**Unit 2 – Chapter 14 Cellular Reproduction**

*Obj. 5. How are medical treatments such as radiation therapy and chemotherapy effective? What are some of the positive and negative aspects of these treatments in relation to cell division? P. 468-69*

**Mutation** – permanent change in the DNA molecule that can change the genetic information of a gene, causing the gene to function improperly or not at all.

Causes: chemicals, radiation, viruses; spontaneously during DNA replication

**Problem**: if a mutation occurs, each time a cell replicates from then onward, that defective information is passed on (passed from a parent cell to daughter cells during mitosis) – found in a localized area (tumor) rather than in every body cell

**Mutations**

* Most are irrelevant because cells can be replaced so rapidly
* If a mutation occurs in a gene of a cell that controls cell division, cancer can result (uncontrolled and rapid growth and division of cells)
* Example: FHIT – gene found on chromosome 3; this gene can be altered by the toxic components in cigarettes. Cells containing the altered FHIT gene reproduce quicker in the lungs than normal cells, resulting in a tumour.

**Genes**

* Work like switches when controlling mitosis
* If altered, the rate of mitosis can change
* Once mitosis occurs, some genes are turned on and produce proteins that stop mitosis
* If a mutation affects these genes and prevent them from switching on, then mitosis doesn’t stop (uncontrolled cell division).
* Genes that cause cancer when they are mutated are called oncogenes

**Cancer**

* Cancer cells grow more quickly than most cells
* Anything that affects cell division will affect cancer cells more than healthy cells
* Radiation and chemotherapy were created based on this notion

**Radiation**

* Directing X-rays or gamma rays at the affected body part
* Doses several times a week or with internal, radioactive material is placed in the body next to the growth
* Radiation damages the chromosomes, preventing the growth and division of a cell
* Healthy cells are damaged too, but many can repair themselves
* The goal is to focus the radiation on the tumor (localized cancer)
* Ex. Tumors on the skin, breast, larynx, cervix
* Side effects: skin inflammation, fatigue; brain radiation results in hair loss, radiation directed towards testes results in infertility – can be permanent

**Chemotherapy**

* A course of one or several types of drugs
* Some drugs attack dividing cells
* Others prevent cell division
* Affects entire body, so used to treat cancers like leukemia
* Chemotherapy also can affect healthy cells (hair, stomach, skin, bone marrow, reproductive cells – sperm and eggs)
* Side effects: hair loss, nausea, diarrhea (usually only lasts during treatment)

While side effects are severe, most people agree that enduring the side-effects is less a risk to life than going without treatment. The goal is to effectively kill cancer cells while causing as less damage to healthy cells as possible.

Goal of cancer research – find a treatment that only affects cancer cells.

<http://www.youtube.com/watch?v=d-ZwWBcfNUg> – Terry Fox 2:46