What is the Nervous System?

Worksheet

The nervous system controls the body by sending electrical impulses through neurons, coordinating everything from reflexes to conscious thought via the brain, spinal cord, and peripheral nerves.

Questions

1. Which structures make up the CNS?

A) Nerves and ganglia
B) Brain and spinal cord
C) Muscles and skin
D) Sensory receptors only

2. A myelinated neuron conducts a signal 1 m in 0.01 s. What's its conduction velocity?

A) 1 m/s
B) 10 m/s
C) 100 m/s
D) 1000 m/s

3. Which division of the PNS controls involuntary functions like heart rate?

A) Somatic
B) Autonomic
C) Central
D) Reflexive

4. What role does myelin play?

A) Produces neurotransmitters
B) Insulates axons to speed conduction
C) Forms the spinal cord
D) Stores memories

5. A nerve impulse travels 1.2 meters along a myelinated motor neuron at 120 m/s. How long does it take to reach the muscle?

6. Compare that to an unmyelinated pain fiber conducting at 1 m/s over the same 1.2 m - how long does the signal take?

7. A reflex arc (touching a hot object) involves the withdrawal reflex, bypassing the brain. If the spinal reflex path is 0.8 m and conducts at 80 m/s, find the reaction time.

8. Define: What are the two main divisions of the nervous system?

9. Define: What is a neuron?

10. Define: Why do myelinated neurons conduct signals faster?

Answer Key

1. B) Brain and spinal cord - CNS = brain + spinal cord, the body's processing and command center.

2. C) 100 m/s - v = d/t = 1 / 0.01 = 100 m/s.

3. B) Autonomic - The autonomic nervous system regulates involuntary processes such as heart rate and digestion.

4. B) Insulates axons to speed conduction - Myelin insulates axons, allowing saltatory conduction that dramatically speeds up signal transmission.

5. time = distance / speed = 1.2 m / 120 m/s = 0.01 s = 10 milliseconds

6. time = 1.2 m / 1 m/s = 1.2 seconds That is 120 slower than the myelinated motor neuron

7. time = 0.8 m / 80 m/s = 0.01 s = 10 milliseconds - much faster than the ~200 ms it takes to consciously perceive pain

8. The central nervous system (brain, spinal cord) and the peripheral nervous system (all other nerves).

9. A specialized cell that transmits electrical and chemical signals throughout the nervous system.

10. Myelin insulates the axon, letting impulses 'jump' between gaps (nodes of Ranvier) instead of traveling continuously.