REINFORCEMENT UNIT 2 RESOURCE BOOK

CHAPTER 5

Cell Growth and Division

SECTION 5.3
REGULATION OF THE CELL CYCLE

Reinforcement

KEY CONCEPT

Cell cycle regulation is necessary for healthy growth.

The cell cycle is regulated by both external and internal factors. External factors come from outside the cell. These include cell–cell contact, which prevents further growth of normal cells, and chemical signals called growth factors. Growth factors stimulate cells to divide. Most cells respond to a combination of growth factors, not just one. Some growth factors affect many different types of cells. Others specifically affect one cell type. Internal factors come from inside the cell. Very often, an external factor triggers the activation of an internal factor. A cyclin is a type of internal factor. It activates kinases, which in turn, add a phosphate group to other molecules that help drive the cell cycle forward.

Cells not only regulate growth, but also death. Apoptosis is programmed cell death. Apoptosis plays important roles in development and metamorphosis.

When a cell loses control over its cycle of growth and division, cancer may result. Cancer cells can continue to divide despite cell–cell contact or a lack of growth factors. Cancer cells form disorganized clumps of cells called tumors. Benign tumors tend to remain clumped together and may be cured by removal. Malignant tumors have cells that break away, or metastasize, and spread to other parts of the body, forming new tumors. Malignant tumors are more difficult to treat than benign tumors. Radiation therapy and chemotherapy are common treatments for cancer. However, both treatments kill healthy cells as well as cancer cells.

Cancer cells can arise from normal cells that have experienced damage to their genes involved in cell cycle regulation. Damage may arise from inherited errors in genes, from mutations carried by viruses, and from carcinogens. Carcinogens are substances known to produce or promote the development of cancer. These include substances such as tobacco smoke and other air pollutants.

1. List two examples of external factors that influence the cell cycle.

2. What is apoptosis?

3. How does a benign tumor differ from a malignant tumor?

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