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### Learning Objectives

- Describe the organization of muscle and the unique characteristics of skeletal muscle cells.
- Identify the structural components of the sarcomere.
- Summarize the events at the neuromuscular junction.

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### Three types of muscle

- **Skeletal**—attached to bone
  - striated, voluntary, myofibers
- **Cardiac**—found in the heart
  - striated, involuntary, branched, cardiocytes
- **Smooth**—lines hollow organs
  - nonstriated, involuntary, fusiform in shape (spindle)

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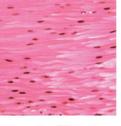
TABLE 10.2 Comparison of Skeletal, Cardiac, and Smooth Muscle			
Characteristic	Skeletal	Cardiac	Smooth
Body location			
	Attached to bones or (some facial muscles) to skin	Walls of the heart	Mostly in walls of hollow organs, such as the stomach, respiratory tubes, bladder, blood vessels, and uterus
Cell shape and appearance			
	Single, very long cylindrical, multinucleate cells with obvious striations	Branching chains of cells; uni- or binucleate; striations	Single, fusiform, uninucleate; no striations

Table 10.2 (1 of 3)

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## Muscle Terms

- "Myo" and "Sarco" mean muscle
- **Muscle grows via hypertrophy** not division. That means the protein mass increases but you DO NOT GAIN MORE MUSCLE CELLS.
- **The ones you have just get bigger.**

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## Skeletal Muscle Tissue and the Muscular System

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## Skeletal muscle functions

- Produce skeletal movement
- Maintain posture and body position
- Support soft tissues
- Guard entrances and exits
- Maintain body temperature

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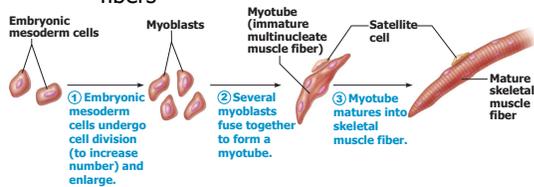
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## Muscle Tissue Throughout Life

- Muscle tissue develops from **myoblasts**
  - Myoblasts fuse to form skeletal muscle fibers



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## Skeletal Muscle

- **Each muscle is an organ**
  - Consists mostly of muscle tissue
  - Skeletal muscle also contains
    - Connective tissue
    - Blood vessels
    - Nerves

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### Basic Features of a Skeletal Muscle

- Nerves and blood vessels
  - Each skeletal muscle supplied by
    - **One nerve**
    - **One artery**
    - **One or more veins**

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### Nerves and blood vessels

- Nerves and vessels branch repeatedly
- smallest nerve branches serve individual muscle fibers
- **Neuromuscular junction**
  - signals the muscle to contract

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### Muscle attachments

- Most skeletal muscles run from one bone to another
- One bone will move – other bone remains fixed
- **Origin** – less movable attachment
- **Insertion** – more movable attachment

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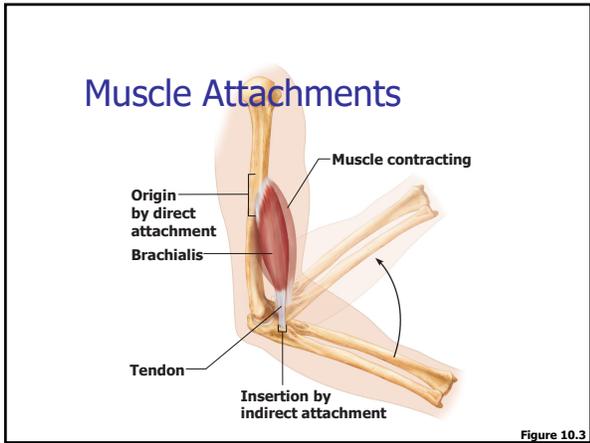
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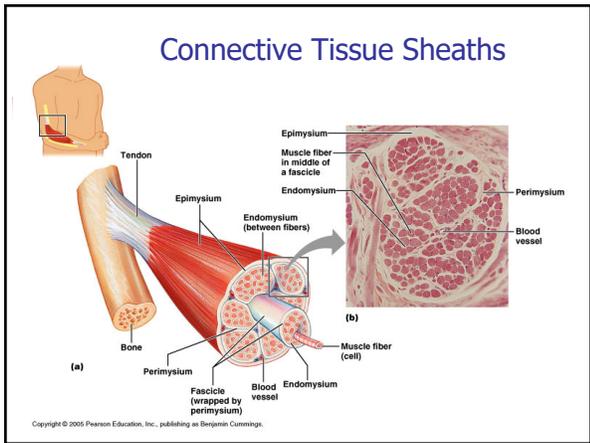
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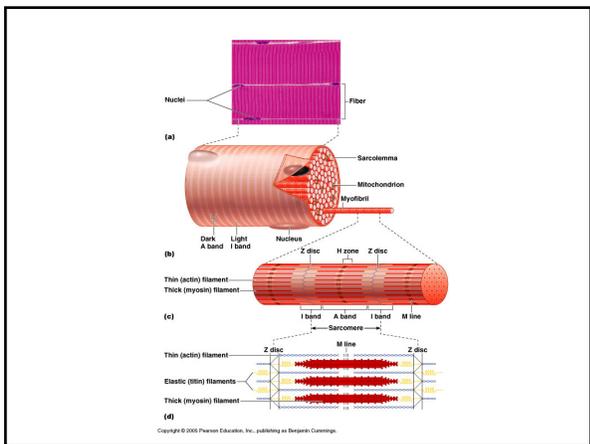
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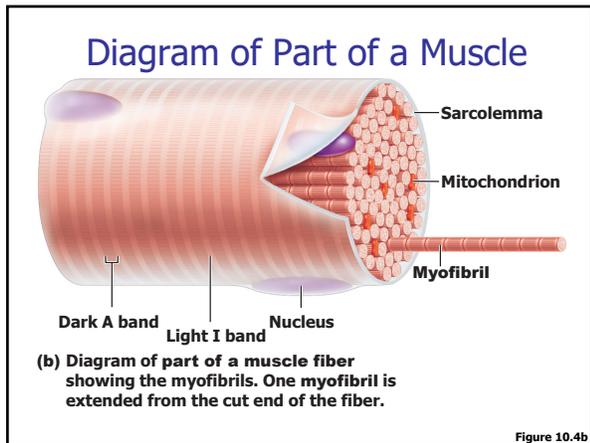
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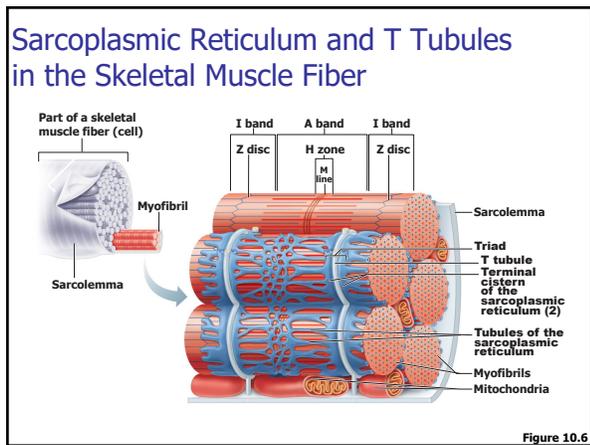
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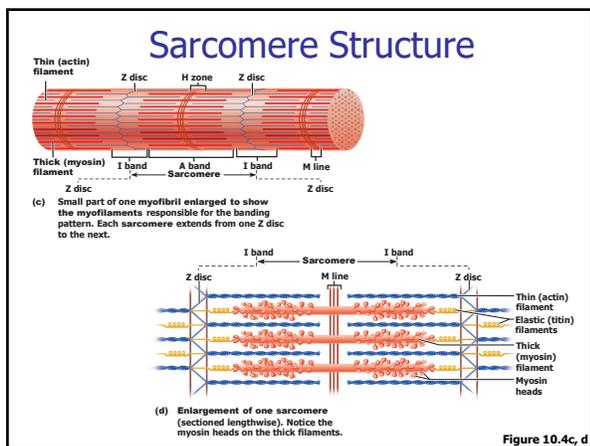
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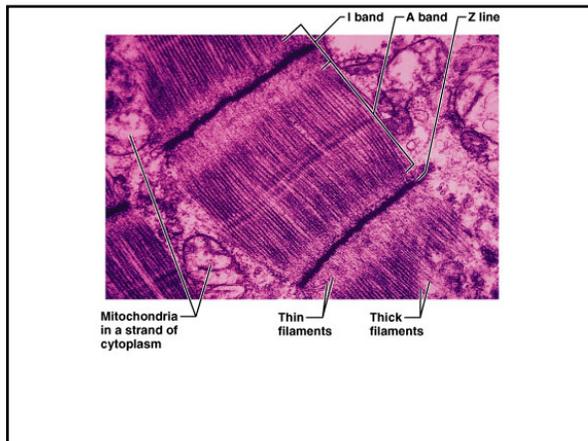
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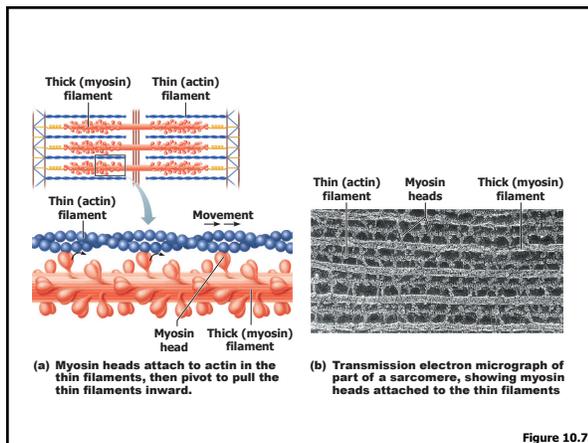
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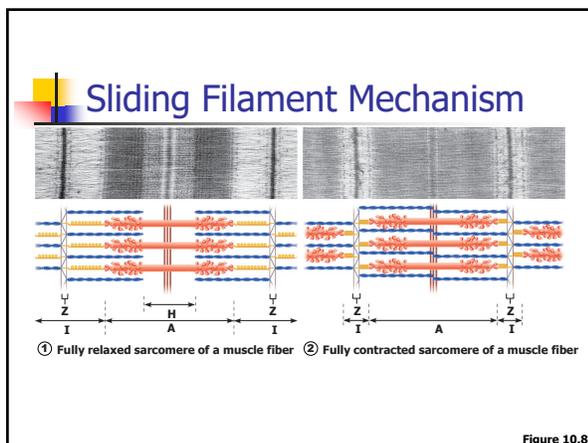
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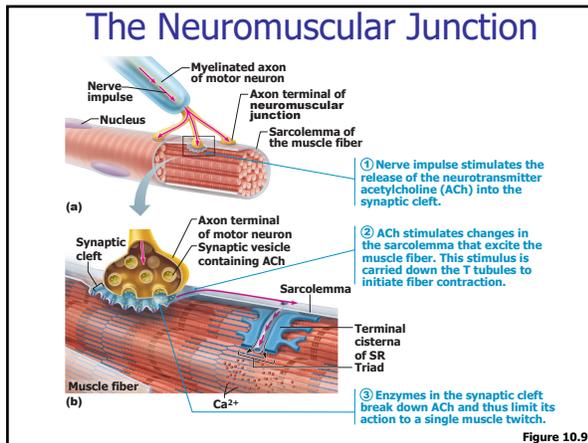
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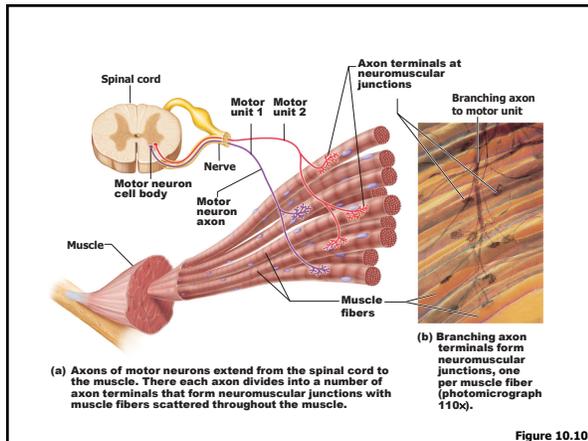
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### Types of Skeletal Muscle Fibers

- Skeletal muscle fibers are categorized according to:
  - How they manufacture energy (ATP)
  - How quickly they contract
- **Oxidative fibers**—produce ATP aerobically
- **Glycolytic fibers**—produce ATP anaerobically by glycolysis

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## Types of Skeletal Muscle Fibers

- Skeletal muscle fibers
  - Are divided into three classes
    - **Slow oxidative fibers**
      - Red slow oxidative fibers
    - **Fast glycolytic fibers**
      - White fast glycolytic fibers
    - **Fast oxidative fibers**
      - Intermediate fibers

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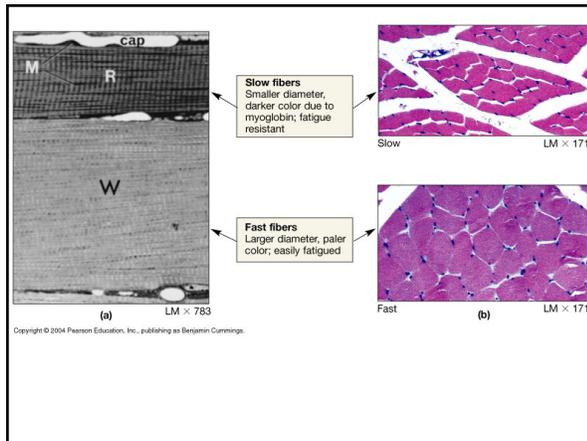
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## You should now be familiar with:

- The organization of muscle and the unique characteristics of skeletal muscle cells
- The structural components of the sarcomere
- The events at the neuromuscular junction
- The key concepts involved in skeletal muscle contraction and tension production
- How muscle fibers obtain energy for contraction
- Aerobic and anaerobic contraction, muscle fiber types, and muscle performance
- The differences between skeletal, cardiac, and smooth muscle

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