UNIT OBJECTIVES

After completing this unit, you should be able to:

- Name the major differences between the three types of muscles
- Name the major parts of a skeletal muscle fiber and describe the function of each part
- Explain the functions of myosin and actin in the muscle contraction
- Explain how oxygen debt develops and how a muscle may become fatigued
- Explain what is meant when muscles are called prime movers, antagonists, or synergists
- Describe the types of movements that occur at freely movable joints
- Identify and describe the location of the major skeletal muscles of each body region
- Identify muscular diseases, causes and symptoms
- State the meanings of the prefixes, suffixes and root words of this unit

VOCABULARY

actin	endomysium	hypertrophy	myofibrils	oxygen debt	sarcomeres
antagonist	epimysium	insertion	myoglobin	perimysium	sarcoplasm
atrophy	fascia	lactic acid	myosin	prime mover	sarcoplasmic reticulum
cramp	hemoglobin	muscle fatigue	origin	sarcolemma	synergist

I. Muscle Types

A. Smooth--lacks striations

B. Cardiac--forms the wall of the heart; striated; involuntary

C. Skeletal--attaches to skeleton; striated; voluntary

1. composition

a. fascia--thin sheets of fibrous connective tissue that hold muscle fibers together

b. epimysium--fascia that surrounds the entire muscle

c. perimysium--separates muscles into bundles

d. endomysium--fascia that surrounds each muscle fiber

2. fibers--represent a single cell

a. sarcolemma--cell membrane

b. sarcoplasm--the cytoplasm that contains nuclei, mitochondria, and myofibrils

c. sarcoplasmic reticulum--similar to but not identical to E.R.--releases calcium

d. myofibrils--contain two kinds of protein

(1) myosin--thick filaments

(2) actin--thin filaments

3. neuromuscular junction--site where nerve fibers and muscle fibers meet

a. motor neuron--nerve cell that takes the impulse back to

b. Neurotransmitters

Name the three types of muscles and give their major differences regarding:

- striations
- voluntary
- locations
- special parts

Name the three types of fascia and their differences.

What is a muscle cell called?

What are the major organelles found in this cell?

What are the major functions of each organelle?

Name the two myofibrils. How are they different?

What is the importance of the neuromuscular junction?

II. Contraction

A. Mechanism

1. nerve impulse arrives at skeletal fiber

2. impulse conducted over sarcolemma

3. calcium is released from s. reticulum

4. Ca combines with troponin (Troponin prevents myosin from interacting with actin normally.)

5. Therefore, myosin interacts with actin and pulls the filaments toward the center of each sarcomere

6. fibers shorten--muscle shortens

Relaxation is the reverse!

B. Energy Supply--comes from breaking high-energy bonds of ATP

C. Oxygen Supply

1. Aerobic respiration--requires the presence of oxygen

2. Hemoglobin--carries the oxygen to the body cells

3. Myoglobin--found in muscle cells; temporarily, stores oxygen

D. Oxygen Debt

1. During rest or moderate exercise, oxygen supplied to muscle is sufficient

2. During strenuous exercise, an oxygen deficiency may develop and lactic acid may accumulate

3. Debt must be paid back by converting accumulated

Describe how a muscle contracts.

Where does this energy come from specifically?

How do your muscles feel if they run out of oxygen?

Explain the relationship between oxygen debt, lactic acid, muscle fatigue, and a cramp.

How does muscular hypertrophy aid in general muscle tone?

lactic acid to glucose. The elevated rate of respiration follows the period of activity.

E. Muscle Fatigue

1. Definition--muscle loses its ability to contract

2. lactic acid--accumulates

3. cramp--muscle contracts spasmodically but does not relax completely

F. Use and Disuse

1. muscular hypertrophy--exercising muscles until they enlarge

2. atrophy--muscle decreases in size, strength and / or number of fibers

G. Muscle Tone--general state of a muscle

H. All-or-none Response--If a muscle fiber contracts at all, it will contract completely

III. Body Movements

A. Origin and Insertion

1. origin--attached to the immovable or fixed end of a bone

2. insertion--attached to the movable part of the bone

3. some muscle have more than one origin or insertion

B. Interaction of skeletal muscles

1. always function in groups or pairs

2. prime mover--muscle most responsible for the movement

3. synergists--muscles that aid the prime mover

4. antagonists--muscle responsible for the movement opposite of the prime mover