Name: _____ Note Set 46

# CHAPTER 44: Neurons and Nervous Systems

1. What are the three different types of neurons and what are their functions?

   a. _____

   _____

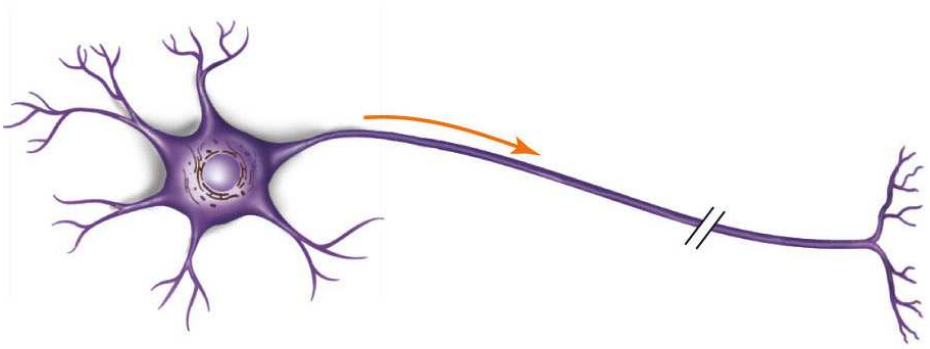
   b. _____

   _____

   c. _____

   _____

2. Label and list the function of each part of the neuron.



3. What is significance of cephalization?

_____

_____

_____

4. How does the neuron maintain an approximate -60 mV potential?

_____

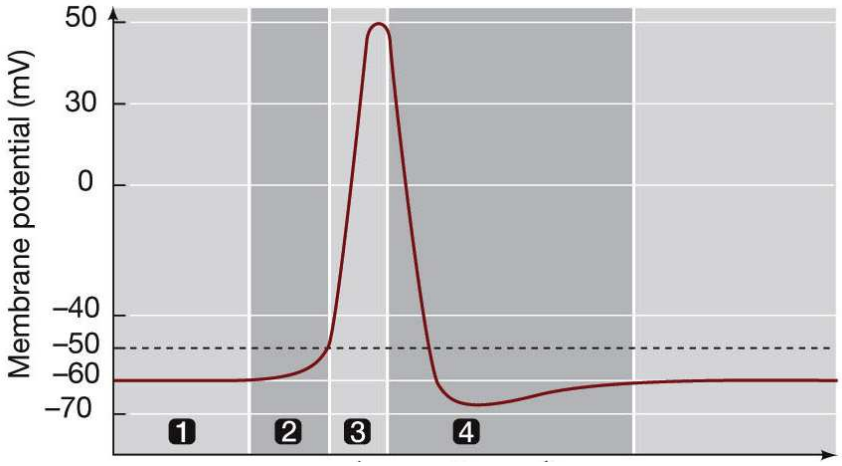
_____

5. What is the significance of the electrochemical gradient?

_____

_____

6. Using **Figure 44.10** and the text identify each step of the course of an action potential and describe what is happening?




7. How does an impulse propagate down the axon?

8. What is the significance of the Schwann cells and myelin?

9. Describe what happens when an impulse reaches the terminal end.

10. What happens at the synapse?

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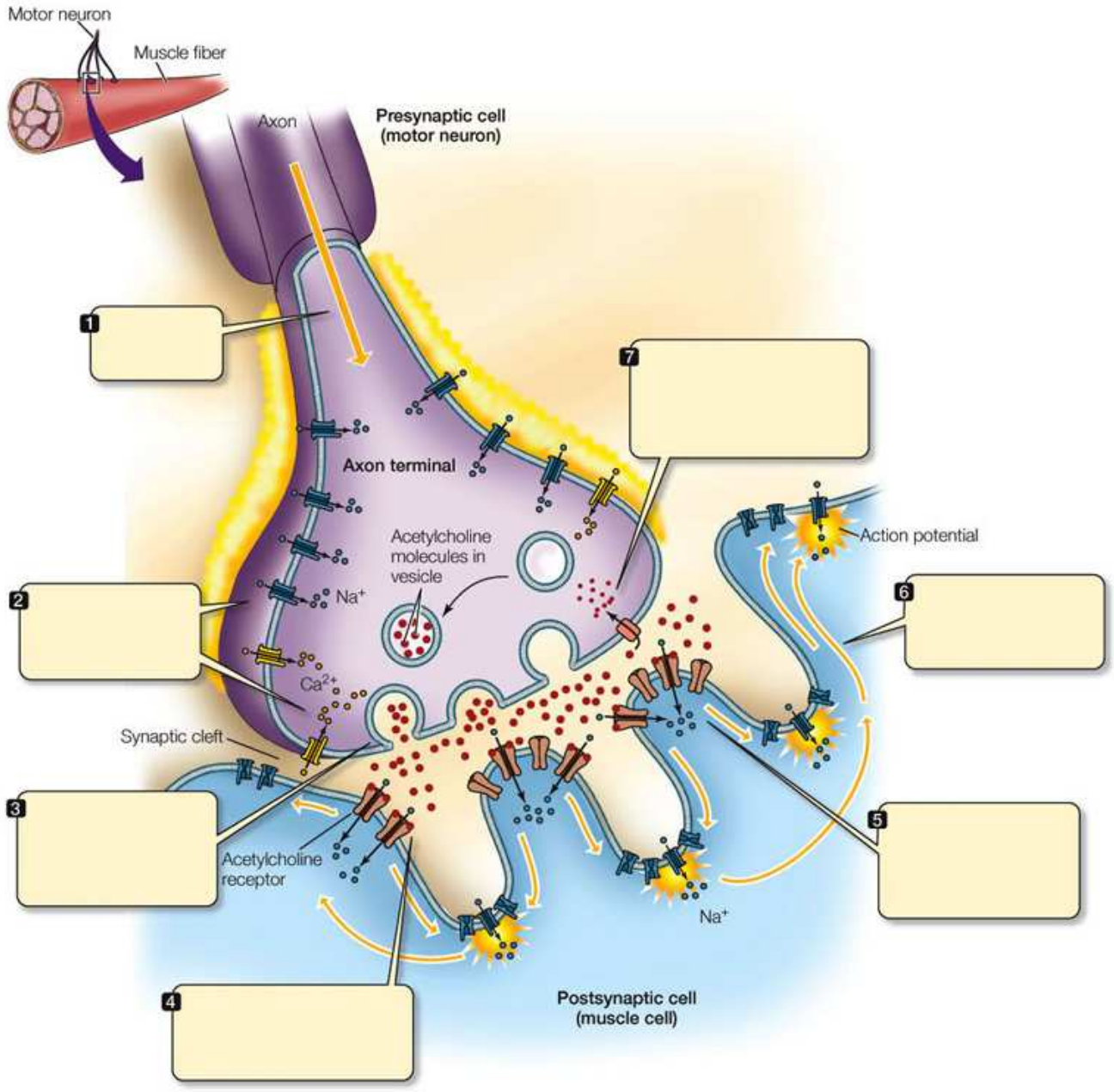
_____

11. Using **Figure 44.13** and the on-line text, describe what is happening in each numbered step of chemical synaptic transmission.



# END OF CHAPTER 44 MULTIPLE CHOICE

1. The rising phase of an action potential is due to the
   A) closing of $K^+$ channels.
   B) opening of chemically gated $Na^+$ channels.
   C) closing of voltage-gated $Ca^{2+}$ channels.
   D) opening of voltage-gated $Na^+$ channels.
   E) spread of positive current along the plasma membrane.

2. The resting potential of a neuron is due mostly to
   A) local current spread.
   B) open $Na^+$ channels.
   C) synaptic summation.
   D) open $K^+$ channels.
   E) open $Cl^-$ channels.

3. Which statement about synaptic transmission is not true?
   A) The synapses between neurons and muscle cells use ACh as their neurotransmitter.
   B) A single vesicle of neurotransmitter cannot cause a muscle cell to contract.
   C) The release of neurotransmitter at the neuromuscular junction causes the motor end plate to fire action potentials.
   D) In vertebrates, the synapses between motor neurons and muscle fibers are always excitatory.
   E) Inhibitory synapses cause the resting potential of the postsynaptic membrane to become more negative.

4. Which statement accurately describes an action potential?
   A) Its magnitude increases along the axon.
   B) Its magnitude decreases along the axon.
   C) All action potentials in a single neuron are of the same magnitude.
   D) During an action potential the membrane potential of a neuron remains constant.
   E) An action potential permanently shifts a neuron's membrane potential away from its resting value.

5. A neuron that has just fired an action potential cannot be immediately restimulated to fire a second action potential. The short interval of time during which restimulation is not possible is called
   A) hyperpolarization.
   B) the resting potential.
   C) depolarization.
   D) repolarization.
   E) the refractory period.

6. The rate of propagation of an action potential depends on
   A) whether or not the axon is myelinated.
   B) the axon's diameter.
   C) whether or not the axon is insulated by glial cells.
   D) the cross-sectional area of the axon.
   E) all of the above.

7. The binding of an inhibitory neurotransmitter to the postsynaptic receptors results in
   A) depolarization of the membrane.
   B) generation of an action potential.
   C) hyperpolarization of the membrane.
   D) increased permeability of the membrane to sodium ions.
   E) increased permeability of the membrane to calcium ions.

8. The difference between slow and fast synapses is
   A) the width of the synaptic cleft.
   B) the size of the synapse.
   C) whether or not the neurotransmitter acts directly on ion channels.
   D) the density of receptors on the postsynaptic membrane.
   E) whether or not the presynaptic vesicles kiss and run.

9. Whether a synapse is excitatory or inhibitory depends on the
   A) type of neurotransmitter.
   B) presynaptic axon terminal.
   C) size of the synapse.
   D) nature of the postsynaptic receptors.
   E) concentration of neurotransmitter in the synaptic space.

10. Which of the following is a likely mechanism for long-term potentiation?
    A) When glutamate binds to postsynaptic AMPA receptors, it activates G proteins that trigger intracellular changes.
    B) When glutamate binds to NMDA receptors, it allows magnesium ions to enter the cell, which initiate intracellular changes.
    C) When sufficient glutamate is released by the presynaptic neuron, it causes an increase in the number of AMPA receptors on the postsynaptic cell.
    D) When sufficient glutamate is released, both AMPA and NMDA receptors are activated, and NMDA receptors allow $Ca^{2+}$ as well as $Na^{+}$ to enter the cell, thus initiating intracellular changes.
    E) When both glutamate and ACh are released together, they create a long-lasting depolarization of the postsynaptic cell.