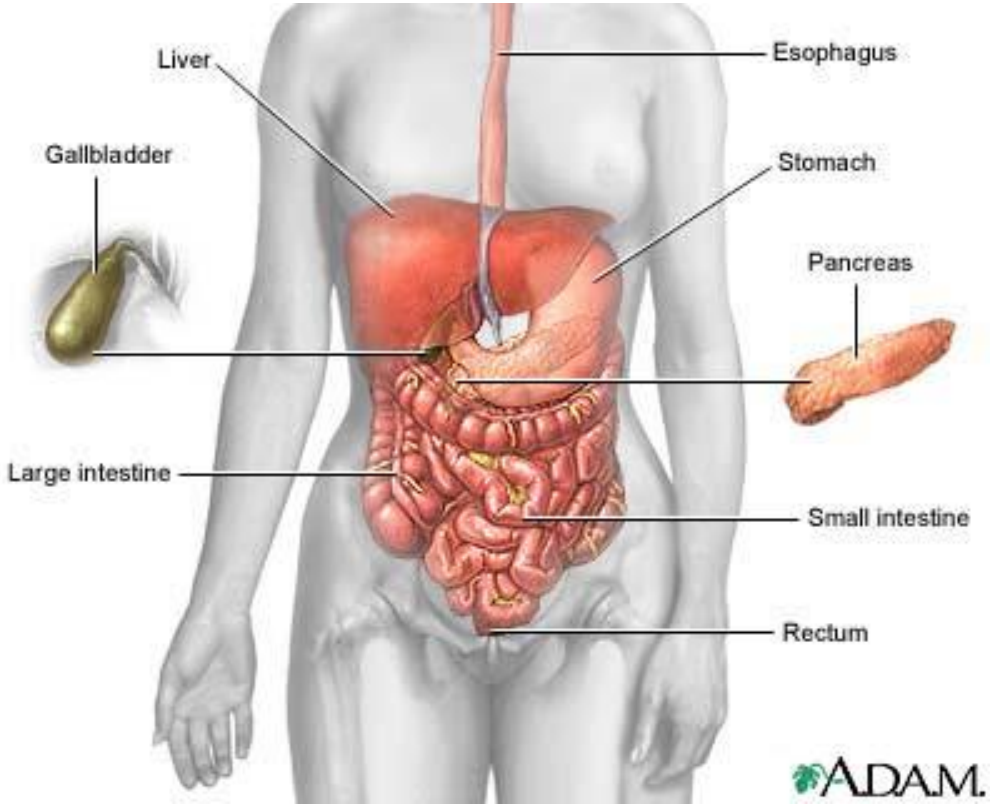
Chapter 15
Food and Digestion

15.1A
Food and Energy



Functions of Nutrients

1. _____
2. _____
3. _____
4. _____

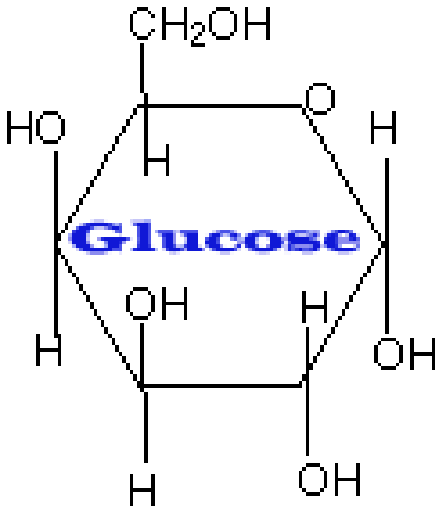
- Calories = amt. of energy in food
- RDA depends on age, gender, size and activity level

Types of Nutrients
(includes carbs, proteins, lipids, water, vitamins & minerals)

- **Carbohydrates**
  - Used for Energy by the _____
  - Made of sugars
  - Energy stored in the chemical bonds of glucose
  - **Cellular respiration** breaks bonds & releases energy

    $C_6H_{12}O_6 + 6O_2 \rightarrow ENERGY + 6CO_2 + 6H_2O$

Types of Carbohydrates



- _____ sugars = $C_6H_{12}O_6$
  - Glucose, fructose, galactose

- _____ sugars = 2 simple sugars joined
  - sucrose (table sugar) is glucose + fructose

Complex Carbohydrates

- _____
- Examples: rice, pasta, potatoes, bread, veggies
- Contain nutrients other than just sugars.

Cellulose = very complex chains of SS

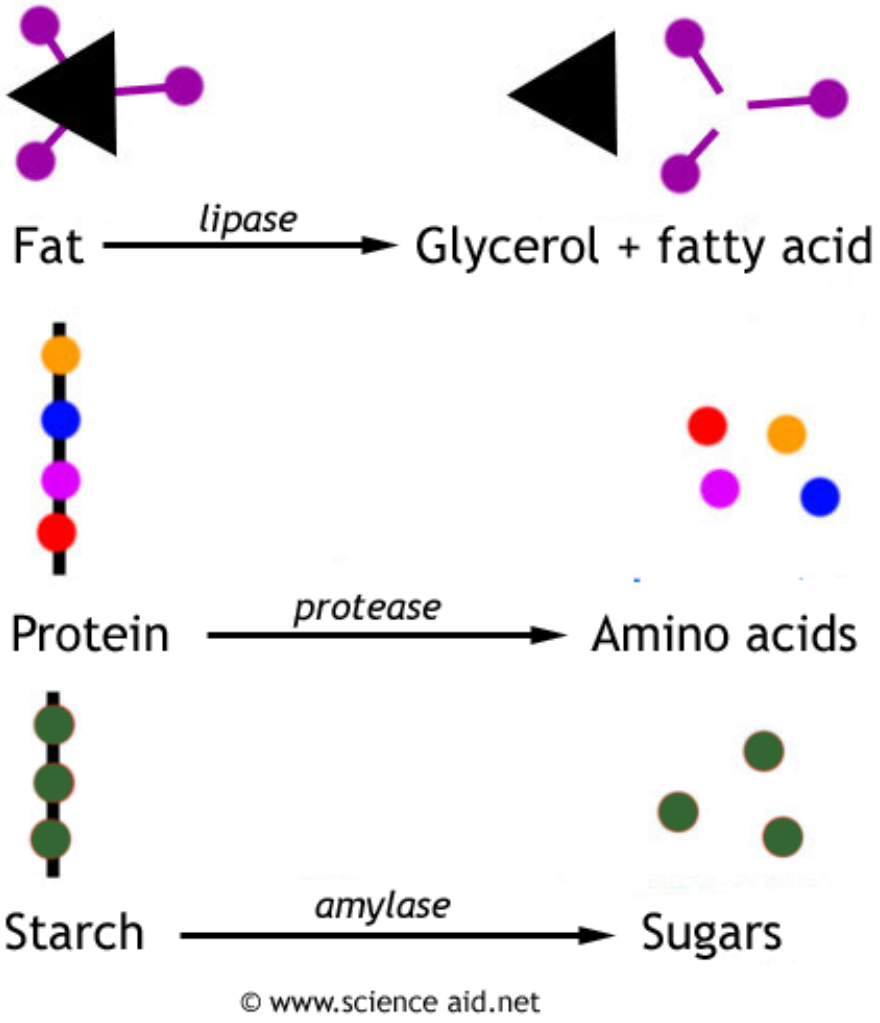
- humans cannot digest
- provides fiber to clean digestive syst., esp. colon

Excess Carbs

1. Stored first as _____in liver and muscles
2. when they are full - _____and stored in adipose tissue

Functions of Proteins

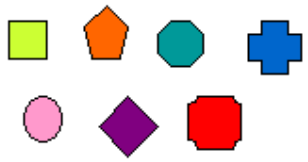
1. _____
2. _____
3. _____
   - Control/ speed up chemical reactions



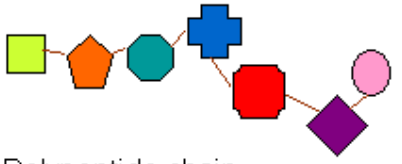
Structure of Proteins

1. Made of chains of _____

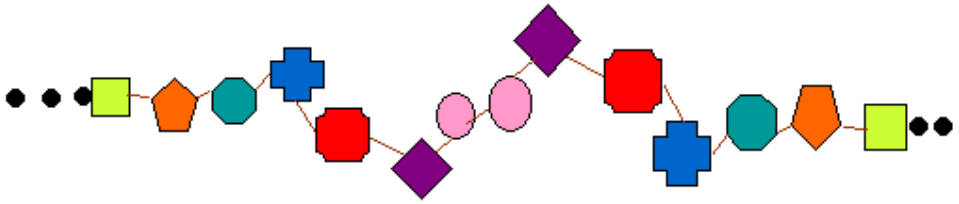
- _____needed
  - 12 can be made by human cells
  - 8 must be ingested = essential AAs
- Body breaks down protein into AAs then reassembles.



Amino acids



Polypeptide chain - a short chain of amino acids



A protein - a long chain of amino acids. The sequence of amino acids will determine the proteins shape & therefore function.

Types of Proteins

- _____Proteins = contain **all 8** essential AAs
  - examples: meats, fish, eggs, and milk
- _____ proteins = **only some** essential AAs
  - beans, peas, nuts, grains

Fats

Provide:

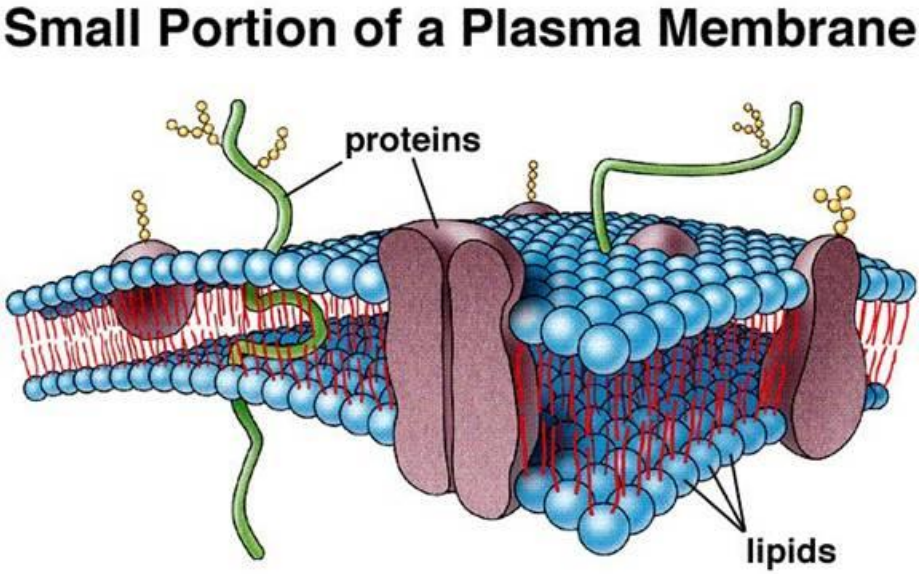
1. _____
2. Insulation
3. Storage:

   _____

   _____

2 Types:

Saturated vs. Unsaturated



Types of Fats

Saturated fats
- animal meats
- cause _____ & _____

Unsaturated fats
- plant oils
- liquid at room temperature

2x as many calories as carbs or proteins

Vitamins

- _____ nutrients needed in small amts.
- types:
  - _____ = dissolve in water; excess washed out
  - _____ = do not dissolve in water; accumulate in fatty tissue; can be toxic
- Balanced diet supplies enough
- _____ = lack of adequate amounts

Minerals

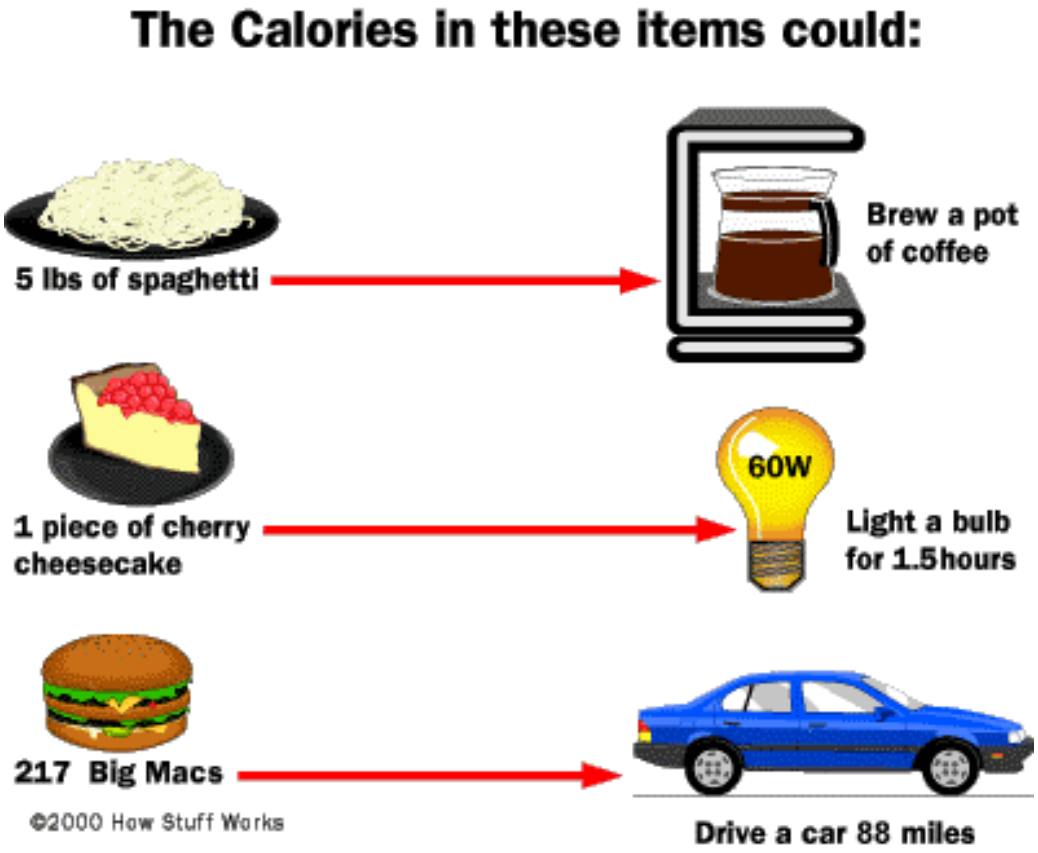
- _____nutrients
- Functions:
  1. build cells - calcium & phosphorus
  2. send nerve impulses - sodium & potassium
  3. carry oxygen - iron

Water

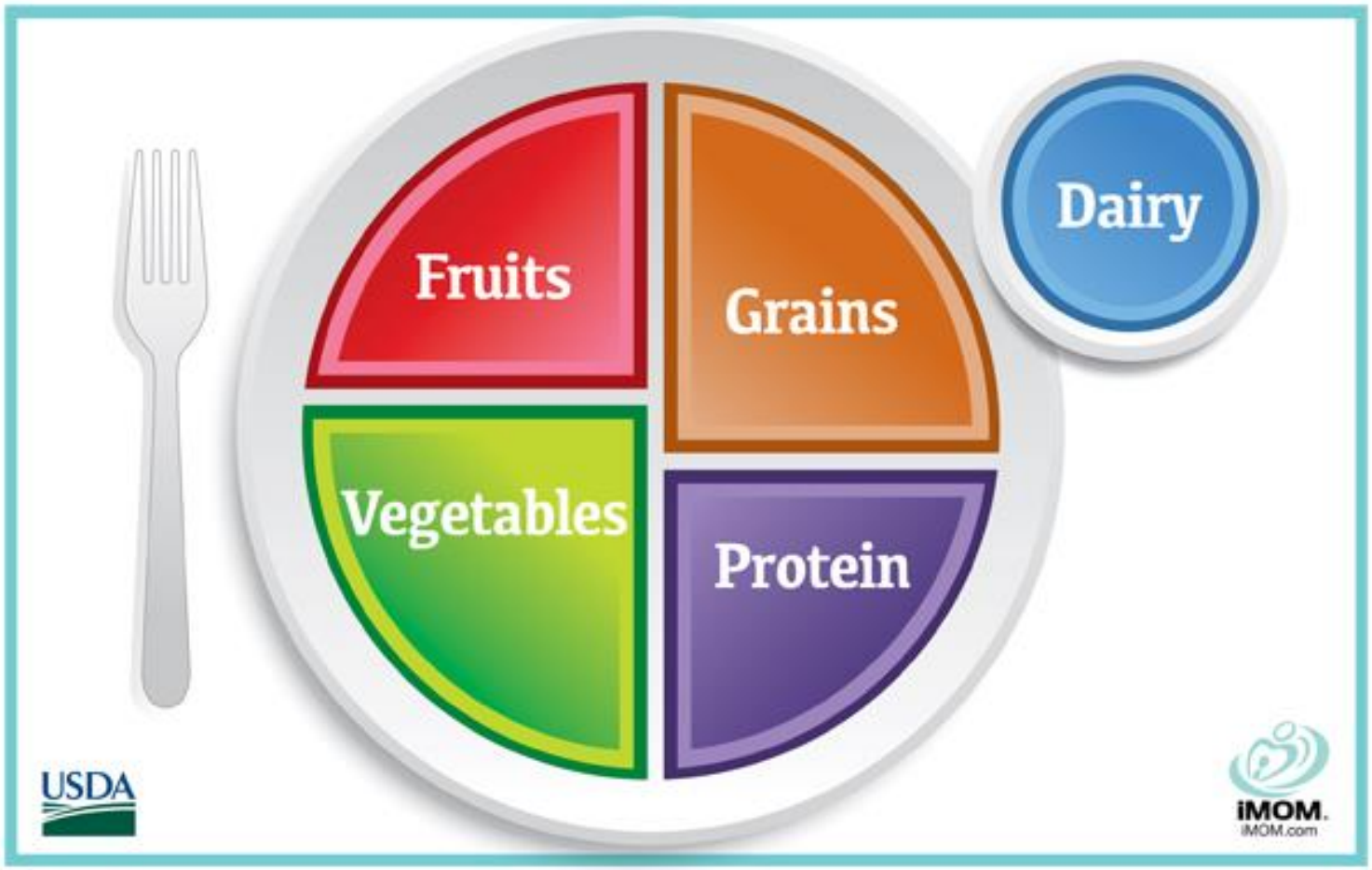
- Body is _____water.
- Functions:
  1. solvent
  2. medium for chem. rxns.
  3. transport
  4. waste removal
  5. cooling

Section 14.1B
Guidelines for a Healthy Diet

1. Calorie needs depend _____
   - 13 year old girls
     - 1600-2200 calories/ day
   - 13 year old boys
     - 1800-2400 calories/ day



Choose My Plate



My Daily Food Plan

GRAINS
6 ounces

Make half your grains whole

Aim for at least
3 ounces
of whole grains a day

VEGETABLES
2 1/2 cups

Vary your veggies

Aim for these amounts **each week:**

Dark green veggies
= 1 1/2 cups

Red & orange veggies
= 5 1/2 cups

Beans & peas
= 1 1/2 cups

Starchy veggies
= 5 cups

Other veggies
= 4 cups

FRUITS
2 cups

Focus on fruits

Eat a variety of fruit

Choose whole or cut-up fruits more often than fruit juice

DAIRY
3 cups

Get your calcium-rich foods

Drink fat-free or low-fat (1%) milk, for the same amount of calcium and other nutrients as whole milk, but less fat and Calories

Select fat-free or low-fat yogurt and cheese, or try calcium-fortified soy products

PROTEIN FOODS
5 1/2 ounces

Go lean with protein

Twice a week, make seafood the protein on your plate

Vary your protein routine—choose beans, peas, nuts, and seeds more often

Keep meat and poultry portions small and lean

Find your balance between food and physical activity

Be physically active for at least **150 minutes** each week.

Know your limits on fats, sugars, and sodium

Your allowance for oils is **6 teaspoons** a day.
Limit Calories from solid fats and added sugars to **260 Calories** a day.
Reduce sodium intake to less than **2300 mg** a day.

Food Labels

- _____= size of a single serving and how many servings in container
- _____= how much energy from one serving
- _____= nutritional content in food for one day
- _____= listed in order of weight, starting with main ingredient

Nutrition Facts

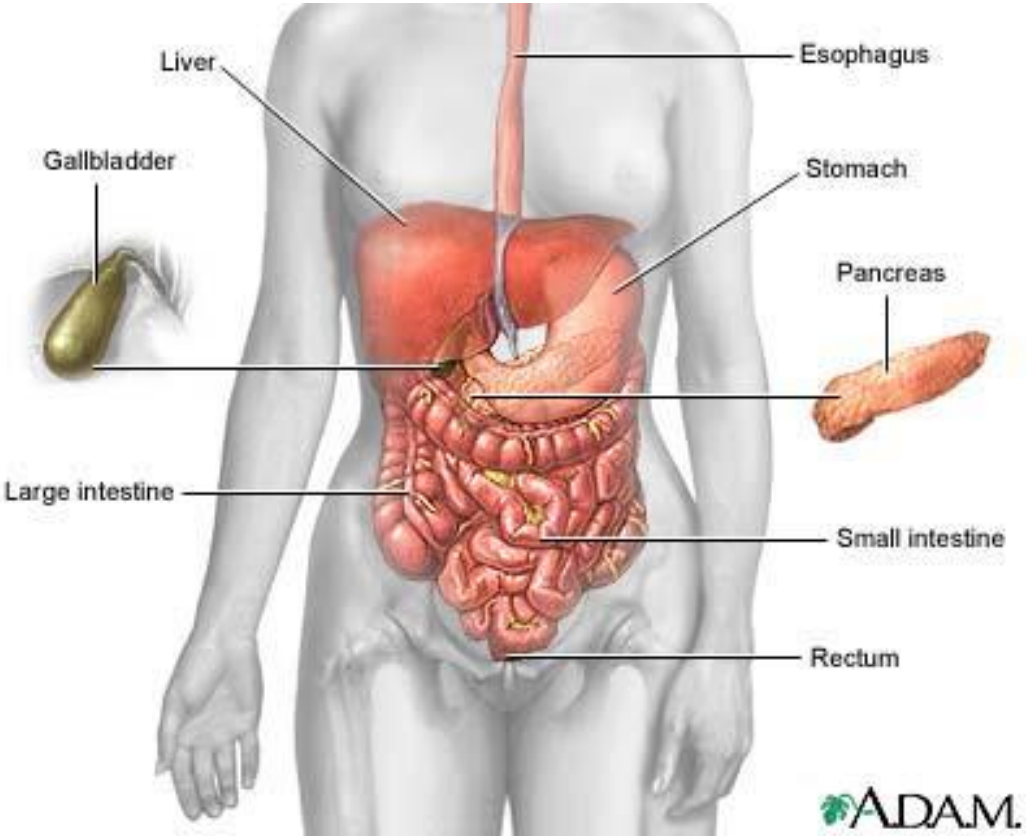
Serv. Size 1 cup (249g)
Servings About 2
Calories 250
Fat Cal. 110
*Percent Daily Values (DV) are based on a 2,000 calorie diet.

Amount/serving	%DV*	Amount/serving	%DV*
Total Fat 12g	18%	**Sodium** 940mg	39%
Sat. Fat 6g	30%	**Total Carb.** 24g	8%
Polyunsat. Fat 1.5g		Dietary Fiber 1g	4%
Monounsat. Fat 2.5g		Sugars 1g	
Cholest. 60mg	20%	**Protein** 10g	20%

Vitamin A 0% • Vitamin C 0% • Calcium 6% • Iron 8%

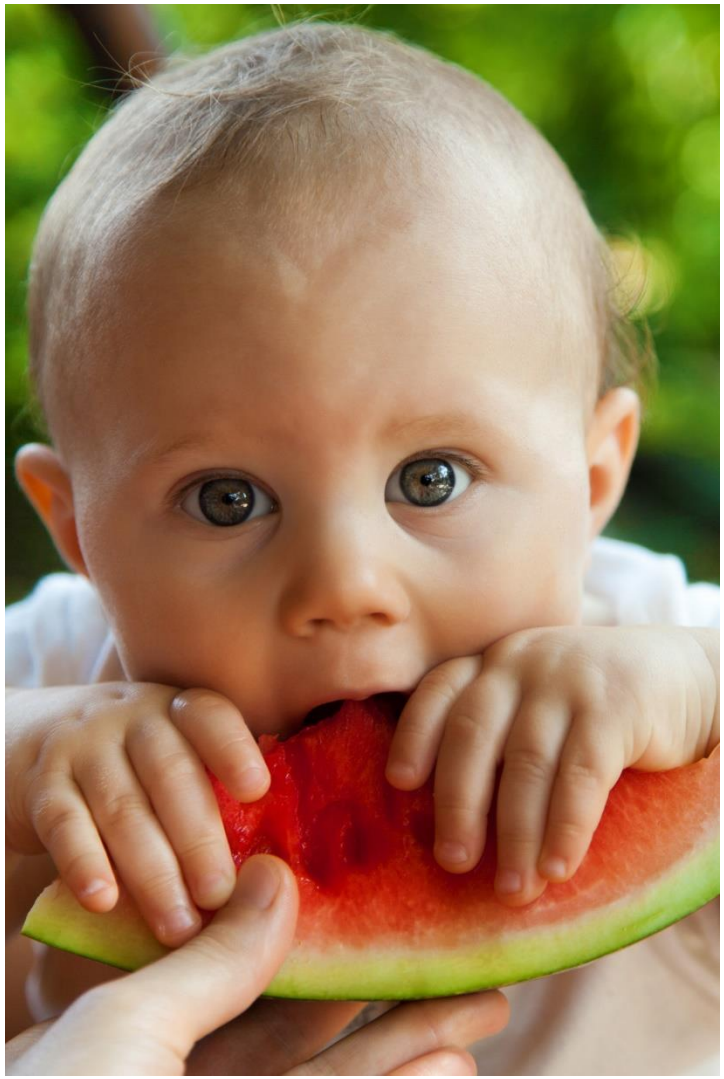
INGREDIENTS: WATER, CHICKEN STOCK, ENRICHED PASTA (SEMOLINA WHEAT FLOUR, EGG WHITE SOLIDS, NIACIN, IRON, THIAMINE MONONITRATE [VITAMIN B1], RIBOFLAVIN [VITAMIN B2] AND FOLIC ACID), CREAM (DERIVED FROM MILK), CHICKEN, CONTAINS LESS THAN 2% OF: CHEESES (GRANULAR, PARMESAN AND ROMANO PASTE [PASTEURIZED COW'S MILK, CULTURES, SALT, ENZYMES], WATER, SALT, LACTIC ACID, CITRIC ACID AND DISODIUM PHOSPHATE), BUTTER (PASTEURIZED SWEET CREAM [DERIVED FROM MILK] AND SALT), MODIFIED CORN STARCH, SALT, WHOLE EGG SOLIDS, SUGAR, DATEM, RICE STARCH, GARLIC, SPICE, XANTHAN GUM, CHEESE FLAVOR (PARTIALLY HYDROGENATED SOYBEAN OIL, FLAVORINGS AND SMOKE FLAVORING), MUSTARD FLOUR, ISOLATED SOY PROTEIN AND SODIUM PHOSPHATE.

15.2—digestion



Physiology: Functions of the Digestive System

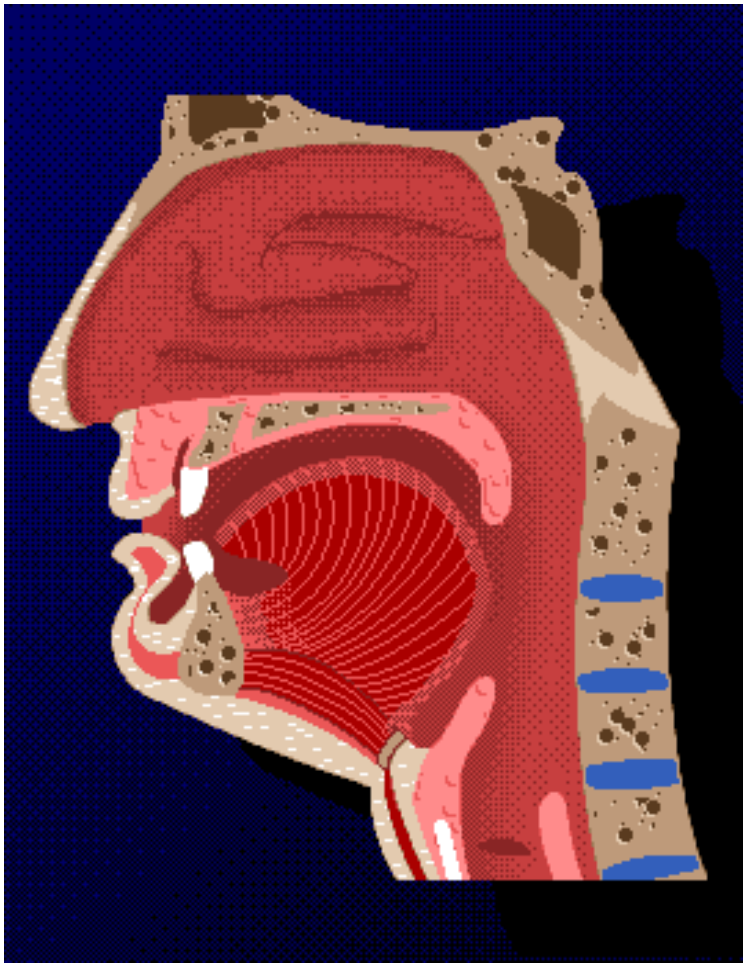
1. _____
   - Breaking down food into nutrients
2. _____
   - Nutrients move into blood
3. _____
   - Waste products leave the body



Anatomy: Structures of the Digestive System

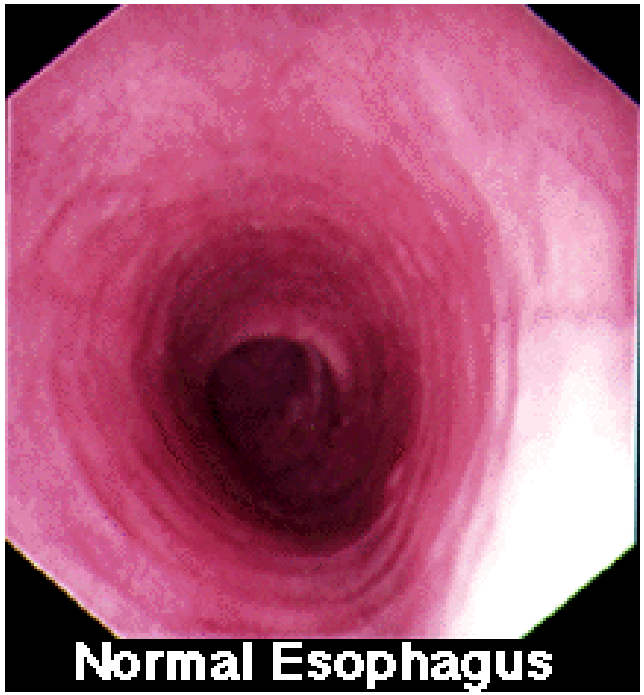
Mouth (teeth, tongue, saliva)

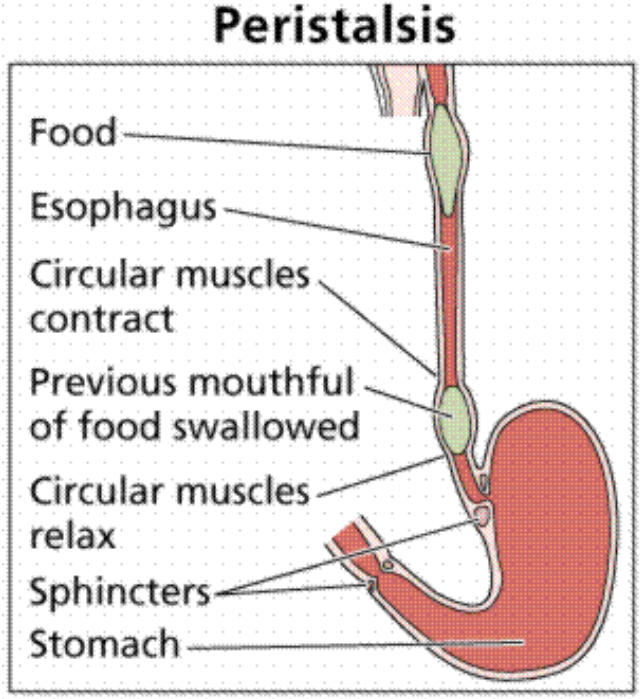
- _____begin here
  - Mechanical = physical change (chewing into smaller pieces)
  - Chemical = molecular bonds are broken (carbs → sugar)
- _____ = proteins that speed up chemical reactions
  - Found in saliva (amylase to break carbs to glucose)



Esophagus

- Muscular, connects mouth to stomach
- Lined with mucus to ease swallowing and movement
- _____= flap that covers windpipe, prevents choking
- _____ = wave-like muscular contractions of smooth muscle to move food through GI tract

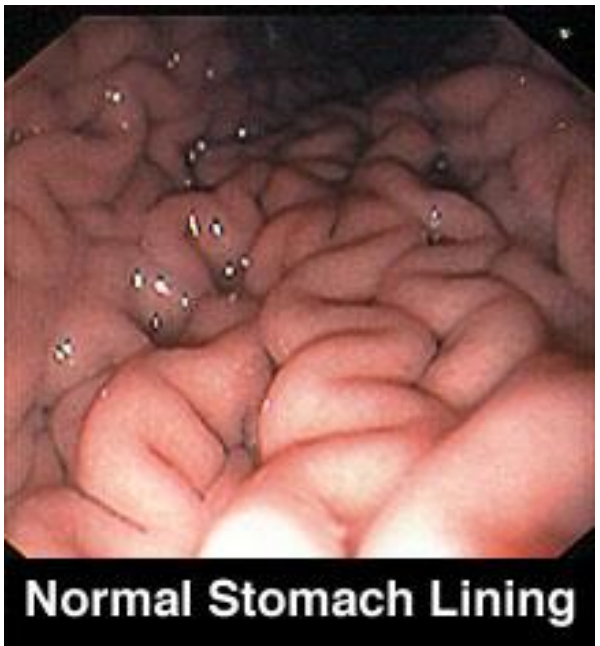




Stomach = j-shaped, muscular pouch

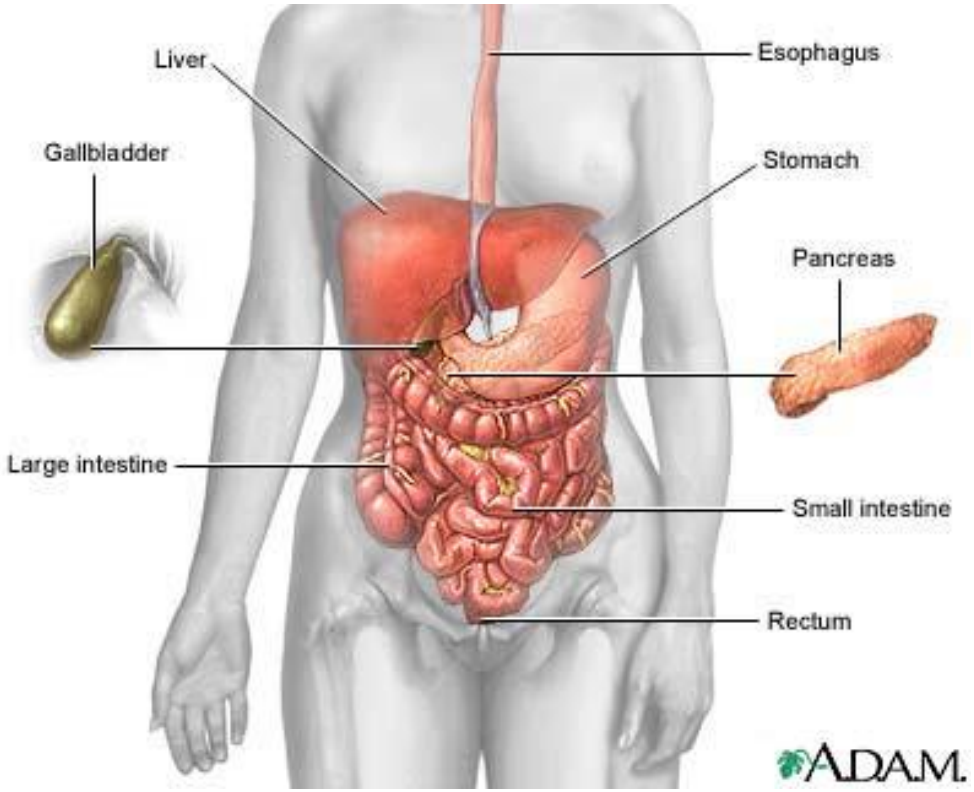
- _____ Digestion
  - food is churned + becomes chyme
- _____Digestion
  - gastric juices containing pepsin breaks down proteins into amino acids
  - Hydrochloric acid kills bacteria
- Mucus lining protects lining from acid

This schematic of the Stomach shows the Esophagus leading into the Stomach which empties into the Small Intestine. The Stomach is in the abdomen with the Esophagus in the chest. The Diaphragm, or breathing muscle, separates the two.



Normal Stomach Lining

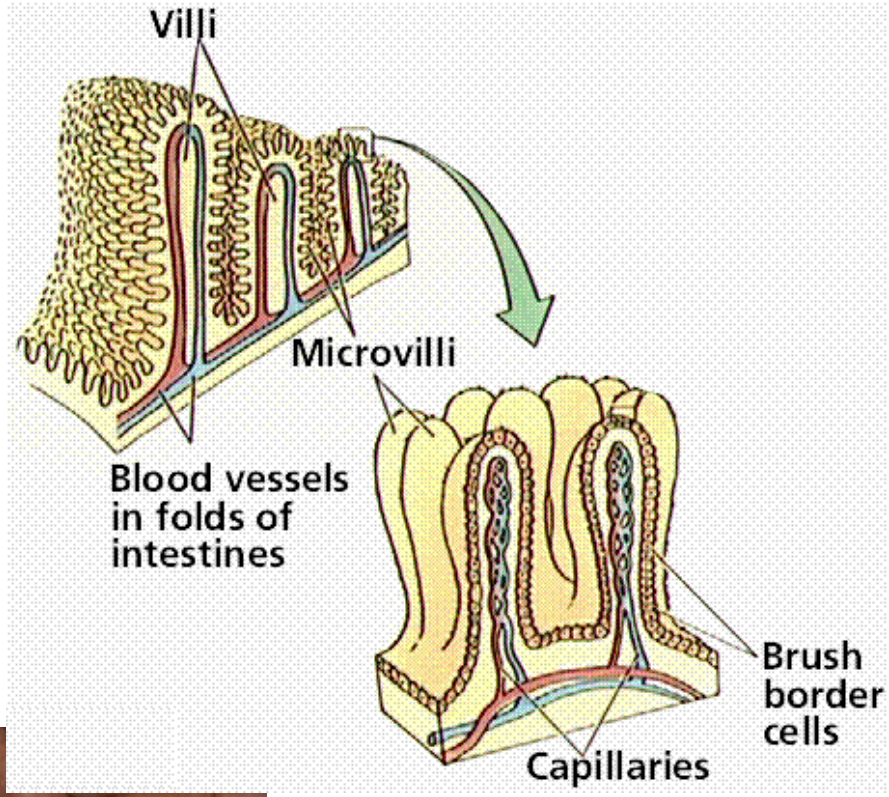
15.3—Final Digestion and Absorption



- Small Intestine
  - _____
  - Villi and microvilli

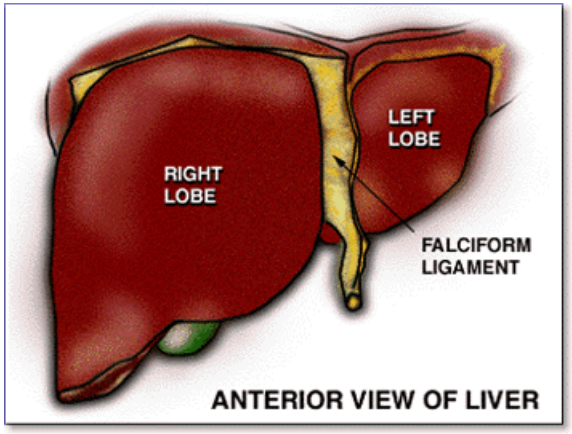
    _____

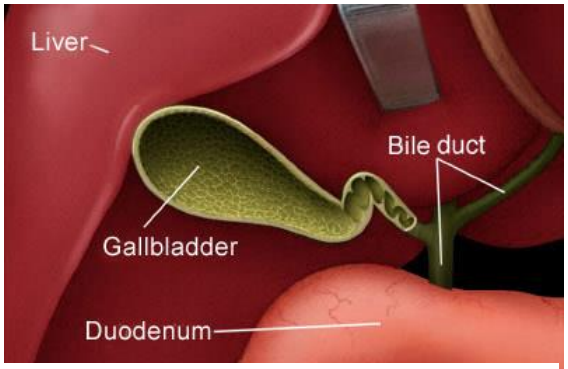
    to absorb nutrients into bloodstream

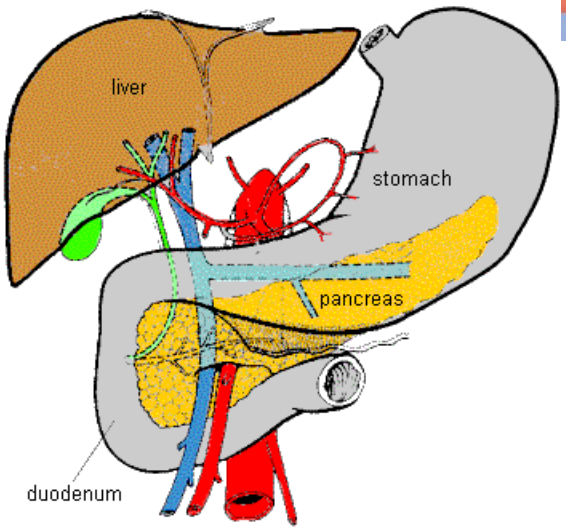


*** Accessory Organs***

1. Liver - _____
   - Breaks down medicines, toxins
   - Produces Bile = breaks down fats
   - Stores excess carbs as glycogen for energy
2. Gall Bladder - small sac
   - stores bile
3. Pancreas = **Triangular organ between upper SI and stomach**
   - Produces enzymes that are secreted into SI that break down starches, proteins, fats
   - Produces – _____





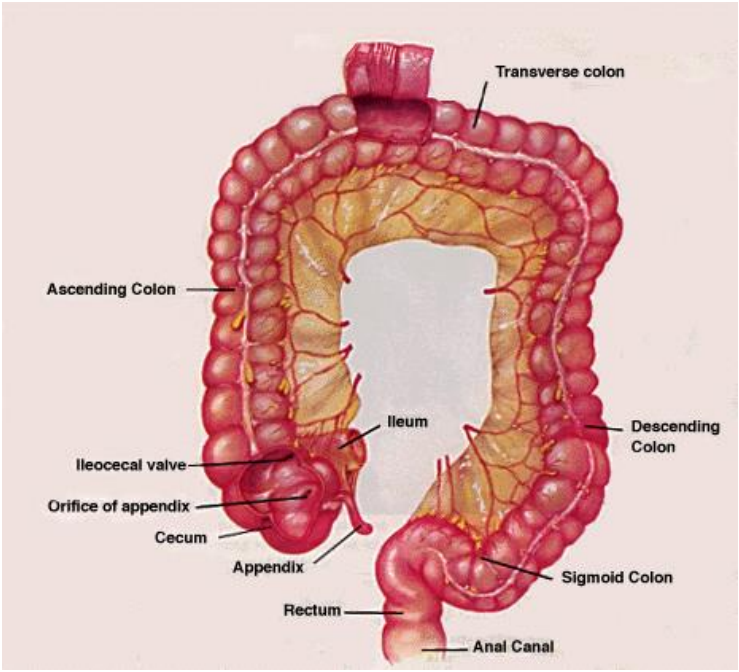


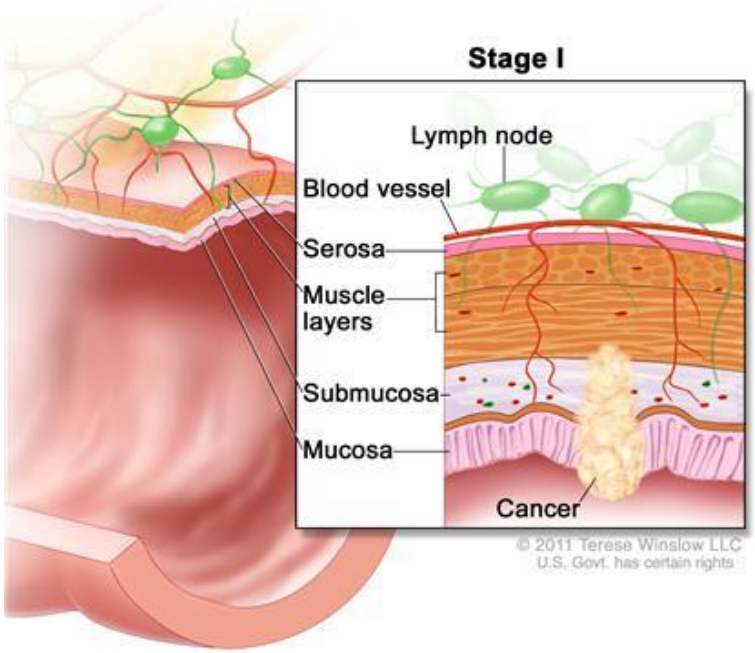
Large Intestine =

_____

- Water is absorbed here
- Contains bacteria that makes Vitamin K (blood clotting)

- Rectum = short tube at the end of LI
  - Waste storage
- Anus = opening
  - Where solid waste is excreted





Digestive System Disruptions

- Ulcer: wearing down of stomach lining
- Heartburn: stomach acid into esophagus