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 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**

This image is from Dr. Parizi’s lecture.
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**

1. **3 coverings of the spinal cord:**
   - Pia
   - Dura
   - Arachnoid
2. **Conus medullaris:** end of the spinal cord (level of L1-L2)
3. **Cauda equina:** collection of nerve roots at the end of the spinal cord (literally means “horse’s tail and looks like one too!”)
4. **Filum terminale:** extension of the pia that becomes the coccygeal ligament
5. **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?multimedioid=10528251

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

**Highlight #1: Myotomes and Dermatomes**

**Myotomes:** a group of muscles innervated by a single spinal nerve level
- **Tested by movement!**
  - C5: should 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 3rd metatarsophalangeal joint
S1: lateral aspect of calcaneus
S2: popliteal fossa (back of knee)

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!

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