

PATHO

PHYSIOLOGY

9TH

EDITION

MCCANCE

TEST BANK

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Chapter 1: Cellular Biology

MULTIPLE CHOICE

1. 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?
- Lysosomes
 - Peroxisomes**
 - Ribosomes
 - Oxyhydrosomes

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 sac-like 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. Oxyhydrosomes are involved in enzyme production.

PTS: 1 REF: Page 8

2. Which statement best describes the cellular function of metabolic absorption?
- Cells can produce proteins.
 - Cells can secrete digestive enzymes.
 - Cells can take in and use nutrients.**
 - 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 REF: Page 2

3. Most of a cell's genetic information, including RNA and DNA, is contained in the:
- Mitochondria
 - Ribosome
 - Nucleolus**
 - 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 other options do not contain most of a cell's genetic information.

PTS: 1 REF: Page 2

4. Which cell component is capable of cellular autodigestion when it is released during cell injury?
- Ribosome
 - Golgi complex
 - Smooth endoplasmic reticulum
 - 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 other options do not correctly describe this process.

PTS: 1 REF: Pages 7-8

5. What is the sequence of steps in the development of a digestive enzyme by the pancreas cells from the initial transcription to the release from the cell?
- The enzyme is transcribed from DNA by RNA in the nucleus, proceeds to the ribosome for synthesis, and is transported in a secretory vesicle to the cell membrane.
 - The enzyme is transcribed from RNA by DNA in the nucleus, proceeds to the lysosome for synthesis, and is transported in an encapsulated membrane to the cell membrane.
 - The enzyme is transcribed by the mitochondria in the nucleus, proceeds to the ribosome for synthesis, and is transported in a cytoskeleton to the cell membrane.
 - The enzyme is transcribed from DNA by RNA in the nucleus, proceeds to the Golgi complex for synthesis, and is transported in a cytosol to the cell membrane.

ANS: A

The enzyme is transcribed from DNA by RNA in the nucleus, proceeds to the ribosome for synthesis, and is transported in a secretory vesicle to the cell membrane. The other options do not correctly describe this process.

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PTS: 1 REF: Page 7 | Figure 1-5

6. During which phase of the cell cycle is DNA synthesized?
- G₁
 - S
 - G₂
 - M

ANS: B

The four designated phases of the cell cycle are: (1) the G₁ 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 G₂ 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 REF: Page 37

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

ANS: C

Proteins act as (1) recognition and binding units (receptors) for substances moving in and out of the cell; (2) pores or transport channels for various electrically charged particles called *ions* or *electrolytes* and specific carriers for amino acids and monosaccharides; and (3) specific enzymes that drive active pumps that promote the concentration of certain ions, particularly potassium (K^+), within the cell while keeping concentrations of other ions, for example, sodium (Na^+), below the concentrations found in the extracellular environment. The other options do not correctly describe this process.

PTS: 1

REF: Page 13 | Page 15

8. Understanding the various steps of proteolytic cascades, such as caspase-mediated apoptosis and complement cascades, may be useful in designing drug therapy for which human diseases?
- Cardiac and vascular disorders
 - Autoimmune and malignant disorders
 - Gastrointestinal and renal disorders
 - 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. The other options do not correctly describe this process.

PTS: 1

REF: Page 15

9. Which structure prevents water-soluble molecules from entering cells across the plasma membrane?
- NURSINGTB.COM
- Carbohydrate chains
 - Glycoprotein channels
 - Membrane channel proteins
 - 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. The other options do not correctly describe this process.

PTS: 1

REF: Pages 12-13

10. The fluid mosaic model explains:
- How a cell membrane functions
 - Why our bodies appear to be solid
 - How tissue is differentiated
 - How fluid moves between the intracellular and extracellular compartments

ANS: A

The fluid mosaic model accounts for the flexibility of cellular membranes, their self-sealing properties, and their impermeability to many substances. The remaining options do not explain the mosaic model.