

CHAPTER 47: Muscles and Bones

1. Distinguish between skeletal, cardiac, and smooth muscle.

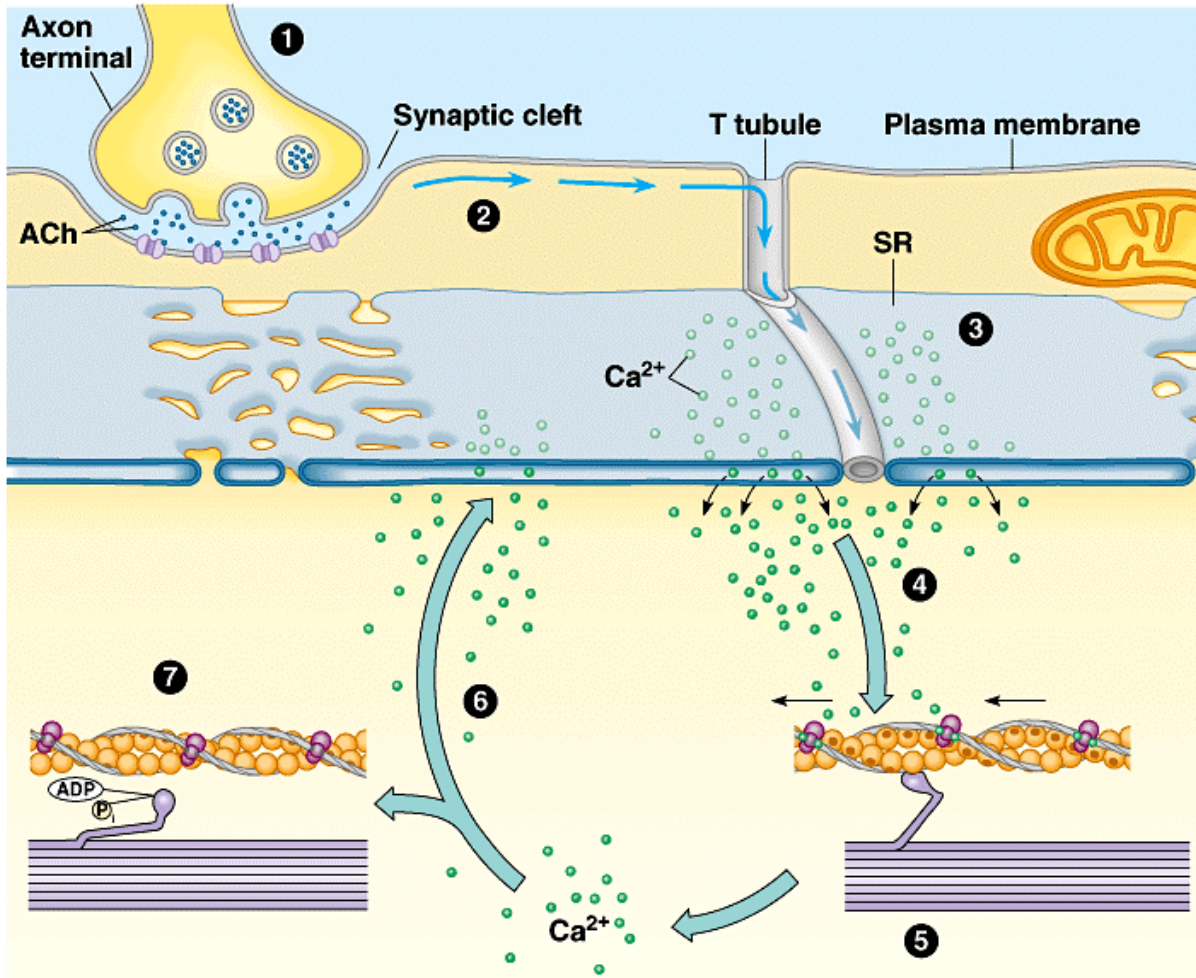
- a. _____
- b. _____
- c. _____

2. Identify the following components (or their roles) used in muscle contraction.

- a. muscle fiber – _____
- b. actin – _____
- c. myosin – _____
- d. titin – _____
- e. troponin – _____
- f. tropomyosin – _____
- g. hemoglobin – _____
- h. myoglobin – _____
- i. myofibrils – _____
- j. sarcomere – _____
- k. sarcoplasmic reticulum – _____
- l. T tubules – _____
- m. acetylcholine – _____
- n. Ca^{++} – _____

3. Briefly describe the sliding filament theory of muscle contraction.

4. Using the figure below, your textbook, and your notes, explain how a muscle contraction is controlled.



Name: _____

Note Set 49

5. What are the two factors that determine how strong (how much tension) a muscle generates?

6. What is tetanus?

7. Compare and contrast slow-twitch and fast twitch muscles.

8. What is the relationship between length of a sarcomere and the amount of force it can maintain?

9. Describe the three ways muscles are able to obtain ATP.

a. _____

b. _____

c. _____

Name: _____

Note Set 49

10. Distinguish between an endoskeleton and an exoskeleton.

11. Explain how the skeleton combines with an antagonistic muscle arrangement to provide a mechanism for movement.

12. Identify the following components of the skeletal system.

a. osteoblasts – _____

b. osteoclasts – _____

c. osteocytes – _____

d. joints – _____

e. tendons – _____

f. ligaments – _____

g. flexors – _____

h. extensors – _____

END OF CHAPTER 47 MULTIPLE CHOICE

1. Smooth muscle differs from both cardiac and skeletal muscle in that
 - A) it can act as a pacemaker for rhythmic contractions.
 - B) contractions of smooth muscle are not due to interactions between neighboring microfilaments.
 - C) neighboring cells are electrically connected by gap junctions.
 - D) neighboring cells are tightly coupled by intercalated discs.
 - E) the membranes of smooth muscle cells are depolarized by stretching.

2. Fast-twitch fibers differ from slow-twitch fibers in that
 - A) they are more common in the leg muscles of champion sprinters than marathon runners.
 - B) they have more mitochondria.
 - C) they fatigue less rapidly.
 - D) their abundance is more a product of training than of genetics.
 - E) they are more common in postural muscles than in finger muscles.

3. The role of Ca^{2+} in the control of muscle contraction is to
 - A) cause depolarization of the T tubule system.
 - B) change the conformation of troponin, thus exposing myosin-binding sites.
 - C) change the conformation of myosin heads, thus causing microfilaments to slide past each other.
 - D) bind to tropomyosin and break actin–myosin cross-bridges.
 - E) block the ATP-binding site on myosin heads, enabling muscles to relax.

4. Fifteen minutes into a 10-km run, what is the major energy source of the leg muscles?
 - A) Preformed ATP
 - B) Glycolysis
 - C) Oxidative metabolism
 - D) Pyruvate and lactate
 - E) High-protein drink consumed right before the race

5. Which statement about skeletal muscle contraction is not true?
 - A) A single action potential at the neuromuscular junction is sufficient to cause a muscle to twitch.
 - B) Once maximum muscle tension is achieved, no ATP is required to maintain that level of tension.
 - C) An action potential in the muscle cell activates contraction by releasing Ca^{2+} into the sarcoplasm.
 - D) Summation of twitches leads to a graded increase in the tension that can be generated by a single muscle fiber.
 - E) The tension generated by a muscle can be varied by controlling how many of its motor units are active.

6. Which statement about the structure of skeletal muscle is true?
- A) The light bands of the sarcomere are the regions where actin and myosin filaments overlap.
 - B) When a muscle contracts, the A bands of the sarcomere lengthen.
 - C) The myosin filaments are anchored in the Z lines.
 - D) When a muscle contracts, the H zone of the sarcomere shortens.
 - E) The sarcoplasm of the muscle cell is contained within the sarcoplasmic reticulum.
7. The long bones of our arms and legs are strong and can resist both compressional and bending forces because
- A) they are solid rods of compact bone.
 - B) their extracellular matrix contains crystals of calcium carbonate.
 - C) their extracellular matrix consists mostly of collagen and polysaccharides.
 - D) they have a very high density of osteoclasts.
 - E) they consist of lightweight cancellous bone with an internal meshwork of supporting elements.
8. If we compare the jaw joint with the knee joint as lever systems,
- A) the jaw joint can apply greater compressional forces.
 - B) their ratios of power arm to load arm are about the same.
 - C) the knee joint has greater rotational abilities.
 - D) the knee joint has a greater ratio of power arm to load arm.
 - E) only the jaw is a hinged joint.
9. Which statement about skeletons is true?
- A) They can consist of mostly cartilage.
 - B) Hydrostatic skeletons cannot be used for locomotion.
 - C) An advantage of exoskeletons is that they can continue to grow throughout the life of the animal.
 - D) External skeletons must remain flexible, so they never include calcium carbonate crystals, as bones do.
 - E) Internal skeletons consist of four different types of bone: compact, cancellous, membranous, and Haversian.
10. Which of the following effectors is not used both for avoiding predators and for communication?
- A) Chromatophores
 - B) Electric organs
 - C) Skeletal muscle
 - D) Glandular secretions
 - E) All of the above