*Biology for a Changing World 2e,* Chapter 13 Test Bank

1. A tissue is composed of

1. cells.
2. organs.
3. organ systems.
4. cells and organs.
5. cells and organ systems.

Answer: A

DQ: What is the structure of tissues and organs, and how can organs be repaired or replaced?

Type: Know It

Difficulty: Easy

Important Words/Concepts: tissues

2. Define the term *tissue*.

*Answer:* A tissue is composed of an integrated group of specialized cells that perform a specific function.

DQ: What is the structure of tissues and organs, and how can organs be repaired or replaced?

Type: Use It

Difficulty: Easy

Important Words/Concepts: tissues

3. A group of cells performing a similar function is described as

1. multicellular.
2. an organism.
3. an organ system.
4. an organ.
5. tissue.

Answer: E

DQ: What is the structure of tissues and organs, and how can organs be repaired or replaced?

Type: Know It

Difficulty: Easy

Important Words/Concepts: stem cells and differentiated cells

4. Somatic stem cells are found in

1. adult tissues.
2. embryonic tissues.
3. umbilical-cord blood.
4. germ tissue.
5. All of the above.

Answer: A

DQ: What is the structure of tissues and organs, and how can organs be repaired or replaced?

Type: Know It

Difficulty: Easy

Important Words/Concepts: regenerative medicine and somatic stem cells

5. A group of tissues working together perform the complex functions of

1. a tissue.
2. an organ.
3. an organ system.
4. an organism.
5. a bladder.

Answer: B

DQ: What is the structure of tissues and organs, and how can organs be repaired or replaced?

Type: Know It

Difficulty: Easy

Important Words/Concepts: stem cells and differentiated cells

6. Organs are composed of

1. one type of cell.
2. one type of tissue.
3. at least two tissues.
4. more than three cell types.
5. None of the above.

Answer: C

DQ: What is the structure of tissues and organs, and how can organs be repaired or replaced?

Type: Know It

Difficulty: Easy

Important Words/Concepts:organ, tissue, cell

7. An organ is composed of

1. three cell types.
2. at least two specialized tissues.
3. at least 10 specialized cell types.
4. one or more tissue types.
5. groups of cells randomly arranged around a scaffold.

Answer: B

DQ: What is the structure of tissues and organs, and how can organs be repaired or replaced?

Type: Know It

Difficulty: Hard

Important Words/Concepts: organ

8. The bladder is composed of multiple tissues. This organization is beneficial because

1. each specialized cell type provides function to the organ.
2. one tissue type would not be functional.
3. having more then one tissue present makes stem-cell harvesting easier.
4. All of the above.
5. None of the above.

Answer: A

DQ: What is the structure of tissues and organs, and how can organs be repaired or replaced?

Type: Know It

Difficulty: Easy

Important Words/Concepts: organ, tissue, cell, organization

9. The formation of an organ through the use of stem cells differentiated into multiple cell types. However, which of the following presents a hurdle to regenerating a new organ to replace a defective one?

1. Many organs contain multiple specialized cell types in an intricate design.
2. Nerve innervation is necessary for the proper function of some organs.
3. Proper blood supply to all the regenerated cells is necessary for the survival of organs.
4. A and C
5. All of the above.

Answer: E

DQ: What is the structure of tissues and organs, and how can organs be repaired or replaced?

Type: Use It

Difficulty: Hard

Important Words/Concepts:organ, tissue, cell, organization

10. Put these terms in order from least complex to most complex: organ system, tissue, cell, organ.

*Answer:* cell, tissue, organ, organ system

DQ: What is the structure of tissues and organs, and how can organs be repaired or replaced?

Type: Use It

Difficulty: Easy

Important Words/Concepts: cells, tissues, organs and organ systems

11. Which of the following is placed in the correct order of increasing complexity?

1. circulatory system→cardiac muscle→heart→cardiac cell
2. circulatory system→heart→cardiac muscle→cardiac cell
3. cardiac cell→heart→cardiac muscle→circulatory system
4. cardiac cell→cardiac muscle→heart→circulatory system
5. cardiac cell→heart→cardiac muscle→circulatory system

Answer: D

DQ: What is the structure of tissues and organs, and how can organs be repaired or replaced?

Type: Know It

Difficulty: Easy

Important Words/Concepts:cell, organ, system, tissue

12. The organization of cells from least to most complex is

1. organ system, organ, tissue, cell.
2. cell, organ, tissue, organ system
3. organs, organ system, tissue, cell.
4. cell, tissue, organ, organ system.
5. cell, tissue, organ system organ.

Answer: D

DQ: What is the structure of tissues and organs, and how can organs be repaired or replaced?

Type: Know It

Difficulty: Easy

Important Words/Concepts:stem cells and differentiated cells

13. Although organ transplants are an available treatment option, which of the following describes potential risks of this approach?

1. The demand for organs such as hearts, livers, and kidneys is greater than the supply.
2. Rejection of the transplanted organ can result in a loss of organ function or potential harm to the patient.
3. Transplantation surgeries do not always produce successful functional organs in the transplanted patient.
4. B and C
5. All of the above.

Answer: E

DQ: What is the structure of tissues and organs, and how can organs be repaired or replaced?

Type: Know It

Difficulty: Hard

Important Words/Concepts: stem cells, regenerated organs, transplant

14. What is/are the challenges facing organ regeneration using stem cells?

1. Organs are highly complex, some containing many types of tissues, all of which would need to be assembled via regenerated tissues (stem cells).
2. Organs are innervated; these connections are difficult to reassemble in regenerated organs.
3. It is difficult to get an engineered organ to function normally when transplanted.
4. We do not know all of the genes involved in regulating a cell, particularly stem cells.
5. All of the above.

Answer: E

DQ: What is the structure of tissues and organs, and how can organs be repaired or replaced?

Type: Know It

Difficulty: Easy

Important Words/Concepts: stem cells, regenerated organs, transplant

15. Stem-cell therapy

1. is not current practice.
2. has been used successfully for years.
3. is still undergoing clinical trials.
4. will be successful in the future.
5. is on its way out.

Answer: B

DQ: What is the structure of tissues and organs, and how can organs be repaired or replaced?

Type: Know It

Difficulty: Easy

Important Words/Concepts: regenerative medicine and somatic stem cells

16. It would be beneficial to generate an organ out of one’s own stem cells because

1. the chances of rejection are decreased because the cells are from the patient’s own body.
2. the chance of rejection is higher because the patient’s immune system would identify the cells as foreign .
3. it is easier to harvest stem cells from the patient rather than a donor.
4. organs grown from stem cells are more efficient.
5. All of the above.

Answer: A

DQ: What is the structure of tissues and organs, and how can organs be repaired or replaced?

Type: Use It

Difficulty: Hard

Important Words/Concepts: stem cells, organ, immune system

17. Explain why growing your own organs is biologically better than implanting an organ from a donor.

*Answer:* Your body will recognize organs grown from your own cells, eliminating the need for antirejection medicines. Antirejection medicines lower overall immunity, leaving the body at risk of infection and even death.

DQ: What is the structure of tissues and organs, and how can organs be repaired or replaced?

Type: Use It

Difficulty: Easy

Important Words/Concepts:organ rejection

18. You have just received a large cut from a kitchen knife. Over the following week, you observe this cut healing and note that the cut appears to heal from the edges toward the middle. Why do you think this is? Why doesn’t the cut heal from the middle toward the edge or from both directions at once?

*Answer:* Cuts heal from the outside in because new skin cells can only be created by the division of existing skin cells, which are on the edges of a cut.

DQ: What is the structure of tissues and organs, and how can organs be repaired or replaced?

Type: Use It

Difficulty: Hard

Important Words/Concepts:differentiation, healing

19. Salamanders have often been looked at as a source of inspiration for tissue regeneration. However, there is a fundamental difference in how tissue in a salamander and tissue in a human heals after being wounded. For both humans and salamanders, describe the result of the healing process and include the primary function of each.

*Answer:* Both humans and salamanders heal after being injured. The healing process of salamanders results in the regeneration of new tissue to replace the injured area. Humans heal through a different process, whereby scar tissue is formed and provides a protective seal from the outside world.

DQ: What is the structure of tissues and organs, and how can organs be repaired or replaced?

Type: Use It

Difficulty: Hard

Important Words/Concepts:differentiation, healing

20. What is the primary hurdle in the healing process of humans that must be bypassed when compared with the tissue regeneration of a salamander?

1. organ rejection
2. tissue development
3. development of scar tissue
4. regeneration of a new tissue
5. differential regeneration

Answer: C

DQ: What is the structure of tissues and organs, and how can organs be repaired or replaced?

Type: Use It

Difficulty: Hard

Important Words/Concepts:differentiation, healing

21. In regenerative therapies, drugs are used to stimulate stem cells to create replacement cells. Compare the timing of drug applications in the two major methods of regenerative therapy (therapeutic drugs and cell therapy).

*Answer:* In cell therapy, the drugs are added to cultures of stem cells, causing them to differentiate into the type of needed cell. Then those cells are injected into the patient. In therapeutic drug therapy, the drugs are injected into the patient, with the aim of stimulating the stem cells within the patient’s body to start dividing and differentiating into the needed cell type.

DQ: What is the structure of tissues and organs, and how can organs be repaired or replaced?

Type: Use It

Difficulty: Hard

Important Words/Concepts**:** regenerative therapy

22. If cardiac tissue is injured, for example in the case of a heart attack, which cells could be used to heal the injury?

1. heart stem cells
2. differentiated cardiac cells
3. embryonic stem cells
4. All of the above.
5. A and C

Answer: E

DQ: What is the structure of tissues and organs, and how can organs be repaired or replaced?

Type: Know It

Difficulty: Hard

Important Words/Concepts: cell division, differentiation, development

23. The difficulties involved in growing a replacement organ include all of the following, EXCEPT

1. scientists have not yet figured out how to make biodegradable scaffolds on which to grow the tissues.
2. organs are made from many different types of stem cells.
3. the larger the organ, the more complex it is.
4. most organs require other associated tissues, such as specialized nerves and muscles.
5. usually a biopsy is required to obtain the stem cells, thus resulting in multiple surgeries.

Answer: A

DQ: What is the structure of tissues and organs, and how can organs be repaired or replaced?

Type: Know It

Difficulty: Easy

Important Words/Concepts: replacement organ, transplant

24. Which organ has been successfully reconstructed using tissue engineering?

1. kidney
2. liver
3. heart
4. bladder
5. All of the above.

Answer: D

DQ: What is the structure of tissues and organs, and how can organs be repaired or replaced?

Type: Know It

Difficulty: Easy

Important Words/Concepts:tissue engineering

25. To engineer a human bladder requires

1. a bladder biopsy, tissue growth on a scaffold, and transplant surgery.
2. stem cell isolation from a bladder biopsy and transplant surgery.
3. a bladder biopsy, stem cell isolation and growth on a scaffold, and transplant surgery.
4. a donor bladder, growth on a scaffold, and replacement surgery.
5. surgery for removal of the bladder and replacement with a donor bladder.

Answer: C

DQ: What is the structure of tissues and organs, and how can organs be repaired or replaced?

Type: Know It

Difficulty: Hard

Important Words/Concepts: tissue engineering

26. Describe the process of building a replacement organ from stem cells.

*Answer:* Biopsy→grow cells in lab→layer stem cells on scaffold→add nutrients→allow cells to grow→replace diseased tissues with newly grown tissue

DQ: What is the structure of tissues and organs, and how can organs be repaired or replaced?

Type: Know It

Difficulty: Easy

Important Words/Concepts:replacement organ, transplant

27. Why is growing a bladder more difficult than growing skin?

1. The bladder has more than one cell type.
2. The bladder has a more complicated architecture.
3. Growing a bladder requires stem-cell isolation from several bladder tissue types.
4. Skin cells are easier to grow since they grow in a sheet.
5. All of the above.

Answer: E

DQ: What is the structure of tissues and organs, and how can organs be repaired or replaced?

Type: Know It

Difficulty: Easy

Important Words/Concepts: bladder, epidermis, replacement organ

28. What is one major benefit of using drugs for regenerative therapy versus stem-cell therapy?

1. Drug therapy is less invasive because it does not require surgery or injections.
2. Drugs can specifically target one cell, whereas stem-cell therapy is not specific.
3. Drug therapy uses cells from the patient, so side effects are unlikely.
4. Drug therapy has fewer side effects than stem-cell therapy.
5. All of the above.

Answer: A

DQ: What is the structure of tissues and organs, and how can organs be repaired or replaced?

Type: Know It

Difficulty: Hard

Important Words/Concepts: stem cells, regenerative therapy, drugs

29. \_\_\_\_ is a decades old example of successful stem cell therapy.

1. Kidney transplants
2. Liver transplants
3. Bone-marrow transplants
4. Heart transplants
5. None of the above.

Answer: C

DQ: What is the structure of tissues and organs, and how can organs be repaired or replaced?

Type: Use it

Difficulty: Easy

Important Words/Concepts: stem cell therapy

30. Which of the following describes a process in development by which complex tissues and organs can be created outside the body from differentiated stem cells using a modified 3D printer?

1. biospraying
2. stem-printing
3. print transplantation
4. bioprinting
5. regenerative printing

Answer: D

DQ: What is the structure of tissues and organs, and how can organs be repaired or replaced?

Type: Use it

Difficulty: Easy

Important Words/Concepts:stem cell therapy

31. Stem cells are found in

1. bone marrow.
2. umbilical-cord blood.
3. brain tissue.
4. skin.
5. All of the above.

Answer: E

DQ: What are the properties of specialized cells in tissues, and how do stem cells differentiate into these specialized cells?

Type: Know It

Difficulty: Easy

Important Words/Concepts:stem cells produce themselves and cells that become specialized

32. When a stem cell divides, the result is

1. two red blood cells.
2. two of any type of specialized cell.
3. a stem cell and a cell that can become specialized.
4. two cells, each of which can become specialized.
5. two neural, cardiac, or blood cells.

Answer: C

DQ: What are the properties of specialized cells in tissues, and how do stem cells differentiate into these specialized cells?

Type: Know It

Difficulty: Easy

Important Words/Concepts:stem cells produce themselves and cells that become specialized

33. Put the following types of stem cells in order from LEAST useful in regenerative medicine to MOST useful.

* 1. pluripotent→multipotent→totipotent→adult
  2. totipotent→pluripotent→multipotent→adult
  3. adult→totipotent→multipotent→pluripotent
  4. adult→pluripotent→multipotent→totipotent
  5. adult→multipotent→pluripotent→totipotent

Answer: E

DQ: What are the properties of specialized cells in tissues, and how do stem cells differentiate into these specialized cells?

Type: Know It

Difficulty:Easy

Important Words/Concepts: multipotent, pluripotent, regenerative medicine, totipotent, transplant

34. Which of the following cell types can become the greatest number of other cell types?

1. a cell from a blastocyst
2. a bone-marrow cell
3. a skin stem cell
4. a skin cell
5. a neural stem cell

Answer: A

DQ: What are the properties of specialized cells in tissues, and how do stem cells differentiate into these specialized cells?

Type: Know It

Difficulty: Hard

Important Words/Concepts: stem cells

35. Cells from an early embryo (preblastocyst) are

1. omnipotent.
2. multipotent.
3. pluripotent.
4. totipotent.
5. quasipotent.

Answer: D

DQ: What are the properties of specialized cells in tissues, and how do stem cells differentiate into these specialized cells?

Type: Know It

Difficulty: Hard

Important Words/Concepts: stem cells

36. Compare a multipotent stem cell with a pluripotent stem cell, using at least one example for each.

*Answer:* Multipotent means that the stem-cell type can only produce a limited number of types of cells, such as a bone-marrow cell that can only produce blood cells. A pluripotent stem cell can produce any type of cell in the body (e.g., heart muscle, skin cell, red blood cell, etc). Only early embryonic cells are pluripontent.

DQ: What are the properties of specialized cells in tissues, and how do stem cells differentiate into these specialized cells?

Type: Use It

Difficulty: Easy

Important Words/Concepts:stem cells

37. Explain the difference between multipotent, pluripotent, and totipotent stem cells. Which one(s) is/are likely to be adult stem cells, and which one(s) is/are likely to be embryonic stem cells?

*Answer:* Multipotent stem cells have the ability to differentiate into just a few types of similar tissue. Pluripotent stem cells have the ability to differentiate into nearly any type of tissue. Totipotent stem cells have the ability to differentiate into every type of tissue. Multipotent stem cells are most likely to be adult stem cells, while pluripotent and totipotent stem cells are more likely to be embryonic.

DQ: What are the properties of specialized cells in tissues, and how do stem cells differentiate into these specialized cells?

Type: Know It

Difficulty: Hard

Important Words/Concepts:adult stem cell, embryonic stem cell, multipotent, pluripotent, totipotent

38. List the following in order from LEAST to MOST specialized cells.

1. somatic stem cells
2. preblastocyst cells
3. inner cell mass from blastocyst
4. liver cells

*Answer:* B, C, A, and D

DQ: What are the properties of specialized cells in tissues, and how do stem cells differentiate into these specialized cells?

Type: Know It

Difficulty: Easy

Important Words/Concepts:embryonic stem cells

39. Adult somatic stem cells usually give rise to

1. multipotent cells.
2. pluripotent cells.
3. multipotent and pluripotent cells.
4. totipotent cells.
5. totipotent and pluripotent cells.

Answer: A

DQ: What are the properties of specialized cells in tissues, and how do stem cells differentiate into these specialized cells?

Type: Know It

Difficulty: Easy

Important Words/Concepts: embryonic stem cells

40. A cell is specialized when it

1. undergoes cell division.
2. is undifferentiated.
3. performs a specific function.
4. undergoes apoptosis.
5. is a stem cell.

Answer: C

DQ: What are the properties of specialized cells in tissues, and how do stem cells differentiate into these specialized cells?

Type: Know It

Difficulty: Easy

Important Words/Concepts:stem cells and differentiated cells

41. A heart cell is considered to be a specialized cell because

1. it only expresses heart genes.
2. it only makes proteins specific to the heart.
3. it occurs only in the heart and nowhere else.
4. without manipulation in a laboratory, it has lost the ability to differentiate into other, nonheart cells.
5. All of the above.

Answer: E

DQ: What are the properties of specialized cells in tissues, and how do stem cells differentiate into these specialized cells?

Type: Know It

Difficulty: Easy

Important Words/Concepts:differentiation, gene expression, specialized, unspecialized

42. Stem cells

1. can only come from a fertilized egg.
2. are predesignated to become a particular type of cell.
3. cannot be collected because they are too difficult to isolate.
4. can become any type of cell given the proper signal.
5. can only come from one source.

Answer: D

DQ: What are the properties of specialized cells in tissues, and how do stem cells differentiate into these specialized cells?

Type: Know It

Difficulty: Easy

Important Words/Concepts:stem cells, specialized cells, immature cells

43. A cell that has matured into a specialized cell with a specific function is referred to as

1. a stem cell.
2. an egg.
3. a somatic stem cell.
4. a differentiated cell.
5. All of the above.

Answer: D

DQ: What are the properties of specialized cells in tissues, and how do stem cells differentiate into these specialized cells?

Type: Know It

Difficulty: Easy

Important Words/Concepts:cell, stem cell, specialized cell, differentiated

14. Specialized cells called \_\_\_\_\_\_\_ are found in most tissues. These cells divide to give rise to more cells of that tissue.

1. mother cells
2. stem cells
3. regenerative cells
4. core cells
5. embryonic cells

Answer: B

DQ: What are the properties of specialized cells in tissues, and how do stem cells differentiate into these specialized cells?

Type: Know It

Difficulty: Easy

Important Words/Concepts: stem cells

45. Why are some cells in your body younger than others? What determines how often a particular cell type needs to be replaced? Name one cell type that is regenerated frequently and one cell type that is rarely replaced.

*Answer:* Cells that are used a lot or are exposed to harsh environments wear out quickly and need to be replaced more often than cells that are used less frequently. Skin and blood are examples of cells that are regenerated frequently, while the lens of the eye and neurons are never replaced.

DQ: What are the properties of specialized cells in tissues, and how do stem cells differentiate into these specialized cells?

Type: Know It

Difficulty: Hard

Important Words/Concepts: age, regeneration

46. Explain how cells with the same DNA can make different proteins.

*Answer:* All cells have the same DNA; however, that DNA is expressed differently in different cells. To make proteins, DNA must first unwind to make RNA. Cells have ways of determining which DNA unwinds; therefore, they regulate which proteins are made.

DQ: What are the properties of specialized cells in tissues, and how do stem cells differentiate into these specialized cells?

Type: Use It

Difficulty: Easy

Important Words/Concepts: gene expression

47. Explain how differential gene expression can cause different cells to have different shapes and functions.

*Answer:* Differential gene expression means that two cells are unwinding different parts of the DNA, resulting in different proteins being expressed from those genes. The shape of the cell is determined by the types and amounts of specific proteins within the cell, especially by the proteins that compromise the cytoskeleton. Different proteins means the cells could have different shapes, and the cellular shape—along with gene expression of other proteins, such as enzymes—provide functional differences.

DQ: What are the properties of specialized cells in tissues, and how do stem cells differentiate into these specialized cells?

Type: Use It

Difficulty: Hard

Important Words/Concepts:differential gene expression

48. Differential gene expression refers to

1. the process by which a cell can make multiple different proteins from a single gene.
2. the process by which a particular cell alters the protein made by a gene.
3. the process by which different cell types use different groups of genes to make protein.
4. the process by which different cell types use the same gene to make different proteins.
5. the process by which different cell types use different genes to make the same protein.

Answer: C

DQ: What are the properties of specialized cells in tissues, and how do stem cells differentiate into these specialized cells?

Type: Know It

Difficulty: Hard

Important Words/Concepts:differentiation, gene expression

49. As every cell in our body has the same genome, what is the basic difference between cells with unique functions?

1. stem cells
2. the cell’s genome
3. mitosis
4. cell differentiation
5. gene expression

Answer: E

DQ: What are the properties of specialized cells in tissues, and how do stem cells differentiate into these specialized cells?

Type: Know It

Difficulty: Easy

Important Words/Concepts:specialized cells and gene expression

50. You carry out somatic-cell nuclear transfer, using an egg and a skin cell. In this scenario, the offspring produced will be

1. genetically identical to the surrogate mother.
2. genetically identical to the mother of the egg donor.
3. genetically identical to the mother of the skin cell donor.
4. genetically identical to the mother of the surrogate mother.
5. genetically identical to the skin cell donor.

Answer: E

DQ: What are the properties of specialized cells in tissues, and how do stem cells differentiate into these specialized cells?

Type: Know It

Difficulty: Easy

Important Words/Concepts: cloning

51. Differential gene expression is

1. use of a unique set of genes in each cell type.
2. the pathway to a cells specialization.
3. required for different cell types.
4. required for a cell’s function and physical shape.
5. All of the above.

Answer: E

DQ: What are the properties of specialized cells in tissues, and how do stem cells differentiate into these specialized cells?

Type: Know It

Difficulty: Hard

Important Words/Concepts:specialized cells and gene expression

52. Why does a hepatocyte (liver cell) look and function differently from a neuron (brain cell)?

1. Different genes are turned on and off in each cell.
2. They originate from different cells.
3. They have different genes in them.
4. They have the same genes, but there are mutations in one cell’s DNA that make it different.
5. All of the above.

Answer: A

DQ: What are the properties of specialized cells in tissues, and how do stem cells differentiate into these specialized cells?

Type: Know It

Difficulty: Hard

Important Words/Concepts:cell, gene regulation

53. When an egg is fertilized by a sperm, all of the following result, EXCEPT

1. a cell that will continue to divide, giving rise to all the cells of the body.
2. a mass of cells that will include stem cells.
3. a cell that will divide and give rise to cells with different DNA.
4. a cell that will divide and give rise to cells with the exact same DNA.
5. All of the above occur.

Answer: C

DQ: What are the properties of specialized cells in tissues, and how do stem cells differentiate into these specialized cells?

Type: Know It

Difficulty: Hard

Important Words/Concepts: cell, stem cells, development, DNA

54. The term “differential gene expression” refers to

1. specialized cells transcribing all genes but only translating a few genes.
2. specialized cells translating all genes but only transcribing a few genes.
3. specialized cells transcribing and translating only a few genes.
4. specialized cells neither transcribing nor translating any genes in the genome.
5. specialized cells transcribing and translating every gene but then quickly destroying the proteins the cell does not need.

Answer: C

DQ: What are the properties of specialized cells in tissues, and how do stem cells differentiate into these specialized cells?

Type: Know It

Difficulty: Hard

Important Words/Concepts:differentiation, gene expression, specialized, unspecialized

55. All of the following are true of adult stem cells, EXCEPT

A. they are also called somatic stem cells.

B. they have the ability to differentiate into every kind of cell in the human body.

C. they are found in many different tissue types.

D. scientists are unsure where they reside in most tissues.

E. they are triggered to divide by disease or injury.

Answer: B

DQ: What are the properties of specialized cells in tissues, and how do stem cells differentiate into these specialized cells?

Type: Know It

Difficulty: Easy

Important Words/Concepts: adult stem cell

56. How can a blastocyst, which is basically a mass of cells, develop into different tissues, organs, systems, and ultimately a fetus?

1. Chemicals enter the cells, causing them to become different tissues.
2. Chemical signals cause the production of genes.
3. Chemical signals cause the regulation of genes and production of particular proteins.
4. Chemical signals cause the regulation of proteins that will produce the appropriate genes.
5. Chemical signals cause all cells to develop into one type of organ that splits off into all the organs of the body.

Answer: C

DQ: What are the properties of specialized cells in tissues, and how do stem cells differentiate into these specialized cells?

Type: Use It

Difficulty: Hard

Important Words/Concepts**:** stem cells, chemical signal, gene regulation, blastocyst

57. Which of the following cell types is MOST differentiated?

1. zygote cell
2. bone-marrow cell
3. neuron from the cerebral cortex
4. neural stem cell
5. mesenchymal stem cell

Answer: C

DQ: What are the properties of specialized cells in tissues, and how do stem cells differentiate into these specialized cells?

Type: Know It

Difficulty: Easy

Important Words/Concepts: differentiation

58. Adult somatic stem cells can become pluripotent by

1. inserting specific genes into the cells.
2. switching certain genes on.
3. adding certain chemicals to the growth media.
4. reprogramming the cells.
5. All of the above.

Answer: E

DQ: What are the properties of specialized cells in tissues, and how do stem cells differentiate into these specialized cells?

Type: Know It

Difficulty: Easy

Important Words/Concepts:dedifferentiation

59. Dedifferentiation is the process of

1. an adult cell becoming multipotent.
2. an adult somatic cell becoming pluripotent.
3. an adult somatic cell becoming totipotent.
4. reprogramming the cells to divide.
5. All of the above.

Answer: B

DQ: What are the properties of specialized cells in tissues, and how do stem cells differentiate into these specialized cells?

Type: Know It

Difficulty: Hard

Important Words/Concepts: dedifferentiation

60. What is/are the main difference(s) between induced and embryonic stem cells?

1. Induced stem cells have genes added to them.
2. Embryonic stem cells come from embryos.
3. Induced stem cells come from differentiated cells.
4. Induced stem cells are genetically engineered.
5. All of the above.

Answer: E

DQ: What are the properties of specialized cells in tissues, and how do stem cells differentiate into these specialized cells?

Type: Know It

Difficulty: Easy

Important Words/Concepts: stem cells, cloning, therapeutic, reproductive

61. What was the major discovery in tissue engineering that advanced the field to where it is today?

1. the use of scaffolds to grow organs
2. tissue antirejection techniques
3. stem-cell isolation from adult tissues
4. A and C
5. All of the above.

Answer: D

DQ: How do stem cells contribute to regenerative medicine, and how can we obtain or produce stem cells for this purpose?

Type: Know It

Difficulty: Easy

Important Words/Concepts:scaffold, transplant, replacement organ, stem cell history

62. List at least four difficulties associated with developing a replacement organ that scientists have had to overcome, and still have yet to overcome.

*Answer:*

Scientists do not always know where stem cells are located.

Scientists do not always know how to induce stem cells to differentiate into the desired tissue type.

Scientists have had to develop biodegradable scaffolds on which to grow tissues.

Only a limited number of adult organs have stem cells that scientists know how to induce to differentiate.

Scientists have to deal with ethical problems associated with embryonic stem cells.

Scientists have had to try to turn adult stem cells into pluripotent stem cells.

Most organs have multiple tissue types, which require multiple types of stem cells.

Harvesting stem cells usually requires a biopsy, thus increasing the number of necessary surgeries.

The larger the organ, the more complex it is and the more difficult it is to create.

Most organs have other associated tissues that are required for proper organ function, such as complex vasculature, musculature, and innervation.

DQ: How do stem cells contribute to regenerative medicine, and how can we obtain or produce stem cells for this purpose?

Type: Know It

Difficulty: Hard

Important Words/Concepts: replacement organ, transplant

# 

63. Why do researchers think embryonic stem cells offer more hope than adult stem cells?

*Answer:* Theoretically, an embryonic stem cell can become any type of cell, whereas adult stems cells are much more limited. Each adult stem cell can only become a few cell types. Once we learn to manipulate stem cells even better, embryonic stem-cell cultures offer more possibilities.

DQ: How do stem cells contribute to regenerative medicine, and how can we obtain or produce stem cells for this purpose?

Type: Use It

Difficulty: Easy

Important Words/Concepts: stem cells

64. What is one major benefit of using stem-cell therapies for regenerative therapy versus drugs?

1. Stem-cell therapy is less invasive because it does not require surgery or injections.
2. Stem-cell therapy can specifically target one cell type, whereas drug therapy is less specific.
3. Stem-cell therapy allows the patient to recover more quickly.
4. Stem-cell therapy is generally easier and less expensive than drug therapy.
5. All of the above.

Answer: B

DQ: How do stem cells contribute to regenerative medicine, and how can we obtain or produce stem cells for this purpose?

Type: Know It

Difficulty: Hard

Important Words/Concepts: stem cells, regenerative therapy, drugs

65. In stem cell therapy, \_\_\_\_\_\_\_\_ is/are treated with drugs to cause stem cells to divide and differentiate.

1. cells removed from a related donor
2. the patient
3. a cell donor
4. embryonic stem cells
5. cells removed from the patient

Answer: E

DQ: How do stem cells contribute to regenerative medicine, and how can we obtain or produce stem cells for this purpose?

Type: Know It

Difficulty: Easy

Important Words/Concepts: cell therapy

66. Why are scientists so optimistic about using stem cells in regenerative medicine?

1. If we can use adult stem cells and reprogram them for therapeutic use, we would have an unlimited supply of cells to use.
2. Reprogramming adult cells means we can use patients’ cells and circumvent many of the rejection problems that arise in transplantation.
3. Use of adult stem cells makes research and development much easier and less controversial.
4. All of the above.
5. None of the above.

Answer: D

DQ: How do stem cells contribute to regenerative medicine, and how can we obtain or produce stem cells for this purpose?

Type: Know It

Difficulty: Hard

Important Words/Concepts: stem cells, regenerative therapy, drugs

67. What is the difference between a stem-cell transplant and regenerative stem-cell therapy?

*Answer:* A stem-cell transplant involves stem cells differentiating into the type of cell they came from, while regenerative stem-cell therapy seeks to induce stem cells to become any type of cell.

DQ: How do stem cells contribute to regenerative medicine, and how can we obtain or produce stem cells for this purpose?

Type: Know It

Difficulty: Hard

Important Words/Concepts: regenerative medicine, transplant

68. Dolly was cloned using

1. in vitro fertilization.
2. somatic cell nuclear transfer.
3. regenerative therapy.
4. stem-cell therapy.
5. therapeutic cloning.

Answer: B

DQ: How do stem cells contribute to regenerative medicine, and how can we obtain or produce stem cells for this purpose?

Type: Know It

Difficulty: Easy

Important Words/Concepts: somatic-cell nuclear transfer and reproductive cloning

69. Explain the difference between therapeutic cloning and reproductive cloning.

*Answer:* Both processes start with the creation of cloned embryos by inserting a diploid nucleus into an enucleated egg cell. The goal of reproductive cloning is to create a whole organism. The goal of therapeutic cloning is to create an organ or specialized tissue type, rather than a whole organism. Reproductive cloning research is banned in the United States, but therapeutic cloning research is allowed.

DQ: How do stem cells contribute to regenerative medicine, and how can we obtain or produce stem cells for this purpose?

Type: Use It

Difficulty: Hard

Important Words/Concepts:therapeutic cloning and reproductive cloning

70. Although there have been many successes in stem cell research, scientists still face all of the following challenges, EXCEPT

1. how to take a biopsy.
2. how to grow large organs.
3. how to grow complex organs.
4. how to find stem cells in certain types of organs.

Answer: A

DQ: How do stem cells contribute to regenerative medicine, and how can we obtain or produce stem cells for this purpose?

Type: Know It

Difficulty: Easy

Important Words/Concepts:regenerative medicine, transplant

71. Each of the following describe the 4 main approaches to regenerative medicine using stem cells, EXCEPT

1. biodegradable scaffolds are used to regenerate new tissues and organs outside the body and then are surgically inserted into the body.
2. drugs artificially stimulate stem cells within the body to regenerate tissues.
3. stem cells are stimulated outside the body and then injected back in to regenerate tissue.
4. stem cells from one individual are used to regenerate new tissues by surgically injecting them into a different individual.
5. biodegradable materials are implanted in the body to serve as a stem cell scaffold for tissue regeneration.

Answer: D

DQ: How do stem cells contribute to regenerative medicine, and how can we obtain or produce stem cells for this purpose?

Type: Know It

Difficulty: Easy

Important Words/Concepts: regenerative medicine, transplant

72. All of the following are true of stem cells, EXCEPT

1. they can be induced to grow in the lab.
2. they show great potential for tissue and organ transplants.
3. they can differentiate into many types of tissues.
4. they are undifferentiated.
5. they are only found in embryos.

Answer: E

DQ: How do stem cells contribute to regenerative medicine, and how can we obtain or produce stem cells for this purpose?

Type: Know It

Difficulty: Easy

Important Words/Concepts: differentiation, stem cell

73. Why would you need to isolate more than one type of stem cell when growing a replacement organ?

1. More than one type of stem cell is grown in case one type does not survive.
2. Growing replacement organs requires at least three types of stem cells.
3. Different tissues have different stem cells.
4. Organs are composed of more than one type of tissue.
5. C and D

Answer: E

DQ: How do stem cells contribute to regenerative medicine, and how can we obtain or produce stem cells for this purpose?

Type: Know It

Difficulty: Hard

Important Words/Concepts: stem cell, transplant, replacement organ

74. A biopsy of a human bladder would contain which types of stem cells?

1. urothelial, connective, and muscle
2. urothelial and connective
3. urothelial and muscle
4. connective and muscle
5. connective and urothelial

Answer: C

DQ: How do stem cells contribute to regenerative medicine, and how can we obtain or produce stem cells for this purpose?

Type: Know It

Difficulty: Hard

Important Words/Concepts:tissue engineering

75. When growing a replacement organ, what is the next step in the process after the doctor takes a biopsy of a patient’s organ?

1. give the patient antirejection drugs
2. replace the diseased tissue with the new cells
3. grow the isolated cells on a scaffold
4. isolate and grow the stem cells from the organ
5. None of the above.

Answer: D

DQ: How do stem cells contribute to regenerative medicine, and how can we obtain or produce stem cells for this purpose?

Type: Know It

Difficulty: Hard

Important Words/Concepts:stem cell, transplant, replacement organ

76. The difference between stem-cell transplants and regenerative stem-cell therapy is that

1. stem-cell transplants involve stem cells differentiating into the type of cell they came from, while regenerative stem-cell therapy seeks to induce stem cells to become any type of cell.
2. regenerative stem-cell therapy involves stem cells differentiating into the type of cell they came from, while stem-cell transplants seek to induce stem cells to become any type of cell.
3. stem-cell transplants have already been successful, while there has not yet been a successful instance of regenerative stem-cell therapy.
4. regenerative stem-cell therapy has already been successful, while there has not yet been a successful instance of a stem-cell transplant.
5. stem cells used for transplants come from embryonic cells, while stem cells used for regenerative therapy come from adult cells.

Answer: A

DQ: How do stem cells contribute to regenerative medicine, and how can we obtain or produce stem cells for this purpose?

Type: Know It

Difficulty: Hard

Important Words/Concepts:regenerative medicine, transplant

77. Where do adult stem cells come from?

1. differentiated adult cells
2. the patients themselves
3. undifferentiated tissue specific cells
4. B and C
5. All of the above.

Answer: D

DQ: How do stem cells contribute to regenerative medicine, and how can we obtain or produce stem cells for this purpose?

Type: Know It

Difficulty: Hard

Important Words/Concepts: stem cells, regenerative therapy, adult stem cells

78. How can embryonic stem cells be created in a lab?

1. The nucleus of an egg is transplanted into a sperm, which artificially fertilizes a new egg.
2. The nucleus of an egg is removed, and a new nucleus from an adult donor cell is transplanted into the egg.
3. The nucleus of a sperm is transplanted into an egg.
4. The nucleus of an egg is removed, and a new nucleus from a sperm is transplanted into the egg.
5. The nucleus of an egg is transplanted into an adult donor cell.

Answer: B

DQ: How do stem cells contribute to regenerative medicine, and how can we obtain or produce stem cells for this purpose?

Type: Use It

Difficulty: Easy

Important Words/Concepts: stem cells, cloning, enucleated, embryonic

79. Describe the three methods of creating embryonic stem cells. Which one(s) is/are likely to be the most controversial and why?

*Answer:* Embryonic stem cells can be made (1) by using embryos that have been donated by fertility clinics. They can also be made (2) by somatic-cell nuclear transfer, which involves removing the haploid nucleus from an egg and replacing it with a diploid nucleus from a differentiated donor cell. The third way they can be made is (3) by adding certain genes or proteins to an adult differentiated cell to induce that cell to behave like an embryonic stem cell, a process resulting in induced pluripotent stem cells. The first two methods are controversial, however, because embryonic stem cells, regardless of how they were created, could in theory be implanted into a uterus and develop into a human being. Thus, some people object to the use of embryonic stem cells for research and regenerative therapy on the grounds that they believe such use represents the destruction of life.

DQ: How do stem cells contribute to regenerative medicine, and how can we obtain or produce stem cells for this purpose?

Type: Know It

Difficulty: Hard

Important Words/Concepts: embryonic stem cell, ethics, regenerative medicine

# 

80. In somatic-cell nuclear transfer,

1. a diploid nucleus is inserted into an egg cell.
2. a haploid nucleus is inserted into an egg cell.
3. a diploid nucleus is inserted into an enucleated egg cell.
4. a diploid nucleus in inserted into a surrogate female.
5. a haploid nucleus is inserted into an enucleated egg cell.

Answer: C

DQ: How do stem cells contribute to regenerative medicine, and how can we obtain or produce stem cells for this purpose?

Type: Know It

Difficulty: Hard

Important Words/Concepts: somatic-cell nuclear transfer and reproductive cloning

81. List the steps involved in somatic-cell nuclear transfer.

*Answer:* Remove the haploid nucleus from an egg, then isolate the diploid nucleus from a specialized donor cell, insert the diploid nucleus into the egg, allow the egg to divide, and harvest in the inner cell mass to use for research

DQ: How do stem cells contribute to regenerative medicine, and how can we obtain or produce stem cells for this purpose?

Type: Know It

Difficulty: Hard

Important Words/Concepts: cloning, somatic cell nuclear transfer

82. Reproductive and therapeutic cloning differ because

A. Reproductive cloning uses two egg cells, while therapeutic cloning involves only one egg cell.

B. therapeutic cloning uses two egg cells, while reproductive cloning involves only one egg cell.

C. both methods involve implantation into a uterus for cell division, but in therapeutic cloning, the cell mass is removed from the uterus.

D. reproductive cloning involves implantation of the egg cell into a uterus, while therapeutic cloning is carried out in a laboratory.

E. reproductive cloning has never been successful on any organism, while therapeutic cloning has had great success.

Answer: D

DQ: How do stem cells contribute to regenerative medicine, and how can we obtain or produce stem cells for this purpose?

Type: Know It

Difficulty: Hard

Important Words/Concepts:cloning, somatic cell nuclear transfer, therapeutic cloning, reproductive cloning

83. To avoid using embryonic cells, scientists have found a way to make adult somatic cells \_\_\_\_\_\_\_\_\_ by adding genes or proteins to the cells.

1. multipotent
2. omnipotent
3. totipotent
4. pluripotent
5. inducible

Answer: D

DQ: How do stem cells contribute to regenerative medicine, and how can we obtain or produce stem cells for this purpose?

Type: Know It

Difficulty: Easy

Important Words/Concepts: dedifferentiation

84. An induced stem cell can become

1. skin cells.
2. pancreatic cells.
3. neural cells.
4. lung cells.
5. All of the above.

Answer: E

DQ: How do stem cells contribute to regenerative medicine, and how can we obtain or produce stem cells for this purpose?

Type: Know It

Difficulty: Easy

Important Words/Concepts:induced stem cells, differentiation

85. Induced pluripotent stem cells have been created by

1. inserting four genes into a differentiated skin cell.
2. inserting 18 genes into an embryonic stem cell.
3. starting with a blastocyst cell.
4. inserting “dedifferentiating” proteins into an adult stem cell.
5. None of the above.

Answer: A

DQ: How do stem cells contribute to regenerative medicine, and how can we obtain or produce stem cells for this purpose?

Type: Know It

Difficulty: Hard

Important Words/Concepts:induced stem cell

86. Explain the dilemmas (ethical, religious, and political) regarding embryonic stem cells.

*Answer:* Living, potentially viable, discarded embryos from fertility clinics are a major source of embryonic stem cells. Many people see these embryos as potential human beings, or as actual human beings, so they have issues with harvesting them for stem cells. Some even consider this to be murder. Others realize that fertility clinics must produce many extra fertilized eggs and embryos than will ever be implanted into the mother, so they see stem-cell harvesting as an appropriate use of the extra embryos. This debate, or clash of opinions, has centered on the concept of the beginning of life and is often tied in closely with abortion issues. It often also spills over into the political arena, where candidates hope to garner votes by taking a stand for or against stem-cell research.

DQ: How do stem cells contribute to regenerative medicine, and how can we obtain or produce stem cells for this purpose?

Type: Use It

Difficulty: Hard

Important Words/Concepts:embryonic stem cells

87. Embryonic stem cells are harvested from the inner cell mass. If this inner cell mass is allowed to continue to develop without harvesting, what would it normally become?

1. a fetus
2. a larger mass of cells, never forming a complete structure
3. adult stem cells only
4. the tissues, organs, and systems of the body
5. A and D

Answer: E

DQ: How do stem cells contribute to regenerative medicine, and how can we obtain or produce stem cells for this purpose?

Type: Use It

Difficulty: Hard

Important Words/Concepts:stem cells, embryonic

88. People who object to the use of embryonic stem cells object to which of the following?

1. stem cell lines created from embryos discarded from fertility clinics
2. stem cell lines created from somatic cell nuclear transfer
3. adult stem cell lines
4. induced pluripotent stem cell lines
5. A and B

Answer: E

DQ: How do stem cells contribute to regenerative medicine, and how can we obtain or produce stem cells for this purpose?

Type: Know It

Difficulty: Easy

Important Words/Concepts:embryonic stem cell, ethics, regenerative medicine