

LECTURE 9: SKELETAL MUSCLE

- A. Describe the functions of muscle tissue (movement, maintenance of posture, joint stabilization, heat generation)
- B. Describe the functional characteristics of muscle tissue that distinguish it from other types of tissues (contractility, excitability, extensibility, elasticity)
- B. Briefly relate the structural features of muscle to functional properties

CLASSIFICATION

1) Explain how muscles are classified into several functional types (agonists, antagonists, synergists, and fixators); give specific muscle examples and describe the functions of prime movers (agonists), antagonists, synergists, and fixators

STRUCTURE: MACROSCOPIC ANATOMY

- 2) Name the layers of connective tissue (tendon, epimysium, perimysium, endomysium), that occur in and around a skeletal muscle
- 3) Define *muscle fascicles*

STRUCTURE: MICROSCOPIC ANATOMY

- 4) List 6 general structural characteristics of skeletal muscle fibers: (1) multinucleate, (2) cannot divide after birth, (3) new muscle cells can form from undifferentiated satellite cells, (4) striated, (5) vascularized, (6) innervated
- 5) Explain the sliding filament theory in the simplest form. Myosin heads of thick filaments (myosin) attach to the thin filaments (actin) at both ends of the sarcomere and pull the thin filaments toward the center of the sarcomere by swiveling inward. This ratchet-like cycle is repeated many times during a single contraction. Thick and thin filaments themselves do not shorten. Initiated by release of calcium from the sarcoplasmic reticulum and binding of calcium to thin filaments. The process is powered by ATP.
- 6) Describe the role of titin in the sarcomere. (1) it holds the thick filaments in place in the sarcomere, thereby maintaining the organization of the A band, (2) it unfolds when the muscle is stretched, then refolds when the stretching force is released, thereby contributing to muscle elasticity.
- 7) Describe and explain the structural and organizational levels of skeletal muscle. Begin with the muscle as an organ followed by the fascicle, muscle fiber, myofibril, and sarcomere, then end with the myofilament.
- 8) Define motor unit—a motor neuron and all the muscle fibers it innervates
- 9) Explain some symptoms of myofascial pain syndrome and fibromyalgia.

Optional:

10) Describe the various ways in which muscles attach to their origins and insertions. Explain attachments of muscles to bones through tendons, aponeuroses, and direct and indirect attachments.