BMD 330 and 335: Human Physiology
Chapter 13 Objectives

Muscle Physiology

1. Name the major structural features of a skeletal muscle cell, and describe each feature's roles in muscle contraction.
    a. Describe a sarcomere and identify the A band, I band, H zone, Z line, and M line.
    b. Describe the thick filament. Identify the two binding sites and their functions.
    c. Describe the three components of thin filaments and describe the function of each.
2. Describe the sequence of events that occurs in the crossbridge cycle, and relate this sequence to the sliding-filament model of muscle contraction.
    a. Describe the role of calcium, troponin, and tropomyosin in cross-bridge cycling
    b. Describe the role of ATP in contraction and relaxation
3. Describe the excitation-contraction coupling mechanism for skeletal muscle
4. Explain the time relationship between an action potential in the skeletal muscle membrane and the contraction
5. Describe the anatomical and functional relationship between the sarcolemma, t-tubules, and sarcoplasmic reticulum.
6. Describe the three sources of ATP for skeletal muscle contraction and explain when each is utilized.
7. Identify the various factors that affect the force of muscle contraction.
    a. Describe the relationship between muscle length and strength of contraction
    b. Define summation and tetanus. How are they related to strength of contraction?
    c. Define a motor unit
    d. Define motor recruitment. What effect does recruitment have on strength of contraction? Explain the size principle.
    e. Define isometric and isotonic contractions. Understand the role of each in muscle contraction.
    f. Describe the effect of the load on the velocity of contraction.
8. Name the three types of skeletal muscle fibers, and describe the major differences among them.
9. Explain muscle fatigue and compare it among the three types of fibers.
10. Describe the structure of smooth muscle and compare it to skeletal muscle.
12. Describe the excitation-contraction coupling mechanism for smooth muscle.
    a. Explain pacemaker potentials.
13. Compare single-unit to multi-unit smooth muscle.
14. Describe the extrinsic control of smooth muscle.
15. Describe similarities and differences between cardiac muscle to smooth and to skeletal muscle.