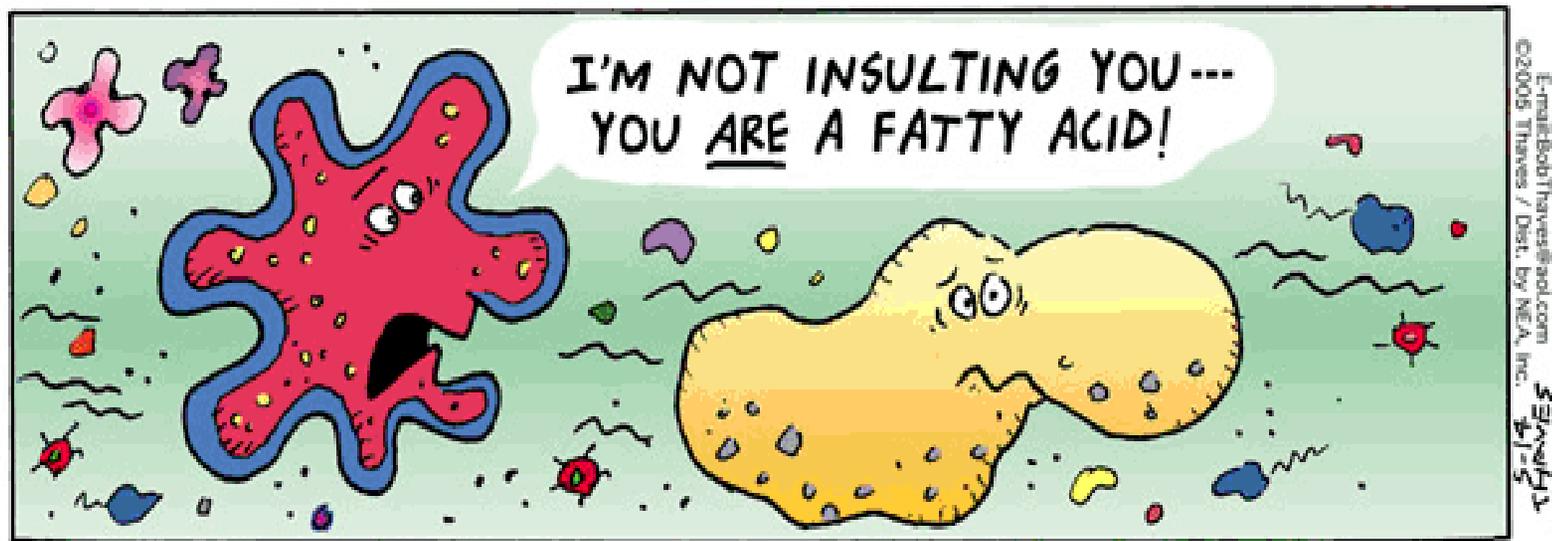


# CH 10-3

## REGULATING THE CELL CYCLE



# I. Cell Growth and Division

A. Very controlled

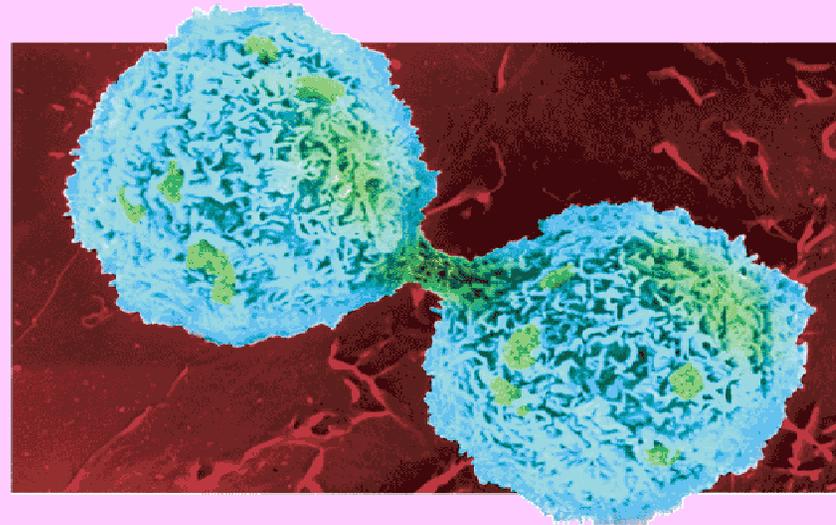
B. All cells go through cell cycle at different rates

1. Some don't divide once completely developed

a. Muscle

b. Nerve

2. Provides new cells to replace worn out or broken cell.



## II. Controls on Cell Division

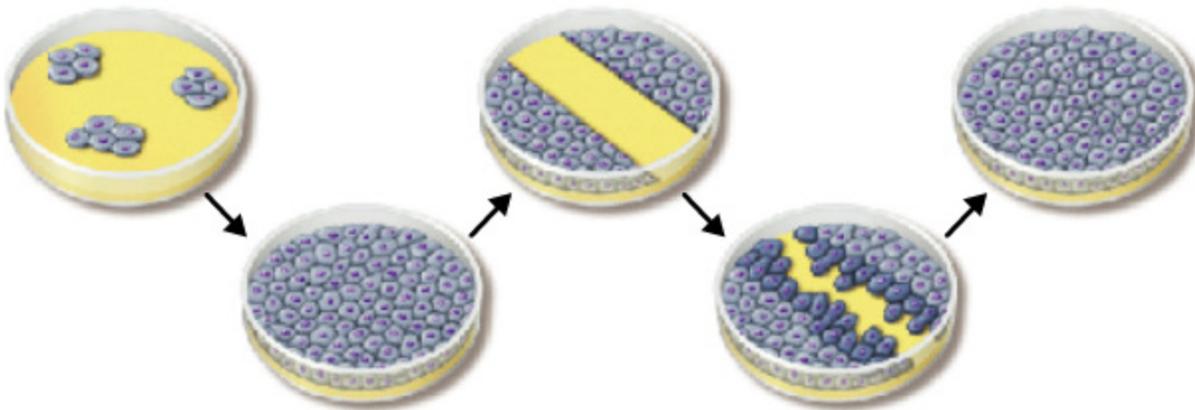
A. Scientists have observed growing cells in a petri dish.

1. Cells grow and divide spreading throughout the dish.

2. Stop once they come into contact with other cells

a. If cells are removed (ex. cut in skin) what happens to cell cycle?

**Speeds up until cells are touching then slows back down.**



### III. Cell Cycle Regulators

#### A. Proteins regulate the cell cycle

1. Cyclin- First protein regulator discovered.

- a. regulates timing of the cell cycle.

- b. Many more discovered since then.

## 2. Two types of Regulators

a. Internal- responds to events in the cell.

i. Will not allow a cell to move on in cell cycle until each stage is complete.

### EXAMPLES:

1. Will not allow mitosis to begin until all chromosomes are replicated and checked for mutations.
2. Will not allow anaphase to pull apart sister chromatids until all spindle fibers are attached.

b. External- directs cells to speed up or slow down the cell cycle.

i. Growth regulators:

Important during

-embryonic development

- healing wounds

ii. Some prevent excessive growth.

## IV. Uncontrolled Cell Growth

A. Consequences are very severe in multi-cellular organisms.

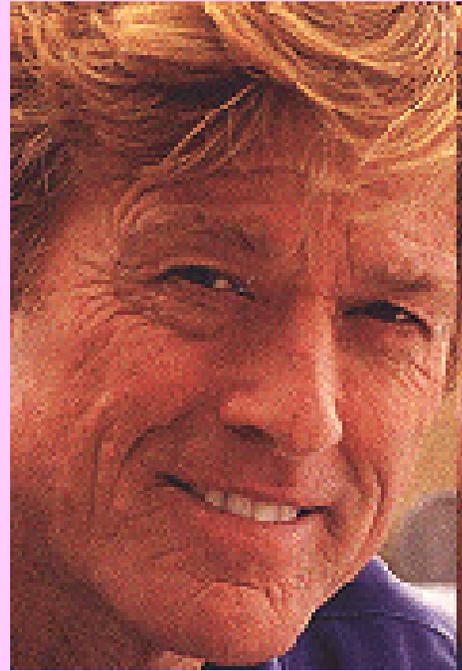
1. Cancer cells do not respond to the signals that regulate the growth of most cells.
2. Cells divide uncontrollably and form tumors.
  - a. can break free disrupting normal activities.
3. Can be caused by exposure to radiation, carcinogens and viruses

V. Many cancer cells have a defect in a gene called p53.

A. Defects in p53 cause the cell to not respond to regulators.

B. This discovery is a monumental breakthrough in the study of cancer treatments, cures and prevention.





MAYBE YOU SHOULD RECONSIDER TANNING



## VI. Stem Cells

- A. Unspecialized cells with potential to differentiate (become specialized in structure and function).
  
- B. All the different types of tissue in your body (ex. Blood, nerve, skin, heart, liver, muscle, hair) were produced by mitosis from stem cells.

## VII. Sources of Stem Cells

### A. Human embryos

1. Very controversial
2. Raises many moral and ethical questions

### B. Also found in:

1. Adult bone marrow
2. Umbilical cord blood cells.

- C. Recently scientists have been able to reverse the “clock” of skin cells and turn them into stem cells.
  
- D. One day we may be able to replace damaged tissue with stem cells from our own body!

## VIII. Stem Cells in Medicine

### A. Have the potential to:

1. Reverse brain and spinal injuries
2. Grow new liver tissue
3. Replace heart valves
4. Reverse effects of diabetes