

Neurophysiology of Nerve Impulses



1. Match each of the definitions in Column A with the appropriate term in Column B.

Column A

- _____ term that refers to a membrane potential of about -70 mv
- _____ reversal of membrane potential due to influx of sodium ions
- _____ major cation found outside of a cell
- _____ minimal stimulus needed to elicit an action potential
- _____ period when cell membrane is totally insensitive to additional stimuli, regardless of the stimulus force applied
- _____ major cation found inside of a cell

Column B

- a. threshold
- b. sodium
- c. potassium
- d. resting membrane potential
- e. absolute refractory period
- f. depolarization

2. Fill in the blanks with the correct words or terms.

Neurons, as with other excitable cells of the body, have two major physiological properties: _____ and _____. A neuron has a positive charge on the outer surface of the cell membrane due in part to the action of an active transport system called the _____. This system moves _____ out of the cell and _____ into the cell. The inside of the cell membrane is negative, not only due to the active transport system but also because of _____, which remain negative due to intracellular pH and keep the inside of the cell membrane negative.

3. Why don't the terms *depolarization* and *action potential* mean the same thing?

4. What is the difference between membrane irritability and membrane conductivity?

5. Why does a nerve's action potential increase slightly when you add 1.0 V to the threshold voltage and stimulate the nerve?

6. If you were to spend a lot of time studying nerve physiology in the laboratory, what type of stimulus would you use, and why?

7. Why does the addition of sodium chloride elicit an action potential?

8. What was the effect of ether on eliciting an action potential?

9. Does the addition of ether to the nerve cause any permanent alteration in neural response?

10. What was the effect of curare on eliciting an action potential?

11. Explain the reason for your answer to Question 10.

12. What was the effect of lidocaine on eliciting an action potential?

13. What is the relationship between size of a nerve and conduction velocity?

14. Keeping your answer to Question 13 in mind, draw an analogy between the nerves in the human body and electrical wires.

15. Hypothesize what types of animals would have the fastest conduction velocities.

16. How does myelination affect nerve conduction velocity? Explain.

17. In the nerve conduction velocity experiment, if any of the nerves used were reversed in their placement on the stimulating and recording electrodes, would there be any differences seen in conduction velocity? Explain.
