

# Microscopic Anatomy, Organization, and Classification of Skeletal Muscle

## Skeletal Muscle Cells and Their Packaging into Muscles

1. What capability is most highly expressed in muscle tissue? \_\_\_\_\_

2. Use the items on the right to correctly identify the structures described on the left.

- |  |                |
|--|----------------|
| _____ 1. connective tissue ensheathing a bundle of muscle cells                          | a. endomysium  |
| _____ 2. bundle of muscle cells  | b. epimysium   |
| _____ 3. contractile unit of muscle  | c. fascicle    |
| _____ 4. a muscle cell   | d. fiber       |
| _____ 5. thin reticular connective tissue investing each muscle cell                     | e. myofilament |
| _____ 6. plasma membrane of the muscle fiber   | f. myofibril   |
| _____ 7. a long filamentous organelle with a banded appearance found within muscle cells | g. perimysium  |
| _____ 8. actin- or myosin-containing structure   | h. sarcolemma  |
| _____ 9. cord of collagen fibers that attaches a muscle to a bone                        | i. sarcomere   |
|  | j. sarcoplasm  |
|  | k. tendon      |

3. Why are the connective tissue wrappings of skeletal muscle important? (Give at least three reasons.)

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4. Why are indirect—that is, tendinous—muscle attachments to bone seen more often than direct attachments?

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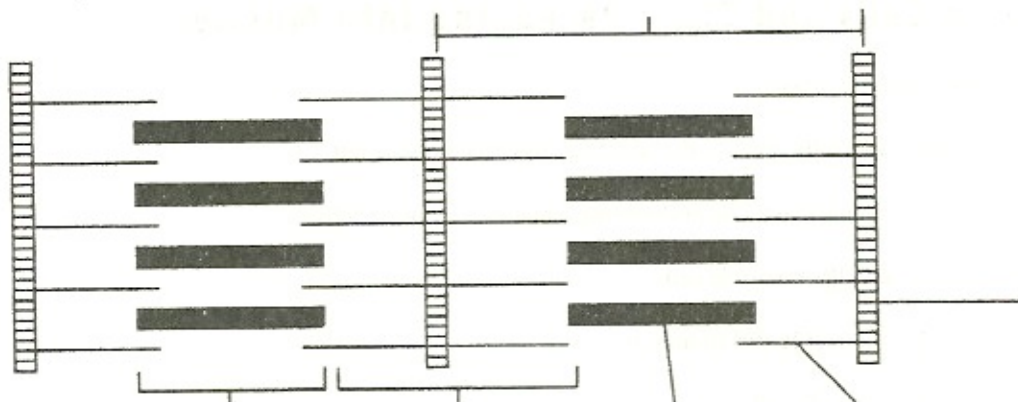
5. How does an aponeurosis differ from a tendon? \_\_\_\_\_

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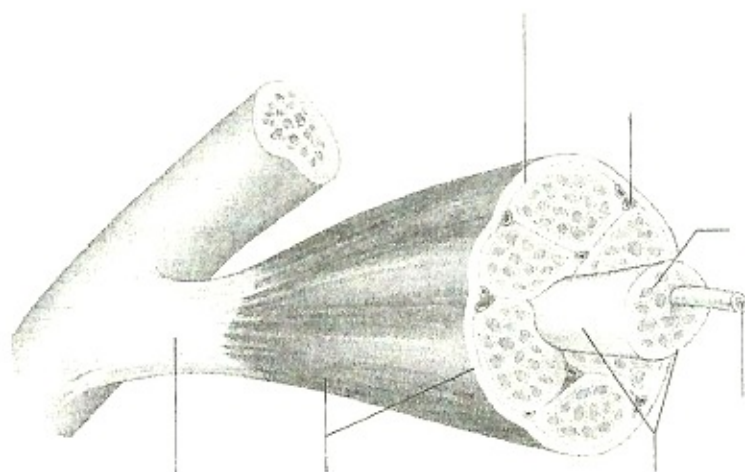
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6. The diagram illustrates a small portion of a muscle myofibril. Using letters from the key, correctly identify each structure indicated by a leader line or a bracket. Below the diagram make a sketch of how this segment of the myofibril would look if contracted.

Key: a. actin filament                      d. myosin filament  
 b. A band                                      e. sarcomere  
 c. I band                                        f. Z disc



7. On the following figure, label blood vessel, endomysium, epimysium, fascicle, muscle cell, perimysium, and tendon.



## The Neuromuscular Junction

Complete the following statements:

The junction between a motor neuron's axon and the muscle cell membrane is called a neuromuscular junction or a 1 junction. A motor neuron and all of the skeletal muscle cells it stimulates is called a 2. The actual gap between the axonal terminal and the muscle cell is called a 3. Within the axonal terminal are many small vesicles containing a neurotransmitter substance called 4. When the 5 reaches the ends of the axon, the neurotransmitter is released and diffuses to the muscle cell membrane to combine with receptors there. The combining of the neurotransmitter with the muscle membrane receptors causes the membrane to become permeable to sodium, which results in the influx of sodium ions and 6 of the membrane. Then contraction of the muscle cell occurs. Before a muscle cell can be stimulated to contract again, 7 must occur.

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

## Classification of Skeletal Muscles

1. Several criteria were given relative to the naming of muscles. Match the criteria (column B) to the muscle names (column A). Note that more than one criterion may apply in some cases.

Column A	Column B
_____ 1. gluteus maximus	a. action of the muscle
_____ 2. adductor magnus	b. shape of the muscle
_____ 3. biceps femoris	c. location of the origin and/or insertion of the muscle
_____ 4. transversus abdominis	d. number of origins
_____ 5. extensor carpi ulnaris	e. location of the muscle relative to a bone or body region
_____ 6. trapezius	f. direction in which the muscle fibers run relative to some imaginary line
_____ 7. rectus femoris	g. relative size of the muscle
_____ 8. external oblique	

2. When muscles are discussed relative to the manner in which they interact with other muscles, the terms shown in the key are often used. Match the key terms with the appropriate definitions.

Key: a. antagonist      b. fixator      c. prime mover      d. synergist

- \_\_\_\_\_ 1. agonist
- \_\_\_\_\_ 2. postural muscles, for the most part
- \_\_\_\_\_ 3. reverses and/or opposes the action of a prime mover
- \_\_\_\_\_ 4. stabilizes a joint so that the prime mover may act at more distal joints
- \_\_\_\_\_ 5. performs the same movement as the prime mover
- \_\_\_\_\_ 6. immobilizes the origin of a prime mover