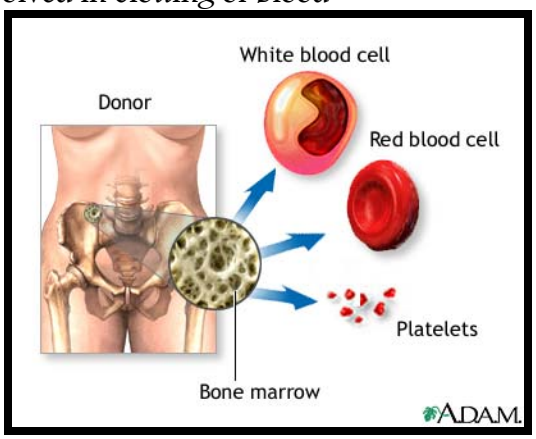
TRANSPORT IN HUMANS

BLOOD is made up of:

- ✓ **PLASMA:** consists mostly of water, inorganic ions, wastes (CO_2, urea) nutrients (glucose), proteins, as well as red blood cells, white blood cells, & platelets
- ✓ **RED BLOOD CELLS (RBCs):**
  --made in the bone marrow of certain bones
  --they are bi-concave & are red due to the respiratory pigment, **HEMOGLOBIN**
  --a necessary component of hemoglobin is **IRON.**
  --**HEMOGLOBIN** carries oxygen from the lungs and the body tissues
  --mature RBCs do ***NOT*** have nuclei and live about 4 months
- ✓ **WHITE BLOOD CELLS (WBCs)**
  --larger than RBCs contain one or more nuclei
  --produced in the bone marrow and in the lymph nodes
  --***PHAGOCYTES:*** WBCs that can leave capillaries and go to the site of infection to engulf invading pathogens
  --***LYMPHOCYTES:*** WBCs that produce **ANTIBODIES**
- ✓ **PLATELETS**
  --small cell fragments involved in clotting of blood



BLOOD-TYPING is based on the presence or absence of antigens of the surface of RBCs.

- ✓ The ABO blood group is the most common grouping system used to identify blood types
- ✓ In this system, two types of antigens are found on RBCs – **ANTIGEN A and/or ANTIGEN B**
- ✓ The plasma of the blood carries **ANTIBODIES to ANTIGEN A & B**. These antibodies are known as ***ANTI-A & ANTI-B***

BLOOD TYPE	ANTIGENS on RBCs	ANTIBODIES in PLASMA
A	A	Anti-B
B	B	Anti-A
AB (universal receiver)	A and B	Neither Anti-A nor Anti-B
O (universal donor)	neither A nor B	Anti A and Anti-B

TRANSPORT VESSELS

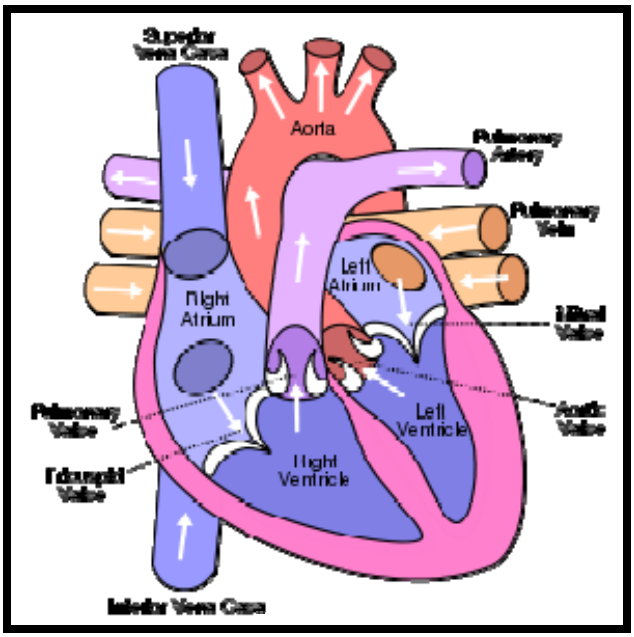
- ✓ ***ARTERIES***: blood is carried **FROM** the heart to all parts of the body
  --thick walled, muscular,
  --**PULSE:**: arteries expand and contract with the beating of the heart to help push the blood to all parts of the body
- ✓ **VEINS:** blood flow from the capillaries into the veins thin-walled vessels that carry the blood **BACK** to the heart.
  --veins contain flaps of tissue that act as valves
  --valves allow the blood in the veins to flow in one direction only – back to the heart
- ✓ **CAPILLARIES**: connect arteries to veins

--tiny blood vessels with walls only one cell layer thick
capillaries **are the site of exchange of material between the blood and body tissues**

INTERCELLULAR FLUID (ICF) & LYMPH

- ✓ As blood flows through capillaries, some fluid diffuses into the surrounding tissues
- ✓ When fluids from blood bathe the body tissue it is referred to as ***INTERCELLULAR FLUID***
- ✓ Excess ICF is drained from around the body tissues by ***LYMPH vessels*** and is called ***LYMPH***
- ✓ The lymph vessels merge, forming larger and larger vessels which eventually merge with the circulatory system, near the veins of the heart.
- ✓ ***LYMPH NODES***: major vessels have enlarged regions have enlarged regions called lymph nodes that that contain phagocytic cells filter bacteria & and dead cells from the lymph.

THE HEART



- ✓ The human heart has 4 chambers: 2 **ATRIA** (atrium – singular) on top & 2 **VENTRICLES** on bottom
- ✓ **DEOXYGENATED** blood flows through the **RIGHT** side of blo0d; the **LEFT** side of the blood carries **OXYGENATED** blood.
- ✓ the **SEPTUM** separates the left and right sides of the heart. Oxygenated and deoxygenated bloods never mix.

SYSTEMIC CIRCULATION

--deoxygenated blood enters the right atrium from the superior & inferior vena cavas, passed through the tricuspid valve to the right ventricle through the pulmonary artery to the left and right lungs where CO2 is removed from the blood and the blood is oxygenated. The blood enters the left side of the heart from the pulmonary veins to the left atrium, through the mitral valve to the left ventricle, to the aortic valve to the aorta which takes blood to all parts of the body (except the lungs)

PULMONARY CIRCULATION

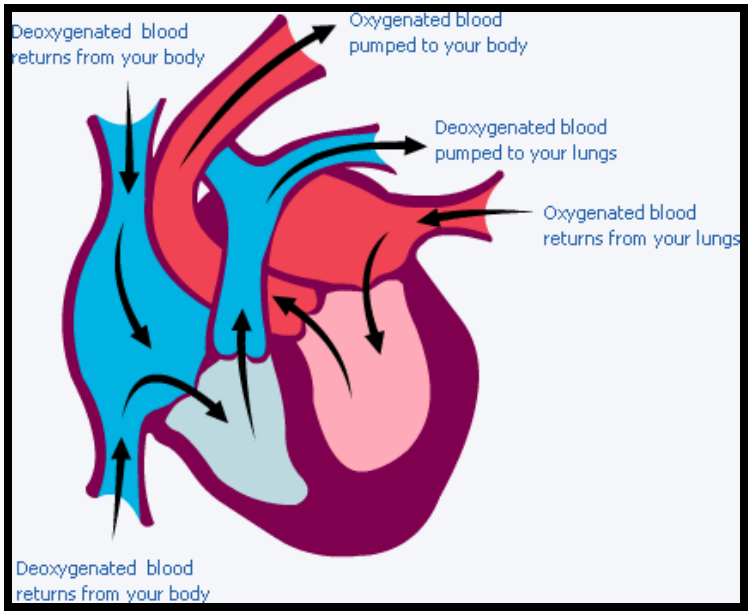
- ✓ circulation from the heart to the lungs

LYMPHATIC CIRCULATION

- ✓ fluid from the plasma of the blood from capillaries to body tissues (now called intercellular fluid,), drained off by the lymph vessels (now called lymph), dumped back into large veins near heart (now called plasma again)

CORONARY CIRCULATION

- ✓ circulation of vessels of the heart



BLOOD PRESSURE

- ✓ pressure exerted by the blood on the walls of the arteries during pumping action of the blood
- ✓ during the contraction phase of the heart **(systole)** the arterial pressure is the highest
- ✓ during the relaxation phase (between beats – known as **diastole)** the arterial pressure is at the minimum

DISORDERS of the TRANSPORT SYSTEM

- ✓ **CARDIOVASCULAR disorders:**
  --***hypertension (high blood pressure):*** can be caused by diet, high salt intake, hereditary, cigarette smoking, aging, and stress
  --Coronary thrombosis (heart attack): some of the muscle tissue of the heart is damaged as a result of oxygen deprivation
  --Angina pectoris: narrowing of the coronary arteries cause temporary shortages of oxygen to the heart muscle, resulting in intense pain in the chest and sometimes in the left arm and shoulder
- ✓ **ANEMIA:** the blood cannot carry enough oxygen to deliver to the cells.
  -- often due to a lack of iron, a component of hemoglobin or as a result of too few RBC
- ✓ **LEUKEMIA:** form of blood cancer in which the bone marrow produces an abnormally large number of nonfunctional WBC