# Lab 10

**Exercise 17 - Histology of Nervous Tissue**
**Exercise 22 – Human Reflex Physiology**
**Exercise 23 – General Sensation**

**Human Reflex Physiology - Exercise 22**
Activity 1 Initiating Stretch Reflexes 1- 4
Activity 3 Initiating the Plantar Reflex

**General Sensation - Exercise 23**
**Activity 2:** Demonstrating the Two-Point Threshold - see Review and Activity Sheet
for sites to test.
**Activity 5:** Demonstrating Adaptation of Touch Receptors
**Response Time Handout**

**Histology of Nervous Tissue - Exercise 17**

**Histology of Nervous Tissue**
**Activity 1**: Identifying Parts of a Neuron
**Activity 3**: Examining Microscopic Structure of a Nerve
Histology of Nervous Tissue 1, 2 (spinal cord smear), 3( use nerve l.s and c.s
slide) and spinal cord section (use the dark purple stained slides - see directions
below)

The spinal cord section slide is a stained transverse section through the spinal
cord. Large multipolar neuron cell bodies can be seen in the anterior part of the
spinal cord called the **anterior horn** (Atlas Plate 36). Locate one of these cell
bodies and focus on it using the 40X lens. (Figure below)
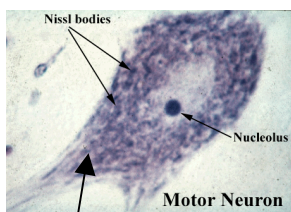


Identify the nucleus and nucleolus, cell body, Nissl bodies, processes.
Small nuclei that can be see around the motor neuron nucleus are nuclei
of astrocytes.

Spinal cord smear: Identify cell body, nucleus, nucleolus, processes, and
nuclei of astrocytes. Lab Manual Figure 17.2.c.

Nerve l.s and c.s: There are two samples of the nerve on this slide. One is cut along
the length of the nerve (l.s.) and the other is a transverse section (c.s. for cross
section).
Locate the nerve l.s. Identify axons, nuclei of Schwann cells, and nodes of
Ranvier. Lab Manual Figure 17.4.
Locate the nerve c.s. Identify axons, fascicle, perineurium and epineurium. Lab
Manual Figure 17.8.

Name _____     Section _____

## Review Sheet

**Exercise 17**

**1. Histology of Neurons and Nerves**
   Draw the following in the spaces below: 5 points each. Draw from the slide, not the text!
   Neuron (label cell body, process, nucleus, nucleolus) Use the 40X lens
   Nerve Long Section. (label myelin sheath, node of Ranvier, and axon) Use the 40X lens
   Nerve Cross Section. (label axon, Schwann cell, fascicle, perineurium Use the 10X or 40X lens

   Figure 1. Neuron

   Figure 2. Nerve Long Section

   Figure 3. Nerve Cross Section

2. List the support cells of the CNS and describe their major function.

| Cell Type | Major Function |
|---|---|
|  |  |
|  |  |
|  |  |
|  |  |

3. List the support cells of the PNS and describe their major function, if known.

| Cell Type | Major Function |
|---|---|
|  |  |
|  |  |

4. Groups of neurons in the CNS are called _____.

5. Groups of neurons in the PNS are called _____ .

6. Bundles of fibers in the CNS are called _____.

7. Bundles of fibers in the PNS are called _____.

8. Match the labels on the figure with the terms below.

_____ Axon                              _____ Myelin Sheath

_____ Axon hillock                      _____ Nissl Bodies

_____ Axon terminals                    _____ Node of Ranvier

_____ Cell body                         _____ Nucleus with nucleolus

_____ Dendrites
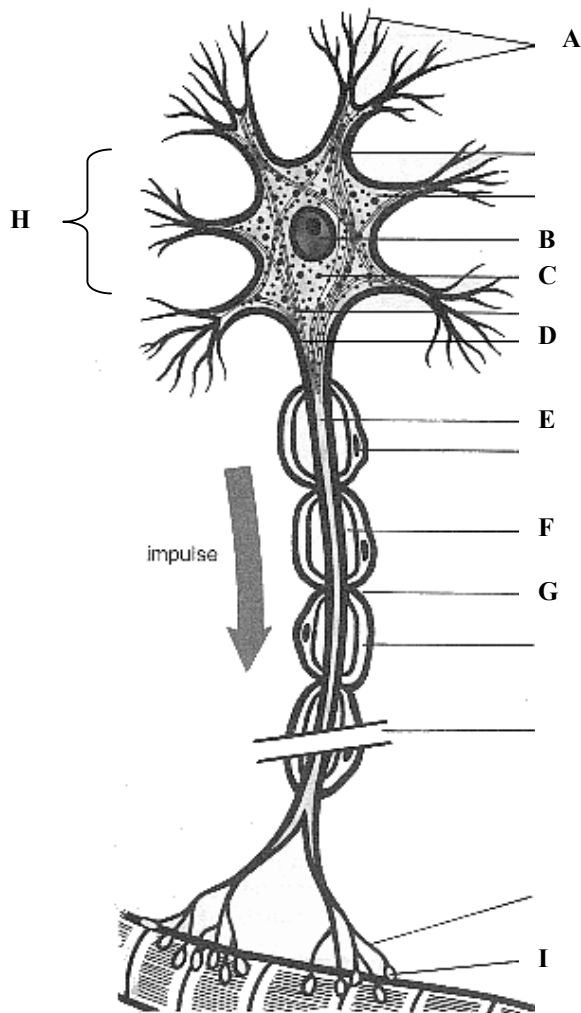


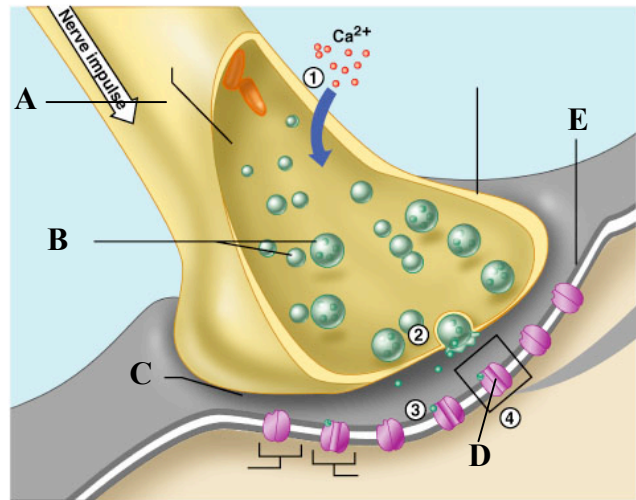(http://www.botany.uwc.ac.za/sci_ed/grade10/mammal/images/neuron.gif)

8. This is a picture of an electron micrograph through a myelinated nerve fiber. Label the figure using the terms below. **Print** the labels in the left margin.

- o Axon
- o Myelin
- o Cytoplasm of Schwann cell
- o Plasma membrane of Schwann cell
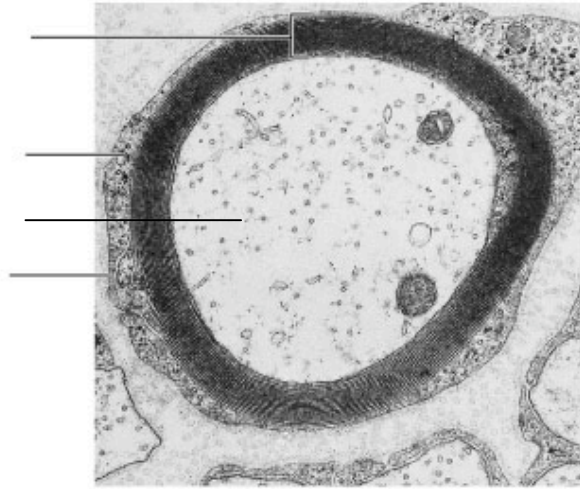


9. What is the role of the myelin sheath?

10. What is the difference between a neuron and a nerve? 2 points

11. Match the labels on the figure with the terms below

_____ Axon

_____ Postsynaptic cell membrane

_____ Receptor and channel in cell membrane

_____ Synaptic cleft

_____ Vesicles of neurotransmitter

12. Describe what is happening at the stages marked 1, 2, 3, and 4 on the figure.

1._____

2. _____

3. _____

4. _____

13. Match the labels on the figure with the terms below:

_____ Axon

_____ Blood vessels

_____ Endoneurium around axons

_____ Epineurium

_____ Fascicle

_____ Myelin sheath

_____ Nerve

_____ Perineurium
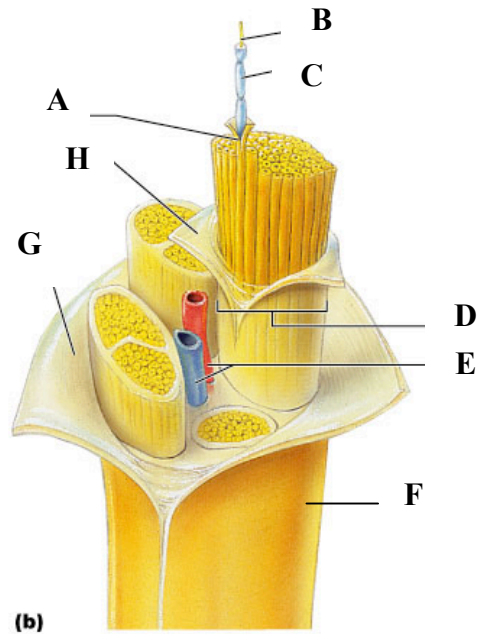


(b)

**Exercise 22**

1. Exercise 22 Activity 1: Initiating Stretch Reflexes
   Record observations of the patellar reflex. Use correct muscle action terminology.

   _____
   _____
   _____
   _____

   Which muscle(s) contracted? _____

   Which nerve carries the afferent and efferent impulses? Hint, look for the nerve to the

   anterior thigh. _____

   What effect did mental distraction have on the reflex? _____

   What effect did muscular activity have on the reflex? _____

   What effect did fatigue have on the reflex? _____

**Response Time** – A comparison of Basic and Acquired Reflexes  (background
information is on page 347 of the lab manual.)

### Response Time Testing

1. Start up the laptop. The user name is **user** and there is no password.

2. Go to the URL   http://faculty.washington.edu/chudler/java/reacttime.html

3. Select a subject and have the subject perform the reaction time test as directed.
   a. What is the subject's average reaction time? ____
   b. What percent of other people taking the test scored in the same range? ____
   c. What percent had a faster response time? ____
   d. What percent had a slower response time? ____

4. Did the response time on the computer seem slower or faster than the response
   time for the patellar reflex (a basic reflex)?  _____

5. Some learned or acquired reflexes actually improve with repetition. Repeat the test
   as above 3 times, using the same subject.  Do not count responses where there is a
   penalty for anticipation.

   a. Is there any change in average reaction time? ____
   b. Does the reaction time become longer or did it become shorter? _____
   c. Explain what might be happening. ( See page 345 of the lab manual for
      information.

6. Using the same subject, repeat the test, but this time with distraction.  Suggestions include talking on a cell phone, text messaging, or reading a newspaper (all things that some people do while driving).

   What distraction did you choose? _____

   What do you expect will happen to reaction time?  (Your hypothesis)
             (Circle one)  longer     shorter     about the same

   a. What is the subject's average reaction time with distraction? ____
   b. How did this compare to reaction time without distraction?
             (Circle one)  longer     shorter     about the same
   c. Did this support or not support your hypothesis?  _____
   d. What percent of other people taking the test scored in the same range? ____
   e. What percent had a faster response time? ____
   f. What percent had a slower response time? ____

7. What implications might this have, if any, for performing tasks like driving while you are talking on a cell phone or texting?

**Exercise 23**
1. Exercise 23 Activity 2 and Activity 3
   Record the results of Exercise 23 Activity 2: Determining the Two-point Threshold (p. 260).

| Body Area Tested | Two-point threshold (mm.) |
|---|---|
| Face | |
| Back of hand | |
| Palm of hand | |
| Fingertips | |
| Back of neck | |
| Ventral forearm | |

Based on your data, which of these areas do you think have the greatest density of touch receptors? _____

Based on your data, which areas do you think have the lowest density of touch receptors? _____

What is meant by punctate distribution?

Does this experiment demonstrate punctate distribution? Explain (2 points)

Give three examples of sensory receptors in the skin that have punctate distribution.

a.  _____

b.  _____

c.  _____

2. Exercise 23 Activity 5

Record the results of Activity 5 - Adaptation of Touch Receptors

| Test | Sensation Persists (sec.) |
|---|---|
| 1 coin, anterior forearm | |
| 1 coin, different forearm location | |
| 3 more coins at second location after pressure sensation ends | |

Did you observe adaptation of the touch receptors?

Why did you test a coin on a different area of the skin?

Why did you test additional coins on the same area of skin?

What is the value of sensory receptor adaptation?

Pain receptors do not adapt.  Why do you think this is important?

Name_____

**Pre-Lab Activity – Brain (20)**

1.  The brain and spinal cord are part of the
    (circle one)          CNS                PNS.

2.  The three major parts of the brain are the _____, _____ and
    _____ .

3.  In which part of the brain is each of these found? Use the terms forebrain, midbrain
    and hindbrain.

Cerebellum                          _____

Cerebral aqueduct                   _____

Cerebral hemispheres                _____

Corpora quadrigemina                _____

Hypothalamus                        _____

Medulla oblongata                   _____

Pineal body                         _____

Pons                                _____

Thalamus                            _____

4.  The outermost membrane surrounding the brain is the _____ .
5.  The innermost membrane surrounding the brain is the _____.
6.  Cerebrospinal fluid travels to the arachnoid villi in the _____ space.
7.  The three membranes surrounding the spinal cord are the :

_____,  _____, and _____
8.  Areas of gray matter in the spinal cord are called _____ .