

Biology 10

Chapter 10-3

p286-291

“Regulating the Cell Cycle”

Objectives

- Identify a factor that can stop cells from growing.
- Describe how the cell cycle is regulated.
- Explain how cancer cells are different from other cells.

Differences in Cell Division

- Not all cells divide at the same rate in the human body!
 - muscle/nerve cells: _____ once formed
 - skin, blood cells: are _____ dividing to replace worn out ones
- So cells need to have control over whether or not they divide... if they don't, bad things happen!

Controls on Cell Division

- When placed in a culture plate, cells divide until they _____
- When cells are removed from the middle of the plate, the cells along the edges _____ until the entire plate is covered
- This process also occurs in the body, during wound healing

Cell Cycle Regulators

- In the 1980's scientists isolated a group of proteins called _____, that were able to regulate the timing of the cell cycle in eukaryotic cells
- The scientist took some cytoplasm from a cell undergoing mitosis, and injected it into a different cell that was in the G2 phase.
 - the G2 cell then started mitosis
- The cytoplasm was analyzed, and cyclins were discovered

Internal Regulators

- Proteins that respond to events within the cell are called _____
- Cyclins are internal regulators.
- Other examples:
 - a certain protein does not allow mitosis to begin until _____
 - another protein does not allow anaphase to begin until all of the chromosomes _____

External Regulators

- External regulators are _____ that help control the cell cycle
- Examples:
 - growth factors: _____ cell division
 - Membrane proteins _____, so when a cell comes up against another cell, it stops dividing (culture plate experiment)

Uncontrolled Cell Growth

- If a cell ignores its restraints and divides uncontrollably, severe conditions arise
- **cancer:** _____
 - the danger arises when some cancer cells break off and spread throughout the body

Uncontrolled Cell Growth

- Cancer can be caused by many factors (**carcinogens**)
 - _____
- A breakdown of regulatory factors is what usually leads to cancer
 - ex: many cancers have a defective gene (**p53**) that causes the regulatory protein that insures anaphase doesn't begin until all of the chromosomes are attached to spindle fibers to have a defect.
 - So then the chromosomes do not separate correctly, and some cells wind up with the incorrect # of chromosomes, which causes _____ of its DNA, and can lead to a tumor cell

Cancer Images