

9

Muscular System

I. Introduction to the Muscular System

☞ *Concept:* Skeletal muscles are adapted to contract in order to carry out the functions of generating body movement, producing heat, and supporting the body and maintaining posture.

A. Multiple Choice Questions

- ___ 1. Which of the following is *not* a function of muscle?
(a) motion (body movement) (d) maintenance of body posture
(b) motor-impulse generation (e) support of body structures
(c) heat production
- ___ 2. The capability of muscle tissue to receive and respond to a stimulus is known as
(a) irritability. (c) extendibility.
(b) contractility. (d) elasticity.
- ___ 3. The ability to be stretched is characteristic of which type(s) of muscle tissue?
(a) skeletal (c) smooth
(b) cardiac (d) all of the above

B. True-False Questions

- ___ 1. Isolated fiber contractions are continuous, even in a relaxed muscle.
- ___ 2. Muscle tonus assists the movement of arterial blood.
- ___ 3. Muscle tissue accounts for approximately 40% of body weight.

II. Structure of Skeletal Muscles

☞ *Concept:* Skeletal muscle tissue and its binding connective tissue are arranged in a highly organized pattern that unites the forces of the contracting muscle fibers and directs them onto the structure being moved.

A. Multiple Choice Questions

- ___ 1. A flattened, sheetlike tendon is known as
(a) an aponeurosis. (c) a retinaculum.
(b) a tendon sheath. (d) a fascial sheath.
- ___ 2. The connective tissue surrounding individual muscle fibers is called
(a) the innermysium. (c) the perimysium.
(b) the endomysium. (d) the epimysium.
- ___ 3. Adipose tissue is abundant in which connective tissue?
(a) fasciculi (c) deep fascia
(b) epimysium (d) superficial fascia

- ___ 4. Which type of fiber arrangement characterizes the deltoid muscle?
 (a) parallel. (c) pennate.
 (b) convergent. (d) sphincteral (circular).
- ___ 5. Which fiber arrangement is the strongest, yet the quickest to tire?
 (a) parallel (c) pennate
 (b) convergent (d) sphincteral

B. True–False Questions

- ___ 1. The distal, more stationary, attachment of a muscle is known as its insertion.
- ___ 2. A retinaculum lubricates and protects, just as a tendon sheath does.
- ___ 3. Most body movements result from contraction of individual muscles rather than groups of muscles.
- ___ 4. Bundles of muscle fibers called fasciculi are surrounded by perimysium.
- ___ 5. Tendons are continuous with the layer of connective tissue covering muscles known as the epimysium.
- ___ 6. Synergistic muscles perform opposite functions and are generally located on the opposite sides of a limb.
- ___ 7. Pennate-fibered muscles have long extensions and good endurance, but are relatively weak.

III. Skeletal Muscle Fibers and Types of Muscle Contraction

☞ *Concept:* Muscle fiber contraction in response to a motor impulse results from a sliding movement within the myofibrils in which the length of the sarcomeres is reduced.

A. Multiple Choice Questions

- ___ 1. Which grouping of muscle constituents is in descending order of size?
 (a) fasciculus, myofibril, muscle fiber, myofilament
 (b) fasciculus, muscle fiber, myofibril, actin-myosin, myofilament
 (c) muscle fiber, fasciculus, myofilament, myofilament
 (d) fasciculus, muscle fiber, myofibril, myofilament, actin-myosin
- ___ 2. Which band contains only myosin that is *not* overlapped with actin myofilaments?
 (a) A band (c) H band
 (b) I band (d) none of the above (myosin is overlapped in all bands)
- ___ 3. The sarcomere, the basic subunit of skeletal muscle contraction, is defined as the distance from
 (a) Z line to Z line. (c) A band to Z line.
 (b) A band to A band. (d) H band to H band.
- ___ 4. What actually shortens when a muscle fiber contracts?
 (a) actin myofilaments (c) sarcomeres
 (b) myosin myofilaments (d) none of the above
- ___ 5. As the distance from Z line to Z line decreases, which bands shorten in a sarcomere?
 (a) I bands and H bands (c) A bands and H bands
 (b) I bands and A bands (d) all of the above

B. True–False Questions

- ___ 1. The cytoplasm within a muscle cell is called sarcolemma.
- ___ 2. Lifting dumbbells is an example of isotonic contraction.
- ___ 3. Motor end plates store the neurotransmitter acetylcholine.
- ___ 4. A motor unit's contraction varies in magnitude according to the strength of the nerve stimulus.

IV. Naming of Muscles

☞ *Concept:* Skeletal muscles are named on the basis of shape, location, attachment, orientation of fibers, relative position, or function.

A. Multiple Choice Questions

- ___ 1. Which of the following is *not* a basis for naming a muscle?
 - (a) shape
 - (b) strength of contraction
 - (c) function
 - (d) relative position
 - (e) location
- ___ 2. The sternocleidomastoid muscle receives its name from its
 - (a) shape.
 - (b) attachment.
 - (c) size.
 - (d) function.
- ___ 3. The tibialis anterior is named for its
 - (a) location and relative position.
 - (b) attachment and shape.
 - (c) function and location.
 - (d) location and attachment.

V. Muscles of the Axial Skeleton

☞ *Concept:* Muscles of the axial skeleton include those responsible for facial expression, mastication, eye movement, tongue movement, neck movement, and respiration, and those of the abdominal wall, the pelvic outlet, and the vertebral column.

A. Multiple Choice Questions

- ___ 1. The muscle responsible for smiling is
 - (a) the orbicularis oris.
 - (b) the depressor anguli oris.
 - (c) the levator labii superioris.
 - (d) the zygomaticus.
- ___ 2. A muscle that does *not* insert on the orbicularis oris is
 - (a) the platysma.
 - (b) the zygomaticus.
 - (c) the risorius.
 - (d) the depressor anguli oris.
 - (e) the levator labii superioris.
- ___ 3. The muscle responsible for protracting the jaw is
 - (a) the lateral pterygoid.
 - (b) the medial pterygoid.
 - (c) the masseter.
 - (d) the temporalis.

- ___ 4. The ocular muscle that passes through the trochlea is
 (a) the superior rectus. (c) the inferior rectus.
 (b) the superior oblique. (d) the inferior oblique.
- ___ 5. Movements of the eyeball superiorly and laterally result from the contraction of which muscle?
 (a) inferior oblique (d) superior oblique
 (b) lateral rectus (e) inferior rectus
 (c) superior rectus
- ___ 6. The muscle that lowers the jaw is
 (a) the mylohyoid. (c) the stylohyoid.
 (b) the sternohyoid. (d) the digastric.
- ___ 7. The muscles that are synergistic to the diaphragm during inspiration are
 (a) the external intercostal muscles.
 (b) the internal intercostal muscles (excluding the interchondral part).
 (c) the abdominal muscles.
 (d) all of the above.
- ___ 8. The muscle that flexes the joints between the lumbar vertebrae is
 (a) the transverse abdominis.
 (b) the internal abdominal oblique.
 (c) the rectus abdominis.
 (d) the external abdominal oblique.
- ___ 9. The perineal group of muscles includes all of the following *except*
 (a) the transversus perinei superficialis.
 (b) the bulbospongiosus.
 (c) the coccygeus.
 (d) the ischiocavernosus.
- ___ 10. The erector spinae muscle group consists of all of the following muscles *except*
 (a) the iliocostalis muscles. (c) the longissimus muscles.
 (b) the spinalis muscles. (d) the semispinalis muscles.

B. True–False Questions

- ___ 1. Contraction of the orbicularis oris muscle compresses the lacrimal gland near the eyeball.
- ___ 2. The depressor anguli oris muscles cause a frown when contracted.
- ___ 3. The masseter muscle is the largest of the muscles of mastication.
- ___ 4. The intrinsic muscles of the tongue are confined within the tongue.
- ___ 5. The floor of the mouth is formed by the mylohyoid muscle.
- ___ 6. The serratus anterior muscle extends from rib to rib and is important in inspiration (inhalation).
- ___ 7. The fibers of the external abdominal oblique muscle extend superiorly and medially.
- ___ 8. The linea alba is an aponeurosis on the midline of the abdomen.
- ___ 9. The ischiocavernosus muscle maintains the erection of the penis in the male and that of the clitoris in the female.
- ___ 10. The rectus abdominis muscle is antagonistic to the erector spinae and spinalis thoracis muscles.

VI. Muscles of the Appendicular Skeleton

☞ *Concept:* The muscles of the appendicular skeleton include those of the pectoral girdle, arm, forearm, wrist, hand, and fingers, and those of the pelvic girdle, thigh, leg, ankle, foot, and toes.

A. Multiple Choice Questions

- _____ 1. A muscle that does *not* have an attachment on the scapula is
(a) the deltoid. (d) the teres major.
(b) the latissimus dorsi. (e) the teres minor.
(c) the coracobrachialis.
- _____ 2. Upon which part of the humerus do the pectoralis major, supraspinatus, infraspinatus, and teres minor muscles insert?
(a) greater tubercle (d) intertubercular groove
(b) deltoid tuberosity (e) lesser tubercle
(c) body (shaft)
- _____ 3. All of the following muscles are synergists in flexing the elbow joint *except*
(a) the biceps brachii. (c) the coracobrachialis.
(b) the brachialis. (d) the brachioradialis.
- _____ 4. Which of the following muscles does *not* attach to the humerus?
(a) biceps brachii (c) brachialis
(b) brachioradialis (d) triceps brachii
- _____ 5. Which of the following muscles does *not* originate on the lateral epicondyle of the humerus?
(a) extensor carpi radialis brevis
(b) extensor digitorum
(c) extensor digiti minimi
(d) none of the above (all originate on the lateral epicondyle)
- _____ 6. The aponeurosis (sheetlike tendon) that forms the stockinglike covering of the posterolateral muscles of the thigh is called
(a) the linea alba. (d) the inguinal ligament.
(b) the iliotibial tract. (e) the fasciculata femoris.
(c) the galea aponeurotica.
- _____ 7. The muscle that extends and laterally rotates the thigh is
(a) the iliacus. (d) the gluteus maximus.
(b) the gluteus medius. (e) the gluteus minimus.
(c) the psoas major.
- _____ 8. The longest muscle in the body is
(a) the biceps brachii. (c) the rectus femoris.
(b) the rectus abdominis. (d) the sartorius.
- _____ 9. Of the four quadriceps femoris muscles, the one that contracts over the hip and knee joints is
(a) the vastus medialis. (c) the rectus femoris.
(b) the vastus intermedius. (d) the vastus lateralis.
- _____ 10. The tendo calcaneus serves both the gastrocnemius and
(a) the plantaris. (c) the popliteus.
(b) the tibialis posterior. (d) the soleus.

B. True–False Questions

- ___ 1. The trapezius muscle adducts the brachium.
- ___ 2. The triceps brachii muscle originates on the humerus and the scapula.
- ___ 3. The palmaris longus muscle pronates the hand.
- ___ 4. The fleshy base of the thumb is called the thenar eminence.
- ___ 5. All three gluteal muscles insert on the greater trochanter of the femur.
- ___ 6. A pulled groin muscle could involve the gracilis muscle.
- ___ 7. The sartorius muscle acts on the hip joint only.
- ___ 8. The quadriceps femoris group of muscles is antagonistic to the hamstring group of muscles.
- ___ 9. Of the muscles considered the hamstrings, only the short head of the biceps femoris muscle originates on the linea aspera of the femur; the other three originate on the os coxae.
- ___ 10. The gastrocnemius and soleus muscles are frequently referred to as a single muscle, the triceps surae.

VII. Developmental Exposition of the Muscular System

A. Completion Questions

- 1. Specialized mesodermal cells called _____ divide mitotically, eventually giving rise to muscle fibers.
- 2. Mesodermal masses that are responsible for muscle fiber development are called _____.
- 3. Movements of the fetus in a pregnant woman are known as _____.

VIII. Clinical Considerations

A. True–False Questions

- ___ 1. Poliomyelitis is a disease of the nervous system that exerts its effects on skeletal muscles.
- ___ 2. Muscular dystrophy is paralyzes muscles as a result of diseased nerves.
- ___ 3. Rhabdomyosarcoma is a malignant tumor of skeletal muscle.

B. Completion Questions

- 1. The rupture or protrusion of a portion of the underlying viscera through muscle tissue is known as a _____.
- 2. Any muscular disease is a _____.
- 3. A persistent contraction of either of the sternocleidomastoid muscles is a condition called _____.

IX. Chapter Review

A. Completion Questions

1. A _____ is a toughened organ, composed primarily of dense regular connective tissue, that connects a muscle to the periosteum of a bone.
2. Flattened, sheetlike tendons called _____ permit muscle attachment over a broad area.
3. Skeletal muscle fibers are arranged in bundles called _____.
4. _____-fibered muscles, with their many fibers per unit area and short excursions, provide strength and dexterity.
5. A skeletal muscle fiber is stimulated to contract upon receiving an impulse through a _____ neuron.
6. The cell membrane surrounding a muscle fiber is called the _____, and the cytoplasm within the fiber is called the _____.
7. The basic subunits of skeletal muscle contraction located between the Z lines are known as _____.
8. When a person dies, the depletion of ATP within the muscle fibers results in _____.
9. In _____ contraction, the length of a muscle remains constant because the force of the antagonist equals the force of the muscle being contracted.
10. The motor end plate of a neuron and the sarcolemma of a muscle fiber form the _____ junction.
11. A _____ consists of a single motor neuron and the aggregation of muscle fibers it innervates.
12. The secretion of _____ from the adrenal gland promotes motor unit effectiveness.
13. The _____ eminence is the fleshy base of the thumb that consists of three muscles.
14. The _____ is the prominent muscle positioned along the lateral surface of the forearm, where it flexes the elbow joint when contracted.
15. The tendons of the muscles of the anterior surface of the forearm are securely positioned at the wrist by the _____.
16. The _____ is a band of connective tissue on the midline of the abdomen that separates the two rectus abdominis muscles.
17. The _____ muscle maintains the erection of the penis and clitoris.
18. The _____ muscle group is located on the anterior surface of the thigh, and the _____ muscle group is located on the posterior surface.

B. Matching Questions

Match each muscle with its action.

- | | |
|---------------------------|---|
| ___ 1. deltoid | (a) flexes and adducts the shoulder joint |
| ___ 2. psoas major | (b) flexes the joints of the vertebral column |
| ___ 3. gracilis | (c) extends the knee joint |
| ___ 4. trapezius | (d) adducts the shoulder joint |
| ___ 5. vastus lateralis | (e) flexes the hip joint and joints of the vertebral column |
| ___ 6. rectus abdominis | (f) adducts and extends the shoulder joint |
| ___ 7. semimembranosus | (g) adducts the hip joint |
| ___ 8. quadratus lumborum | (h) abducts the shoulder joint |
| ___ 9. latissimus dorsi | (i) flexes the elbow joint |
| ___ 10. coracobrachialis | (j) abducts and medially rotates the hip joint |
| ___ 11. gluteus medius | (k) flexes the knee joint |
| ___ 12. brachialis | (l) extends the joints of the lumbar region of the vertebral column |