Chapter 15

Cardiovascular, Respiratory, Digestive Systems
Cardiovascular/Respiratory Systems
Cardiovascular System

- Blood is pumped to the body 24/7
- Heart’s tasks:
  - Carries oxygen from lungs to body cells
  - Absorbs nutrients from food and delivers to body cells
  - Carries CO$_2$ from cells to lungs to be exhaled
  - Helps white blood cells fight disease by attacking infectious organisms
- If you laid out your blood vessels, they would stretch over 60,000 miles (circle Earth almost 2 1/2 times)
The Heart

- Heart has 4 chambers:
  - Atria (top chambers)
  - Ventricles (bottom chambers)
  - Septum (wall tissue) separates the 4 chambers
- Electrical impulses stimulate the atria to contract which allows blood into the ventricles
- Muscles of the ventricles contract, pumping blood out of the heart
- Pulmonary circulation: blood that has lost oxygen and picked up carbon dioxide and wastes receives fresh oxygen in the lungs
Blood

- Fluid that delivers oxygen, hormones, and nutrients to the cells and carries away wastes
- Made up of:
  - Plasma—55% of total blood volume
  - Red blood cells—40%
    - Hemoglobin: oxygen-carrying protein
  - White blood cells—protect the body against infection
    - Surround and ingest the disease causing organisms or form antibodies
  - Platelets
    - Cells in the blood that cause blood clots to form
Blood Types

- 4 types:
  - A, AB, B, O
  - Determine type by presence or absence of antigens
  - O contain NO antigens; universal donors
  - A, B, AB contain antigens
Blood Vessels

- 3 types:
  - Arteries (branched vessels)-carry oxygenated blood away from the heart
  - Capillaries-carry blood to small vessels called venules which empty into veins
  - Veins-blood vessels that return blood to the heart
    - Thinner and less elastic than those of arteries
Blood Pressure

- Needed for proper blood circulation
- Measure of the amount of force that the blood places on the walls of blood vessels as it is pumped through the body
- Reading includes 2 #s:
  - Systolic pressure (top #)-max pressure as your heart contracts to push blood into your arteries
  - Diastolic pressure (bottom #)-pressure at its lowest point when your ventricles relax
- Healthy= 120/80
- Unhealthy= 140/90 +
- My last doctor visit: 110/70
Marfan’s Syndrome

- Marfan syndrome is caused by a defect (mutation) in the gene that tells the body how to make fibrillin-1—a protein that is an important part of connective tissue.
- 1 in 5,000 people have it
- Inherited from parents
  - 50/50 chance they can give it to their children
Symptoms

- “finger test”
- Arm span longer than height
- Curvature of the spine
- Long, thin fingers
- Roof of your mouth
- Flat feet
- Crowded teeth
- Overly flexible joints

- Point system used by doctors
  - Out of 22 or 23
  - brother=21
  - Mom=19
Respiratory System

- Breathing is regulated by the brain which sends impulses to stimulate the muscles involved in respiration
- Diaphragm - muscle that separates the chest from the abdominal cavity
  - As you inhale, the diaphragm and muscles between your ribs contract
  - Contraction expands your chest cavity and your lungs
  - Pressure inside your lungs is lower than the pressure outside your body
  - As you exhale, these same muscles relax and your chest cavity decreases
Respiratory System Problems

- Colds/influenza are common infections of the upper respiratory system
- Sinusitis
  - Caused by allergies or an infection
  - Symptoms: nasal congestion, headache, fever
- Bronchitis
  - Membranes that line the bronchi produce excessive amounts of mucus in the airways
- Asthma
  - Inflammatory condition in which the trachea and bronchi become narrowed, causing difficulty breathing
- Pneumonia
  - Inflammation of the lungs caused by a bacterial or viral infection
Time to DRAW! (pg 409)

- Draw/diagram pulmonary circulation
- Label the following:
  - Both lungs
  - Pulmonary artery
  - Aorta
  - Both atriums
  - Both ventricles
  - Pulmonary veins
- On the left or right side of the heart I want you to describe how blood flows through the heart AND circulates (pg 409/410)
Digestive System
Digestive System

- Food that you eat needs to be broken down into smaller nutrients to be absorbed into the blood
- 3 main processes:
  - Digestion
    - Mechanical/chemical breakdown of food within the stomach/intestines
  - Absorption
    - Passage of digested food from the digestive tract into the cardiovascular system
  - Elimination
    - Body’s expulsion of undigested food or body wastes
How Digestion Works

- Mechanical process involves chewing, mashing, and breaking down food
- Chemical process involves secretions produced by digestive organs
- Teeth
  - Break food you eat into smaller pieces
  - Mastication: chewing
- Salivary glands
  - Produce digestive juices
- Tongue
  - Prepares chewed food for swallowing by shaping it
The Stomach

- Expands when you eat
- 3 tasks:
  - Mixing foods with gastric juices
    - Gastric juices are secretions from the stomach lining that contain hydrochloric acid and pepsin (enzyme that digests protein)
  - Storing partially digested food and liquid
    - Stomach holds food for further digestion before moving to the small intestine
  - Moving food into the small intestine
    - As food is digested, it’s converted into chyme—creamy fluid mixture of food and gastric juices
Pancreas, Liver, Gallbladder

- Pancreas produces enzymes that break down the carbs, fats, and proteins in food
- Liver produces bile (digestive juice)—yellow-green bitter fluid that breaks down and absorbs fats
- Stored in the gallbladder
Small and Large Intestines

- Small intestine is 20-23 ft in length
- 3 parts:
  - duodenum
  - jejunum
  - ileum
- About 90% of all nutrients are absorbed through the small intestine
- Undigested parts of food pass into the colon or large intestine
- Large intestine absorbs water, vitamins, and salts
  - Eliminates waste
Functional Problems

• Indigestion
  • Eating too much, too fast, spicy foods

• Constipation
  • Feces becomes hard and dry; not drinking enough water or consuming enough fiber

• Heartburn
  • From acid reflux or backflow of stomach acid in the esophagus

• Gas

• Nausea

• Diarrhea

(what commercial does this sound like??)
Structural Problems

- Peptic ulcers - sore in the lining of the digestive tract
  - Commonly caused by overuse of aspirin
- Gallstones
  - Cholesterol in bile crystallizes
- Appendicitis
  - Inflammation of the appendix
- Cirrhosis
  - Scarring of the liver tissue
  - Caused by heavy alcohol use
Excretory System
Excretory System/Liver

- Responsible for removing wastes from the body
- Wastes come in solids, liquids, and gases
- Liver removes toxins from the blood
- First organ to receive chemicals absorbed from the small intestine
- Liver detoxifies the body by processing and excreting into bile things like drugs and alcohol
Urinary system

- Kidneys, bladder, ureters, urethra
- Filters waste and extra fluid from the blood
- Urine=liquid waste
- Kidneys adjust the amount of salts, water, and other materials excreted according to the body’s needs
- Ureters tighten and relax to force urine down and away from the kidneys and to the bladder
- Urethra is the tube that leads from the bladder to the outside of the body