

Chapter 8 - Muscular System

8.1 Introduction (p. 178)

- A. The three types of muscle in the body are skeletal, smooth, and cardiac muscle.
- B. This chapter focuses on skeletal muscle.

8.2 Structure of a Skeletal Muscle (p. 178)

- A. Each muscle is an organ, comprised of skeletal muscle tissue, connective tissues, nervous tissue, and blood.
- B. Connective Tissue Coverings (p. 178; Fig. 8.1)
 - 1. Layers of dense connective tissue, called fascia, surround and separate each muscle.
 - 2. This connective tissue extends beyond the ends of the muscle and gives rise to tendons that are fused to the periosteum of bones.
 - 3. Sometimes tendons are broad sheets of connective tissue called aponeuroses.
 - 4. The layer of connective tissue around each whole muscle is the epimysium; the perimysium surrounds individual bundles (fascicles) within each muscle; and each muscle cell (fiber) is covered by a connective tissue layer called endomysium.
- C. Skeletal Muscle Fibers (p. 179; Figs. 8.2-8.4)
 - 1. Each muscle fiber is a single, long, cylindrical muscle cell.
 - 2. Beneath the sarcolemma (cell membrane) lies sarcoplasm (cytoplasm) with many mitochondria and nuclei; the sarcoplasm contains myofibrils.
 - a. Thick filaments of myofibrils are made up of the protein myosin.
 - b. Thin filaments of myofibrils are made up of the protein actin.
 - c. The organization of these filaments produces striations.
 - 3. A sarcomere extends from Z line to Z line.
 - a. I bands (light bands) made up of actin filaments are anchored to Z lines.
 - b. A bands (dark bands) are made up of overlapping thick and thin filaments.
 - c. In the center of A bands is an H zone, consisting of myosin filaments only.
 - 4. Beneath the sarcolemma of a muscle fiber lies the sarcoplasmic reticulum (endoplasmic reticulum), which is associated with transverse (T) tubules (invaginations of the sarcolemma).
 - a. Each T tubule lies between two cisternae of the sarcoplasmic reticulum.
 - b. The sarcoplasmic reticulum and transverse tubules activate the muscle contraction mechanism when the fiber is stimulated.
- D. Neuromuscular Junction (p. 181; Fig. 8.5)
 - 1. The site where the motor neuron and muscle fiber meet is the neuromuscular junction.
 - a. The muscle fiber membrane forms a motor end plate in which the sarcolemma is tightly folded and where nuclei and mitochondria are abundant.
 - b. The cytoplasm of the motor neuron contains numerous mitochondria and synaptic vesicles storing neurotransmitters.
- E. Motor Units (p. 181; Fig. 8.6)
 - 1. A motor neuron and the muscle fibers it controls make up a motor unit; when stimulated to do so, the muscle fibers of the motor unit contract all at once.

8.3 Skeletal Muscle Contraction (p. 182; Table 8.1)

- A. Muscle contraction involves several components that result in the shortening of sarcomeres, and the pulling of the muscle against its attachments.
- B. Role of Myosin and Actin (p. 182; Figs. 8.7-8.9)
 - 1. Myosin consists of two twisted strands with globular cross-bridges projected