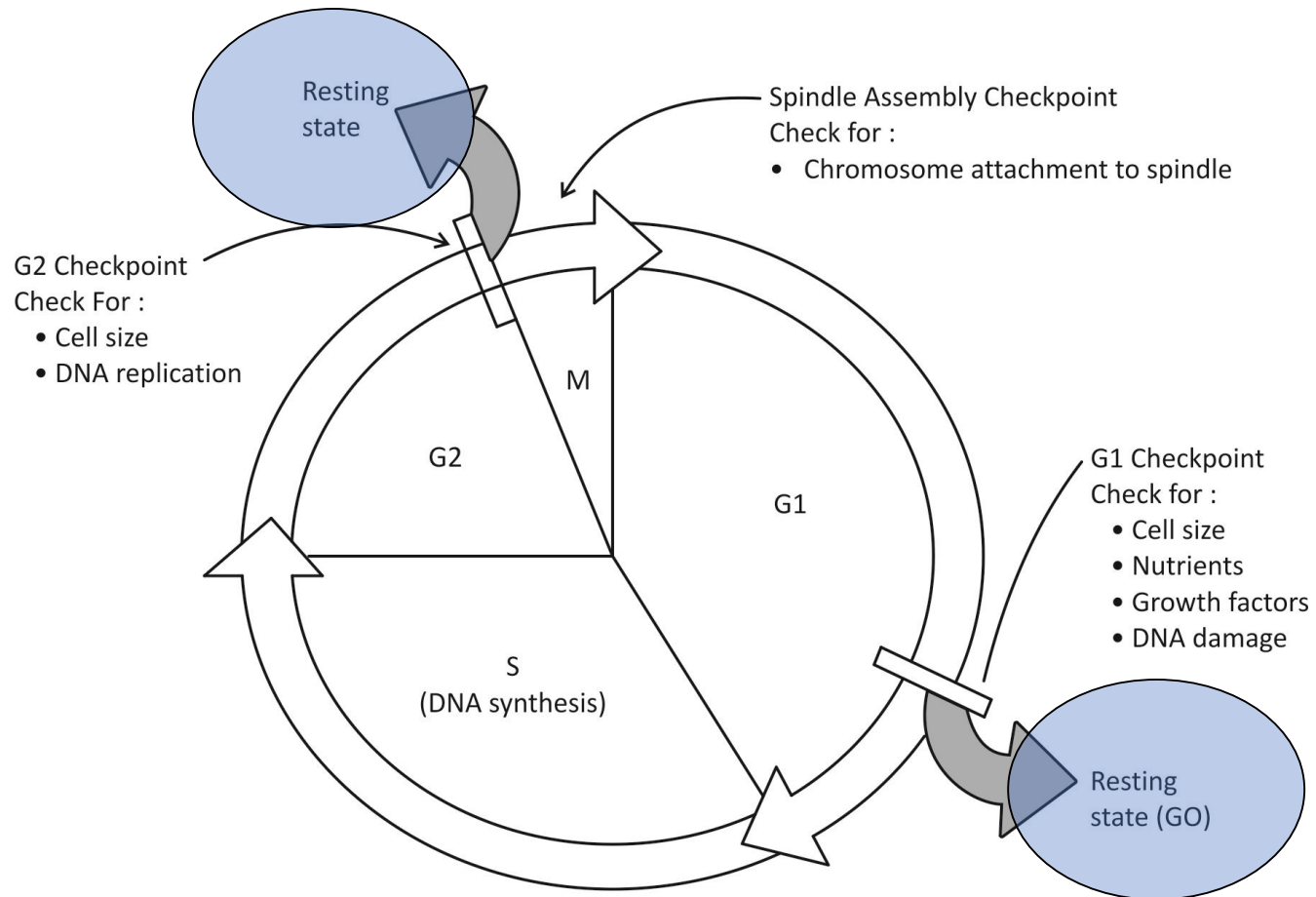
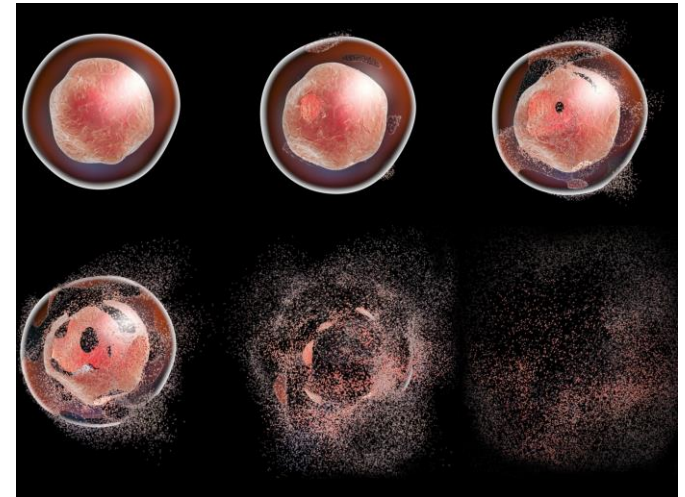
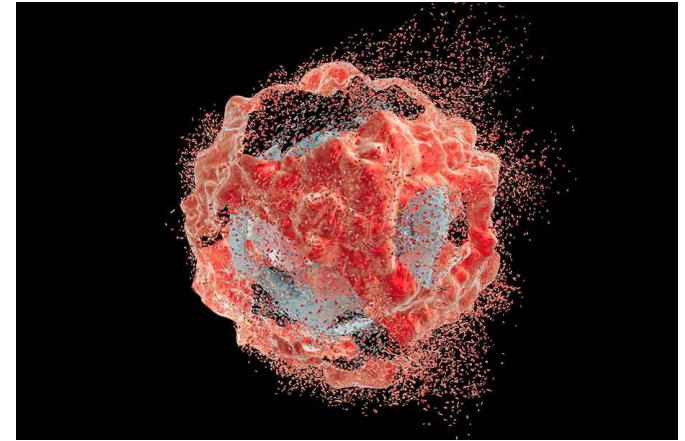
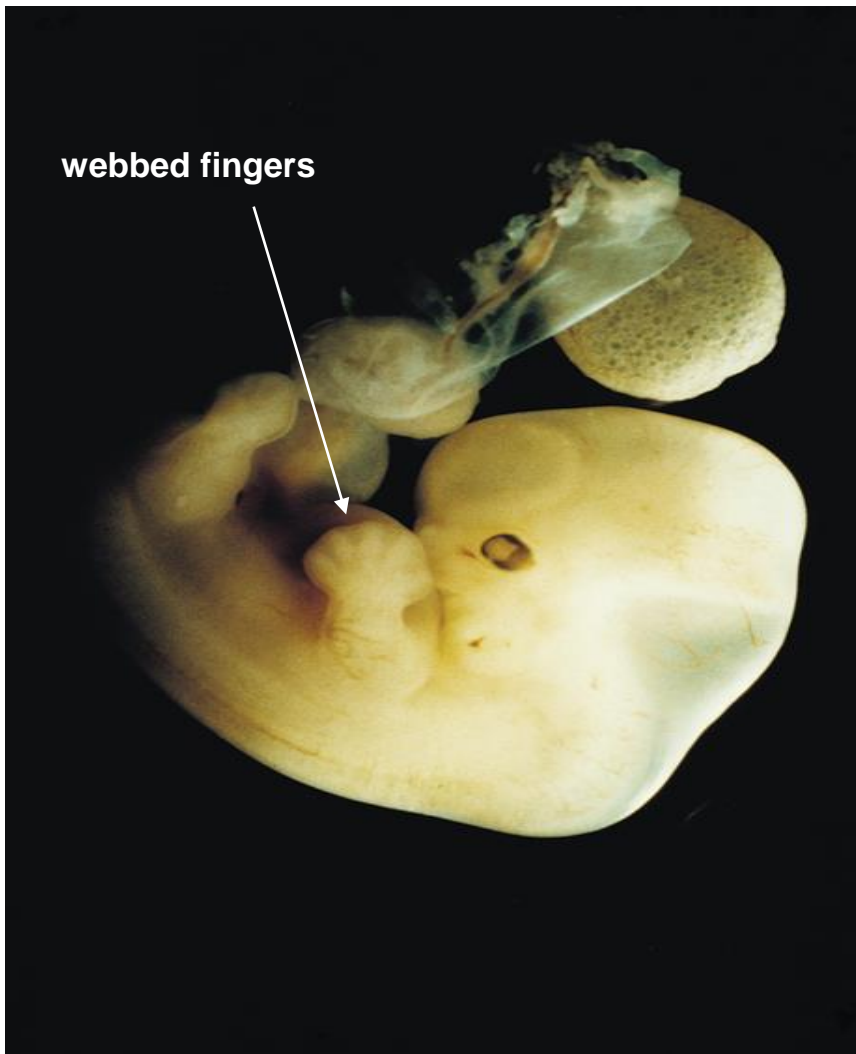


Fig. : Various check points in cell division cycle

Regulation

- **Apoptosis**
 - Just as cells need to grow and divide, other cells need to die.
 - Internal or external signals can start an orderly process of cell death.
 - The cell is broken down and its parts are reused in building other molecules.
 - The process of programmed cell death is called ***apoptosis***.

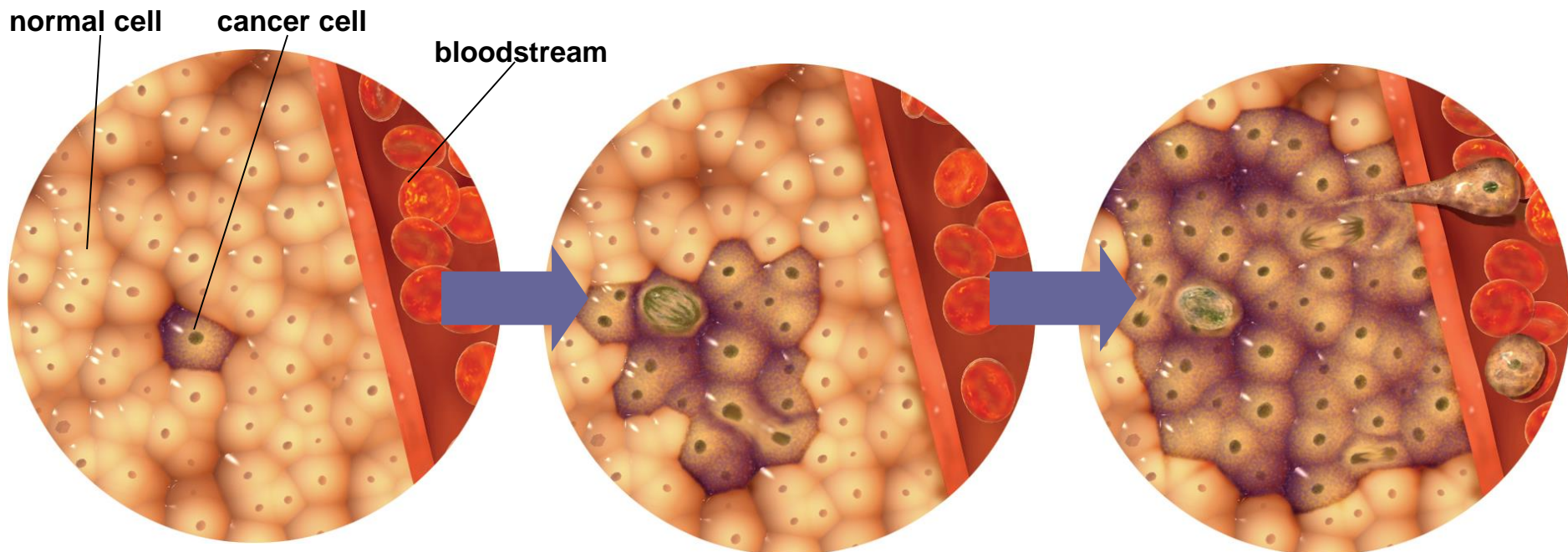




In early human fetal development, webbing of the toes and fingers is normal. At about 6 weeks of gestation, apoptosis takes place due to a protein named SHH, which dissolves the tissue between the fingers and toes, and the webbing disappears.

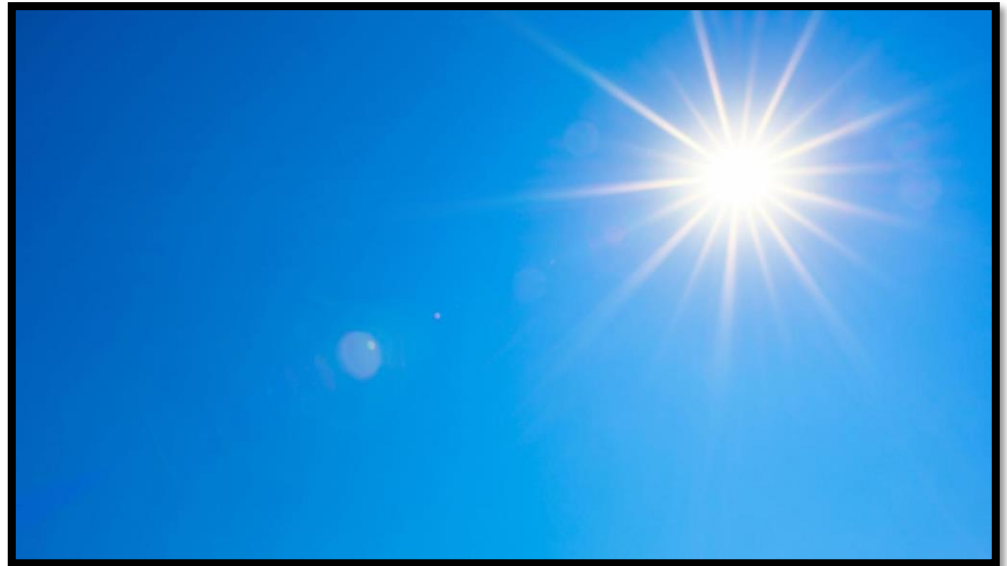
Regulation

- Uncontrolled cell division is known as 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.



Regulation

- Cancer cells do not carry out necessary functions.
- Cancer cells come from normal cells with damage to genes involved in cell-cycle regulation.
- Substances that are known to cause or lead to cancer are called carcinogens.
 - Air pollutants
 - Tobacco smoke
 - UV Rays



Cell Cycle and Cancer

- Video Link: <https://youtu.be/QVCjdNxJreE>

