

Package Title: Test Bank
Course Title: Karp7e
Chapter Number: 7

Question Type: Multiple Choice

1) What could be defined as an organized network of extracellular materials found beyond the immediate vicinity of the plasma membrane?

- a) intracellular matrix
- b) extracellular matrix
- c) extracellular netrax
- d) intercellular material
- e) epicellular matrix

Answer: b

Difficulty: Easy

Learning Objective: LO 7.1 List a few of the functions of the extracellular matrix in animal tissue, distinguishing between the glycocalyx, basement membrane, and extracellular matrix of cartilage tissue.

Section Reference: Section 7.1 The Extracellular Space

2) You place mammary gland epithelial cells in culture and then treat them with enzymes that digest the surrounding extracellular matrix. What happens?

- a) The secretory and synthetic activities of the cells decrease.
- b) The secretory and synthetic activities of the cells increase.
- c) The cells die.
- d) The cells enunciate.
- e) The secretory and synthetic activities of the cells do not change.

Answer: a

Difficulty: Medium

Learning Objective: LO 7.1 List a few of the functions of the extracellular matrix in animal tissue, distinguishing between the glycocalyx, basement membrane, and extracellular matrix of cartilage tissue.

Section Reference: Section 7.1 The Extracellular Space

3) If extracellular matrix materials are added back to the cells described in question #2, what

happens?

- a) Nothing happens.
- b) Everything happens.
- c) The differentiated state of the cells is restored and the cells produce their usual products.
- d) The cells die.
- e) The cells dedifferentiate.

Answer: c

Difficulty: Medium

Learning Objective: LO 7.1 List a few of the functions of the extracellular matrix in animal tissue, distinguishing between the glycocalyx, basement membrane, and extracellular matrix of cartilage tissue.

Section Reference: Section 7.1 The Extracellular Space

4) The basal lamina of which structure may thicken abnormally in long-term diabetics causing kidney failure?

- a) the dermis
- b) the epidermis
- c) the glomerulus
- d) the bladder epithelium
- e) the pericardium

Answer: c

Difficulty: Easy

Learning Objective: LO 7.1 List a few of the functions of the extracellular matrix in animal tissue, distinguishing between the glycocalyx, basement membrane, and extracellular matrix of cartilage tissue.

Section Reference: Section 7.1 The Extracellular Space

5) All collagen family members consist of _____ chains arranged in a _____.

- a) 2, double helix
- b) 3, double helix
- c) 3, triple helix
- d) 3, triple lattice
- e) 2, triple helix

Answer: c

Difficulty: Medium

Learning Objective: LO 7.1 List a few of the functions of the extracellular matrix in animal tissue, distinguishing between the glycocalyx, basement membrane, and extracellular matrix of cartilage tissue.

Section Reference: Section 7.1 The Extracellular Space

6) Collagen fibrils are strengthened by covalent cross-links between _____ and _____ residues on adjacent collagen molecules.

- a) lysine, hydroxylysine
- b) proline, hydroxyproline
- c) lysine, hydroxyproline
- d) proline, hydroxylysine
- e) proline, lysine

Answer: a

Difficulty: Medium

Learning Objective: LO 7.1 List a few of the functions of the extracellular matrix in animal tissue, distinguishing between the glycocalyx, basement membrane, and extracellular matrix of cartilage tissue.

Section Reference: Section 7.1 The Extracellular Space

7) In the corneal stroma, the uniformity of collagen fiber size and the ordered packing of the fibers confers what property on the corneal stroma?

- a) strength
- b) flexibility
- c) extensibility
- d) transparency
- e) opacity

Answer: d

Difficulty: Easy

Learning Objective: LO 7.1 List a few of the functions of the extracellular matrix in animal tissue, distinguishing between the glycocalyx, basement membrane, and extracellular matrix of cartilage tissue.

Section Reference: Section 7.1 The Extracellular Space

8) Basement membranes contain Type IV collagen, a nonfibrillar collagen organized in a flattened network. The Type IV collagen trimer has some interspersed nonhelical segments.

What property does this confer upon basement membranes?

- a) strength
- b) flexibility
- c) extensibility
- d) transparency
- e) opacity

Answer: b

Difficulty: Easy

Learning Objective: LO 7.1 List a few of the functions of the extracellular matrix in animal tissue, distinguishing between the glycocalyx, basement membrane, and extracellular matrix of cartilage tissue.

Section Reference: Section 7.1 The Extracellular Space

9) Type I collagen mutations cause a potentially lethal condition characterized by extremely fragile bones, thin skin and weak tendons. This condition is called _____.

- a) osteogenesis imperfecta
- b) Ehler-Danlos syndrome
- c) Alport syndrome
- d) dwarfism and skeletal deformities
- e) diabetes

Answer: a

Difficulty: Easy

Learning Objective: LO 7.1 List a few of the functions of the extracellular matrix in animal tissue, distinguishing between the glycocalyx, basement membrane, and extracellular matrix of cartilage tissue.

Section Reference: Section 7.1 The Extracellular Space

10) Type II collagen mutations alter the properties of cartilage tissue and are known to cause _____.

- a) osteogenesis imperfecta
- b) Ehler-Danlos syndromes
- c) Alport syndrome
- d) dwarfism and skeletal deformities
- e) diabetes

Answer: d

Difficulty: Easy

Learning Objective: LO 7.1 List a few of the functions of the extracellular matrix in animal tissue, distinguishing between the glycocalyx, basement membrane, and extracellular matrix of cartilage tissue.

Section Reference: Section 7.1 The Extracellular Space

11) Mutations in other collagen genes can lead to a variety of distinct but related defects in collagen matrix structure, one of which causes hyperflexible joints and highly extensible skin. These defects are usually referred to as _____.

- a) osteogenesis imperfecta
- b) Ehler-Danlos syndromes
- c) Alport syndromes
- d) Cushing's syndrome
- e) diabetes

Answer: b

Difficulty: Easy

Learning Objective: LO 7.1 List a few of the functions of the extracellular matrix in animal tissue, distinguishing between the glycocalyx, basement membrane, and extracellular matrix of cartilage tissue.

Section Reference: Section 7.1 The Extracellular Space

12) What substance joins proteoglycans together into gigantic complexes called proteoglycan aggregates? These complexes can occupy very large volumes.

- a) hyaluronidase
- b) hyaluronic acid
- c) proteoglycase
- d) fibronectin
- e) laminin

Answer: b

Difficulty: Easy

Learning Objective: LO 7.1 List a few of the functions of the extracellular matrix in animal tissue, distinguishing between the glycocalyx, basement membrane, and extracellular matrix of cartilage tissue.

Section Reference: Section 7.1 The Extracellular Space

13) If antibodies to fibronectin are exposed to an embryo through which neural crest cells are migrating, what happens?

- a) Neural crest cell movements are inhibited.
- b) Neural crest cell movements are excited.
- c) Neural crest cells die.
- d) Neural crest cells divide.
- e) Neural crest cells convert into muscle cells.

Answer: a

Difficulty: Hard

Learning Objective: LO 7.1 List a few of the functions of the extracellular matrix in animal tissue, distinguishing between the glycocalyx, basement membrane, and extracellular matrix of cartilage tissue.

Section Reference: Section 7.1 The Extracellular Space

14) What would be the effect on primordial germ cells when an embryo is exposed to laminin-specific antibodies?

- a) They arrive at the developing gonad more quickly.
- b) Their movement to the developing gonad is disrupted.
- c) They begin to divide rapidly.
- d) They increase greatly in size.
- e) Their nuclei disintegrate.

Answer: b

Difficulty: Hard

Learning Objective: LO 7.1 List a few of the functions of the extracellular matrix in animal tissue, distinguishing between the glycocalyx, basement membrane, and extracellular matrix of cartilage tissue.

Section Reference: Section 7.1 The Extracellular Space

15) The degradation of the extracellular matrix, along with cell surface proteins, is accomplished mostly by a _____-containing enzyme family called _____.

- a) copper, matrix metalloproteinases
- b) copper, MMPs
- c) zinc, matrix metalloproteinases
- d) magnesium, matrix metalloproteinases
- e) manganese, MMPs

Answer: c

Difficulty: Easy

Learning Objective: LO 7.1 List a few of the functions of the extracellular matrix in animal tissue, distinguishing between the glycocalyx, basement membrane, and extracellular matrix of cartilage tissue.

Section Reference: Section 7.1 The Extracellular Space

16) Which protein below is thought to be secreted into the extracellular matrix that surrounds the lining of mature blood vessels, where it inhibits angiogenesis?

- a) tenascin
- b) entactin
- c) thrombospondin
- d) actin
- e) laminin

Answer: c

Difficulty: Medium

Learning Objective: LO 7.1 List a few of the functions of the extracellular matrix in animal tissue, distinguishing between the glycocalyx, basement membrane, and extracellular matrix of cartilage tissue.

Section Reference: Section 7.1 The Extracellular Space

17) What integral membrane protein family made of two membrane-spanning chains (α and β) is involved in attaching cells to their extracellular microenvironment?

- a) laminins
- b) fibronectins
- c) integrins
- d) myosins
- e) lysins

Answer: c

Difficulty: Easy

Learning Objective: LO 7.2 Elaborate on how a cell-surface protein can be involved in both cell adhesion and transmembrane signal transduction.

Section Reference: Section 7.2 Interactions of Cells with Extracellular Materials

18) In an integrin, what structure is it that crosses the lipid bilayer?

- a) a transmembrane pleated sheet
- b) a transmembrane spear
- c) a transmembrane plate
- d) a transmembrane helix
- e) a bent, curved leg

Answer: d

Difficulty: Easy

Learning Objective: LO 7.2 Elaborate on how a cell-surface protein can be involved in both cell adhesion and transmembrane signal transduction.

Section Reference: Section 7.2 Interactions of Cells with Extracellular Materials

19) The activation of a membrane integrin by the binding of its cytoplasmic portion to molecules in the cytoplasm and the resultant increase in its affinity for an extracellular ligand is called _____.

- a) inside-out signaling
- b) outside-in signaling
- c) right-side-out signaling
- d) simple signaling
- e) integration

Answer: a

Difficulty: Easy

Learning Objective: LO 7.2 Elaborate on how a cell-surface protein can be involved in both cell adhesion and transmembrane signal transduction.

Section Reference: Section 7.2 Interactions of Cells with Extracellular Materials

20) Evidence strongly suggests that the bent conformation of an integrin is _____ and unable to bind its ligand.

- a) loose
- b) active
- c) tight
- d) stretched
- e) inactive

Answer: e

Difficulty: Easy

Learning Objective: LO 7.2 Elaborate on how a cell-surface protein can be involved in both cell adhesion and transmembrane signal transduction.

Section Reference: Section 7.2 Interactions of Cells with Extracellular Materials

21) You are investigating the interactions of integrin α and β subunits and isolate the extracellular portion of an integrin as a soluble α/β heterodimer. The heterodimer lacks the associated transmembrane and cytoplasmic domains normally present as part of the molecule. You experimentally link the α and β subunits at the bases of their legs so that the ligand-binding regions of the α and β subunits approach one another. Which of the following statements is true about the molecules formed?

- a) The molecules bind their ligand tightly.
- b) The molecules are unable to bind a ligand.
- c) The molecules are cleaved.
- d) The molecules denature their ligand.
- e) The molecules denature and degrade.

Answer: a

Difficulty: Hard

Learning Objective: LO 7.2 Elaborate on how a cell-surface protein can be involved in both cell adhesion and transmembrane signal transduction.

Section Reference: Section 7.2 Interactions of Cells with Extracellular Materials

22) If experimentally linked α/β heterodimer integrin subunits are separated, what happens?

- a) The molecules bind their ligand tightly
- b) The molecules are unable to bind a ligand.
- c) The molecules are cleaved.
- d) The molecules denature their ligand.
- e) The molecules are denatured and degraded.

Answer: b

Difficulty: Medium

Learning Objective: LO 7.2 Elaborate on how a cell-surface protein can be involved in both cell adhesion and transmembrane signal transduction.

Section Reference: Section 7.2 Interactions of Cells with Extracellular Materials

23) What ion is not known to bind to integrins?

- a) calcium

- b) magnesium
- c) sodium
- d) divalent cations
- e) manganese

Answer: c

Difficulty: Medium

Learning Objective: LO 7.2 Elaborate on how a cell-surface protein can be involved in both cell adhesion and transmembrane signal transduction.

Section Reference: Section 7.2 Interactions of Cells with Extracellular Materials

24) What kind of experiments have provided evidence that most integrins have unique functions?

- a) enzyme assays
- b) gene addition experiments
- c) gene knockout experiments
- d) freeze-fracture, freeze etch experiments
- e) sucrose density centrifugation

Answer: c

Difficulty: Medium

Learning Objective: LO 7.2 Elaborate on how a cell-surface protein can be involved in both cell adhesion and transmembrane signal transduction.

Section Reference: Section 7.2 Interactions of Cells with Extracellular Materials

25) You coat a Petri dish with fibronectin and proteoglycans and culture cells on the dish. The cells adhere to the dish. You repeat the experiment but this time add RGD tripeptides to the culture dish as the cells are added. What happens?

- a) The cells adhere as they normally do.
- b) The cells die immediately.
- c) The cells lyse immediately.
- d) The cells do not adhere to the dish.
- e) The cells immediately change their phenotype.

Answer: d

Difficulty: Hard

Learning Objective: LO 7.2 Elaborate on how a cell-surface protein can be involved in both cell adhesion and transmembrane signal transduction.

Section Reference: Section 7.2 Interactions of Cells with Extracellular Materials

26) You coat a Petri dish with fibronectin and proteoglycans and culture cells on the dish. The cells adhere to the dish. You repeat the experiment but this time add RGD tripeptides to the culture dish as the cells are added. The result of this experiment is an example of what biochemical process?

- a) competitive inhibition
- b) noncompetitive inhibition
- c) enzymatic activation
- d) feedback inhibition
- e) allosterism

Answer: a

Difficulty: Hard

Learning Objective: LO 7.2 Elaborate on how a cell-surface protein can be involved in both cell adhesion and transmembrane signal transduction.

Section Reference: Section 7.2 Interactions of Cells with Extracellular Materials

27) Why do cells flatten out as they make contact with a surface?

- a) They lose water.
- b) They extrude cytoplasm.
- c) They send out projections that make increasingly stable attachments.
- d) Their membranes stiffen.
- e) They make focal assignments.

Answer: c

Difficulty: Medium

Learning Objective: LO 7.2 Elaborate on how a cell-surface protein can be involved in both cell adhesion and transmembrane signal transduction.

Section Reference: Section 7.2 Interactions of Cells with Extracellular Materials

28) To what is the cytoplasmic domain of integrins in the region of a focal contact connected via various adaptors?

- a) tubulins of the cytoskeleton
- b) actinin of the cytoskeleton
- c) actin of the cytoskeleton
- d) dynein of the cytoskeleton
- e) band III protein of the membrane

Answer: c

Difficulty: Easy

Learning Objective: LO 7.2 Elaborate on how a cell-surface protein can be involved in both cell adhesion and transmembrane signal transduction.

Section Reference: Section 7.2 Interactions of Cells with Extracellular Materials

29) The tightest attachment between a cell and its extracellular matrix is seen at the site where an epithelial cell is attached to the underlying basement membrane. The specialized adhesive structure found at such a site is called a(n) _____.

- a) tight junction
- b) spot desmosome
- c) plasmodesma
- d) hemidesmosome
- e) gap junction

Answer: d

Difficulty: Easy

Learning Objective: LO 7.2 Elaborate on how a cell-surface protein can be involved in both cell adhesion and transmembrane signal transduction.

Section Reference: Section 7.2 Interactions of Cells with Extracellular Materials

30) Filaments connected to the dense plaque underlying the membrane in a hemidesmosome course outward into the cytoplasm. These filaments are composed of the protein _____ and are best known as _____.

- a) actin, microfilaments
- b) keratin, microfilaments
- c) actin, intermediate filaments
- d) keratin, intermediate filaments
- e) tubulin, intermediate filaments

Answer: d

Difficulty: Easy

Learning Objective: LO 7.2 Elaborate on how a cell-surface protein can be involved in both cell adhesion and transmembrane signal transduction.

Section Reference: Section 7.2 Interactions of Cells with Extracellular Materials

31) Epidermolysis bullosa, an inherited blistering disease, is caused by _____.

- a) production of antibodies against hemidesmosome plaque proteins
- b) production of autoantibodies
- c) production of antibodies against spot desmosome plaque proteins
- d) genetic alterations in any one of a number of hemidesmosomal proteins
- e) production of antibodies against connexins

Answer: d

Difficulty: Easy

Learning Objective: LO 7.2 Elaborate on how a cell-surface protein can be involved in both cell adhesion and transmembrane signal transduction.

Section Reference: Section 7.2 Interactions of Cells with Extracellular Materials

32) Focal adhesions _____.

- a) may act as a type of sensory structure
- b) collect information about the physical properties of the extracellular environment
- c) collect information about the chemical properties of the extracellular environment
- d) transmit information to the cell interior that may lead to changes in cell adhesion, proliferation or survival
- e) All of these are correct.

Answer: e

Difficulty: Medium

Learning Objective: LO 7.2 Elaborate on how a cell-surface protein can be involved in both cell adhesion and transmembrane signal transduction.

Section Reference: Section 7.2 Interactions of Cells with Extracellular Materials

33) Focal adhesions _____.

- a) have been implicated in cell locomotion
- b) contain integrins that develop transient interactions with the extracellular matrix
- c) collect information about the chemical properties of the extracellular environment
- d) transmit information to the cell interior that may lead to changes in cell adhesion, proliferation or survival
- e) All of these are correct.

Answer: e

Difficulty: Medium

7.2

34) Which of the following proteins are known to be associated with focal adhesions?

- a) actin
- b) aconitase
- c) myosin
- d) malin
- e) actin and myosin

Answer: e

Difficulty: Medium

Learning Objective: LO 7.2 Elaborate on how a cell-surface protein can be involved in both cell adhesion and transmembrane signal transduction.

Section Reference: Section 7.2 Interactions of Cells with Extracellular Materials

35) Cells were allowed to bind to beads that had been covered with a coating of fibronectin. When the membrane-bound beads were pulled by an optical tweezer, the resultant mechanical stimulus was transmitted into the cell interior. What response did this cause?

- a) It generated a wave of Src kinase activity.
- b) It caused nuclear shrinkage.
- c) It caused activation of phosphofructokinase.
- d) It caused inhibition of phosphofructokinase.
- e) It inhibited Src kinase activity.

Answer: a

Difficulty: Medium

7.2

36) Mesenchymal stem cells were grown on a soft, pliable substratum. Into what type of cells did they develop?

- a) skin cells
- b) muscle cells
- c) nerve cells
- d) osteoblasts
- e) osteoclasts

Answer: c

Difficulty: Medium

Learning Objective: LO 7.2 Elaborate on how a cell-surface protein can be involved in both cell adhesion and transmembrane signal transduction.

Section Reference: Section 7.2 Interactions of Cells with Extracellular Materials

37) Mesenchymal stem cells were grown on a substratum of moderate stiffness. Into what type of cells did they develop?

- a) bone cells
- b) muscle cells
- c) nerve cells
- d) osteoblasts
- e) bone cells and osteoblasts

Answer: b

Difficulty: Medium

Learning Objective: LO 7.2 Elaborate on how a cell-surface protein can be involved in both cell adhesion and transmembrane signal transduction.

Section Reference: Section 7.2 Interactions of Cells with Extracellular Materials

38) Mesenchymal stem cells were grown on a very stiff substrate. Into what type of cells did they develop?

- a) skin cells
- b) muscle cells
- c) nerve cells
- d) osteoblasts, which give rise to bone cells
- e) osteoclasts, which give rise to bone cells

Answer: d

Difficulty: Medium

Learning Objective: LO 7.2 Elaborate on how a cell-surface protein can be involved in both cell adhesion and transmembrane signal transduction.

Section Reference: Section 7.2 Interactions of Cells with Extracellular Materials

39) The filaments associated with hemidesmosomes are _____.

- a) actin filaments
- b) keratin filaments

- c) microtubules
- d) intermediate filaments
- e) keratin filaments and intermediate filaments

Answer: e

Difficulty: Medium

Learning Objective: LO 7.2 Elaborate on how a cell-surface protein can be involved in both cell adhesion and transmembrane signal transduction.

Section Reference: Section 7.2 Interactions of Cells with Extracellular Materials

40) In which disease do individuals produce antibodies that bind to proteins present in hemidesmosomes? It causes the lower layer of the epidermis to lose attachment to the underlying basement membrane and thus to the underlying connective tissue layer of the dermis. The leakage of fluid into the space beneath the epidermis results in severe blistering of the skin.

- a) epidermolysis bullosa
- b) bullous pemphigoid
- c) blisterosis
- d) hemidesmosomosis
- e) eczema

Answer: b

Difficulty: Medium

Learning Objective: LO 7.2 Elaborate on how a cell-surface protein can be involved in both cell adhesion and transmembrane signal transduction.

Section Reference: Section 7.2 Interactions of Cells with Extracellular Materials

41) Which disease is an inherited blistering disease that can occur in patients with genetic alterations in any one of a number of hemidesmosomal proteins, including the α_6 or β_4 integrin subunit, collagen VII or laminin-5?

- a) epidermolysis bullosa
- b) bullous pemphigoid
- c) blisterosis
- d) hemidesmosomosis
- e) eczema

Answer: a

Difficulty: Medium

Learning Objective: LO 7.2 Elaborate on how a cell-surface protein can be involved in both cell

adhesion and transmembrane signal transduction.

Section Reference: Section 7.2 Interactions of Cells with Extracellular Materials

42) What proteins have been shown to be altered by genetic mutations in patients who suffer from epidermolysis bullosa?

- a) the α_6 integrin subunit
- b) the β_4 integrin subunit
- c) collagen VII
- d) laminin-5
- e) All of these are correct.

Answer: e

Difficulty: Medium

Learning Objective: LO 7.2 Elaborate on how a cell-surface protein can be involved in both cell adhesion and transmembrane signal transduction.

Section Reference: Section 7.2 Interactions of Cells with Extracellular Materials

43) You disaggregate cells from two different developing organs and mix them together. Initially, they form a mixed clump. What happens next?

- a) The clump stabilizes.
- b) The cells sort themselves out so that each cell adhered only to cells of the same type.
- c) The mixed clump persists.
- d) The clumped cells die.
- e) The clump forms a mesenchyme.

Answer: b

Difficulty: Medium

Learning Objective: LO 7.3 Briefly detail the functions of selectins, certain members of the immunoglobulin superfamily, certain members of the integrin family, and cadherins.

Section Reference: Section 7.3 The Interaction of Cells with Other Cells

44) _____ are members of an integral membrane glycoprotein family that bind to specific sugar arrangements in oligosaccharides that project from the surfaces of other cells.

- a) Selectins
- b) Integrins
- c) Immunoglobulin super family proteins
- d) Cadherins

e) Calmodulins

Answer: a

Difficulty: Easy

Learning Objective: LO 7.3 Briefly detail the functions of selectins, certain members of the immunoglobulin superfamily, certain members of the integrin family, and cadherins.

Section Reference: Section 7.3 The Interaction of Cells with Other Cells

45) Lymphocytes are isolated and labeled with radioactive isotopes. They are then exposed to frozen tissue sections of a lymphoid organ. What happens?

- a) The lymphocytes bind uniformly to the sections.
- b) The lymphocytes bind to each other.
- c) The lymphocytes selectively adhere to the endothelial lining of venules in peripheral lymph nodes.
- d) The lymphocytes selectively adhere to the endothelial lining of arterioles in peripheral lymph nodes.
- e) The lymphocytes do not stick to the sections.

Answer: c

Difficulty: Medium

Learning Objective: LO 7.3 Briefly detail the functions of selectins, certain members of the immunoglobulin superfamily, certain members of the integrin family, and cadherins.

Section Reference: Section 7.3 The Interaction of Cells with Other Cells

46) The binding of lymphocytes to the endothelial lining of venules in peripheral lymph node frozen tissue sections could be blocked in what way? This demonstrated the existence of what kind of molecule?

- a) Treatment with antibodies against specific lymphocyte surface glycoproteins, selectins
- b) Treatment with antibodies against specific lymphocyte surface glycoproteins, IgSFs
- c) Treatment with antibodies against specific lymphocyte surface glycoproteins, integrins
- d) Treatment with antibodies against specific ECM glycoproteins, selectins
- e) Treatment with antibodies against specific ECM glycoproteins, cadherins

Answer: a

Difficulty: Hard

Learning Objective: LO 7.3 Briefly detail the functions of selectins, certain members of the immunoglobulin superfamily, certain members of the integrin family, and cadherins.

Section Reference: Section 7.3 The Interaction of Cells with Other Cells

47) While most IgSF members are involved in various aspects of immune function, some of them mediate _____ cell-cell adhesion.

- a) calcium-dependent
- b) calcium-independent
- c) magnesium-dependent
- d) manganese-dependent
- e) iron-independent

Answer: b

Difficulty: Easy

Learning Objective: LO 7.3 Briefly detail the functions of selectins, certain members of the immunoglobulin superfamily, certain members of the integrin family, and cadherins.

Section Reference: Section 7.3 The Interaction of Cells with Other Cells

48) The bonds that selectins form with their ligands become _____ when the interaction is _____.

- a) stronger, placed under mechanical stress
- b) weaker, placed under mechanical stress
- c) stronger, exposed to a higher temperature
- d) more elastic, exposed to a higher temperature
- e) more elastic, placed under mechanical stress

Answer: a

Difficulty: Medium

Learning Objective: LO 7.3 Briefly detail the functions of selectins, certain members of the immunoglobulin superfamily, certain members of the integrin family, and cadherins.

Section Reference: Section 7.3 The Interaction of Cells with Other Cells

49) What is thought to be the origin of immunoglobulins?

- a) They may be derived from immune system molecules in invertebrates.
- b) They may be derived from cell-adhesion receptors in invertebrates.
- c) They may be derived from cell-adhesion receptors in fish.
- d) They may be derived from cell-adhesion molecules in amphibians.
- e) They may be derived from immune system molecules in reptiles.

Answer: b

Difficulty: Medium

Learning Objective: LO 7.3 Briefly detail the functions of selectins, certain members of the immunoglobulin superfamily, certain members of the integrin family, and cadherins.

Section Reference: Section 7.3 The Interaction of Cells with Other Cells

50) What is the function of most IgSFs?

- a) cell adhesion
- b) cell division
- c) mediating specific interactions of epithelial cells with cells needed for immune response
- d) mediating specific interactions of lymphocytes with cells needed for the immune response
- e) cell fusion

Answer: d

Difficulty: Medium

Learning Objective: LO 7.3 Briefly detail the functions of selectins, certain members of the immunoglobulin superfamily, certain members of the integrin family, and cadherins.

Section Reference: Section 7.3 The Interaction of Cells with Other Cells

51) L1 is an IgSF molecule that has been shown to be important in neural development; it is thought that it may be involved in axon growth within the embryonic nervous system. What evidence supports this statement?

- a) L1 mutants always die.
- b) L1 mutants show deficits in their vision.
- c) People who die of L1-deficiency are often missing two large nerve tracts.
- d) People who die of L1-deficiency are often missing a significant portion of their brain.
- e) People who die of L1-deficiency are often missing a significant portion of their spinal cord.

Answer: c

Difficulty: Easy

Learning Objective: LO 7.3 Briefly detail the functions of selectins, certain members of the immunoglobulin superfamily, certain members of the integrin family, and cadherins.

Section Reference: Section 7.3 The Interaction of Cells with Other Cells

52) Patients that have died of L1-deficiency disease are missing a nerve tract that _____.

- 1) runs between the brain and the spinal cord
- 2) runs between the two halves of the brain
- 3) runs between the spinal cord and cerebellum

4) runs between the brain and the endocrine system

- a) 1
- b) 2
- c) 3
- d) 4
- e) 1 and 2

Answer: e

Difficulty: Medium

Learning Objective: LO 7.3 Briefly detail the functions of selectins, certain members of the immunoglobulin superfamily, certain members of the integrin family, and cadherins.

Section Reference: Section 7.3 The Interaction of Cells with Other Cells

53) You genetically engineer nonadhesive cells to express one variety of cadherins and then mix the cells in various combinations. You then monitor their interactions. What do you observe?

- a) The genetically engineered cells adhered preferentially to cells expressing one of the other cadherins.
- b) The genetically engineered cells adhered preferentially to cells expressing the same cadherins.
- c) The genetically engineered cells did not stick to any other cells.
- d) The genetically engineered cells died.
- e) The genetically engineered cells migrated to a different location.

Answer: b

Difficulty: Medium

Learning Objective: LO 7.3 Briefly detail the functions of selectins, certain members of the immunoglobulin superfamily, certain members of the integrin family, and cadherins.

Section Reference: Section 7.3 The Interaction of Cells with Other Cells

54) Cadherins appear to be important in holding cells together in _____ tissues.

- a) mesenchymal
- b) loosely cohesive
- c) tightly cohesive
- d) noncohesive
- e) gel-like

Answer: c

Difficulty: Medium

Learning Objective: LO 7.3 Briefly detail the functions of selectins, certain members of the immunoglobulin superfamily, certain members of the integrin family, and cadherins.

Section Reference: Section 7.3 The Interaction of Cells with Other Cells

55) Calcium ions form bridges between _____.

- a) successive domains of a given cadherin molecule
- b) cadherins on adjacent cells
- c) cadherins on the same cell
- d) cadherins and IgSFs
- e) IgSFs and selectins

Answer: a

Difficulty: Medium

Learning Objective: LO 7.3 Briefly detail the functions of selectins, certain members of the immunoglobulin superfamily, certain members of the integrin family, and cadherins.

Section Reference: Section 7.3 The Interaction of Cells with Other Cells

56) What determines the strength of adhesion between apposing cells held together by cadherins?

- a) the length of the cadherins connecting the cells
- b) the width of the cadherins connecting the cells
- c) the amount of tryptophan in the cadherins connecting the cells
- d) the number of cadherins in a cluster connecting the cells
- e) the number of tyrosine residues in the cadherins connecting the cells

Answer: d

Difficulty: Medium

Learning Objective: LO 7.3 Briefly detail the functions of selectins, certain members of the immunoglobulin superfamily, certain members of the integrin family, and cadherins.

Section Reference: Section 7.3 The Interaction of Cells with Other Cells

57) The loss of cadherin function may be instrumental in what disease state?

- a) colds
- b) the spread of benign tumors
- c) the spread of malignant tumors
- d) influenza
- e) AIDS

Answer: c

Difficulty: Easy

Learning Objective: LO 7.3 Briefly detail the functions of selectins, certain members of the immunoglobulin superfamily, certain members of the integrin family, and cadherins.

Section Reference: Section 7.3 The Interaction of Cells with Other Cells

58) When tight junctions, gap junctions and desmosomes are arranged in a specific array, the assortment of surface specializations is called a(n) _____.

- a) junctional array
- b) synaptonemal complex
- c) belt complex
- d) junctional complex
- e) spot complex

Answer: d

Difficulty: Easy

Learning Objective: LO 7.3 Briefly detail the functions of selectins, certain members of the immunoglobulin superfamily, certain members of the integrin family, and cadherins.

Section Reference: Section 7.3 The Interaction of Cells with Other Cells

59) From the apical surface to the basal surface of an epithelial cell, what is the order of cell junctions observed in the junctional complex?

- a) tight junction, belt desmosome, spot desmosomes, gap junctions
- b) tight junction, gap junction, belt desmosome, spot desmosomes
- c) belt desmosome, tight junction, gap junctions, spot desmosomes
- d) belt desmosome, gap junctions, tight junctions, spot desmosomes
- e) gap junctions, spot desmosomes, belt desmosome, tight junction

Answer: a

Difficulty: Hard

Learning Objective: LO 7.3 Briefly detail the functions of selectins, certain members of the immunoglobulin superfamily, certain members of the integrin family, and cadherins.

Section Reference: Section 7.3 The Interaction of Cells with Other Cells

60) What type of cell adhesion molecule is associated with cells being held together by adherens junctions at the site of the junction?

- a) adherins
- b) selectins
- c) IgSFs
- d) integrins
- e) cadherins

Answer: e

Difficulty: Medium

Learning Objective: LO 7.3 Briefly detail the functions of selectins, certain members of the immunoglobulin superfamily, certain members of the integrin family, and cadherins.

Section Reference: Section 7.3 The Interaction of Cells with Other Cells

61) What can be described as a tightly adherent, polarized cell layer?

- a) a mesenchyme
- b) cartilage
- c) an epithelium
- d) a mesothelium
- e) mesoderm

Answer: c

Difficulty: Easy

Learning Objective: LO 7.3 Briefly detail the functions of selectins, certain members of the immunoglobulin superfamily, certain members of the integrin family, and cadherins.

Section Reference: Section 7.3 The Interaction of Cells with Other Cells

62) What can be described as solitary, nonadhesive, nonpolarized migratory cells?

- a) a mesenchyme
- b) cartilage
- c) an epithelium
- d) a mesothelium
- e) an endothelium

Answer: a

Difficulty: Easy

Learning Objective: LO 7.3 Briefly detail the functions of selectins, certain members of the immunoglobulin superfamily, certain members of the integrin family, and cadherins.

Section Reference: Section 7.3 The Interaction of Cells with Other Cells

63) Which of the following is typified by an epithelial-mesenchymal transition or EMT?

- 1) formation of the mesoderm during gastrulation in a chick or mammalian embryo
- 2) cells breaking away from a from a cohesive epiblast
- 3) fusion of sperm and egg
- 4) formation of cartilage

- a) only 1
- b) only 2
- c) 3
- d) 4
- e) 1 and 2

Answer: e

Difficulty: Medium

Learning Objective: LO 7.3 Briefly detail the functions of selectins, certain members of the immunoglobulin superfamily, certain members of the integrin family, and cadherins.

Section Reference: Section 7.3 The Interaction of Cells with Other Cells

64) Which of the following tissues are typically derived from mesenchymal cells?

- a) mesodermal tissues
- b) ectodermal tissues
- c) only blood
- d) only muscle
- e) mesodermal tissues, blood and muscle

Answer: e

Difficulty: Medium

Learning Objective: LO 7.3 Briefly detail the functions of selectins, certain members of the immunoglobulin superfamily, certain members of the integrin family, and cadherins.

Section Reference: Section 7.3 The Interaction of Cells with Other Cells

65) Which of the following tissues are typically not derived from mesenchymal cells?

- a) mesodermal tissues
- b) ectodermal tissues
- c) blood
- d) muscle
- e) bone

Answer: b

Difficulty: Medium

Learning Objective: LO 7.3 Briefly detail the functions of selectins, certain members of the immunoglobulin superfamily, certain members of the integrin family, and cadherins.

Section Reference: Section 7.3 The Interaction of Cells with Other Cells

66) The cells of the epiblast of a developing mammalian embryo display what cell adhesion molecules on their surfaces, molecules that presumably promote their close association with one another?

- a) selectins
- b) E-cadherins
- c) P-cadherins
- d) integrins
- e) IgSFs

Answer: b

Difficulty: Easy

Learning Objective: LO 7.3 Briefly detail the functions of selectins, certain members of the immunoglobulin superfamily, certain members of the integrin family, and cadherins.

Section Reference: Section 7.3 The Interaction of Cells with Other Cells

67) What is thought to promote the release of future mesoderm cells from an epithelium and their transformation into mesenchymal cells?

- a) a stoppage in the expression of E-cadherin genes
- b) an increase in the expression of E-cadherin genes
- c) degradation of the cell membrane
- d) the cytoplasm taking on an anti-adhesive character
- e) autophagy of the nucleus

Answer: a

Difficulty: Medium

Learning Objective: LO 7.3 Briefly detail the functions of selectins, certain members of the immunoglobulin superfamily, certain members of the integrin family, and cadherins.

Section Reference: Section 7.3 The Interaction of Cells with Other Cells

68) Which tissues below are typically derived from the single-celled epithelium on the dorsal

surface of a chick embryo after gastrulation?

- a) muscle
- b) skin, ectodermal tissues and nervous system
- c) only skin
- d) only ectodermal tissues
- e) only tissues of nervous system

Answer: b

Difficulty: Medium

Learning Objective: LO 7.3 Briefly detail the functions of selectins, certain members of the immunoglobulin superfamily, certain members of the integrin family, and cadherins.

Section Reference: Section 7.3 The Interaction of Cells with Other Cells

69) Which tissues below are not typically derived from the single-celled epithelium on the dorsal surface of a chick embryo after gastrulation?

- a) muscle
- b) skin, ectodermal tissues and nervous system
- c) skin
- d) ectodermal tissues
- e) nervous system

Answer: a

Difficulty: Easy

Learning Objective: LO 7.3 Briefly detail the functions of selectins, certain members of the immunoglobulin superfamily, certain members of the integrin family, and cadherins.

Section Reference: Section 7.3 The Interaction of Cells with Other Cells

70) What changes in the central region of the dorsal surface of the single-celled epithelial layer of a chick embryo lead to the formation of the primitive nervous system?

- 1) a stoppage in the expression of E-cadherin genes
- 2) a stoppage in the expression of N-cadherin genes
- 3) an elevation in the expression of N-cadherin genes

- a) 1
- b) 2
- c) 3
- d) 1 and 3
- e) 1 and 2

Answer: d

Difficulty: Medium

Learning Objective: LO 7.3 Briefly detail the functions of selectins, certain members of the immunoglobulin superfamily, certain members of the integrin family, and cadherins.

Section Reference: Section 7.3 The Interaction of Cells with Other Cells

71) Which tissues below are typically derived from the cells on the dorsal surface of a mammalian embryo after gastrulation that express N-cadherins and stop expressing E-cadherins?

- a) skin
- b) only brain
- c) only spinal cord
- d) only neural tube
- e) brain, spinal cord and neural tube

Answer: e

Difficulty: Hard

Learning Objective: LO 7.3 Briefly detail the functions of selectins, certain members of the immunoglobulin superfamily, certain members of the integrin family, and cadherins.

Section Reference: Section 7.3 The Interaction of Cells with Other Cells

72) Which tissues below are not typically derived from the cells on the dorsal surface of a mammalian embryo after gastrulation that express N-cadherins and stop expressing E-cadherins?

- a) skin
- b) brain
- c) spinal cord
- d) neural tube
- e) None of these are correct.

Answer: a

Difficulty: Hard

Learning Objective: LO 7.3 Briefly detail the functions of selectins, certain members of the immunoglobulin superfamily, certain members of the integrin family, and cadherins.

Section Reference: Section 7.3 The Interaction of Cells with Other Cells

73) Cadherin clusters of adherens junctions _____.

- 1) connect the external environment to the actin cytoskeleton
- 2) do not require calcium ions to perform their function

- 3) provide a pathway for signals to be transmitted from the cell exterior to the cytoplasm
- 4) connect the external environment to the vimentin cytoskeleton

- a) 1
- b) 2
- c) 3
- d) 4
- e) 1 and 3

Answer: e

Difficulty: Medium

Learning Objective: LO 7.3 Briefly detail the functions of selectins, certain members of the immunoglobulin superfamily, certain members of the integrin family, and cadherins.

Section Reference: Section 7.3 The Interaction of Cells with Other Cells

74) Desmosomes are particularly numerous in tissues _____.

- a) that are subjected to mechanical stress
- b) like cardiac muscle
- c) like the epithelial layers of the skin
- d) like the epithelial layers of the uterine cervix
- e) All of these are correct.

Answer: e

Difficulty: Easy

Learning Objective: LO 7.3 Briefly detail the functions of selectins, certain members of the immunoglobulin superfamily, certain members of the integrin family, and cadherins.

Section Reference: Section 7.3 The Interaction of Cells with Other Cells

75) The cadherins of the desmosomes _____.

- 1) have a different domain structure from classical cadherins
- 2) are referred to as desmogleins
- 3) are called desmocollins

- a) 1
- b) 2
- c) 3
- d) 1, 2 and 3
- e) 1 and 2

Answer: d

Difficulty: Medium

Learning Objective: LO 7.3 Briefly detail the functions of selectins, certain members of the immunoglobulin superfamily, certain members of the integrin family, and cadherins.

Section Reference: Section 7.3 The Interaction of Cells with Other Cells

76) Pemphigus vulgaris _____.

- a) is characterized by a loss of epidermal cell-cell adhesion
- b) is an autoimmune disease
- c) is characterized by severe blistering of the skin
- d) is caused by the production of antibodies against one of the desmogleins
- e) All of these are correct.

Answer: e

Difficulty: Medium

Learning Objective: LO 7.3 Briefly detail the functions of selectins, certain members of the immunoglobulin superfamily, certain members of the integrin family, and cadherins.

Section Reference: Section 7.3 The Interaction of Cells with Other Cells

77) Attachment of an integrin to its ligand can induce which of the following responses within a cell?

- a) changes in cytoplasmic pH
- b) changes in cytoplasmic Ca^{2+} ion concentration
- c) protein phosphorylation
- d) gene expression
- e) All of these are correct.

Answer: e

Difficulty: Medium

Learning Objective: LO 7.3 Briefly detail the functions of selectins, certain members of the immunoglobulin superfamily, certain members of the integrin family, and cadherins.

Section Reference: Section 7.3 The Interaction of Cells with Other Cells

78) Mammary gland epithelial cells are removed from a mammary gland and grown on a bare culture dish. What happens to them?

- 1) Nothing happens.
- 2) They lose their ability to synthesize milk proteins.
- 3) They appear as flattened, undifferentiated cells.

4) They become even more differentiated and proliferate at a high rate.

- a) 1
- b) 2
- c) 3
- d) 4
- e) 2 and 3

Answer: e

Difficulty: Medium

Learning Objective: LO 7.3 Briefly detail the functions of selectins, certain members of the immunoglobulin superfamily, certain members of the integrin family, and cadherins.

Section Reference: Section 7.3 The Interaction of Cells with Other Cells

79) When undifferentiated mammary gland epithelium cells that had been grown on a bare culture dish are cultured in the presence of certain extracellular molecules (e.g., laminin), what, if anything happens to them?

- 1) There is no change in these cells.
- 2) They regain their differentiated appearance.
- 3) They differentiate into muscle and bone cells.
- 4) They become organized into milk-producing, gland-like structures.

- a) 1
- b) 2
- c) 3
- d) 4
- e) 2 and 4

Answer: e

Difficulty: Medium

Learning Objective: LO 7.3 Briefly detail the functions of selectins, certain members of the immunoglobulin superfamily, certain members of the integrin family, and cadherins.

Section Reference: Section 7.3 The Interaction of Cells with Other Cells

80) Laminin is thought to stimulate mammary gland cells to differentiate into milk-producing gland-like structures. How does laminin accomplish this?

- 1) Laminin stimulates the mammary cells by binding to cell-surface integrins.
- 2) Laminin stimulates the mammary cells by binding to cell-surface selectins.
- 3) Laminin binding at the cell surface activates kinases at the inner surface of the membrane.
- 4) Laminin binding at the cell surface activates kinases on the membrane's outer surface.

- a) only 1
- b) 2
- c) 3
- d) only 4
- e) 1 and 4

Answer: e

Difficulty: Medium

Learning Objective: LO 7.3 Briefly detail the functions of selectins, certain members of the immunoglobulin superfamily, certain members of the integrin family, and cadherins.

Section Reference: Section 7.3 The Interaction of Cells with Other Cells

81) What forms the barrier of the tight junctions that seals off the space between adjacent cells?

- a) paired rows of aligned integral membrane proteins
- b) paired rows of aligned phospholipids
- c) paired rows of carbohydrates
- d) paired rows of polynucleotides
- e) interdigitating integral membrane proteins

Answer: a

Difficulty: Easy

Learning Objective: LO 7.4 Discuss the details and functions of a tight junction.

Section Reference: Section 7.4 Tight Junctions: Sealing the Extracellular Space

82) Which tight junction will form a tighter seal?

- a) one with a single strand of aligned integral membrane proteins
- b) one with a number of parallel, interconnected strands of aligned integral membrane proteins
- c) tight junctions containing a special kind of phospholipid
- d) tight junctions containing a special kind of carbohydrate
- e) one with a number of parallel, interconnected strands of interdigitated integral membrane proteins

Answer: b

Difficulty: Medium

Learning Objective: LO 7.4 Discuss the details and functions of a tight junction.

Section Reference: Section 7.4 Tight Junctions: Sealing the Extracellular Space

83) One small region of a human kidney tubule known as the thick ascending limb (or TAL) has tight junctions that are permeable to magnesium (Mg^{2+}) ions. What is thought to account for the permeability of this tight junction to magnesium ions?

- a) The membrane in this region is leaky because of special phospholipids.
- b) Loops of claudin molecules that extend into the extracellular space form pores in the TAL.
- c) Loops of claudin molecules that extend into the cytoplasm form pores in the TAL.
- d) Loops of claudin molecules fully embedded in the TAL membrane form pores in the TAL.
- e) Claudin molecules form gap junctions that allow the passage of magnesium ions.

Answer: b

Difficulty: Medium

Learning Objective: LO 7.4 Discuss the details and functions of a tight junction.

Section Reference: Section 7.4 Tight Junctions: Sealing the Extracellular Space

84) Animals lacking the claudin-1 gene suffered from _____.

- a) uncontrolled water loss
- b) high salt loading
- c) low salt loading
- d) Mg^{2+} ion permeability
- e) constant, unremitting pain

Answer: a

Difficulty: Medium

Learning Objective: LO 7.4 Discuss the details and functions of a tight junction.

Section Reference: Section 7.4 Tight Junctions: Sealing the Extracellular Space

85) Despite the presence of the blood-brain barrier, what cells, oddly enough, can pass through the blood-brain barrier by sending a signal that opens up the junction?

- a) red blood cells
- b) immune system cells
- c) platelets
- d) complement cells
- e) epithelial cells

Answer: b

Difficulty: Medium

Learning Objective: LO 7.4 Discuss the details and functions of a tight junction.

Section Reference: Section 7.4 Tight Junctions: Sealing the Extracellular Space

86) The opening in the center of a connexon that allows the passage of solutes between cells is called a(n) _____.

- a) connexin
- b) annulus
- c) cumulous
- d) lunulus
- e) limulus

Answer: b

Difficulty: Easy

Learning Objective: LO 7.5 Compare and contrast plasmodesmata and gap junctions, focusing on structure and function.

Section Reference: Section 7.5 Gap Junctions and Plasmodesmata: Mediating Intercellular Communication

87) Each connexon in a gap junction is constructed of ____ connexin subunits.

- a) 2
- b) 4
- c) 6
- d) 8
- e) 10

Answer: c

Difficulty: Easy

Learning Objective: LO 7.5 Compare and contrast plasmodesmata and gap junctions, focusing on structure and function.

Section Reference: Section 7.5 Gap Junctions and Plasmodesmata: Mediating Intercellular Communication

88) During gap junction formation, connexons in apposing cells become tightly connected through extensive noncovalent interactions of _____.

- a) connexin subunit intracellular domains
- b) connexin subunit extracellular domains
- c) connexin carbohydrates
- d) connexin lipids

e) polynucleotides

Answer: b

Difficulty: Medium

Learning Objective: LO 7.5 Compare and contrast plasmodesmata and gap junctions, focusing on structure and function.

Section Reference: Section 7.5 Gap Junctions and Plasmodesmata: Mediating Intercellular Communication

89) What kind of molecule does not pass through a gap junction?

- a) ions
- b) cAMP
- c) inositol phosphates
- d) ribosomes
- e) cGMP

Answer: d

Difficulty: Medium

Learning Objective: LO 7.5 Compare and contrast plasmodesmata and gap junctions, focusing on structure and function.

Section Reference: Section 7.5 Gap Junctions and Plasmodesmata: Mediating Intercellular Communication

90) A new type of communication system has been discovered that consists of thin, highly elongated tubules capable of conducting cell-surface proteins, cytoplasmic vesicles and calcium signals from one cell to another. This system is referred to as _____.

- a) T tubules
- b) scanning tunneling EMs
- c) tunneling nanotypes
- d) tunneling nanotubes
- e) sarcoplasmic tubules

Answer: d

Difficulty: Easy

Learning Objective: LO 7.5 Compare and contrast plasmodesmata and gap junctions, focusing on structure and function.

Section Reference: Section 7.5 Gap Junctions and Plasmodesmata: Mediating Intercellular Communication

91) Which animal cell structure do plasmodesmata in plants most closely resemble?

- a) maculae adherens
- b) spot desmosomes
- c) zonulae adherens
- d) gap junctions
- e) zonulae occludens

Answer: d

Difficulty: Easy

Learning Objective: LO 7.5 Compare and contrast plasmodesmata and gap junctions, focusing on structure and function.

Section Reference: Section 7.5 Gap Junctions and Plasmodesmata: Mediating Intercellular Communication

92) What explains the fact that plants lack the specialized junctions seen in animal cells?

- a) the presence of the large central vacuole
- b) the presence of chloroplasts
- c) the presence of the cell wall
- d) the presence of mitochondria
- e) the absence of centrioles, basal bodies, cilia and flagellae

Answer: c

Difficulty: Hard

Learning Objective: LO 7.5 Compare and contrast plasmodesmata and gap junctions, focusing on structure and function.

Section Reference: Section 7.5 Gap Junctions and Plasmodesmata: Mediating Intercellular Communication

93) What lines the plasmodesmata?

- a) integral membrane proteins
- b) peripheral proteins
- c) carbohydrates
- d) the plasma membrane
- e) DNA

Answer: d

Difficulty: Medium

Learning Objective: LO 7.5 Compare and contrast plasmodesmata and gap junctions, focusing on structure and function.

Section Reference: Section 7.5 Gap Junctions and Plasmodesmata: Mediating Intercellular Communication

94) The dense central structure that is derived from the smooth endoplasmic reticulum and usually seen in the plasmodesmata is called a(n) _____.

- a) desmosome
- b) desmotubule
- c) hemidesmosome
- d) annulus
- e) desmoglein

Answer: b

Difficulty: Easy

Learning Objective: LO 7.5 Compare and contrast plasmodesmata and gap junctions, focusing on structure and function.

Section Reference: Section 7.5 Gap Junctions and Plasmodesmata: Mediating Intercellular Communication

95) From what cell organelle does the desmotubule appear to be derived?

- a) SER of the two cells
- b) RER of the two cells
- c) Golgi apparatus of the two cells
- d) secretory vesicles of the two cells
- e) cell wall of both cells

Answer: a

Difficulty: Easy

Learning Objective: LO 7.5 Compare and contrast plasmodesmata and gap junctions, focusing on structure and function.

Section Reference: Section 7.5 Gap Junctions and Plasmodesmata: Mediating Intercellular Communication

96) You are studying a plant and inject fluorescein, a fluorescent dye, into a single cell on the surface of the plant. After a brief period of time, the dye spreads to cells neighboring the

injected cell. What do you conclude?

- a) The cells are connected by the cell wall.
- b) The cells are connected by tight junctions.
- c) The cells are connected by gap junctions.
- d) The cells are connected by plasmodesmata.
- e) The cells are connected by zonulae adherens.

Answer: d

Difficulty: Hard

Learning Objective: LO 7.5 Compare and contrast plasmodesmata and gap junctions, focusing on structure and function.

Section Reference: Section 7.5 Gap Junctions and Plasmodesmata: Mediating Intercellular Communication

97) Which of the following is not a function of the plant cell wall?

- a) It allows plant cells to develop osmotic turgor pressure that pushes against their surrounding walls.
- b) It provides mechanical support for individual cells and serves as a type of "skeleton" for the whole plant.
- c) It protects cells against damage from mechanical abrasion, osmotic influx of water & pathogens.
- d) It prevents cell-cell interactions.
- e) It can be a source of signals that alter activities of cells that it contacts.

Answer: d

Difficulty: Medium

Learning Objective: LO 7.6 Distinguish between cellulose and hemicellulose, a cellulose molecule and a microfibril, a primary cell wall and a secondary cell wall.

Section Reference: Section 7.6 Cell Walls

98) The enzyme embedded in the plant cell membrane that catalyzes the growth of a cellulose molecule is called _____.

- a) cellulase
- b) cellulose synthase
- c) Rubisco
- d) PEP carboxylase
- e) cellulose transferase

Answer: b

Difficulty: Easy

Learning Objective: LO 7.6 Distinguish between cellulose and hemicellulose, a cellulose molecule and a microfibril, a primary cell wall and a secondary cell wall.

Section Reference: Section 7.6 Cell Walls

99) Which plant cell wall molecule is economically important as a component essential for the production of jams and jellies?

- a) hemicellulose
- b) pectin
- c) amylopectin
- d) proteins
- e) desmotubulin

Answer: b

Difficulty: Easy

Learning Objective: LO 7.6 Distinguish between cellulose and hemicellulose, a cellulose molecule and a microfibril, a primary cell wall and a secondary cell wall.

Section Reference: Section 7.6 Cell Walls

100) What class of plant cell proteins facilitates plant cell growth by causing a localized relaxation of the cell wall, which allows the cell to elongate at that site in response to turgor pressure generated within the cell?

- a) extensins
- b) desmins
- c) expansins
- d) protein kinases
- e) phosphatases

Answer: c

Difficulty: Easy

Learning Objective: LO 7.6 Distinguish between cellulose and hemicellulose, a cellulose molecule and a microfibril, a primary cell wall and a secondary cell wall.

Section Reference: Section 7.6 Cell Walls

101) What type of protein also seen in animal cells spans the plant plasma membrane and is thought to transmit signals from the cell wall to the cytoplasm?

- a) protein kinase
- b) catalase
- c) acid phosphatase
- d) succinate dehydrogenase
- e) adenylate cyclase

Answer: a

Difficulty: Medium

Learning Objective: LO 7.6 Distinguish between cellulose and hemicellulose, a cellulose molecule and a microfibril, a primary cell wall and a secondary cell wall.

Section Reference: Section 7.6 Cell Walls

102) Cell walls of young, undifferentiated plant cells must be able to grow along with the cells of which they are a part and thus exhibit extensibility. What are they known as?

- a) primary walls
- b) secondary walls
- c) expandophiles
- d) complete walls
- e) incomplete walls

Answer: a

Difficulty: Easy

Learning Objective: LO 7.6 Distinguish between cellulose and hemicellulose, a cellulose molecule and a microfibril, a primary cell wall and a secondary cell wall.

Section Reference: Section 7.6 Cell Walls

103) The thicker walls seen in mature plants that no longer allow extensive growth of the cell wall are known as _____.

- a) primary walls
- b) secondary walls
- c) nonexpandophiles
- d) complete walls
- e) incomplete walls

Answer: b

Difficulty: Easy

Learning Objective: LO 7.6 Distinguish between cellulose and hemicellulose, a cellulose

molecule and a microfibril, a primary cell wall and a secondary cell wall.
Section Reference: Section 7.6 Cell Walls

104) How is the structure of the mature plant cell wall similar to the structure of the corneal stroma of the chicken embryo?

- a) Both contain cellulose.
- b) Both contain adjacent layers of fibers that run parallel to each other.
- c) Both contain phospholipids.
- d) Both contain adjacent layers of fibers that are arranged perpendicular to each other.
- e) Both are composed of collagen.

Answer: d

Difficulty: Hard

Learning Objective: LO 7.6 Distinguish between cellulose and hemicellulose, a cellulose molecule and a microfibril, a primary cell wall and a secondary cell wall.
Section Reference: Section 7.6 Cell Walls

Question Type: Essay

105) A scientist is growing cartilage cells in culture. He accidentally spills into the culture enzymes that enzymatically digest the ECM surrounding the cartilage cells. What happens to the behavior of the cartilage cells? How could any change in behavior be reversed?

Answer:

Difficulty: Medium

Learning Objective: LO 7.1 List a few of the functions of the extracellular matrix in animal tissue, distinguishing between the glycocalyx, basement membrane, and extracellular matrix of cartilage tissue.

Section Reference: Section 7.1 The Extracellular Space

Solution: Following the enzymatic digestion, the cartilage cells exhibit a marked decrease in synthetic and secretory activities. If these ECM materials are added back to the culture, the differentiated state of the cells would be restored and they would begin to produce their usual cell products.

106) You are given a tissue that has a large fibrillar component. The fibers are aligned parallel to each other and the long axis of the tissue. What can you conclude about the pulling forces experienced by this tissue?

Answer:

Difficulty: Hard

Learning Objective: LO 7.1 List a few of the functions of the extracellular matrix in animal tissue, distinguishing between the glycocalyx, basement membrane, and extracellular matrix of cartilage tissue.

Section Reference: Section 7.1 The Extracellular Space

Solution: The pulling forces experienced by the tissue are aligned parallel to the direction of fiber alignment.

107) You study another tissue that also contains a fibrillar component. In this tissue, however, the fibers are arranged in layers with each layer perpendicular to those above and below it. In addition, the fibers are uniform in size. What properties would such a tissue have?

Answer:

Difficulty: Hard

Learning Objective: LO 7.1 List a few of the functions of the extracellular matrix in animal tissue, distinguishing between the glycocalyx, basement membrane, and extracellular matrix of cartilage tissue.

Section Reference: Section 7.1 The Extracellular Space

Solution: The perpendicular arrangement of the layers is like that in plywood and affords the tissue a great degree of strength. The uniformity of the size and arrangement of the fibers and their ordered packing would probably make the tissue transparent as long as the fibers themselves are not opaque, since the scattering of incoming light rays would be minimized.

108) Why would the collagen found in basement membranes have molecular arrangements and structure different from that found in other collagens and what are some of these differences?

Answer:

Difficulty: Medium

Learning Objective: LO 7.1 List a few of the functions of the extracellular matrix in animal tissue, distinguishing between the glycocalyx, basement membrane, and extracellular matrix of cartilage tissue.

Section Reference: Section 7.1 The Extracellular Space

Solution: The basement membrane is a thin, supportive sheet that must experience forces from a number of different directions. It must be strong and flexible. The collagen fibers of the basement membrane contain nonhelical segments unlike most collagen fibers, which have a long, uninterrupted triple helix. They also have globular domains at each end, which is atypical. The nonhelical segments give the collagen lattice flexibility, while the globular ends serve as the connection points for the lattice elements. Other extracellular materials are deposited on the latticework.

109) In the intercellular junctional complex, why is the tight junction closer to the surface of the epithelium (the apical end of the cell) than the belt desmosome?

Answer:

Difficulty: Hard

Learning Objective: LO 7.4 Discuss the details and functions of a tight junction.

Section Reference: Section 7.4 Tight Junctions: Sealing the Extracellular Space

Solution: As an example, consider the intestinal epithelium. The pH inside the intestinal lumen is extremely low. However, the tight junctions prevent leakage of the acidic contents of the intestines around the cells. If such leakage happened, the acid environment would be likely to damage the intercellular cement of the belt desmosomes and spot desmosomes. If the arrangement were reversed, the intestinal acids would be able to get to the belt desmosomes, easily destroying them. The tight junctions, which are not constructed to withstand much force, would then be torn out and the epithelium would be severely damaged.