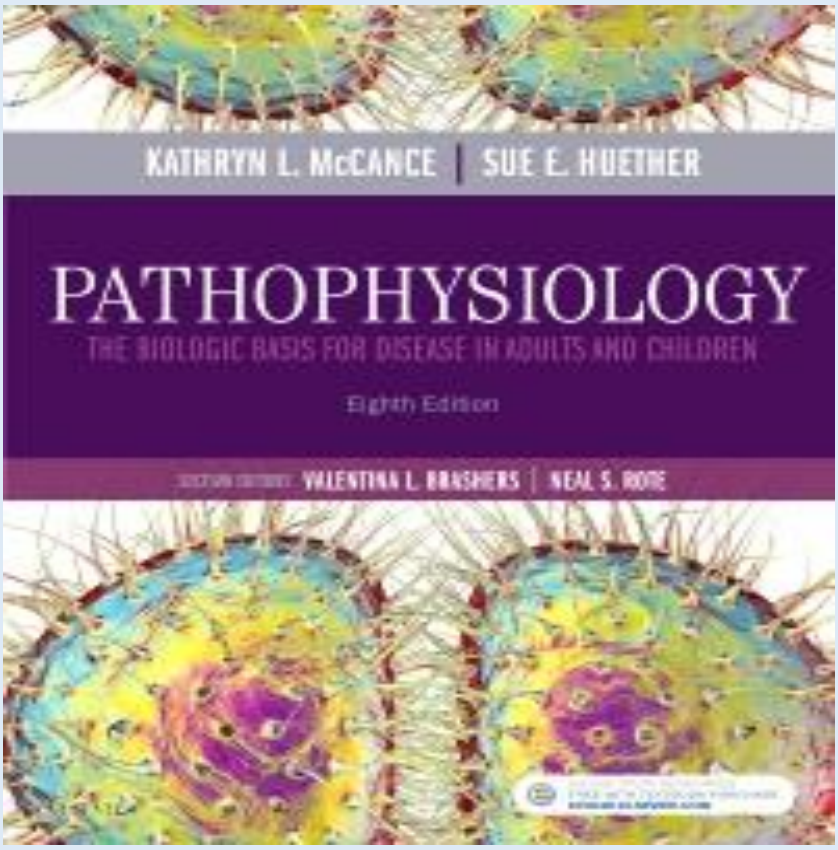
TEST BANK

PATHOPHYSIOLOGY

The Biologic Basis For Disease In Adults And Children

8TH EDITION BY KATHRYN L. MCCANCE



CONTENTS:

Part 1: CENTRAL CONCEPTS OF PATHOPHYSIOLOGY: CELLS AND TISSUES
Unit I: THE CELL

CHAPTER 01: CELLULAR BIOLOGY

MULTIPLE CHOICE

1. Which statement best describes the cellular function of metabolic absorption?
   a. Cells can produce proteins.
   b. Cells can secrete digestive enzymes.
   c. Cells can take in and use nutrients.
   d. Cells can synthesize fats.

   ANS: C
   In metabolic absorption, all cells take in and use nutrients and other substances from their surroundings. The remaining options are not inclusive in their descriptions of cellular metabolic absorption.

   PTS: 1 DIF: Cognitive Level: Remembering

2. Where is most of a cell's genetic information, including RNA and DNA, contained?
   a. Mitochondria
   b. Ribosome
   c. Nucleolus
   d. Lysosome

   ANS: C
   The nucleus contains the ***nucleolus,*** a small dense structure composed largely of RNA, most of the cellular DNA, and the DNA-binding proteins, such as the histones, which regulate its activity. The mitochondria are responsible for cellular respiration and energy production. Ribosomes' chief function is to provide sites for cellular protein synthesis. Lysosomes function as the intracellular digestive system.

   PTS: 1 DIF: Cognitive Level: Remembering

3. Which component of the cell produces hydrogen peroxide (H_2O_2) by using oxygen to remove hydrogen atoms from specific substrates in an oxidative reaction?
   a. Lysosomes
   b. Peroxisomes
   c. Ribosomes
   d. Endosome

   ANS: B

Peroxisomes are so named because they usually contain enzymes that use oxygen to remove hydrogen atoms from specific substrates in an oxidative reaction that produces H_2O_2, which is a powerful oxidant and potentially destructive if it accumulates or escapes from peroxisomes. Ribosomes are RNA-protein complexes (nucleoproteins) that are synthesized in the nucleolus and secreted into the cytoplasm through pores in the nuclear envelope called *nuclear pore complexes*. Lysosomes are saclike structures that originate from the Golgi complex and contain more than 40 digestive enzymes called *hydrolases***,** which catalyze bonds in proteins, lipids, nucleic acids, and carbohydrates. An endosome is a vesical that has been pinched off from the cellular membrane.

PTS: 1 DIF: Cognitive Level: Remembering

4. Which cell component is capable of cellular autodigestion when it is released during cell injury?
   a. Ribosome
   b. Golgi complex
   c. Smooth endoplasmic reticulum
   d. Lysosomes

   ANS: D
   The lysosomal membrane acts as a protective shield between the powerful digestive enzymes within the lysosome and the cytoplasm, preventing their leakage into the cytoplasmic matrix. Disruption of the membrane by various treatments or cellular injury leads to a release of the lysosomal enzymes, which can then react with their specific substrates, causing *cellular self-digestion*. The chief function of a ribosome is to provide sites for cellular protein synthesis. The Golgi complex is a network of flattened, smooth vesicles and membranes often located near the cell nucleus. The smooth endoplasmic reticulum is involved in steroid hormone production and removing toxic substances from the cell.

   PTS: 1 DIF: Cognitive Level: Remembering

5. Which cAMP-mediated response is related to antidiuretic hormone?
   a. Increased heart rate and force of contraction
   b. Secretion of cortisol
   c. Increased retention of water
   d. Breakdown of fat

   ANS: C
   Antidiuretic hormone leads to increased retention of water in the body. Epinephrine causes increases in heart rate and force of contraction. Increased cortisol secretion is due to ACTH. Breakdown of fat is due to glucagon.

   PTS: 1 DIF: Cognitive Level: Remembering

6. During which phase of the cell cycle is DNA synthesized?
   a. G_1
   b. S
   c. G_2
   d. M

ANS: B
The four designated phases of the cell cycle are: (1) the G_1 phase (G = gap), which is the period between the M phase (M = mitosis) and the start of DNA synthesis; (2) the S phase (S = synthesis), during which DNA is synthesized in the cell nucleus; (3) the G_2 phase, during which RNA and protein synthesis occurs, the period between the completion of DNA synthesis and the next phase (M); and (4) the M phase, which includes nuclear and cytoplasmic division.

PTS: 1 DIF: Cognitive Level: Remembering

7. What organic compound facilitates transportation across cell membranes by acting as receptors, transport channels for electrolytes, and enzymes to drive active pumps?
   a. Lipids
   b. Proteases
   c. Proteins
   d. Carbohydrates

   ANS: C
   Proteins have several functions, including acting as receptors, transport channels for electrolytes, and enzymes to drive active pumps Lipids help act as the "glue" holding cell membranes together. Proteases cause the breakdown of protein. Carbohydrates are involved in cellular protection and lubrication and help produce energy via oxidative phosphorylation.

   PTS: 1 DIF: Cognitive Level: Remembering

8. Understanding the various steps of proteolytic cascades may be useful in designing drug therapy for which human diseases?
   a. Cardiac and vascular disorders
   b. Autoimmune and malignant disorders
   c. Gastrointestinal and renal disorders
   d. Endocrine and gastrointestinal disorders

   ANS: B
   Understanding the various steps involved in this process is crucial for designing drug interventions. Dysregulation of proteases features prominently in many human diseases, including cancer, autoimmunity, and neurodegenerative disorders. Cardiac, vascular, gastrointestinal, renal, and endocrine disorders do not involve this process.

   PTS: 1 DIF: Cognitive Level: Remembering

9. Which structure prevents water-soluble molecules from entering cells across the plasma membrane?
   a. Carbohydrate chains
   b. Glycoprotein channels
   c. Membrane channel proteins
   d. Lipid bilayer

   ANS: D

The bilayer's structure accounts for one of the essential functions of the plasma membrane. It is impermeable to most water-soluble molecules (molecules that dissolve in water) because the water-soluble molecules are insoluble in the oily core region. The bilayer serves as a barrier to the diffusion of water and hydrophilic substances while allowing lipid-soluble molecules, such as oxygen (O_2) and carbon dioxide (CO_2), to diffuse through it readily. Carbohydrate chains, glycoprotein channels, and membrane channel proteins do not prevent water-soluble molecules from entering cells across the cell membrane.

PTS: 1 DIF: Cognitive Level: Remembering

10. A student asks for an explanation of the absolute refractory period of the action potential. What response by the professor is best?
    a. A stronger than normal impulse will evoke another response.
    b. No stimulus is able to evoke another response at this time.
    c. Multiple stimuli can produce more rapid action potentials.
    d. The hyperpolarized state means a weaker stimulus produces a response.

    ANS: B
    During the absolute refractory state of the action potential, no stimulus is able to evoke another response from the cell. A stronger than normal impulse may generate a response in the relative refractory period. This period of time is not related to the number of stimuli. A hyperpolarized state means a stronger than normal stimulus would be needed to generate a response.

    PTS: 1 DIF: Cognitive Level: Remembering

11. Which form of cell communication is used to communicate within the cell itself and with other cells in direct physical contact?
    a. Protein channel (gap junction)
    b. Plasma membrane-bound signaling molecules
    c. Hormone secretion such as neurotransmitters
    d. Extracellular chemical messengers such as ligands

    ANS: B
    Cells communicate in three main ways; they display plasma membrane-bound signaling molecules that affect the cell itself and other cells in direct physical contact with it, they affect receptor proteins inside the target cell, and they form protein channels (gap junctions) that directly coordinate the activities of adjacent cells. Neurotransmitters are released by neurons and cross the synaptic cleft to communicate with the cells they innervate. Ligands are involved in binding processes.

    PTS: 1 DIF: Cognitive Level: Remembering

12. Which mode of chemical signaling uses blood to transport communication to cells some distance away?
    a. Paracrine
    b. Autocrine
    c. Neurotransmitter
    d. Hormonal

ANS: D
Chemical signaling can be classified into three categories: (1) local-chemical mediator, (2) hormone, and (3) neurotransmitter. Hormones are released by one set of cells and travel through tissues or the bloodstream to another set of cells where they produce a response by those cells. In paracrine signaling, cells secrete local chemical mediators that are quickly absorbed, destroyed, or immobilized. Paracrine signaling requires close membrane-to-membrane contact. Paracrine signaling usually involves different cell types; however, cells also may produce signals that they, themselves, respond to, which is called autocrine signaling. Neurotransmitters are released by neurons and cross the synaptic cleft to communicate with the cells they innervate.

PTS: 1 DIF: Cognitive Level: Remembering

13. Which mode of chemical signaling uses local chemical mediators that are quickly taken up, destroyed, or immobilized?
    a. Paracrine
    b. Autocrine
    c. Neurotransmitter
    d. Hormone

ANS: A
In paracrine signaling**,** cells secrete local chemical mediators that are quickly taken up, destroyed, or immobilized. Autocrine signaling occurs when the target cells produce signals that they themselves respond to. Neurotransmitters are released by neurons and cross the synaptic cleft to communicate with the cells they innervate. Hormones are released by one set of cells and travel through tissues or the bloodstream to another set of cells where they produce a response by those cells.

PTS: 1 DIF: Cognitive Level: Remembering

14. Neurotransmitters affect the postsynaptic membrane by binding to which structure?
    a. Lipids
    b. Ribosomes
    c. Amphipathic lipids
    d. Receptors

ANS: D
In each type of chemical signaling, the target cell receives the signal by first attaching to its receptors. The other options do not correctly describe this process.

PTS: 1 DIF: Cognitive Level: Remembering

15. How do cells receive communication from the extracellular fluid surrounding them?
    a. Protein channel (gap junction)
    b. Plasma membrane-bound signaling molecules (involving receptors)
    c. Hormone secretion such as neurotransmitters
    d. Chemical messengers such as ligands

ANS: D