

**BIO 4432 – Human Anatomy***Resource #3*

The concepts this resource covers are the topics typically covered during this week of the semester. If you do not see the topics your particular section of class is learning this week, please take a look at other weekly resources listed on our website for additional topics throughout the semester.

**We also invite you to look at the group tutoring chart on our website to see if this course has a group tutoring session offered this semester.**

If you have any questions about these study guides, group tutoring sessions, private 30 minute tutoring appointments, the Baylor Tutoring YouTube channel or any tutoring services we offer, please visit our website [www.baylor.edu/tutoring](http://www.baylor.edu/tutoring) or call our drop in center during open business hours. M-Th 9am-8pm on class days 254-710-4135.

**Keywords:** Spinal cord, Spinal nerves, Myotomes, Dermatomes

*Topic of the Week: Spinal Cord***Terminology**

**Somatic** – voluntary innervation; goes to skeletal muscle

**Visceral** – involuntary innervation; goes to smooth muscle or glands

**Afferent** – sensory; travels TO spinal cord

**Efferent** – motor; brings signal back to the muscles (think Efferent causes an Effect in the muscles/glands)

**Spinal Nerves**

8 cervical pairs, 12 thoracic pairs, 5 lumbar pairs, 5 sacral pairs, 1 coccygeal pair

- Spinal nerves exit through the *intervertebral foramen*
- Remember that cervical spinal nerve 1 starts above the first cervical vertebra!

Dorsal Rami

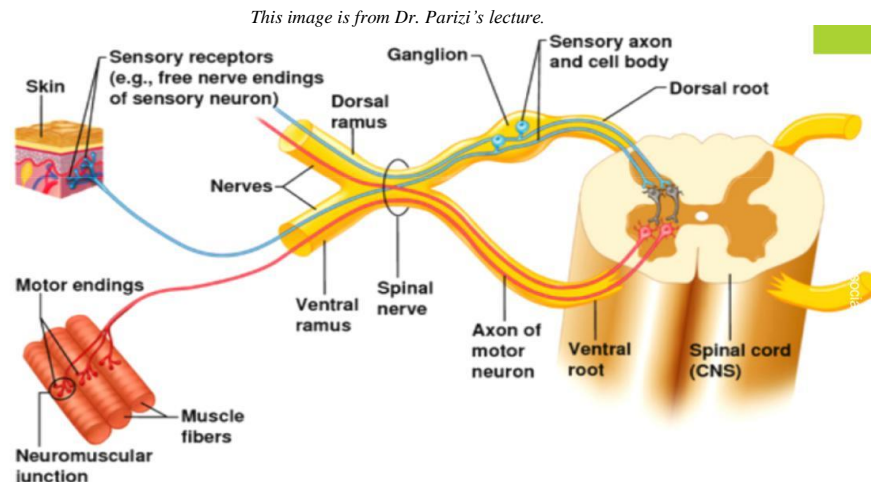
Sensory to: the skin over the back

Motor to: the deep/intrinsic back muscles

Ventral Rami

Sensory to: the skin over ventral trunk and limbs

Motor to: skeletal muscles of neck, trunk, and extremities

**Cross Section**

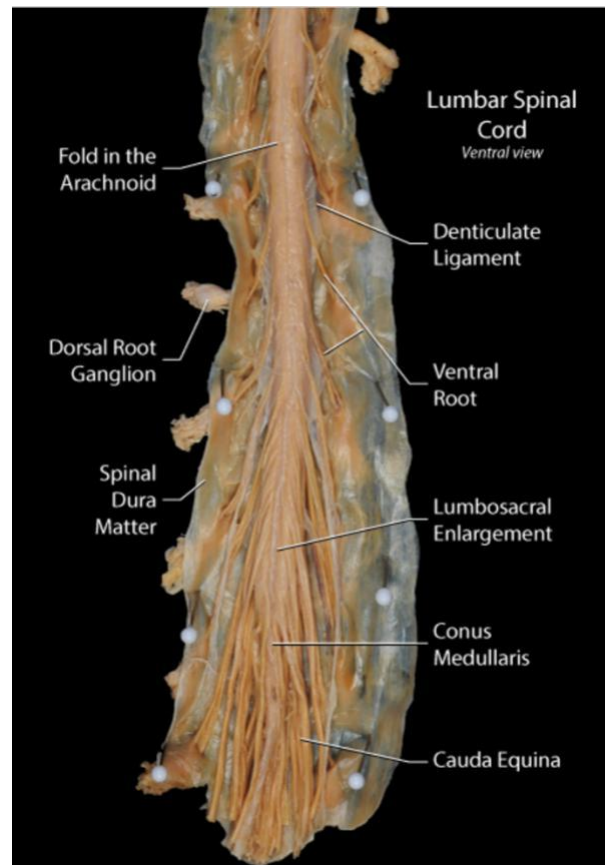
The **ventral horn** contains **motor/efferent** cell bodies, but the **dorsal horn** does not contain any cell bodies – **sensory/afferent cell bodies** are found in the **dorsal root ganglion**.

### Important Features

- 3 coverings of the spinal cord:
  - Pia
  - Dura
  - Arachnoid
- Conus medullaris**: end of the spinal cord (level of L1-L2)
- Cauda equina**: collection of nerve roots at the end of the spinal cord (literally means “horse’s tail and looks like one too!”)
- Filum terminale**: extension of the pia that becomes the coccygeal ligament
- Denticulate ligaments**: stabilize the spinal cord by keeping it attached to the dura

Dr. Acland’s video covering the spinal cord:

<https://aclandanatomy.com/MultimediaPlayer.aspx?multimediaId=10528251>



*This image was taken from biodrawing.com*

**Knowledge checkpoint 1:** Trace the path of an efferent signal from the spinal cord to a skeletal muscle.

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### Highlight #1: Myotomes and Dermatomes

**Myotomes:** a group of muscles innervated by a single spinal nerve level

- Tested by movement!

C5: shoulder abduction

C6: elbow flexion

C7: elbow extension

C8: finger flexion (make a fist)

T1: finger abduction

L2: hip flexion

L3: hip adduction

L4: knee extension

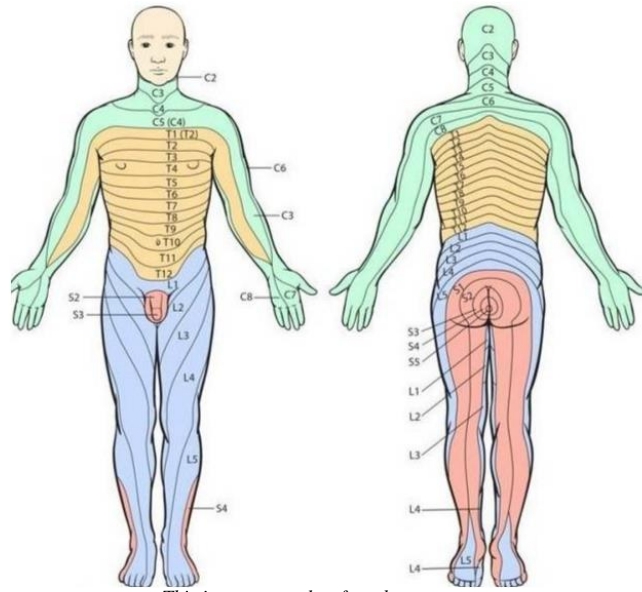
L5: dorsiflexion

S1: plantar flexion

**Dermatomes:** an area of skin innervated by a single spinal nerve level

- Tested by touch!

- C2: back of the head
- C5: lateral epicondyle
- C6: dorsal surface of thumb (digit 1)
- C7: dorsal surface of middle finger (digit 3)
- C8: dorsal surface of little finger (digit 5)
- T1: medial epicondyle
- T4: level of the nipple
- T10: level of bellybutton/umbilicus
- L1: inguinal ligament
- L3: medial knee
- L4: medial malleolus
- L5: dorsum of foot at 3<sup>rd</sup> metatarsophalangeal joint
- S1: lateral aspect of calcaneus
- S2: popliteal fossa (back of knee)



*This image was taken from bonesmart.org*

**Knowledge checkpoint 2:** If a patient suffers nerve damage to the C7 spinal nerve level, which movement will be affected? Which area, if palpitated, will they be unlikely to feel?

### THINGS YOU MAY STRUGGLE WITH!

1. ***The difference between horns, roots, spinal nerves, and rami:*** The ventral and dorsal horns are projections of spinal cord grey matter. Remember the ventral horn contains efferent cell bodies and the dorsal horn has no cell bodies. The nerve root is the part of the spinal nerve that branches directly off the spinal cord. There are dorsal and ventral roots – the dorsal root **ONLY** brings sensory information to the spinal cord and the ventral root **ONLY** brings motor information to muscles. The spinal nerve is where the ventral and dorsal roots come together before branching into rami. Ventral and dorsal rami carry **BOTH** sensory and motor information, but to different destinations.
2. ***Myotomes and dermatomes:*** These you will just have to commit to memory. It helps to act out the myotomes and point out the dermatomes on yourself to cement them into your memory!

**CONGRATS:** You made it to the end of the resource! Thanks for checking out these weekly resources! Don't forget to check out our website for group tutoring times, video tutorials and lots of other resources: [www.baylor.edu/tutoring](http://www.baylor.edu/tutoring)!

**Answers**

1. Ventral horn → ventral root → spinal nerve → ventral ramus → skeletal muscle
2. Elbow extension; dorsal surface of digit 3