What is a Reflex Arc?

Worksheet

A reflex arc is a neural pathway from sensory neuron synapse in spinal cord motor neuron muscle response, bypassing the brain. It produces a fast, involuntary response (reflex).

Questions

1. In a reflex arc, the synapse occurs in the

A) brain
B) spinal cord grey matter
C) sensory receptor
D) muscle

2. Which neuron carries the signal FROM the spinal cord to the muscle?

A) sensory neuron
B) interneuron
C) motor neuron
D) relay neuron

3. Why do reflex responses happen faster than conscious decisions?

A) sensory neurons are faster
B) the spinal cord acts without waiting for the brain
C) muscles respond instantly to stimuli
D) no synapses are involved

4. The patellar (knee-jerk) reflex is an example of a

A) 3-neuron arc
B) 2-neuron arc
C) monosynaptic arc
D) both B and C

5. You touch a hot stove. Describe the reflex arc.

6. The doctor taps your knee and your leg kicks. Why?

7. Why do you blink when an object approaches your eye?

8. Define: What is a reflex arc?

9. Define: Why are reflexes fast?

10. Define: What is an effector in a reflex?

Answer Key

1. B) spinal cord grey matter - The synapse between sensory and motor neurons is in the spinal cord, allowing a fast response without brain delay.

2. C) motor neuron - The motor (efferent) neuron carries signals away from the CNS to the effector muscle.

3. B) the spinal cord acts without waiting for the brain - The reflex arc operates at spinal level, bypassing the brain's processing delay (~200-300 ms).

4. D) both B and C - It's a 2-neuron arc (sensory + motor, no interneuron) with one synapse - the simplest reflex.

5. Stimulus: heat on fingertip Sensory neuron: pain receptor spinal cord Synapse: connection in grey matter Motor neuron: spinal cord finger muscles Response: hand jerks away in ~50 ms

6. Stimulus: tap on patellar tendon Sensory neuron: stretch receptor in quadriceps spinal cord Synapse: 2-neuron arc (sensory + motor, no interneuron) Motor neuron: spinal cord quadriceps muscle Response: leg extends (patellar reflex)

7. Stimulus: approaching object (light/air movement) Sensory neuron: eye/eyelid receptor brainstem Synapse: connection in motor nucleus Motor neuron: brainstem eyelid muscles Response: eyelid closes in ~100 ms

8. A fast neural pathway from stimulus sensory neuron spinal cord synapse motor neuron response, without involving the brain.

9. They bypass the brain. The synapse is in the spinal cord, not the brain, so the response happens in ~50 ms.

10. The organ or muscle that produces the response (e.g., hand muscle that pulls away from heat).