


Grade 12 NTI Day #8 Anatomy

Assignment: Please read the excerpt below as an independent reading assignment. Then read and answer the questions below the excerpt.



Start Reading HERE (3.6a, 3.6b, & 3.6c)

3.6 Muscle Tissue

Muscle tissues are highly specialized to *contract*, or *shorten*, which generates the force required to produce movement. In order to contract, muscle must also be *irritable*, that is, able to respond to stimuli. There are three types of muscle tissue: *skeletal*, *cardiac*, and *smooth* (Figure 3.20). Notice their similarities and differences as you read through the following descriptions.

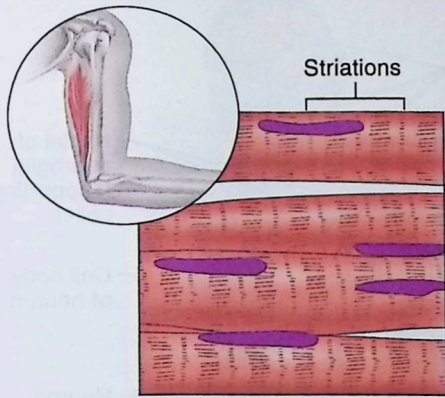
3.6a Skeletal Muscle

Skeletal muscle tissue is packaged by connective tissue sheets into organs called *skeletal muscles*, which are attached to the skeleton. These muscles, which can be controlled *voluntarily* (or consciously), form the flesh of the body, the so-called muscular system (see Chapter 6). When the skeletal muscles contract, they pull on bones or skin. As a result, gross body movements or changes in our facial expressions occur.

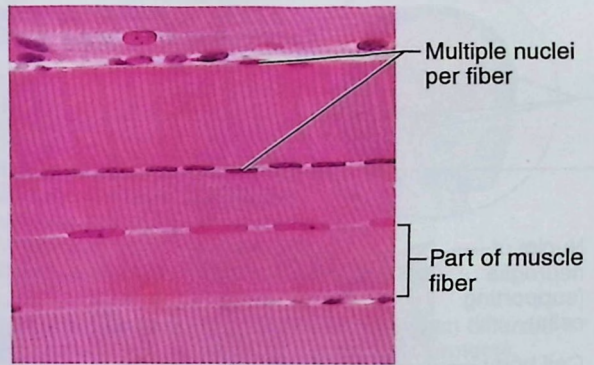
The cells of skeletal muscle are long, cylindrical, and multinucleate, and they have obvious *striations* (stripes). Because skeletal muscle cells are elongated to provide a long axis for contraction, they are often called *muscle fibers*.

3.6b Cardiac Muscle

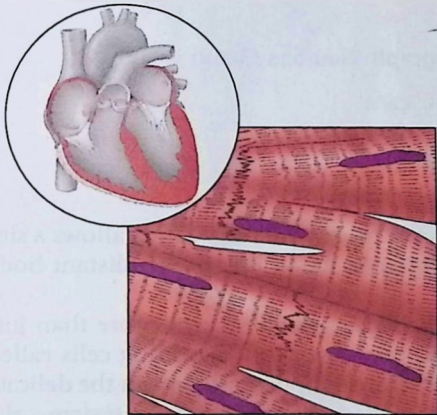
Cardiac muscle (covered in more detail in Chapter 11) is found only in the heart wall. As it contracts, the heart acts as a pump to propel blood through the blood vessels. Like skeletal muscle, cardiac muscle has striations, but cardiac cells have only a single nucleus and are relatively short, branching cells that fit tightly together (like clasped fingers) at junctions called **intercalated discs**. These intercalated discs contain gap junctions that allow ions to pass freely from cell to cell. This ties the cardiac cells into a functional syncytium (*syn* = together, *cyt* = cell), resulting in rapid conduction of the electrical signal to contract across the heart. Cardiac muscle is under *involuntary control*, which means that we cannot consciously control the activity of the heart. Can you imagine having to “tell” your heart to beat like you “tell” your legs to walk?



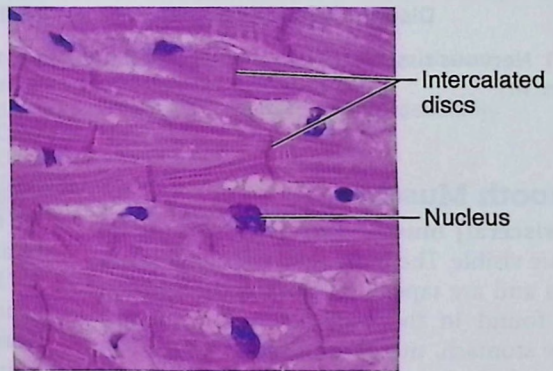
(a) Diagram: Skeletal muscle



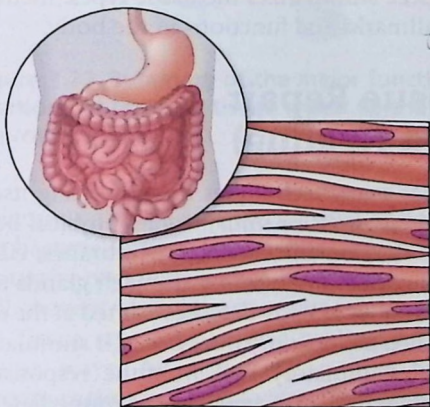
Photomicrograph: Skeletal muscle (195 \times).



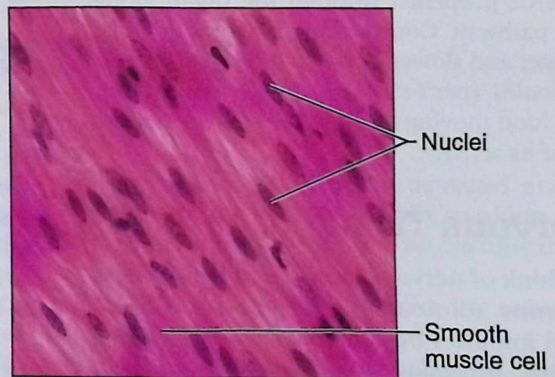
(b) Diagram: Cardiac muscle



Photomicrograph: Cardiac muscle (475 \times).



(c) Diagram: Smooth muscle



Photomicrograph: Sheet of smooth muscle (360 \times).

Figure 3.20 Types of muscle tissue and their common locations in the body.

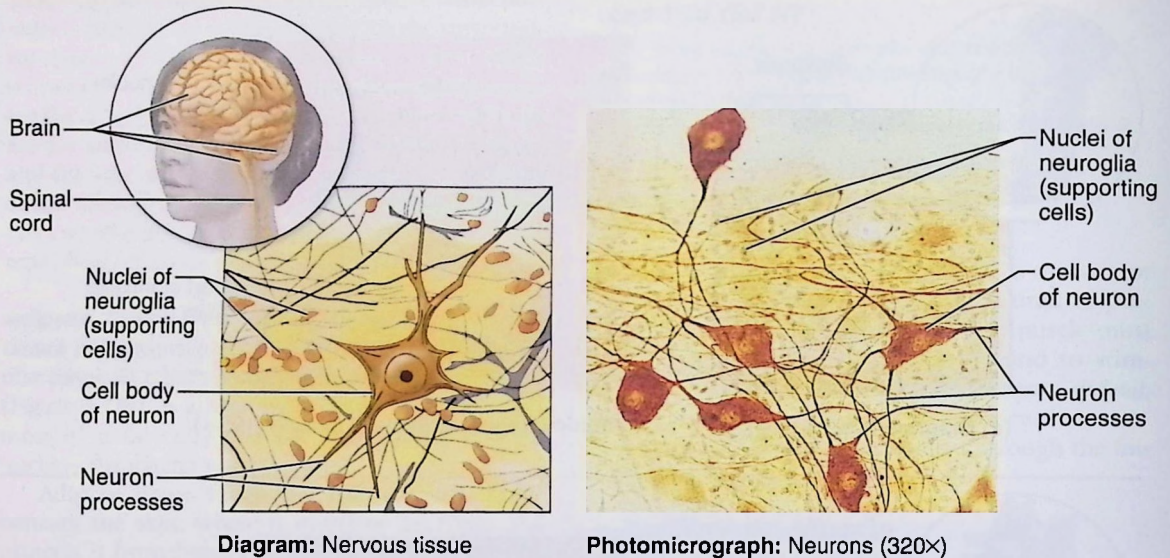


Diagram: Nervous tissue

Photomicrograph: Neurons (320×)

Figure 3.21 Nervous tissue. Neurons and supporting cells form the brain, spinal cord, and nerves.

3.6c Smooth Muscle

Smooth (visceral) muscle is so called because no striations are visible. The individual cells have a single nucleus and are tapered at both ends. Smooth muscle is found in the walls of hollow organs such as the stomach, uterus, and blood vessels. As smooth muscle in its walls contracts, the cavity of an organ alternately becomes smaller (constricts when smooth muscle contracts) or enlarges (dilates when smooth muscle relaxes) so that substances are mixed and/or propelled through the organ along a specific pathway. Contractions of smooth muscle are longer and slower than the other two muscle types. *Peristalsis* (per^uī-stal'sis), a wavelike motion that keeps food moving through the small intestine, is typical of its activity.

STOP Reading
Here. Skip to
Question
Sheet.

Multiple Choice Questions

1. **Which type of muscle tissue has multinucleated, long, cylindrical cells with striations?**
 - a) Cardiac muscle
 - b) Smooth muscle
 - c) Skeletal muscle
 - d) Nervous tissue
 2. **What unique structure in cardiac muscle allows for rapid conduction of electrical signals?**
 - a) Peristalsis
 - b) Intercalated discs
 - c) Fibroblasts
 - d) Synapses
 3. **Which of the following best describes smooth muscle cells?**
 - a) Cylindrical and multinucleated with striations
 - b) Branched with a single nucleus and striations
 - c) Spindle-shaped with a single nucleus and no striations
 - d) Long and cylindrical with intercalated discs
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Short Answer Question

4. **Explain how the structure of cardiac muscle tissue is suited to its function.**
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