

Muscle Tissues

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MUSCLE TISSUE

- **Structure**
- The cells of muscle tissues are called fibers. There are three types of muscle tissues: (1) skeletal, (2) cardiac, and (3) smooth.
- **Locations**
- Skeletal muscle tissue forms the muscles of the body that are used for the body's movements. Cardiac muscle tissue forms the muscle of the heart. Smooth muscle tissue lines hollow organs such as the stomach, urinary bladder, uterus, blood vessels, etc.

MUSCLE TISSUE

- **Functions**
- Muscle fibers **contract** by the interaction of the contractile proteins actin and myosin. Muscle contraction generates contractile force (tension.) The contractile proteins of muscle are located in protein filaments called myofibrils. Muscle tissues function in
 - (1) body movements such as locomotion and in
 - (2) the movement of the body's internal materials (blood, urine, food stuffs, etc.).
- Muscle tissues are mostly controlled by the nervous system. However, cardiac and smooth muscle may be additionally regulated by the endocrine system.

Skeletal Muscle Tissue

Structure

Skeletal muscle tissue is formed from skeletal muscle fibers (cells). The fibers are characterized by being

- (1) long,
- (2) parallel,
- (3) cylindrical, and
- (4) multinucleate.

(5) The nuclei of the fiber are located at the fiber's periphery. About 80% of the fiber consists of rod-like protein filaments called **myofibrils**. The myofibrils extend the length of the fiber and contain the contractile elements. These elements include the protein filaments, the thick and thin filaments, that are organized to produce the alternating dark and light cross bands called striations.

Striations

- The light cross bands are called **I bands** (isotropic bands); the dark cross bands are called **A bands** (anisotropic bands). Centered in each I band is a thin line called the **Z line**.
- The functional unit of contraction, the **sarcomere**, is identified as the region between two successive Z lines.

Skeletal Muscle Tissue

- **Location**
Skeletal muscle tissue is organized by connective tissues into the skeletal muscles.
- **Functions**
Skeletal muscle tissue functions in the
 - (1) production of voluntary body movements and
 - (2) heat production.

Lab Activity 18 Skeletal Muscle Tissue

- Observe a tissue preparation labeled "Skeletal Muscle," or "Muscle, three types." Muscle preparations from different suppliers vary in their appearance, and frequently the fibers are not cut along a parallel axis. A nonparallel section makes the fibers appear short and interwoven.

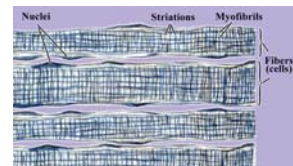


Fig. 8.66

Skeletal Muscle Tissue

- Skeletal muscle (100x) consists of fibers (cells) that are long, parallel, and striated. Long protein filaments, the myofibrils, run the length of the fiber and contain the thin and thick protein filaments.

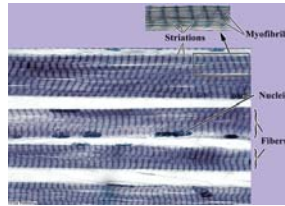


Fig. 8.67

Skeletal Muscle Tissue

- Skeletal muscle fiber (1,000x) showing the detail of the striations (bands) and the sarcomere.



Fig. 8.68

Cardiac Muscle Tissue

- Structure**
Cardiac muscle fibers are characterized by being
 - (1) cylindrical,
 - (2) mostly uninucleate (some cells are binucleate),
 - (3) striated, and
 - (4) branching.
 - (5) The fibers are connected end-to-end at sites called intercalated disks.

Cardiac Muscle Tissue

- Location**
Cardiac muscle for the muscle of the heart.
- Function**
The muscle of the heart functions in producing the heart's involuntary contractions.

Lab Activity 19 – Cardiac Muscle Tissue

- Observe a tissue preparation labeled “Cardiac Muscle,” or “Muscle, three types.” Identify the branched cardiac fibers and the darkly stained intercalated disks.

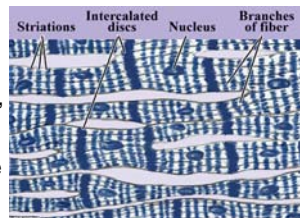


Fig. 8.69

Cardiac Muscle Tissue

- Photograph of cardiac muscle tissue (430x) showing its branching fibers (cells). The fibers are joined at end-to-end junctions called intercalated discs.

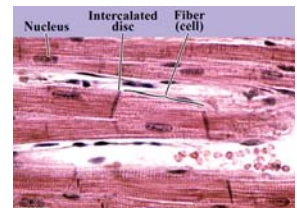


Fig. 8.70

Smooth Muscle

- **Structure**

Smooth muscle is organized into muscular sheets that surround or enclose many of the body's hollow organs. Its fibers are characterized by being

- (1) long,
- (2) spindle shaped
- (3) uninucleate, and
- (4) nonstriated (smooth).

Smooth Muscle

- **Locations**

Smooth muscle is located in the walls of many of the hollow organs such as the

- (1) esophagus,
- (2) stomach,
- (3) intestines,
- (4) urinary bladder, and
- (5) blood vessels.

- **Functions**

Smooth muscle functions in producing **involuntary contractions** that move materials through the organs it surrounds.

- Smooth muscle has great plasticity; it can undergo considerable stretching without appreciably reducing its ability to contract.

Lab Activity 20 – Smooth Muscle Tissue

- Observe a tissue preparation labeled “Smooth Muscle,” or “Muscle, three types.” Smooth muscle fibers are organized into muscular sheets that surround or enclose many of the body's hollow organs.

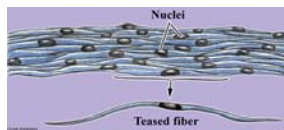


Fig. 8.71

Smooth Muscle Tissue

- Smooth muscle is organized into muscular sheets that surround or enclose many of the body's hollow organs.

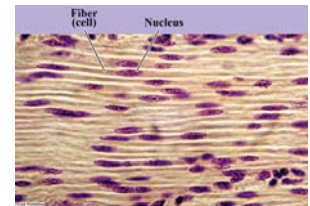


Fig. 8.72

Smooth Muscle Tissue

- Preparations of teased smooth muscle show the fibers to be long, spindle shaped, uninucleate, and nonstriated.



Fig. 8.73