

10

Muscle and Nervous Tissues

MATERIALS NEEDED

Textbook
Compound light microscope
Prepared slides of the following:
Skeletal muscle tissue
Smooth muscle tissue
Cardiac muscle tissue
Nervous tissue (spinal cord smear and/or cerebellum)
Colored pencils

PURPOSE OF THE EXERCISE

To review the characteristics of muscle and nervous tissues and to observe examples of these tissues.



LEARNING OUTCOMES

After completing this exercise, you should be able to

- ① Differentiate the special characteristics of each type of muscle tissue and nervous tissue.
- ② Sketch and label the characteristics of the different muscle and nervous tissues that you were able to observe.
- ③ Indicate an example location and function of each type of muscle tissue and nervous tissue.
- ④ Identify three types of muscle tissues and nervous tissues on microscope slides.

Muscle tissues are characterized by the presence of elongated cells or muscle fibers that can contract in response to specific stimuli. As they shorten, these fibers pull at their attached ends and cause body parts to move. The three types of muscle tissues are *skeletal*, *smooth*, and *cardiac*.

Nervous tissues occur in the brain, spinal cord, and peripheral nerves. They consist of *neurons* (nerve cells), the impulse-conducting cells of the nervous system, and *neuroglia*, which perform supportive and protective functions for neurons.



PRACTICE

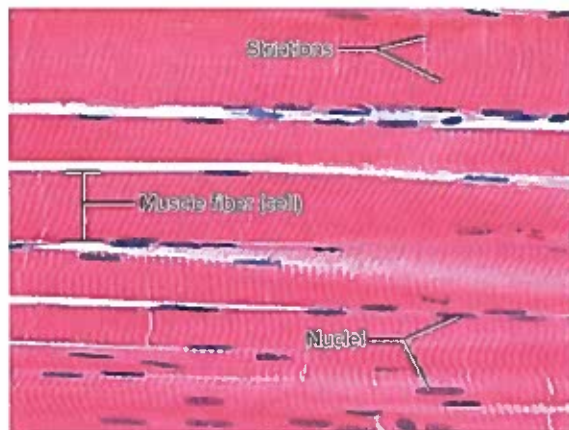
PROCEDURE—Muscle and Nervous Tissues

1. Review the sections entitled “Muscle Tissues” and “Nervous Tissues” in chapter 5 of the textbook.
2. Complete Part A of Laboratory Report 10.
3. Using the microscope, observe each of the types of muscle tissues on the prepared slides. Look for the special features of each type, as described in the textbook. Compare your prepared slides of muscle tissues to the micrographs in figure 10.1 and the muscle tissue characteristics in table 10.1. As you observe each type of muscle tissue, prepare a labeled sketch of a representative portion of the tissue in Part B of the laboratory report.
4. Observe the prepared slide of nervous tissue and identify neurons (nerve cells), neuron cellular processes, and neuroglia. Compare your prepared slide of nervous tissue to the micrograph in figure 10.1. Prepare a labeled sketch of a representative portion of the tissue in Part B of the laboratory report. 

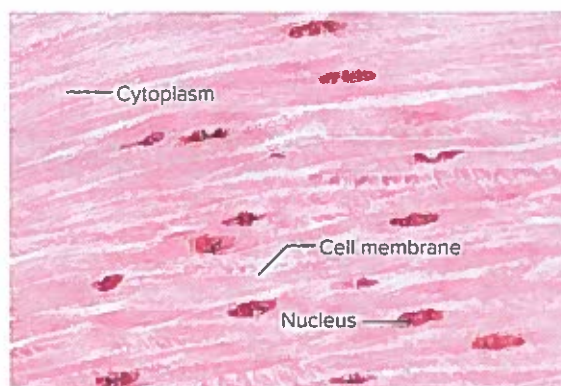
TABLE 10.1 Muscle Tissue Characteristics

Characteristic	Skeletal Muscle	Smooth Muscle	Cardiac Muscle
Appearance of cells	Unbranched and relatively parallel	Spindle-shaped	Branched and connected in complex networks
Striations	Present and obvious	Absent	Present but faint
Nucleus	Multinucleated	Uninucleated	Uninucleated (usually)
Intercalated discs	Absent	Absent	Present
Control	Voluntary (usually)	Involuntary	Involuntary

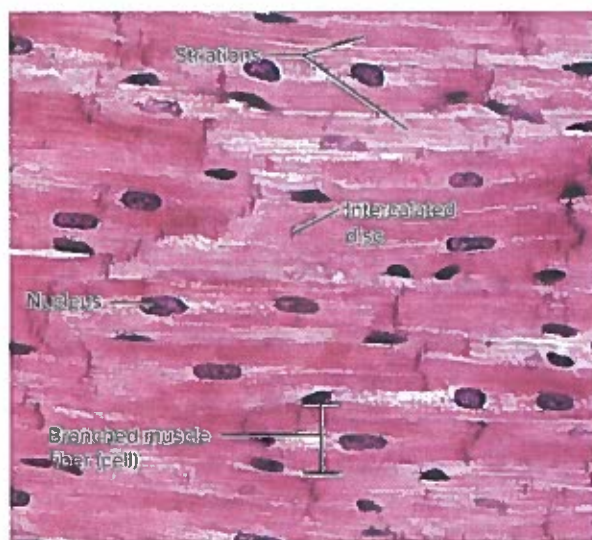
5. Complete Part B of the laboratory report.
6. Test your ability to recognize each of these muscle and nervous tissues by having your laboratory partner select a slide, cover its label, and focus the microscope on this tissue. Then see if you correctly identify the tissue. **A**



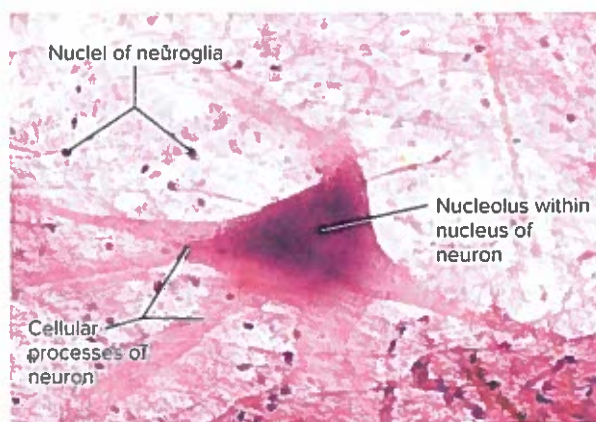
(a) Skeletal muscle (400x)



(b) Smooth muscle (from small intestine) (400x)



(c) Cardiac muscle (from heart) (400x)



(d) Nervous tissue (350x)

FIGURE 10.1 Micrographs of muscle and nervous tissues (a–d). **AP|R** ((a–d) © McGraw-Hill Education/AI Telser, photographer)

Name _____
Date _____
Section _____

The **A** corresponds to the indicated Learning Outcome(s) found at the beginning of the laboratory exercise.

Muscle and Nervous Tissues



PART A ASSESSMENTS

Match the tissues in column A with the characteristics in column B. Place the letter of your choice in the space provided.
(Some answers may be used more than once.) **A** **3**

Column A

- a. Cardiac muscle
- b. Nervous tissue
- c. Skeletal muscle
- d. Smooth muscle

Column B

- _____ 1. Coordinates, regulates, and integrates body functions
- _____ 2. Contains intercalated discs
- _____ 3. Muscle that lacks striations
- _____ 4. Striated and involuntary
- _____ 5. Striated and voluntary
- _____ 6. Contains neurons and neuroglia
- _____ 7. Muscle attached to bones
- _____ 8. Muscle that composes heart
- _____ 9. Moves food through the digestive tract
- _____ 10. Conducts impulses along cellular processes
- _____ 11. Muscle under conscious control
- _____ 12. Muscle of blood vessels and urinary bladder



PART B ASSESSMENTS

In the space that follows, sketch a few cells or fibers of each of the three types of muscle tissues and of nervous tissue as they appear through the microscope. For each sketch, label the major structures of the cells or fibers, indicate the magnification used, write an example of a location in the body, and provide a function. **1 2 3**

Skeletal muscle tissue (____x) Location: _____ Function: _____	Smooth muscle tissue (____x) Location: _____ Function: _____
Cardiac muscle tissue (____x) Location: _____ Function: _____	Nervous tissue (____x) Location: _____ Function: _____



LEARN: ACTIVITY

Use colored pencils to differentiate various cellular structures in Part B.