Name:_____Date: _____

A Closer Look at Cancer

Part I: KWL

Start this activity off by completing the "K" (What do you know about cancer) and the "W" (what do you want to know about cancer) portion of the table below. *The last section, the "L", should be saved for last.*

KWL		
What do you **K**now about cancer?	What do you **W**ant to know about cancer?	What have you **L**earned about cancer?

Part II: The History of Cancer

Cancer is a very serious and complex disease. Though we are making new discoveries every day, cancer is not a new disease; it has been around since mankind. It is hard to say if the incidences of cancer are higher today than they were hundreds of years ago, because then the disease was not well understood and often not diagnosed.

The oldest known description of cancer was found on an Egyptian papyri written between 3000-2000 BC. The writings referred to tumors of the breast. Also, in mummified remains of both Peruvian Incas and Egyptians dating back to 1600 BC contained lesions (abnormal growth) of bones, which suggests cancer.

Cancer is not contagious because it does not involve the transmission of pathogens. Cancer is actually caused by a faulty gene in your own cells. A tumor is simply a cluster of cancerous cells, which can vary in size. Tumors can be malignant, which means the cells are spreading to other parts of the body, or benign, which means that the cancer cells are contained in one area- they cannot spread or grow in other parts of the body. The ancient Greek philosopher Hippocrates is known to be the first man to recognize the difference between benign and malignant tumors. He wrote manuscripts of cancer found in many regions of the body. Hippocrates noticed that blood vessels swell around malignant tumors. The swollen blood vessels reminded him of crab claws- so he called the disease karkinos (Greek for "crab"). In English, this term translates to carcinos- or carcinoma, which is the medical term for cancer.

1. What evidence do we have that cancer is not a disease of modern civilization?

_____
_____
_____
_____.

2. What is a tumor? _____
_____.

3. Name and describe the two types of tumors.

_____
_____
_____
_____.

4. Who was Hippocrates and why did he essentially name the disease after a crab?

_____
_____
_____
_____.

Making connections

5. Based on the reading, why do you think we refer to the disease as "cancer"?

_____
_____
_____.

Part III: What is Cancer?

Recall that your body is made of billions of cells. Cells are constantly dividing to make more of themselves- how else would you have transformed from a baby to an (almost) adult? Cells divide for several reasons, including: growth, repair, and to replace.

Cells need to repair themselves from injury. Humans do have some small capabilities of regeneration. If you break a bone, new bone cells will grow to heal. If you scrape your knee, new skin cells will grow to heal. Cells also need to replace old cells. Did you know that cells have programmed cell death? Your old cells will need to be replaced by new ones. Typically, cells can only make a certain amount of copies of themselves. Some cells, such as red blood cells, do not make copies of themselves at all.

Cancer results from damage to genes. Recall that genes are segments of DNA, which have specific instructions. In healthy cells, these genes limit the ability for a cell to divide. In cancerous cells, the genes are damaged and are not able to control the cell's division as effectively.

What can cause this damage? It appears as though certain environmental factors may be linked to some types of cancer. For example, the cancer rates among the U.S. are not evenly distributed across the nation. Usually there is a higher rate of cancer in cities, suggesting that pollution and pesticide runoff may contribute to cancer. There is a clear link between pollutants and radiation to cancer. Most cancer causing agents are powerful mutagens- substances that can damage DNA. When DNA is damaged, we call it "mutated".

How many mutations does it take for cancer to occur? Research indicates that it only takes a few gene mutations to transform a healthy cell into a cancerous cell. The cancer- causing genes involved are responsible for regulating how fast a cell grows and divides. Scientists have discovered two types of genes that control cell division: **oncogenes** and **tumor-suppressor genes.**

Imagine driving a car. To get things going, you step on the gas. Your cells have genes that act like the accelerator of a car to start the process of cell division; these are called oncogenes. Just like you can use your brakes if you need to slow down or stop a car, a cell has genes that can slow down and stop cell division, too. These are called tumor- suppressor genes. If these genes are damaged, cell growth might not slow down, and this leads to cancer.

6. What are three reasons that cells need to divide? _____
_____
_____.

7. Cancer results from damage to _____, which are segments of DNA, which have _____ _____.

8. Describe what a mutagen is and name two mentioned in the reading:
_____
_____
_____.

9. What is an oncogene? _____
_____
_____.

10. What is a tumor-suppressor gene? _____
_____.

Graphing Exercise

Cancer can affect many different organs- some of which, such as skin, can be affected by several different types of cancer. Some types of cancer are more treatable than others.

Using the information below, create a bar graph to depict the cancer rates of different types of cancer in the United States. Use one color for the type of cancer, and another color for how many deaths that particular disease caused.

Be sure to label your graph! There will be TWO bars for each type of cancer- one for the number of cases, and one for the number of estimated deaths. Use two different colors in your bar graph (one for estimated cases and one for estimated deaths).

Type of Cancer	Estimated Cases	Estimated Deaths
Breast cancer	180,000	40,000
Lung cancer	160,000	140,000
Prostate cancer	320,000	40,000
Skin (basal and squamous cell)	800,000	10,000
Skin (melanoma)	30,000	20,000
Colon	100,000	40,000

Interpreting Your Graph

Use complete sentences, please!

1. Which cancer type is most common? Least common?

2. Which cancer type seems to be least treatable? Most treatable?

3. Provide a possible explanation as to why the incidence of basal and squamous skin cancer is so high.

4. Using breast cancer as an example, calculate the percentage of survival for this cancer type (hint: calculate the # of survivors, divide it by the # of estimated cases, and multiply this # by 100%).

Do not forget to complete the "L" part of your KWL in Part I.

Tips on how to set up your graph:
The y axis can be labeled number of thousands of estimated cases and deaths, which means that you would only need to go from 0-800 on the y axis. Just be sure to come up with a good method for measuring what each line on your graph is worth first? (For example: should going up one line be an increase of 10? 50? Decide this before you proceed). The x axis should be the type of cancer (two bars for each type of two different colors).

Graph title: