Nerve and Special Senses

BSC 181 Lab Supplement

**Materials:**

Peripheral Nerve cross section slide

Spinal cord cross section

Ox spinal cord

Pacinian corpuscles

Rabbit tongue with taste buds

Rulers

Reflex hammer, if available

Note: We will omit the motor unit and muscle spindles since we addressed them earlier with the muscle lab. We will however, repeat the viewing of the spinal cord cross section. Retina slides will be viewed along with the eye dissection later.

**Peripheral Nerve**

Examine the peripheral nerve cross section at 40X (scanning power). Try to discern the axon bundles/fascicles. Bringing the magnification up to high power (400X) will help you see the individual axons.





**Draw the peripheral nerve at 40X**

Label as many features as you can identify



**Draw the peripheral nerve at 400X**

Label as many features as you can identify

Answer the questions using your lab manual, your text book, and your lecture notes. Answer the questions before leaving lab.

What is the function of the myelin sheath?

To increase the conduction/speed of the impulses

What cell type is responsible for the myelin sheath in a peripheral nerve? In a CNS nerve?

PNS: Schwann cell

CNS: oligodendrocyte

Where do we commonly find multipolar neurons?

Throughout the body, common in the CNS

Where do we commonly find bipolar neurons?

Rare: in sensory organs such as eye, ear, olfactory mucosa



Where do we commonly find unipolar neurons?

PNS, bodies are located in the dorsal root ganglia for spinal nerves. For cranial nerves, bodies are located in the sensory ganglia.





**Spinal Cord**

Microscope: View the prepared slide of the spinal cord and draw it. Identify white and gray matter, anterior and posterior horns, gray commisure, central canal

40X



400X

View the **ox spinal cord** slide. View and identify the dendrites, soma, and axons. Also present will be some glial cells.

What type of material composes the gray matter of the spinal cord?

Mostly cell bodies, unmyelinated fibers, glial cells

What type of material composes the white matter of the spinal cord?

Mylenated axons

What is the location and function of the dorsal root ganglion?

Dorsal root ganglion is located bilaterally, flanking the posterior aspect of the spinal cord. The DRG contains the bodies of the sensory/afferent neurons.

Review the illustration of the spinal cord from the brain handout. You will be responsible for that anatomy.

**Monosynaptic reflexes**

In monosynaptic reflex like the patellar reflex, the impulse has only to cross one synapse (mono = one). We can see this type of reflex arc in the stretch reflexes of our muscles.

The stretch will be caused by the reflex hammer or the hand striking the tendon. This stimulation will cause the afferent fiber to send an impulse towards the CNS. Once at the CNS (note that here the CNS is the lumbar spinal cord… NOT the brain) the afferent fiber will synapse with the efferent fiber. Recall that the efferent fiber is the motor fiber. The motor fiber will run to the effector (the quadriceps) to create the leg extension. There will also be motors running to the antagonists (hamstrings) to keep them relaxed so the quadriceps can extend the leg.

**Exercise: tap the patellar reflex**

1. Have your lab partner sit in a location where they can sit comfortably upright while the lower legs can freely swing.
2. Locate the patella. Find the tendinous depression immediately inferior to the patella
3. Stand off to the side of your lab partner. Recall that the goal here is leg extension, and you don’t want to be standing in the way.
4. With a reflex hammer or with the side of your hand, quickly strike the tendons.
5. Note: The strike must be rapid and with a moderate force. Your goal is to see the reflex, not harm your lab partner. Keep in mind that your lab partner will be testing the same reflex on you in a bit.
6. Repeat the process on the opposite leg, and then switch so your lab partner can try it on you.



**Pacinian Corpuscles**

Pacinian corpuscles are exteroreceptors scattered deep in the dermis and subcutaneous tissues. They consist of a sensory dendrite surrounded by layers of flattened cells and layers of collagen fibers that form an egg-shaped capsule. They are receptors for vibration and touch.



Use the description in your lab manual to guide you in finding the Pacinian corpuscle on the prepared slide.



Try to identify and label the
following structures in your drawing:

Fingernail

Keratinized epithelium

Schwann cells

Adipose tissue

Sweat glands

**Answer the following questions:**

Would the fiber that runs from a Pacinian corpuscle be afferent or efferent?

afferent

Would it be considered part of the Central Nervous System or the Peripheral Nervous System?

PNS

**Exercise: Cutaneous Sensation**

It is important for the sensory receptors to be able to sense the pressure, vibration, temperature, sharp and dull, but it is also important where in the CNS those impulses get sent. Our sensory receptors are not evenly distributed; some areas are more sensitive than others. Some areas of our bodies are better mapped in the brain than others. We can demonstrate this with the following exercise.

**Materials needed:**

Lab partner

Pencil or pen. (You’ll be marking on your skin, so make sure it’s an ink that will wash off. )

Ruler/measuring tool

1. Ask your lab partner to close his/her eyes.
2. Place a mark with the pen or pencil on the anterior forearm
3. With eyes still closed, have your lab partner add a mark as close as possible to the original mark.
4. Measure the distance between the two marks in millimeters
5. Repeat the procedure for each of the following locations:
	1. Posterior calf
	2. Back of the neck
	3. Palm of hand
	4. Dorsum of hand (back of hand)
	5. Fingertip
	6. Anterior thigh (if accessible)

|  |  |
| --- | --- |
| Region | Error of Localization in mm |
| Anterior forearm |  |
| Posterior calf |  |
| Palmar surface of hand |  |
| Dorsum of hand |  |
| Fingertip |  |
| Back of neck |  |
| Anterior thigh  |  |

In which area were you most accurate?

In which area were you least accurate?

What would be the advantage of having some areas more sensitive than others?

To which area of the brain are these impulses being sent?

Somatosensory cortex of the brain, post-central gyrus

**Taste buds**

Recall that the term “papillae” means projection. In the tongue’s papillae we will find the gustatory cells or taste cells. When these cells are exposed to food the stimulation results in a signal being sent to the brain.



View the slide of the rabbit tongue.

Try to locate the stratified squamous epithelium, the papillae, and the taste buds.