Mitosis, meiosis, and mutation

Science, Biology

Biopsy Lab Report Up d 5/15/14 _____

_____ Please use this report form and simply “ fill” in your observational data and conclusions.

Purpose: To apply an understanding of cellular division to distinguish between cancerous and noncancerous tissue samples.

Expected Observations (5 points)

It is expected that cancer cells will have a high rate of division and proliferation compared to the normal cells because cancer arises when there is a rapid growth of abnormal growth. In addition, cancerous cells are known to bypass the cell regulatory mechanisms.

Materials and Methods

The materials for this lab are embedded within the Cellular Reproduction Lab located in the week 3 resources section. You must view the acquired mutation section of the lab to reach the virtual microscope and tissue samples. There are four simulation tissue samples; each of which is “ stained” so that you can observe the stages of mitosis in the sample cells. Select each sample with your mouse and “ drag” it to the virtual microscope in order to observe the cells in each sample.

Results (20 points)

Use the chart below to record your observations of the tissue samples. For each virtual tissue sample, count the number of cells in each stage of mitosis and record your observations below.

Tissue Sample

Interphase

Prophase

Metaphase

Anaphase

Telophase

Sample #1: Normal Tissue

9

1

0

0

0

Sample #2: Normal Tissue

9

0

0

0

1

Sample #3: Cancer Tissue

7

2

0

1

0

Sample #4: Cancer Tissue

7

1

1

0

1

Analysis (20 points)

It was observed that 90 percent (nine cells) of the normal cells were in the anaphase stage of mitosis in the first sample while only 10 percent was in prophase. In the second sample, 90 percent of the cells were in anaphase while only 10 percent of the cells were in the telophase stage of mitosis. These two observations showed than in normal cells, only 10 percent of the cells were actively dividing at any given time. In sample 3, which was a cancerous tissue, 70% of the cells (7 cells) were in the interphase stage while 20 % (2 cells) were in the prophase stage. 10 % (1 cell) was in the anaphase stage. Similarly, in sample 4, 70 % of the cells were in interphase while 10% (1 cell) was in prophase, metaphase and telophase stages of mitosis. These findings showed that cancer cells have an abnormally higher rate of division and proliferation. Therefore, the results of the experiment were in line with the expected observations of the experiment.

These findings suggest that a general approach to combat cancer is preventing the abnormal multiplication of cancerous cells. One such way is through eliminating the cancerous cells, which can be achieved through chemotherapy as well as radiation therapy. Chemotherapy involves the use of chemical agents that target certain stages in the cell cycle of cancerous cells (Priestman, 2012). In addition, anticancer drugs work against certain proteins that are vita in the survival of cancer cells. Radiotherapy, on the other hand, is the utilization of high-energy radiations to eliminate malignant cells (Reilly, 2010). The two methods may be used concurrently. Another

treatment option is the surgical removal of the malignant cells. Though the mode of action of the various methods may differ, all cancer treatment methods aim at eradicating the cancerous cells in order to prevent them from multiplying.

The findings of this lab have shown that cancer cells grow and multiply at a faster rate than normal cells. Additionally, this lab has been useful in illustrating the actual mechanisms that underlie the development of cancer as well as its treatment.

Conclusion (5 points)

It was observed that 90% of normal cells and 70% of cancer cells were in the resting stage or anaphase at any given time. Therefore, the rate of division and multiplication of cancerous cells was higher than in normal cells. Therefore, the most effective method of treating cancer was to prevent the proliferation of cancer cells by eliminating them. As a result, various methods such as chemotherapy, radiotherapy and surgery are used in the treatment of cancer.

A possible research question that has come up in this lab is “ What is the cellular mechanism in the treatment of cancer?” Future experiments could look at cells from cancerous tissues that have been exposed to the various cancer therapies to illustrate their modes of action at the cellular level. The effects of the treatments in the various stages of cell division can then be illustrated.

References

Priestman, T. (2012). Cancer chemotherapy in clinical practice (2nd ed.). London: Springer-Verlag.

Reilly, R. M. (2010). Monoclonal antibody and peptide-targeted radiotherapy of cancer. Hoboken, NJ: Wiley.