

Pollard: Cell Biology, 2nd Edition

Test Bank

Chapter 1: Introduction to Cells

MULTIPLE CHOICE

1. Which statement is NOT true of the prokaryotic cell?
 - a. DNA is circular.
 - b. It is enclosed by plasma membrane.
 - c. It lacks a cytoskeletal support structure.
 - d. Contains many organelles.

ANS: D

Presence of organelles is a distinguishing feature of eukaryotic cells.

2. Plasma membranes expand by
 - a. *de novo* synthesis.
 - b. endocytosis of bacterial membranes.
 - c. budding of endoplasmic reticulum
 - d. Do not expand over the lifetime of the cell.

ANS: C

Membranes grow only by expansion of preexisting membranes, usually endoplasmic reticulum not directly, pass through Golgi first.

3. The sequence of amino acids in a protein determines its
 - a. Location in the cell.
 - b. Function.
 - c. Transcription.
 - d. None of the above.

ANS: A

Improperly folded proteins lack biological function.

4. Genetic information
 - a. is encoded only in eukaryotic cells.
 - b. is stored in long polymers of DNA.
 - c. is stored in messenger RNA molecules.
 - d. None of the above.

ANS: B

DNA, a basic carrier of genetic information, is a linear molecule composed of complementary nucleotides. Both prokaryotes and eukaryotes use DNA as hereditary information.

5. The pairing between complementary nucleotide bases in DNA is stabilized by

- a. peptide bonds.
- b. cytosine bonds.
- c. noncovalent bonds.
- d. disulfide bonds.

ANS: C

Specific noncovalent bonds stabilize the complementary bases and form a double helix.

6. Subcellular localization of the protein is determined by
- a. signal sequences within protein sequence.
 - b. signal sequences in the mitochondria.
 - c. phospholipid synthesis.
 - d. electrochemical gradients.

ANS: A

Signal recognition sequences that are integral part of the polypeptide sequence direct the protein to the proper destination.

7. ATP
- a. is a common energy “currency” used both by prokaryotes and eukaryotes.
 - b. can be used to power molecular motors.
 - c. is a nucleotide used in the assembly of RNA and DNA.
 - d. All of the above.

ANS: D

Molecular motor proteins require energy to move their cargo. The energy is delivered from the universal source, ATP both in prokaryotes and eukaryotes.

8. The cytoskeleton
- a. is a common feature of all cells.
 - b. acts as tracks for cellular motors.
 - c. is necessary for protein targeting.
 - d. None of the above.

ANS: B

9. Activation of cell surface receptors can
- a. change cell metabolism.
 - b. affect gene transcription.
 - c. cause the cell to die.
 - d. All of the above.

ANS: D

Activation of cell receptors allows cells to perceive environmental conditions and adapt their behavior to those conditions.

10. Signal transduction mechanisms
- a. are activated by stimulation of the receptor molecules on the cell surface.
 - b. conserved through phylogenesis.

- c. transmit an environmental signal to intracellular effector molecules.
- d. All of the above.

ANS: D

Many of the signal transduction systems are very ancient, although some of them have arisen later in evolution. Their main role is to relay an extracellular signal to a specific effector molecule to allow the cell to adjust its behavior to environmental signal.

11. The nucleus
- a. contains hereditary information submerged in the nucleoplasm.
 - b. is separated from the cytoplasm by a nuclear envelope in eucaryotic cells.
 - c. is metabolically isolated from the cytoplasm by the double membrane.
 - d. Only a and b.

ANS: D

The nucleus is an organelle that contains hereditary information in the form of chromosomes. It is separated from the cytoplasm by a double membrane but not isolated from it. Many proteins and nucleic acids cross the nuclear membrane through nuclear pores.

12. Nuclear pores allow transport of which of the following molecules?
- a. proteins
 - b. DNA
 - c. RNA
 - d. All of the above.

ANS: C

Nuclear pores are selective filters for transport between cytoplasm and inside of the nucleus. Transported molecules include mRNA, ribosomal subunits, and proteins such as DNA polymerase.

13. The endoplasmic reticulum
- a. is a site of phospholipid synthesis.
 - b. is continuous with the nuclear envelope.
 - c. regulates cytoplasmic Ca^{2+} concentration.
 - d. All of the above.

ANS: D

Endoplasmic reticulum is a membranous structure for protein and phospholipid synthesis. It is network of interconnected closed membrane spaces that are continuous with the outer membrane of nuclear envelope. In addition it contains a variety of pumps and channels that allow to control cytoplasmic Ca^{2+} concentration.

14. The rough endoplasmic reticulum is a primary place of
- a. phospholipid synthesis.
 - b. protein synthesis.
 - c. fatty acid synthesis.
 - d. a and b.

ANS: D

Ribosomes on the surface of the rough ER are the site of synthesis of secretory and membrane proteins.

15. Which statement about Golgi apparatus is INCORRECT?

- a. It forms a delivery system of the cell.
- b. It is a site of posttranslational protein modifications.
- c. It is a site of protein synthesis.
- d. It contains different sets of modifying enzymes.

ANS: C

The Golgi apparatus is the “delivery system” of the cell. It processes, packages, and distributes molecules synthesized in the ER

16. Posttranslational modifications of sugar side chains take place

- a. In the cytoplasm
- b. In the ER
- c. In the Golgi apparatus
- d. All of the above

ANS: C

After synthesis in the ER, proteins are sorted to Golgi apparatus where the enzymes for the modification of sugar side chains in glycoproteins are located.

17. Lysosomes

- a. are a site sorting of secretory proteins.
- b. contain acid hydrolases that carry out the degradation of “worn” cell components.
- c. arise by budding from the endoplasmic reticulum.
- d. All of the above.

ANS: B

Lysosomes contain acid hydrolases that carry out the degradation of “worn” cell components.

18. Mitochondria

- a. are the site of oxidative phosphorylation in the cell.
- b. are enclosed by a double membrane.
- c. contain ribosomes upon which some of the mitochondrial proteins are synthesized.
- d. All of the above.

ANS: D

Mitochondria are the double membrane organelles that are the place of oxidative metabolism and ATP production.

19. Oxidation of fatty acids occurs in

- a. lysosomes.
- b. peroxisomes.
- c. Golgi apparatus.
- d. None of the above.

ANS: B

Peroxisomes are the second organelle (in addition to mitochondria) that can oxidize fatty acids.

20. Which functions are NOT attributed to intermediate filaments?
- a. They support cell locomotion.
 - b. They support the plasma membrane.
 - c. They reinforce the nuclear envelope.
 - d. They integrate cells into tissues.

ANS: A

Intermediate filaments reinforce cell structures and by interactions with cell adhesion molecules integrate cells into tissues but unlike actin and microtubules do not serve as tracks for cellular motors.

21. A function of cell membrane proteins is
- a. reception of signals from the extracellular environment.
 - b. functional connection with other cells.
 - c. generate a permeability barrier.
 - d. a and b only.

ANS: D

Cell membrane separates the interior of the cell from the extracellular environment. At the same time the cell membrane is a place of communication and selective transport from the outside. Membrane lipids are responsible for the permeability barrier function of the p.m.

22. Which of the following organelles is enclosed by a double membrane?
- a. Endoplasmic reticulum
 - b. Mitochondrion
 - c. Lysosome
 - d. Peroxisome

ANS: B

Mitochondria have double membrane that allows them to create proton gradient and use it in ATP synthesis.

23. Which of the following components are not found in prokaryotes?
- a. Nucleic acids
 - b. Phospholipid bilayers
 - c. Ribosomes
 - d. Actin fibers

ANS: D

Cytoskeleton is a specific feature of eukaryotic cells not present in prokaryotes.