

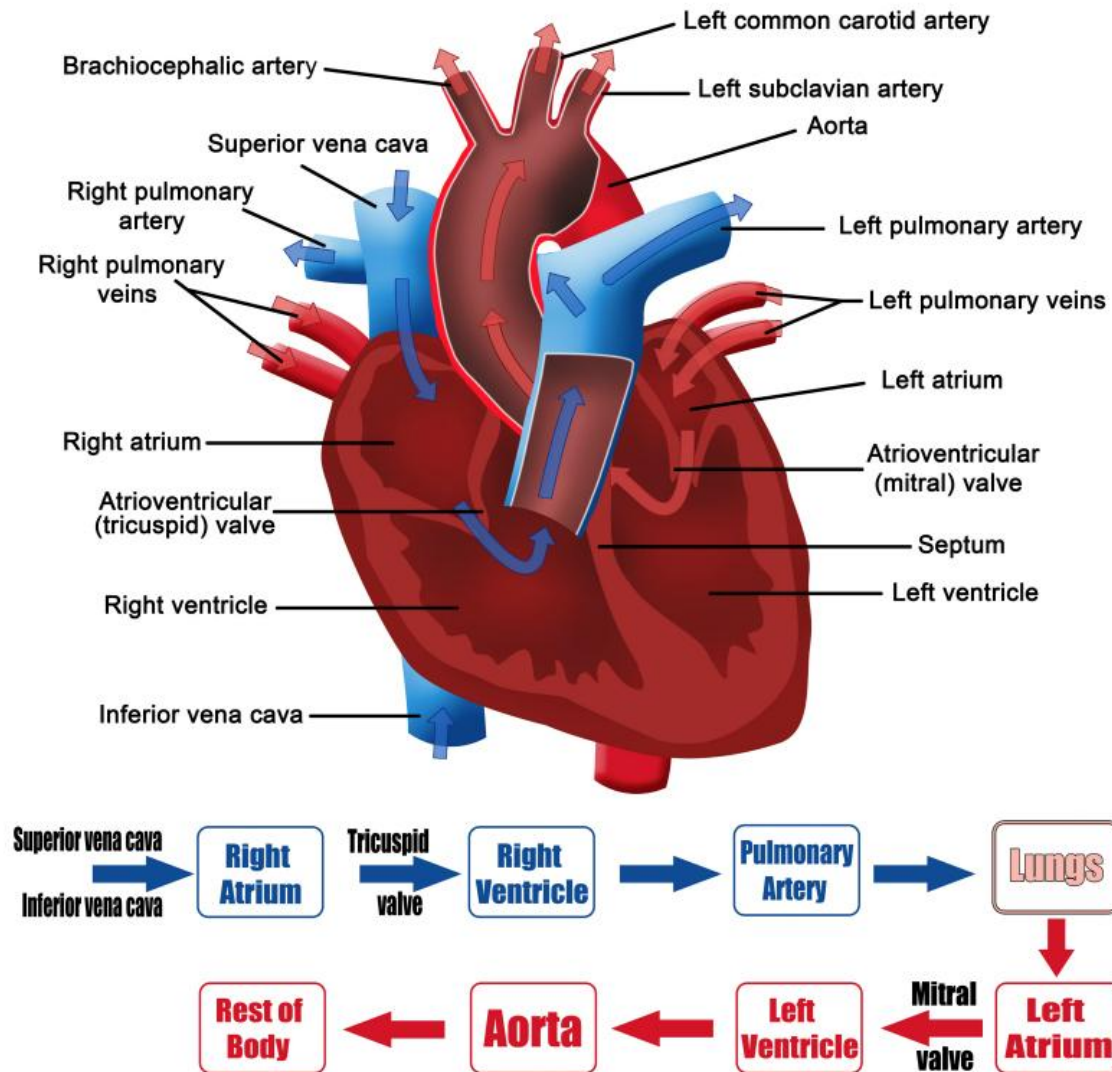
## Circulatory System

The circulatory system consists of two subdivisions the cardiovascular system and the lymphatic system.

**The cardiovascular system** consists of the heart and blood vessels.

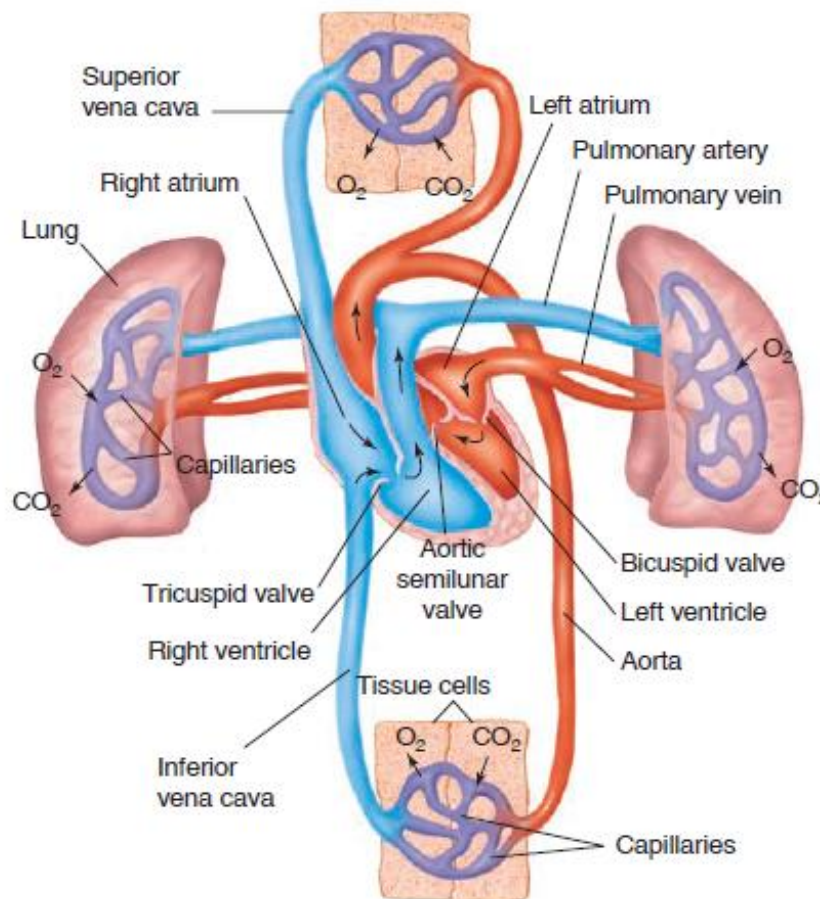
**The heart** consists of four chambers; two auricles (atria) and two ventricles separated by atrio-ventricular groove. The anterior and posterior vena cava open on the upper and lower parts of the right atrium, respectively. They bring non- oxygenated blood from different tissues to the right atrium. This blood passes to the right ventricle through the tricuspid valve. The pulmonary arch opens at the left of the right atrio-ventricular groove and guarded by the pulmonary valve. It transfers non- oxygenated blood to the lungs through two pulmonary arteries. Four pulmonary veins open at the left atrium. They transfer blood from lungs to the left atrium. The aorta opens on the left ventricle and is guarded by three semilunar valves. It transfers oxygenated blood to different parts of the body.

# CIRCULATION OF BLOOD THROUGH THE HEART



**Blood vessels** form a tubular network that permits blood to flow from the heart to all the living cells of the body and then back to the heart. Arteries carry blood away from the heart, whereas veins return blood to the heart. Arteries branch extensively to form a “tree” of progressively smaller vessels. The

smallest of the arteries are called arterioles. While the smallest of the veins are called venules. Arterioles and venules are continuous with each other through microscopic blood vessels called capillaries, which are the thinnest and most numerous of the blood vessels. All exchanges of fluid, nutrients, and wastes between the blood and tissues occur across the walls of capillaries.



A diagram of the cardiovascular system

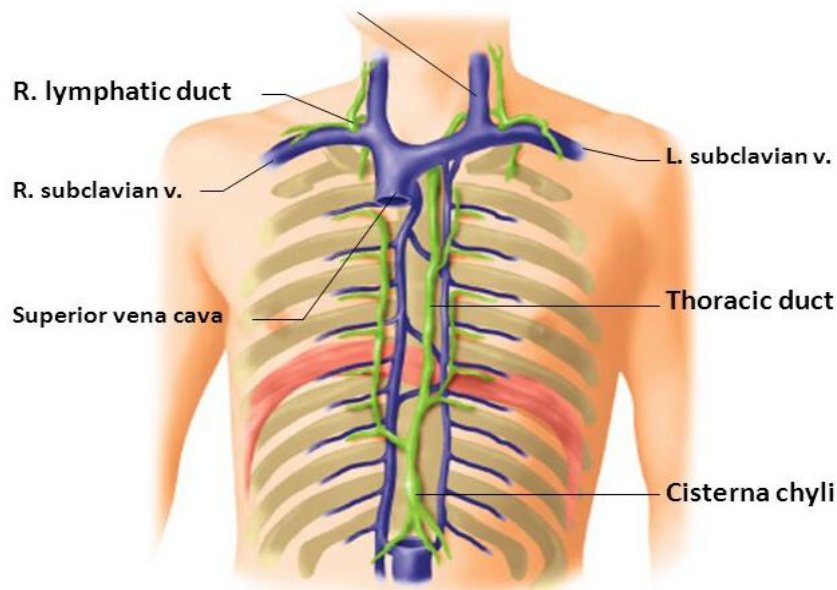
**Blood** is a liquid connective tissue. Blood volume is about 5 liters in adult male and 4 liters in adult female. Blood can be divided into plasma and corpuscles. Plasma contains 90 % water and 10 % other substances (soluble proteins, electrolytes, dissolved respiratory gases and nutrients). Blood corpuscles are distinguished into leukocytes, erythrocytes and blood platelets or thrombocytes. Leucocytes are classified into granulocytes (eosinophils, basophils and neutrophils) and agranulocytes (lymphocytes and monocytes).

**Functions of blood:**

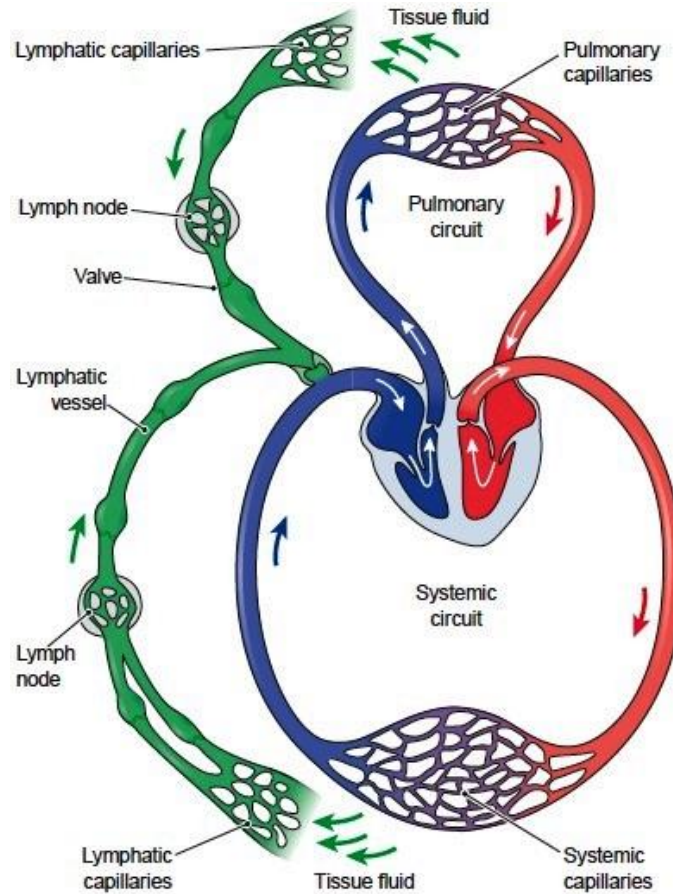
- 1- It transports oxygen from lungs to tissues.
- 2-It transports carbon dioxide from tissues to lungs.
- 3-It carries nutrients as glucose and amino acids.
- 4-It transports wastes of metabolism and toxic substances to kidney.
- 5- It transports some enzymes and hormones to affected organs.
- 6- It helps in regulation of body temperature.
- 7-Leukocytes protect the body against bacteria and harmful microorganisms.

**The lymphatic system** includes lymphatic vessels and lymphoid tissues within the spleen, thymus, tonsils, and lymph nodes.

The smallest vessels of the lymphatic system are the lymphatic capillaries. Lymphatic capillaries form vast networks in the intercellular spaces within most organs. Lymph is carried by lymphatic capillaries into larger lymphatic vessels called lymph ducts. The walls of lymph ducts are similar to those of veins. The lymph ducts empty into one of two principal vessels: the thoracic duct or the right lymphatic duct. These ducts drain the lymph into the left and right subclavian veins, respectively. Before the lymph is returned to the cardiovascular system, it is filtered through lymph nodes. The composition of lymph is nearly the same as that of plasma with lower protein contents.



A diagram of the lymphatic system



A diagram of the circulatory system