

# Histology – Muscle & Nervous Tissue

## HASPI Medical Anatomy & Physiology 04c

### Activity

## Background

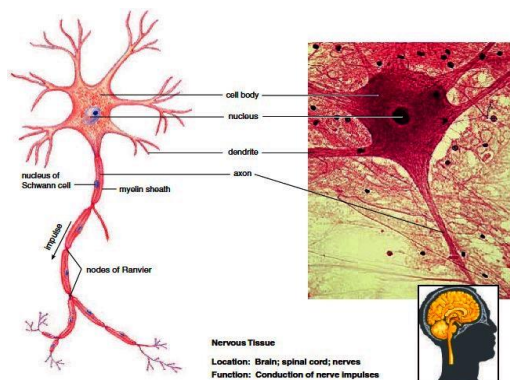
### Muscle Tissue

The cells of muscle tissue are extremely long and contain protein fibers capable of contracting to provide movement. The bulk of muscle tissue is made up of two proteins: **myosin** and **actin**. These proteins are organized into muscle fibers called myofilaments, and can be arranged into even larger bundles to create muscles. Muscle tissues are separated into three main types depending on the arrangement of these myofilaments. These include **skeletal** muscle tissue, **smooth** muscle tissue, and **cardiac** muscle tissue.

**Skeletal muscle** is also considered “voluntary muscle” and makes up the muscles that are attached to our skeleton by tendons. These muscles contract voluntarily and function in movement and maintenance of posture. About 35-45% of the human body is made up of skeletal muscle tissue. When skeletal muscle tissue is observed, there are visible **striations**, or lines, that can be seen.

**Smooth muscle** is “involuntary muscle” and makes up the lining of most of the organs of the body. This includes the gastrointestinal tract, respiratory tract, blood vessels, bladder, and uterus just as a few examples. These muscles do not contract voluntarily and do not have visible striations. For example, in a process called *peristalsis*, smooth muscle contracts in waves to push food from the esophagus all the way through until it is expelled out the anus.

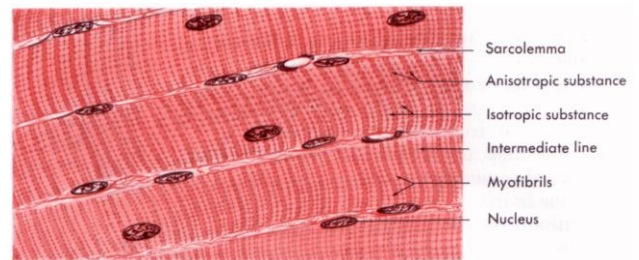
**Cardiac muscle** makes up the heart, and is an extremely dense strong tissue. Cardiac muscle tissue has a very large number of mitochondria to provide the energy source for the continuous contracting action of the heart. Cardiac muscle tissue is striated like skeletal muscle tissue, but also has myofilaments arranged into larger striations called intercalated discs that join cardiac muscle fibers together.



Name(s): \_\_\_\_\_

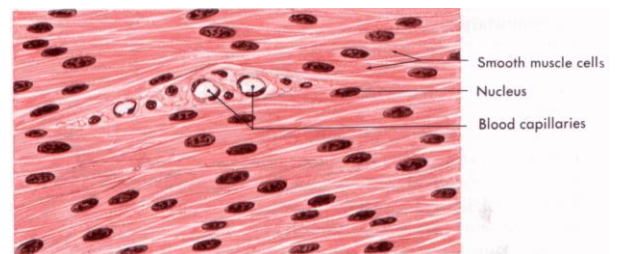
Period: \_\_\_\_\_ Date: \_\_\_\_\_

### Skeletal Muscle Tissue



<http://www.arthursclipart.org/medical/humanbody/muscle%20tissue.gif>

### Smooth Muscle Tissue



<http://www.arthursclipart.org/medical/humanbody/muscle%20tissue%202.gif>

### Cardiac Muscle Tissue



<http://www.arthursclipart.org/medical/humanbody/muscle%20tissue%203.gif>

### Nervous Tissue

Nervous tissue is found in the brain, spinal cord, and nerves and is responsible for communication. There are two main cells that make up nervous tissue: **neurons** and **neuroglia** cells. Neurons are responsible for sending and receiving messages while neuroglia provide support and nutrients for neurons.

## Materials

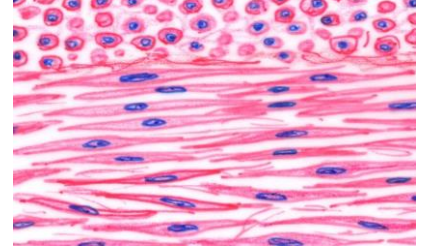
Muscular and nervous tissue charts (6)  
Computer/internet OR muscle and nervous tissue slides and a microscope

## Procedure

### Part A. Becoming Familiar with Muscular and Nervous Tissues

Figure 1

In Part A of this lab, you will have the opportunity to familiarize yourself with the different types of muscle and nervous tissues. Posters with the main types of muscular and nervous tissue have been placed throughout the room. Visit each poster and record the description, function, and location in the following chart. Draw and label an example in the right column for each picture. An example drawing can be seen in Figure 1 to the right.



<http://www.vetmed.vt.edu/education/curriculum/vm8054/labs/lab10/IMAGES/SMOOTH%20MUSCLE%20COMPOSITE.jpg>

a. Skeletal muscle	
Description (write or draw)	<i>Draw an example. Use colored pencils and label if necessary.</i>
Function	
Location	
b. Skeletal muscle: cross-section	
Description (write or draw)	<i>Draw an example. Use colored pencils and label if necessary.</i>
Function	
Location	

### c. Cardiac muscle

Description (write or draw)

*Draw an example. Use colored pencils and label if necessary.*

Function

Location

### d. Smooth muscle

Description (write or draw)

*Draw an example. Use colored pencils and label if necessary.*

Function

Location

### e. Nervous tissue: neurons

Description (write or draw)

*Draw an example. Use colored pencils and label if necessary.*

Function

Location

## f. Nervous tissue: neuroglia

Description (write or draw)

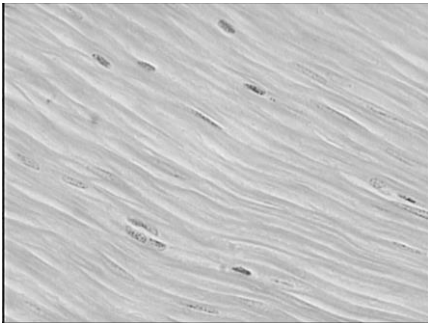
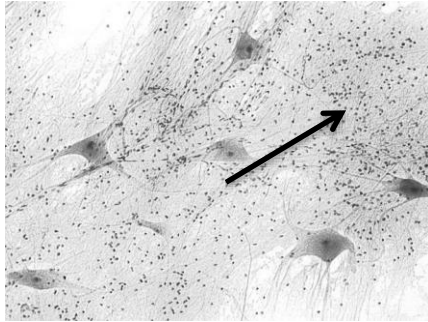
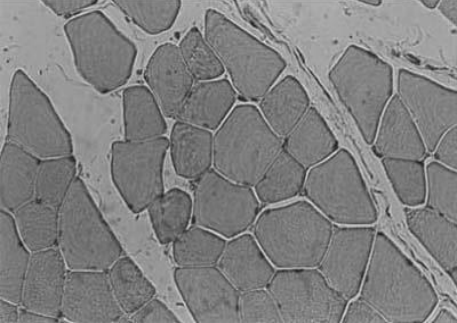
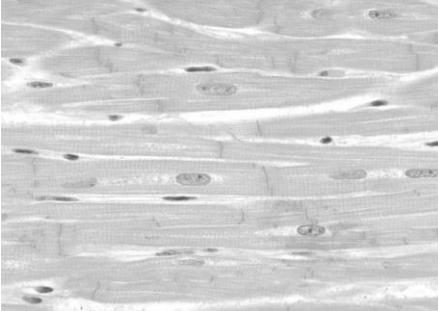

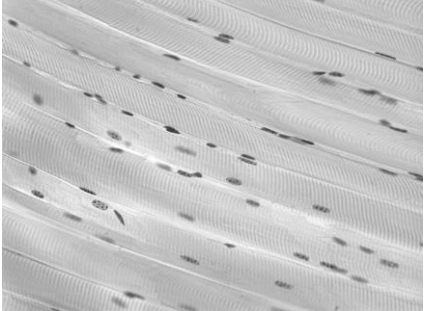
Draw an example. Use colored pencils and label if necessary.

Function

Location

## Part B. Identify the Muscle and Nervous Tissue

In Part B of this activity, use what you have just learned to identify the following connective tissues. Write your answers on the line in each box.

<p style="text-align: center;"><b>A.</b></p> 	<p style="text-align: center;"><b>B.</b></p> 	<p style="text-align: center;"><b>C.</b></p> 
<p style="text-align: center;"><b>D.</b></p> 	<p style="text-align: center;"><b>E.</b></p> 	<p style="text-align: center;"><b>F.</b></p> 

A. [http://www.qwc.maricopa.edu/class/bio201/Histology/31SmoothMusc3\\_400X\\_rev.jpg](http://www.qwc.maricopa.edu/class/bio201/Histology/31SmoothMusc3_400X_rev.jpg)

B. <http://www.eastcentral.edu/programs/nervous.jpg>

C. <http://www.histology-world.com/photomicrographs/striatedmuscle1.jpg>

D. [http://medcell.med.yale.edu/histology\\_old/muscle/images/cardiac\\_muscle.jpg](http://medcell.med.yale.edu/histology_old/muscle/images/cardiac_muscle.jpg)

E. [http://www.proprofs.com/quiz-school/user\\_upload/ckeditor/soma.jpg](http://www.proprofs.com/quiz-school/user_upload/ckeditor/soma.jpg)

F. [http://4.bp.blogspot.com/\\_quSOFRs\\_Ks/TNvGn-s2D8I/AAAAAAAAAQo/A4rZFbinPWw/s1600/Skeletal+muscle+01a.jpg](http://4.bp.blogspot.com/_quSOFRs_Ks/TNvGn-s2D8I/AAAAAAAAAQo/A4rZFbinPWw/s1600/Skeletal+muscle+01a.jpg)

### Part C. Practice, Practice, Practice

Your instructor will either have slides available to view with the microscope OR you can use a computer and the following website to choose slides to view:

[http://medsci.indiana.edu/c602web/602/c602web/virtual\\_nrml/nrml\\_1st.htm](http://medsci.indiana.edu/c602web/602/c602web/virtual_nrml/nrml_1st.htm)

For each type of connective tissue, observe the slide and identify the connective tissue.

- REMEMBER there are multiple tissue types on many of the slides.
- Start by searching through the slide for images similar to those in your drawings from Part A.
- You may need to move the slide around to find a good example!
- You may need to look up/research the organ function if it is unfamiliar.

<b>a. Skeletal muscle</b>	
<b>Slide Choices: Skeletal muscle</b>	
Organ	<i>Draw an example. Use colored pencils.</i>
Organ Function	
Tissue Function	
<b>b. Skeletal muscle: cross section</b>	
<b>Slide Choices: Skeletal muscle: cross section</b>	
Organ	<i>Draw an example. Use colored pencils.</i>
Organ Function	
Tissue Function	

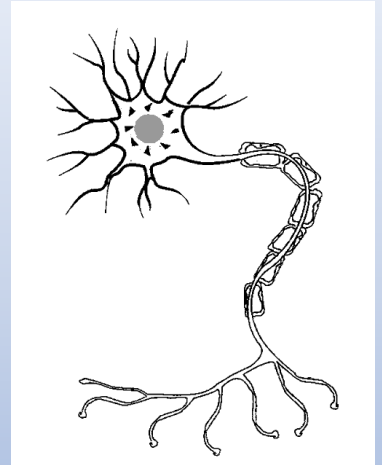
<b>c. Cardiac muscle</b>	
<b>Slide Choices: Heart</b>	
Organ	<i>Draw an example. Use colored pencils.</i>
Organ Function	
Tissue Function	
<b>d. Smooth muscle</b>	
<b>Slide Choices: Smooth muscle, wall of any hollow organ</b>	
Organ	<i>Draw an example. Use colored pencils.</i>
Organ Function	
Tissue Function	
<b>e. Nervous tissue: neurons</b>	
<b>Slide Choices: Brain, spinal cord, nerve</b>	
Organ	<i>Draw an example. Use colored pencils.</i>
Organ Function	
Tissue Function	



<b>f. Nervous tissue: neuroglia</b>	
<b>Slide Choices:</b> Brain, spinal cord, nerve	
Organ	<i>Draw an example. Use colored pencils.</i>
Organ Function	
Tissue Function	

### Analysis Questions - on a separate sheet of paper complete the following

1. What is the difference between skeletal, smooth, and cardiac muscle?
2. What are the lines in skeletal and cardiac muscle?
3. What is an intercalated disc? Why are these not seen in skeletal muscles?
4. What is the difference between neurons and neuroglia?
5. How is the shape of a neuron suited to its purpose?
6. Draw a neuron and label the *dendrites*, *cell body*, *nucleus*, *axon*, *myelin*, and *axon terminal*. An example neuron diagram is pictured on the right.
7. **CONCLUSION:** In 1-2 paragraphs summarize the procedure and results of this lab.



### Review Questions - on a separate sheet of paper complete the following

1. What is the function of muscle tissue?
2. What two proteins make up the bulk of muscle tissue?
3. What are myofilaments?
4. Where are skeletal muscles found?
5. How much of the human body is made up of skeletal muscle?
6. Where would smooth muscle tissue be found?
7. Which muscle tissues have striations?
8. Which muscle tissues are voluntary?
9. Why does cardiac muscle tissue have large numbers of mitochondria?
10. What is the function of nervous tissue?
11. How do neurons and neuroglial cells work together?

