



Spinal Cord

Psychology 372

Physiological Psychology

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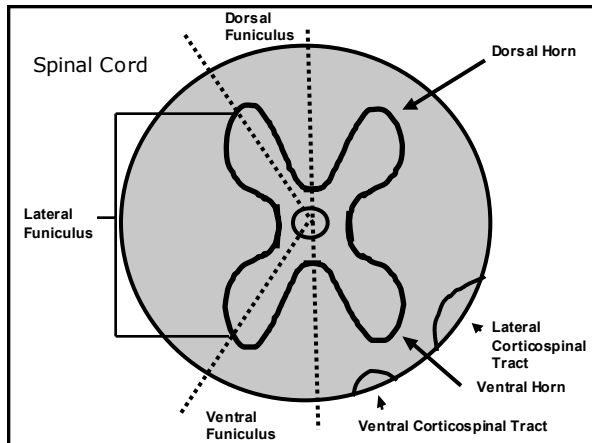
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Overview

- Has a central core of non-myelinated neurons (gray matter) surrounded by myelinated neurons (white matter)
- Gray matter is shaped like an H
- Is shorter than the vertebral column
- Is separated into regions which contain structures.

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Some Structures

- Dorsal Horn
 - Contains sensory nuclei
 - Forms clusters of nuclei
 - Receives information from outside the CNS
- Ventral Horn
 - Contains motor nuclei
 - Receives information from major motor pathways
 - Sends information to muscles
 - Does not contain clusters – are arranged in columns that run the length of the spinal cord

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Some Structures

- Are different sizes depending on where you are in the spinal column.
- E.g.
 - Ventral horn is larger where motor neurons innervate the arms and legs.
 - Need neurons for regulation
- Dorsal Horn is larger where sensory nerves from the limbs enter the spinal cord.
- Need more neurons because you have more receptors.

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Internuncial Neurons

- Also called interneurons
- Are also in gray matter
- Modulate information flowing from sensory neurons towards the brain, and higher brain centers to motor neurons
- Modulates neural activity within motor systems.
- Are also involved in reflexes.

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White Matter

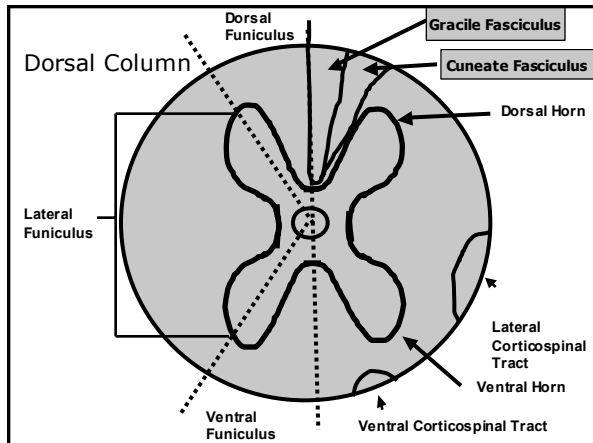
- Surrounds the Gray Matter
- Divided into three columns
 - Dorsal
 - Lateral
 - Ventral
- Each column contains bundles of ascending and descending axons

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Dorsal Column

- Lie between the two dorsal horns
- Sends only sensory information via axons to the brain
- Uses the Gracile Fasciculus (lower limbs) and Cuneate Fasciculus (upper body) pathways.

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Lateral Columns

- Sends information to the brain
- Also sends information from the brainstem and cortex to lower motor neurons.
- Lateral Corticospinal tract.
 - Sends motor information to Final Common Pathway
 - Most motor information is sent in this pathway.

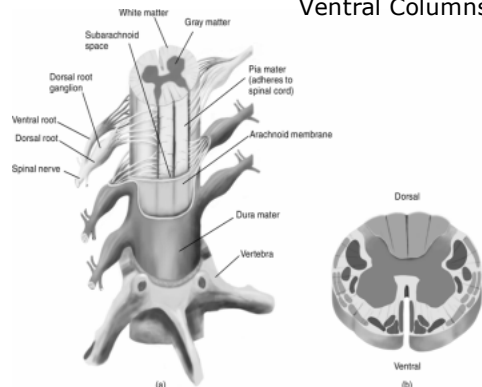
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Ventral Columns

- Includes ascending and descending axons
- Ascending sends information about pain and thermal sensation.
- Descending pathways help control axial muscles and posture.
 - Uses Ventral Corticospinal tract and others
 - Sends remaining motor information

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Ventral Columns



Spinal Cord

- Divided into four major regions
 - Cervical
 - Thoracic
 - Lumbar
 - Sacral
- Are related to body development segments
- Nerves enter and leave through the intervertebral foramen.

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Cervical Nerves

- Has 8 segments
- Involved with
 - sensory perception
 - Motor function on the back of the head, neck, arms

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Thoracic

- Has 12 segments
- Innervates upper body

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Lumbar and Sacral

- Lumbar - 5 segments
- Sacral - 5 segments
- Innervates the lower body, the back, and legs
- Spinal Cord usually terminates in the lumbar area.

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Pyramidal Decussation

- Located in the Medulla
- Is where the majority of fibers cross over to the opposite side of the body
 - E.g., 80-85% of motor fibers cross over to contralateral (opposite) side
 - Uses the lateral corticospinal tract
 - 15-20% remain ipsilateral (on same side)
 - Uses the ventral corticospinal tract.

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Other Things

- Few sensory axons enter at sacral level
- As you ascend up the spinal column, more sensory neurons enter.
- Most descending axons terminate at cervical levels
- Thus, the sacral level has less white matter than at cervical levels.

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