What Is Spinal Cord Gray Matter Organization?

Worksheet

Spinal cord gray matter is organized into a dorsal (posterior) horn that receives sensory input, a ventral (anterior) horn that houses motor neurons, and - at thoracic and upper lumbar levels - a lateral horn containing sympathetic preganglionic neurons. Histologically, this same gray matter is subdivided into ten Rexed laminae (I-X) based on cell type and function, from the sensory-processing laminae I-VI dorsally to the motor neuron-rich lamina IX ventrally.

Questions

1. Which horn of the spinal cord gray matter receives sensory input?

A) Ventral horn
B) Dorsal horn
C) Lateral horn
D) Central canal

2. Lower motor neuron cell bodies for skeletal muscle are found in which horn?

A) Dorsal horn
B) Lateral horn
C) Ventral horn
D) None - they are in the brainstem

3. The lateral horn, containing sympathetic preganglionic neurons, is present at which spinal levels?

A) C1-C8 only
B) T1-L2/L3
C) S1-S5 only
D) Present at every spinal level

4. Rexed laminae classify spinal gray matter based on what?

A) Blood supply
B) Cell type and cytoarchitecture/function
C) Vertebral level only
D) Myelin content of white matter

5. A sensory neuron carrying pain information from the skin enters the spinal cord. Which horn does it synapse in first?

6. A lower motor neuron innervating the biceps brachii is damaged in the spinal cord. Which horn contains its cell body?

7. At spinal level T4, a lesion destroys the lateral horn. What system is disrupted?

8. Define: What shape is spinal cord gray matter in cross-section?

9. Define: What does the dorsal horn do?

10. Define: What does the ventral horn contain?

Answer Key

1. B) Dorsal horn - Sensory afferents enter via the dorsal root and synapse in the dorsal horn.

2. C) Ventral horn - The ventral horn (Rexed lamina IX) houses motor neurons whose axons exit via the ventral root.

3. B) T1-L2/L3 - Sympathetic outflow arises only from thoracolumbar levels T1 through about L2/L3.

4. B) Cell type and cytoarchitecture/function - Rexed laminae I-X are defined by neuronal cytoarchitecture and functional role, from sensory dorsally to motor ventrally.

5. Sensory (afferent) fibers enter via the dorsal root. They synapse on second-order neurons in the dorsal horn (laminae I-V, especially lamina I and II for pain). From there the signal ascends via the spinothalamic tract.

6. Motor neuron cell bodies that innervate skeletal muscle sit in the ventral (anterior) horn. This corresponds largely to Rexed lamina IX. Damage here causes flaccid paralysis of the biceps (lower motor neuron signs).

7. The lateral horn is present only from roughly T1 to L2/L3. It contains sympathetic preganglionic neurons (intermediolateral cell column). Destruction disrupts sympathetic outflow to structures like sweat glands and blood vessels below that level.

8. A butterfly or H shape, with dorsal, ventral, and (at some levels) lateral horns.

9. Receives and processes sensory (afferent) input entering via the dorsal root.

10. Cell bodies of lower motor neurons that exit via the ventral root to innervate skeletal muscle.