Digestion

I. Functions
- A. Take in food and water
- B. Break down the food
- C. Absorb nutrients
- D. Elimination of left over.

II. General Characteristics
- A. The alimentary canal is about 9 meters.
- B. Continuous with outside environment
- C. Four Layers of the Wall
  1. 1st layer is the mucosa, which is lined with epithelium attached to connective tissue; it protects inner tissues, secretes and absorbs.
  2. 2nd layer is the submucosa, which is made up of connective tissue with blood and lymph vessels and nerves; it nourishes the surrounding layers of the canal.
  3. 3rd Layer is the muscularis consists of circular and longitudinal smooth muscle that propel food through the canal.
  4. 4Th Layer, or serosa, is composed of visceral peritoneum that protects underlying tissues and secretes serous fluid to it from sticking to other tissues.
- D. Peristalsis - wavelike motion that propels food

III. Digestion
- A. Types
  1. Mechanical – increases surface area
  2. Chemical – break bonds to make smaller molecules
  3. Absorption

- B. Mouth
  1. Cheeks and Lips – keep food in
  2. Tongue – move food, taste
  3. Tonsils – posterior wall, role in immunity
  4. Palate – roof of oral cavity
     a. Hard palate –anterior part with bone
     b. Soft palate – connective tissue and skeletal muscle
        - with uvula, functions to close off the nasal cavity during swallowing.
  5. Teeth begin mechanical digestion by mastication.
     a. The 20 primary teeth are shed in the order they appeared and are replaced by 32 secondary teeth.
     b. Incisors cut, canine hold, molars grind
  6. Salivary Glands
     a. Located near ear, mandible, and tongue
     b. Secrete saliva, moistens and dissolves food
        -. Salivary Amylase – digests starch

-. Lysozyme - antibiotic

C. Pharynx and Esophagus
1. Pharynx – connects mouth to esophagus
2. Esophagus
a. muscular tube connecting the pharynx to stomach
b. Lower esophageal sphincter (cardiac) prevents regurgitation of stomach contents
- If it does not work, heart burn.

D. Stomach
1. Parts
a. Cardiac
b. Fundus
c. Body
d. Rugae – folds
e. Pyloric Region
f. Pyloric Sphinctor – releases food into the small intestine
2. Gastric Glands
a. Open as gastric pits.
b. Gastric glands produce:
i. Mucus - protects the stomach lining.
ii. Pepsin digests protein
iii. Hydrochloric acid – kills bacteria and activates pepsin
iv. Gastrin – stomach hormone to help regulate secretions
3. Chyme
a. mixture in stomach
b. Muscle contractions churn, mix, move

E. Pancreas
1. Endocrine tissues – produce insulin and glucagons which regulate glucose in the blood
2. Exocrine - tissues produce pancreatic juice.
3. Pancreatic Juice
a. Contains enzymes that digest carbohydrates, fats, proteins, and nucleic acids.
b. Bicarbonate neutralizes acid

F. Liver
1. Composed of right and left lobes
2. Secretions from cells are collected in hepatic ducts that lead to the gallbladder.
3. <u>Liver Functions</u>
a. Metabolism of carbohydrates, lipids, and proteins.
b. Sugar from blood is stored in the form of glycogen.

c. Storage and/or conversion of nutrients, Ex. vitamins A, D, B_{12}, iron,

d. Filters the blood, removes damaged red blood cells, foreign substances, and toxins.

Ex. Removes ammonia and converts it to urea

e. Secretes bile

i. emulsifies fats and neutralizes acid

ii. stored in gallbladder, released through bile duct

iii. reabsorbed in ileum

G. Small Intestine

1. Duodenum – first 25 cm
    a. Bile, pancreatic fluid, chyme mix
    b. Enzymes digest
    c. Most digestion and Absorbtion
2. Jejunum – 2.5 m
3. Ileum – 4 m
4. Villi – fingerlike projections increase surface area for absorbing nutrients

H. Large Intestine

1. Absorbs water and electrolytes and forms and stores feces.
2. Parts
    a. cecum
    b. appendix
    c. ascending colon
    d. transverse colon
    e. descending colon
    f. Sigmoid colon
    g. rectum
    h. anal canal
3. Anus is guarded by an involuntary internal anal sphincter and a voluntary external anal sphincter.
4. Bacteria live in colon and make vitamins and release minerals for absorption.
5. Peristaltic waves happen only two or three times during the day.

IV. Nutrition

A. Carbohydrates, such as sugars and starches, are used for energy sources.

1. From grains, meat, fruits and vegetables
2. Break down into monosaccharides
3. Cellulose provides bulk (fiber), helps move food through the intestine.

B. Lipids

1. Supplies energy and builds structures.
2. From animal (saturated) and plant (unsaturated) sources.

3. Break into fatty acids and glycerol

C. Proteins

1. Made of amino acids

2. Functions as enzymes, hormones, antibodies, clotting factors, energy source.

3. From Animal (all 20 a.a.) or plants (missing some)

D. Vitamins

1. Organic compounds required for metabolic processes

2. Classified as fat-soluble (vitamins A, D, E, and K) or water-soluble (B vitamins and vitamin C).

E. Minerals

1. Essential to metabolism.

2. Structural materials in body cells, portions of enzymes; play roles in conduction of nerve impulses, muscle contraction

F. Water