

Ovalle: Netter's Essential Histology, 3rd Edition

Chapter 1: The Cell

Test Bank

MULTIPLE CHOICE

1. Rough endoplasmic reticulum (RER) in the cell cytoplasm is intensely stained by hematoxylin because hematoxylin:
 - a. Attaches to lipids in RER membranes
 - b. Binds readily to RNA
 - c. Catalyzes the precipitation of ribosomes into a dense, readily stained matrix
 - d. Is an acid dye and binds to acidophilic ribosomal proteins
 - e. Reacts with carbohydrate molecules of integral membrane proteins

ANS: B

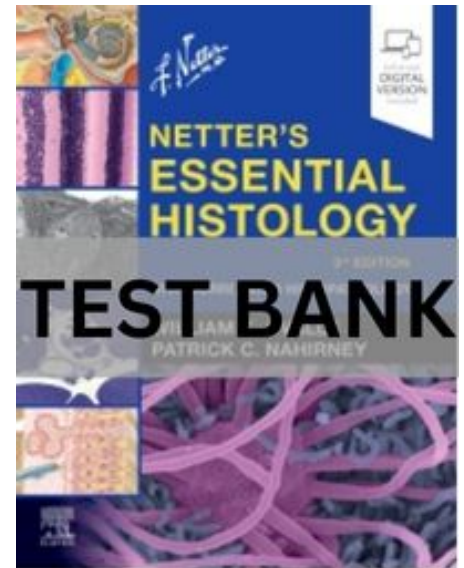
The metal ions associated with hematoxylin impart a positive charge to the dye, which enables it to bind to negatively charged molecules like acids (e.g., ribonucleic acid). See 1-1.

2. Staining a specimen using immunocytochemical methods detects the presence of:
 - a. Lipids with multiple double bonds between carbon atoms
 - b. Organelles with an above average optical density
 - c. Specific types of carbohydrates
 - d. Specific proteins
 - e. Specific sequences of RNA

ANS: D

Antibodies are typically used to bind to specific proteins; specific sequences of RNA are detected by in situ hybridization histochemical techniques. See 1-23.

3. Desmin is an intermediate filament protein that is specifically localized in:



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- a. Astrocytes
- b. Cardiac muscle
- c. Lymphocytes
- d. Macrophages
- e. Simple cuboidal epithelial cells

ANS: B

Cells in each of the four classes of tissue produce intermediate filaments specific for that class of cells; desmin is the intermediate filament specific for muscle. See 1-24.

4. Numerous mitochondria possessing unusual tubular cristae are a distinguishing anatomic feature of:
- a. Exocrine pancreatic acinar cells
 - b. Nerve cells of the cerebral cortex
 - c. Pancreatic islet cells
 - d. Skeletal muscle cells
 - e. Steroid-secreting cells in the adrenal cortex

ANS: E

Mitochondria possess enzymes required for critical steps in steroid synthesis; why these enzymes are associated with tubular cristae is not yet known. See 1-12.

5. Tay-Sachs disease results from abnormalities in:
- a. Keratin
 - b. Lysosomes
 - c. Microtubules
 - d. Mitochondria
 - e. Rough endoplasmic reticulum

ANS: B

Tay-Sachs disease results from a deficiency of lysosomal hexosaminidase, leading to an accumulation of gangliosides within cells. See 1-18.

6. Claudin is a protein that is functionally important in:

- a. Gap junctions
- b. Hemidesmosomes
- c. Intermediate junctions
- d. Synapses
- e. Tight junctions

ANS: E

Claudin is essential for the formation of membrane fusions in tight junctions. See 1-5.

7. A function of the Golgi complex includes:

- a. Degradation of abnormal proteins
- b. Destruction of hydrogen peroxide
- c. Glycosylation of proteins
- d. Storage of calcium
- e. Translation of messenger RNA

ANS: C

Golgi stacks are the site of O-linked glycosylation of proteins and for the addition of carbohydrate molecules such as sialic acid. See 1-17.

8. Lipofuscin is a brownish pigment that may accumulate in:

- a. Lipid droplets
- b. Lysosomes
- c. Mitochondria
- d. Smooth endoplasmic reticulum
- e. The cell nucleus

ANS: B

Lipofuscin represents the indigestible remnants of structures hydrolyzed in lysosomes. See 1-18.

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Chapter 2: Epithelium and Exocrine Glands

Test Bank

MULTIPLE CHOICE

1. Goblet cells are typically found in which type of epithelium?
 - a. Pseudostratified columnar
 - b. Simple cuboidal
 - c. Simple squamous
 - d. Stratified squamous
 - e. Transitional

ANS: A

Tall, columnar mucus-secreting goblet cells are found only in association with other columnar epithelial cells and differentiate under the influence of a protein called Math-1 that is produced within this type of epithelium. See 2-6.

2. A serous demilune is defined as a(n):
 - a. A collection of secretory acini that drain into a single duct
 - b. An association of secretory vesicles at the apical surface of an epithelial cell
 - c. A bright-staining segment of a basal lamina beneath glandular epithelial cells
 - d. A collection of serous cells adjacent to mucus cells of a salivary gland
 - e. Simple cuboidal cells that constitute the duct portions of salivary glands

ANS: D

Swelling of mucus cells within a salivary gland during fixation of the tissue tends to compress adjacent serous cells into a half-moon shaped "cap" at the end of a mixed secretory acinus. See 2-16.

3. A major protein component of the basal lamina of an epithelium is:

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- a. Heparin
- b. Keratin
- c. Tubulin
- d. Type II collagen
- e. Type IV collagen

ANS: E

Type II collagen is found only in cartilage, whereas type IV collagen is found in all basal laminae. Keratin and tubulin are intracellular and not extracellular proteins. See 2-12.

4. Casein is a major protein produced by cells in:

- a. Eccrine sweat glands
- b. Mammary glands
- c. Mucus-type salivary acini
- d. Serous-type salivary acini
- e. The exocrine pancreas

ANS: B

Casein is a protein found only in milk. See 2-19.

5. A simple squamous epithelium is specialized for:

- a. Adaptation to rapid changes in the volume of a hollow organ
- b. Diffusion of molecules between a lumen and underlying connective tissue
- c. Movement of mucus within the respiratory system
- d. Protection of underlying connective tissue from abrasion or desiccation
- e. Secretion of proteins into a lumen

ANS: B

The thin cytoplasm of flat, simple squamous cells enhances the diffusion of molecules across this epithelium. See 2-2.

6. A stratified cuboidal epithelium is found in which location?

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- a. Eccrine sweat glands
- b. Lining blood vessels
- c. Lining the trachea
- d. Lining the urinary bladder
- e. Surface of the skin

ANS: A

The epithelium surrounding sweat glands is a mixture of myoepithelial cells and cuboidal cells that form a stratified cuboidal epithelium. See 2-9.

7. In certain epithelial cells, the plasma membrane has a scalloped contour and contains many rigid membranous plaques. In which type of epithelium can such cells be found?
- a. Simple cuboidal epithelium
 - b. Simple columnar epithelium
 - c. Simple squamous epithelium
 - d. Stratified squamous epithelium
 - e. Transitional epithelium

ANS: E

In transitional epithelium, the superficial cells must drastically flatten out when the urinary bladder fills with urine and increases its volume. These cells must suddenly acquire extra plasma membrane to accommodate this change in cell shape. Extra membrane is added in the form of plaques that otherwise are stored in the cytoplasm in vesicles, which have the ability to fuse to the plasma membrane. See 2-11.

8. A brush border of microvilli, specialized for the active transport of small molecules across transporter proteins in the cell membrane, is typically found in which type of epithelium?
- a. Pseudostratified columnar epithelium
 - b. Simple columnar epithelium
 - c. Simple squamous epithelium
 - d. Stratified squamous epithelium
 - e. Transitional epithelium

ANS: B

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Simple columnar epithelial cells, e.g., in the intestine or gallbladder, frequently possess a brush border of microvilli that enhances active absorption of molecules from the lumen. See 2-5.

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Chapter 3: Connective Tissue

Test Bank

MULTIPLE CHOICE

1. Heat generation via nonshivering thermogenesis is accomplished by cells in which tissue?
 - a. Brown adipose tissue
 - b. Liver
 - c. Skeletal muscle
 - d. Smooth muscle
 - e. White adipose tissue

ANS: A

The abundant mitochondria in brown fat cells metabolize fat within multiple lipid droplets in an inefficient manner, involving a protein called uncoupling protein that channels protons into the matrix of a mitochondrion without producing adenosine triphosphate. The energy produced via this pathway appears as heat. See 3-18.

2. A dysfunction of receptors for the protein hormone, leptin, can provoke:
 - a. Excessive phagocytosis by tissue macrophages
 - b. Immunoglobulin deficiency
 - c. Impaired synthesis of collagen
 - d. Obesity
 - e. Septic shock

ANS: D

The fat cell hormone, leptin, binds to receptors in the hypothalamus to regulate feeding and obesity. In its absence, as occurs in genetically obese mice, the hypothalamus does not restrain appetite and the excess of ingested calories is stored as fat. See 3-17.

3. Mature molecules of tropocollagen are found in the:
- a. Cisternae of the rough endoplasmic reticulum of a fibroblast
 - b. Extracellular environment of a fibroblast
 - c. Golgi apparatus of a plasma cell
 - d. Secretory vesicles of a fibroblast
 - e. Smooth endoplasmic reticulum of a macrophage

ANS: B

Tropocollagen molecules, which have the ability to spontaneously self-assemble into large collagen fibers, are only formed by proteolytic cleavage of procollagen when secreted outside of the cell. Otherwise, they would assemble within a cell and expand to completely disrupt the cell. See 3-6.

4. In adipose tissue, lipoprotein lipase:
- a. Forms triacylglycerol from circulating free fatty acids and glycerol
 - b. Is activated in response to norepinephrine released from synapses upon fat cells
 - c. Is synthesized by fat cells and delivered to capillary endothelial cells
 - d. Signals fat cells to form endocytic vesicles for the ingestion of fat
 - e. Travels from fat depots to the hypothalamus and functions as a signal of adiposity

ANS: C

Transfer of this enzyme from fat cells to capillaries allows the cleavage of blood-borne triacylglycerides into molecules (glycerol, fatty acids) that are more easily absorbed into fat cells. See 3-17.

5. Which connective tissue cell possesses a large, euchromatic, irregular (ovoid) nucleus?
- a. Brown fat cell
 - b. Fibroblast
 - c. Lymphocyte
 - d. Macrophage
 - e. Mast cell

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ANS: D

All of the cell types in this question have small, round nuclei, except for fibroblasts, which possess spindle-shaped nuclei. See 3-15.

6. The cytoplasmic granules of mast cells stain intensely with toluidine blue. This is because of the contents of these granules, which contain:
- a. Acid hydrolyases
 - b. Histamine and proteoglycans
 - c. Lipid
 - d. Matrix granules
 - e. Ribosomes

ANS: B

The negatively charged proteoglycans of mast cells avidly bind toluidine blue. See 3-10.

7. Reticular fibers of connective tissue are composed of:
- a. Type I collagen
 - b. Type II collagen
 - c. Type III collagen
 - d. Type IV collagen
 - e. Type VII collagen

ANS: C

Collagens types II and IV are restricted to cartilage and basal laminae, respectively. Type I collagen forms large, coarse fibers, whereas type III collagen forms thin reticular fibers that are intensely stained by silver stains. See 3-7.

8. Which connective tissue cell possesses a dark-staining, round nucleus, a large, basophilic cytoplasm, and an abundant Golgi apparatus?
- a. Brown fat cell
 - b. Fibroblast
 - c. Lymphocyte
 - d. Macrophage

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- e. Plasma cell

ANS: E

The cytoplasm of plasma cells, with extensive rough endoplasmic reticulum and Golgi stacks, is specialized for the secretion of immunoglobulin molecules. See 3-13.

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Chapter 4: Muscle Tissue

Test Bank

MULTIPLE CHOICE

1. The stem cells of muscle, which multiply and differentiate into muscle fibers to repair damaged muscle, are called:
 - a. Intercalated cells
 - b. Myoepithelial cells
 - c. Pericytes
 - d. Satellite cells
 - e. Schwann cells

ANS: D

After muscle is damaged, macrophages infiltrate into muscle to phagocytize debris and also secrete proteins that stimulate the differentiation of satellite cells that form new muscle fibers. See 4-14.

2. Nervous stimulation of skeletal muscle results in a wave of depolarization along the plasma membrane. This electrical signal is carried into the interior of the muscle cell via the membranes of the:
 - a. Intercalated disks
 - b. Nuclear envelope
 - c. Sarcomere
 - d. Sarcoplasmic reticulum
 - e. T-tubules