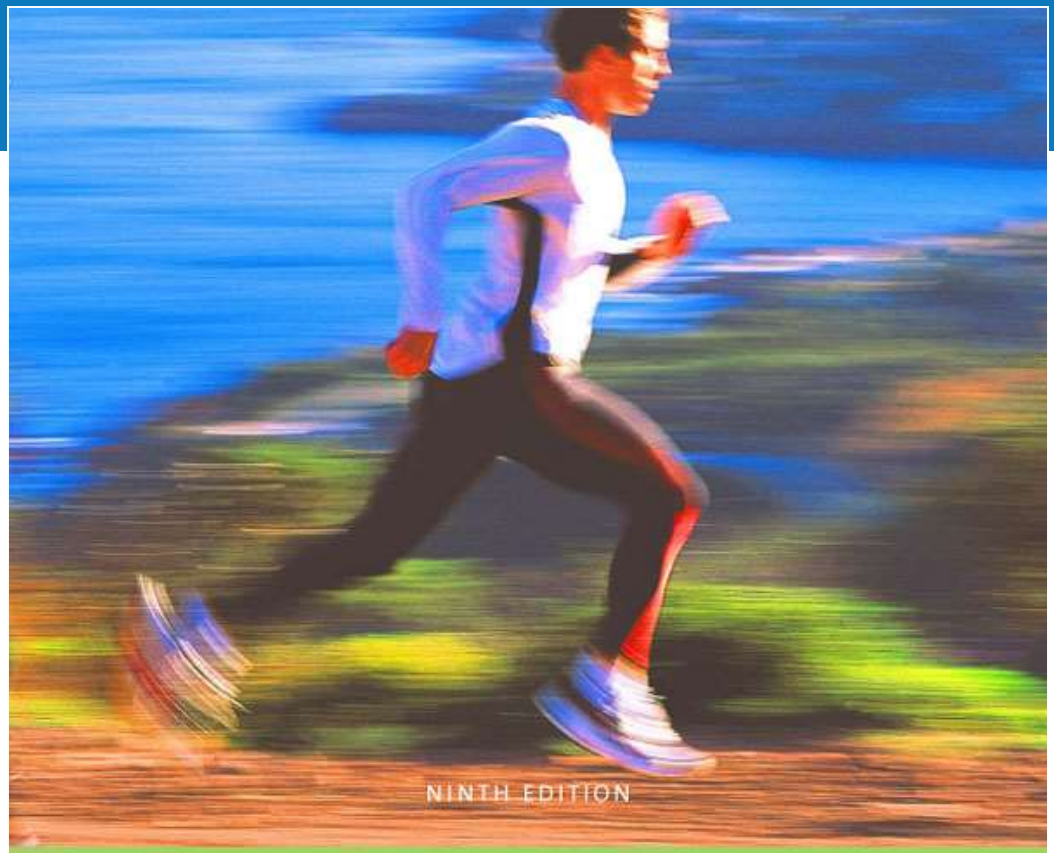
Lesson 1

- Types of Muscles
- Characteristics



PowerPoint® Lecture Slide Presentation
by Patty Bostwick-Taylor,
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The Muscular System

6 PART A

The Muscular System

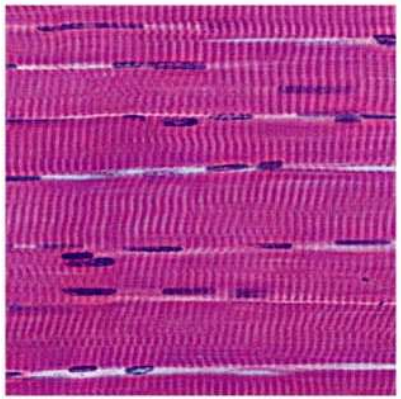
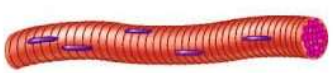
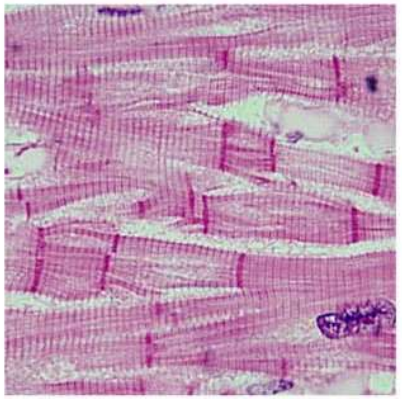
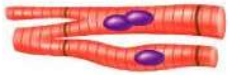
- Muscles are responsible for all types of body movement
- Three basic muscle types are found in the body
  - Skeletal muscle
  - Cardiac muscle
  - Smooth muscle

Characteristics of Muscles

- **Skeletal** and **smooth** muscle cells are elongated (muscle cell = muscle fiber)
- **Contraction** of muscles is due to the movement of **microfilaments**
- All muscles share some terminology
  - Prefixes *myo* and *mys* refer to "**muscle**"
  - Prefix *sarco* refers to "**flesh**"

Comparison of Skeletal, Cardiac, and Smooth Muscles

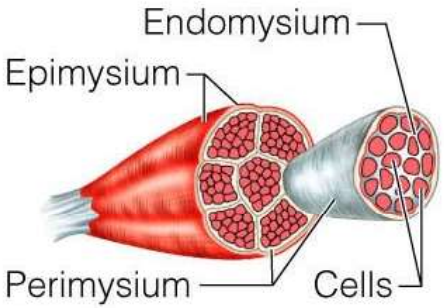
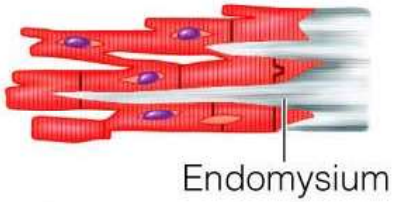
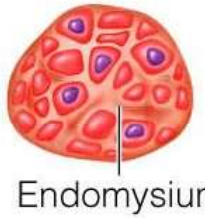
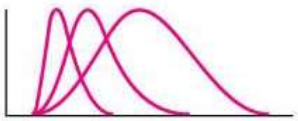
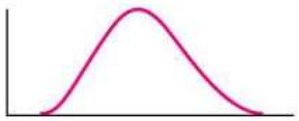
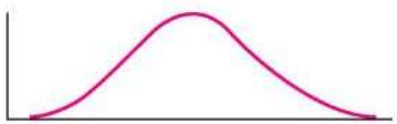
TABLE 6.1 Comparison of Skeletal, Cardiac, and Smooth Muscles

Characteristic	Skeletal	Cardiac	Smooth
Body location	Attached to bones or, for some facial muscles, to skin 	Walls of the heart 	Mostly in walls of hollow visceral organs (other than the heart) 
Cell shape and appearance	Single, very long, cylindrical, multinucleate cells with very obvious striations  	Branching chains of cells; uninucleate, striations; intercalated discs  	Single, fusiform, uninucleate; no striations  

Comparison of Skeletal, Cardiac, and Smooth Muscles

Table 6.1 (2 of 2)

TABLE 6.1 Comparison of Skeletal, Cardiac, and Smooth Muscles *(continued)*

Characteristic	Skeletal	Cardiac	Smooth
Connective tissue components	Epimysium, perimysium, and endomysium	Endomysium attached to the fibrous skeleton of the heart	Endomysium
			
Regulation of contraction	Voluntary; via nervous system controls	Involuntary; the heart has a pacemaker; also nervous system controls; hormones	Involuntary; nervous system controls; hormones, chemicals, stretch
Speed of contraction	Slow to fast	Slow	Very slow
			
Rhythmic contraction	No	Yes	Yes, in some

Anatomical (structural) differences (possible answers may include)

Cell shape and appearance

1. Skeletal muscles are multinucleate while smooth and cardiac muscles are uninucleate
2. Skeletal & cardiac muscles have striations while smooth do not
3. Only cardiac muscle has intercalated discs

Location

4. Skeletal muscle is attached to bones, cardiac muscle is in the heart, smooth muscle lines the walls of hollow organs (ex. Digestive tract)

Physiological (functional) differences (possible answers may include)

Regulation of contraction

1. Skeletal muscle is under voluntary control while smooth and cardiac muscle are under involuntary control

Speed of contraction

2. Skeletal muscles can be slow or fast to contract but cardiac muscles contract slow & smooth muscles contract very slow.

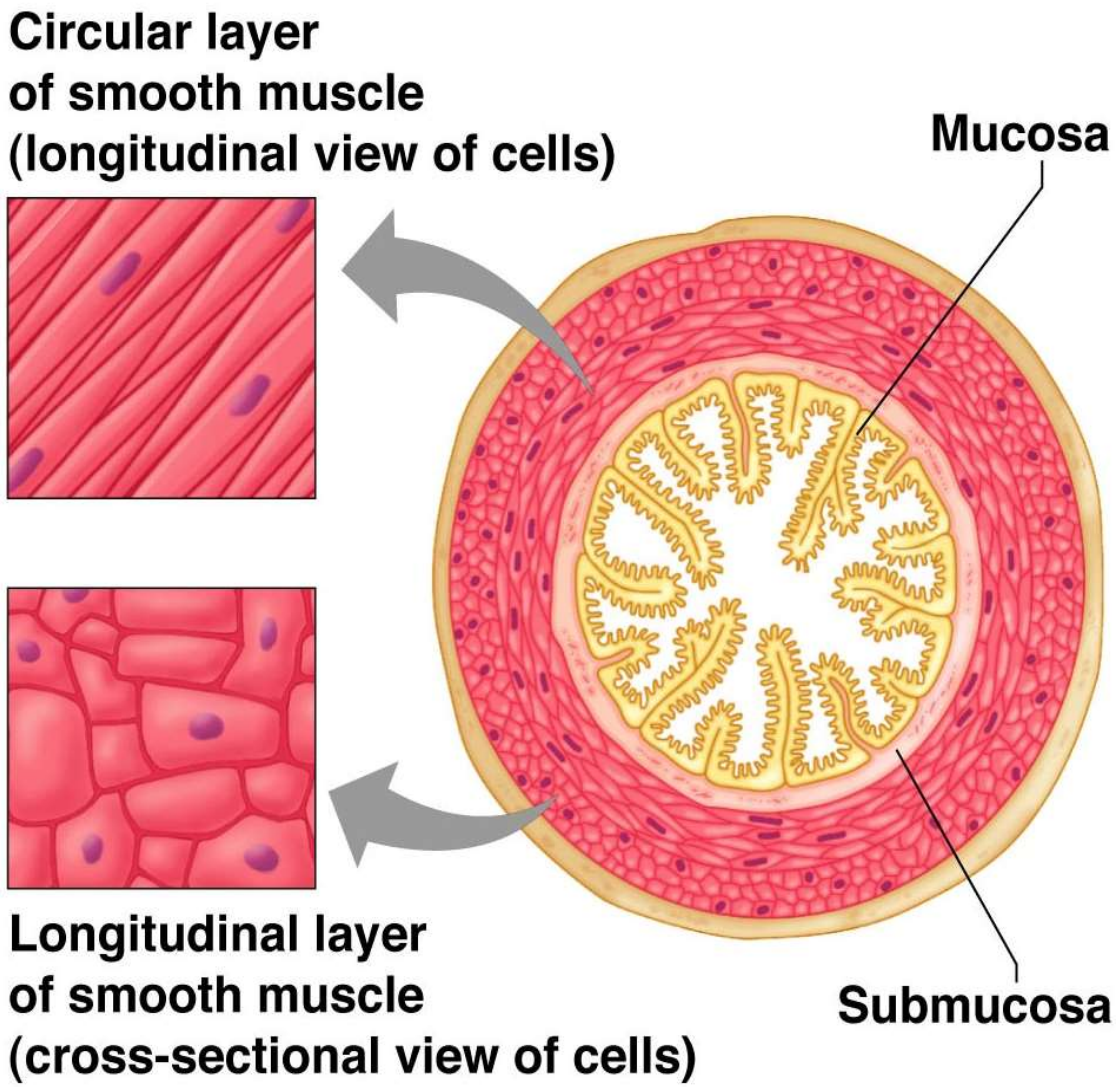
Rhythm of contraction

3. Cardiac and some smooth muscles have rhythmic contraction, skeletal does not

Smooth Muscle Characteristics

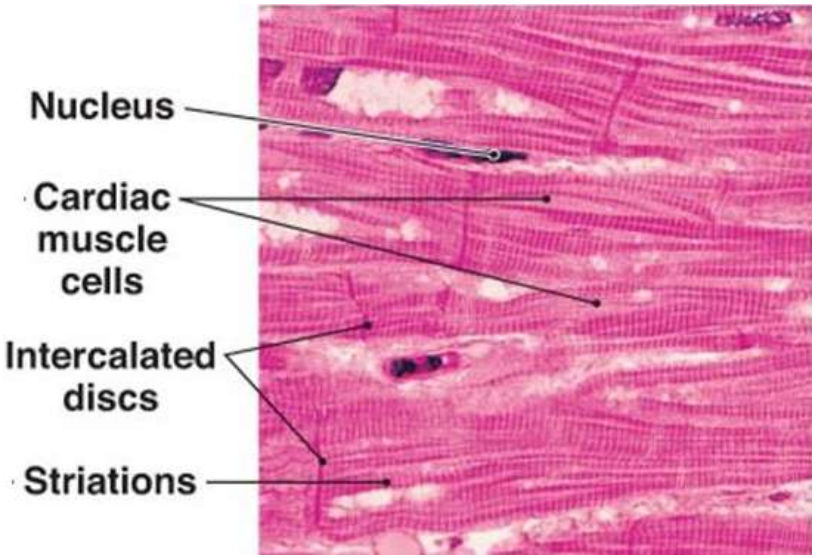
Figure 6.2a

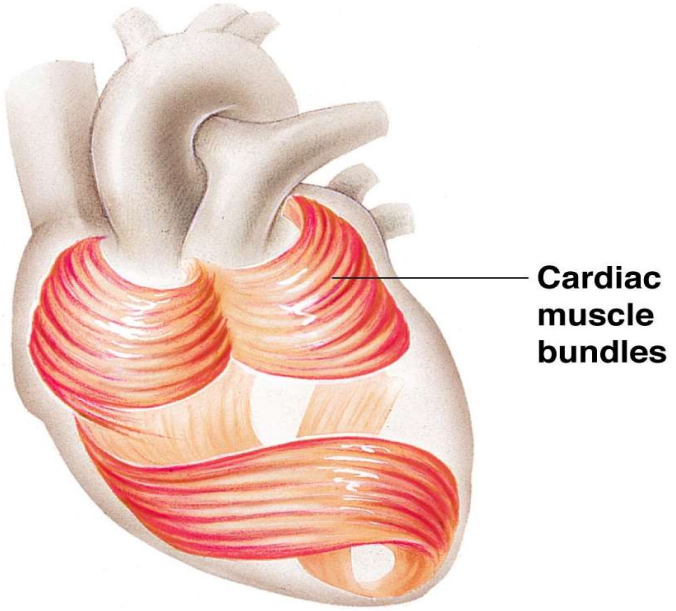
- Lacks striations
- Spindle-shaped cells
- Uninucleate
- Involuntary— no conscious control
- Found mainly in the walls of hollow organs



Cardiac Muscle Characteristics

- Striations
- Usually uninucleate
- Branching cells
- Joined to another muscle cell at an intercalated disc
- Involuntary – no conscious control
- Found only in the heart
- arranged in spiral or figure 8-shaped bundles



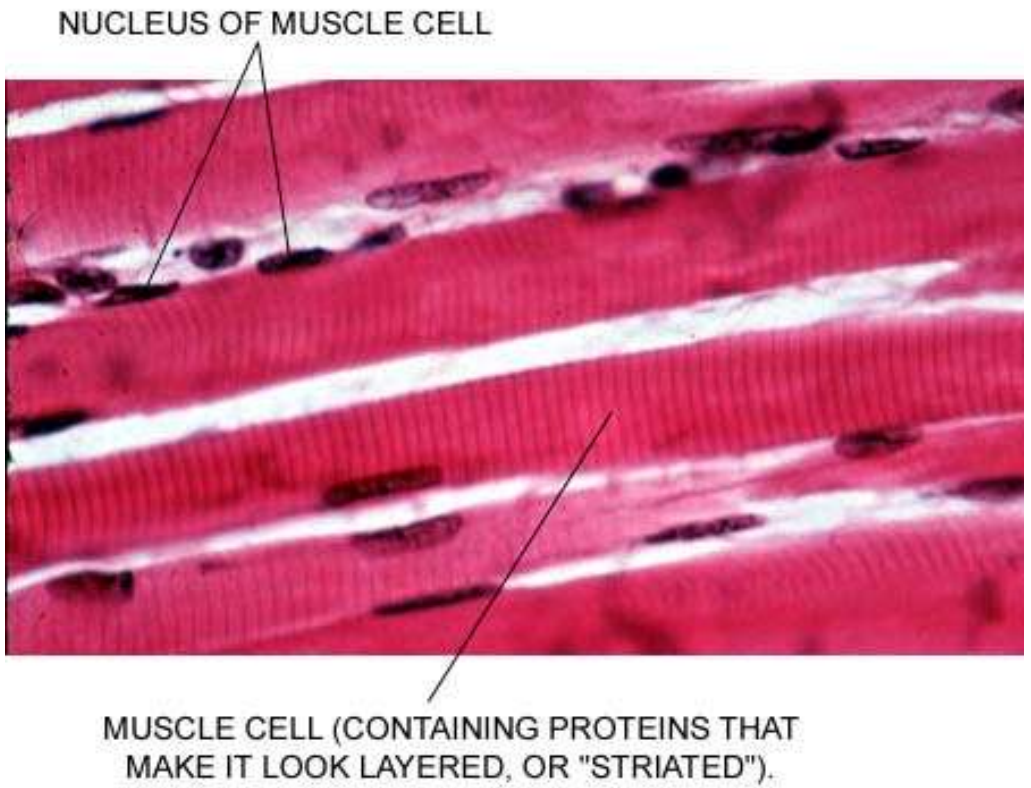


(b)

Figure 6.2b

Skeletal Muscle Characteristics

- Most of over 600 muscles are attached by tendons to bones
- Cells are multinucleate
- Striated — have visible banding
- Voluntary — subject to conscious control

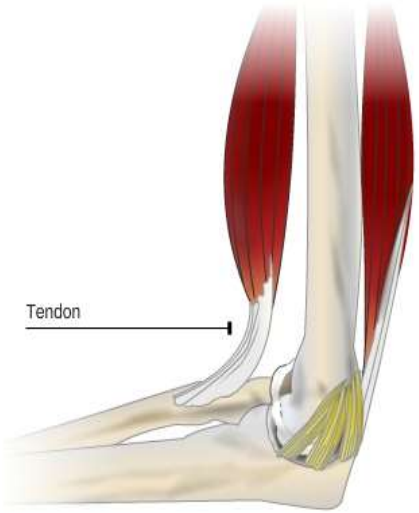


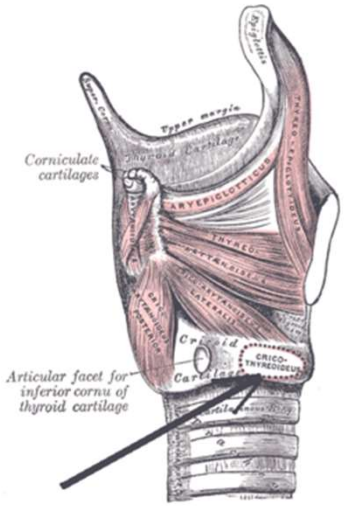
Skeletal Muscle Attachments

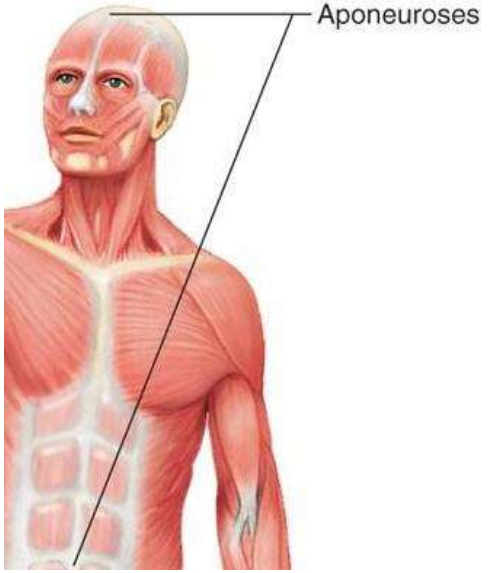
- Epimysium (outer covering of muscle) blends into a connective tissue attachment
  - Tendons—cord-like structures that connect muscle to bone
    - Mostly collagen fibers
    - Often cross a joint due to toughness and small size
  - Aponeuroses—sheet-like structures
    - Attach muscles indirectly to bones, cartilages, or connective tissue coverings

Skeletal Muscle Attachments

- Sites of muscle attachment
  - Bones
  - Cartilages
  - Connective tissue coverings







Skeletal Muscle Functions

- **Produce movement** – allow us to quickly respond to changes in the external environment
- **Maintain posture** – remaining erect or seated despite downward pull of gravity
- **Stabilize joints** – reinforcement of skeletal articulations
- **Generate heat** – by product of muscle activity as ATP is used to power muscle contraction