Histology Sample Items

1. An oophorectomized monkey is treated with high doses of estrogen. Which of the following changes is most likely to occur in the endometrium after 1 year of treatment?

   (A) Atrophy
   (B) Hyperplasia
   (C) Hypertrophy
   (D) Hypoplasia
   (E) Metaplasia

2. Which of the following muscle cell components helps spread the depolarization of the muscle cell membranes throughout the interior of muscle cells?

   (A) Actin
   (B) Myosin
   (C) T tubule
   (D) Tropomyosin
   (E) Troponin
   (F) Z disk

3. A new drug is developed that prevents the demyelinization occurring in the progress of multiple sclerosis. The drug protects the cells responsible for the synthesis and maintenance of myelin in the central nervous system. These cells are most likely which of the following?

   (A) Astrocyte
   (B) Ependymal cell
   (C) Microglial cell
   (D) Oligodendrocyte
   (E) Schwann cell

4. A 10-year-old boy undergoes an appendectomy. Granulation tissue develops normally at the incision site. Tissue remodeling begins at this site with degradation of collagen in the extracellular matrix by which of the following proteins?

   (A) Cytokines
   (B) Lipoxygenases
   (C) Metalloproteinase
   (D) Nitric oxide
   (E) Plasminogen activator

5. In which of the following nuclear structures is DNA actively transcribed to rRNA?

   (A) Envelope
   (B) Lamina
   (C) Matrix
   (D) Nucleolus
   (E) Pore

6. A 22-year-old man is brought to the emergency department in respiratory distress 15 minutes after he was stung on the arm by a wasp. His pulse is 100/min, respirations are 30/min, and blood pressure is 100/60 mm Hg. Physical examination shows grunting respirations and subcostal retractions. Expiratory wheezes are heard over both lung fields. There is generalized urticaria. Secretion of the molecule causing this patient's symptoms is most likely mediated by which of the following?

   (A) Activation of complement
   (B) Activation of mast cell
   (C) Activation of T lymphocytes
   (D) Production of IgA
   (E) Production of IgG
   (F) Production of IgM

7. A 66-year-old man with Zollinger-Ellison syndrome undergoes a gastrectomy. He is informed that he will require treatment with intramuscular vitamin B_{12} (cyanocobalamin) for the rest of his life. This therapy is necessary because this patient lacks which of the following types of cells?

   (A) Chief
   (B) G (gastrin)
   (C) Goblet
   (D) Mucous neck
   (E) Parietal

8. Beginning with protein synthesis in membrane-bound ribosomes, hepatocytes secrete proteins into the circulation via which of the following mechanisms?

   (A) Active transport through the cell membrane
   (B) Diffusion through the cell membrane
   (C) Transport by microtubules and exocytosis
   (D) Transport in vesicles and exocytosis
   (E) Transport through pores in the cell membrane

9. Which of the following is required to transport fatty acids across the inner mitochondrial membrane?

   (A) Acyl carrier protein
   (B) Albumin
   (C) Carnitine
   (D) Chylomicrons
   (E) Creatinine
   (F) Lecithin-cholesterol acyltransferase

10. An experiment is conducted in which the mitochondrial content of various tissues is studied. It is found that the mitochondrial content is directly proportional to the amount of energy one cell is required to generate and expend. The mitochondrial content is most likely greatest in which of the following types of cells?

   (A) Cardiac muscle cells
   (B) Chondrocytes
   (C) Endothelial cells
   (D) Epidermal cells
   (E) Hepatocytes
   (F) Osteocytes
   (G) White adipocytes

11. A 45-year-old man without a history of bleeding or excessive bruising dies suddenly due to rupture of an aortic dissection. Genetic analysis at autopsy shows a defect in the gene for fibrillin. Which of the following events most likely occurs with defective fibrillin?

(A) Elastic fibers in the extracellular matrix are not correctly formed
(B) Hyaluronic acid in proteoglycans is not sulfated on the proper hydroxyl residues
(C) Intermediate filaments are not assembled in endothelial cells
(D) Shorter side chains of chondroitin sulfate are present on the proteoglycans
(E) Tubulin is not polymerized correctly due to the lack of GTP in endothelial cells

12. A 42-year-old woman comes to the physician for a follow-up examination after two separate Pap smears have shown dysplastic epithelial cells. Results of a molecular diagnostic test show DNA that encodes high-risk versions of the human papillomavirus E6 and E7 proteins. The viral E6 protein binds to the cellular p53 tumor suppressor gene, causing it to be degraded. Which of the following best describes the mechanism by which the E6 protein causes cervical cancer?

(A) Arrests the cell cycle
(B) Enhances tissue invasion and metastasis
(C) Inhibits telomerase expression
(D) Prevents apoptosis
(E) Sustains angiogenesis

13. Which of the following is the correct sequence of events in the initiation of contraction of a skeletal muscle fiber?

	Depolarization of Sarcolemma	**Conformational Change in Troponin-Tropomyosin Complex**	**Release of Ca^{2+} from Sarcoplasmic Reticulum**	**Propagation into Transverse Tubules**	**Acetylcholine Binding to Receptors**
(A)	1	2	3	4	5
(B)	2	5	4	3	1
(C)	3	5	2	4	1
(D)	4	2	5	3	1
(E)	5	3	4	1	2

14. A 90-year-old woman is brought to the emergency department 30 minutes after she fell while climbing the steps into her house. Physical examination shows tenderness over the right shin area. An x-ray of the right lower extremity shows a fracture of the tibia. A DEXA scan shows decreased bone density. Increased activity of which of the following cell types is the most likely cause of the decrease in bone mass in this patient?

(A) Chondrocytes
(B) Osteoblasts
(C) Osteoclasts
(D) Osteocytes
(E) Osteoprogenitor cells

15. A 50-year-old man comes to the physician because of a cough productive of large quantities of mucus for 6 months. He has smoked 1 pack of cigarettes daily for 25 years. Which of the following cell types is the most likely cause of the increase in this patient's secretion of mucus?

(A) Columnar ciliated epithelial cells
(B) Goblet cells
(C) Interstitial cells
(D) Macrophages
(E) Pneumocyte epithelial cells

16. A 65-year-old man with severe atherosclerotic coronary artery disease comes to the emergency department because of a 12-hour history of chest pain. Plasma activity of the MB isozyme of creatine kinase (MB-CK) is markedly increased. Which of the following processes is the most likely explanation for the increased plasma MB-CK?

(A) Cell membrane damage
(B) Endoplasmic reticulum dilation
(C) Mitochondrial swelling
(D) Polysome dissociation
(E) Sodium pump dysfunction

17. During an experimental study, an investigator finds that the regulation of cell cycle and programmed cell death may be initiated by the mitochondrion. The interaction of the mitochondrion with the activation of the caspase family of proteases and subsequent apoptosis is most likely mediated by which of the following?

(A) Calcium release
(B) cAMP production
(C) Cytochrome *c* release
(D) GTP binding
(E) Nitric oxide release

18. A 48-year-old man has hepatic cancer that is unresponsive to standard therapy. He enrolls in a clinical study of a novel chemotherapeutic agent that, as a side effect, blocks kinesin, a component of the cellular microtubular transport system. One week later, he develops skeletal muscle weakness. An alteration in which of the following components of the neuromuscular junction is the most likely cause of the muscle weakness?

(A) A decrease in the number of postsynaptic neurotransmitter receptors
(B) A decrease in the number of presynaptic neurotransmitter vesicles
(C) A decrease in the presynaptic neuron calcium permeability
(D) Impaired α-motoneuron action potential conduction
(E) Impaired skeletal muscle action potential conduction

19. A polysome is actively involved in translation. The ribosomes are attached to which of the following?

(A) Single-stranded DNA
(B) Double-stranded DNA
(C) mRNA
(D) rRNA
(E) tRNA

20. A pathologist uses monoclonal antibodies against several intermediate filament proteins and finds that a tumor section stains positive for cytokeratin only. The tumor most likely originated from which of the following tissues?

(A) Connective
(B) Epithelial
(C) Glial
(D) Muscle
(E) Nemal

Answer Form for Histology Sample Questions

(Questions 1–20)

1. ____
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20. ____

Answer Key for Histology Examination Sample Questions

(Questions 1–20)

1.	B
2.	C
3.	D
4.	C
5.	D
6.	B
7.	E
8.	D
9.	C
10.	A
11.	A
12.	D
13.	B
14.	C
15.	B
16.	A
17.	C
18.	B
19.	C
20.	B