Review Objectives
o Distinguish between anatomy and physiology. Explain the relationship between the form (structure) and function (physiology) of human body parts.

o List and describe the levels of complexity within the human body from the atomic through the organ-system level. What is the lowest level that possesses the characteristics of life?

o Explain what is meant by the term homeostasis. Describe two homeostatic regulatory mechanisms in the human body. Include: stimulus, receptor(s), set point and effectors. What is the internal environment? What is negative feedback? Positive feedback?

New Objectives
1. Explain the following imaging procedures:
   a. Ultrasound
   b. Magnetic resonance imaging (MRI)
   c. Positron emission tomography (PET)
   d. Computerized axial tomography (CAT).

2. What is each type of imaging used for?

NOTE: Use the index as some information may be located in different chapters. You may also want to refer to the Internet (WebMD, PubMed, National Institutes for Health websites, Mayo Clinic) for more information on these imaging techniques.
REVIEW OBJECTIVES

- Describe the anatomical position.

- Distinguish between sagittal, mid-sagittal, frontal (or coronal), and transverse planes. Try to visualize what the above sections would "look like" in different areas of the body (use torso diagrams to help). Practice these with a pencil, a broom, and a tie shoe as specimens.

- Define the following terms and be able to use them to describe the relative location of various parts of the body: superior, inferior, anterior (or ventral), posterior (or dorsal), medial, lateral, proximal, distal, superficial, deep.

- Distinguish between the dorsal and ventral body cavities and name the smaller subdivisions that occur within each. What separates thoracic and abdominal cavities?

- Describe the mediastinum. What structures are located in the mediastinum?

- Describe the following serous membranes and "spaces": parietal pleura, visceral pleura, parietal peritoneum, visceral peritoneum, peritoneal cavity, visceral pericardium, and parietal pericardium, visceral pericardium, pericardial cavity.

- What are the various systems of the human body? What is the overall function of each system?

NEW OBJECTIVES

None
REVIEW OBJECTIVES

- Explain what is meant by pH, and describe the pH scale. Be able to relate hydrogen ion (H+) and hydroxyl ion (OH\(^-\)) concentration to the pH scale.

- Distinguish between organic and inorganic substances.

- What is the difference between and electrolyte and a nonelectrolyte? Briefly, explain the concept of electrolyte balance.

- Distinguish between molecular & structural formulas. Compare the chemical composition of carbohydrates, lipids, and proteins.

- Name the two major types of nucleic acids.

- What is an enzyme? A substrate? Describe how an enzyme is thought to interact with its substrate when it catalyzes a chemical reaction. How does an enzyme affect chemical reaction?

- What is the role of a cofactor or coenzyme? List several examples of cofactors and coenzymes. Explain why humans need vitamins in their diets. What factors are likely to denature enzymes?

- Define energy.

NEW OBJECTIVES

**Atoms, Ions, and Molecules**

3. Define the term isotope.


5. How are radioactive isotopes used to study life processes? What is meant by the term half-life?

6. What radioactive isotope is especially useful in studying the thyroid gland? The heart?

7. What radioisotope is particularly useful in treating cancer? Why are cancer cells more susceptible to ionizing radiation than normal cells?
Energy and Chemical Reactions
8. Define metabolism. Distinguish between anabolic and catabolic metabolism.

9. Name a substance formed by the anabolic metabolism of monosaccharides; of amino acids; of glycerol and fatty acids. What general functions does anabolic metabolism serve?

10. Distinguish between dehydration synthesis and hydrolysis. What end products result from the hydrolysis of fats? Proteins? Complex carbohydrates? Using structural formulas, show the synthesis of a dipeptide via dehydration synthesis

11. Define oxidation. What is an oxidizing agent?

12. Define reduction. What is a reducing agent?

13. Draw a diagram that shows the relationship between oxidation and reduction. Which molecule is oxidized? Which molecule is reduced?

Organic Compounds
14. Name the three major categories of carbohydrates and give examples of each.

15. List several types of lipids. Name the two major portions that make up a fat molecule. Distinguish between saturated and unsaturated fats. How are they related to atherosclerosis?

16. What are the basic building blocks of proteins? What is a peptide bond?

17. Explain how protein molecules may become denatured. Indicate the structural formula of alanine and be able to identify the amino and carboxyl group.

18. Label the following parts of an amino acid: central (alpha) carbon, amine group, carboxyl group, and the variable region. What would be placed in the variable region to make the amino acid alanine?

19. Describe the general roles (functions) played in cells by various types of organic compounds (carbohydrates, lipids, proteins, and nucleic acids).

20. Describe the structure of adenosine triphosphate (ATP). Explain the importance of ATP to cellular processes and relate this to the ATP cycle (including the relationship between ATP and ADP).
REVIEW OBJECTIVES
None

NEW OBJECTIVES

Carbohydrate Metabolism
1. List and describe the three major macromolecules important to energy production.

2. List the 3 basic steps of glucose metabolism. Summarize what is happening in each step.

3. What are the two electron carriers that collect the energy from the breakdown of carbohydrates? Summarize the differences between these electron carriers.

4. List the 5 steps of glycolysis.
   a. What is happening to glucose at each stop of the way?
   b. What is being oxidized? What is being reduced?
   c. How many ATP molecules are produced through glycolysis?

5. Explain what happens to glucose during glycolysis. Explain “key” molecules such as: glucose, fructose-1,6-diphosphate, glyceraldehyde-3-phosphate, pyruvic acid

6. Why does aerobic fermentation occur?
   a. Where does this take place?
   b. What is oxidized and what is reduced during this process?
   c. Be able to draw a reaction that represents this process.

7. Explain what happens to pyruvic acid and NADH + H+ when muscle tissue is subjected to prolonged strenuous exercise (i.e., Lactic Acid Fermentation). Explain how the body deals with lactic acid. What type of cells are involved in the reconversion of lactic acid? Explain the reconversion process.

8. What are the two groups of reactions in aerobic respiration?
   a. Where does each take place?
   b. What are the key reactions (oxidation, phosphorylation, decarboxylation, and reduction) in each group?
   c. Be able to identify the initial substrates, end products, and the amount of energy (ATP) produced.
9. Explain the Citric acid cycle and what happens to the by-products of glucose here.
   a. Explain “key” molecules of the citric acid cycle: acetyl coenzyme A, oxaloacetic acid, citric acid, succinate, carbon dioxide, ATP, flavine adenine dinucleotide (FAD), nicotinamide adenine dinucleotide (NAD). Be sure to pay attention to how the number of carbon molecules changes through each step of the cycle.
   b. Which reactions are oxidation reactions? Reduction reactions?
   c. Strive for an understanding of major relationships and concepts.

10. Describe the electron transport (respiratory) chain including its major function and location.
    a. What are the cytochromes?
    b. How are they involved in electron transport?
    c. What is oxidative phosphorylation and how is it related to the respiratory chain?
    d. Describe the function of NAD and FAD+. Indicate the end products and how they relate to NADH + H+ and FADH+. Include in your discussion the role of the hydrogen pump. Describe the specific role that O₂ plays in cellular respiration.
    e. Explain why cyanide is such a deadly poison.

11. Compare the energy yield of aerobic and anaerobic respiration (in terms of numbers of ATP molecules generated) when a molecule of glucose is completely oxidized. Describe cellular respiration when oxygen is not available.

12. Explain why 36 versus 38 ATP can be produced from one glucose molecule in certain situations in the cell.

13. Describe glycogen metabolism and its relationship to ATP production. Define glycogenesis, glycogenolysis, and gluconeogenesis. Be able to relate these processes your own life and needs for ATP? When would this process occur? Why?

**Lipid and Protein Metabolism**

14. Define lipogenesis. When does this occur? Why?

15. Define lipolysis. How does beta-oxidation lead to the production of ATP.

16. What is ketogenesis? Explain why large amounts of ketone bodies develop when excessive amounts of fats are metabolized in the body. Name at least two of the ketone bodies. Name some conditions whereby excessive amounts of ketone
bodies are produced in the body. How are ketone bodies related to acidosis? What effect does ketoacidosis have on the body?

17. Explain the process of protein catabolism.
   a. What organ is involved in the formation of urea via metabolic changes in amino acids?
   b. What portion of the amino acid molecule is converted to urea in the above named organ.
   c. What role does ammonia play in this process?
18. Explain why some amino acids are described as essential. What is meant by the blood urea nitrogen level and how does this relate to kidney function?

**Miscellaneous**

19. Be able to describe, explain, draw, and/or summarize, and the interrelations between the metabolism of carbohydrates, fats, and proteins.
Chapter 7
Bone Tissue

REVIEW OBJECTIVES
o List and describe the 4 types of bone cells. What are the functions of each type of cell.

o Distinguish between compact and spongy bone. Where are these types of bone found?

o Compare and contrast the functions red and yellow bone marrow.

NEW OBJECTIVES

Tissues and Organs of the Skeletal System
1. List the major functions of the skeletal system.

2. Sketch a long bone such as the femur, and label the following parts:
   - Epiphyses
   - Diaphysis
   - Remnant of epiphyseal disk
   - Medullary cavity
   - Periosteum
   - Articular cartilage
   - Yellow marrow
   - Red marrow
   - Compact bone (cortical bone)
   - Spongy bone (cancellous bone)
   - Endosteum
   - Trabeculae. LAB

3. Describe the functions of the above listed structures. LAB

Histology of Osseous Tissue
4. Describe the chemical composition of bones in terms of organic and inorganic constituents.

5. Explain how heavy metals or other substances may be incorporated into bone tissues, and discuss the effects it may have on such tissues.

6. Be able to describe the microscopic structure (histology) of compact bone:
   - Haversian system (osteon)
   - Haversian (Osteonic)
   - Canal
   - Lamellae
   - Osteocytes
   - Lacunae
   - Canaliculi. LAB

7. Distinguish between red and yellow bone marrow (anatomy and physiology). What is hematopoiesis (Hemopoiesis)? Name the formed elements (blood corpuscles) that are produced by the red marrow. Indicate specific bones in the adult that contain red marrow. LAB
Bone Development
8. In developing bone, be able to identify and discuss the function of calcified cartilage, osteoids (new bone), osteoblasts, blood cells, hyaline cartilage, lacunae, and chondrocytes, pericondrium, and periosteum.

9. Distinguish between intramembranous and endochondral ossification and explain in detail how such bones grow and develop. Distinguish between osteocytes, osteoblasts, and osteoclasts.

10. How can you tell, via x-ray whether or not a bone is still able to gain in length? Explain in detail the function of the five layers of the epiphyseal disk. Which layers of the epiphyseal disk are connected to the epiphyses and diaphysis of a long bone? What effect could damage to the epiphyseal disk have on bone growth? How do bones grow in diameter?

11. Describe the effects of sunlight, nutrition (vitamin A, C, and D, calcium...), hormonal secretions (thyroid hormone, growth hormone, calcitonin, parathyroid hormone, sex hormones...), and exercise on bone development.

Physiology of Osseous Tissue
12. Describe what happens to the body when blood calcium levels drop significantly (hypocalcemia). Discuss the effect of hypoparathyroidism and hyperparathyroidism on the skeleton. What are the Roles of osteoclasts and osteoblasts in the homeostatic regulation of Ca^{++}?

Bone Disorders
13. Explain the pathogenesis of osteoporosis and any related health implications. What are some of the risk factors for this disorder? Make an information matrix to compare and contrast osteoporosis, hyperostosis and Paget’s disease.

14. Explain, summarize and describe the following disorders as they relate to the skeletal system:
   - pituitary dwarfism
   - rickets
   - Osteogenesis imperfecta
   - Paget’s disease (osteitis deformans)
   - giantism
   - osteomalacia
   - osteosarcoma
   - acromegaly
   - achondroplasia
1. Know the terms used to describe skeletal structures (e.g. condyle, fossa, foramen, facet, head, trochanter, spine, crest, etc.). Be able to locate and identify the following bones, structures, and markings:

<table>
<thead>
<tr>
<th>Cranial Bones</th>
<th>Cranial Markings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frontal</td>
<td>frontal sinuses</td>
</tr>
<tr>
<td>Parietal</td>
<td></td>
</tr>
<tr>
<td>Occipital</td>
<td>foramen magnum</td>
</tr>
<tr>
<td></td>
<td>external occipital protuberance</td>
</tr>
<tr>
<td></td>
<td>occipital condyles</td>
</tr>
<tr>
<td>Temporal</td>
<td>mastoid process</td>
</tr>
<tr>
<td></td>
<td>mastoid air cells</td>
</tr>
<tr>
<td></td>
<td>external acoustic meatus</td>
</tr>
<tr>
<td></td>
<td>jugular foramen</td>
</tr>
<tr>
<td></td>
<td>carotid canal</td>
</tr>
<tr>
<td></td>
<td>zygomatic process</td>
</tr>
<tr>
<td>Sphenoid</td>
<td>sella turcica</td>
</tr>
<tr>
<td></td>
<td>pterygoid processes</td>
</tr>
<tr>
<td></td>
<td>sphenoidal sinuses</td>
</tr>
<tr>
<td>Ethmoid</td>
<td>cribriform plate</td>
</tr>
<tr>
<td></td>
<td>Cribiform (olfactory) foramina</td>
</tr>
<tr>
<td></td>
<td>crista galli</td>
</tr>
<tr>
<td></td>
<td>perpendicular plate</td>
</tr>
<tr>
<td></td>
<td>ethmoidal sinuses</td>
</tr>
<tr>
<td></td>
<td>superior conchae</td>
</tr>
<tr>
<td></td>
<td>middle conchae</td>
</tr>
</tbody>
</table>

Facial Bones: Facial Markings:

<table>
<thead>
<tr>
<th>Maxilla</th>
<th>maxillary sinus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Palatine</td>
<td>hard palate</td>
</tr>
<tr>
<td>Zygomatic</td>
<td>zygomatic arch</td>
</tr>
<tr>
<td></td>
<td>temporal process</td>
</tr>
<tr>
<td>Lacrimal</td>
<td>lacrimal fossa</td>
</tr>
<tr>
<td>Nasal</td>
<td></td>
</tr>
<tr>
<td>Vomer (lower portion of nasal septum)</td>
<td></td>
</tr>
</tbody>
</table>

Inferior Nasal conchae

<table>
<thead>
<tr>
<th>Mandible</th>
<th>body</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ramus</td>
</tr>
<tr>
<td></td>
<td>angle</td>
</tr>
<tr>
<td></td>
<td>mental foramen</td>
</tr>
<tr>
<td></td>
<td>condylar process</td>
</tr>
<tr>
<td></td>
<td>temporomandibular joint (tmj)</td>
</tr>
<tr>
<td></td>
<td>coronoid process</td>
</tr>
<tr>
<td></td>
<td>mandibular foramen</td>
</tr>
<tr>
<td></td>
<td>condyles</td>
</tr>
</tbody>
</table>

Other Cranial/Facial Structures:

*Hyoid bone*

Orbits

*Sutural bone(s) / also called wormian bones*

**Sutures:** sagittal coronal
Squamosal lambdoidal

**Fontanel:** anterior posterior
Mastoid sphenoid

Auditory ossicles (3)

**Vertebral Column**

<table>
<thead>
<tr>
<th>Vertebrae</th>
<th>body</th>
<th>pedicles</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lamina</td>
<td>vertebral (neural) arch</td>
</tr>
<tr>
<td></td>
<td>spinous process</td>
<td>transverse process</td>
</tr>
<tr>
<td></td>
<td>vertebral foramen</td>
<td>superior and inferior articulating processes</td>
</tr>
<tr>
<td></td>
<td>intervertebral foramen</td>
<td></td>
</tr>
</tbody>
</table>

Cervical vertebrae number of vertebrae
transverse foramen atlas
axis odontoid process (dens)

*Thoracic vertebrae* number of vertebrae
general characteristics

Lumbar vertebrae number
general characteristics

*Sacrum* sacral foramina (dorsal and pelvic)
sacral canal
sacral promontory
sacroiliac joint

Coccyx (Fusion of how many bones?)

*Curves* primary
secondary
Thoracic Cage
Costal bones (ribs)  
   head  shaft
   Tubercle  true ribs
   false ribs  floating ribs
   costal cartilage  intercostals space
   thoracic inlet  costal margin

Sternum  
   body  manubrium (jugular notches)
   xiphoid process  sternal angle (Angle of Louis)

Pectoral girdle:
Clavicle  sternal end/sternoclavicular joint
   Acromial end/acromioclavicular joint

Scapula  
   spine
   acromion process
   coracoid process
   glenoid cavity
   supraspinous fossa
   infraspinous fossa

Upper limb:
Humerus  
   head  anatomical neck
   greater tubercle  lesser tubercle
   intertubercular sulcus  surgical neck
   medial and lateral epicondyles  deltoid tuberosity
   lateral epicondyles  medial epicondyles
   olecranon fossa  trochlea
   capitulum

Radius  
   radial tuberosity  styloid process
   ulnar notch  head

Ulna  
   trochlear notch  olecranon (process)
   radial notch  styloid process

Carpals  
   trapezium  trapezoid
   capitate  hamate
   scaphoid  lunate
   triquetrum  pisiform

Metacarpals (#1-#5)
Phalanges  
   proximal phalanx (digits 1-5)
   middle phalanx (digits 2-5) (no middle on thumb)
   distal phalanx (digits 2-5)

Pelvic girdle:
Biology 106: Course Objectives
<table>
<thead>
<tr>
<th><strong>Os Coxa</strong></th>
<th><strong>Preliminary</strong></th>
<th><strong>Hemipelvis</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>pubic symphysis</td>
<td>greater pelvis (false pelvis)</td>
<td></td>
</tr>
<tr>
<td>lesser pelvis (true pelvis)</td>
<td>pelvic brim</td>
<td></td>
</tr>
<tr>
<td>pelvic inlet</td>
<td>pelvic outlet</td>
<td></td>
</tr>
<tr>
<td>acetabulum</td>
<td>obturator foramen</td>
<td></td>
</tr>
<tr>
<td>ilium</td>
<td>iliac crest</td>
<td></td>
</tr>
<tr>
<td>anterior superior iliac spine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>posterior superior iliac spine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>anterior inferior iliac spine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>posterior inferior iliac spine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>greater sciatic notch</td>
<td>ischium</td>
<td></td>
</tr>
<tr>
<td>body</td>
<td>ischial spine</td>
<td></td>
</tr>
<tr>
<td>ischial tuberosity</td>
<td>pubis</td>
<td></td>
</tr>
<tr>
<td>pubic arch</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Lower Limb:</strong></th>
<th><strong>Femur</strong></th>
<th><strong>Tibia</strong></th>
<th><strong>Fibula</strong></th>
<th><strong>Tarsals</strong></th>
<th><strong>Metatarsals (#1= thumb → #5)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Neck</strong></td>
<td>fovea capitis</td>
<td>lateral condyle</td>
<td>head</td>
<td>calcaneus</td>
<td>proximal phalanx (digits 1-5)</td>
</tr>
<tr>
<td>lesser trochanter</td>
<td>greater trochanter</td>
<td>medial condyle</td>
<td>lateral malleolus</td>
<td>talus</td>
<td>middle phalanx (digits 2-5) (no middle on great toe)</td>
</tr>
<tr>
<td>lateral epicondyle</td>
<td>linea aspera</td>
<td>medial epicondyle</td>
<td>medial malleolus</td>
<td>navicular</td>
<td>distal phalanx of digits 1-5</td>
</tr>
<tr>
<td>lateral condyle</td>
<td>medial condyle</td>
<td></td>
<td></td>
<td>cuboid</td>
<td></td>
</tr>
<tr>
<td>patellar surface</td>
<td></td>
<td></td>
<td></td>
<td>medial, intermediate, and lateral cuneiform</td>
<td></td>
</tr>
</tbody>
</table>
2. Explain how an infection in the pharynx could eventually lead to mastoiditis. What bones fail to fuse in a cleft palate? What are the functions of the sinuses?

3. List the names of all of the cranial bones and the number of each. List the names of all of the facial bones and the number of each.

4. Explain the importance of the fontanels. Identify the site of the following fontanels: anterior, posterior, sphenoid, and mastoid. When does the anterior fontanel close?

5. Describe and locate the lamina, pedicle, spinous process, transverse process, superior and inferior articulating processes, and the body of a vertebra. What makes up the vertebral (or neural) arch?

6. Explain the differences between cervical, thoracic, and lumbar vertebrae.

7. Describe the structure of an intervertebral disk (including the terminology: annulus fibrosus and nucleus pulposus) and relate it to a condition referred to as a ruptured (herniated) disk. What is a laminectomy? What is sciatica?

8. Distinguish between kyphosis, scoliosis, lordosis, primary and secondary curves.

9. Explain what is meant by the false (greater) pelvis and the true (lesser) pelvis. How can a male and female pelvis be distinguished? What is the pelvic brim and pubic arch?

10. Learn the following clinical terms:
    - laminectomy
    - lumbago
    - luxation
    - orthopedics
    - osteogenesis
    - osteoma
    - osteomyelitis
    - osteonecrosis
    - Colles fracture
    - Roentgenogram
Chapter 9
Joints

REVIEW OBJECTIVES

- Distinguish between immovable joints (synarthroses), slightly movable joints (amphiarthroses), and freely movable joints (diarthroses) in terms of their structure and give examples of each.

- Describe the structure of a freely movable (synovial) joint – include a simple sketch to illustrate major parts.

- Be able to define and give examples of the following types of body movements caused by skeletal muscle contractions: flexion, extension, hyperextension, abduction, adduction, rotation, circumduction, supination, pronation, eversion, inversion, protraction, retraction, elevation, depression, dorsiflexion, plantar flexion.

- List the six types of synovial joints, indicate where they are found in the Skeleton, and describe movements of each.

- What are the menisci, where are they found, and what are their functions? What are bursae, where are they commonly located, and what are their functions?

NEW OBJECTIVES

Joints and Their Classification

1. Identify the specific types of Fibrous and Cartilaginous joints and their location within the body. Know the relationship between the functional classification of joints and the structural classification of joints.

Synovial Joints

2. Identify the common constituents of synovial fluid. Identify pathological changes in synovial fluid that would indicate sepsis? Inflammation?

Anatomy of Selected Diarthroses

3. Describe the major structures of the Knee joint. What structures contribute to the stability of this joint?

4. Describe the major structures of the shoulder joint (including the rotator cuff). What structures contribute to the stability of this joint?

5. Describe the major structures of the hip joint. What structures contribute to the stability of this joint?
6. Distinguish between dislocation, sprain, and strain. What are the common cartilage injuries and why do they persist?


8. Define the following terms:
   - Ankylosis
   - Arthrocentesis
   - Arthropathy
   - Hemarthrosis
   - Arthralgia
   - Arthrogram
   - Arthroscopy
   - Gout (gouty arthritis)
   - Anomaly
   - Arthrology

   *Hemarthrosis*
Chapter 10
The Muscular System

REVIEW OBJECTIVES
• List the general functions of muscle tissue.

• Describe the connective tissue components and relationships in skeletal muscles. Include the following terminology: epimysium, perimysium, endomysium, fasciculi, fascia, tendon, and aponeuroses. Explain in general terms the layers of fascia seen in the body.

NEW OBJECTIVES
None

LAB OBJECTIVES
1. Distinguish between a muscle’s origin and its insertion. Define prime mover, synerist, and antagonist, and give examples of each.

2. Be able to define and give examples of the following types of body movements caused by skeletal muscle contractions: flexion, extension, hyperextension, abduction, adduction, rotation, circumduction, supination, pronation, eversion, inversion, protraction, retraction, elevation, depression, dorsiflexion, plantar flexion.

3. Identify and describe the location (origin and insertion) and actions of the following major skeletal muscles:

<table>
<thead>
<tr>
<th>Muscles of Facial Expression:</th>
<th>Muscles of Mastication:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frontalis</td>
<td>Masseter</td>
</tr>
<tr>
<td>Occipitalis</td>
<td>Temporalis</td>
</tr>
<tr>
<td>Orbicularis oculi</td>
<td>Medial pterygoid</td>
</tr>
<tr>
<td>Orbicularis oris</td>
<td>Lateral pterygoid</td>
</tr>
<tr>
<td>Buccinator</td>
<td></td>
</tr>
<tr>
<td>Zygomaticus major</td>
<td></td>
</tr>
<tr>
<td>Zygomaticus minor</td>
<td></td>
</tr>
<tr>
<td>Platysma</td>
<td></td>
</tr>
<tr>
<td>Muscles Acting on the Head:</td>
<td>Muscles Acting on the Humerus:</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td>Sternocleidomastoid</td>
<td>pectoralis major</td>
</tr>
<tr>
<td>Scalenes</td>
<td>latissimus dorsi</td>
</tr>
<tr>
<td>Trapezius</td>
<td>deltoid</td>
</tr>
<tr>
<td>Splenius capitis</td>
<td>teres major</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Muscles Acting on the Scapula:</th>
<th>Muscles Acting on the Forearm:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pectoralis minor</td>
<td>brachialis</td>
</tr>
<tr>
<td>Serratus anterior</td>
<td>biceps brachii</td>
</tr>
<tr>
<td>Terapezius</td>
<td>triceps brachii</td>
</tr>
<tr>
<td>Levator scapulae</td>
<td>brachioradialis</td>
</tr>
<tr>
<td>Rhomboideus major</td>
<td>pronator teres</td>
</tr>
<tr>
<td>Rhomboideum minor</td>
<td>supinator</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Muscles Acting on the Hand:</th>
<th>Muscles Acting on the Hip and Femur:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extensors</td>
<td>Iliacus</td>
</tr>
<tr>
<td>Flexors</td>
<td>Psoas major</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Muscles Acting on the Foot:</th>
<th>Muscles of the Anterior Abdominal Wall:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fibularis longus</td>
<td>External abdominal oblique</td>
</tr>
<tr>
<td>Extensor digitorum longus</td>
<td>internal abdominal oblique</td>
</tr>
<tr>
<td>Tibialis anterior</td>
<td>transverse abdominal</td>
</tr>
<tr>
<td>Gastrocnemius</td>
<td>rectus abdominis</td>
</tr>
<tr>
<td>Soleus</td>
<td>linea alba (not a muscle)</td>
</tr>
<tr>
<td>Flexor digitorum longus</td>
<td></td>
</tr>
<tr>
<td>Tibialis posterior</td>
<td></td>
</tr>
</tbody>
</table>
Chapter 11
Muscular Tissue

REVIEW OBJECTIVES
- What are the basic characteristics of skeletal muscle cells?
- Describe the microanatomy and physiology of the neuromuscular (myoneural) junction. Include terms such as acetylcholine, cholinesterase, and receptors. Discuss how botulinus toxin, curare, and myasthenia gravis affect the neuromuscular junction.
- Compare and contrast the location, histological appearance, nervous control, contraction characteristics, and functions of skeletal, smooth, and cardiac muscle.

NEW OBJECTIVES

Types and Characteristics of Muscle Tissue
1. List and explain in detail the universal characteristics of muscle tissue.

Microscopic Anatomy of Skeletal Muscle Cell
2. Describe skeletal muscle cells have multiple nuclei per cell? What terms are used to describe the cell membrane and cytoplasm of a muscle fiber (cell)? Describe the purpose of following structures that are found in the cytoplasm:
   - Myofibrils
   - Glycogen
   - Myoglobin
   - Sarcoplasmic reticulum and terminal cisternae
   - T-tubules

3. List the three types of myofilaments found in the sarcoplasm.
   - Describe each myofilament with respect to its function and structure.
   - How does muscular dystrophy relate to dystrophin?
   - Which proteins are regulatory? Which are contractile?

4. Explain why skeletal muscle appears striated. Include the following:
   A Band    I Band    Z Line    H zone

5. Explain the relationships between the sarcoplasmic reticulum and the T tubules. What are the functions of these structures?

6. Describe the molecular components of the thick and thin filaments. Include the following: actin, myosin, troponin, tropomyosin. What is the function of dystrophin? Discuss the cause of Duchenne Muscular Dystrophy.
**The Nerve-Muscle Relationship**

7. Define a motor unit and explain how the number of fibers within a unit affects muscular contractions.

**Behavior of Skeletal Muscle Fibers**

8. What are the 4 phases of muscle contraction?

9. Discuss (in detail) the physiology that occurs within each phase. Be sure to include:
   a. the development of a nerve impulse in a motor neuron;
   b. how an action potential develops and how it relates to a muscle impulse.
   c. the major electrical, molecular, and mechanical events and how they relate to the sliding filament mechanism;
   d. an explanation of how the filaments of a myofibril interact during muscle contraction.

10. Explain the major events that occur during muscle relaxation.

11. Explain rigor mortis?

12. Be able to describe the length-tension relationship and muscle tone as they relate to skeletal muscle.

13. Define muscle tone. Cite one example depicting the importance of muscle tone. What is the neurological basis of muscle tone?

**Behavior of Whole Muscles**

14. Sketch a graph (myogram) representing a single muscular twitch and identify the latent period, period of contraction, and period of relaxation. Relate the parts of a muscle twitch with the physiology of muscle fiber contraction and relaxation.

15. What is threshold? How does it fit into the process of muscle contraction?

16. Be able to draw and describe how changes in the strength of the stimulus can affect the strength of contraction. What is meant by the term recruitment?

17. Be able to draw and describe how changes in the stimulus frequency can affect the strength of contraction. Define the following as they related to frequency of stimulation:
   a. Treppe
   b. Temporal summation and wave summation
   c. incomplete tetanus
   d. complete tetanus

18. Explain the difference between isometric and isotonic contractions.
**Muscle Metabolism**

19. Describe the sources of ATP for muscle contraction during activity of the following durations:
   a. immediate energy: Besides stored ATP, what are the 2 mechanisms that continue to supply ATP
   b. short-term energy
   c. long-term
   d. How do anaerobic and aerobic respiration fit into this?

20. Discuss the factors that can cause muscle fatigue. What is VO2-Max?

21. Describe the concept of oxygen debt and what causes it. What is happening during oxygen debt? Why are athletes less likely experience muscle fatigue than nonathletes?

22. Distinguish between fast twitch and slow twitch muscles.
   a. List differences and give examples of muscles in the body containing these fibers?
   b. Can a muscle contain both fast and slow twitch fibers? Explain your answer.
   c. What function does myoglobin have in muscle physiology?
   d. What is the function of muscle glycogen?

23. What does strength training and aerobic conditioning do the muscle cells? Distinguish between muscular hypertrophy and atrophy and indicate possible causes. What happens to the size of muscle fibers during these conditions?

**Cardiac and Smooth Muscles**

24. Describe the two major types of smooth muscle.

25. How is smooth muscle stimulated? Is this different from cardiac and skeletal muscle? What affect does the NS have on smooth muscle?

26. What are the contraction characteristics of smooth muscle? How does this compare to skeletal muscle with respect to physiology?

27. What is peristalsis?

28. Define the following clinical terms
   - Convulsion
   - electromyography
   - Fibrosis
   - fibrositis
   - Myalgia
   - mycology
   - myoma
   - Myopathy
   - myositis
   - myotomy
   - Paralysis
REVIEW OBJECTIVES

- Distinguish between the central and peripheral nervous systems; the somatic and autonomic nervous systems.
- What are the universal properties of neurons?
- Diagram and label a generalized neuron and describe the functions of major neuronal structures. What are nissl bodies and how do they function? Describe neurofibrils, dendrites, and axons. Why are neurons amitotic?
- Differentiate between the functional differences of neurons and the structural difference of neurons.
- List the six (6) types of neuroglial cells. Describe the functions of each type.
- Describe the microscopic anatomy of a synapse. Make a diagram showing the following:
  - synaptic knob
  - synaptic vesicles
  - neurotransmitter
  - synaptic cleft
  - presynaptic membrane
  - postsynaptic membrane

NEW OBJECTIVES

**Supportive Cells (Neuroglia)**

1. Describe how myelin is formed.
   a. Distinguish between myelinated and unmyelinated nerve fibers.
   b. Specifically, indicate what cells are responsible for the formation of the myelin sheath in the central and peripheral nervous systems.
   c. What is the neurilemma?
   d. What are the Nodes of Ranvier?
   e. How does myelination affect the speed of impulse transmission.

2. How is the myelin affected in diseases such as multiple sclerosis and Tay-Sachs disease?

3. Distinguish between white matter and gray matter in the CNS.

4. Describe how an injured nerve fiber regenerates. Why is regeneration unlikely in the CNS?
**Electrophysiology of Neurons**

5. What is an electrical potential? Define the resting membrane potential. Give an example of a typical resting potential, in millivolts, of a neuron.

6. Discuss the factors which are responsible for the resting membrane potential (RMP) in neurons.

7. What are local potentials? List and explain the 4 characteristics of local potentials.

8. Describe the major events that occur during an action potential and be able to draw a graphical representation of an action potential. Include the use of terms such as depolarization, repolarization, threshold, hyperpolarization, local potential and resting membrane potential.

9. What are the 3 characteristics of action potentials?

10. Define the absolute and relative refractory periods. What role does the refractory period play in action potential generation?

11. Explain how impulse conduction differs in myelinated and unmyelinated nerve fibers. What is saltatory conduction? How does nerve fiber diameter affect velocity of conduction?

12. Explain how a deficiency of calcium affects nerve excitability. How do local anesthetic drugs such as procaine (novocaine) affect impulse conduction in neurons.

**Synapses**

13. Discuss the function and structure of the following neurotransmitters:

   - Acetylcholine
   - Norepinephrine
   - Dopamine
   - Serotonin
   - gamma-aminobutyric acid
   - nitric oxide

14. Describe the action of the drug Prozac and tricyclic antidepressents on neurotransmitters. What is their effect on mood?

15. Describe three different modes of action of synapses and how each works.
   a. Excitatory Cholinergic synapses
   b. Inhibitory GABAergic synapses
   c. Excitatory Adrenergic synapses

**Neural Integration**

17. What is a post-synaptic potential? Distinguish between EPSP and IPSP. Be able to relate these to ion movements, depolarization, and hyperpolarization.

18. How does summation of PSP allow decision making to occur by the brain? What is spacial summation? Temporal summation?

19. Compare and contrast the 4 types of neuronal circuits. What would be the purpose of each type of circuit?

20. Distinguish between short, intermediate, and long-term memory. Identify areas of the brain associated with storage of different types of memory. Distinguish the changes seen in neurons with memory storage.

21. What seems to be the apparent cause of Parkinson’s Disease. How can this disease be treated? What neurotransmitters appear to be deficient in Alzheimer's disease and clinical depression?
1. What type of neuron would have large numbers of cell bodies located in the anterior horn? What type of neuron would have large numbers of cell bodies located in the lateral horn?

2. What is located in the funiculi? What parts of the spinal cord would be found in the lateral horns and why? Describe how poliomyelitis can cause paralysis.

3. Distinguish between ascending and descending tracts of the spinal cord. Indicate the functions of the following ascending tracts:
   a. fasciculus gracilis and faciculus cuneatus (note that these tracts are located in the posterior funiculus)
   b. lateral spinothalamic tract
   c. spinocerebellar tracts.

4. Indicate the function of the corticospinal tracts (pyramidal tracts). What is a cordotomy? Describe flaccid and spastic paralysis. Where do the corticospinal (pyramidal) tracts originate?

5. On an anatomical basis, explain why the motor area of the right cerebral hemisphere controls muscles on the left side of the body and vice versa. (The same principle applies to sensory information.)

6. Describe the effects of spinal cord trauma, its pathogenesis, and treatment. (See page 508)
REVIEW OBJECTIVES

- List and describe the major landmarks of the brain.
  - frontal, parietal, occipital, and temporal lobe
  - cerebral hemispheres
  - central sulcus
  - lateral & longitudinal fissure,
  - corpus callosum
  - gyri (convolutions), sulci
  - cerebral cortex
  - primary motor area, general sensory area, visual area, auditory area,
  - precentral gyrus, and postcentral gyrus.

- Describe the meninges. Name the layers of the meninges. What are the dural sinuses? Explain where cerebrospinal fluid is found in the nervous system. Discuss the epidural space. Describe a subdural hematoma and the consequences to the body.

- Describe the location of the ventricles of the brain. Also, be able to relate to the location of the
  - choroid plexuses,
  - cerebral aqueduct
  - subarachnoid space
  - central canal
  - arachnoid villi,
  - interventricular foramen
  - dural sinuses.

- Explain how cerebrospinal fluid (CSF) is produced and how it functions. Explain the pattern of cerebrospinal fluid circulation, including where it is finally absorbed.

- What can cause hydrocephalus? How can it be treated? Where is a lumbar puncture usually performed? What device is used to measure CSF pressure? Is the presence of RBC’s in cerebrospinal fluid normal?

- What vitamin(s) seems to be associated with neural tube defects? Name two neural tube defects.

- Know the name, number, and function of all 12 pairs of cranial nerves.

NEW OBJECTIVES

Biology 106: Course Objectives
The Hindbrain and Midbrain
1. List the structures that make up the brain stem.

2. List and describe the functions of the vital reflex centers in the medulla oblongata. Also, list certain nonvital reflex centers that are located in the medulla.

3. Describe the major functions of the cerebellum.
   a. Describe the sensory input to the cerebellum.
   b. What are proprioceptors and where are they located?
   c. Describe what may happen to an individual that experiences damage to the Cerebellum.

4. Describe the location and nature of the reticular formation.
   a. What is the function of the reticular formation (reticular activating system)?
   b. What can happen if it is injured?

The Forebrain
5. Describe the location of the diencephalon.
   a. What two major structures make up the diencephalon.
   b. Describe the major functions of the thalamus.
   c. Describe the major functions of the hypothalamus.

6. What general functions are related to the frontal, temporal, parietal, and occipital lobes of the cerebral cortex?

7. Describe the basal ganglia (basal nuclei is a more appropriate name) including functions.
   a. Note that the caudate nucleus, putamen, and globus pallidus are gray matter structures that make up the basal ganglia.
   b. Relate this information to Parkinson's disease.

8. Describe the functions of the limbic system.

Higher Brain Functions
9. What is an Electroencephalogram (EEG)?
   a. Relate brain death to the EEG.
   b. Identify the different brain waves seen on an EEG and what they indicate.

10. Distinguish between slow wave and rapid eye movement (REM) sleep.

11. What is meant by hemisphere dominance? Describe the location and function of Broca’s area.
REVIEW OBJECTIVES
None

NEW OBJECTIVES

General Properties of the Autonomic Nervous System
1. Define visceral reflex. How is this different from a somatic reflex?

2. Draw a diagram that shows how the Motor division of the peripheral nervous system is broken down. What are the branches of the autonomic nervous system?

3. What is autonomic tone? Give some examples.

4. Describe the neural pathways of the autonomic nervous system.
   a. How do autonomic and somatic motor pathways differ?
   b. Distinguish between a preganglionic and postganglionic nerve fiber.

Anatomy of the Autonomic Nervous System
5. For the sympathetic nervous system
   a. What neurotransmitter is released from the preganglionic neuron?
   b. Where do the neurons in the pathway synapse?
   c. What NT is released from the postganglionic neuron?
   d. What are the paravertebral chain ganglia? Collateral ganglia? What is their function?
   e. What nerves give rise to the sympathetic nervous system?
   f. What are the three pathways that preganglionic fibers can take?
   g. What types of effectors does each route act upon?

6. Explain why there is only one sympathetic nerve fiber that innervates the adrenal gland.
   a. What part of the adrenal gland receives this fiber?
   b. What is the effect?

7. For the parasympathetic nervous system
   a. What neurotransmitter is released from the preganglionic neuron?
   b. Where do the neurons in the pathway synapse?
   c. What NT is released from the postganglionic neuron?
   d. What are terminal ganglia? What is their function?
   e. What nerves give rise to the parasympathetic nervous system?
   f. What types of effectors does each route act upon?

8. Define the enteric nervous system. Where is it found? What does it do?
**Autonomic Effects on Target Organs**

9. Define the terms cholinergic and adrenergic as they relate to nerve fibers and the secretion of neurotransmitter.
   a. How long do the effects of each type of fiber last?
   b. How are the different neurotransmitters removed from the synapse?

10. List and explain the role of the different receptors of the ANS.
    a. Where they are found.
    b. Describe the antagonistic effects of these receptors.

11. Explain how the ANS can have both cooperating effects and antagonistic effects on the same target organ.

12. How are target organs without dual innervation controlled?

12. Compare and contrast sympathetic and parasympathetic effects on visceral structures. What receptors are used? What effect does each branch have on the following:
   a. iris of the eye
   b. sweat glands (eccrine/merocrine)
   c. adrenal medulla
   d. heart
   e. Visceral blood vessels
   f. Skeletal muscle blood vessels
   g. Skin blood vessels
   h. Bronchioles
   i. urinary bladder muscle
   j. muscles of the GI tract
   k. digestive glands
   l. liver (blood glucose concentration)
   m. pancreatic enzymes
   n. pancreatic insulin secretion

13. What division prepares the body for “fight or flight”? What division is responsible for “internal housekeeping”?

**Central Control of Autonomic Function**

14. Describe the role that the following play in autonomic function?
   a. Cerebral cortex
   b. Hypothalamus
   c. Midbrain
   d. Pons
   e. Medulla oblongata
Chapter 16
Senses

REVIEW OBJECTIVES
- Distinguish between somatic and special senses.
- Distinguish between chemoreceptors, pain receptors, thermoreceptors, mechano-receptors, and photoreceptors in terms of the environmental change to which each is sensitive. Where are proprioceptors found and what are they sensitive to? Describe the function of baroreceptors (pressoreceptors).
- Explain how a sensation is produced. Explain what is meant by the projection of a sensation?
- What is meant by sensory adaptation and provide an example of this phenomenon.
- Describe the functions of Meissner’s and pacinian corpuscles.
- Describe the nature of pain receptors. Do they adapt readily? What types of stimuli excite pain receptors? Explain how a muscle cramp can elicit pain and why application of heat can sometimes alleviate some of the soreness. What appears to cause the pain associated with angina pectoris?
- What types of stimuli appear to cause pain in visceral organs such as the intestine?
- What is referred pain and provide an example of this phenomenon? Describe a possible mechanism for referred pain.
- Describe the neuropeptides that may block pain transmission. What narcotic drug do these neuropeptides mimic?

NEW OBJECTIVES
None
REVIEW OBJECTIVES

- Compare and contrast the endocrine system with the nervous system.

- For the following endocrine organs, list their location, function, and any special characteristics.
  - Pineal gland
  - Thymus gland
  - Thyroid gland
  - Parathyroid gland
  - Adrenal gland
  - Pancreas
  - Gonads
  - Heart
  - Skin
  - Liver
  - Kidneys
  - Stomach
  - Small intestine
  - Placenta

NEW OBJECTIVES

The Hypothalamus and Pituitary Glands
1. Name the hormones produced by the hypothalamus and pituitary gland.
   a. State the effects of each.
   b. How does growth hormone function?

2. Explain how the secretions from the pituitary gland are controlled. What type of feedback is this?

Other Endocrine Glands
3. For the following endocrine organs, list their location, function, and any special characteristics.

4. Describe the control of cortisol—include the following: hypothalamus, releasing hormones, ACTH, pituitary, adrenal cortex. Indicate some of the serious side effects of excessive amounts of cortisol.

Hormones and Their Actions
5. Identify the chemical classes to which the different hormones belong
   a. Steroid
   b. Peptides
   c. Monamines.

6. Explain the mechanisms by which the different classes of hormones act?
**Stress and Adaptation**

7. Discuss how the body adapts to stress through endocrine and sympathetic nervous system. Describe the stress response and the different stages that are part of this response.

**Endocrine Disorders**

8. Define hyposecretion and hypersecretion.

9. For the following endocrine disorders, list the cause, the effect of the disorder, treatment.
   a. Hypothyroidism and hyperthyroidism
   b. Cretinism
   c. Endemic goiter
   d. Hypoparathyroidism and hyperparathyroidism
   e. Cushing syndrome and Addison’s disease

10. Distinguish between Type I and Type II Diabetes mellitus. Include etiology and pathogenesis. Describe the glucose-tolerance test.

11. Describe the metabolic consequences of insulin deficiency. Discuss effects on carbohydrate, fat, and protein metabolism.

12. Names some ketone bodies. How are ketone bodies related to metabolic acidosis, and why is this so serious? Identify what type of diabetes is involved.

13. Give a possible explanation for the fact that many diabetics have normal insulin levels and yet still have hyperglycemia. What may be the consequences of an excessive injection of insulin? How can insulin shock be treated?

14. How does diabetes insipidus compare to diabetes mellitus?
Chapter 18
The Circulatory System: Blood

REVIEW OBJECTIVES

- What are the general components and properties of blood? Blood plasma?
  - What are the basic functions of blood plasma?
  - Define non-protein nitrogenous substances and name those commonly present in plasma.

- Describe a red blood cell: structure and function.

- Distinguish between granulocytes and agranulocytes.
  - List five types of white blood cells and explain how they differ from one another.
  - Describe the functions of the five types of white blood cells.

- Distinguish between leukocytosis and leukopenia.

- Indicate the origin of blood platelets. What is the function of blood platelets? What is a normal blood platelet count?

NEW OBJECTIVES

Introduction
1. List and describe the functions of the circulatory system.

2. What is a BUN and why may a rise in it suggest a kidney disorder?

3. List three groups of plasma proteins and their basic functions.
   a. Indicate where all of the plasma proteins are produced
   b. How does albumin help to maintain water balance between the blood and the tissues?
   c. Which one of the globulins functions in immunity?
   d. Describe how a decrease in blood protein concentration causes edema.
   e. What are some conditions that can cause a decrease in plasma protein concentration?

4. Define hematocrit and explain how it is determined. What is the buffy coat (layer)?

LAB

Erythrocytes
5. What is hematopoiesis (Hemopoiesis)? Chronologically where does it occur—starting with very early human development (an embryo) and proceeding to birth.
6. What’s the relationship between hemoglobin and the red blood cell?
   a. Describe the structure of a hemoglobin molecule.
   b. How many oxygen molecules can one hemoglobin molecule bind?
   c. Where does oxygen and carbon dioxide bind on the hemoglobin molecule?
   d. Distinguish between oxyhemoglobin and deoxyhemoglobin.
   e. What is hypoxia?
   f. Relate hypoxia to cyanosis.

7. Describe in detail the life cycle of the red blood cell.
   a. What is the average life expectancy of a red blood cell?
   b. What is a normal red blood cell count for a male? Female?
   c. What is a hemocytometer?
   d. What dietary factors affect erythrocyte production?
   e. How does altitude affect erythrocytes?

8. What vitamins are necessary for erythrocyte production?
   a. What role does iron play in erythrocyte production?
   b. Why would drinking vitamin C increase the absorption of iron in the digestive tract and how would this be beneficial to erythrocyte production?

9. Indicate the function of macrophages in the liver and spleen. LAB

10. Explain the principle of a manual red blood cell count, a hematocrit (or packed cell volume), and a white blood cell differential.
   a. List the material used in performing these tests and their importance to the test.
   b. Explain the significance of both normal and abnormal results from these tests. LAB

11. Discuss the process of erythrocyte destruction in the body?
   a. Where is the site(s) for this process?
   b. Indicate the end products of hemoglobin destruction and what ultimately happens to these products.
   c. Describe the different types of jaundice that can occur.
   d. Discuss cause and treatment.

12. What is polycythemia.
   a. List several possible causes for this condition.
   b. How does polycythemia affect the viscosity of the blood?
   c. What is polycythemia vera?
   d. What is secondary polycythemia?
13. Explain the following types of anemia with respect to etiology, defect, and clinical manifestations:
   a. aplastic anemia
   b. hemolytic anemia
   c. iron deficiency anemia
   d. pernicious anemia
   e. sickle cell disease & sickle cell trait
   f. thalassemia
   g. porphyria.

14. Distinguish between Rh positive and Rh negative blood. **LAB**
   a. Under what conditions might a person with Rh negative blood develop anti-Rh antibodies?
   b. Describe erythroblastosis fetalis and explain how this condition may develop.
   c. Explain how erythroblastosis fetalis can be prevented.

**Leukocytes**
15. Describe the form and function of leukocytes (in general).

16. What is the origin of leukocytes?

17. What is a normal white blood cell count? **LAB**

18. What is a differential white blood cell count? Explain the significance of white blood cell counts as aids to diagnosing diseases. **LAB**

19. What is Leukemia? Distinguish between myeloid and lymphoid leukemia. Describe changes that may occur to leukocytes, red blood cells and platelets in myeloid leukemia.

20. What is the etiology and clinical manifestations for the following types of leukemia: chronic and acute lymphocytic, and chronic and acute granulocytic.

21. How do white blood cells reach microorganisms that are outside blood vessels
   a. Which white blood cells are the most active phagocytes?
   b. Describe the inflammatory reaction.
   c. Be able to discuss diapedesis, histamine, pus, and positive chemotaxis.

**Platelets and Hemostasis—The Control of Bleeding**
22. What is meant by hemostasis? Name two hemostatic events that occur before blood coagulates.

23. Describe the basic events that occur during blood coagulation (intrinsic and extrinsic pathways). Construct a diagram and show the interrelationships between fibrin, fibrinogen, prothrombin, thrombin, and prothrombin activator.
24. What are the roles of calcium and vitamin-K in blood coagulation? Where are prothrombin and fibrinogen made?

25. Describe how bile duct obstruction can cause a tendency to bleed. Why are liver diseases often associated with a tendency to bleed?

26. What conditions lead to excessive blood clot formation?

27. What is the function of plasmin (fibrinolysin)?
   a. Describe the clinical significance of clot-busting biochemicals such as tPA (tissue plasminogen activator) and streptokinase.
   b. What is heparin and name two cells that secrete it.

28. Distinguish between different types of hemophilia?

**On Your Own**

29. Define the following terms
   - Plasma
   - serum
   - Thrombus
   - embolus
   - artherosclerosis

30. Become familiar with the following clinical terms related to blood
   - heparinized whole blood
   - leucopenia
   - eosinophilia
   - neutrophilia
   - packed red cells
   - pancytopenia
   - septicemia
Chapter 19
The Circulatory System: The Heart

REVIEW EXERCISES

- Define pulmonary and systemic circuits. **LAB**

- Describe the location of the heart. Where would you listen to hear the apical heartbeat? Distinguish between the visceral pericardium and the parietal pericardium and the fibrous pericardium. Describe the fluid in the pericardial cavity. **LAB**

- Describe the following heart structures: **LAB**
  - atria
  - auricles
  - ventricles
  - A-V valves
  - papillary muscles
  - chordae tendineae
  - interatrial septum
  - interventricular septum

- Identify and describe the location and function of the valves of the heart. **LAB**
  - Trace the path of blood through the heart—include major vessels that are attached to the heart.
  - What is mitral valve prolapse?
  - What is valvular stenosis?
  - Describe how rheumatic fever leads to valve damage.
  - Discuss the clinical manifestations of rheumatic heart disease.

- What are arrhythmias? Distinguish between tachycardia and bradycardia. Discuss the origin of premature (ectopic) heartbeats. Define flutter and fibrillation.

- What part of the conduction system is autorhythmic (self-excitable) and is responsible for the rhythmic contractions of the heart?

NEW OBJECTIVES

**Gross Anatomy Of The Heart**

1. Compare the layers of the cardiac wall. Describe the skeleton of the heart and explain its function.

2. Trace the path of blood through the coronary circulation. Know the following vessels: **LAB**
   - left and right coronary arteries
   - anterior interventricular artery (also called the anterior descending artery)
   - circumflex artery
   - cardiac veins (anterior and great)
   - coronary sinus.
3. What is ischemia? How is it related to myocardial infarction.
   a. What is meant by the term anastomosis and collateral circulation?
   b. Be able to describe angina pectoris including the cause.
   c. Define diaphoresis, dyspnea, and myocardial infarction.

**The Cardiac Conduction System and Cardiac Muscle**
4. Discuss the autonomic innervation of the heart.
   a. Describe the nerves that supply parasympathetic and sympathetic fibers to the heart.
   b. Also, mention the neurotransmitters released by the postganglionic neurons and their effect on the heart.
   c. What are beta-adrenergic receptors and beta blockers?

5. What kind of tissue makes up the cardiac conduction system?
   a. Describe the anatomy of the conduction system.
   b. Describe the pathway of an impulse as it travels through the entire conduction system—note any important aspects that insure that the atria and ventricles contract in an orderly sequence.
   c. Describe what is meant by a functional syncytium.
   d. Identify the syncytia of the heart.
   e. How are they related to the skeleton of the heart and the cardiac conduction system?

6. Review characteristics of a cardiac fiber.
   a. What is the arrangement of myocardial muscle fibers within the ventricular walls?
   b. What are intercellular junctions? Explain tight junctions, desmosomes, gap junctions and cell adhesion molecules (CAMS).
   c. With relation to cardiac fibers contracting as a whole, which intercellular junction will be utilized?

**Electrical and Contractile Activity of the Heart**
7. Define the following terms:
   a. Sinus rhythm
   b. Ectopic focus
   c. Nodal rhythm
   d. Arrhythmia
   e. Heart block

8. Explain the physiology of the pacemaker of the heart (SA Node).
   a. How do the sympathetic and parasympathetic branches affect the functioning of the SA node?
   b. Discuss the significance of the delay of impulse transmission in the AV node.
9. Describe the behavior of the myocardium in response to signals from the SA node.
   a. How does this compare with the physiology of skeletal muscle contraction?
   b. Be able to draw and explain a graph that represents the electrical events with the muscular events.

10. Describe a normal ECG Pattern (also, sketch one) and explain the significance of its various waves: LAB
    a. P wave, QRS complex, and T wave.
    b. Relate the mechanical events (e.g., systole) of the P-R interval.
    c. What may be wrong when the ECG shows a prolonged QRS complex?
    d. What is Bundle Branch Block?

11. Why is ventricular fibrillation much more serious than atrial fibrillation? Indicate several possible causes of fibrillation. Describe the principle behind defibrillation the heart. Discuss arrhythmias associated with the conduction system. Describe the artificial pacemaker.

**Blood Flow, Heart Sounds, and the Cardiac Cycle**

12. Describe the importance of pressure as it relates to the movement of blood.

13. Explain the origin of heart sounds. What is a heart murmur? Regurgitation?

14. Describe the cardiac cycle.
    a. Describe the pressure changes that occur in the atria and ventricles during a cardiac cycle.
    b. Correlate the pressure changes with systole and diastole and the opening and closing of valves.
    c. Study the graph of the cardiac cycle that shows pressure and volume changes in the atria, ventricle, and aorta and correlate these with the electrocardiogram (ECG or EKG) and heart sounds.

15. Explain why the alveoli do not normally fill with fluid. Describe how a failing heart (e.g. left ventricular failure) can cause pulmonary edema. Why is this life threatening?

**Cardiac Output**

16. Define cardiac output? What are the variables affecting cardiac output? How would a heart murmur and regurgitation affect cardiac output?

17. Describe the effects on the heart of abnormal amounts of potassium (e.g. hyperkalemia, hypokalemia) and calcium (hypercalcemia, hypocalcemia). How do changes in body temperature affect heart rate? Why is hypothermia useful in some types of surgery?
18. Describe Starling’s Law of the Heart and show how it enables the heart to respond to varying conditions. How is this law related to the end-diastolic volume (EDV)?

**Insight 19.5**

Chapter 20
The Circulatory System: Blood Vessels

REVIEW OBJECTIVES

o Describe varicose veins and explain why they occur.

o Define blood pressure. Distinguish between systolic and diastolic blood pressures. What causes a pulse?

NEW OBJECTIVES

General Anatomy Of Blood Vessels

1. Name the 3 types of blood vessels. Describe the components of the walls of arteries and veins. What are the similarities and difference between these walls when in arteries and when in veins? LAB

2. Distinguish between an artery and arteriole. What are the arterial sense organs and how do they function?

3. Describe the structure and function of a capillary. Describe the effect of histamine on a capillary.

4. Describe veins. Why are valves so abundant in the veins of the leg?

Blood Pressure, Resistance, and Flow

5. What is pulse pressure? Define mean arterial pressure. What happens to blood pressure as blood moves through the systemic circuit?

6. Define hypertension and explain some possible causes of this condition. What is essential hypertension?

7. What are the 3 variables that affect blood pressure? Describe their effects on BP.

8. What is phlebitis? Thrombophlebitis? Pulmonary embolism? What are aneurysms and indicate some common sites.

9. Define peripheral resistance. Explain how blood viscosity, vessel length and vessel radius can affect peripheral resistance and blood pressure.

10. Name the blood vessels that play the most important role in terms of affecting peripheral resistance and thus blood pressure. Describe the relationship between vasodilation, vasoconstriction, peripheral resistance, and blood pressure.
11. Explain how blood pressure is regulated. Consider the following factors:
   Local control  Neural control  Hormonal control

12. Describe in detail the renin-angiotensin system and show how it regulates or controls blood pressure. How may kidney diseases contribute to high blood pressure?

**Capillary Exchange**

13. Using terms such as hydrostatic pressure, osmotic pressure, and filtration, explain how the following forces are responsible for the exchange of nutrients and metabolic products between the blood and interstitial fluid:
   Diffusion  transcytosis  filtration  reabsorption

14. Since more fluid leaves the capillary than returns to it, how is the remainder returned to the vascular system?

15. Explain the relationship between hydrostatic pressure, colloid osmotic pressure, oncotic pressure, and net filtration pressure.

15. Define edema and identify some possible causes of this condition. Describe how a failing heart (e.g. right ventricular failure) can cause peripheral edema (e.g. edema in the legs). What is ascites?

**Venous Return and Circulatory Shock**

16. Describe the causes of circulatory shock and what homeostatic mechanism bring about recovery.

17. List the factors that promote the flow of venous blood and its return to the heart.
   a. What is central venous pressure?
   b. How is a high central venous pressure related to peripheral edema? Describe cardiac tamponade.
   c. How does the venous circulation help to maintain blood pressure when blood is lost by hemorrhage?

**Special Circulatory Routes**

18. Describe a Cerebrovascular accident (CVA) or stroke and a transient ischemic attach (TIA). Why is treatment critical immediately following a CVA (i.e., within a few hours of the stroke)?
**Insight 20.4**

19. Why is prolonged high blood pressure dangerous? What is a CVA? Describe drugs used to treat hypertension – ACE inhibitors, beta blockers, calcium channel blockers, and diuretics.

**Miscellaneous**

20. Define the following clinical terms

- Aneurysm
- Asystole
- Cardiac tamponade
- Congestive heart failure
- Cor pulmonale
- Embolectomy
- Endarterectomy
- Palpitation
- Phlebotomy
- Coronary angiogram
- Coronary angioplasty
- Restenosis
- Coronary bypass surgery.
- Which vessel is generally used to replace coronary arteries in a bypass surgery?

**Anatomy of the Pulmonary Circuit/Anatomy of the Systemic Arteries**

**ALL ARE LAB OBJECTIVES**

21. Distinguish between the pulmonary and systemic circuits of the cardiovascular system. Trace the path of blood through the pulmonary circuit. Trace the path of blood through the systemic circuit.

22. Identify the following blood vessels by name, location, and area they supply blood to:

**AORTA AND PRINCIPAL BRANCHES:**

- Brachiocephalic a.
- Left common carotid a
- Left subclavian a.
- Thoracic aorta
- Bronchial a.
- Pericardial a.
- Esophageal a.
- Mediastinal a.
- Intercostals a.
- Abdominal aorta
- Celiac a.
- L-gastric a.
- Splenic a.
- Hepatic a.
- Phrenic a.
- Renal a.
- Gonadal a.
- Lumbar a.
- Middle sacral a
- Common iliac a.

Superior mesenteric a.
- Identify branches extending to ascending colon, transverse colon, and the small intestine.

Inferior mesenteric a.
- Identify branches to the descending colon, sigmoid colon, and rectum.
ARTERIES TO THE NECK, HEAD, AND BRAIN:
Vertebral a.
Circle of Willis
External carotid a.
Internal carotid a.

ARTERIES TO THE SHOULDER AND UPPER LIMB:
Axillary a.
Brachial a.
Ulnar a.
Radial a.
Palmar arch (Superficial and Deep)
Digital arteries

ARTERIES TO THE PELVIS AND LOWER LIMB:
Common iliac a.
Internal iliac a.
External iliac a.
Femoral a.
Popliteal a.
Anterior tibial a.
Posterior tibial a.
Peroneal a.
Dorsal pedis a.

VEINS:
Superior vena cava Radial v. Ulnar v.
Anterior and Posterior Intercostal v.
Ascending lumbar v. Hepatic portal v. Hepatic sinusoids
Hepatic v. Lumbar v. Gonadal v.
Renal v. Suprarenal v. phrenic v.
Dorsalis pedis v. Anterior tibial v. Posterior tibial v
Popliteal v. Femoral v.
Great saphenous v.
Chapter 21
Lymphatic and Immune Systems

REVIEW OBJECTIVES

- Describe the general functions of the lymphatic system.

- Describe the following structures found in the lymphatic system:
  - Lymphatic capillaries
  - Lacteals
  - Lymphatic vessels
  - Valves
  - Lymphatic trunks (don’t memorize all of the different trunks)
  - Thoracic duct and right lymphatic duct.
  - Where do the latter two structures empty into the circulatory system?

- Indicate major areas of the body drained by the thoracic duct and right lymphatic duct.

- What are the major functions of lymph nodes?

- Describe the location and development of the thymus.
  - What are the major functions of the thymus?
  - What is the function of the hormone thymosin?

- Describe the location of the spleen. What are the functions of the spleen?

NEW OBJECTIVES

The Lymphatic System

1. Describe the origin of interstitial fluid (tissue fluid) and lymph and explain the function of lymph. Compare the composition of plasma, interstitial fluid, and lymph (especially in regard to proteins and electrolytes (ions)).

2. Describe the forces that are responsible for the movement of lymph. Explain how lymphatic obstruction leads to edema. The axillary lymph nodes are sometimes removed during a mastectomy—what may happen to nearby tissues? Define metastasis.

3. Identify lymph nodes by name and location. **LAB**
   a. Be able to locate and name the following lymph nodes:
      i. cervical nodes
      ii. thoracic cavity nodes
      iii. axillary nodes
      iv. inguinal nodes
      v. pelvic nodes
      vi. abdominal nodes
      vii. supratrochlear nodes.
b. Note that lymph nodes are particularly abundant in the axillary, inguinal, and cervical regions.

4. Explain the anatomy and function of a lymph node.
   a. What cells would you expect to find in a lymph node and why?
   b. Describe lymphangitis.
   c. What is lymphadenitis?
   d. Note that the tonsils and Peyer’s patches in the ileum also contain lymphatic tissue.

5. Distinguish between the ICF (intracellular fluid) and the ECF (extracellular fluid).
   a. List as many examples of ECF (Including types of transcellular fluid) as you can.
   b. What electrolytes are in higher concentration in extracellular fluid? In intracellular fluid?
   c. How does the composition of protein vary in different body fluids—compare ICF, plasma, interstitial fluid, and lymph.

6. What factors control movement of water and electrolytes from one fluid compartment to another?
   a. Define edema.
   b. List several causes of hypoproteinemia.
   c. Explain why edema associated with hypoproteinemia.

7. What characteristic of the inflammatory response causes edema?
   a. How would venous obstructions or a failing heart lead to edema?
   b. Describe how ascites can develop with serious liver disease.
   c. Describe dehydration and water intoxication.
Chapter 22
Respiratory System

REVIEW OBJECTIVES

• Be able to describe the location, structure, and function of the nose and the pharynx. **LAB**

• What is the function of the larynx? **LAB**

• Name and describe the locations and functions of the following cartilages located in the larynx: **LAB**
  - thyroid, cricoid, epiglottis, arytenoid, and corniculate.
  - Distinguish between the false vocal cords (folds) and the true vocal cords (folds).
  - How do the vocal cords function to produce sounds?
  - What is the condition of the glottis during breathing? During swallowing?

• Describe the structure of the trachea and the bronchiole tree. **LAB**
  - Become familiar with the following terms: bronchi, carina, bronchioles, alveolar ducts, and alveoli.
  - How do the right and left bronchi differ in structure?
    - What is a bronchogram?
  - What is a tracheostomy?

• Describe the location and structure of the lungs. **LAB**
  - What are bronchioles?
  - Describe the histological structure of the respiratory membrane.
  - How is this structure adapted to its function?
  - Discuss Type I and Type II alveolar cells, and alveolar macrophages.
  - What is surfactant? Explain its function.
  - Describe respiratory distress syndrome (RDS).

• Distinguish between visceral pleura and parietal pleura.
  a. What is the function of the serous fluid within the pleural cavity?
  b. Where is the pleural cavity?

NEW OBJECTIVES

**Pulmonary Ventilation**

1. Define inspiration and expiration. What is the respiratory cycle?

2. List the muscles that aid in breathing and their mechanism of action. What are the origin and insertions of these muscles?

3. Describe the location and areas that constitute the respiratory center and explain how it functions in the control of breathing. Name the nerves that control the major muscles of respiration.

5. Describe the major events that occur during inspiration.
   a. In describing inspiration, indicate what happens to the intra-alveolar pressure.
   b. How does surface tension aid expansion of the lungs during inspiration?
   c. Name several muscles that are “recruited” during deep or forced inspirations.
   d. What is compliance?

6. Describe the major events that occur during expiration.
   a. Indicate what happens to the intra-alveolar pressure.
   b. Explain how forced expiration is accomplished.

7. How does resistance affect airflow? What are the 3 main factors that effect resistance?

8. Define alveolar ventilation.
   a. What is anatomic dead space?
   b. Physiological dead space?

9. Define tidal volume, inspiratory reserve volume, expiratory reserve volume, residual volume, vital capacity, total lung capacity, and spirometry. Perform a vital capacity in laboratory. Be able to interpret results of this test. **LAB**

10. **Gas Exchange and Transport**
    Define partial pressure.
    a. Describe the composition of air in terms of the gases present and their percentages.
    b. Know how to calculate the partial pressure of these gases.
    c. Explain the relationship between the partial pressure of a gas and its rate of diffusion.
    d. Describe gaseous exchange at the tissue and alveolar level—use examples of partial pressures to illustrate your point.
    e. What is a normal partial pressure of O₂ in the body?

11. What are the 5 factors effecting alveolar gas exchange? Explain them.

12. Explain the role of hemoglobin in oxygen transport.
    a. Include a description of hemoglobin structure.
    b. Distinguish between oxyhemoglobin and deoxyhemoglobin.
    c. Describe and diagram the oxyhemoglobin dissociation curve.

13. Describe three ways in which CO₂ is transported in the blood.
    a. How is it possible for hemoglobin to carry oxygen and carbon dioxide at the same time?
    b. Give an example to illustrate the importance of hemoglobin as a buffer in blood.
14. How is carbon dioxide released from the blood into the lungs?
   e. What triggers the movement?
   f. Distinguish the following from each other: respiratory acidosis, respiratory
      alkalosis, metabolic acidosis, and metabolic alkalosis.

15. What is systemic gas exchange? Chloride shift? How does oxygen unload from
    hemoglobin?

16. How do CO2, pH, and temperature affect the dissociation of oxygen from the
    hemoglobin molecule?

17. How do the following affect the rate of respiration:
    Hydrogen Ions  Carbon Dioxide  Oxygen  Exercise

18. Why is carbon monoxide (CO) so toxic? How is CO poisoning treated?

**Respiratory Disorders**

19. Describe the following respiratory disorders and their effect on breathing:
    Bronchial asthma
    Emphysema
    Sleep apnea
    Chronic obstructive pulmonary diseases

20. Know the following clinical terms related to the respiratory system:
    Apnea  asphyxia  atelectasis  bronchitis
    Dyspnea  Cheyne-Stokes respiration  hypoxemia  hypoxia
    Hypercapnia  hyperventilation  hypoxia
    lobar pneumonia  pleurisy  pneumothorax
    pneumoconiosis sinusitis  tracheotomy.
REVIEW OBJECTIVES

- Name the organs of the urinary system and list their general functions. **LECTURE & LAB**

- Describe the structures both macroscopically and microscopically of the kidney. Name the structures fluid passes through as it travels from the glomerulus to the urethra.

NEW OBJECTIVES

1. Where are the macula densa and juxtaglomerular apparatus located? What are their functions?

2. Distinguish between filtration, reabsorption, and secretion as they relate to urine formation.
   a. Define filtration pressure.
   b. Compare the composition of the glomerular filtrate with that of blood plasma.
   c. How does the diameters of the efferent and afferent arterioles affect the rate of glomerular filtration?
   d. Explain how the hydrostatic pressure of a glomerular capsule affects the rate of glomerular filtration.
   e. Describe how tubular reabsorption is a selective process.
   f. Describe the countercurrent mechanism with respect to sodium ions.

3. Explain renal plasma threshold as it relates to tubular reabsorption.
   a. How does sodium ion reabsorption affect water reabsorption?
   b. How are amino acids and proteins reabsorbed?

4. Describe the effects of ADH on the distal tubules and collecting ducts. What is the origin of ADH?

5. Identify 3 substances secreted from the plasma into the tubular fluid.

6. Identify the major constituents of urine. What factor(s) affect the volume of urine? Perform a routine urinalysis procedure (macroscopic and microscopic urinalysis). Indicate the clinical relevance of finding of the following findings in urine: pH changes, glucose, ketones, urobilinogen, bilirubin, protein, hemoglobin, myoglobin, erythrocytes, leukocytes, epithelial cells, mucus, bacteria, nitrates, crystals, and casts. **LAB**

7. Describe the process of elimination of urine as it relates to the ureters, urinary bladder, urethra, external urethral sphincter.
   a. What role does the parasympathetic nervous system play with respect to the detrusor muscle?
   b. Stretch receptors in the bladder wall?
8. What causes the formation of renal calculi (kidney stones)? How are they treated?

**On Your Own**

9. Define the following terms:

<table>
<thead>
<tr>
<th>Anuria</th>
<th>bacteriuria</th>
<th>cystectomy</th>
<th>cystitis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cystoscopy</td>
<td>cystotomy</td>
<td>diuresis</td>
<td>diuretic</td>
</tr>
<tr>
<td>Dysuria</td>
<td>enuresis</td>
<td>hematuria</td>
<td>incontinence</td>
</tr>
<tr>
<td>Nephrectomy</td>
<td>nephrolithiasis</td>
<td>nephroptosis</td>
<td>oliguria</td>
</tr>
<tr>
<td>Polyuria</td>
<td>pyelolithotomy</td>
<td>pyruia</td>
<td>uremia</td>
</tr>
<tr>
<td>Ureteritis</td>
<td>urethritis</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**REVIEW OBJECTIVES**

- Name and describe the locations and functions of the organs of the digestive system and their major parts. **LAB**

- Describe the structure and function of the wall (4 layers) of the alimentary canal. **LAB**

**NEW OBJECTIVES**

1. Explain how the contents of the alimentary canal are processed and moved.

2. Identify the source and function of the following with respect to the digestive system:
   - salivary amylase
   - pepsin (precursor to pepsinogen)
   - gastric lipase
   - intrinsic factor
   - hydrochloric acid
   - mucus
   - chyme
   - pancreatic lipase
   - trypsin
   - chymotrypsin
   - carboxypeptidase
   - enterokinase
   - nucleases
   - pancreatic amylase

3. Describe the functions of the liver.
   a. What liver function is directly related to digestion?
   b. Describe a hepatic lobule.
   c. Explain how bile originates.
   d. How is secretion of bile regulated?
   e. What is the function of bile salts?
   f. What is acute cholecystitis? Cholelithiasis? Cholecystectomy?

4. Identify the source and function of the following digestive hormones:
   - Gastrin
   - intestinal gastrin
   - somatostatin
   - intestinal somatostatin
   - cholecystokinin
   - secretin.

5. Describe carbohydrate, protein, and fat digestion with reference to:
   a. the initial site digestion begins
   b. enzymes involved
   c. absorption of end products
   d. the pathway to the bloodstream by these end products.

6. Briefly explain the following disorders: diverticulitis, ulcerative colitis, and colon cancer.
NOTE: A review of the anatomy of the reproductive system will be done in the laboratory section of this course. If time permits, the reproductive system will be revisited in lecture also.

REVIEW OBJECTIVES

• Identify the parts of both the male and female reproductive systems (refer to the laboratory manual). LAB

NEW OBJECTIVES

Chapter 27 – Male Reproductive Anatomy
1. Explain the etiology, clinical manifestations, treatment, and prevention of the following types of cancer: testicular and prostate.

Chapter 28 – Reproductive Anatomy
2. Where is the specific location of the mammary glands with respect to breast tissue? What is the structure of this gland? What controls the development of the breast?

3. Explain the etiology, clinical manifestations, treatment, and prevention of the following types of cancer: breast, cervical, uterine, ovarian, testicular, and prostate.

Chapter 28 – Puberty and Menopause
4. Explain the etiology, clinical manifestations, and treatment of menopause to the female. What is the average age of women entering menopause?

5. Identify the most common cause of female infertility. List one other cause and briefly explain this cause. Identify causes of male infertility.
Chapters 27 & 28: On Your Own

6. Define the following terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Term</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abortion</td>
<td>amenorrhea</td>
<td>conization</td>
</tr>
<tr>
<td>Curettage</td>
<td>dysmenorrheal</td>
<td>eclampsia</td>
</tr>
<tr>
<td>Endometritis</td>
<td>epididymitis</td>
<td>gestation</td>
</tr>
<tr>
<td>Hematometra</td>
<td>hydrocele</td>
<td>hysterectomy</td>
</tr>
<tr>
<td>Mastitis</td>
<td>oophorectomy</td>
<td>orchietomy</td>
</tr>
<tr>
<td>Orchitis</td>
<td>prostatectomy</td>
<td>prostatitis</td>
</tr>
<tr>
<td>Salpingectomy</td>
<td>vaginitis</td>
<td>varicocele</td>
</tr>
<tr>
<td>infancy period</td>
<td>childhood</td>
<td>adolescence</td>
</tr>
<tr>
<td>adulthood</td>
<td>senescence</td>
<td>abruptio placentae</td>
</tr>
<tr>
<td>amniocentesis</td>
<td>dizygotic twins</td>
<td>hydatid mole</td>
</tr>
<tr>
<td>lochia</td>
<td>meconium</td>
<td>monozygotic twins</td>
</tr>
<tr>
<td>perinatology</td>
<td>postpartum</td>
<td>intrauterine transfusion</td>
</tr>
</tbody>
</table>