Nutrients and Digestion

Nutrition –

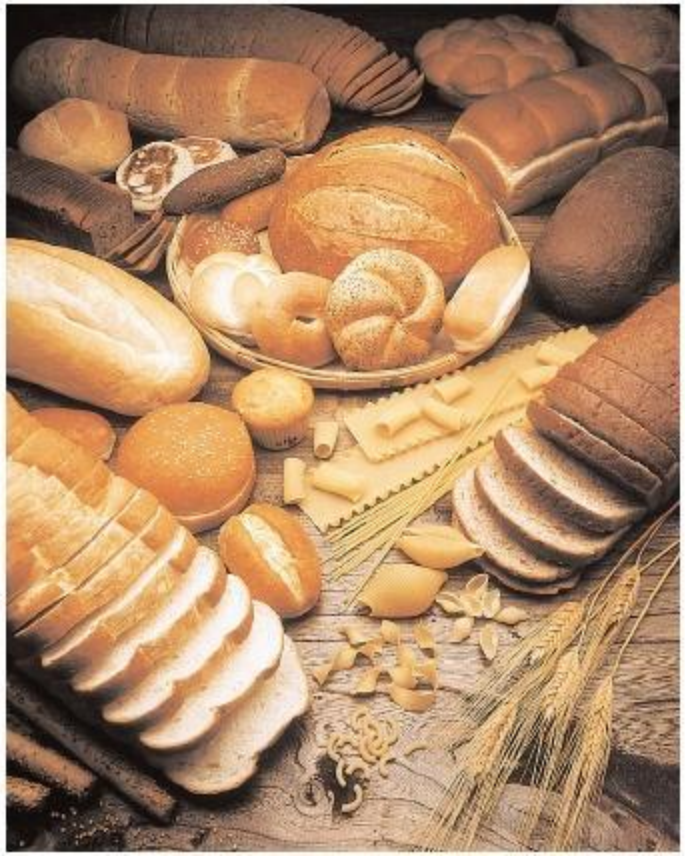
- **what is needed to be taken in to keep the body healthy**

Essential Nutrients

- Carbohydrates
- Fats
- Proteins
- Minerals
- Vitamins
- Water

Carbohydrates

- **Types of sugars combined in different ways (breads, sugars)**
- **Types of Carbohydrates**
- **Sugars are simple carbohydrates**
  - **Monosaccharides and Disaccharides**
- **Starches are more complex carbohydrates like breads and cereals**
- **Cellulose are very complex carbohydrates like leaves and wood**



Proteins

- **Made up of amino acids**
- **Your body can assemble 12**
- **The other eight amino acids we must get from what we eat**

Fats

- **Saturated**
  - **Are solids at room temperature**
  - **Some types cause build ups in the arteries**
- **Unsaturated**
  - **Liquids at room temperature**
- **Made up of:**
  - **Fatty Acid and Glycerol**

Vitamins

- **nutrients needed in small quantities to help your body use other nutrients**

Minerals

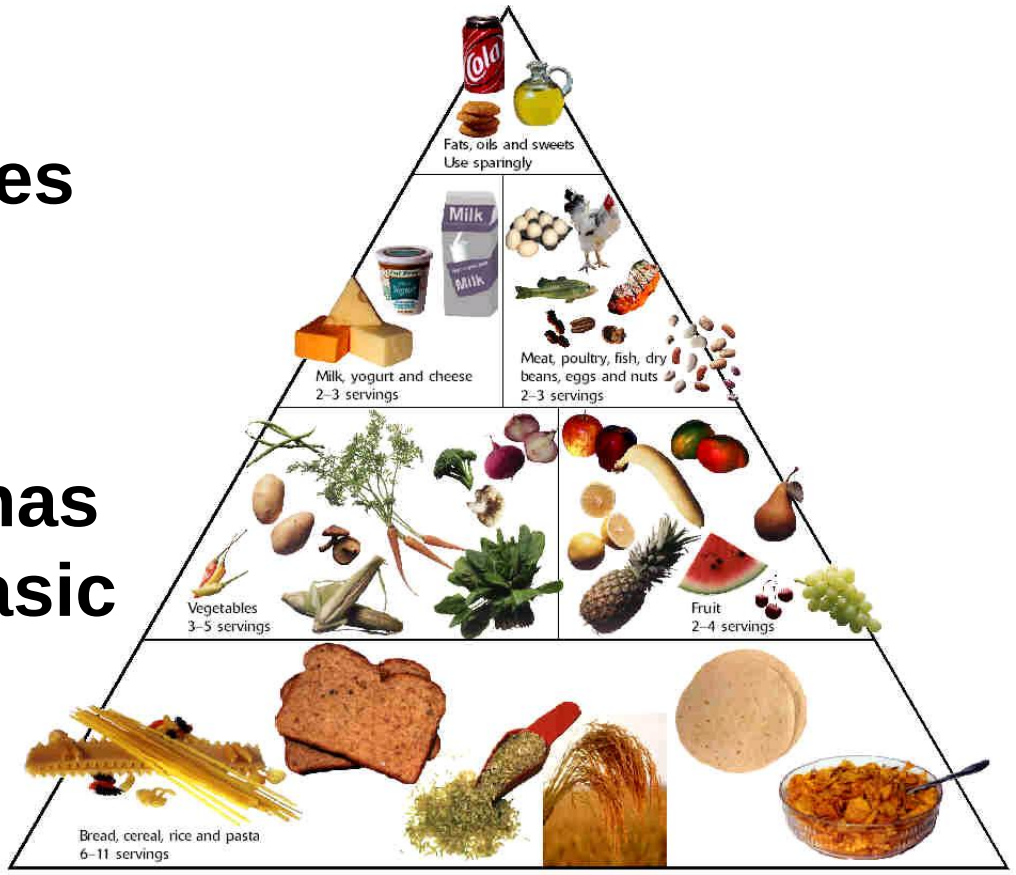
- **Inorganic nutrients that regulate many chemical reactions in your body**

Water

- **makes up more than 60 % of your body by weight**

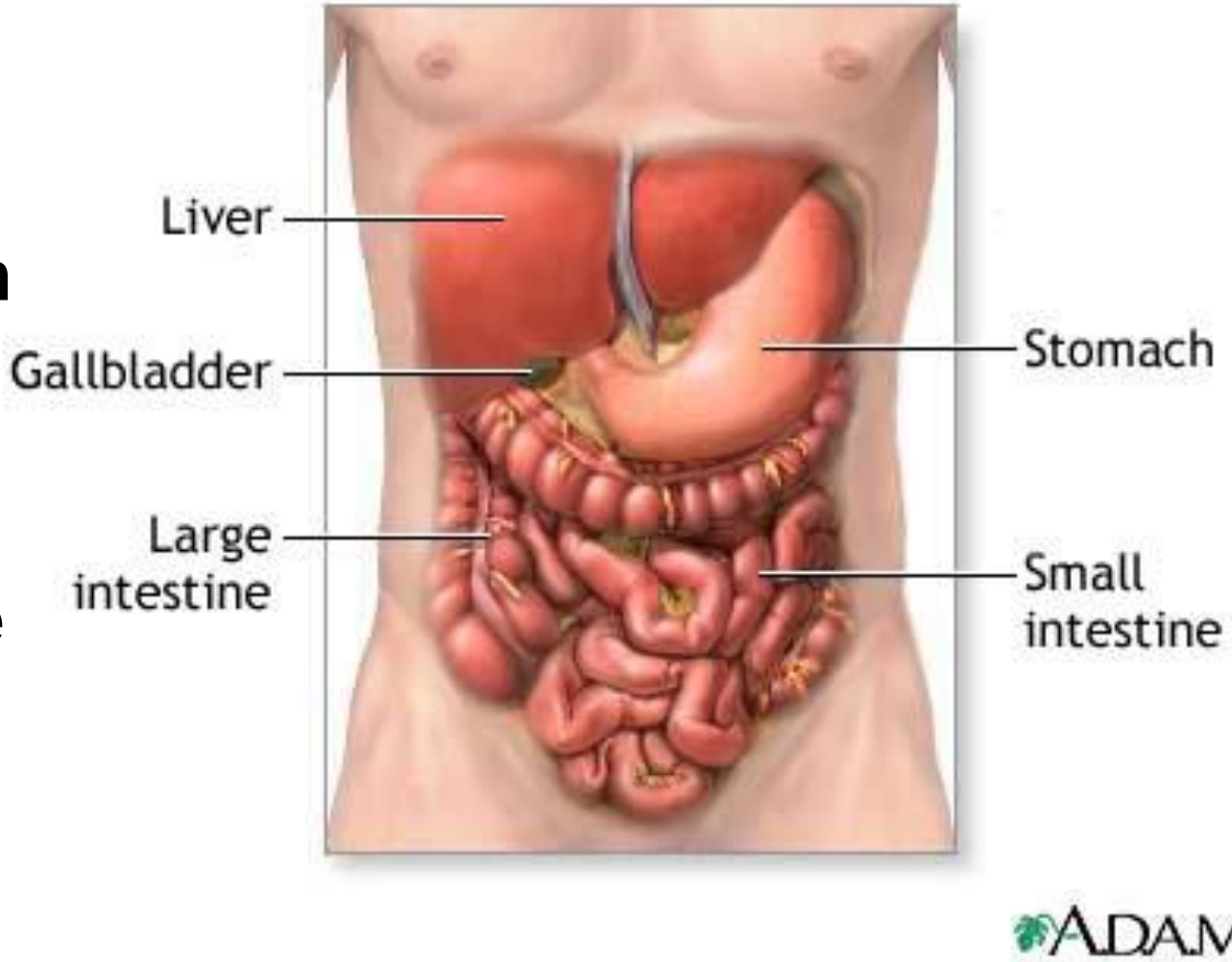
Food groups – eating some of each of these helps you get all your essential nutrients

- **Breads and Cereals**
- **Fruits and Vegetables**
- **Meat and poultry**
- **Dairy**
- **The Food Pyramid has replaced the four basic food groups**



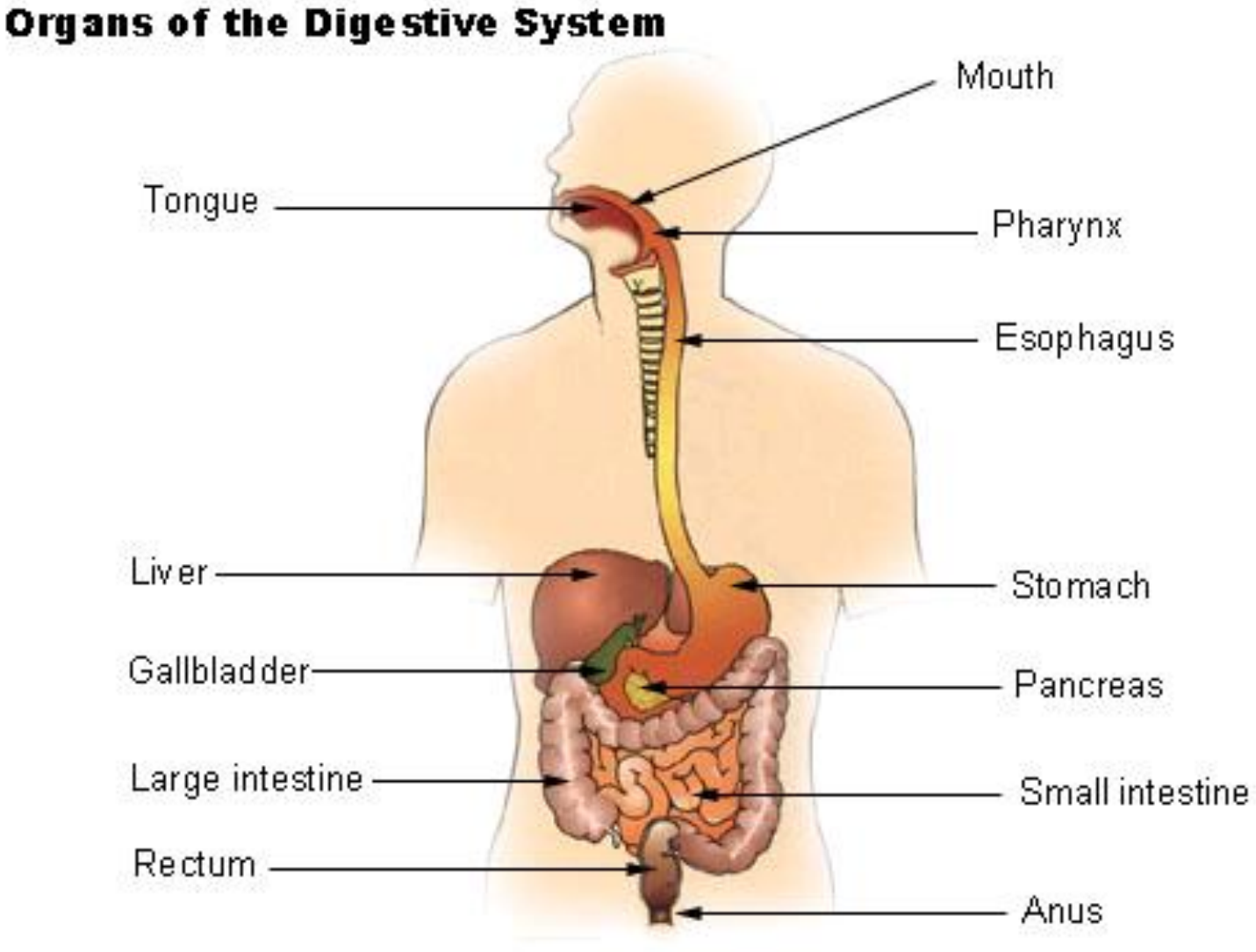
Your Digestive System

- **Digestion – is the process of breaking down foods into small molecules so they can move into the blood.**



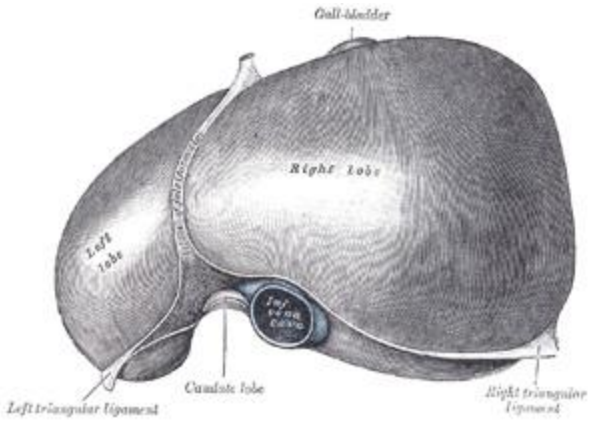
Organs of digestion

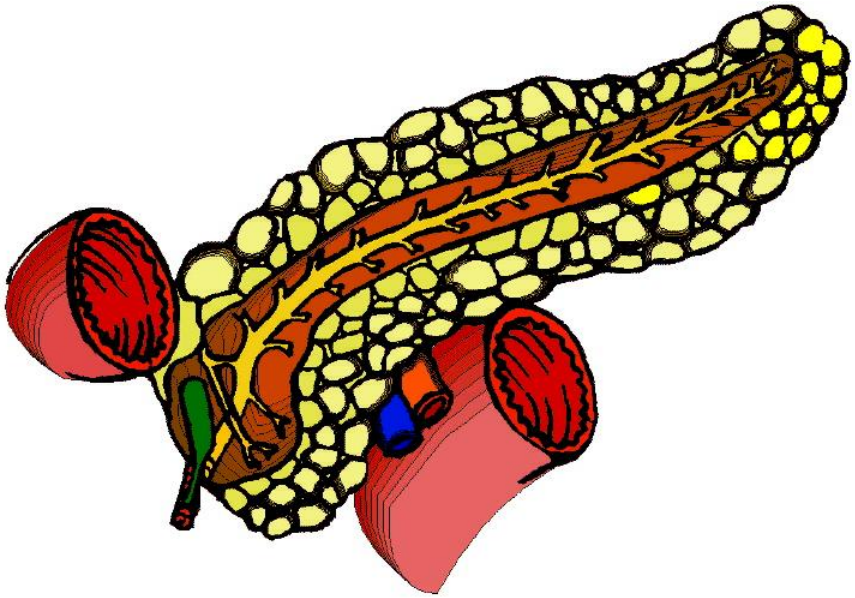
- **Food passes through the mouth, esophagus, stomach, small intestine, large intestine, rectum, and anus**



Other organs of digestion that food doesn't pass through are

- Liver
- Pancreas
- Gallbladder



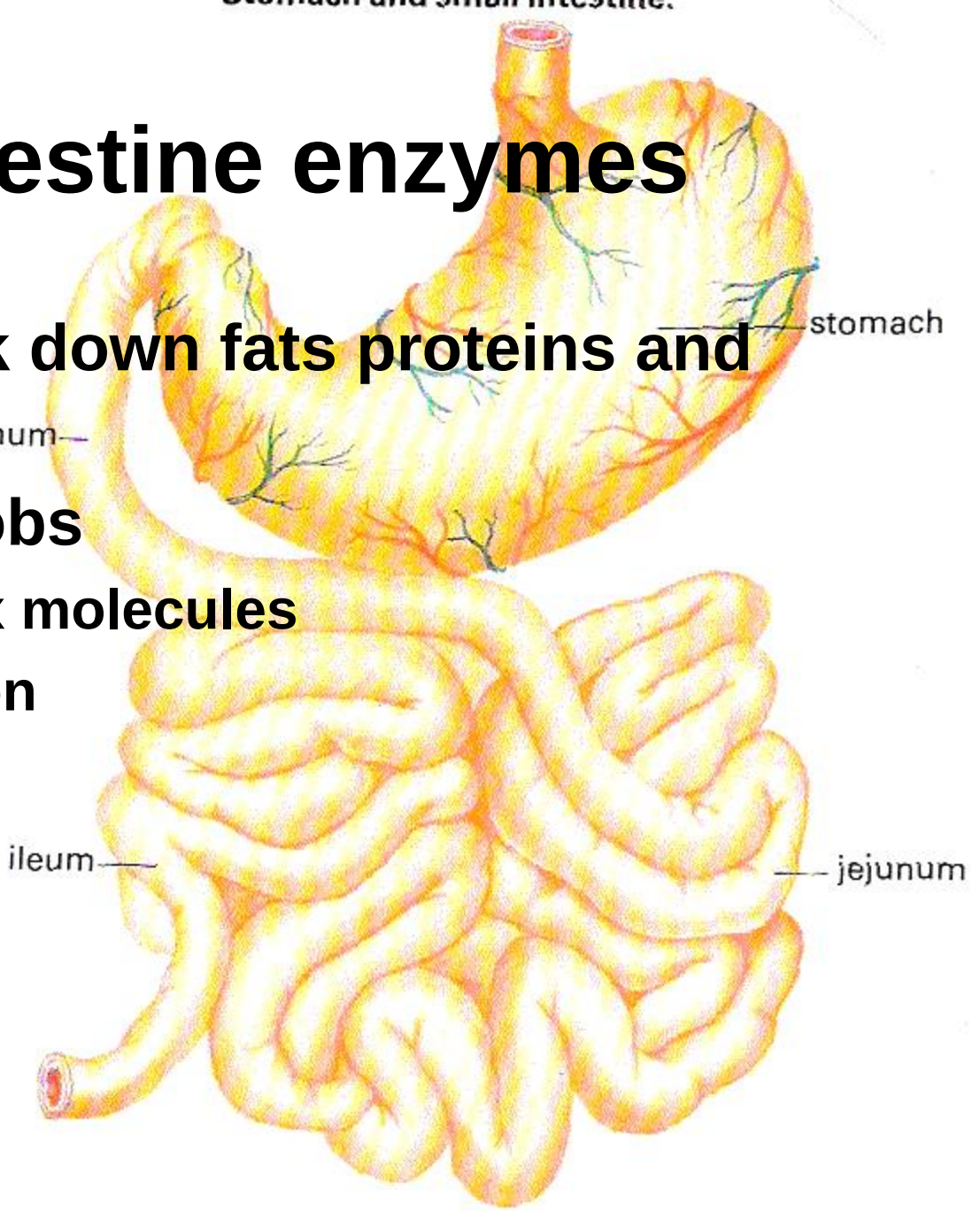


Enzymes

- **Enzymes are proteins that speed up the rate of chemical reaction in your body without being used themselves**
- **Enzymes of digestion**
  - **Amylase in the saliva break down carbohydrates into simple sugars**
  - **Pepsin in the stomach causes complex proteins to break down into less complex proteins**

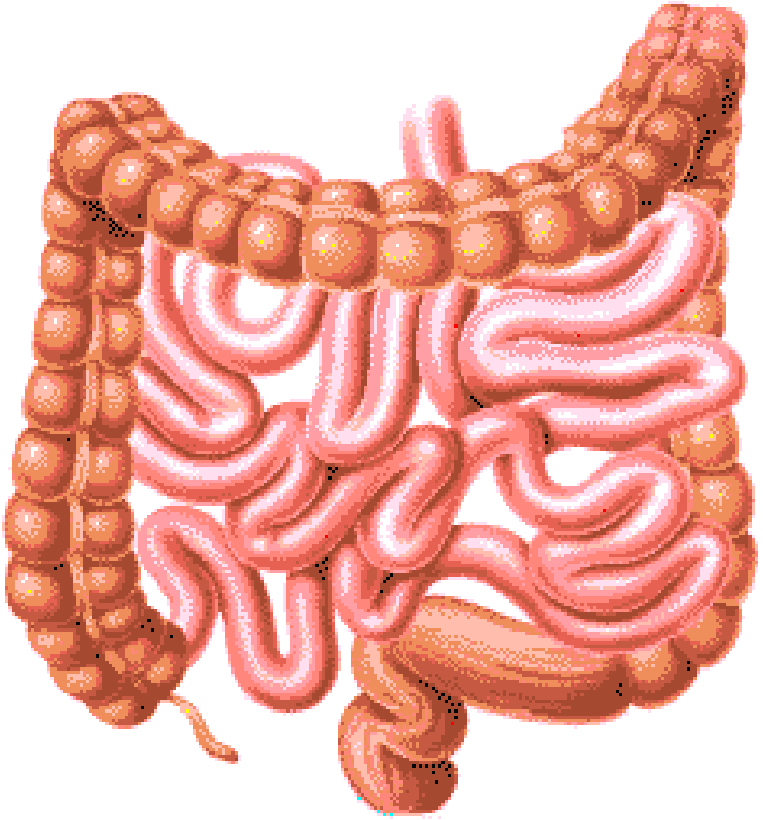
Small intestine enzymes

- **continue to break down fats proteins and carbohydrates**
- **Enzymes other jobs**
  - **Building complex molecules**
  - **Energy production**
  - **Blood clotting**



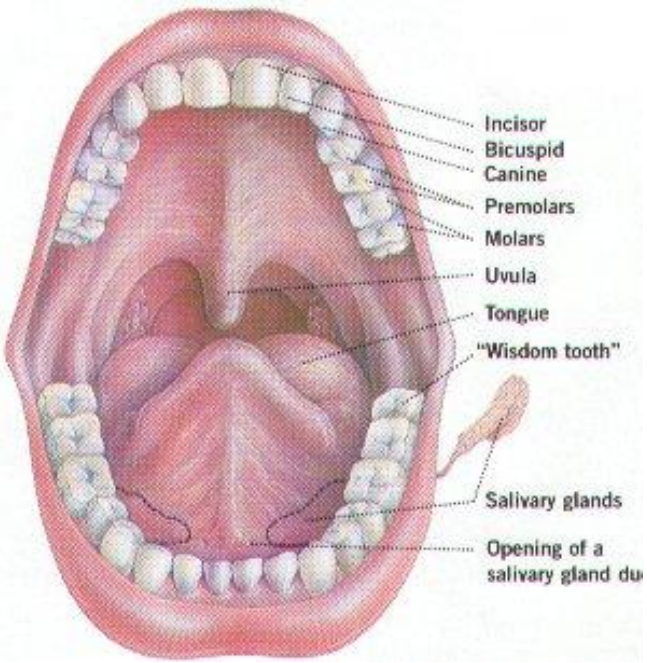
Where digestion occurs

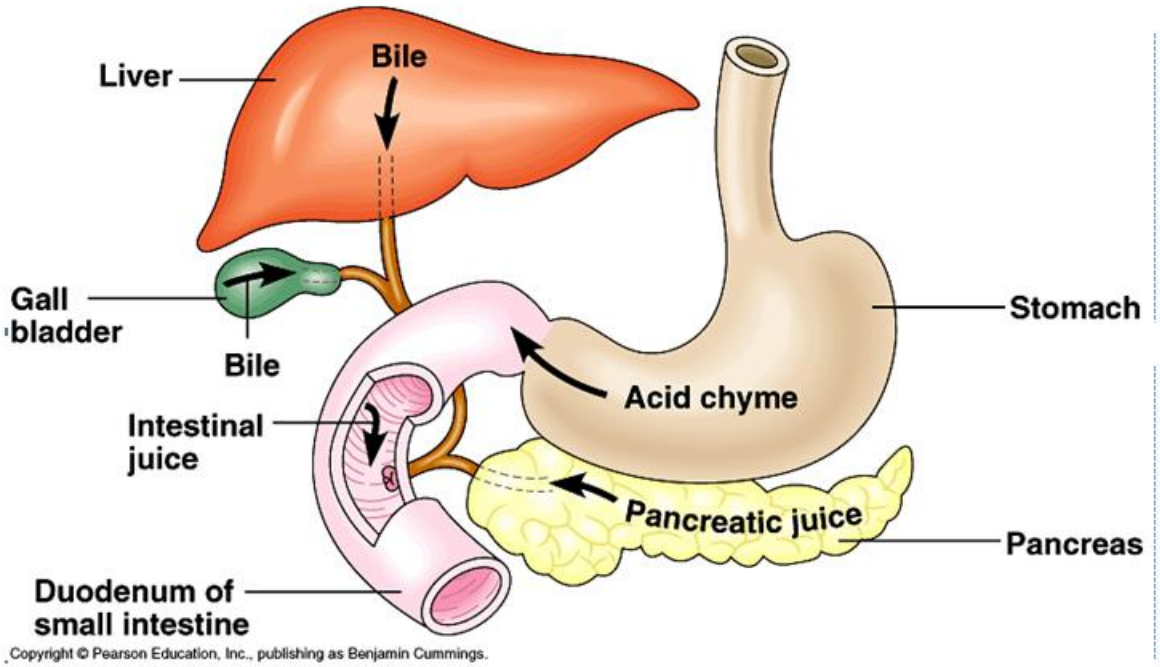
- **All along the digestive tract, but the most takes place in the small intestine**



Two types of digestion

- **Mechanical Digestion is the movement and churning and physically breaking apart substances**
- **Chemical Digestion is the chemical reactions that break down food**
  Mouth



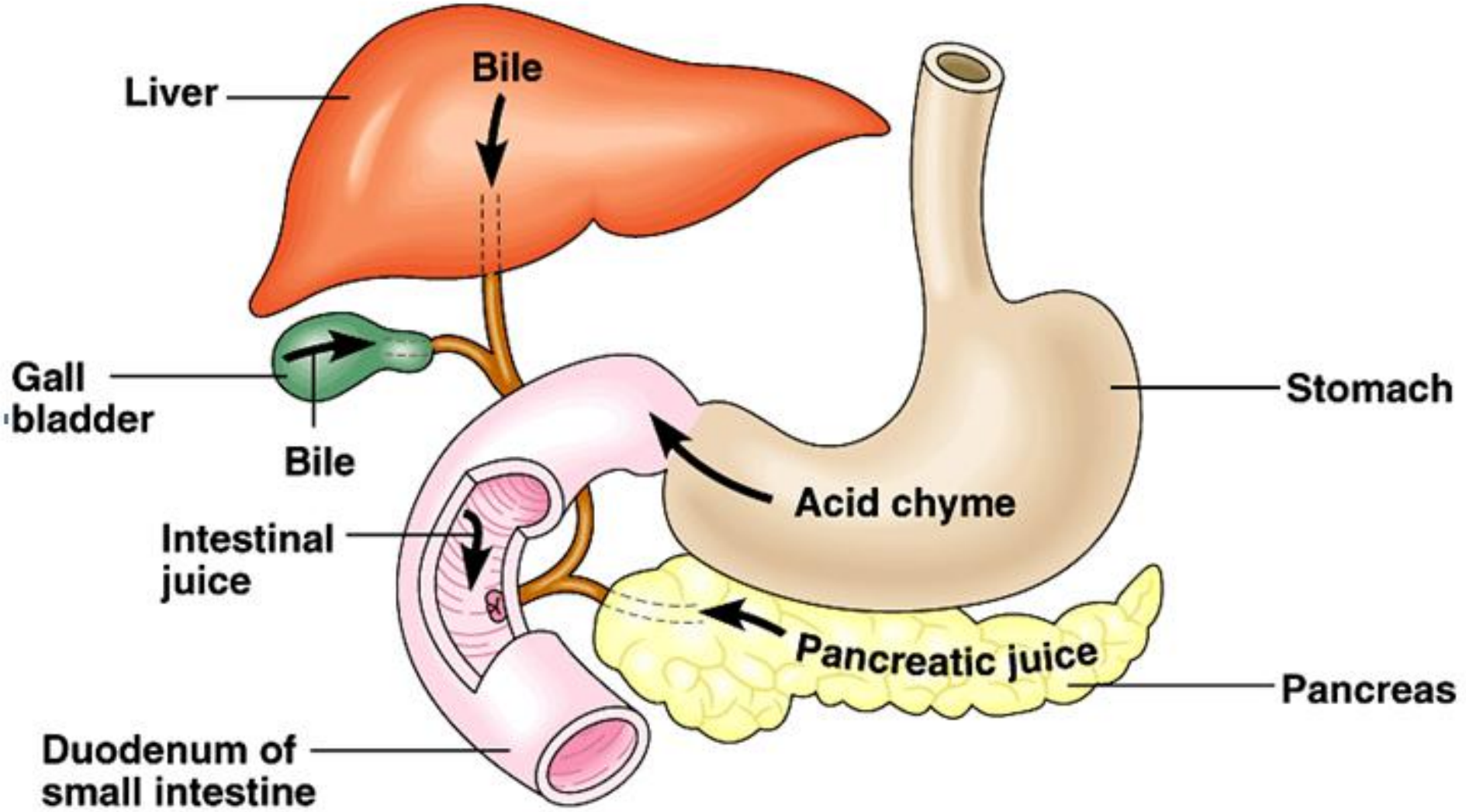


Mechanical and chemical digestion

- **Starts in the mouth by chewing, moistening and adding the amylase ptyalin**
- **Esophagus**
  - **Mechanical muscular movement called peristalsis**
- **Stomach**
  - **Mechanical by muscular churning of the food**
  - **Chemically by Hydrochloric acid and pepsin and mucus from the stomach**

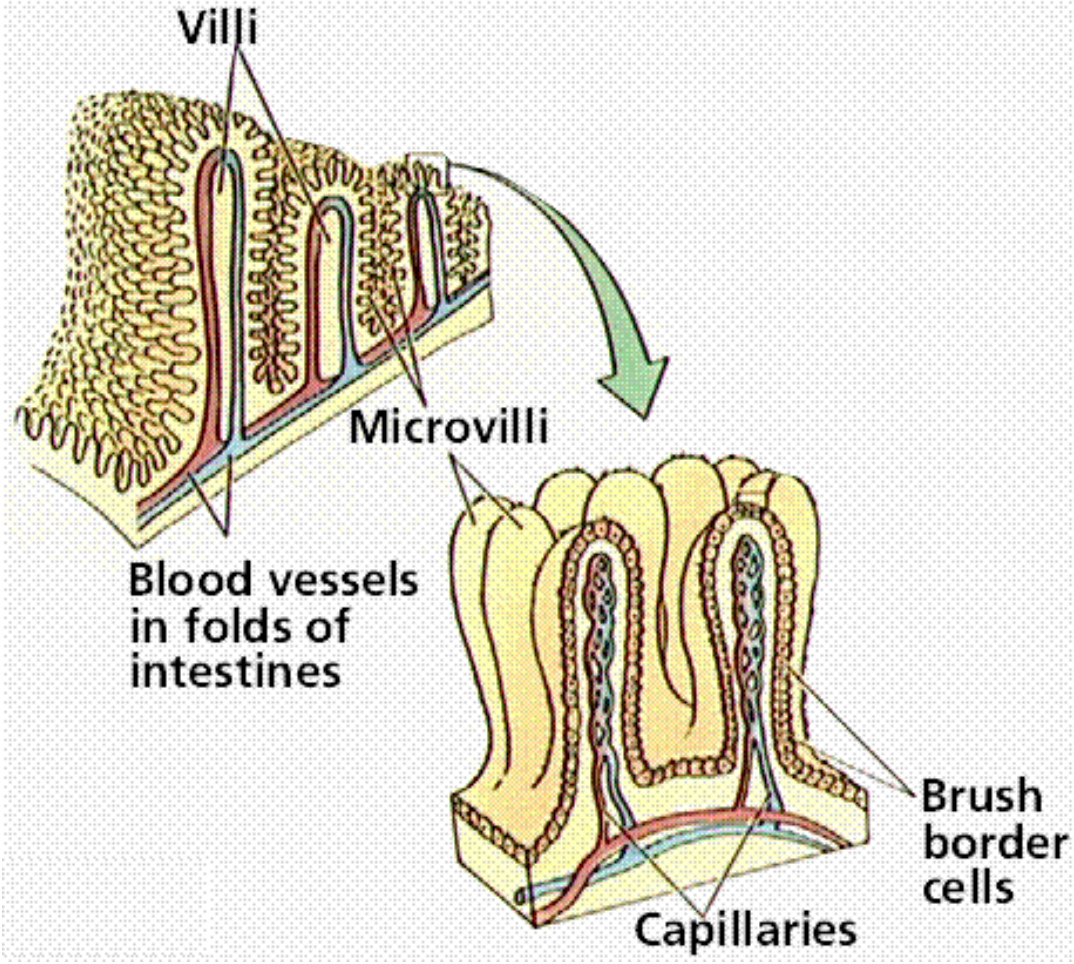
Digestion continued

- **The mixture in the stomach is called chyme**
- **Duodenum – the first area of the small intestine right below the stomach**
- **Small intestine – chyme moves by peristalsis**
  - **Most of the digestion takes place**
  - **Liver adds bile that it stores in the gallbladder**
  - **Bile emulsifies fats (makes them so they can dissolve in the blood)**
  - **Pancreas – produces enzymes that help break down carbohydrates, fats and proteins**
  - **Pancreas also produces insulin, a hormone that controls the sugar in your blood.**



Small Intestine

- **Surface area of the small intestine**
  - **There are villi that increase the surface of the small intestine**
- **Almost all of the absorption of food takes place in the small intestine**

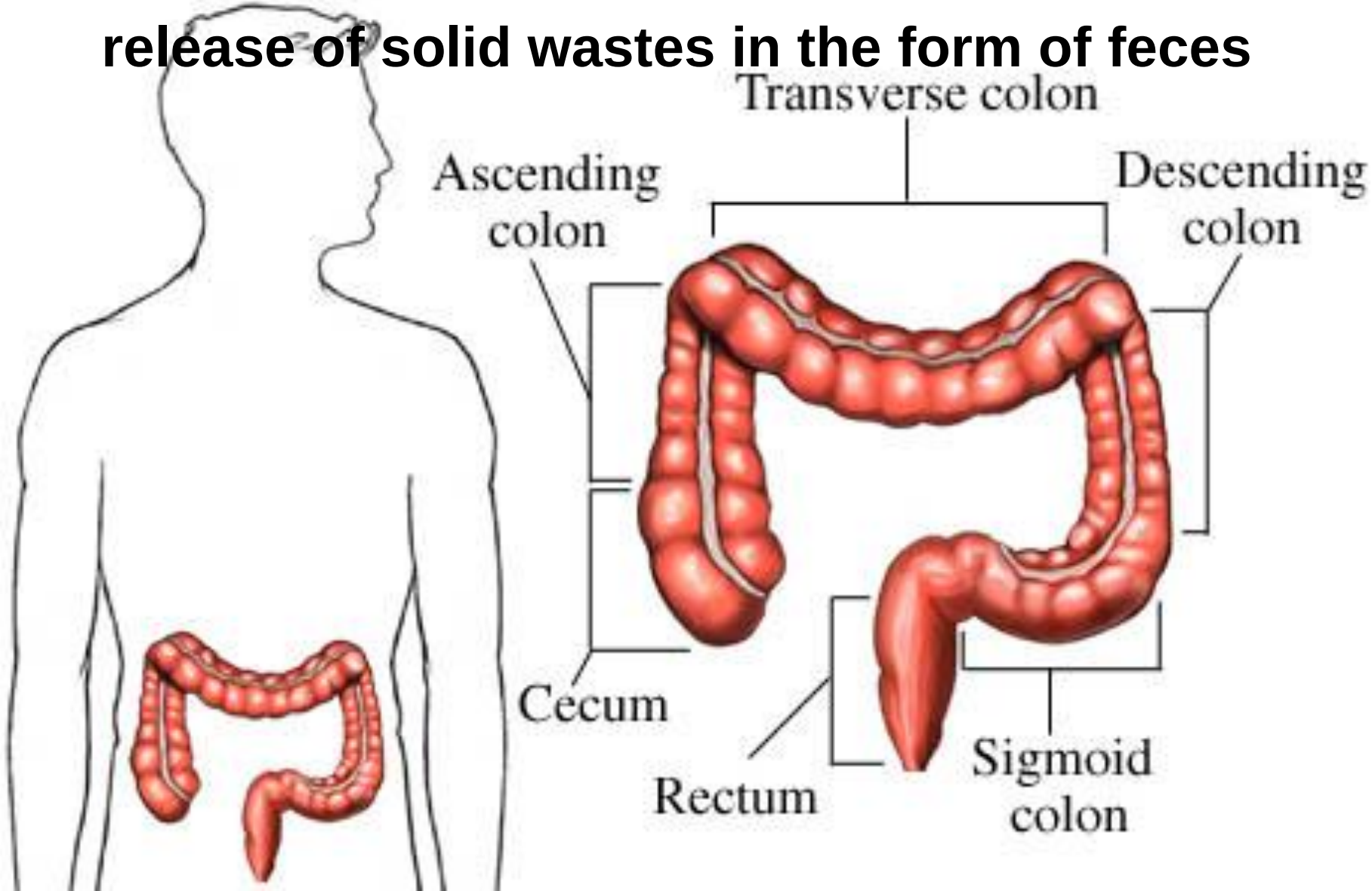


The large intestine

- **Peristalsis slows down**
- **Absorbs water out of the remaining chyme**
- **Bacteria that live in your large intestine feed on the undigested materials and in turn produce vitamins that we need**

Release of Waste

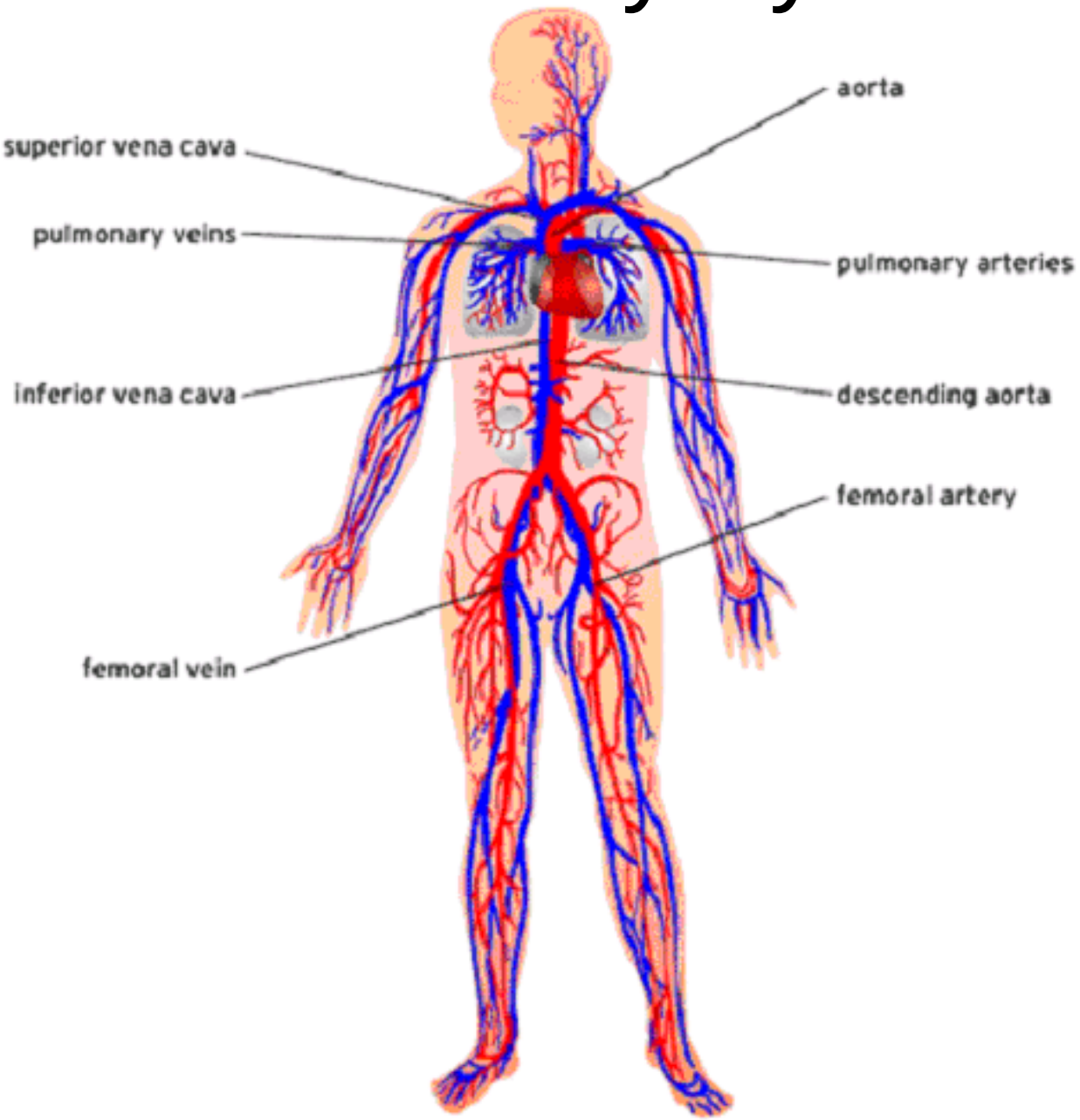
- **Muscles in the rectum and anus control the release of solid wastes in the form of feces**



Quiz

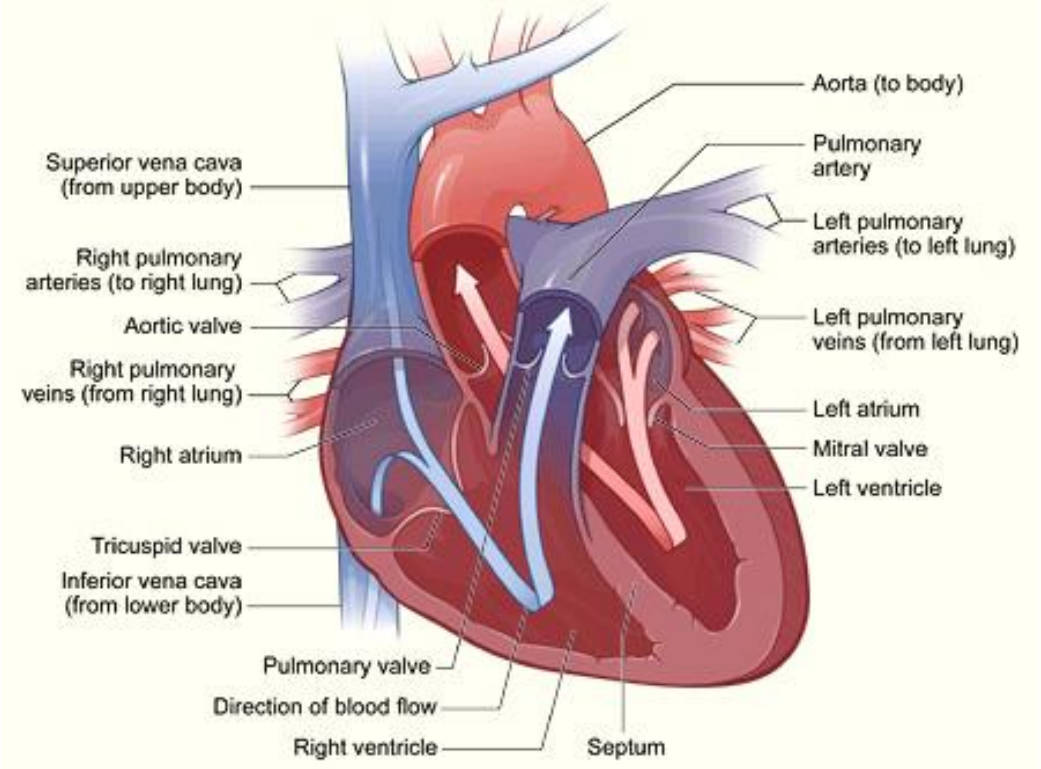
1. What are the 6 nutrients needed in the human body?
2. What is the difference between chemical and mechanical digestion?
3. What is the purpose of bile?
4. Where does digestion Start?
5. Where does most of the digestion take place in the human body?
6. What smaller molecules make up carbohydrates?
7. What smaller molecules make proteins?

The Circulatory System



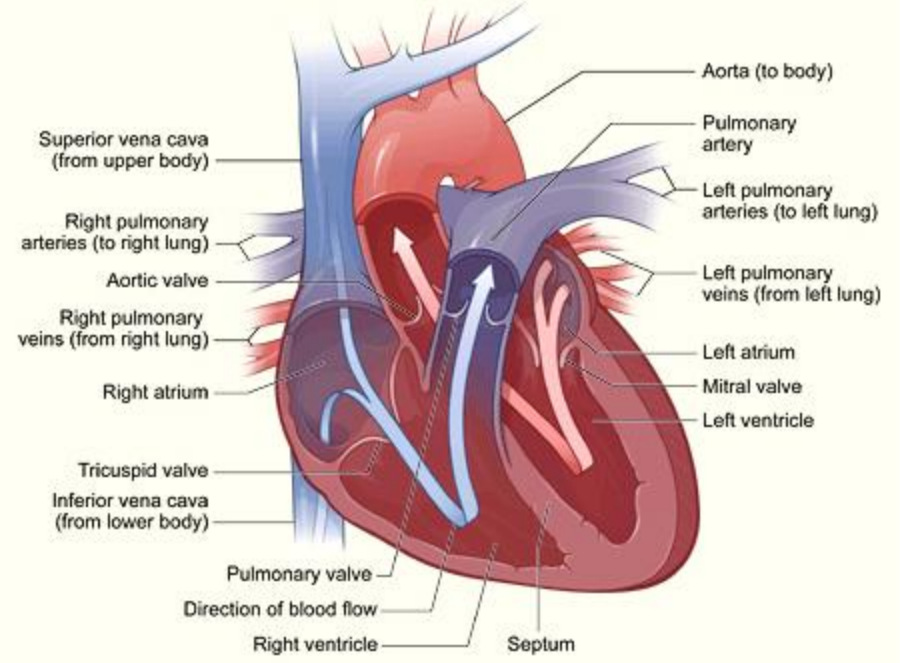
Heart

- Vena cava - blood comes into your heart
- Right Atrium - first chamber of the heart
- Tricuspid valve - The valve between the right atrium and right ventricle
- Right Ventricle - The very muscular chamber that pumps blood to the lungs
- Semi Lunar valve - The valve between the right ventricle and pulmonary artery that keeps blood from going back into the heart
- Pulmonary artery - takes blood from the heart to the lungs



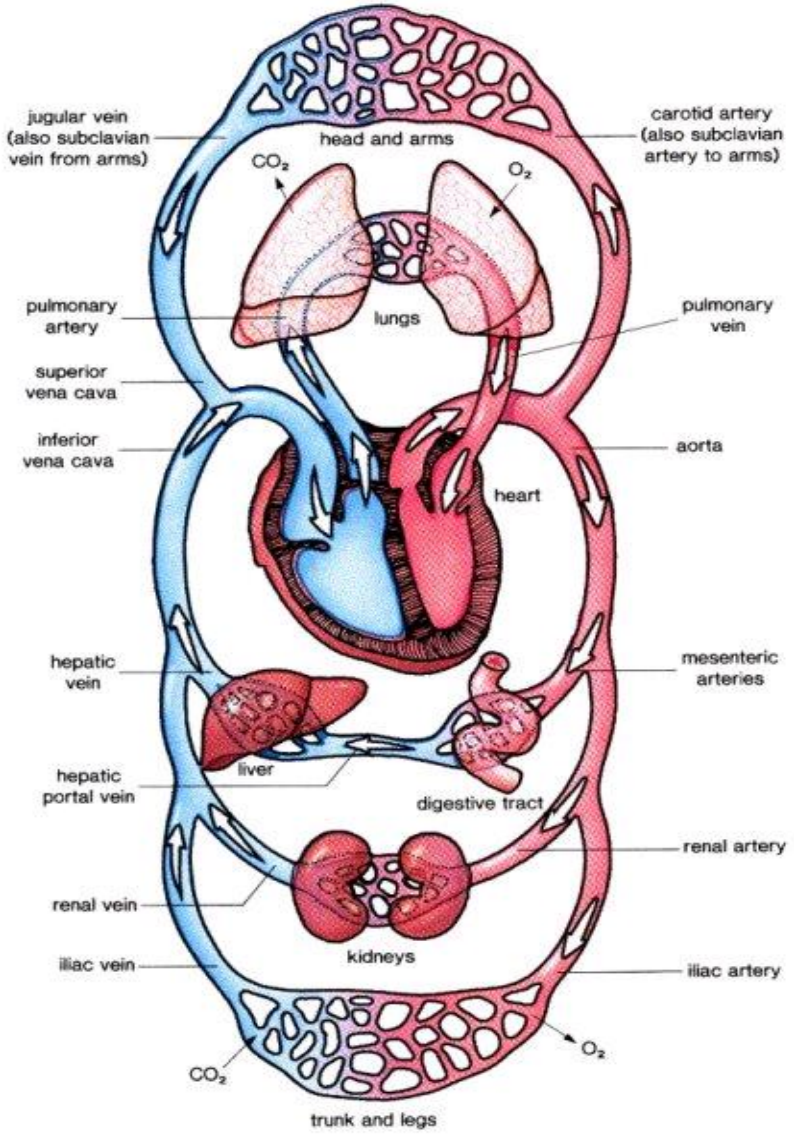
Heart

- Pulmonary vein - takes blood back to the left atrium of the heart
- Left atrium - the chamber that oxygenated blood enters when it returns to the lungs
- Bicuspid valve - The valve between the Left Atrium and Left Ventricle
- Left Ventricle - Muscular chamber that pushes blood through the body
- Semi lunar valve - The valve that keeps blood from going back into the left ventricle
- Aortic arch - the large major artery that all the other arteries in the body receive



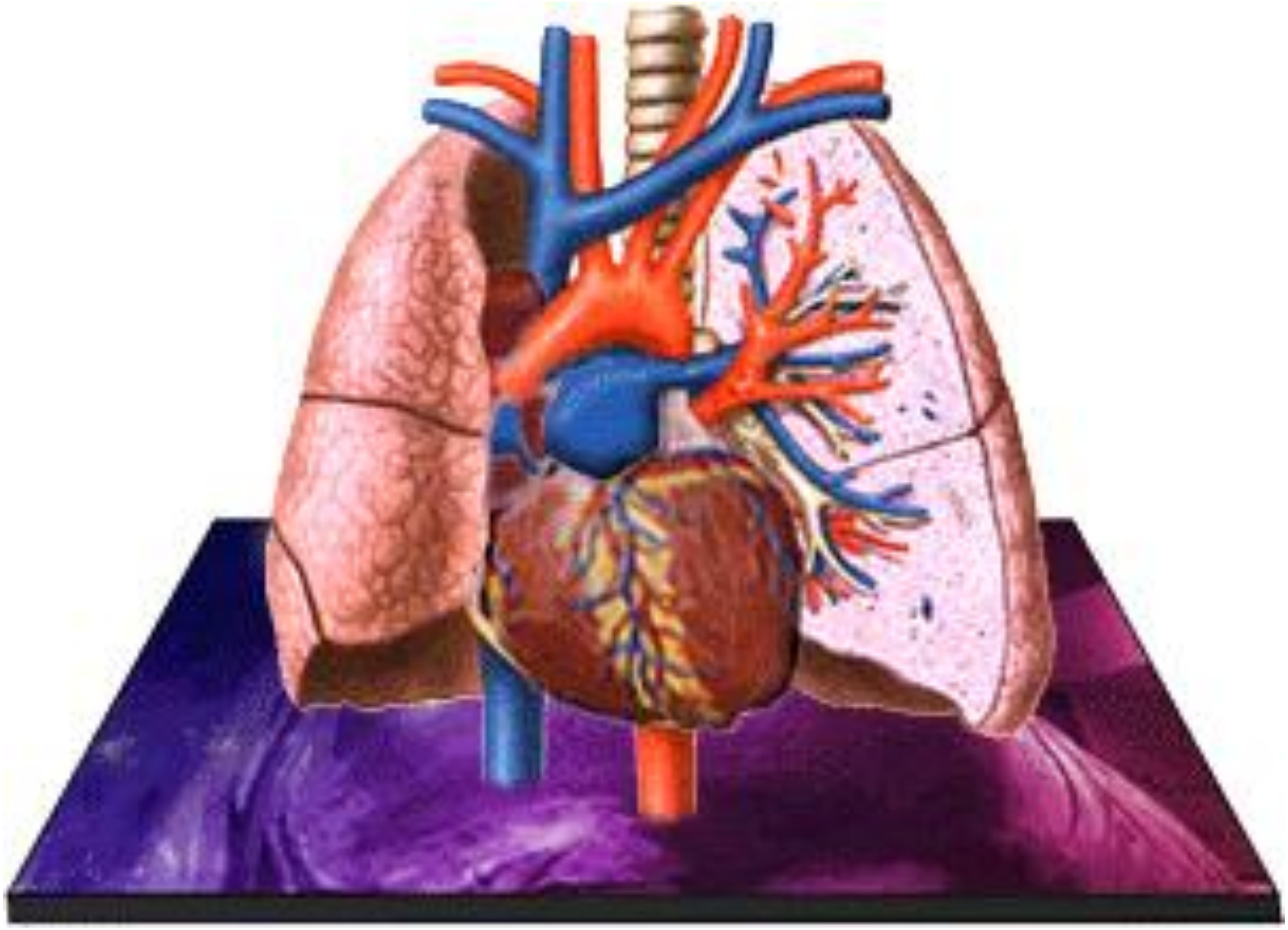
Circulation

- Cardiovascular - Heart and vessels



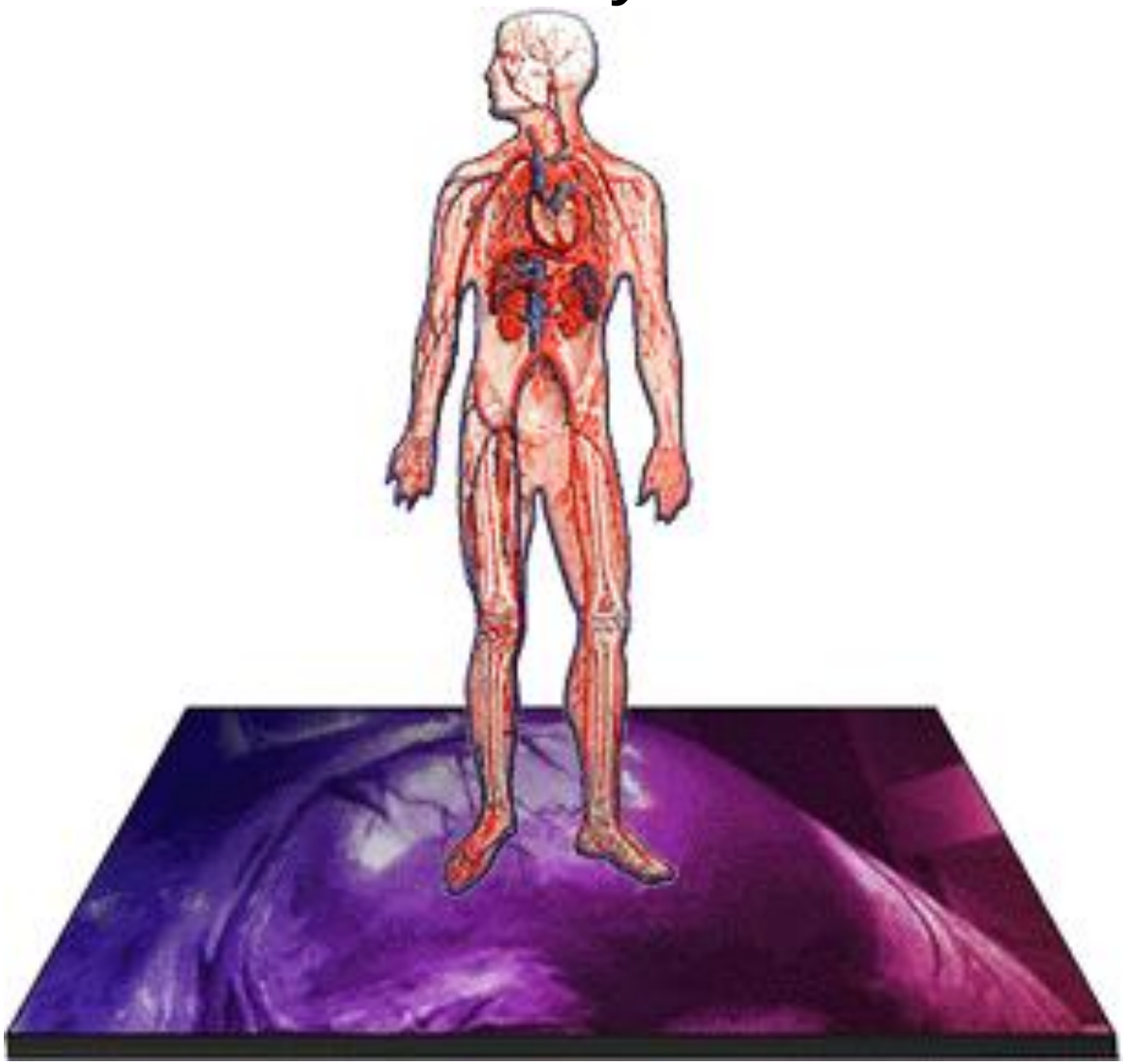
Pulmonary circulation -

- Circulation to the Lungs



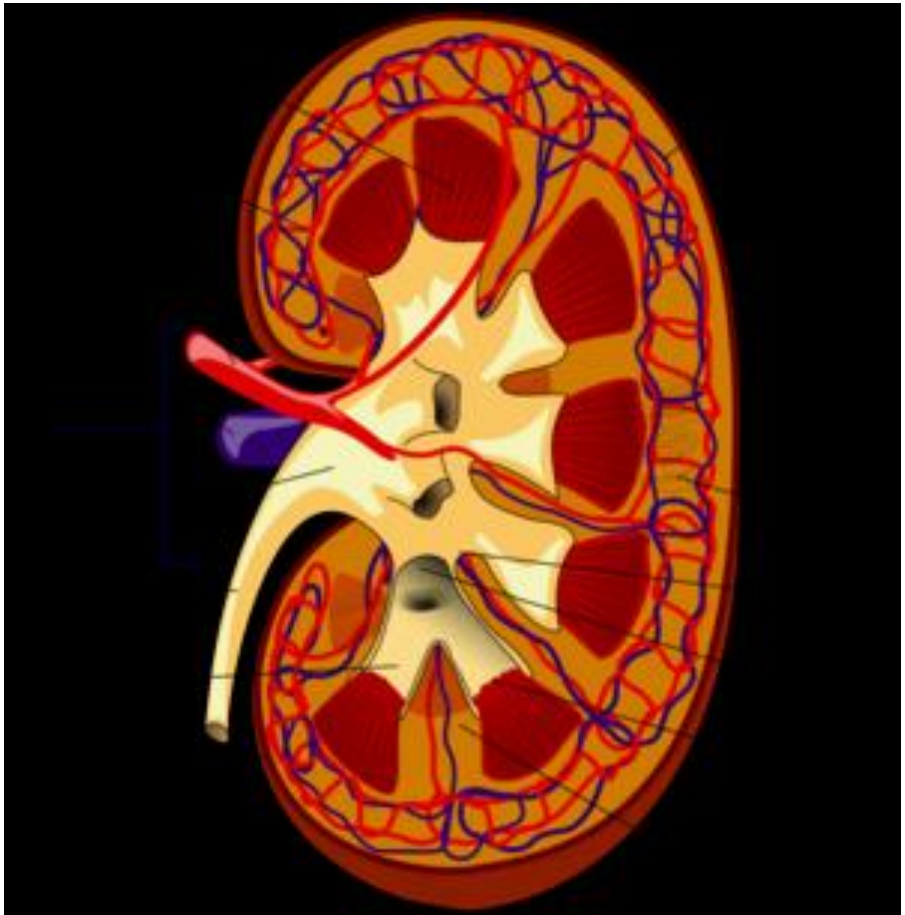
Systemic circulation –

- Circulation to the body



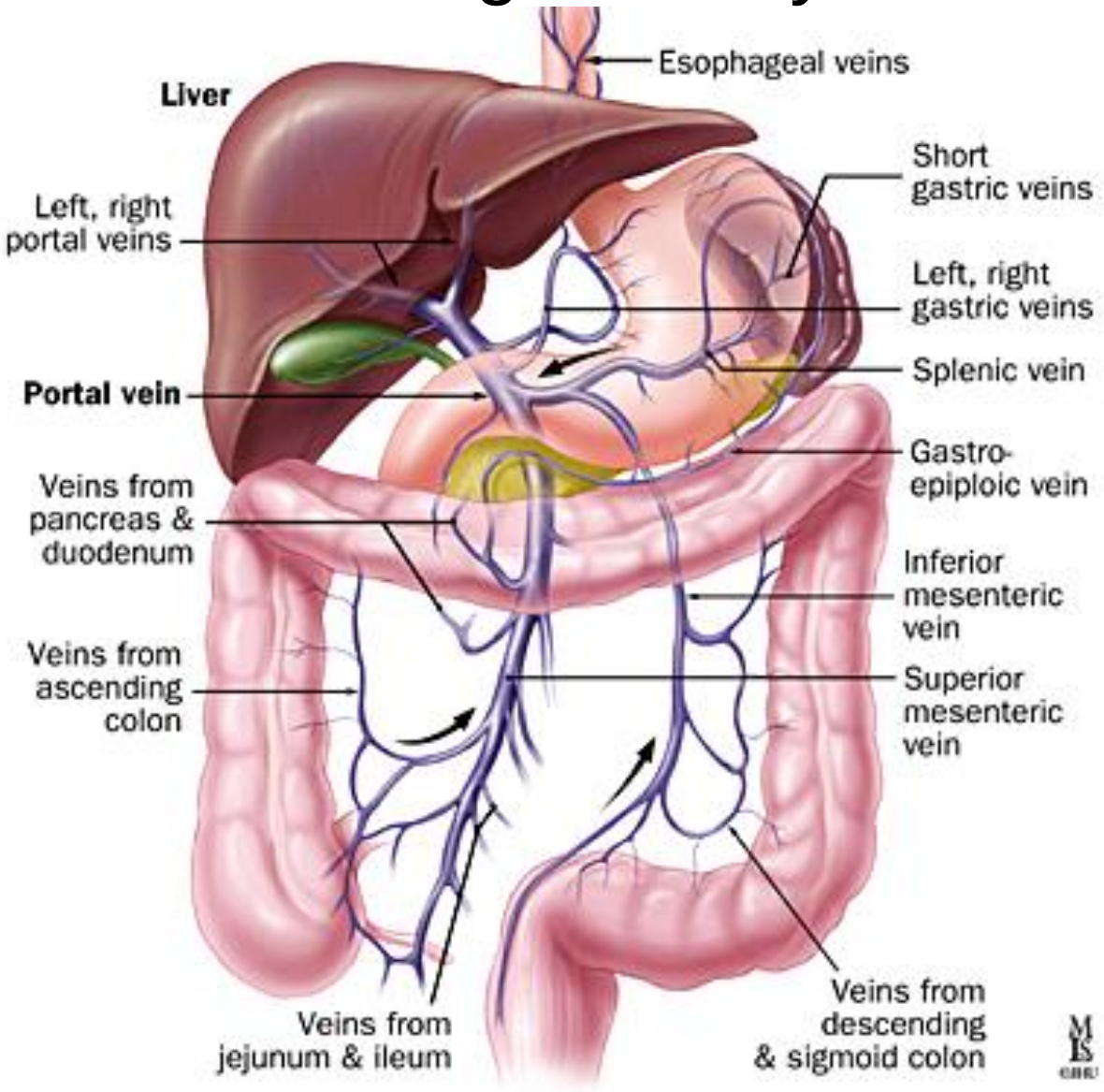
Renal circulation -

- Circulation to the kidneys



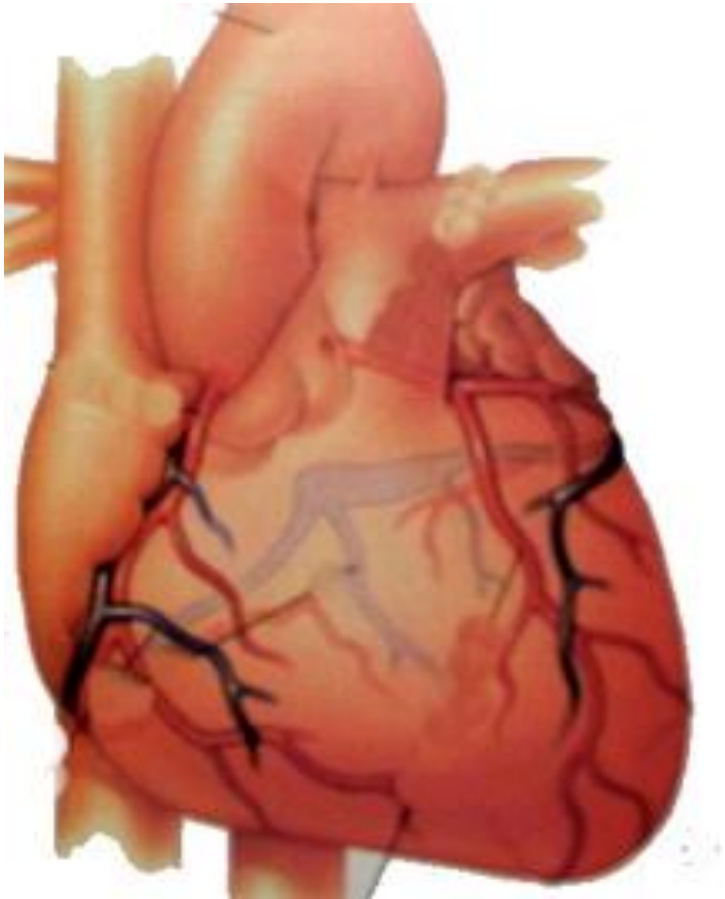
Portal circulation -

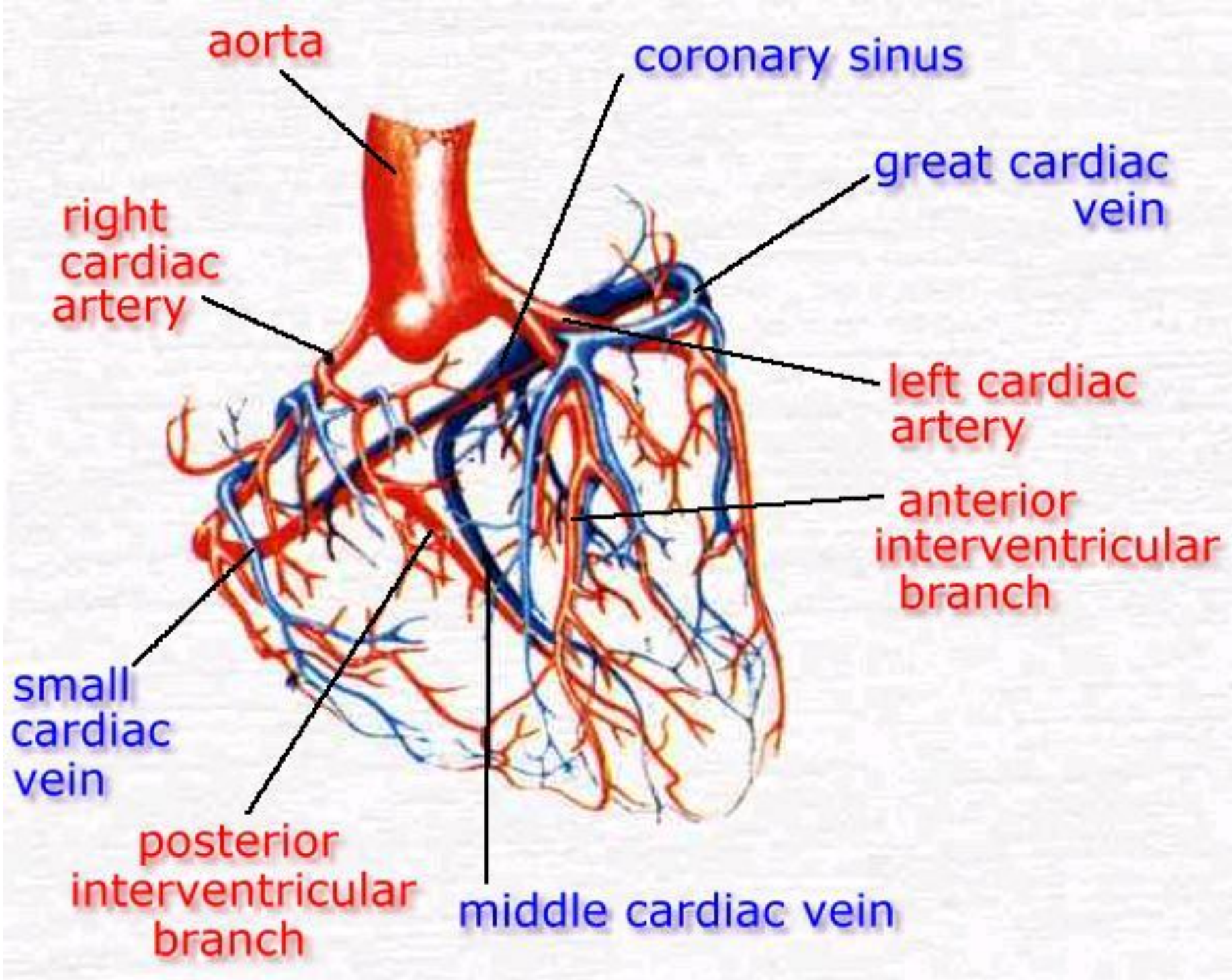
- Circulation to the digestive systems



Coronary Circulation –

- Circulation to the heart




aorta
coronary sinus
great cardiac vein
right cardiac artery
left cardiac artery
anterior interventricular branch
small cardiac vein
posterior interventricular branch
middle cardiac vein

Blood Vessels

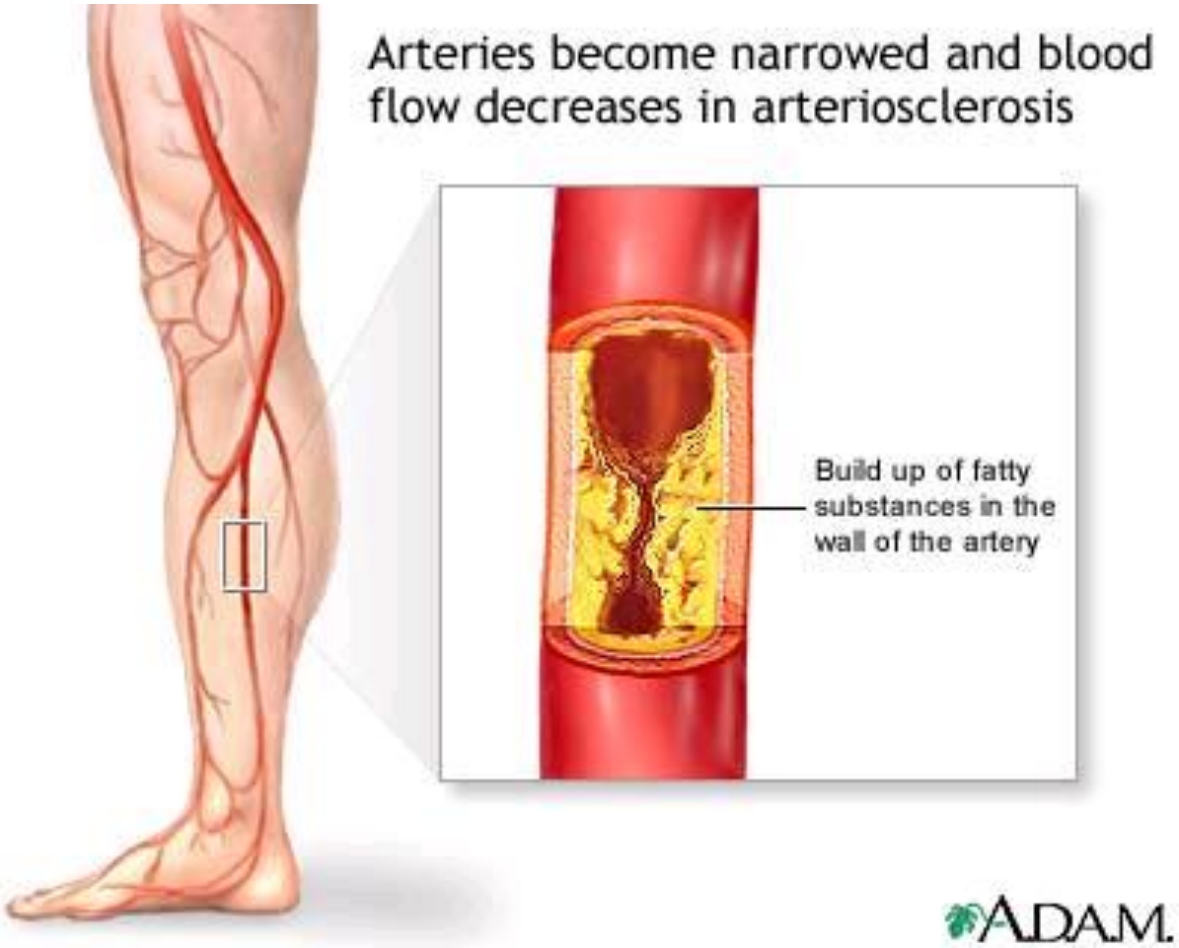
- Arteries carry blood away from the heart
- Capillaries are microscopic vessels that attach arteries to veins
- Veins take blood back to the heart

Blood Pressure

- The result of the heart contractions putting pressure on the arteries
- Systolic pressure is the pressure when the heart contracts and blood is forced in the arteries
- Diastolic pressure is the pressure in the arteries when the heart is relaxed.
- Control of the blood pressure is in the walls of the arteries.

Cardio Vascular disease.

- Arteriosclerosis - a condition caused by fatty deposits on the arterial walls
- Hypertension - increase in blood pressure



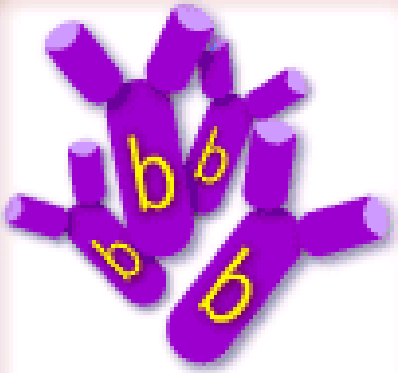
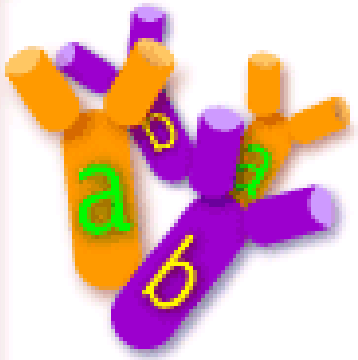
Blood

- Functions of Blood
  - Carries Oxygen and removes CO_2 from the blood
  - Carries waste to the kidneys
  - Transports nutrients
- About 8% of your body mass
- Parts of your blood
  - Plasma – liquid portion of the blood
  - Hematicrit portion of the blood
    - Red blood cells that carry oxygen
      - Hemoglobin is the protein in the blood that helps it to carry oxygen
    - White Blood cells fight off disease
    - Platelets are irregular shaped cell fragments that help clot the blood

Blood types

- A, B, AB, and O
- Type A
  - Antigen A
  - Antibody B
- Type B
  - Antigen B
  - Antibody A
- Type AB
  - Antigen A&B
  - No Antibodies
- Type O
  - No Antigens
  - Has Antibodies A&B

The ABO Blood System

Blood Type (genotype)	Type A (AA, AO)	Type B (BB, BO)	Type AB (AB)	Type O (OO)
Red Blood Cell Surface Proteins (phenotype)	 A agglutinogens only	 B agglutinogens only	 A and B agglutinogens	 No agglutinogens
Plasma Antibodies (phenotype)	 b agglutinin only	 a agglutinin only	 No agglutinin	 a and b agglutinin

Transfusions

- Type A
  Can receive A&O
  Can Donate to A&AB
- Type B
  Can receive B & O
  Can Donate to B&AB
- Type AB
  Can receive from all
  Can Donate to AB
- Type O
  Can receive for O
  Can Donate to all

Rh Factor -

- Is the Rh protein in the blood
- Erithroblastosis fetalis

Blood disorders

- Anemia
- Leukemia
- Hemophilia
- Lymphatic System Page 644

The Lymphatic System –

- collects this fluid from body tissue spaces and returns it to the blood through a system of lymph capillaries and larger lymph vessels.
- Contains cells lymphocytes that help your body defend itself
- Lymphatic organs
  - Lymph Nodes – small structures through out the body that filter out microorganisms and foreign materials
    - Tonsils
    - Thymus
    - Spleen
- Diseases of the lymph system
  - HIV
  - Lymphoma