

The Anatomy Of A Nerve Impulse Worksheet

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Part 1: Foundational Knowledge

What is the primary function of the myelin sheath in a neuron?

Hint: Think about the role of myelin in nerve impulse speed.

- A) To store neurotransmitters
- B) To increase the speed of nerve impulse transmission
- C) To generate action potentials
- D) To maintain the resting potential

Which of the following are components of a neuron? (Select all that apply)

Hint: Consider the main parts that make up a neuron.

- A) Dendrites
- B) Axon
- C) Synapse
- D) Cell body

Explain the role of the sodium-potassium pump in maintaining the resting membrane potential of a neuron.

Hint: Consider how ions are moved across the membrane.

List the three main phases of an action potential.

Hint: Think about the sequence of events during an action potential.

1. Phase 1

2. Phase 2

3. Phase 3

Part 2: Understanding and Interpretation

During which phase of the action potential do sodium ions rush into the neuron?

Hint: Consider the phase where the membrane potential becomes more positive.

- A) Restoring potential
- B) Depolarization
- C) Repolarization
- D) Hyperpolarization

Which statements are true about the refractory period? (Select all that apply)

Hint: Think about the characteristics of the refractory period.

- A) It prevents the backward propagation of action potentials.
- B) It occurs after the action potential has reached its peak.
- C) It allows the neuron to immediately fire another action potential.
- D) It is divided into absolute and relative periods.

Describe how neurotransmitters facilitate synaptic transmission between neurons.

Hint: Consider the process of neurotransmitter release and binding.

Part 3: Applying Knowledge and Analyzing Relationships

If a neuron is exposed to a toxin that blocks sodium channels, what immediate effect would this have on action potential generation?

Hint: Think about the role of sodium channels in action potentials.

- A) Action potentials would be generated more frequently.
- B) Action potentials would not be generated.
- C) The resting potential would become more positive.
- D) The neuron would become hyperpolarized.

In a scenario where the myelin sheath is damaged, what consequences might occur? (Select all that apply)

Hint: Consider the effects of myelin damage on nerve function.

- A) Slower nerve impulse transmission
- B) Increased action potential frequency
- C) Impaired coordination and movement
- D) Enhanced synaptic transmission

Apply your understanding of synaptic transmission to explain how a drug that inhibits neurotransmitter reuptake might affect neural communication.

Hint: Consider the role of reuptake in neurotransmitter availability.

Part 4: Synthesis and Reflection

Which of the following best explains why action potentials are unidirectional?

Hint: Think about the factors that influence the direction of action potentials.

- A) The presence of the myelin sheath
- B) The refractory period following an action potential
- C) The structure of the axon
- D) The release of neurotransmitters

Analyze the effects of hyperpolarization on a neuron. Which statements are correct? (Select all that apply)

Hint: Consider how hyperpolarization affects neuronal excitability.

- A) It makes the neuron less likely to fire an action potential.
- B) It occurs when potassium channels remain open longer than necessary.
- C) It results in a more positive membrane potential.
- D) It is a phase that immediately follows depolarization.

Which strategy would be most effective in treating a neurological disorder characterized by excessive neuronal firing?

Hint: Consider the mechanisms that could reduce neuronal excitability.

- A) Enhancing sodium channel activity
- B) Inhibiting potassium channel activity
- C) Increasing neurotransmitter release
- D) Enhancing the function of inhibitory neurotransmitters

Evaluate the potential effects of a novel drug that enhances the reuptake of neurotransmitters. Which outcomes are likely? (Select all that apply)

Hint: Think about how reuptake affects neurotransmitter levels in the synapse.

- A) Decreased synaptic transmission
- B) Increased neurotransmitter availability in the synaptic cleft
- C) Reduced neuronal excitability
- D) Enhanced synaptic plasticity

Design an experiment to test the effects of a new drug on action potential propagation in neurons. Outline the hypothesis, method, and expected results.

Hint: Consider how you would structure an experiment to measure action potentials.