

Cell Interactions & Communication

1. _____ among cells is a hallmark of multicellular organisms, an ability the prokaryotes lack.
2. Cells in a multicellular organism communicate with each other by means of _____ molecules that bind to receptor proteins.
3. Endocrine signaling involves the release of _____.
4. Adjacent cells can signal others by direct contact, while nearby cells that are not touching can communicate by the release of _____ signals.
5. The long distance communication systems use hormones and _____.
6. Chemically gated ion _____ open or close when signal molecules bind to the channel, allowing specific ions to diffuse through the channel.
7. Enzymatic receptors typically activate intracellular proteins by _____.
8. A small number of surface receptors can ultimately generate a large intracellular response, as each step of the pathway is often expanded by signal _____.
9. Tight and anchoring _____ cause cells to adhere tightly to each other.
10. Hormones are an example of intercellular communication known as _____.
11. Protein kinases, enzymes which add phosphate groups to proteins, are an example of _____ receptors.
12. Located on or within the cell are _____ proteins, each of which has a three dimensional shape complementary to that of a specific signal molecule.
 - A. amplification
 - B. monoclonal
 - C. transmembranal
 - D. receptor
 - E. messenger
13. The space into which neurotransmitters are released is called a chemical
 - A. synapse
 - B. junction
 - C. channel
 - D. desmosome
 - E. vesicle

14. Cyclic AMP and calcium ions are often used within a cell as
- A. neurotransmitters
 - B. monoclonal antibodies
 - C. signaling chemicals
 - D. hormones
 - E. secondary messengers
15. Specific protein receptors are present for all of the following except
- A. signal amplification
 - B. signal transduction
 - C. intracellular receptors binding to DNA
 - D. signaling to other cells
 - E. as cell junctions
16. The cells of multicellular organisms use a variety of molecules as signals which are
- A. amino acids and proteins
 - B. nucleotides and lipids
 - C. dissolved gases like nitric oxide
 - D. only a and b
 - E. a, b, and c
17. Which of the following events is not likely to be one of the responses by the cell towards approaching signal molecules?
- A. First recognize the receptor protein having the correct 3-D shape.
 - B. Then bind to it if having complementary shape.
 - C. The binding induces a change in the receptor protein's shape.
 - D. This change in the receptor ultimately results in cellular action.
 - E. All of the above are correct.
18. Communication between cells can occur by all of the following basic mechanisms except
- A. direct contact
 - B. signaling to digest plasma membrane
 - C. paracrine signaling
 - D. endocrine signaling
 - E. synaptic signaling
19. Signals with short-lived, local effects are called
- A. direct contact
 - B. endocrine signals
 - C. paracrine signals
 - D. synaptic signals
 - E. light signals

20. Synaptic signaling requires
- A. hormones
 - B. internal receptors
 - C. genes
 - D. neurotransmitters
 - E. lipids
21. Signal molecules activate intracellular receptors in
- A. chromosomes
 - B. vesicles
 - C. target cells
 - D. skin cells
 - E. surface cells
22. The molecules that convert extracellular signals into intracellular ones are
- A. neurotransmitters
 - B. peptide hormones
 - C. cell surface receptors
 - D. growth factor proteins
 - E. genes
23. All of the following statements about chemically gated ion channels are true except
- A. their amino acid chain winds back and forth across the membrane
 - B. they have genes encoded in them
 - C. in the center of the protein a pore exists
 - D. the pore connects the extracellular fluid with the cytoplasm
 - E. the pore is big enough for ions to pass through it
24. The class of cell surface receptors that act indirectly on plasma membrane-bound enzymes or ion channels are called
- A. G proteins
 - B. gated channels
 - C. enzymic receptors
 - D. second messengers
 - E. antibodies
25. Each of the following about G proteins is true except
- A. They are seven-pass transmembrane proteins.
 - B. They typically activate an intermediate protein by phosphorylation.
 - C. Signal molecules by binding cause changes in receptor protein shape.
 - D. Associated G proteins become activated by binding to GTP.
 - E. Activated G protein diffuses away from the receptor.

26. Gilman, the Nobel Prize winner of 1994, implicated which of the following in everything from sex in yeast to cognition in humans?
- A. enzymic receptors
 - B. G protein-linked receptors
 - C. gated ion channels
 - D. phospholipids
 - E. cAMP
27. Some enzymic receptors and most G protein-linked receptors carry the signal molecule's message into the target cell by utilizing other substances within the cytoplasm commonly called
- A. genes
 - B. antibodies
 - C. enzymes
 - D. second messengers
 - E. first messengers
28. Which pair are examples of second messengers?
- A. sodium, potassium ions
 - B. amino acids, proteins
 - C. steroids, lipids
 - D. sugars, starches
 - E. cAMP, calcium ions
29. A small number of surface receptors can ultimately generate a large intracellular response, as each step of the pathway is often expanded by
- A. enzymic receptors
 - B. gated ion channels
 - C. signal amplification
 - D. G protein-linked receptors
 - E. all of the above
30. Most cells are in physical contact with other cells at all times by forming permanent connections called
- A. cell junctions
 - B. gated ion channels
 - C. enzymic receptors
 - D. G protein-linked receptors
 - E. cell surface markers

31. In the digestive tract adjacent cells develop connections to form a sheet that prevents leakage of small molecules. These connections between cells are called
- A. communicating junctions
 - B. desmosomes
 - C. gap junctions
 - D. ion gates
 - E. tight junctions
32. Small molecules or ions can pass from one cell to another through
- A. tight junctions
 - B. communicating junctions
 - C. diffusion spheres
 - D. desmosomes
 - E. adherens junctions
33. Junctions in which the cytoskeleton of a cell is attached to that of other cells or the extracellular matrix are called
- A. communicating junctions
 - B. gap junctions
 - C. tight junctions
 - D. anchoring junctions
 - E. plasmodesmata
34. In plants, cell-cell junctions can only occur at gaps in the cell walls through cytoplasmic connections that form across the plasma membranes of the touching cells. These junctions are called
- A. desmosomes
 - B. tight junctions
 - C. plasmodesmata
 - D. cellulose matrix
 - E. adhering junctions
35. A biochemist is designing a new drug that will mimic the shape of a particular signal molecule. She has to design the drug molecules so that they will be selected over the other “normal” molecules at the surface of the cell membrane. Therefore she must produce molecules that will bind to the receptor protein and
- A. retain their three-dimensional shape
 - B. induce a change in the receptor molecule shape, which will ultimately produce a cellular response
 - C. induce a change in the phospholipid bilayer that causes a polar reversal allowing the molecules to be “pulled” inside the cell
 - D. produce a cellular response by altering the Sodium-Potassium pump located near the receptor site

36. A researcher is trying to produce a new cancer drug to be tested on small tumors. The tumor has to be localized in a small area of the body and cannot have become metastasized. Furthermore, this drug must prohibit the signaling from one tumor cell to another tumor cell. Given the above information, this new drug will prohibit
- A. direct physical contact between tumor cells
 - B. autocrine signaling between tumor cells
 - C. paracrine signaling between tumor cells
 - D. endocrine signaling between tumor cells
37. Chemically gated ion channels are receptor proteins through which ions pass. A cell biologist has blocked these channels in a lab rat's liver tissue from passing ions by a process that must
- A. prohibit the binding of a neurotransmitter
 - B. prohibit ions from entering the cell via passive transport
 - C. create a special enzyme barrier that causes ions to combine with protein transporters and move in the opposite direction of the ion gradient
 - D. prevent the G protein from secreting protein kinases
38. G proteins are the largest family of cell surface receptors. More than one hundred G protein-linked receptors have been identified. These G protein molecules mediate a vast range of cell signals, such as neurotransmitters. Each G protein-linked receptor passes through the plasma membrane
- A. three times
 - B. four times
 - C. five times
 - D. six times
 - E. seven times
39. Intracellular mediators—or as they are also called, secondary messengers—alter the behavior of proteins by binding with the protein, thus altering their shape. There are two widely used secondary messengers. Choose the correct two from the following list.
- A. cAMP and potassium
 - B. cAMP and ATP
 - C. cAMP and G proteins
 - D. cAMP and calcium
 - E. cAMP and calmodulin

40. A researcher is investigating the MHC protein. That means she is
- A. studying proteins that are similar to G proteins and that pass through the plasma membrane seven times
 - B. studying proteins that provide surface markers for distinguishing between “self cells” and “non-self cells”
 - C. studying proteins that are commonly used to detect human blood groups (A, B, AB, and O)
 - D. studying proteins that act as secondary messengers conveying signal molecule messages to target cells deep within the cytoplasm
41. If the digestive tract lining of an animal leaks, this means that the junctions between cells have broken down. Teams of researchers working at a pesticide company are trying to produce a new rodent poison that will cause junctions between intestine cells to leak. This poison will be used on rat infestations at an old waterfront warehouse. The researchers are developing a poison that will be incorporated into grain and left where the rodents will feed on it. The poison is supposed to work by
- A. breaking down the gap junctions between the gut epithelial cells
 - B. breaking down the tight junctions between the gut epithelial cells
 - C. breaking down the anchoring junctions between the gut epithelial cells
 - D. breaking down the communicating junctions between the gut epithelial cells
 - E. breaking down the nuclear membranes of the gut epithelial cells causing the rupturing of the nucleus and thus preventing new cell growth and protein synthesis
42. Some plant cells have their cytoplasms linked, which permits small molecules and ions to pass from one cell to the other. These areas of cytoplasmic linkages are called
- A. gap junctions
 - B. anchoring junctions
 - C. tight junctions
 - D. plasmodesmata
 - E. adherens junctions
43. NO (nitric oxide) diffuses out of epithelial cells and causes smooth muscles, such as blood vessels, to relax. For NO to be effective it must bind with
- A. guanylyl cyclase that catalyzes the synthesis of cyclic guanosine monophosphate (GMP), which acts as an intracellular molecule.
 - B. a protein kinase that catalyzes the synthesis of cyclic guanosine monophosphate (GMP), which acts as an intracellular molecule
 - C. MHC complexes on the surface of the plasma membranes before it catalyzes the synthesis of cyclic guanosine monophosphate (GMP), which acts as an intracellular molecule
 - D. the smooth muscle epithelial cell directly; then it catalyzes the synthesis of cyclic guanosine monophosphate (GMP), which acts as an intracellular molecule

44. Which of the following is an example of cell signaling?
- gap junction
 - neurotransmitter release
 - hormone
 - paracrine signaling
 - all of the above
45. Which of the following is not part of the cell communication system in animal cells?
- gap junctions
 - plasmodesmata
 - tight junctions
 - desmosomes
 - none of the above
46. A scientist has developed a mutant cell line that does not respond to nitric oxide (NO) gas. What is likely to be the result of such a cell line when treated with NO gas?
- All intracellular receptor activity will decrease.
 - Gated ion channels will no longer function.
 - Levels of GMP will decrease.
 - Levels of GMP will increase.
47. What characteristics do all cell surface receptors share?
- They are composed of hydrophilic proteins.
 - They all must bind to a molecule to be activated.
 - They all result in creation of an ion channel.
 - They include the activation of a G protein.
 - all of the above
48. Match each of the following.
- | | |
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| _____ A. Long-lived affect cells very distant from the releasing cell; hormones. | 1. paracrine molecules; signals |
| _____ B. Molecules on the plasma membrane; important in early development; lipids, carbohydrates, and proteins. | 2. direct contact cell' |
| _____ C. The molecules neurons; signals released very close to the target cells; neurotransmitters. | 3. endocrine released by signals |
| _____ D. Short-lived causing local effects; destroyed by extracellular enzymes; important in early development and coordination of activities of neighboring cluster of cells. | 4. synaptic molecules signals |

Answer Key

No. on Test	Correct Answer
1	Communication
2	signal
3	hormones
4	paracrine
5	neurotransmitters
6	channels
7	phosphorylation
8	amplification
9	junctions
10	endocrine signaling
11	enzymic
12	D
13	A
14	E
15	E
16	E
17	E
18	B
19	C
20	D
21	C
22	C
23	B
24	A
25	A
26	B
27	D
28	E
29	C
30	A
31	E
32	B
33	D
34	C

35	B
36	C
37	A
38	E
39	D
40	B
41	B
42	D
43	A
44	E
45	B
46	C
47	B
48	1-C, 2-B, 3-D, 4-A