

# The Human Body Systems

## Chapters 17 & 18

### I. **Integumentary System** – The Skin

- a. Main Function: Protection from the external Environment
- b. **Epidermis** – Top layer: cells undergo rapid cell division, entire epidermis replaced every 4 weeks
- c. **Dermis**-
  - i. contains specialized epithelial cells to form hair and nails
  - ii. Contains
    1. **hair follicles**
    2. **sweat glands**
    3. **connective tissue**
    4. **nerve endings**
    5. **blood vessels**
    6. **sebaceous glands**
  - iii. Wrinkles develop here
- d. Skin color from **melanin**
- e. Regulates body temp by sweating

### II. **Skeletal System**

- a. **206** bones in the body
- b. about ½ are in the hands and feet
- c. **Axial Skeleton**: Cranium (skull), vertebrae
- d. **Appendicular skeleton**: arms and legs, pectoral girdle and pelvic girdle
- e. Function
  - i. Support
  - ii. Anchor point for muscles
  - iii. Protective cage for internal organs
- f. **Skull**
  - i. **Frontal Bone, Parietal, Occipital, Temporal, Nasal, Maxilla, Mandible**
- g. Spine
  - i. **7 Cervical: Atlas and Axis**
  - ii. **12 Thoracic**
  - iii. **5 Lumbar**
  - iv. **Sacrum** (fused vertebrae)
  - v. **Coccyx** (4 fused)
  - vi. Cartilaginous disks between vertebrae
- h. Structure of bone
  - i. **Periosteum**- tough covering which supplies blood vessels, nutrients and oxygen to the bone
  - ii. **Shaft**
  - iii. **Compact bone**: dense strong bone
    1. **Haversian Canals**: network of tubes w/ vessels and nerves
    2. **Lamella**: Circular layers
  - iv. **Spongy bone**: porous bone
    1. **Red Marrow**- found in the spongy bone makes red and white blood cells
    2. **Yellow marrow** – contains fat and nerve cells
  - v. **Osteocytes**: cells that manufacture bone cells- embedded in compact and spongy layers. Deposits Calcium to make the bone
- i. Development of Bone

- i. Long bones w/ **Epiphyseal Plates**: Growth Plates
- ii. Babies born mainly w/ Cartilage which is replaced by bone as baby grows
- iii. Cartilage in adults
  - 1. Cushions the body i.e. knee
  - 2. Flexibility i.e. the ribs
  - 3. Support i.e. nose and ears
- iv. **Ligaments** connect bone to bone
- v. **Tendons**: connect muscle to bone
- j. **Joints**: Place where 2 bones come together
  - i. **Immovable** joint: fixed, no movement, interlocking pieces of puzzle: skull
  - ii. **Movable**
    - 1. **Ball and Socket**: Widest range of motion, Circular type movement
      - a. Hip ( femur and pelvis) & Shoulder
    - 2. **Hinge**: back and forth movement: elbow and knee
    - 3. **Pivot**: Allows side-to-side and up-and-down movement: Atlas/Axis
    - 4. **Gliding**: some bending and twisting: wrist and vertebrae

### III. Muscular System

- a. 3 types of muscle
  - i. **Striated Muscle** – Voluntary – skeletal muscle
  - ii. **Smooth Muscle** - Voluntary – muscles surrounding internal organs, arteries and the diaphragm
  - iii. **Cardiac Muscle** - Heart Muscle
- b. **Actin and Myosin** → **Filaments** → **Myofibrils** → **muscle fibers** → **Bundles** → **Muscle**
- c. Nerve impulse causes muscle to contract but no pushing action
- d. Skeletal Muscles usually found in **antagonistic pairs**: when one contracts, the other relaxes
  - i. **Flexor**: (i.e. Biceps) causes limb to flex ( bend)
  - ii. **Extensors** (i.e. Triceps) causes limb to extend ( Straighten)
  - iii. **Origin**: tendon location where muscle starts ( proximal end)
  - iv. **Insertion**: tendon location on adjacent bone (Distal end)

### IV. Digestion

- a. Basic “**tube within a tube**” digestive system
- b. The “tube is made up of specialized organs with different phases of digestion taking place in each one.
- c. Order of movement: **Oral Cavity** (mouth)- **Pharynx** (throat)- **esophagus**- **stomach**- **duodenum**-**small intestine**-**large intestine**- **rectum**- **anus**.
- d. **Accessory Glands** (not actually in the digestive system)- Their secretions pass into digestive system through a duct: Salivary glands- liver- gall bladder- pancreas
- e. **The Mouth and Pharynx**: Mechanical (chewing) and Chemical digestion begins
  - i. 3 pairs of salivary glands secrete saliva to moisten, lubricate and begin breakdown of carbohydrates
  - ii. Chewed up food that is mixed w/ saliva is called bolus
  - iii. Tongue moves bolus to pharynx
  - iv. Automatic swallowing reflex begins and moves bolus to esophagus
- f. **Esophagus**
  - i. Involuntary contractions and relaxation of smooth muscle surrounding esophagus moves food down esophagus: Peristalsis
  - ii. **Cardiac Sphincter**: Ring shaped muscle separating the esophagus from the stomach
- g. **Stomach**
  - i. Mechanical and chemical digestion
    - 1. **Mechanical**: stomach walls squeeze and churned together

2. **Chemical:** stomach lining secrete digestive enzymes and hydrochloric acid
  3. Stomach also secretes **mucus** to protect the stomach
- ii. **Acidic**
  - iii. Continued digestion of carbohydrates and digestion of protein begins
  - iv. Liquids pass through in 20 minutes or less
  - v. Solids broken down into **chyme** and slowly passed out of the **pyloric sphincter**
- h. Small Intestines**
- i. About **20 feet long** and **1-2” in diameter**
  - ii. Most chemical digestion takes place in the small intestine
  - iii. Three parts: **duodenum, jejunum, and the ileum**
  - iv. Several features to increase surface area
    1. Small intestine **very long**
    2. Lining has **many folds**
    3. Lining covered w/ millions of finger-like projections: **villi**
    4. Villi have more tiny projections: **microvilli**
  - v. **Alkaline**
  - vi. **Chyme** mixed w/
    1. **Pancreatic juices:** neutralize stomach acid, digestive enzymes for protein, carbs and fat
    2. **Bile:** made in liver, stored in the gall bladder, emulsifies fats
    3. **Intestinal enzymes:** completes digestion of carbs, protein and fat
  - vii. Carbohydrates, proteins and fats are finished being digested
  - viii. Food nutrients are absorbed into the blood
  - ix. Undigested and unabsorbed food passes from Small Intestines to the Large Intestines
- i. Large Intestines**
- i. About **5 or 6 feet** in length and **3 or 4 inches in diameter**
  - ii. 3 parts: **Ascending, Transverse and Descending**
  - iii. Point where small intestines join the large: small pouch: **Appendix**
  - iv. Appendicitis: infected/ inflamed appendix: pain in lower right side of abdomen
  - v. Main Function:
    1. **Reabsorbtion of water** from the food mass
    2. **Reabsorbtion of vitamins**
    3. **Elimination** of undigested food
  - vi. Undigested food: feces – stored in the **rectum** and out the **anus**