

Quiz Yourself: Chapter 5

Choices can be used more than once or not at all

1-5. Matching

- | | | |
|---|---|-------------|
| A) surface of membrane facing extracellular fluid | hydrophilic | 1) <u>E</u> |
| B) surface of membrane facing intracellular fluid | hydrophobic | 2) <u>C</u> |
| C) interior core of membrane | phosphate based | 3) <u>E</u> |
| D) none of the above | lipid and cholesterol based | 4) <u>C</u> |
| E) A and B | water soluble ions and molecules cannot enter this region | 5) <u>C</u> |

6-10. Matching

- | | | |
|--|----------------------------------|--------------|
| A) Can move through membrane rapidly without transporter | Ions | 6) <u>B</u> |
| B) Cannot move through membrane without transporter | O ₂ , CO ₂ | 7) <u>A</u> |
| | Small lipids | 8) <u>A</u> |
| | Small sugars | 9) <u>B</u> |
| | Small amino acids | 10) <u>B</u> |

11-15. Matching

- | | | |
|------------------------------|---|--------------|
| A) Pumps | Transport depends on concentration gradient of a driving ion | 11) <u>C</u> |
| B) Channels | Allow facilitated diffusion of small molecules (e.g. glucose) | 12) <u>D</u> |
| C) Co-Transporters | Transport of ions depends on energy from ATP | 13) <u>A</u> |
| D) Facilitative Transporters | Are transmembrane proteins | 14) <u>E</u> |
| E) all of the above | Allow diffusion of ions | 15) <u>B</u> |

16-20. Matching (epithelial transport)

- | | | |
|-------------------------|--|--------------|
| A) Basolateral membrane | Often has Na ⁺ channels | 16) <u>B</u> |
| B) Apical membrane | Faces the interstitial fluid | 17) <u>A</u> |
| | Commonly has Na ⁺ /K ⁺ pumps | 18) <u>A</u> |
| | Often has Na ⁺ /Glucose Co-transporters | 19) <u>B</u> |
| | Often has facilitative glucose transporters | 20) <u>A</u> |

Fill in

21. In a membrane, the **lipids** of the phospholipids in one monolayer face the **lipids** of the phospholipids in the other monolayer.
22. It is difficult for polar molecules to pass through the phospholipid bilayer because **lipid** **molecules** attract one another.
23. The passage of solutes through channels is an example of **passive** transport.
24. The passage of solutes using co-transporters is an example of **secondary** **active** transport.
25. In diffusion water or solutes pass from an area of high to **low** concentration.

Study Questions

1. Explain the process of diffusion and its role in the movement of substances across the plasma membrane.
2. Explain the role of channels and pumps in the movement of water or electrolytes across the plasma membrane.
3. Compare and contrast the roles of channels, facilitative transporters, co- and counter-transporters, and pumps

Quiz Yourself: Chapter 6

Choices can be used more than once or not at all

1-5. Matching

- | | | |
|----------------------|--|-----------------|
| A) amines | are synthesized as short chains of amino acids | 1) <u> C </u> |
| B) steroids | are synthesized from single amino acids | 2) <u> A </u> |
| C) peptides | are synthesized from cholesterol | 3) <u> B </u> |
| D) amino acids | include glycine and glutamate | 4) <u> D </u> |
| E) none of the above | include epinephrine | 5) <u> A </u> |

6-10. Matching

- | | | |
|----------------------|-------------------------|------------------|
| A) are water soluble | steroids | 6) <u> B </u> |
| B) are lipid soluble | thyroxin | 7) <u> B </u> |
| | peptides | 8) <u> A </u> |
| | amino acids | 9) <u> A </u> |
| | most non-thyroid amines | 10) <u> A </u> |

11-15. Matching (chemical messengers)

- | | | |
|--|--------------------------------|------------------|
| A) Bind to intracellular receptors (Transcription factors) | Steroid messengers | 11) <u> A </u> |
| B) Bind to G-protein coupled receptors (GPCRs) | Amino acid messengers | 12) <u> E </u> |
| C) Bind to tyrosine kinase linked receptors (RTK) | Eicosanoid messengers | 13) <u> B </u> |
| D) Bind to channel linked receptors | <u>Most</u> peptide messengers | 14) <u> B </u> |
| E) B and D | Non-thyroid amine messengers | 15) <u> B </u> |

16-20. Matching (REB = response element binding)

- | | | |
|--|--|------------------|
| A) G-protein coupled receptors (GPCRs) | Utilize adenylyl cyclase | 16) <u> A </u> |
| B) Channel linked receptors | Utilize phospholipase C | 17) <u> A </u> |
| C) Enzyme linked receptors | Include ligand-gated channels | 18) <u> B </u> |
| D) Intracellular receptors | Include the tyrosine kinase linked receptors | 19) <u> C </u> |
| | Often are REB proteins that form transcription factors | 20) <u> D </u> |

Fill in

21. Chemical messengers bind to extra-cellular or intra-cellular receptors.
22. Water soluble chemical messengers bind to ligand gated channels, enzyme linked receptors, or G-protein coupled receptors.
23. RTKs phosphorylate IRS and Shc, causing activation, respectively, of Akt and MAPK.
24. GPCRs control enzymes such as adenylyl cyclase to produce cAMP.
25. In addition to affecting cyclase, activation of GPCRs can increase the activity of phospholipase-C, causing production of IP3 and DAG.

Study Questions

1. Describe the major classes of chemical messenger.
2. Explain how lipid soluble chemical messengers, using cortisol as an example, cause cellular responses.
3. Explain how water soluble chemical messengers, using glucagon as an example, cause cellular responses.
4. Compare and contrast the organization of channel linked receptors, tyrosine kinase linked receptors, and G-protein coupled receptors.

Quiz Yourself: Chapter 7

Choices can be used more than once or not at all

1-5. Matching

- | | | |
|-----------|--|-------------|
| A) 140 mM | intracellular concentration of sodium | 1) <u>C</u> |
| B) 100 mM | extracellular concentration of sodium | 2) <u>A</u> |
| C) 15 mM | extracellular concentration of calcium | 3) <u>E</u> |
| D) 5 mM | intracellular concentration of potassium | 4) <u>A</u> |
| E) 3 mM | extracellular concentration of potassium | 5) <u>D</u> |

6-10. Matching

- | | | |
|---------------------------|--|--------------|
| A) voltage gated channels | are commonly found in axons | 6) <u>A</u> |
| B) ligand gated channels | are commonly found in dendrites | 7) <u>B</u> |
| | are commonly found in cell bodies | 8) <u>B</u> |
| | are commonly found in presynaptic membranes | 9) <u>A</u> |
| | are commonly found in postsynaptic membranes | 10) <u>B</u> |

11-15. Place the following events in the order leading to the release of a neurotransmitter.

- | | | |
|---|--------|--------------|
| A) The neurotransmitter diffuses out of the vesicle into the synaptic cleft | first | 11) <u>C</u> |
| B) Synaptic vesicle fuse with the presynaptic membrane | second | 12) <u>D</u> |
| C) An action potential reaches the synaptic bulb | third | 13) <u>E</u> |
| D) Voltage gated calcium channels open | fourth | 14) <u>B</u> |
| E) Calcium enters the intracellular fluid | fifth | 15) <u>A</u> |

16-20. Matching

- | | | |
|--------------|---|--------------|
| A) Slow EPSP | caused by opening ligand gated sodium channels | 16) <u>B</u> |
| B) Fast EPSP | caused by opening ligand gated chloride channels | 17) <u>D</u> |
| C) Slow IPSP | caused by opening calcium channels that are G-protein coupled | 18) <u>A</u> |
| D) Fast IPSP | caused by closing potassium channels that are G-protein coupled | 19) <u>A</u> |
| | caused by opening potassium channels that are G-protein coupled | 20) <u>C</u> |

Fill in

21. Neurotransmitters are released from **synaptic vesicles**.
22. **Calcium** is essential for the fusion of the synaptic vesicles to the presynaptic membrane.
23. Rapid release of neurotransmitter at a single synapse can cause **temporal** summation.
24. **Ligand** gated channels open or close in response to specific chemicals.
25. Neurotransmitters are **water** soluble.

Study Questions

1. Describe the general organization and purpose of unipolar and multipolar neurons.
2. Describe the intracellular and extracellular distribution of common ions and explain their role in the generation of the resting membrane potential.
3. Explain the role of membrane potentials and ion channels in the generation and conduction of action potentials.
4. Explain the function of synaptic communication and explain the mechanisms responsible for the secretion of neurotransmitters.
5. Explain how postsynaptic receptors respond to common neurotransmitters, and the significance of EPSPs and IPSPs.

Quiz Yourself: Chapter 8

Choices can be used more than once or not at all

1-5. Matching (in the context of sensory neurons)

- | | | |
|--------------------------------|---|-----------------|
| A) sensory receptors/dendrites | generate nervous signals | 1) <u> A </u> |
| B) peripheral axon | release neurotransmitters | 2) <u> C </u> |
| C) synaptic bulbs | detect chemical or physical signals | 3) <u> A </u> |
| D) central axon | conduct signals toward the synaptic bulb | 4) <u> D </u> |
| | conduct signals from the receptors/dendrite | 5) <u> B </u> |

6-10. Matching

- | | | |
|----------------------|--|------------------|
| A) C fibers | are the axons of most mechanoreceptor neurons | 6) <u> C </u> |
| B) A δ fibers | conduct signals about touch, pressure, vibration | 7) <u> C </u> |
| C) A β fibers | are the axons of nociceptor neurons | 8) <u> D </u> |
| D) A and B | conduct fast or prickling pain | 9) <u> B </u> |
| E) All of the above | conduct slow or aching pain | 10) <u> A </u> |

11-15. Matching

- | | | |
|---------------------|----------------------------|------------------|
| A) Nociceptors | respond to local movement | 11) <u> E </u> |
| B) Photoreceptors | respond to local chemicals | 12) <u> C </u> |
| C) Chemoreceptors | respond to tissue damage | 13) <u> A </u> |
| D) Thermoreceptors | respond to temperature | 14) <u> D </u> |
| E) Mechanoreceptors | respond to light | 15) <u> B </u> |

16-20. Place in order the events for detecting and transferring the effects of sensory stimulation.

- | | | |
|---|--------|------------------|
| A) A stimulus alter the permeability of the sensory receptor membrane | first | 16) <u> A </u> |
| B) Neurotransmitter is released onto specific neurons in the CNS | second | 17) <u> C </u> |
| C) The receptor (dendritic) potential reaches threshold | third | 18) <u> E </u> |
| D) The action potential is propagated to the CNS | fourth | 19) <u> D </u> |
| E) An action potential is generated | fifth | 20) <u> B </u> |

Fill in

21. Sensory receptors are commonly part of the sensory neuron's dendrite .

22. Sensory transduction converts a physical signal into a neural signal.

23. In the dorsal column pathways the sensory neurons synapse in the medulla .

24. In the spinothalamic pathways the sensory neurons synapse in the spinal cord .

25. Modulation of pain depends on the inhibition of nervous transmission.

Study Questions

- Describe the organization of sensory neurons and accessory sensory cells.
- Describe the general mechanisms responsible for the transduction of sensory information.
- Explain with diagrams the circuitry responsible for processing somatosensory signals in the posterior column and spinothalamic pathways.
- Explain how synaptic connections are involved in the filtering of sensory information.
- Explain the basis for referred pain and the modulation of pain.