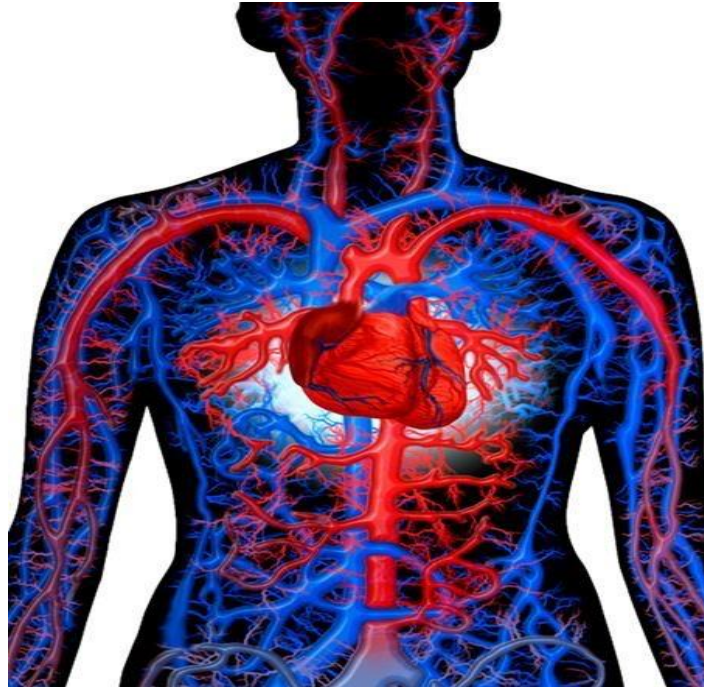
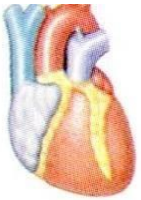


THE CIRCULATORY SYSTEM

The Body's Transport System

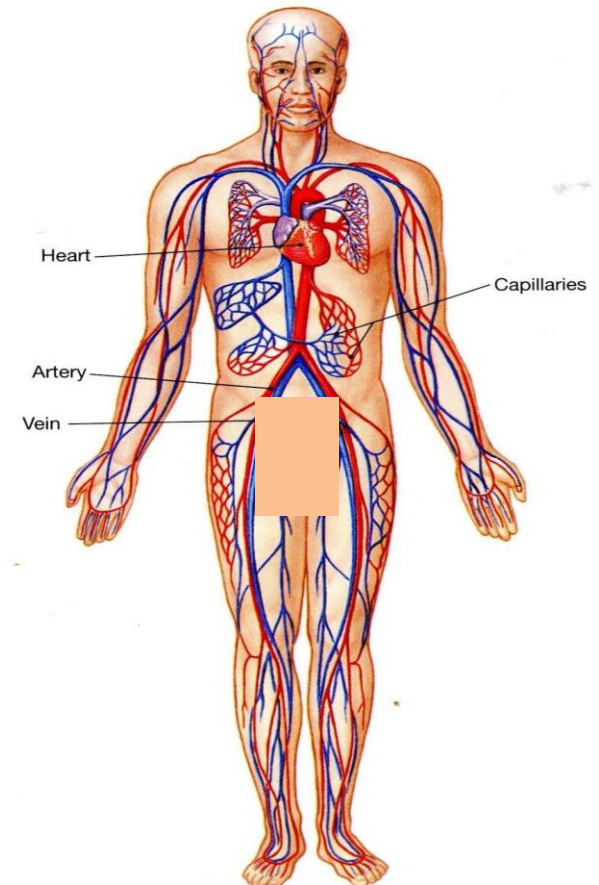




(f) THE CARDIOVASCULAR SYSTEM

Transports cells and dissolved materials, including nutrients, wastes, and gases

Organ/Component	Primary Functions
Heart	Propels blood; maintains blood pressure
Blood Vessels	Distribute blood around the body
Arteries	Carry blood from heart to capillaries
Capillaries	Permit diffusion between blood and interstitial fluids
Veins	Return blood from capillaries to the heart
Blood	Transports oxygen, carbon dioxide, and blood cells; delivers nutrients and hormones; removes waste products; assists in temperature regulation and defense against disease



- The circulatory system, sometimes called the cardiovascular system, consists of the heart, blood vessels, and blood.
- It transports oxygen, hormones, and nutrients to all the cells in the body.
- It picks up waste products generated by metabolic processes and delivers them to other organs for disposal.

The heart provides the "muscle" needed to pump blood throughout the body.

The system circulates blood in two circuits:

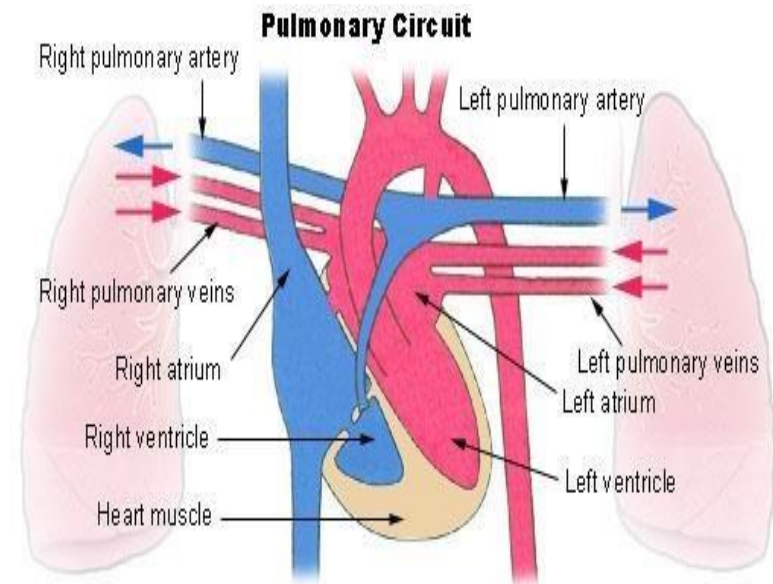
The Pulmonary circuit and Systemic circuit.

PULMONARY CIRCULATION

Heart: your heart pumps blood through two major pathways.

1) Pulmonary circulation

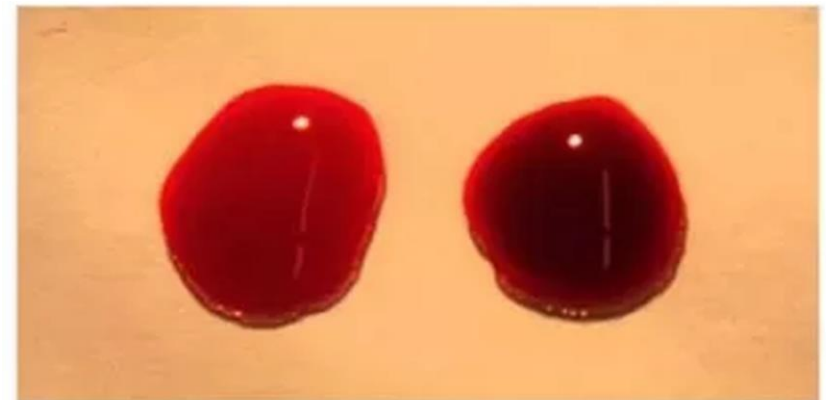
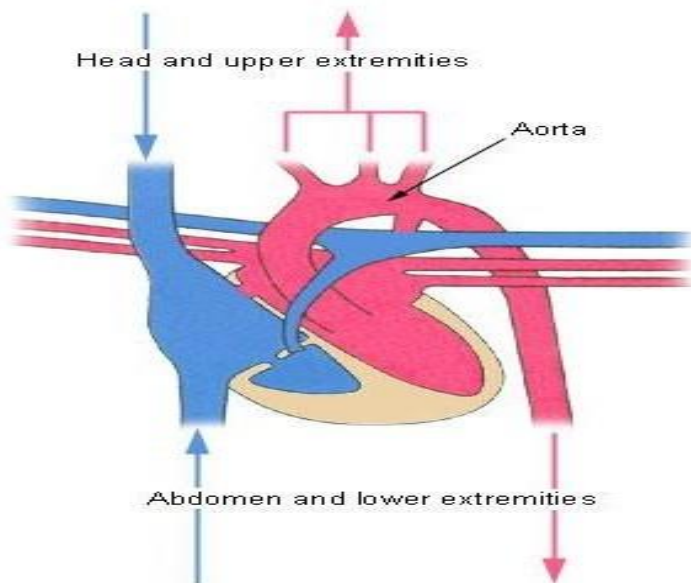
Transports oxygen-poor blood from the right ventricle to the lungs where blood picks up a new oxygen supply.



SYSTEMIC CIRCULATION

2) **Systemic circulation** It returns oxygen rich blood and nutrients to the left atrium and is pumped out all over the body It also picks up carbon dioxide and other waste products.

Systemic Circuit



Oxygenated
blood: **Bright red**

Deoxygenated
blood:
Deep red-purple

- **Hormones** : from glands help regulate cell activity.
- **Oxygen** from the lungs combines with nutrients to provide energy.
- **Nutrients** from the digestive system provide food for the cell.

- ❖ Oxygen-rich blood enters the heart from the lungs (red, right side) and is pumped out to the body (top)
- ❖ Oxygen poor blood enters the heart from the body (blue, top left) and is pumped out to the lungs (blue, top right)

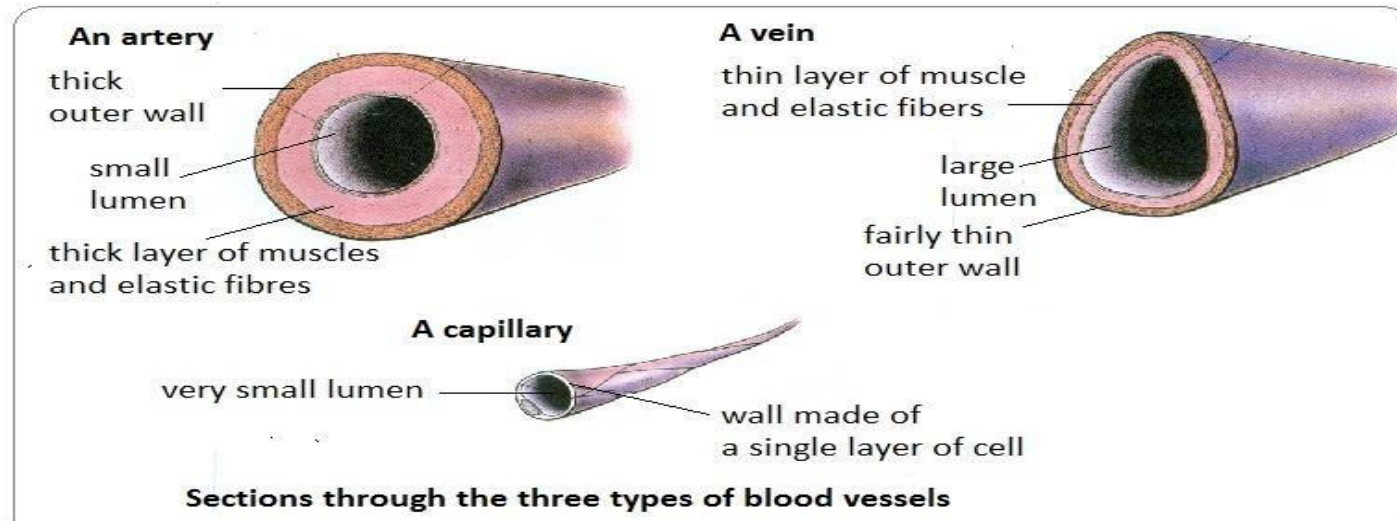


THE CIRCULATORY SYSTEM WORKS IN CONJUNCTION WITH OTHER BODY SYSTEMS, TO KEEP THE IT WORKING PROPERLY.

- ❖ When your blood circulates through your digestive system, it picks up nutrients your body absorbed from your last meal.
- ❖ Your blood also carries oxygen inhaled by the lungs. Your circulatory system delivers oxygen and nutrients to your heart and the other cells of your body then picks up any waste products created by these cells, including carbon dioxide, and delivers these waste products to the kidneys and lungs for disposal.
- ❖ The circulatory system carries hormones from the endocrine system, and the immune system's white blood cells that fight off infection.
 - ❖ The circulatory system provides your brain with a constant supply of oxygen-rich blood while your brain regulates your heart rate and blood pressure.
 - ❖ Your circulatory system delivers oxygen-rich blood to your bones.
Meanwhile, your bones are busy making new blood cells.

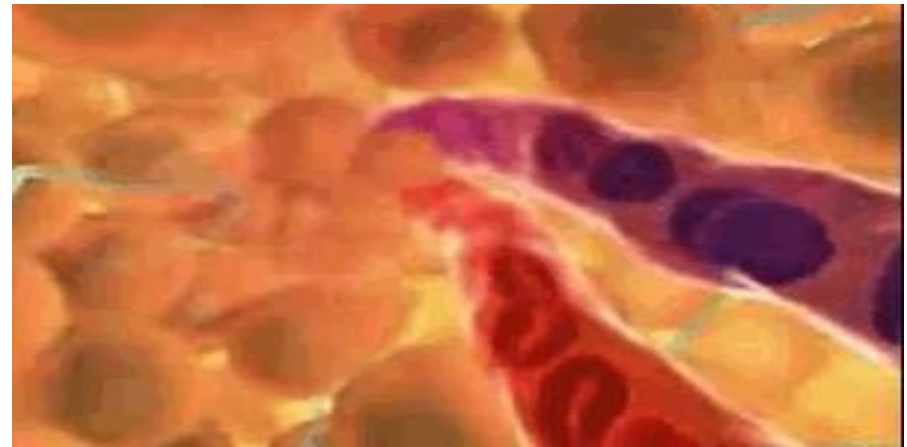
BLOOD VESSELS - Over 60,000 miles of blood vessels transport your blood throughout your body. There are 3 types of blood vessels.

- **Arteries:** Blood vessels that carry blood away from the heart to other parts of the body. They are much thicker than Veins because of the high pressure of blood coming from the heart. The smallest arteries <0.1 mm in diameter, are referred to as arterioles. The joining of branches of arteries is called an anastomosis.
- **Veins:** Blood vessels that carry blood from the body back to the heart. The smallest veins are called venules. The smaller veins, or tributaries, unite to form larger veins, which commonly join with one another to form venous plexuses.
- **Capillaries:** Tiny tubes that carry blood from the arteries to the body's cells, and then back to the veins.
- **Sinusoids** resemble capillaries in that they are thin-walled blood vessels, but they have an irregular cross diameter and are wider than capillaries.

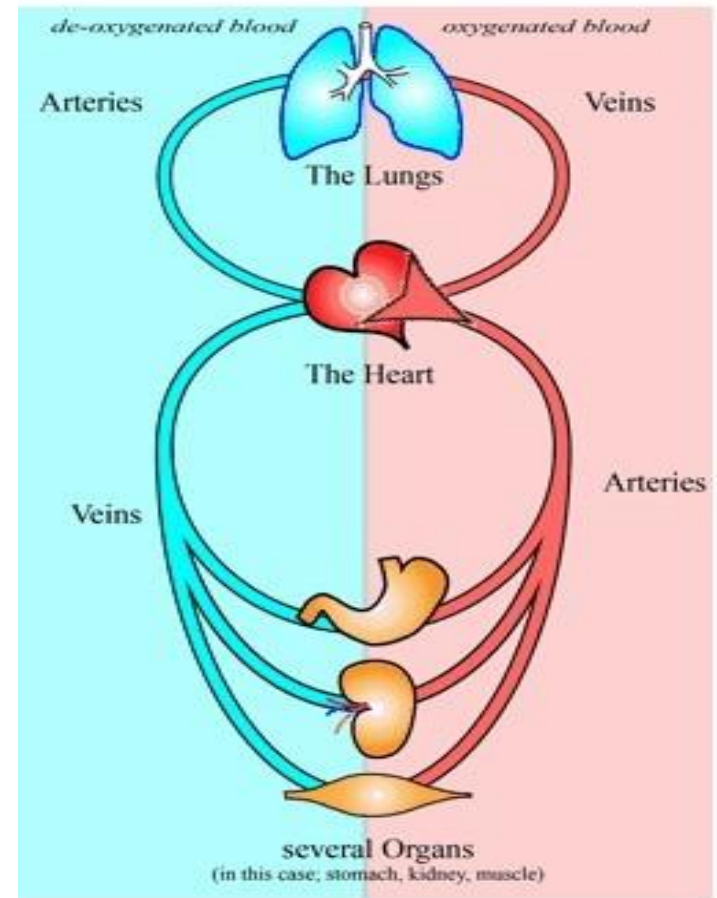
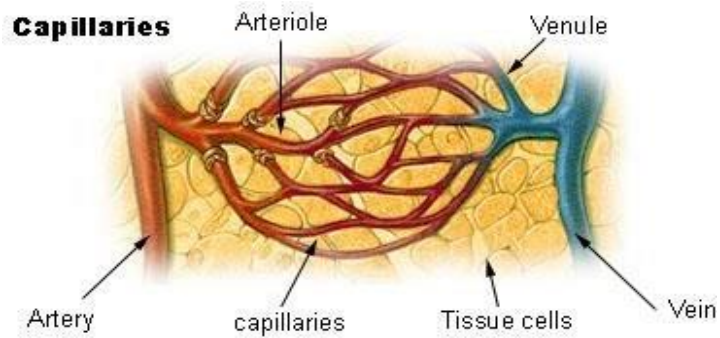
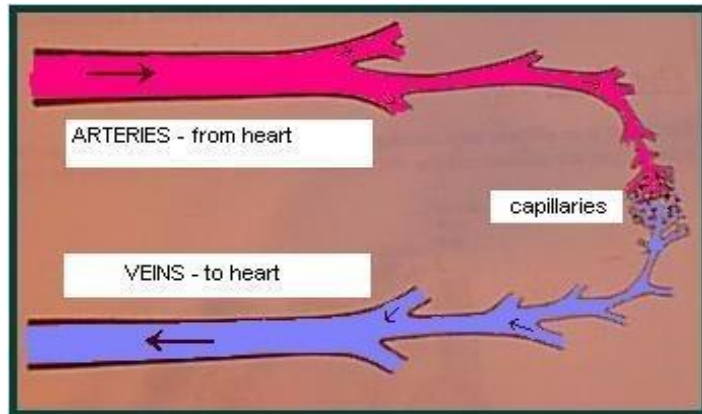


CAPILLARIES

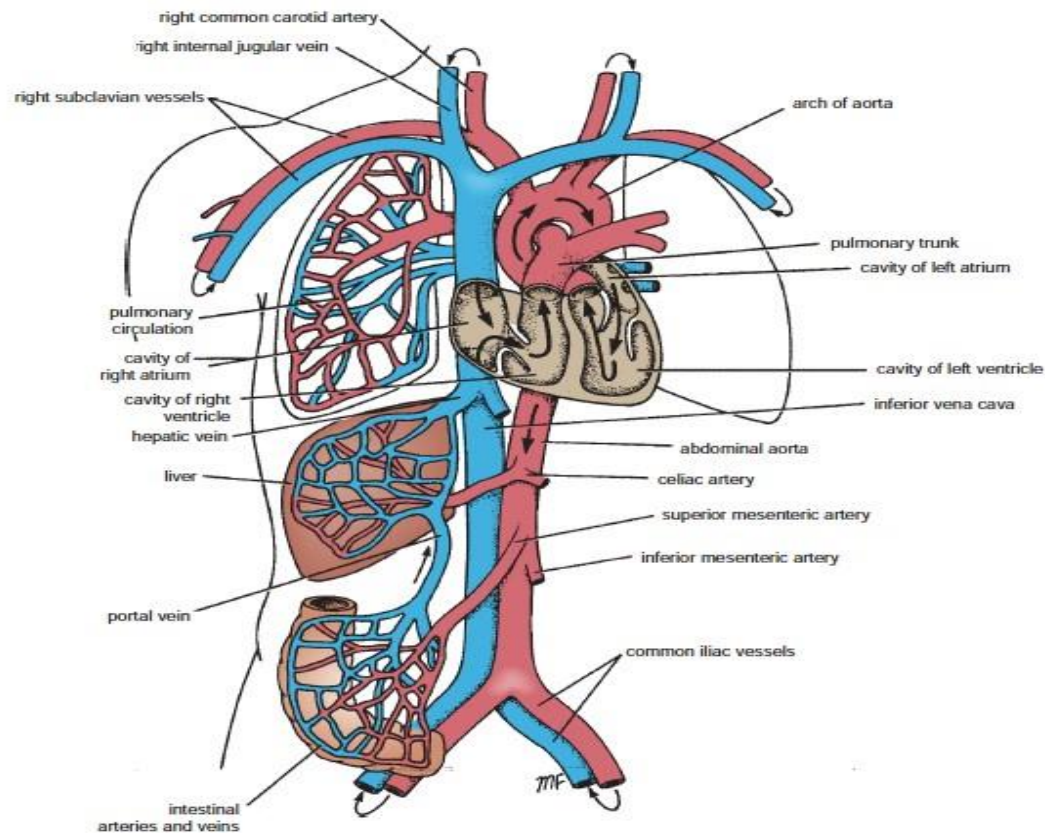
- Body tissues contain a vast network of thin capillaries.
- Capillary walls are only one cell thick, allowing exchange of gases, nutrients, and wastes.
- Capillaries are so fine that red blood cells must line up single file to go through them.



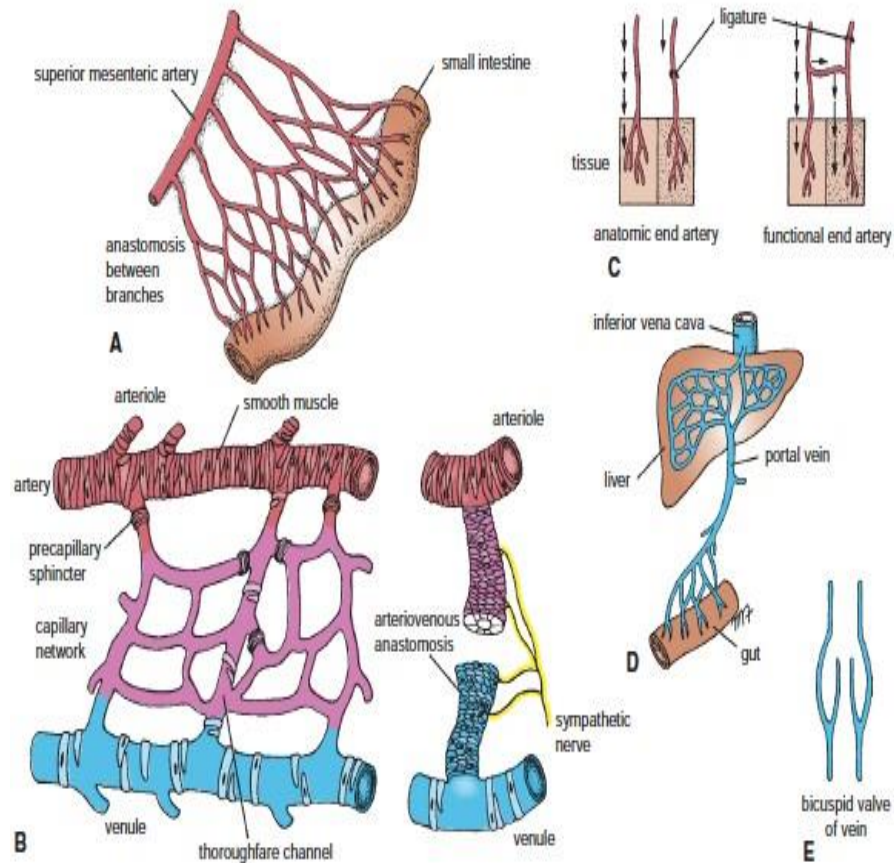
ARTERIES, VEINS, AND CAPILLARIES



CARDIOVASCULAR SYSTEM



Types of blood vessels and their union methods



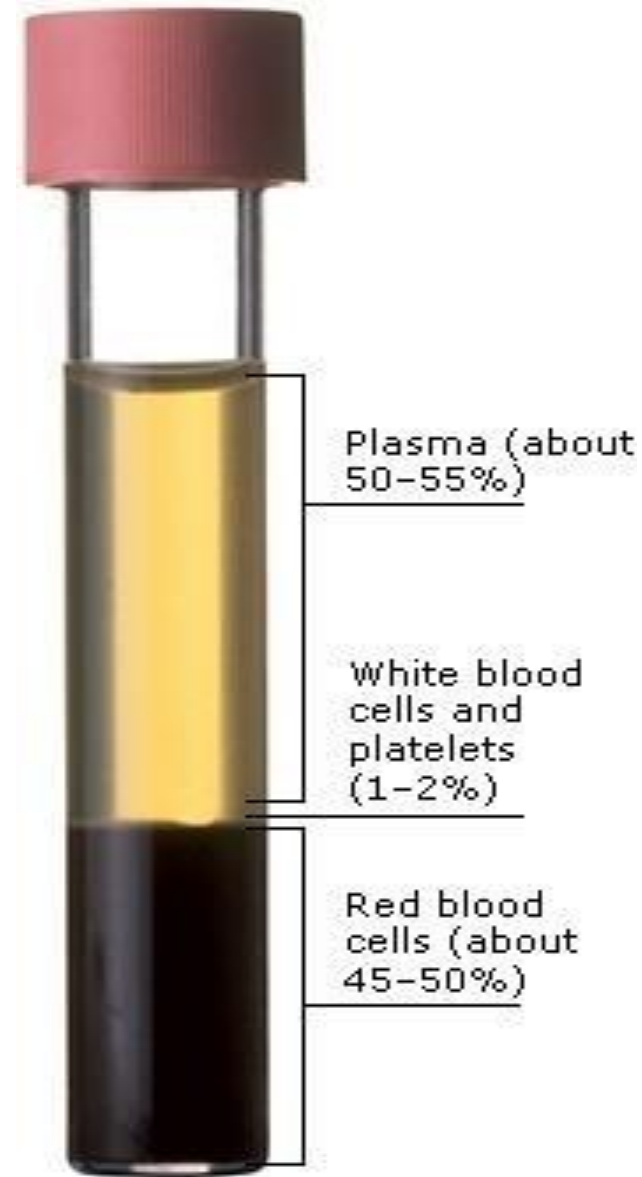
BLOOD

Blood forms about one-twelfth of the body weight of an adult, amounting to about 5 liters (11 pints) in volume. 45% – 50% is red Blood Cells

Roughly 50–55 % of blood is plasma, the liquid-only portion in which cellular components are distributed.

Plasma contains 90 per cent water with dissolved substances such as glucose (blood sugar), hormones, enzymes, and also waste products such as urea and lactic acid.

Plasma also contains proteins such as albumin, fibrinogen (important in clotting), and globular proteins or globulins.





RED BLOOD CELLS (ERYTHROCYTES)

- ⦿ They are Transporters of
 - Oxygen
 - Carbon Dioxide
- ⦿ Red Blood Cells
 - Lack a nucleus
 - Contain hemoglobin
 - Disk-shaped
- ⦿ They are produced in red bone marrow of the:
 - ribs
 - Humerus (upper arm bone)
 - Femur (upper leg bone)
 - sternum, and other long bones
- ⦿ They live for 120 days
- ⦿ Old red blood cells are destroyed in the liver and spleen

Their shape is described as Bio-Concave as they have depressions on both sides, so they have a maximum amount of surface to absorb oxygen from the lungs

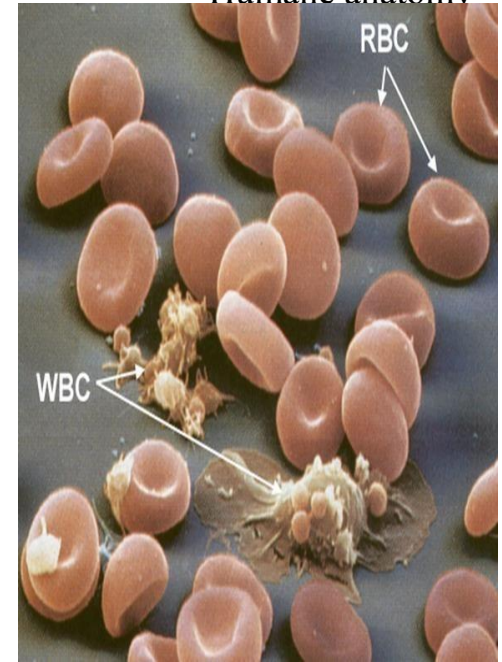
WHITE BLOOD CELLS

- White blood cells defend against disease by recognizing proteins that do not belong to the body.

They can pass through the walls of capillaries to patrol the tissues and reach the lymph system.



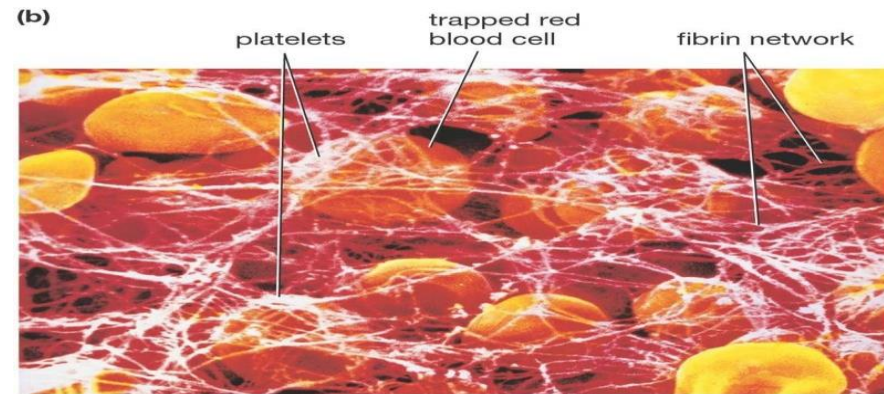
Humane anatomy



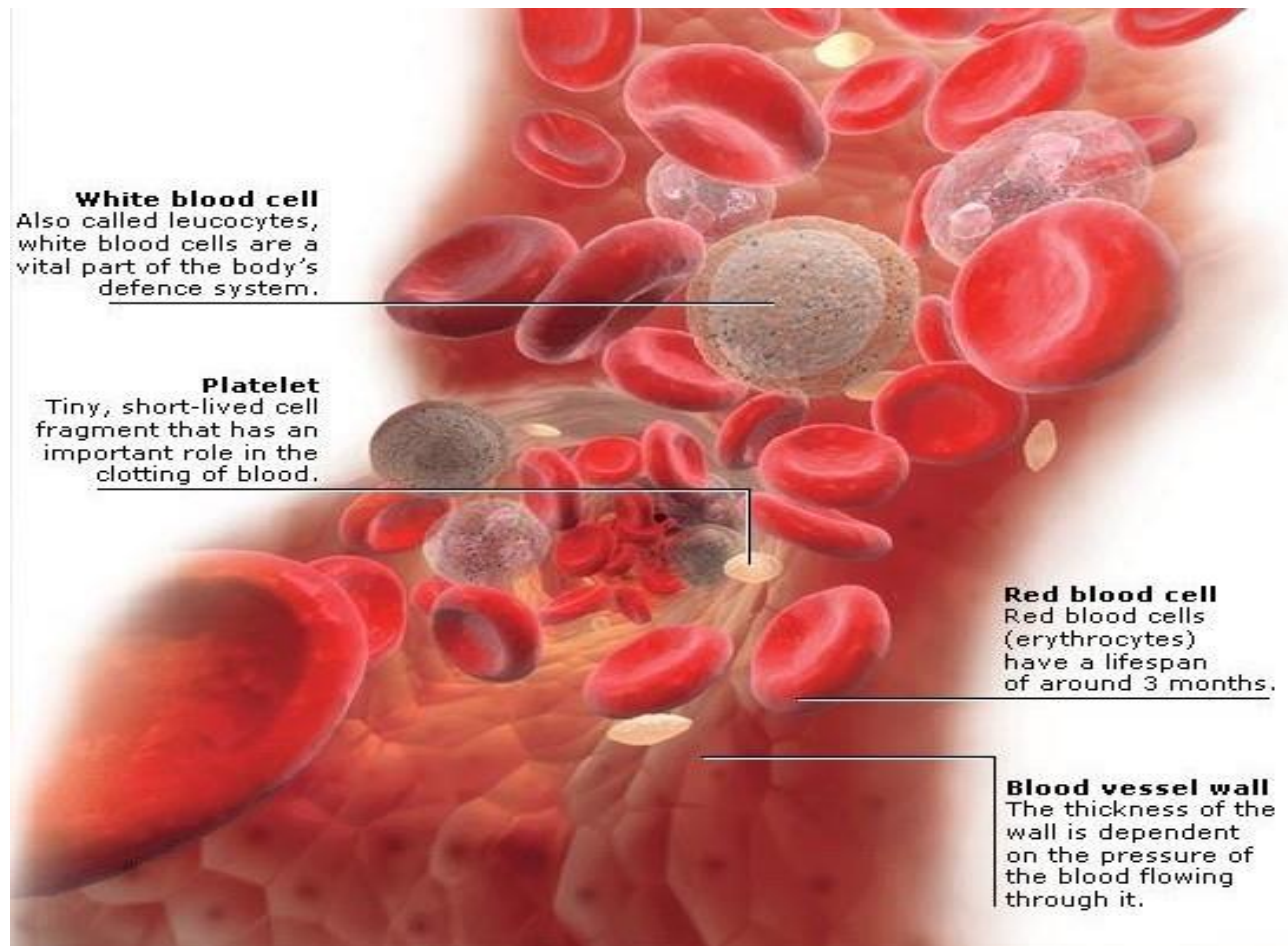
PLATELETS

- Platelets are cell fragments used in blood clotting.
- They are derived from megakaryocytes.

Because they lack a nucleus, platelets have a short lifespan, usually about 10 days.

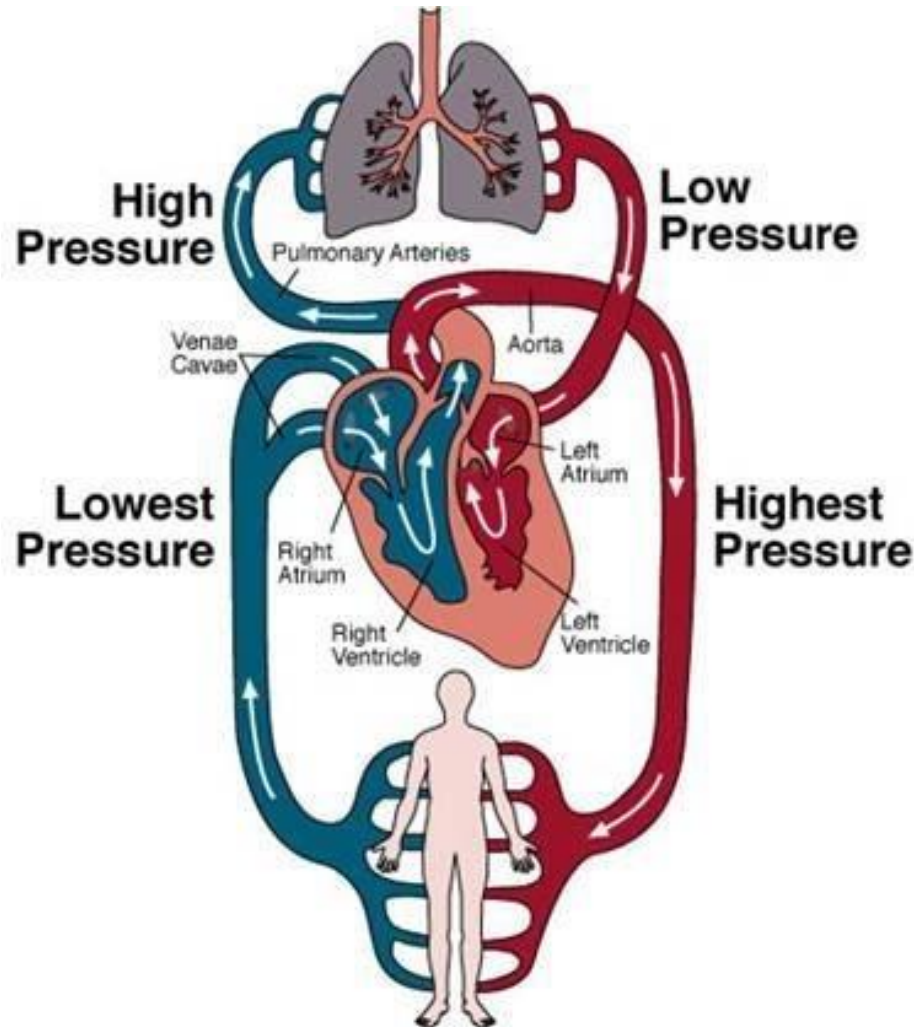


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BLOOD PRESSURE

As blood is moved through your body, it exerts pressure against the walls of blood vessels.



- **Systolic Pressure:** as your heart contracts to push blood into your arteries, your blood pressure is at its highest point.
- **Diastolic Pressure:** As your heart relaxes to refill, blood pressure is at its lowest point.

There is an electrical system inside your heart that controls the rate (speed) and rhythm of your heart. A normal heart rhythm is called normal sinus rhythm (NSR).

When there is a problem with your heart rhythm or rate, it is called arrhythmia.

The heart's electrical system

It starts with an electrical signal in the right atrium, at the SA Node (sinoatrial node). The electrical signal then spreads throughout the heart from top to bottom (from atria to ventricles). As one part contracts, the others relax in a sequence.

WHAT IS AN ECG OR AN EKG?

- An electrocardiogram (ECG or EKG) is a test that checks how your heart is functioning by measuring the electrical activity of the heart.

With each heartbeat, an electrical impulse (or wave) travels through your heart. This wave causes the muscle to squeeze and pump blood from the heart.

An ECG measures and records the electrical activity that passes through the heart. A doctor can determine if this electrical activity is normal or irregular.



