

10.3 Regulating The Cell (Biology)

- Cell growth is controlled in multicellular organisms
- Most human muscles & nerves do not divide after forming.
- Bone marrow cells & stomach cells divide rapidly (hrs.) Replace cells that wear out.

Controls on Cell Division

In the lab-cells divide until they contact other cells.

Skin is cut/bone is broken-cells begin to divide rapidly & slow down once healed.

Biologist discovered a protein in cells during mitosis → injected protein into nondividing cells → cells began dividing. **Regulating proteins called cyclins** (like cycle).

Regulatory Proteins

- Internal Regulators-respond to events inside the cell & make sure one event is complete before next step begins. Ex. Chromosomes must be replicated BEFORE mitosis begins.
- External Regulators=respond to events outside the cell & speed up or slow down cell cycle.
 - Growth Factors-stimulates growth & division of cells
 - Growth increases during embryonic development & wound healing
 - Prevents excessive growth when proteins on neighboring cells slow down/stop cell cycle.
 - Analyzing Data-page 288

Apoptosis

- Process of programmed cell death
- Steps to cell self destruction
- Cell/chromatin shrink, parts of membrane break off, nearby cells clean up the cell's remains.
- Important in shaping of structures & organs. Ex. Mice toes-cells between toes died by apoptosis during tissue development.
- Can result in diseases: cell loss in AIDS & Parkinson's disease (too much apoptosis)

Cancer-Uncontrolled Cell Growth

- Disorder where body cells lose their ability to control growth.
- Cancer cells do not respond to signals that regulate the growth of most cells. So, cells divide uncontrollably.
- Cells form a cell mass called tumor.
- Not all tumors are cancerous. Benign means noncancerous & does not spread to other tissues.
- Malignant tumors invade & destroy surrounding healthy tissue.

- As cancer cells spread, they absorb nutrients needed by other cells, block nerve connections, & cause organs to malfunction.

Causes of Cancer

- Defects in the genes that regulate cell growth & division.
- Sources: tobacco use, radiation exposure, other defective genes, viral infections.
- Often defect in “gene p53”. Should stop the cell cycle when chromosomes are not properly replicated.
- Gene p53 causes cells to lose info needed to respond to protein regulators.

Treatment for Cancer

- Cancerous tumor may be removed by surgery. Ex. Skin cancer-most serious form is melanomas (must be detected early & removed).
- Radiation-carefully targeted beams that target the fast growing cancer cells.
- Chemotherapy-use of chemical compounds to kill/slow cancer cells. Some cancers have been cured. Targets rapidly growing cells but also interferes with healthy cells & produces serious side effects on patient.
- Cancer is a disease of the cell cycle.

HW-Carcinogens-cancer causing agents

Make a list of 10 carcinogens you and your family may come in contact with.