THE MUSCULAR SYSTEM:
Muscles, the specialized tissues that facilitate body movement, make up about 40% of body weight. Most body muscle is the voluntary type, called skeletal muscle because it is attached to the bony skeleton. Skeletal muscle contributes to body contours and shape, and it composes the organ system called the muscular system. These muscles allow you to grin, frown, run, swim, shake hands, swing a hammer, and to otherwise manipulate your environment. The balance of body muscle is smooth and cardiac muscles, which form the bulk of the walls of hollow organs and the heart. Smooth and cardiac muscles are involved in the transport of materials within the body.

OVERVIEW OF MUSCLE TISSUES

1. Nine characteristics of muscle tissue are listed below. Identify the muscle tissue type described by writing the correct answer in the blank.
   a. __________________________ Involuntary
   b. __________________________ Banded appearance
   c. __________________________ Longitudinally and circularly arranged layers
   d. __________________________ Dense connective tissue packaging
   e. __________________________ Figure-8 packaging of the cells
   f. __________________________ Coordinated activity to act as a pump
   g. __________________________ Moves bones and the facial skin
   h. __________________________ Referred to as the muscular system
   i. __________________________ Voluntary

2. Identify the type of muscle in each of the illustrations in the figure.

[Diagram of muscle tissues]
3. First, identify the structures in Column B by matching them with the descriptions in Column A. Enter the correct letters (or terms if desired) in the answer blanks. Then, for the appropriate terms in Column B, label the figure.

**Column A**

- a. __________ Connective tissue surrounding a fascicle
- b. __________ Connective tissue ensheathing the entire muscle
- c. __________ Contractile unit of muscle
- d. __________ A muscle cell
- e. __________ Thin connective tissue surrounding each muscle cell
- f. __________ Plasma membrane of the muscle cell
- g. __________ A long, filamentous organelle found within muscle cells that has a banded appearance
- h. __________ Actin- or myosin-containing structure
- i. __________ Cordlike extension of connective tissue beyond the muscle, serving to attach it to the bone
- j. __________ A discrete bundle of muscle cells

**Column B**

- Endomysium
- Epimysium
- Fascicle
- Fiber
- Myofilament
- Myofibril
- Perimysium
- Sarcolemma
- Sarcomere
- Sarcoplasm
- Tendon
4. This figure is a diagrammatic representation of a small portion of a relaxed muscle cell (bracket indicates the portion enlarged). First, label the figure. Then bracket and label an A band, an I band, and a sarcomere.
5. Label muscle fiber diagram below with the following terms: actin, nucleus, mitochondrion, myofibril, myosin, sarcolemma, sarcoplasm, sarcoplasmic reticulum, and T-tubules. Then identify the method of ATP production in the diagram at the bottom.

6. This figure shows the components of a neuromuscular junction. Identify the parts by labeling the corresponding structures in the diagram.
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1. involuntary
2. fusiform shape

1. types of muscle tissue
2. muscle (organ)
3. many fascicles
4. small bundles called?
5. cells called?
6. muscle functions
7. C.T. sheath
8. muscle (organ) sheath
9. converge to form
10. sheet-like
11. cord-like
12. tendons
13. motor unit
14. muscle functions
15. muscle functions

1. Microscopic Structure
2. basic unit of contraction
3. light band
4. dark band
5. 2 types of microfilaments
6. I Band
7. A Band
8. troponin
9. tropomyosin
10. myosin heads
11. slide past each other
12. theory of contraction
13. releases
14. neuromuscular junctions
15. two parts
16. muscle fiber
17. neurotransmitter
18. type of

1. involuntary
2. fusiform shape
3. involuntary
4. striated
5. intercalated discs
6. involuntary
7. striated
8. involuntary
9. involuntar)
10. many fascicles
11. cord-like
12. tendons
13. motor unit
14. muscle functions
15. muscle functions
16. Microscopic Structure
17. basic unit of contraction
18. light band
19. dark band
20. 2 types of microfilaments
21. I Band
22. A Band
23. troponin
24. tropomyosin
25. myosin heads
26. slide past each other
27. theory of contraction
28. releases
29. neuromuscular junctions
30. two parts
31. muscle fiber
32. neurotransmitter
33. type of
Overview of Muscle Tissues

7. Describe similarities and differences in the structure and function of the three types of muscle tissue and indicate where they are found in the body.

8. Define muscular system.

9. Define and explain the role of the following: endomysium, perimysium, epimysium, tendon, and aponeurosis.

Microscopic Anatomy of Skeletal Muscle

10. Describe the microscopic structure of skeletal muscle and explain the role of actin- and myosin-containing myofilaments.

Skeletal Muscle Activity

11. Describe how an action potential is initiated in a muscle cell.
12. Describe the events of muscle cell contraction.

13. Define graded response, tetanus, isotonic and isometric contractions, and muscle tone as these terms apply to a skeletal muscle.

14. Describe three ways in which ATP is regenerated during muscle activity.

15. Define oxygen deficit and muscle fatigue and list possible causes of muscle fatigue.

16. Describe the effects of aerobic and resistance exercise on skeletal muscles and other body organs.

**Muscle Movements, Types, and Names**

17. Define origin, insertion, prime mover, antagonist, synergist, and fixator as they relate to muscles.

18. List some criteria used in naming muscles.
19. Explain the importance of a nerve supply and exercise in keeping muscles healthy.

20. Describe the changes that occur in aging muscles.
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