What is a Neuron and How Does It Transmit Signals?

Worksheet

A neuron receives signals through dendrites, integrates them in the cell body (soma), sends an electrical impulse down the axon, and releases neurotransmitters at the synapse to communicate with the next cell.

Questions

1. Which part of a neuron receives incoming signals?

A) Axon
B) Dendrites
C) Synapse
D) Myelin sheath

2. What does myelin do?

A) Releases neurotransmitters
B) Speeds up signal conduction
C) Detects light
D) Stores memories

3. Where are neurotransmitters released?

A) Dendrites
B) Cell body
C) Axon terminal at the synapse
D) Nucleus

4. What triggers an action potential?

A) Random cell activity
B) Sufficient signal reaching the axon hillock threshold
C) Neurotransmitter storage
D) Myelin formation

5. Trace a signal from your fingertip to your brain when you touch something cold.

6. Why does myelin speed up signal transmission?

7. What happens at a synapse when a neurotransmitter is released?

8. Define: What do dendrites do?

9. Define: What is the function of the axon?

10. Define: What is myelin and why does it matter?

Answer Key

1. B) Dendrites - Dendrites receive signals from other neurons.

2. B) Speeds up signal conduction - Myelin insulates the axon, enabling faster saltatory conduction.

3. C) Axon terminal at the synapse - Neurotransmitters are released from the axon terminal into the synaptic cleft.

4. B) Sufficient signal reaching the axon hillock threshold - An action potential fires when integrated signals at the axon hillock exceed threshold.

5. A sensory receptor in the skin detects cold Dendrites of a sensory neuron pick up the signal The signal travels through the cell body and down a long axon toward the spinal cord At the synapse, neurotransmitters relay the signal to the next neuron heading to the brain

6. Myelin wraps the axon in insulating segments with gaps (nodes of Ranvier) The electrical impulse 'jumps' node to node instead of traveling continuously This saltatory conduction can be up to 100x faster than in unmyelinated axons

7. An action potential reaches the axon terminal Voltage-gated calcium channels open and calcium flows in Synaptic vesicles release neurotransmitter into the synaptic cleft The neurotransmitter binds receptors on the next neuron, triggering a new signal (or inhibiting it)

8. Receive incoming signals from other neurons and carry them toward the cell body.

9. Conducts the electrical impulse (action potential) away from the cell body toward the synapse.

10. A fatty insulating sheath around axons that speeds up signal conduction via saltatory conduction.