

3

Cytology

Answers and Explanations

I. Introduction to Cellular Anatomy

A. Multiple Choice Questions

1. (c) – Hooke actually coined the term *cell*, meaning “small room.”
2. (d) – According to the cell theory, living organisms are composed of basic structural and functional units called cells.
3. (a) – Only the ovum produced by the female ovary is macroscopic.
4. (a) – Neurons are the functional cells of the nervous system in responding to stimuli and transmitting nerve impulses.

B. True–False Questions

1. True – Proper cellular metabolism is necessary to maintain body homeostasis.
2. True – Because cells and tissues are microscopic, both cytological and histological studies require the use of a microscope.
3. False – Etiology is the study of how diseases develop and progress.
4. False – There are perhaps only a few hundred specific types of cells within the body.

II. Cellular Chemistry

A. Multiple Choice Questions

1. (b) – Four elements compose 95% of the body: O–65%, C–18%, H–10%, and N–3%.
2. (d) – Water is an inorganic compound, not an organic compound.
3. (b) – The prefix *hydro-* means “water,” and the suffix *-lysis* means “dissolution.”
4. (b) – Carbohydrates are organic compounds with a 2:1 ratio of hydrogen to oxygen.

B. True–False Questions

1. True – Water is a solvent and is the most common inorganic compound within the body.
2. False – Hormones are specialized proteins.
3. True – The danger in protein utilization as a source of energy is that certain proteins are difficult, or even possible, to replace.
4. False – Fats play an important role in insulating, protecting, and supporting certain body organs.

III. Cellular Structure

A. Multiple Choice Questions

1. (c) – Chromoplasm is a contrived term.
2. (c) – Molecular motion is the energy source for diffusion; an example is the movement of respiratory gases in the lungs.
3. (b) – Blood pressure creates hydrostatic pressure necessary for the filtration of blood within the kidneys.
4. (c) – The cell membrane barrier to molecular movement is not affected by the speed of molecular movement.
5. (a) – It is through contact of the cell membranes with the lumen of the GI tract that absorption occurs in the digestion process.
6. (a) – Hair cells are sensitive extensions of sensory neurons.
7. (d) – Nucleoplasm is the protoplasm within the confines of the nuclear membrane and cytoplasm is the protoplasm within the confines of the cell membrane; outside the nucleus.
8. (b) – Ribosomes synthesize proteins from amino acids.

9. (d) – In the production of cellular energy, mitochondria have been called the “powerhouses” of the cell.
10. (b) – The enzymes produced by lysosomes are important in ridding the body of unwanted materials.

B. True–False Questions

1. True – The cell membrane is selectively permeable both ways—in and out of a cell.
2. True – Although they are passive processes, molecular energy is required in both diffusion and osmosis.
3. False – Microvilli extend into the lumen of the GI tract, not into ducts of the body.
4. True – It is through the process of exocytosis that cellular products are made available to the bloodstream, where they are transported to other body sites.
5. False – Small droplets of fluid are obtained by the cell through the process of pinocytosis.
6. False – Goblet cells secrete a lubricating mucus.
7. True – The flagellum of a spermatozoon permits locomotion.
8. False – The perinuclear cisterna is the narrow space between the two walls of the nuclear membrane.
9. True – Once produced, ribosomes may become attached to an endoplasmic reticulum; thereafter, the organelle is known as a rough endoplasmic reticulum (rough ER).
10. False – Chromatin is a coiled, threadlike mass of genetic material. As a cell begins to divide, the chromatin shortens and thickens into rod-shaped chromosomes.

IV. The Cell Cycle

A. Multiple Choice Questions

1. (b) – The double-helix shape of a DNA molecule matches the appropriate nucleotides.
2. (c) – The four types of nitrogenous bases in a DNA molecule are adenine, thymine, cytosine, and guanine.
3. (a) – The S phase occurs during the middle of the interphase period.
4. (a) – Since the cytoplasm does not contain chromosomes to be divided, division of the cytoplasm is referred to as cytokinesis.
5. (d) – Precise events occur sequentially during each stage of mitosis.

B. True–False Questions

1. True – Most of the cells that are mitotically replaced are recycled by the body in various ways.
2. True – This ensures the consistency of the diploid condition.
3. False – The rungs of a DNA molecule are composed of nucleotides.
4. False – Adenine always pairs with thymine, and cytosine always pairs with guanine.

C. Matching Questions

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| 1. (a) | 4. (d) |
| 2. (e) | 5. (b) |
| 3. (c) | |

V. Clinical Considerations

A. Multiple Choice Questions

1. (b) – Compensatory hypertrophy underscores the effectiveness of cellular adaptability.
2. (b) – Metaplasia is a specialized cellular change in which one type of cell transforms into another.
3. (a) – Abnormal accumulation of glycogen or lipids within particular cells is a symptom of Tay–Sachs disease or of Gaucher’s disease.
4. (d) – Cancerous cells divide more rapidly than normal cells and seemingly are more resistant to death.

B. True–False Questions

1. True – It is from the toxins contained in the metabolic wastes from bacteria that white blood cells are directed to the site of infection.
2. True – However, the mechanism by which a mutation results in cancer is unknown.
3. True – Embryos with monosomy generally die.
4. False – Carcinogens are not cancers; rather, they are cancer-causing agents.

VI. Chapter Review

A. Completion Questions

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|-----------------|----------------------------|
| 1. cell theory | 6. nuclear membrane |
| 2. cytoskeleton | 7. Lipids (fats) |
| 3. Proteins | 8. Centrosomes |
| 4. pinocytosis | 9. hyperplasia/hypertrophy |
| 5. autophagy | 10. DNA |

B. Matching Questions

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|-----------|------------|
| 1. E, (e) | 6. F, (b) |
| 2. B, (g) | 7. I, (d) |
| 3. H, (j) | 8. A, (f) |
| 4. J, (c) | 9. D, (h) |
| 5. G, (a) | 10. C, (i) |