Internal and external factors regulate cell division.

If the cell cycle goes out of control, cancer can result. Cancer is uncontrolled cell division. To regulate means “to control.” Regulation of the cell cycle is important for healthy cell growth. Internal means “inside” and external means “outside.” Information from both inside and outside the cell—internal and external factors—help regulate the cell cycle.

**External Factors**

There are external physical and chemical signals that help regulate the cell cycle. For example, a cell that is surrounded by other cells stops dividing. Many cells also release chemical signals that tell other cells to grow. **Growth factors** are proteins that stimulate cell division. If you are bleeding, some of your blood cells release a growth factor to help start the healing process.

**Internal Factors**

External factors bind to a receptor on the cell membrane. This starts a response inside the cell. These internal factors include enzymes and proteins that help a cell move through the cell cycle.

**Apoptosis**

Just as cells need to grow and divide, other cells need to die. Internal or external signals can start an orderly process of cell death. The cell is broken down and its parts are reused in building other molecules. This process of programmed cell death is called **apoptosis** (ap-uhp-TOH-sihs).

**Why is regulation of the cell cycle important?**

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**stimulate** to cause something to happen
Cell division is uncontrolled in cancer.

Cancer is the common name for a group of diseases that involve uncontrolled cell division. Cancer cells keep dividing and form clumps called tumors. A benign tumor is relatively harmless because the cells stay clumped together and it can be removed. A malignant tumor has cancer cells that break away from the tumor. These cells metastasize (mih-TAS-tuh-syz), which means they travel to other parts of the body and can form more tumors. When a cancer metastasizes, it is much harder to get rid of.

Cancer cells come from normal cells that have damaged genes. Substances that are known to cause or lead to cancer are called carcinogens (kah-RIHN-uh-juhnz). Tobacco smoke and certain air pollutants are carcinogens.

What is the difference between a benign tumor and a malignant tumor?

5.3 Vocabulary Check

Choose the correct term from the list for each description.

1. substance that causes cancer ______________
2. programmed cell death ______________
3. a tumor that does not metastasize ______________

5.3 The Big Picture

1. What are two ways that cell division is regulated in healthy cells?

2. What is one main difference between a normal cell and a cancer cell?