**Problem-Solving Lab 8-3**

**Interpreting Data**

**How does the incidence of cancer vary?** Cancer affects many different body organs. In addition, the same body organ, such as our skin, can be affected by several different types of cancer. Some types of cancer are more treatable than others. Use the following graph to analyze the incidence of cancer.

![Cancer Rates in the United States (2000)](image)

**Thinking Critically**

1. Which cancer type is most common? Least common?
2. Which cancer type seems to be least treatable? Most treatable?
3. Offer a possible explanation for why the incidence of basal and squamous skin cancer is so high.
4. Using breast cancer as an example, calculate the percent of survival for this cancer type.

Many studies point to the portion of interphase just before DNA replication as being a key control period in the cell cycle. Scientists have identified several enzymes that trigger DNA replication.

**Cancer: A Mistake in the Cell Cycle**

Currently, scientists consider cancer to be a result of changes in one or more of the genes that produce enzymes that are involved in controlling the cell cycle. These changes are expressed as cancer when something prompts the damaged genes into action. Cancerous cells form masses of tissue called tumors that deprive normal cells of nutrients. In later stages, cancer cells enter the circulatory system and spread throughout the body, a process called metastasis, forming new tumors that disrupt the function of organs, organ systems, and ultimately, the organism.

Cancer is the second leading cause of death in the United States, exceeded only by heart disease. Cancer can affect any tissue in the body. In the United States, lung, colon, breast, and prostate cancers are the most prevalent types. Use the Problem-Solving Lab on this page to estimate the number of people in the United States who will develop these kinds of cancers in this decade, and how many people are expected to die from cancers. The Health Connection feature at the end of this chapter further discusses skin cancer.

**The causes of cancer**

The causes of cancer are difficult to pinpoint because both genetic and environmental factors are involved. The environmental influences of cancer become obvious when you consider that people in different countries develop different types of cancers at different rates. For example, the rate of breast cancer is relatively high in the United States, but relatively low in Japan. Similarly, stomach cancer is common in China, but rare in the United States.

In addition, when people move from one country to another, cancer rates appear to follow the pattern of the country in which they are currently living, not their country of origin. Other environmental factors, such as cigarette smoke, air and water pollution, and exposure to ultraviolet...
radiation from the sun, are all known to damage the genes that control the cell cycle. Cancer may also be caused by viral infections that damage genes.

**Cancer prevention**

From recent and ongoing investigations, scientists have established a clear link between a healthy lifestyle and the incidence of cancer.

Physicians and dietary experts agree that diets low in fat and high in fiber content can reduce the risk of many kinds of cancer. For example, diets high in fat have been linked to increased risk for colon, breast, and prostate cancers, among others. People who consume only a minimal amount of fat reduce the potential risk for these and other cancers and may also maintain a healthy body weight more easily. In addition, recent studies suggest that diets high in fiber are associated with reduced risk for cancer, especially colon cancer. Fruits, vegetables, and grain products are excellent dietary options because of their fiber content and because they are naturally low in fat. The foods displayed in Figure 8.16 illustrate some of the choices that are associated with cancer prevention.

Vitamins and minerals may also help prevent cancer. Key in this category are carotenoids, vitamins A, C, and E, and calcium. Carotenoids are found in foods such as yellow and orange vegetables and green leafy vegetables. Citrus fruits are a great source of vitamin C, and many dairy products are rich in calcium.

In addition to diet, other healthy choices such as daily exercise and not using tobacco also are known to reduce the risk of cancer.

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**Section Assessment**

**Understanding Main Ideas**

1. Do all cells complete the cell cycle in the same amount of time?
2. Describe how genes control the cell cycle.
3. How can disruption of the cell cycle result in cancer?
4. How does cancer affect normal cell functioning?

**Thinking Critically**

5. What evidence shows that the environment influences the occurrence of cancer?

**Skill Review**

6. **Observing and Inferring** Although breast cancer is more prevalent than lung cancer, more deaths are caused by lung cancer than breast cancer. Using your knowledge of how cancer spreads and factors that influence cancer, provide an explanation for this difference. For more help, refer to Thinking Critically in the Skill Handbook.