

**THE UNIVERSITY OF CONNECTICUT**  
**Graduate School**  
**Meds 384, Mammalian Neuroanatomy**  
**Cellular Organization and Tracts of the Spinal Cord**

**INSTRUCTIONS:**

Use the images of the spinal cord found in the carousel marked **General CNS Anatomy**. The same images are found on our web page: <http://penguin.uchc.edu/~meds384/>

**Levels of the spinal cord**

Identify:

cervical spinal cord.

thoracic spinal cord.

lumbar spinal cord.

sacral spinal cord.

In each section, identify:

dorsal horn	substantia gelatinosa (lamina II)	motor neurons (lamina IX)
ventral horn	nucleus proprius (lamina IV)	

Identify the cervical enlargement.

Identify the lumbosacral enlargement.

What muscles are innervated by the motor neurons in the cervical enlargement? What muscles are innervated by the motor neurons in the thoracic spinal cord? What muscles are innervated by the motor neurons in the lumbosacral enlargement?

**Normal spinal cord**

Use slides CNS-02 through CNS-06 and your atlas to examine the spinal gray and white matter in detail. In each slide, use the structures listed below to classify the section as either upper cervical, cervical enlargement, thoracic, lumbar, or sacral. Compare the slides to determine whether the following structures are present or absent.

In the gray matter find:

dorsal root entry zone	intermediate spinal gray	intermediolateral cell column*
lamina I	motor neurons (lamina IX)	dorsal nucleus of Clarke
substantia gelatinosa (lamina II)	dorsolateral motor column*	
nucleus proprius (lamina IV)	ventromedial motor column*	* Note that these columns are in the gray matter, not the white matter!!

**White matter: The major tracts in the dorsal funiculus**

In CNS-2-9, identify the location of the following tracts in the dorsal funiculus:

fasciculus gracilis

fasciculus cuneatus

dorsolateral fasciculus

**White matter: The major tracts in the lateral funiculus - Superficial**

Use slides CNS-4 and CNS-6 to locate the structures: Dorsal spinocerebellar tract, Ventral spinocerebellar tract. They receive inputs from primary afferents that innervate muscle spindles and

Golgi tendon organs. The dorsospinocerebellar tract originates in the Dorsal Nucleus of Clarke. These tracts carry information from the spinal cord to the cerebellum. The ventral spinocerebellar tract originates from interneurons of the lumbosacral spinal cord, and it conveys information about spinal reflexes.

**White matter: The major tracts in the lateral funiculus - Deep**

anterolateral system (spinothalamic tract) - Fast pain and temperature  
corticospinal tract, lateral - Control of voluntary movement  
rubrospinal tract - Voluntary movement  
reticulospinal tract, medullary - Involuntary movements such as muscle tone and posture.

**White matter: The major tracts in the ventral funiculus - superficial**

vestibulospinal tract, lateral - Involuntary movements such as muscle tone and posture.  
tectospinal tract - Head and neck movements

**White matter: The major tracts in the ventral funiculus - deep**

Reticulospinal tract, pontine - Involuntary movements such as muscle tone and posture.  
Corticospinal tract, anterior - Same as lateral corticospinal  
Vestibulospinal tract, medial - Involuntary movements such as muscle tone and posture.

**Pathology of the Spinal Cord**

Examine the pathological dorsal funiculus in slides CNS-7, CNS-8, and CNS-9. The sections of the spinal cord normally stain black with the myelin stain. However, when the axons (and myelin) have degenerated due to pathology, they do not stain and the structures appear white.

Identify the tracts that are damaged. What symptoms would they produce?