Chapter 11 Outline

Note: Please refer to handout List of Skeletal Muscles and their Actions for the material you are responsible for from the Exhibits in the chapter.

I. INTRODUCTION

A. The *muscular system* specifically concerns skeletal muscles and associated connective tissue that make individual muscle organs.

B. This chapter discusses how skeletal muscles produce movement and describes the principal skeletal muscles.

II. HOW SKELETAL MUSCLES PRODUCE MOVEMENT

A. Muscle Attachment Sites: Origin and Insertion

1. Skeletal muscles produce movements by exerting force on tendons, which in turn pull on bones or other structures, such as skin.
2. Most muscles cross at least one joint and are attached to the articulating bones that form the joint.
3. When such a muscle contracts, it draws one articulating bone toward the other.
    a. The attachment to the stationary bone is the *origin.*
    b. The attachment to the movable bone is the *insertion*.

B. Lever Systems and Leverage

1. Bones serve as *levers* and joints serve as *fulcrums*. A lever is a rigid structure that can move around a fixed point called a fulcrum.
2. The lever is acted on by two different forces: *effort* (which causes movement) and *load (resistance*) (which opposes movement. The effort is the force exerted by muscular contraction, and the load is the weight of the body part being moved.

C. Effects of Fascicle Arrangement

1. Skeletal muscle fibers (cells) are arranged within the muscle in bundles called fasciculi.
2. The muscle fibers are arranged in a parallel fashion within each bundle, but the arrangement of the fasciculi with respect to the tendons may take one of the following characteristic patterns: parallel, fusiform, pennate, triangular, and circular.
3. Fascicular arrangement is correlated with the power of a muscle and the range of motion.

D. Coordination Within Muscle Groups

1. Most movements are coordinated by several skeletal muscles acting in groups rather than individually, and most skeletal muscles are arranged in opposing (antagonistic) pairs at joints.
2. A muscle that causes a desired action is referred to as the *prime mover* (*agonist*); the *antagonist* produces an opposite action.
3. Most movements also involve muscles called *synergists*, which serve to steady a movement, thus preventing unwanted movements and helping the prime mover function more efficiently.
4. Some synergist muscles in a group also act as *fixators*, which stabilize the origin of the prime mover so that it can act more efficiently.
5. Under different conditions and depending on the movement and which point is fixed, many muscles act, at various times, as prime movers, antagonists, synergists, or fixators.

III. HOW SKELETAL MUSCLES ARE NAMED

A. The names of most of the nearly 700 skeletal muscles are based on several types of characteristics.

B. These characteristics may be reflected in the name of the muscle.

C. The most important characteristics include the direction in which the muscle fibers run, the size, shape, action, numbers of origins, and location of the muscle, and the sites of origin and insertion of the muscle.

IV. PRINCIPLE SKELETAL MUSCLES

A. Figure 11.3 shows general anterior and posterior views of the muscular system.

B. Figures 11.4-11.23 show the principal skeletal muscles in various regions of the body.