

Bailey Joyner

**Unit Objectives:**

- ❓ Describe the structure and function of the skeletal system and joints
- ❓ Describe the structure and function of the muscular system
- ❓ Describe the structure and function of the nervous system

**Relevant Topics in Textbook:**

Chapter 7 Skeletal System  
 Chapter 8 Muscular System  
 Chapter 9 Nervous System  
 Chapter 10 The Senses

**Lecture Exam Review Questions: Lectures 12 and 13****The Spinal Cord**

1. Describe the basic structure (where does it begin and end) and functions of the spinal cord.

- ❓ **Structure (where does it begin and end):** Foramen Magnum and ends at the L1 & L2
- ❓ **Functions:**
  - **Conduction** – A bundle of nerve fibers passing information up/down
  - **Locomotion** – Neurons providing control of flexors and extensors
  - **Reflexes** – Involuntary, stereotyped responses to stimuli (EX: removing hand from hot surface)
- a. **Describe the location and role of the 3 meninges.**
  - ❓ Dura mater – Outermost & strongest layer - collagen (bone periosteum is outside this layer & epidural space is outside this layer of the spinal cord)
  - ❓ Arachnoid mater – Spider web of connective tissue that creates space for CSF between it and the pia matter called subarachnoid space ; lots of blood vessels
  - ❓ Pia mater – Delicate layer of CT that is in direct contact with the brain tissue and spinal cord tissue
- b. **What is the epidural space? (between what 2 structures?)**
  - ❓ Located between the periosteum & dura matter. A common side for the administration of drugs and is filled with adipose tissue
  - i. **Why might someone receive an epidural?**
    - Someone might receive an epidural during child birth

**2. What is a nerve?**

- ❓ A nerve is a bundle of axons with connective tissue to strengthen and organize ; the nerve itself and the neurons within are surrounded by connective tissue and arteries / veins help supply the nerve with nutrients and oxygen

- a. **Describe the connective tissue wrappings of a nerve, including the endoneurium, perineurium and epineurium.** Take note of the similarities of this organization, which is similar to skeletal muscle.

- **Endoneurium** – Connective tissue sheath around each axon.
- **Perineurium** – Coarser connective tissue wrapping surrounding fascicles
- **Epineurium** – Tough fibrous sheath around the entire nerve

3. When looking at the spinal cord in cross section, you will notice a dark, gray matter section that resembles the letter “H”. **Be able to identify the dorsal and ventral horns and roots (and the dorsal root ganglion); describe the type of signal (afferent or efferent) that would be carried within these. Are they entering or leaving the spinal cord? Where are they coming from or going to?**

❓ **Horns**

- Ventral – Contain axon terminals of sensory neurons
- Dorsal (posterior) – Sensory neuron axons enter the dorsal horns

❓ **Roots**

- Ventral – Contains motor (efferent) fibers/axons from motor neurons in the ventral horn and leave the spinal cord
- Dorsal – Contain sensory (afferent) fibers/axons from sensory neurons in the dorsal root ganglia - conduct impulses (enters the dorsal horn)

- ❓ Dorsal root ganglion – A collection of cell bodies of sensory neurons

**4. What types of stimuli can trigger an action potential within the nervous system?**

- ❓ Many different things can trigger an action potential within the nervous system:
1. Different sensations (temperature, touch, pain, pressure)
  2. Various chemicals
  3. Sound waves in the air

**5. What is a graded potential?**

- ❓ Stimulus must reach a threshold before an AP can be generated

**6. How does the brain (or spinal cord) know what type of signal it is receiving?**

**a. Do sensory neurons detect more than one stimulus?**

- ❓ No, sensory neurons carry just ONE type of signal.

**b. How does the brain (or spinal cord) know where the stimulus is coming from?**

- ❓ Since the information being sent to the brain can only travel on specific neurons, and we have a map in the sensory cortex that will tell the brain where the stimulus is coming from, the brain is able to tell where the signal arose and what the stimulus was that triggered it.

**7. How does degree of myelination impact how fast sensory signals reach the brain?**

If the neuron has a lot of myelin - the signal would reach the brain a lot faster (sharp pain for example)  
 If there is less myelin - the signal would be slower (dull pain)

**8. Why is the sensation of pain LEAST likely to adapt (go away)?****a. What is pain supposed to tell us?**

? Pain is supposed to warn the body of actual or impending tissue damage or injury of some kind.

**9. What is a reflex?**

? An automatic response to a stimulus that involves a nerve impulse passing inward from a receptor to a nerve center then outward to an effector without reaching the level of consciousness.

**a. Why are they important?**

? Reflexes are important because if we were to touch something hot our hand would lift away before our brain receives this information - if it did not we could have a slower time processing and cause injury to our hand.

**10. What is referred pain?**

? The brain accidentally interprets pain coming from the wrong location. EX : when you are experiencing a heart attack, some experience pain their arm

**Special Senses****1. List the full sequence of events (from nose to where it is perceived in the brain) that leads to our perception of smell:**

? 1. Orderants in the air bind to their receptors causing depolarization of those neurons then the signal is carried vis cranial nerve I through the ethmoid bone, to relay neurons in the olfactory bulb of the cerebrum. From the olfactory bulb the signal continues to the olfactory complex within the temporal lobe for processing.

**2. What is the role of our olfactory ensheathing cells? Help olfactory neurons and their axons track from the brain to the nasal cavity to allow the sense of smell.****a. How do they aid in olfactory neuron regeneration?**

? There are glial cells that surround and supply the olfactory neurons

**b. Why is this unique for a neuron?**

? They turn-over at a high rate in the nasal epithelium

**3. List the full sequence of events (from tongue to where it is perceived in the brain) that leads to our perception of taste upon binding depolarization of taste cells:**

Taste cell receptors bind to tastants - this binding causes depolarization of the cells and the release of additional chemicals (ATP or Serotonin) which activates near taste relay neurons. Once stimulated, the action potential is sent to the brain for processing via cranial nerves VII and IX

4. **What accounts for our ability to smell or taste different odorants or tastants?** (i.e. what do we need to be able to perceive a smell or a taste?)
- ? The widespread genetic variation among mammalian olfactory receptor repertoires within species
5. **List the full sequence of events (from ear to where it is processed in the brain) that leads to our perception of sound:**
- ? Sound pressure waves in air, funnels pressure waves in air, vibration of bones in the middle ear, pressure waves in fluid activates hair cells, action potential to brain through vestibule cochlear nerve, thalamus to the temporal lobe cerebrum is the auditory cortex that allows for hearing.
6. **Do all of the cells within the cochlea respond to all sound frequencies?**
- Yes
7. **What structure within the ear is responsible for our sense of balance?**
- ? Semicircular canals and vestibule
8. **Compare and contrast the photoreceptors, rods and cones. What type of light do they require? What do they allow us to see?**
- ? **Rods** – They operate in dim light ; provides indistinct, fuzzy, non color peripheral vision. More numerous at peripheral region of the retina away from the macula lutea
  - ? **Cones** – Operate in bright light, provides high acuity color vision. Found in the macula lutea ; concentrated in the fovea centralis
9. **List the pathway of light through the eye (structures the light passes through as it goes from cornea to retina)**
- ? Light enters the cornea, goes through an aqueous humor before going through the iris/pupil, light continues through the lens, then through the vitreous humor, until it hits the macula at the back of the eye. When light activates the photoreceptors the action potential that is generated is carried by the optic nerve to the brain
10. **List the full sequence of events that leads to our perception of visual stimuli (from retina to occipital lobe):**
- ? The optic disc is the start of our optic nerve which carries the action potential that is generated by the rods and cones to the occipital lobe

## 11. What are opsins?

- ? Opsins are proteins within the photoreceptors cells ; different colors of light stimulate these opsins. These are genes associated with these opsins

### a. Why is color blindness more common in males?

- They only have 1 X chromosome, if that chromosome has a defective gene ,  
? there's not another one to produce a functional protein. However, in females  
? there are 2 X chromosomes so having one is sufficient to produce the proteins  
to be able to be seen in red and green

## 12. Describe the following conditions: myopia, hyperopia, presbyopia.

- ? **Myopia** – A condition where the light is hitting at a point in front of the retina ; the eye itself is perhaps too long. (Nearsightedness)
- ? **Hyperopia** – (Farsighted) A condition where the eyeball is too short and the light is focused on a point that lies beyond the retina
- ? **Presbyopia** – Farsightedness with old age due to the stiffening of the lens