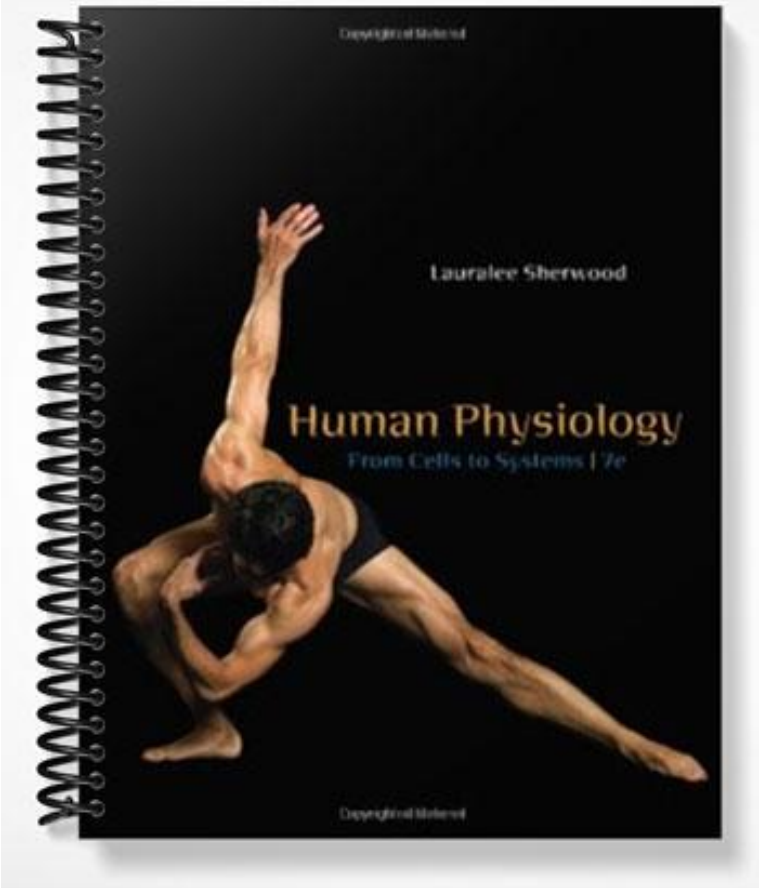
TEST BANK


Lauralee Sherwood
Human Physiology
From Cells to Systems | 7e

Chapter 2--Cell Physiology

Student: _____

1. Which component below is not always found in a typical human cell?

   A. cytosol
   B. DNA
   C. flagellum
   D. plasma membrane
   E. water

2. A typical human cell is about ____ micrometers in diameter.

   A. 1 to 2
   B. 10 to 20
   C. 80 to 100
   D. 150 to 200
   E. 200 to 300

3. Select the structure that is not located in the cytosol of the cell.

   A. ER
   B. Golgi complex
   C. lysosome
   D. mitochondrion
   E. nucleolus

4. Which organelle is not membrane-bound?

   A. Golgi body
   B. lysosome
   C. mitochondrion
   D. RER
   E. ribosome

5. Which statement about human cells is incorrect?

   A. They are living building blocks of the body.
   B. They are generally about 100 times smaller than the smallest particle visible to the unaided eye.
   C. They consist of highly organized inanimate chemicals.
   D. They usually must be stained to be seen under a microscope.
   E. They consist of a plasma membrane, nucleus, and cytoplasm.

6. Which statement about the plasma membrane is not true?

   A. It serves as a mechanical barrier to hold in the contents of the cell.
   B. It selectively controls movement of molecules between the ECF and the ICF.
   C. It is the barrier that surrounds the blood vessels and separates the blood plasma from the interstitial fluid.
   D. It contains proteins that provide membrane functions.
   E. It has cholesterol to maintain rigidity.

7. The rough endoplasmic reticulum

A. is studded with ribosomes
B. synthesizes proteins for export from the cell or for use in construction of a new cellular membrane
C. is continuous with the smooth endoplasmic reticulum
D. is connected to the nucleus
E. all of these

8. The rough ER is a membranous system associated with

A. chromosomes
B. lysosomes
C. microfilaments
D. ribosomes
E. vacuoles

9. Of the organelles below, which occurs in the lowest number within a typical human cell?

A. mitochondria
B. vaults
C. peroxisomes
D. lysosomes
E. nuclei

10. Which of the following is contained within the nucleus?

A. ribosomal subunits
B. cytosol
C. plasma membrane
D. endoplasmic reticulum
E. catalase

11. Select the incorrect statement about ribosomes.

A. They are composed of RNA.
B. They assemble polypeptides.
C. They may be bound to endoplasmic reticulum.
D. They are comprised of two parts.
E. They have a membrane.

12. Which of the following must be at ribosome in order for protein synthesis to occur?

A. tRNA
B. mRNA
C. DNA
D. All of these
E. tRNA and mRNA

13. The smooth endoplasmic reticulum

A. is most abundant in cells specialized for protein secretion
B. gives rise to transport vesicles containing newly synthesized molecules wrapped in a layer of smooth ER membrane
C. consists of stacks of relatively flattened sacs called cisternae
D. has many ribosomes
E. all of these

14. Smooth ER in liver cells

    A. contains large numbers of ribosomes
    B. is called sarcoplasmic reticulum and stores calcium
    C. has enzymes to detoxify harmful substances
    D. has no interactions with other organelles
    E. none of these

15. Select the incorrect statement about the smooth ER.

    A. It is abundant in most cell types.
    B. It is found in liver cells.
    C. It specializes in lipid metabolism.
    D. In one type of cell, it is called sarcoplasmic reticulum.
    E. It does not contain ribosomes.

16. Which structure is not associated with the secretion of proteins produced by ER?

    A. Golgi complex
    B. smooth ER
    C. transport vesicles
    D. lysosomal membrane
    E. plasma membrane

17. Which characteristic of the Golgi complex is incorrect?

    A. It sorts and directs products to their final destination.
    B. It modified proteins chemically.
    C. It produces secretory vesicles.
    D. It synthesizes proteins using free ribosomes.
    E. It receives transport vesicles coming from the ER.

18. Which of the following does not apply to lysosomes?

    A. They contain hydrolytic enzymes.
    B. They generate hydrogen peroxide.
    C. They aid in the breakdown of material that is taken into the cell through endocytosis.
    D. When they are abnormal, Tay-Sachs disease may result.
    E. They help remove damaged organelles.

19. Extrusion of materials to the exterior of the cell through the plasma membrane is called

    A. endocytosis
    B. exocytosis
    C. phagocytosis
    D. pinocytosis
    E. all of these

20. The form of endocytosis in which whole cells such as bacteria are brought in is

    A. exocytosis
    B. pinocytosis
    C. receptor-mediated endocytosis
    D. phagocytosis
    E. mitosis

21. The SNARE complex provides

A. recognition of foreign proteins in the cell
B. binding of correct enzyme with correct substrate
C. a means to deliver vesicles to an appropriate site
D. for receptor mediated endocytosis
E. all of these

22. Select the incorrect characteristic of mitochondria.

A. They have an inner fluid-filled space called the cristae.
B. They possess their own DNA.
C. They are the site of cellular respiration.
D. Their inner membranes contain electron carriers.
E. They possess two membranes.

23. Where do the citric acid cycle reactions occur?

A. cytoplasm
B. cytosol
C. inner-mitochondrial membrane
D. outer-mitochondrial membrane
E. mitochondrial matrix

24. What accounts for the most ATP production?

A. Krebs cycle
B. citric acid cycle
C. NADH
D. oxidative phosphorylation
E. glycolysis

25. Where is CO_2 released in the aerobic cellular respiration process?

A. glycolysis
B. electron transport chain
C. Krebs cycle
D. just prior to pyruvate entering the Krebs cycle
E. Krebs cycle and just prior to pyruvate entering the Krebs cycle

26. Why do most cells in the body require oxygen molecules?

A. Glucose cannot be broken down without it.
B. It pulls electrons off the electron transport chains in the last part of cellular respiration.
C. The electron transport system must pump it through the inner membrane for chemiosmosis.
D. ATP synthase uses it to add a phosphate ion to ADP in order to make ATP.
E. It pulls electrons off the electron transport chains in the last part of cellular respiration and ATP synthase uses it to add a phosphate ion to ADP in order to make ATP.

27. What might happen if you took in less than optimum amounts of niacin in your diet?

A. Fewer pyruvate molecules would be produced.
B. Available FAD would increase.
C. The number of hydrogen ions pumped through the ETS in a given amount of time would increase.
D. The number of Krebs cycles occurring in a given amount of time would increase.
E. All of these.

28. What is the carbon-based end product (chain) of glycolysis?

A. NADH
B. ATP
C. pyruvate
D. $FADH_2$
E. CO_2

29. Identify the true statement(s) about anaerobic respiration.

A. It completely oxidizes certain food molecules.
B. It forms a compound that can be altered and then enter the Krebs cycle.
C. It generates ATP molecules.
D. All of these.
E. It forms a compound that can be altered and then enter the Krebs cycle, and it generates ATP molecules.

30. Chemiosmosis

A. releases CO_2
B. extracts energy from a H^+ concentration gradient
C. transfers hydrogens from the ETS to NAD^+
D. converts pyruvate to lactate
E. none of these

31. The complexes within electron transport chains

A. are "circuits" for small amounts of electricity to pass through
B. contain NADH that transports electrons
C. transport H^+ into the mitochondrial matrix
D. are in the mitochondrion's inner membrane
E. all of these

32. Cristae are found in the

A. lysosome
B. mitochondrion
C. nucleolus
D. nucleus
E. rough ER

33. Select the incorrect association.

A. ATP/high-energy bonds
B. electron transport chain/mitochondrion
C. glycolysis/anaerobic
D. glycolysis/cytosol
E. pyruvate/five-carbon molecule

34. During anaerobic conditions

A. More pyruvate is formed from lactate.
B. The degradation of glucose cannot proceed beyond the Krebs cycle.
C. Mitochondrial processing of nutrient molecules takes place.
D. More pyruvate is formed from lactate, and the degradation of glucose cannot proceed beyond the Krebs cycle.
E. None of these.

35. Which statement regarding the citric acid cycle is incorrect?

A. It occurs in the mitochondrial matrix.
B. It forms carbon dioxide.
C. It forms two ATP molecules during each turn.
D. Acetyl CoA and oxaloacetate react to form citric acid.
E. Each turn forms one molecule of GTP.

36. Which modified form of pyruvate enters the citric acid cycle?

A. acetyl CoA
B. adenosine diphosphate
C. citric acid
D. oxaloacetic acid
E. pyruvic acid

37. ATP synthase

A. pumps H^+ ions into the intermembrane space
B. transports oxygen
C. accepts H^+ ions from NADH
D. synthesizes ATP
E. pumps H^+ ions into the intermembrane space and synthesizes ATP

38. NADH

A. is an energy carrier
B. plays a role in cellular respiration
C. is produced in glycolysis
D. is produced in the citric acid cycle
E. all of these

39. Glycolysis

A. produces citric acid
B. transfers energy to glucose
C. produces more ATP molecules than does one turn of the Krebs cycle
D. traps energy in $FADH_2$
E. none of these

40. The term *aerobic* means

A. in the blood
B. with carbon dioxide
C. with oxygen
D. without carbon dioxide
E. without oxygen

41. Select the incorrect statement about vaults.

A. They may play a role in drug resistance.
B. Their shape resembles hexagonal barrels.
C. They are larger than ribosomes.
D. They are organelles.
E. They are not visible by ordinary staining techniques.

42. Select the item that is not a part of the cytoskeleton.

A. inclusions
B. intermediate filaments
C. microfilaments
D. microtubular lattice
E. microtubules

43. The bending movements of cilia and flagella

A. are associated with microtubules and kinesin
B. involve the alternate assembly and disassembly of actin filaments
C. are produced by the sliding of adjacent microtubule doublets past each other
D. involves dynein action on microfilaments
E. involves myosin action on microfilaments

44. Microtubules

A. serve as a mechanical stiffener for microvilli
B. are specialized to detect sound and positional changes in the ear
C. form non-muscle contractile assemblies
D. play an important structural role in parts of the cell subject to mechanical stress
E. none of these

45. Which of the following organelles contains catalase?

A. peroxisomes
B. mitochondria
C. lysosomes
D. vaults
E. all of these, except vaults

46. Glycolysis

A. yields two molecules of ATP for each molecule of glucose processed
B. yields two molecules of NADH when converting one glucose into two pyruvates
C. does not take place in the mitochondrion
D. all of these
E. yields two molecules of ATP for each molecule of glucose processed, and yields two molecules of NADH when converting one glucose into two pyruvates

47. Identify the true statement(s).

A. Kinesin always moves toward a centriole.
B. Dynein always moves toward the plasma membrane.
C. Dynein is responsible for movement of microvilli.
D. Myosin motors move along actin proteins.
E. Myosin motors move along actin proteins and Dynein always moves toward the plasma membrane.

48. Nicotimamide adenine dinucleotide (NAD)

A. does not convert ADP + Pi to ATP
B. is found in the cytosol
C. is a hydrogen carrier molecule
D. is found in the mitochondrion
E. all of these

49. Which of the following is not associated with the cytosol?

A. replication of chromosomes
B. enzymatic regulation of intermediary metabolism
C. storage of fat and glycogen
D. synthesis of proteins
E. site of glycolysis

50. Choose the incorrect statement about the cytoskeleton.

A. It may help organize groups of enzymes.
B. It is involved in replication of DNA.
C. It serves as a mechanical stiffener.
D. It is involved in cilia movement.
E. It has components within microvilli.

51. During axonal transport

A. Kinesins carry axonal debris toward the axon terminal.
B. Kinesins move toward the nucleus of the cell.
C. Dyneins carry secretory vesicles toward the axon terminal.
D. Dyneins move away from the nucleus.
E. Microfilaments serve as the major intracellular "highway."

52. Actin and myosin filaments are very common in ____ cells.

A. epithelial
B. muscle
C. nerve
D. red blood
E. white blood

53. Ribosomes

A. are the site of protein synthesis
B. contain protein in their chemical makeup
C. contain RNA in their chemical makeup
D. consist of subunits that are constructed inside the nucleus
E. all of these

54. The molecule that associates with microtubules to provide transport of secretory vesicles is

A. actin
B. myosin
C. kinesin
D. tubulin
E. keratin

55. Which characteristic regarding microfilaments is incorrect?

A. They serve as mechanical stiffeners for microvilli.
B. They are composed of actin subunits.
C. They are the smallest elements of the cytoskeleton.
D. They are involved in cell locomotion.
E. They form mitotic spindles.

56. Intermediate filaments

A. comprise mitotic spindles
B. are important in cell regions subject to mechanical stress
C. comprise cilia and flagella
D. form the basal bodies
E. comprise cilia and flagella and form the basal bodies

57. Identify all items that are inclusions.

A. peroxisome
B. glycogen granule
C. centriole
D. vault
E. glycogen granule and vault

58. Which of the following is most associated with storage of molecules that a cell uses as a source of energy?

A. peroxisome
B. inclusion
C. lysosome
D. nucleus
E. Golgi complex

59. Which of the following may help transport ribosomal subunits out of the nucleus?

A. Golgi complex
B. mitotic spindle
C. vault
D. centriole
E. secretory vesicle

60. Electron microscopes are about 1000 times more powerful than light microscopes.

True False

61. DNA's genetic code is transcribed into rRNA.

True False

62. The cytoplasm includes everything between the plasma membrane and nucleus of a cell.

True False

63. DNA in the nucleus has the genetic instructions to make enzymatic proteins.

True False

64. The nucleus indirectly governs most cellular activities by directing the kinds and amounts of various enzymes and other proteins that are produced by the cell.

True False

65. The rough endoplasmic reticulum is most abundant in cells specialized for protein secretion, whereas smooth endoplasmic reticulum is abundant in cells that specialize in lipid metabolism.

True False

66. Proteins synthesized at the endoplasmic reticulum become permanently separated from the cytosol as soon as they have been synthesized.

True False

67. RER is most abundant in cells specialized for steroid production.

True False

68. The Golgi complex is functionally connected to the ER.

True False

69. The endoplasmic reticulum is one continuous organelle consisting of many tubules and cisternae.

True False

70. Lysosomes synthesize hydrolase enzymes.

True False

71. The rough ER synthesizes proteins within their interconnected sacs.

True False

72. Secretory vesicles are taken into a cell by means of phagocytosis.

True False

73. Secretory vesicles are about 200 times larger than transport vesicles.

True False

74. Coated vesicles enclose a representative mixture of proteins present in the Golgi sac before budding off.

True False

75. All cell organelles are renewable.

True False

76. Vaults are presumably descendants of primitive bacterial cells.

True False

77. Endocytosis can be accomplished by phagocytosis and pinocytosis.

True False

78. Phagocytosis is a specialized form of endocytosis used for bringing in ECF.

True False

79. Peroxisomes are nonmembranous organelles that mainly generate hydrogen peroxide.

True False

80. Glycolysis utilizes most of the stored energy in glucose when synthesizing ATP molecules.

    True False

81. ATP synthase is located in the inner mitochondrial membrane.

    True False

82. Most intermediary metabolism is accomplished in the cytosol.

    True False

83. Oxidative phosphorylation generates more ATP per glucose molecule than does glycolysis.

    True False

84. Dynein is a mitochondrial enzyme.

    True False

85. Cytokinesis is the division of the nucleus during mitosis.

    True False

86. Amoeboid movement is accomplished by alternate assembly and disassembly of actin filaments.

    True False

87. The protective, waterproof outer layer of skin is formed by the tough skeleton of intermediate filaments that persist after the surface skin cells die.

    True False

88. Intermediate filaments account for about 85% of the protein present in muscle and liver cells.

    True False

89. Amyotrophic lateral sclerosis is likely associated with the disruption of microtubules and microfilaments within motor neurons.

    True False

90. **Complete each of the following statments.**

    The three major subdivisions of a cell are the _____, the _____, and the _____.

    _____

91. **Complete each of the following statments.**

    The fluid contained within all of the cells of the body is known collectively as _____, and the fluid outside of the cells is referred to as _____.

    _____

92. **Complete each of the following statments.**

The two major parts of the cell's interior are the _____ and the _____.

_____

93. **Complete each of the following statments.**

_____ RNA carries amino acids to the sites of protein synthesis in the cell.

_____

94. **Complete each of the following statments.**

The _____ ER is the central packaging and discharge site for molecules to be transported from the ER.

_____

95. **Complete each of the following statments.**

_____ is a motor molecule that moves toward the "plus" end of a cytoskeletal filament made of actin.

_____

96. **Complete each of the following statments.**

On a microtubule, the motor molecule called _____ moves toward a centriole.

_____

97. **Complete each of the following statments.**

_____ is the most abundant protein inside skin cells, where it comprises the intermediate filaments of the cytoskeleton.

_____

98. **Complete each of the following statments.**

The ribosomes of the rough ER synthesize _____, whereas its membranous walls contain enzymes essential for the synthesis of _____.

_____

99. **Complete each of the following statments.**

In muscle cells, the sarcoplasmic reticulum stores the substance _____.

_____

100. **Complete each of the following statments.**

_____ refers to the process of an intracellular vesicle fusing with the plasma membrane, then opening and emptying its contents to the exterior.

_____

101. **Complete each of the following statments.**

_____ is a protein responsible for pinching off an endocytic vesicle.

_____

102. **Complete each of the following statments.**

Foreign material to be attacked by lysosomal enzymes is brought into the cell by the process of _____.

_____

103. **Complete each of the following statments.**

Organelles called _____ contain _____ enzymes that are capable of digesting and removing unwanted debris from the cell.

_____

104. **Complete each of the following statments.**

_____ are organelles that may possibly transport ribosomal subunits out of the nucleus.

_____

105. **Complete each of the following statments.**

_____, an enzyme found in peroxisomes, decomposes potentially toxic hydrogen peroxide.

_____

106. **Complete each of the following statments.**

ADP and P are formed from the breakdown of the molecule _____.

_____

107. **Complete each of the following statments.**

The decomposition of hydrogen peroxide produces the substances _____ and _____.

_____

108. **Complete each of the following statments.**

Enzymes referred to as _____ enzymes use O_2 to strip hydrogen from organic molecules.

_____

109. **Complete each of the following statments.**

One glucose molecule is converted into two molecules of _____ by the end of glycolysis.

_____

110. **Complete each of the following statments.**

The metabolism of acetyl CoA into the citric acid cycle depends on the presence of _____ gas in the mitochondrion.

_____

111. **Complete each of the following statments.**

The chemiosmotic mechanism involves the transport of _____ ions across the inner membrane of the _____.

_____

112. **Complete each of the following statments.**

The most common inclusion within cells of adipose tissue is _____.

_____

113. **Complete each of the following statments.**

_____ are the dominant structural and functional components of cilia and flagella.

_____

114. **Complete each of the following statments.**

Microfilaments are comprised of the protein _____, and are used as highways by motor molecules called _____.

_____

115. **Complete each of the following statments.**

One disease caused by neurofilament abnormalities is _____.

_____

116. **Complete each of the following statments.**

A cilium or flagellum originates from a structure called a(n) _____.

_____

117. **Complete each of the following statments.**

_____ serves as the final electron acceptor in the electron transport system.

_____

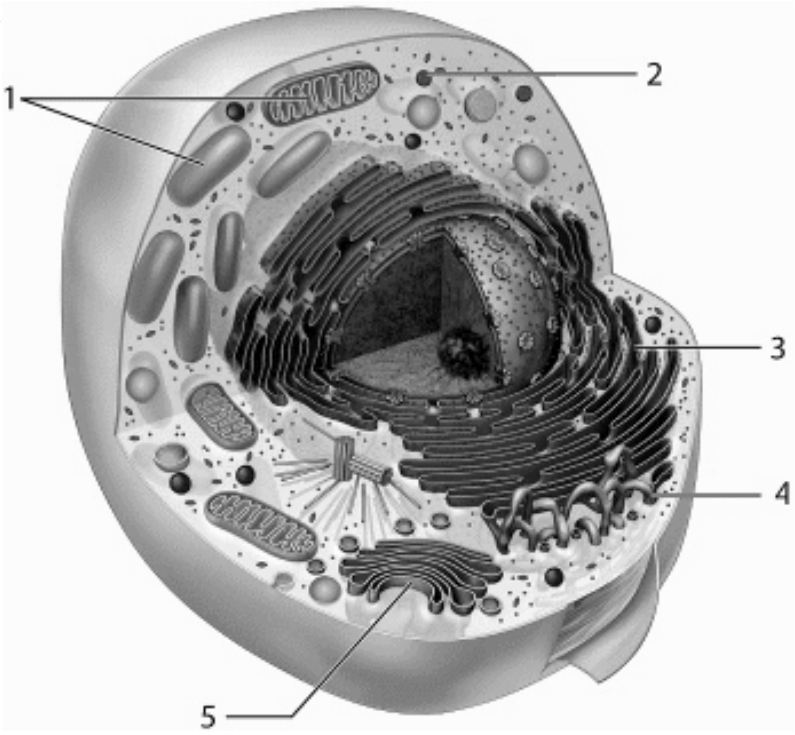
118. Match the cellular protein with its correct characteristic.

1. Comprises intermediate filaments	dynamin	____
2. Causes pinching off of endocytic vesicles	actin	____
3. Provides for transport of vesicles	tubulin	____
4. Comprises microtubules	kinesin	____

119. Indicate which of the characteristics applies to 1) glycolysis, 2) citric-acid cycle, or 3) oxidative phosphorylation.

a. directly uses inspired oxygen
b. does not directly use inspired oxygen
c. takes place in the cytosol
d. takes place in the mitochondrial matrix
e. takes place on the inner mitochondrial membrane
f. = low yield of ATP
g. = high yield of ATP

120.

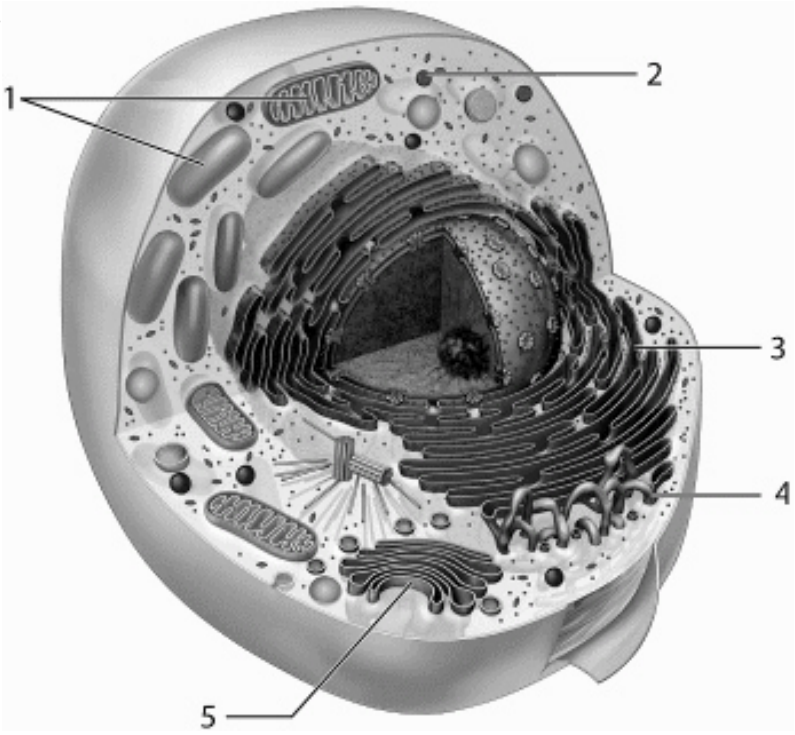


Use the figure above to answer the corresponding questions.

Which number identifies the structure responsible for the synthesis of proteins that end up in secretory vesicles?

a. 1
b. 2
c. 3
d. 4
e. 5

121.

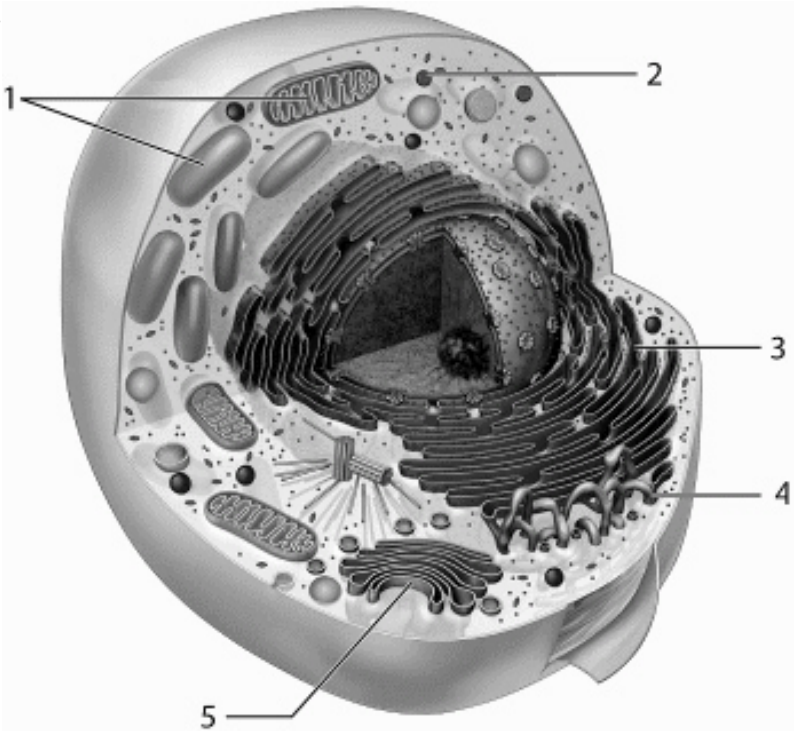


Use the figure above to answer the corresponding questions.

Which number identifies the site of aerobic respiration?

a. 1
b. 2
c. 3
d. 4
e. 5

122.

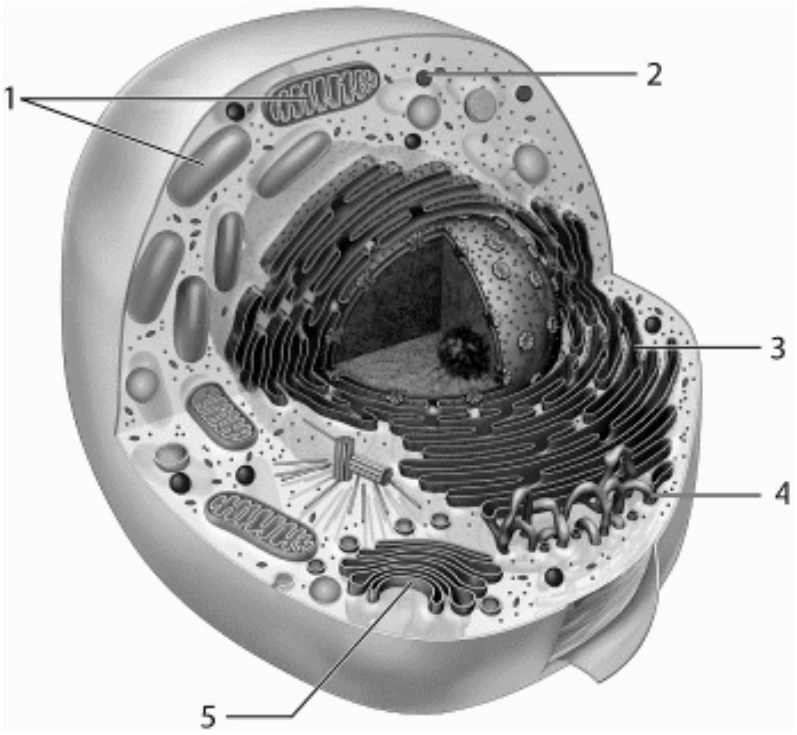


Use the figure above to answer the corresponding questions.

Which organelle gives rise to specialized vesicles that contain hydrolytic enzymes?

a. 1
b. 2
c. 3
d. 4
e. 5

123.

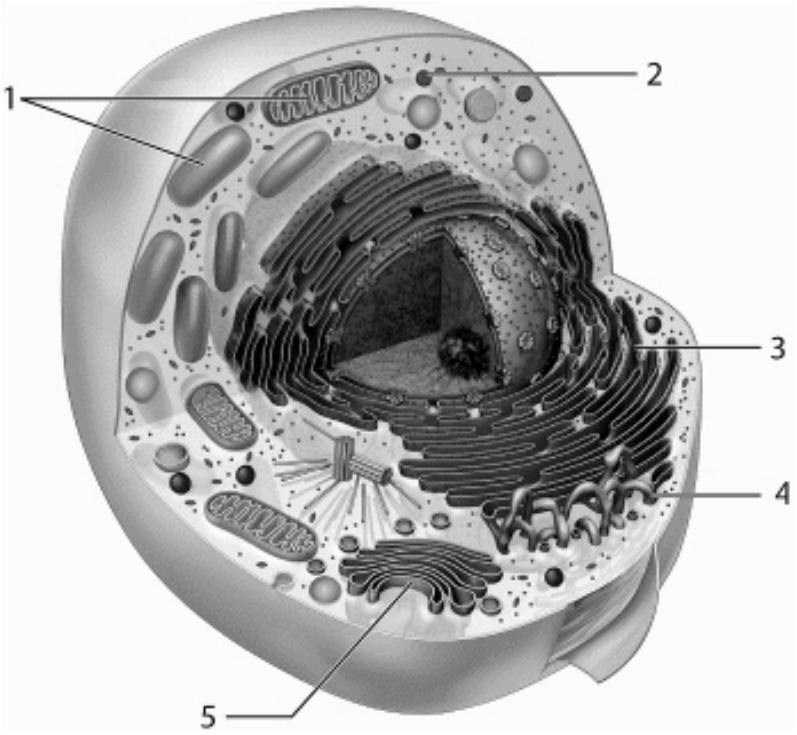


Use the figure above to answer the corresponding questions.

Which organelle uses oxygen to strip hydrogens from organic molecules?

a. 1
b. 2
c. 3
d. 4
e. 5

124.

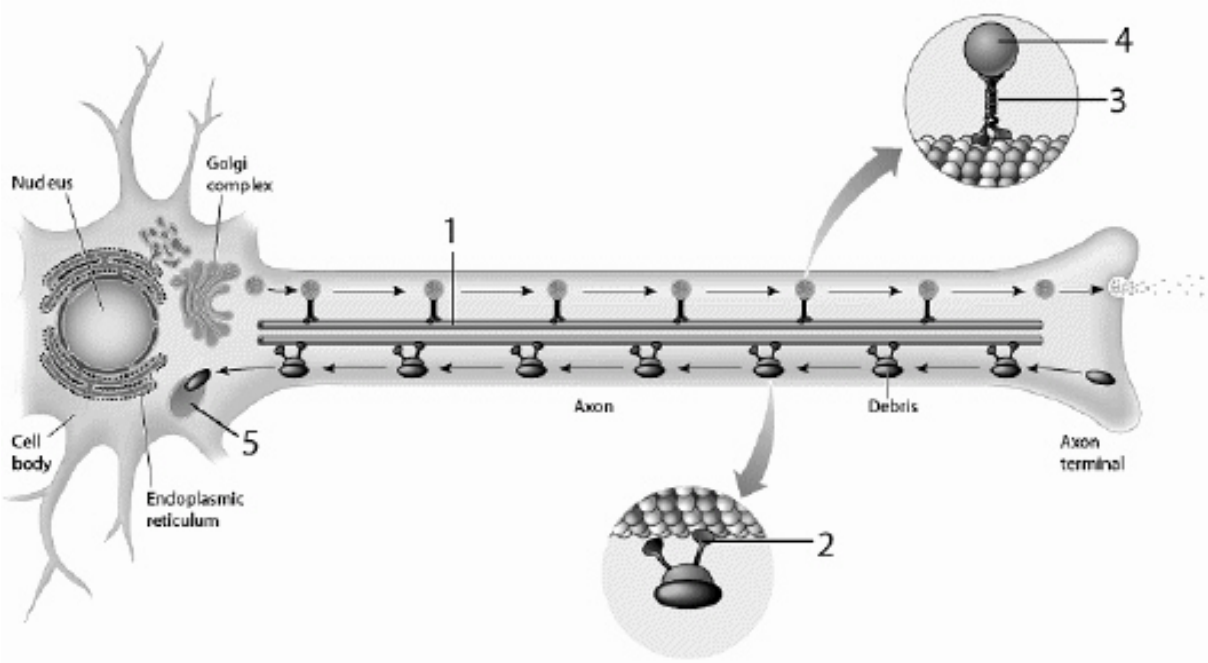


Use the figure above to answer the corresponding questions.

Which organelle contains structures that bind to docking-marker acceptors?

a. 1
b. 2
c. 3
d. 4
e. 5

125.

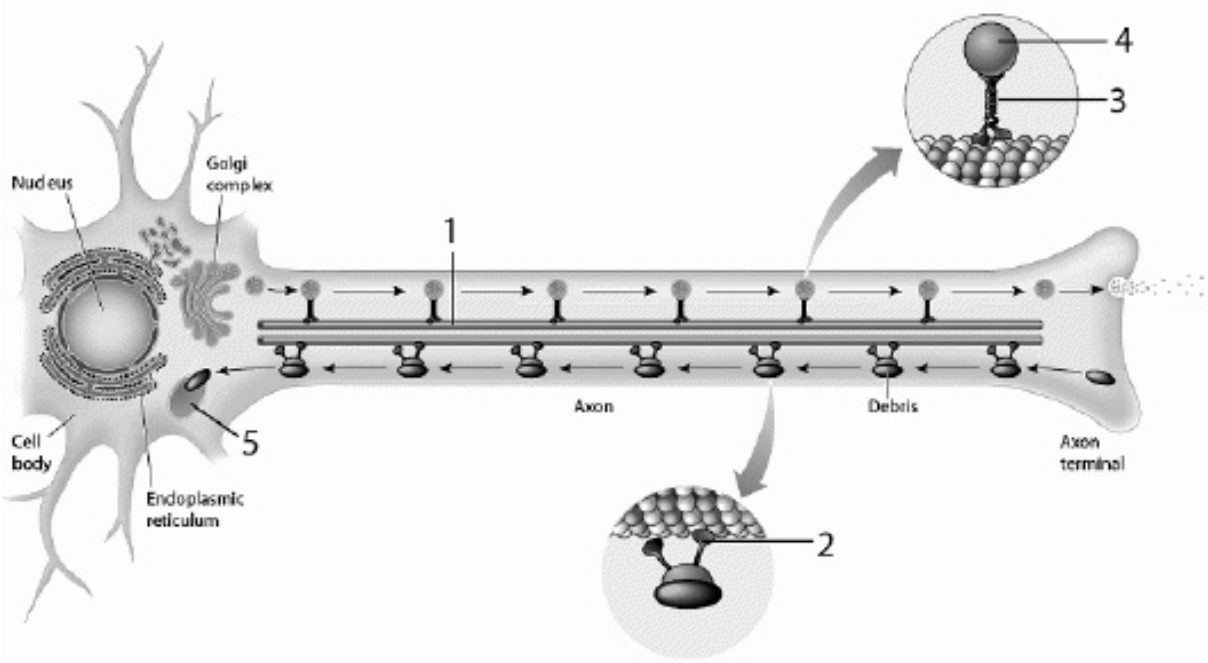


Use the figure above to answer the corresponding questions.

The structure labeled "1"

a. is a microfilament
b. is made of actin
c. originates at a centriole
d. is a "highway" for myosin motor molecules
e. all of these

126.

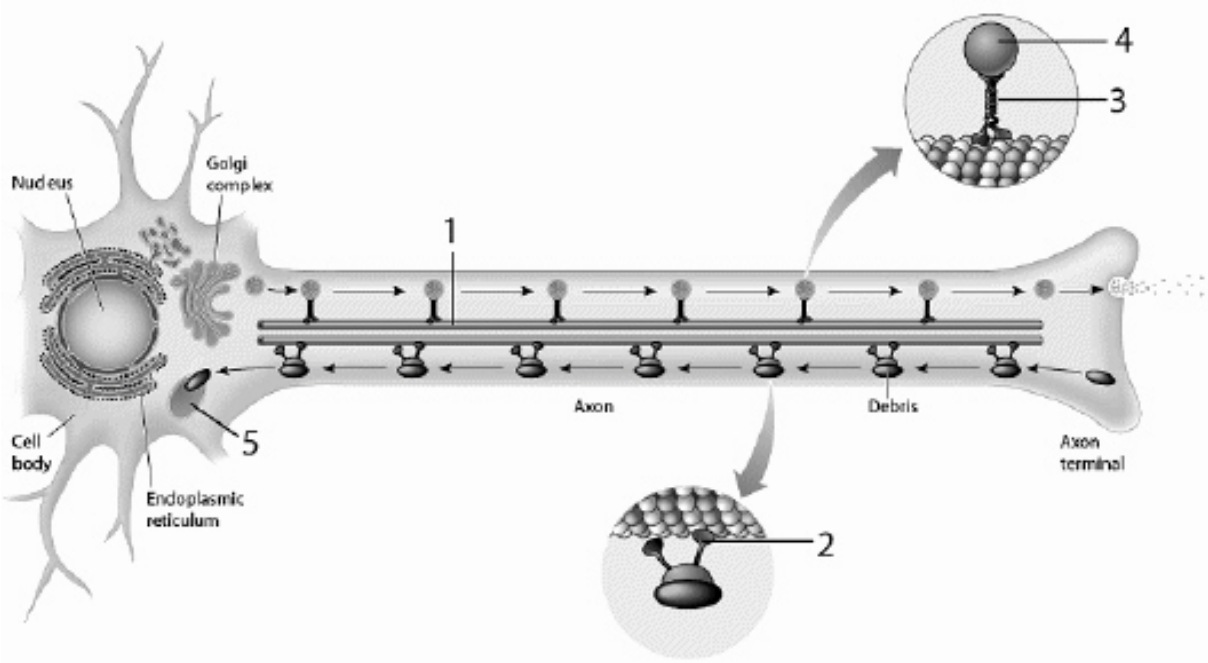


Use the figure above to answer the corresponding questions.

Label "3" identifies

a. a myosin motor moving along a microtubule
b. a kinesin motor moving along a microfilament
c. a dynein motor moving along a microtubule
d. a dynein motor moving away from a centriole
e. none of these

127.



Use the figure above to answer the corresponding questions.

Which number identifies a structure that utilizes hydrolases to perform its function?

a. 1
b. 2
c. 3
d. 4
e. 5

128.Describe the pathway that newly synthesized polypeptides take on route for secretion.

129. Describe two benefits of a cell carrying out anaerobic glycolysis. Be sure to include the following in your answer: pyruvate, electrons (in hydrogen atoms), oxygen, mitochondrion, Krebs cycle, ETS, and ATP.

130. How is ATP synthesized via electron transport and oxidative phosphorylation? Be sure to include the following items in your answer: electrons, glycolysis, Krebs cycle, NADH, $FADH_2$, hydrogen ion pump, intermembrane space, ATP synthase, ATP, and oxygen.

131. Describe the movement of vesicles along microtubules in the cytoskeleton. Include the following in your answer: microtubules, tubulin, kinesin, dynein, plus end, minus end, and centriole.

132. Describe the structure and function of cilia and flagella. Be sure to include the following in your answer: basal body, doublets, triplets, dynein, fused, unfused, and "9+2."

Chapter 2--Cell Physiology Key

1. Which component below is not always found in a typical human cell?

   A. cytosol
   B. DNA
   C. flagellum
   D. plasma membrane
   E. water

2. A typical human cell is about ____ micrometers in diameter.

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3. Select the structure that is not located in the cytosol of the cell.

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   B. Golgi complex
   C. lysosome
   D. mitochondrion
   E. nucleolus

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B. lysosomes
C. microfilaments
D. ribosomes
E. vacuoles

9. Of the organelles below, which occurs in the lowest number within a typical human cell?

A. mitochondria
B. vaults
C. peroxisomes
D. lysosomes
E. nuclei

10. Which of the following is contained within the nucleus?

A. ribosomal subunits
B. cytosol
C. plasma membrane
D. endoplasmic reticulum
E. catalase

11. Select the incorrect statement about ribosomes.

A. They are composed of RNA.
B. They assemble polypeptides.
C. They may be bound to endoplasmic reticulum.
D. They are comprised of two parts.
E. They have a membrane.

12. Which of the following must be at ribosome in order for protein synthesis to occur?

A. tRNA
B. mRNA
C. DNA
D. All of these
E. tRNA and mRNA

13. The smooth endoplasmic reticulum

A. is most abundant in cells specialized for protein secretion
B. gives rise to transport vesicles containing newly synthesized molecules wrapped in a layer of smooth ER membrane
C. consists of stacks of relatively flattened sacs called cisternae
D. has many ribosomes
E. all of these

14. Smooth ER in liver cells

A. contains large numbers of ribosomes
B. is called sarcoplasmic reticulum and stores calcium
C. has enzymes to detoxify harmful substances
D. has no interactions with other organelles
E. none of these

15. Select the incorrect statement about the smooth ER.

A. It is abundant in most cell types.
B. It is found in liver cells.
C. It specializes in lipid metabolism.
D. In one type of cell, it is called sarcoplasmic reticulum.
E. It does not contain ribosomes.

16. Which structure is not associated with the secretion of proteins produced by ER?

A. Golgi complex
B. smooth ER
C. transport vesicles
D. lysosomal membrane
E. plasma membrane

17. Which characteristic of the Golgi complex is incorrect?

A. It sorts and directs products to their final destination.
B. It modified proteins chemically.
C. It produces secretory vesicles.
D. It synthesizes proteins using free ribosomes.
E. It receives transport vesicles coming from the ER.

18. Which of the following does not apply to lysosomes?

A. They contain hydrolytic enzymes.
B. They generate hydrogen peroxide.
C. They aid in the breakdown of material that is taken into the cell through endocytosis.
D. When they are abnormal, Tay-Sachs disease may result.
E. They help remove damaged organelles.

19. Extrusion of materials to the exterior of the cell through the plasma membrane is called

A. endocytosis
B. exocytosis
C. phagocytosis
D. pinocytosis
E. all of these

20. The form of endocytosis in which whole cells such as bacteria are brought in is

A. exocytosis
B. pinocytosis
C. receptor-mediated endocytosis
D. phagocytosis
E. mitosis

21. The SNARE complex provides

A. recognition of foreign proteins in the cell
B. binding of correct enzyme with correct substrate
C. a means to deliver vesicles to an appropriate site
D. for receptor mediated endocytosis
E. all of these

22. Select the incorrect characteristic of mitochondria.

A. They have an inner fluid-filled space called the cristae.
B. They possess their own DNA.
C. They are the site of cellular respiration.
D. Their inner membranes contain electron carriers.
E. They possess two membranes.

23. Where do the citric acid cycle reactions occur?

A. cytoplasm
B. cytosol
C. inner-mitochondrial membrane
D. outer-mitochondrial membrane
E. mitochondrial matrix

24. What accounts for the most ATP production?

A. Krebs cycle
B. citric acid cycle
C. NADH
D. oxidative phosphorylation
E. glycolysis

25. Where is CO_2 released in the aerobic cellular respiration process?

A. glycolysis
B. electron transport chain
C. Krebs cycle
D. just prior to pyruvate entering the Krebs cycle
E. Krebs cycle and just prior to pyruvate entering the Krebs cycle

26. Why do most cells in the body require oxygen molecules?

A. Glucose cannot be broken down without it.
B. It pulls electrons off the electron transport chains in the last part of cellular respiration.
C. The electron transport system must pump it through the inner membrane for chemiosmosis.
D. ATP synthase uses it to add a phosphate ion to ADP in order to make ATP.
E. It pulls electrons off the electron transport chains in the last part of cellular respiration and ATP synthase uses it to add a phosphate ion to ADP in order to make ATP.

27. What might happen if you took in less than optimum amounts of niacin in your diet?

A. Fewer pyruvate molecules would be produced.
B. Available FAD would increase.
C. The number of hydrogen ions pumped through the ETS in a given amount of time would increase.
D. The number of Krebs cycles occurring in a given amount of time would increase.
E. All of these.

28. What is the carbon-based end product (chain) of glycolysis?

A. NADH
B. ATP
C. pyruvate
D. $FADH_2$
E. CO_2

29. Identify the true statement(s) about anaerobic respiration.

A. It completely oxidizes certain food molecules.
B. It forms a compound that can be altered and then enter the Krebs cycle.
C. It generates ATP molecules.
D. All of these.
E. It forms a compound that can be altered and then enter the Krebs cycle, and it generates ATP molecules.

30. Chemiosmosis

A. releases CO_2
B. extracts energy from a H^+ concentration gradient
C. transfers hydrogens from the ETS to NAD^+
D. converts pyruvate to lactate
E. none of these

31. The complexes within electron transport chains

A. are "circuits" for small amounts of electricity to pass through
B. contain NADH that transports electrons
C. transport H^+ into the mitochondrial matrix
D. are in the mitochondrion's inner membrane
E. all of these

32. Cristae are found in the

A. lysosome
B. mitochondrion
C. nucleolus
D. nucleus
E. rough ER

33. Select the incorrect association.

A. ATP/high-energy bonds
B. electron transport chain/mitochondrion
C. glycolysis/anaerobic
D. glycolysis/cytosol
E. pyruvate/five-carbon molecule

34. During anaerobic conditions

A. More pyruvate is formed from lactate.
B. The degradation of glucose cannot proceed beyond the Krebs cycle.
C. Mitochondrial processing of nutrient molecules takes place.
D. More pyruvate is formed from lactate, and the degradation of glucose cannot proceed beyond the Krebs cycle.
E. None of these.

35. Which statement regarding the citric acid cycle is incorrect?

A. It occurs in the mitochondrial matrix.
B. It forms carbon dioxide.
C. It forms two ATP molecules during each turn.
D. Acetyl CoA and oxaloacetate react to form citric acid.
E. Each turn forms one molecule of GTP.

36. Which modified form of pyruvate enters the citric acid cycle?

A. acetyl CoA
B. adenosine diphosphate
C. citric acid
D. oxaloacetic acid
E. pyruvic acid

37. ATP synthase

A. pumps H^+ ions into the intermembrane space
B. transports oxygen
C. accepts H^+ ions from NADH
D. synthesizes ATP
E. pumps H^+ ions into the intermembrane space and synthesizes ATP

38. NADH

A. is an energy carrier
B. plays a role in cellular respiration
C. is produced in glycolysis
D. is produced in the citric acid cycle
E. all of these

39. Glycolysis

A. produces citric acid
B. transfers energy to glucose
C. produces more ATP molecules than does one turn of the Krebs cycle
D. traps energy in $FADH_2$
E. none of these

40. The term *aerobic* means

A. in the blood
B. with carbon dioxide
C. with oxygen
D. without carbon dioxide
E. without oxygen

41. Select the incorrect statement about vaults.

A. They may play a role in drug resistance.
B. Their shape resembles hexagonal barrels.
C. They are larger than ribosomes.
D. They are organelles.
E. They are not visible by ordinary staining techniques.

42. Select the item that is not a part of the cytoskeleton.

A. inclusions
B. intermediate filaments
C. microfilaments
D. microtubular lattice
E. microtubules

43. The bending movements of cilia and flagella

A. are associated with microtubules and kinesin
B. involve the alternate assembly and disassembly of actin filaments
C. are produced by the sliding of adjacent microtubule doublets past each other
D. involves dynein action on microfilaments
E. involves myosin action on microfilaments

44. Microtubules

A. serve as a mechanical stiffener for microvilli
B. are specialized to detect sound and positional changes in the ear
C. form non-muscle contractile assemblies
D. play an important structural role in parts of the cell subject to mechanical stress
E. none of these

45. Which of the following organelles contains catalase?

A. peroxisomes
B. mitochondria
C. lysosomes
D. vaults
E. all of these, except vaults

46. Glycolysis

A. yields two molecules of ATP for each molecule of glucose processed
B. yields two molecules of NADH when converting one glucose into two pyruvates
C. does not take place in the mitochondrion
D. all of these
E. yields two molecules of ATP for each molecule of glucose processed, and yields two molecules of NADH when converting one glucose into two pyruvates

47. Identify the true statement(s).

A. Kinesin always moves toward a centriole.
B. Dynein always moves toward the plasma membrane.
C. Dynein is responsible for movement of microvilli.
D. Myosin motors move along actin proteins.
E. Myosin motors move along actin proteins and Dynein always moves toward the plasma membrane.

48. Nicotimamide adenine dinucleotide (NAD)

A. does not convert ADP + Pi to ATP
B. is found in the cytosol
C. is a hydrogen carrier molecule
D. is found in the mitochondrion
E. all of these

49. Which of the following is not associated with the cytosol?

A. replication of chromosomes
B. enzymatic regulation of intermediary metabolism
C. storage of fat and glycogen
D. synthesis of proteins
E. site of glycolysis

50. Choose the incorrect statement about the cytoskeleton.

A. It may help organize groups of enzymes.
B. It is involved in replication of DNA.
C. It serves as a mechanical stiffener.
D. It is involved in cilia movement.
E. It has components within microvilli.

51. During axonal transport

A. Kinesins carry axonal debris toward the axon terminal.
B. Kinesins move toward the nucleus of the cell.
C. Dyneins carry secretory vesicles toward the axon terminal.
D. Dyneins move away from the nucleus.
E. Microfilaments serve as the major intracellular "highway."

52. Actin and myosin filaments are very common in ____ cells.

A. epithelial
B. muscle
C. nerve
D. red blood
E. white blood

53. Ribosomes

A. are the site of protein synthesis
B. contain protein in their chemical makeup
C. contain RNA in their chemical makeup
D. consist of subunits that are constructed inside the nucleus
E. all of these

54. The molecule that associates with microtubules to provide transport of secretory vesicles is

A. actin
B. myosin
C. kinesin
D. tubulin
E. keratin

55. Which characteristic regarding microfilaments is incorrect?

A. They serve as mechanical stiffeners for microvilli.
B. They are composed of actin subunits.
C. They are the smallest elements of the cytoskeleton.
D. They are involved in cell locomotion.
E. They form mitotic spindles.

56. Intermediate filaments

A. comprise mitotic spindles
B. are important in cell regions subject to mechanical stress
C. comprise cilia and flagella
D. form the basal bodies
E. comprise cilia and flagella and form the basal bodies

57. Identify all items that are inclusions.

A. peroxisome
B. glycogen granule
C. centriole
D. vault
E. glycogen granule and vault

58. Which of the following is most associated with storage of molecules that a cell uses as a source of energy?

A. peroxisome
B. inclusion
C. lysosome
D. nucleus
E. Golgi complex

59. Which of the following may help transport ribosomal subunits out of the nucleus?

A. Golgi complex
B. mitotic spindle
C. vault
D. centriole
E. secretory vesicle

60. Electron microscopes are about 1000 times more powerful than light microscopes.

FALSE

61. DNA's genetic code is transcribed into rRNA.

FALSE

62. The cytoplasm includes everything between the plasma membrane and nucleus of a cell.

TRUE

63. DNA in the nucleus has the genetic instructions to make enzymatic proteins.

TRUE

64. The nucleus indirectly governs most cellular activities by directing the kinds and amounts of various enzymes and other proteins that are produced by the cell.

TRUE

65. The rough endoplasmic reticulum is most abundant in cells specialized for protein secretion, whereas smooth endoplasmic reticulum is abundant in cells that specialize in lipid metabolism.

TRUE

66. Proteins synthesized at the endoplasmic reticulum become permanently separated from the cytosol as soon as they have been synthesized.

TRUE

67. RER is most abundant in cells specialized for steroid production.

FALSE

68. The Golgi complex is functionally connected to the ER.

TRUE

69. The endoplasmic reticulum is one continuous organelle consisting of many tubules and cisternae.

TRUE

70. Lysosomes synthesize hydrolase enzymes.

FALSE

71. The rough ER synthesizes proteins within their interconnected sacs.

FALSE

72. Secretory vesicles are taken into a cell by means of phagocytosis.

FALSE

73. Secretory vesicles are about 200 times larger than transport vesicles.

TRUE

74. Coated vesicles enclose a representative mixture of proteins present in the Golgi sac before budding off.

FALSE

75. All cell organelles are renewable.

TRUE

76. Vaults are presumably descendants of primitive bacterial cells.

FALSE

77. Endocytosis can be accomplished by phagocytosis and pinocytosis.

TRUE

78. Phagocytosis is a specialized form of endocytosis used for bringing in ECF.

FALSE

79. Peroxisomes are nonmembranous organelles that mainly generate hydrogen peroxide.

FALSE

80. Glycolysis utilizes most of the stored energy in glucose when synthesizing ATP molecules.

FALSE

81. ATP synthase is located in the inner mitochondrial membrane.

TRUE

82. Most intermediary metabolism is accomplished in the cytosol.

TRUE

83. Oxidative phosphorylation generates more ATP per glucose molecule than does glycolysis.

TRUE

84. Dynein is a mitochondrial enzyme.

FALSE

85. Cytokinesis is the division of the nucleus during mitosis.

FALSE

86. Amoeboid movement is accomplished by alternate assembly and disassembly of actin filaments.

TRUE

87. The protective, waterproof outer layer of skin is formed by the tough skeleton of intermediate filaments that persist after the surface skin cells die.

TRUE

88. Intermediate filaments account for about 85% of the protein present in muscle and liver cells.

FALSE

89. Amyotrophic lateral sclerosis is likely associated with the disruption of microtubules and microfilaments within motor neurons.

FALSE

90. **Complete each of the following statments.**

The three major subdivisions of a cell are the _____, the _____, and the _____.

plasma membrane, nucleus, cytoplasm

91. **Complete each of the following statments.**

The fluid contained within all of the cells of the body is known collectively as _____, and the fluid outside of the cells is referred to as _____.

intracellular fluid, extracellular fluid

92. **Complete each of the following statments.**

The two major parts of the cell's interior are the _____ and the _____.

nucleus, cytoplasm

93. **Complete each of the following statments.**

_____ RNA carries amino acids to the sites of protein synthesis in the cell.

Transfer

94. **Complete each of the following statments.**

The _____ ER is the central packaging and discharge site for molecules to be transported from the ER.

smooth

95. **Complete each of the following statments.**

_____ is a motor molecule that moves toward the "plus" end of a cytoskeletal filament made of actin.

Myosin

96. **Complete each of the following statments.**

On a microtubule, the motor molecule called _____ moves toward a centriole.

dynein

97. **Complete each of the following statments.**

_____ is the most abundant protein inside skin cells, where it comprises the intermediate filaments of the cytoskeleton.

Keratin

98. **Complete each of the following statments.**

The ribosomes of the rough ER synthesize _____, whereas its membranous walls contain enzymes essential for the synthesis of _____.

proteins, lipids

99. **Complete each of the following statments.**

In muscle cells, the sarcoplasmic reticulum stores the substance _____.

calcium

100. **Complete each of the following statments.**

_____ refers to the process of an intracellular vesicle fusing with the plasma membrane, then opening and emptying its contents to the exterior.

Exocytosis

101. **Complete each of the following statments.**

_____ is a protein responsible for pinching off an endocytic vesicle.

Dynamin

102. **Complete each of the following statments.**

Foreign material to be attacked by lysosomal enzymes is brought into the cell by the process of _____.

endocytosis

103. **Complete each of the following statments.**

Organelles called _____ contain _____ enzymes that are capable of digesting and removing unwanted debris from the cell.

lysosomes, hydrolytic

104. **Complete each of the following statments.**

_____ are organelles that may possibly transport ribosomal subunits out of the nucleus.

Vaults

105. **Complete each of the following statments.**

_____, an enzyme found in peroxisomes, decomposes potentially toxic hydrogen peroxide.

Catalase

106. **Complete each of the following statments.**

ADP and P are formed from the breakdown of the molecule _____.

adenosine triphosphate (ATP)

107. **Complete each of the following statments.**

The decomposition of hydrogen peroxide produces the substances _____ and _____.

water, oxygen

108. **Complete each of the following statments.**

Enzymes referred to as _____ enzymes use O_2 to strip hydrogen from organic molecules.

oxidative

109. **Complete each of the following statments.**

One glucose molecule is converted into two molecules of _____ by the end of glycolysis.

pyruvic acid

110. **Complete each of the following statments.**

The metabolism of acetyl CoA into the citric acid cycle depends on the presence of _____ gas in the mitochondrion.

oxygen

111. **Complete each of the following statments.**

The chemiosmotic mechanism involves the transport of _____ ions across the inner membrane of the _____.

hydrogen, mitochondrion

112. **Complete each of the following statments.**

The most common inclusion within cells of adipose tissue is _____.

fat

113. **Complete each of the following statments.**

_____ are the dominant structural and functional components of cilia and flagella.

Microtubules

114. **Complete each of the following statments.**

Microfilaments are comprised of the protein _____, and are used as highways by motor molecules called _____.

actin, myosin

115. **Complete each of the following statments.**

One disease caused by neurofilament abnormalities is _____.

amyotropic lateral sclerosis

116. **Complete each of the following statments.**

A cilium or flagellum originates from a structure called a(n) _____.

basal body

117. **Complete each of the following statments.**

_____ serves as the final electron acceptor in the electron transport system.

Oxygen

118. Match the cellular protein with its correct characteristic.

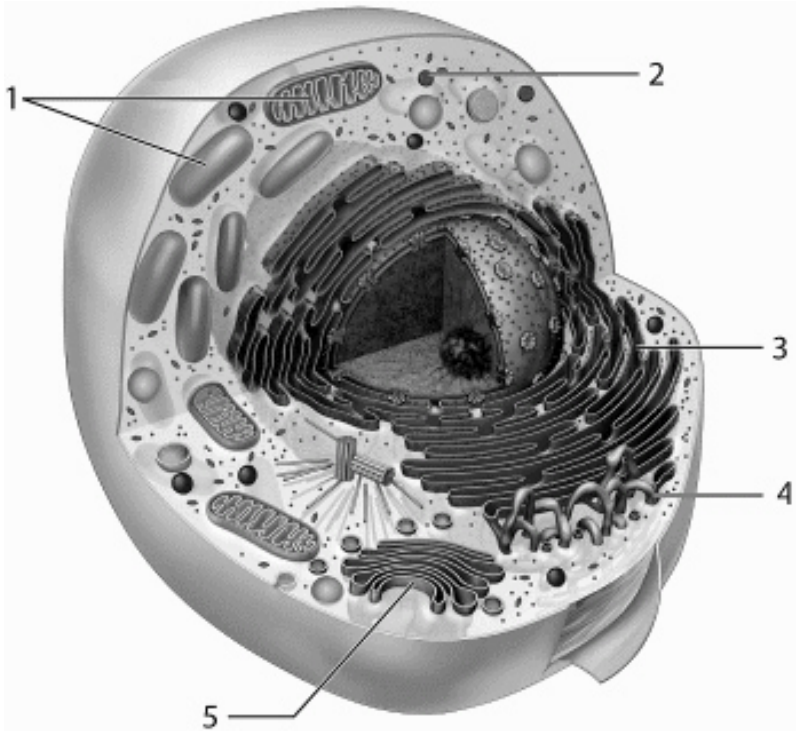
1. Comprises intermediate filaments	dynamin	**2**
2. Causes pinching off of endocytic vesicles	actin	**1**
3. Provides for transport of vesicles	tubulin	**4**
4. Comprises microtubules	kinesin	**3**

119. Indicate which of the characteristics applies to 1) glycolysis, 2) citric-acid cycle, or 3) oxidative phosphorylation.

a. directly uses inspired oxygen
b. does not directly use inspired oxygen
c. takes place in the cytosol
d. takes place in the mitochondrial matrix
e. takes place on the inner mitochondrial membrane
f. = low yield of ATP
g. = high yield of ATP

glycolysis: b, c, f;
citric-acid cycle: b, d, f;
oxidative phosphorylation: a, e, g

120.



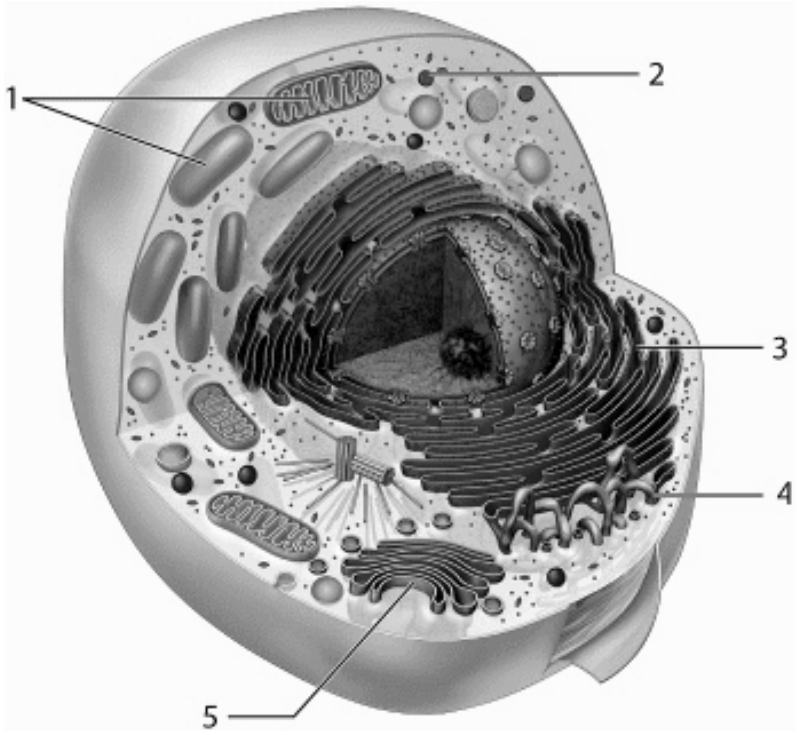
Use the figure above to answer the corresponding questions.

Which number identifies the structure responsible for the synthesis of proteins that end up in secretory vesicles?

a. 1
b. 2
c. 3
d. 4
e. 5

c

121.



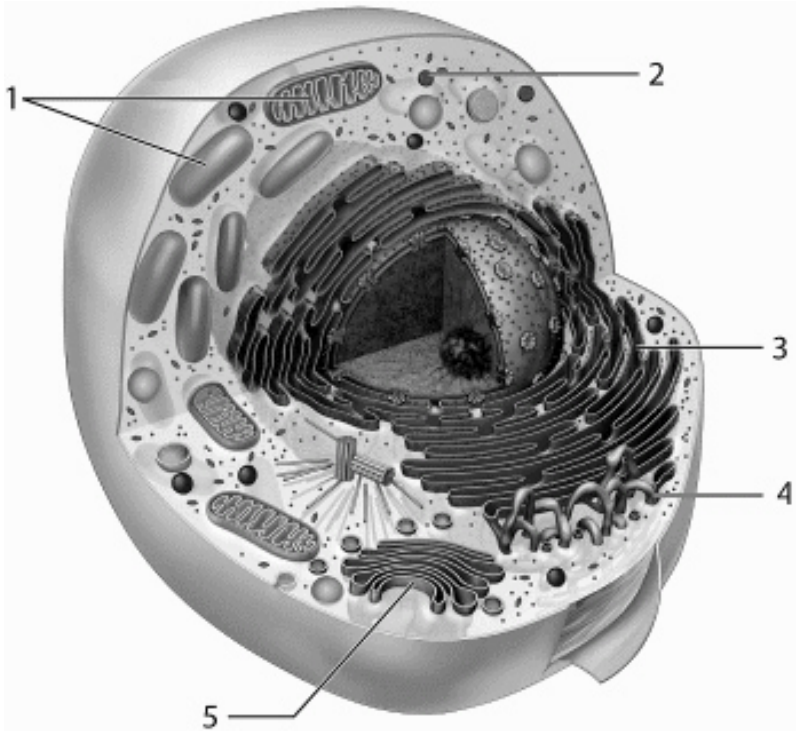
Use the figure above to answer the corresponding questions.

Which number identifies the site of aerobic respiration?

a. 1
b. 2
c. 3
d. 4
e. 5

a

122.



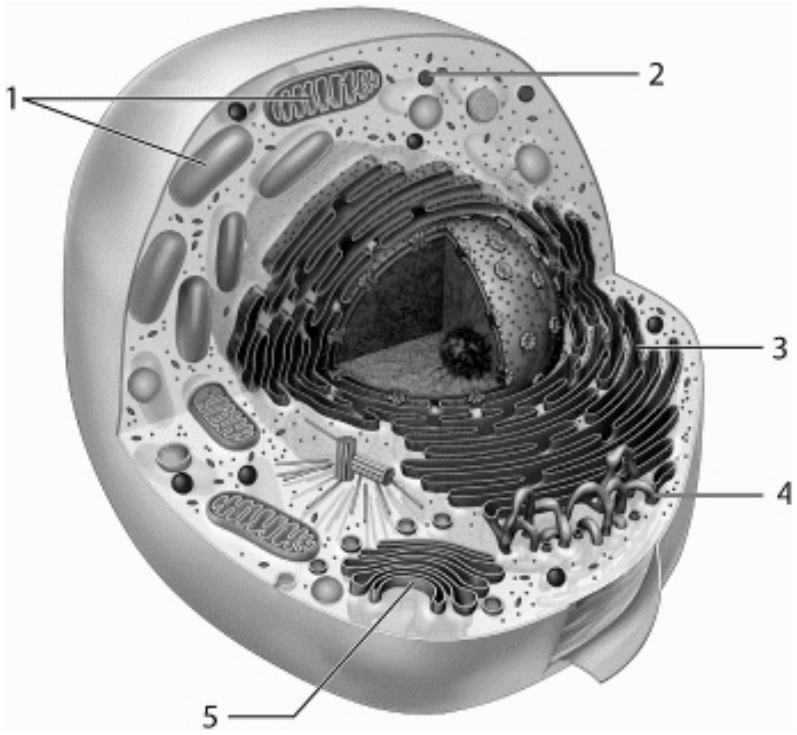
Use the figure above to answer the corresponding questions.

Which organelle gives rise to specialized vesicles that contain hydrolytic enzymes?

a. 1
b. 2
c. 3
d. 4
e. 5

e

123.



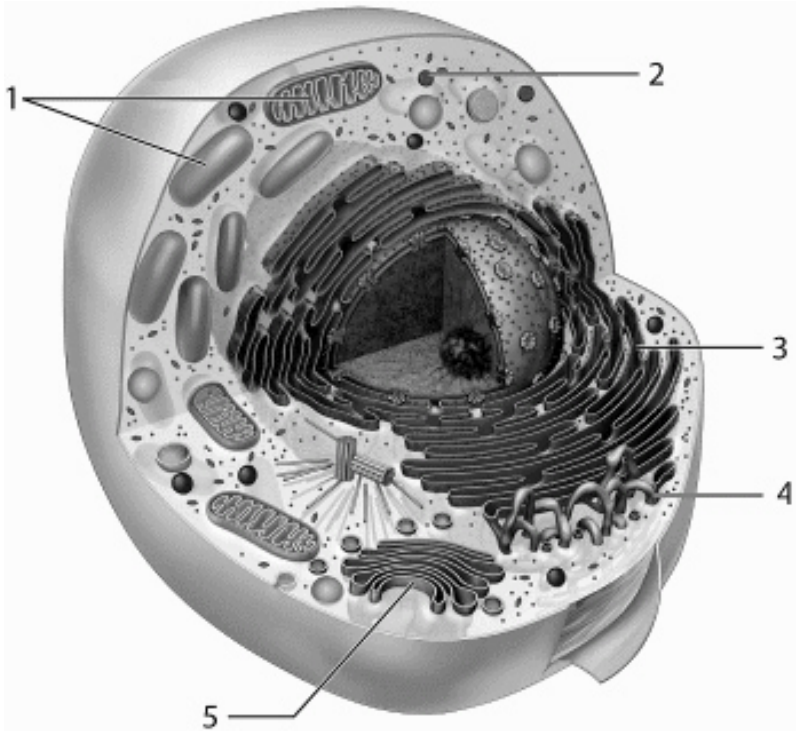
Use the figure above to answer the corresponding questions.

Which organelle uses oxygen to strip hydrogens from organic molecules?

a. 1
b. 2
c. 3
d. 4
e. 5

b

124.



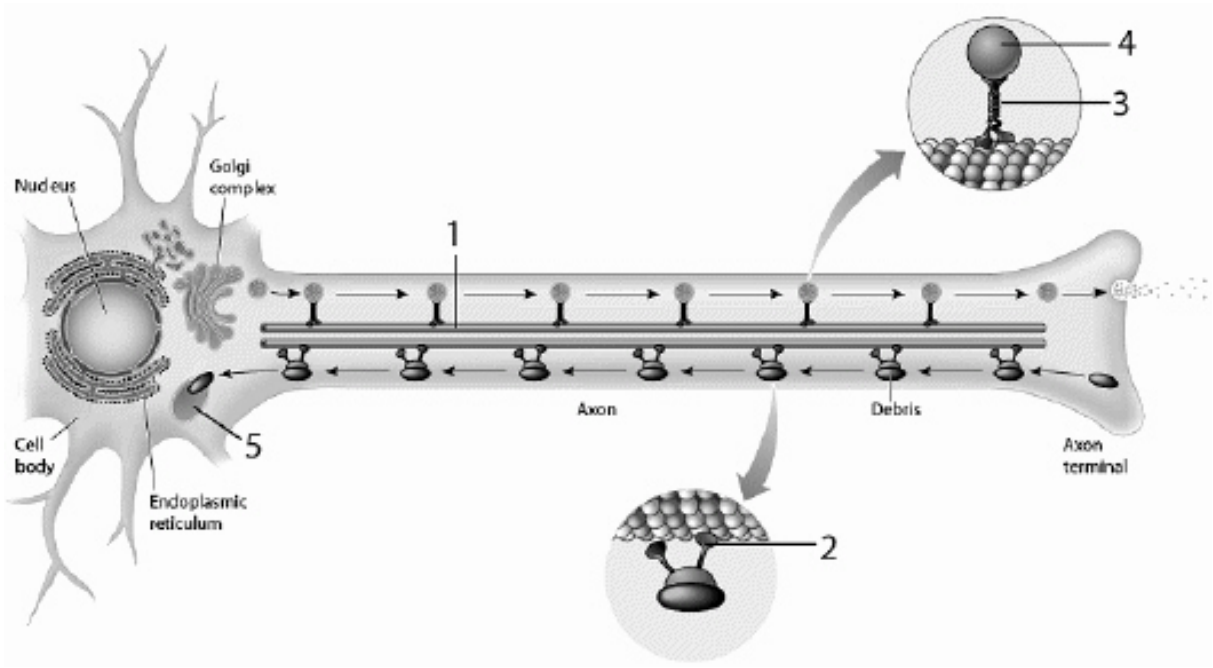
Use the figure above to answer the corresponding questions.

Which organelle contains structures that bind to docking-marker acceptors?

a. 1
b. 2
c. 3
d. 4
e. 5

e

125.



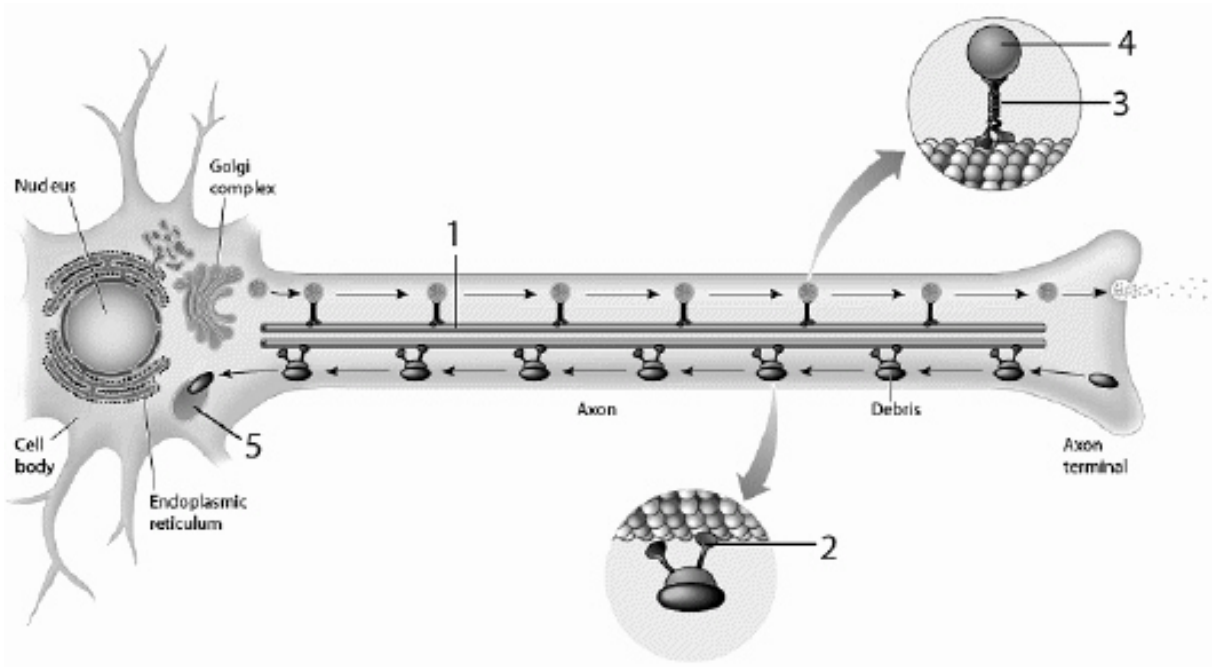
Use the figure above to answer the corresponding questions.

The structure labeled "1"

a. is a microfilament
b. is made of actin
c. originates at a centriole
d. is a "highway" for myosin motor molecules
e. all of these

c

126.



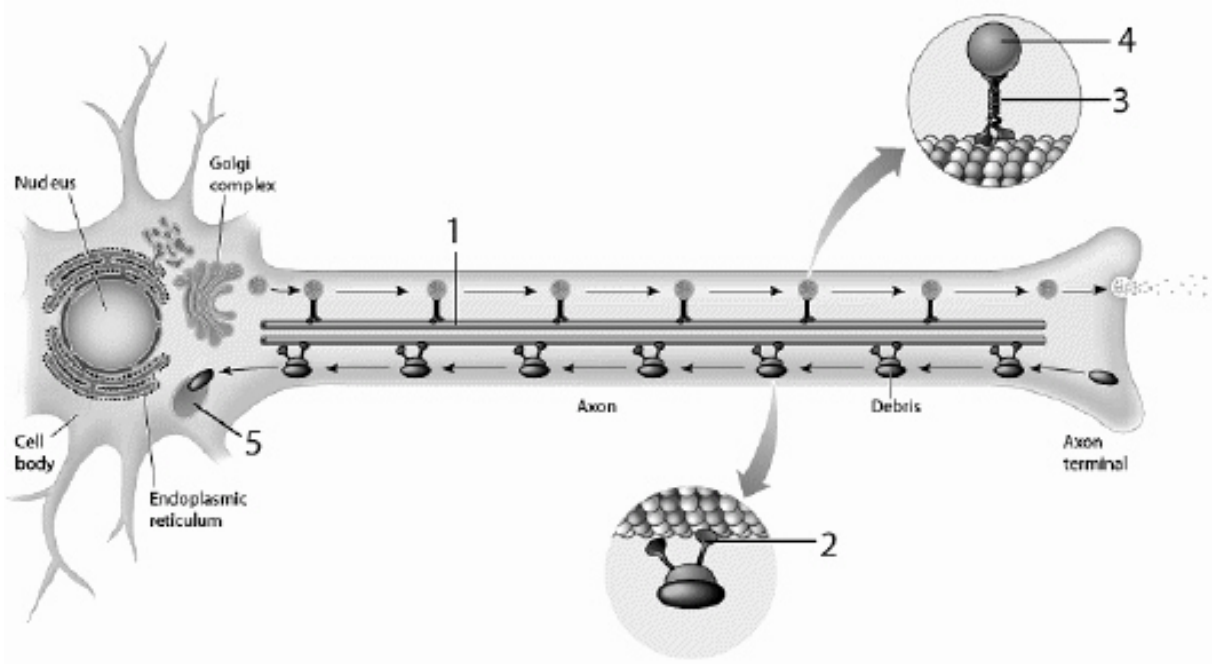
Use the figure above to answer the corresponding questions.

Label "3" identifies

a. a myosin motor moving along a microtubule
b. a kinesin motor moving along a microfilament
c. a dynein motor moving along a microtubule
d. a dynein motor moving away from a centriole
e. none of these

e

127.



Use the figure above to answer the corresponding questions.

Which number identifies a structure that utilizes hydrolases to perform its function?

a. 1
b. 2
c. 3
d. 4
e. 5

e

128. Describe the pathway that newly synthesized polypeptides take on route for secretion.

The rough ER synthesizes proteins, which then make their way into the smooth ER. The smooth ER packages the proteins within transport vesicles that pass to the Golgi complex. The contents of the vesicle enter the Golgi complex where they may be modified. Eventually, the secretory products are packaged into secretory vesicles, which bud off the Golgi complex and make their way to the plasma membrane along components of the cytoskeleton. On appropriate stimulation, the secretory vesicles fuse with the plasma membrane and empty their contents into the ECF via exocytosis.

129. Describe two benefits of a cell carrying out anaerobic glycolysis. Be sure to include the following in your answer: pyruvate, electrons (in hydrogen atoms), oxygen, mitochondrion, Krebs cycle, ETS, and ATP.

Glycolysis produces ATP in the cytosol and does not require oxygen. Therefore, when oxygen concentrations in the cell decrease below optimum, the cell can still synthesize ATP using energy extracted from glucose. Another advantage is that glycolysis provides substrates in the form of pyruvate and high-energy electrons that can be used within the mitochondria to generate more ATP. The pyruvate is modified into acetyl CoA, which enters the Krebs cycle; and high-energy electrons (within hydrogen atoms) that are taken out of glycolysis reactions can be used to power the electron transport system, which is important for oxidative phosphorylation within the mitochondrion.

130. How is ATP synthesized via electron transport and oxidative phosphorylation? Be sure to include the following items in your answer: electrons, glycolysis, Krebs cycle, NADH, $FADH_2$, hydrogen ion pump, intermembrane space, ATP synthase, ATP, and oxygen.

Electrons (in hydrogen atoms) that are stripped out of reactions in glycolysis and the Krebs cycle are transported to the ETS via electron carriers (NADH and $FADH_2$). The electrons are passed along carriers within the ETS and the energy they release is used by hydrogen ion pumps to move hydrogen ions from the mitochondrial matrix into the intermembrane space of the mitochondrion. Hydrogen ions then diffuse back into the matrix through special enzymes called ATP synthases. The movement of H^+ through the enzymes energizes the enzymes, allowing them to phosphorylate ADP to form ATP. Oxygen serves as the final electron acceptor in the ETS, thus allowing the ETS to continue accepting electrons from NADH and $FADH_2$.

131. Describe the movement of vesicles along microtubules in the cytoskeleton. Include the following in your answer: microtubules, tubulin, kinesin, dynein, plus end, minus end, and centriole.

Centrioles form microtubules, which are made of tubulin proteins. The microtubules radiate out from the centrioles, with their "minus" ends at the centrioles and their "plus" ends farthest away from the centriole. Motor molecules attach to vesicles and then move along the microtubules. Kinesin can only move toward the plus end of the microtubule; therefore, they always move away from the centriole. Dynein can only move toward the minus end of the microtubule; therefore, they always move toward the centriole.

132. Describe the structure and function of cilia and flagella. Be sure to include the following in your answer: basal body, doublets, triplets, dynein, fused, unfused, and "9+2."

Flagella and cilia are motile extensions of a cell, and they contain nine fused pairs of microtubules (each pair is a doublet) arranged in a ring around two single unfused microtubules, yielding a "9+2" arrangement. Dynein motor molecules walk along adjacent microtubule doublets, causing the doublets to slide past each other; this is responsible for the bending and stroking actions of cilia and flagella. Cilia and flagella arise from basal bodies, which are similar to centrioles and have nine fused triplets rather than doublets of microtubules and do not surround any unfused microtubules.