CARDIOVASCULAR SYSTEM AND BLOOD

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- **The heart pumps blood to every cell in the body. That job is critical, because without the oxygen and nutrients that the blood delivers, body cells quickly die.**

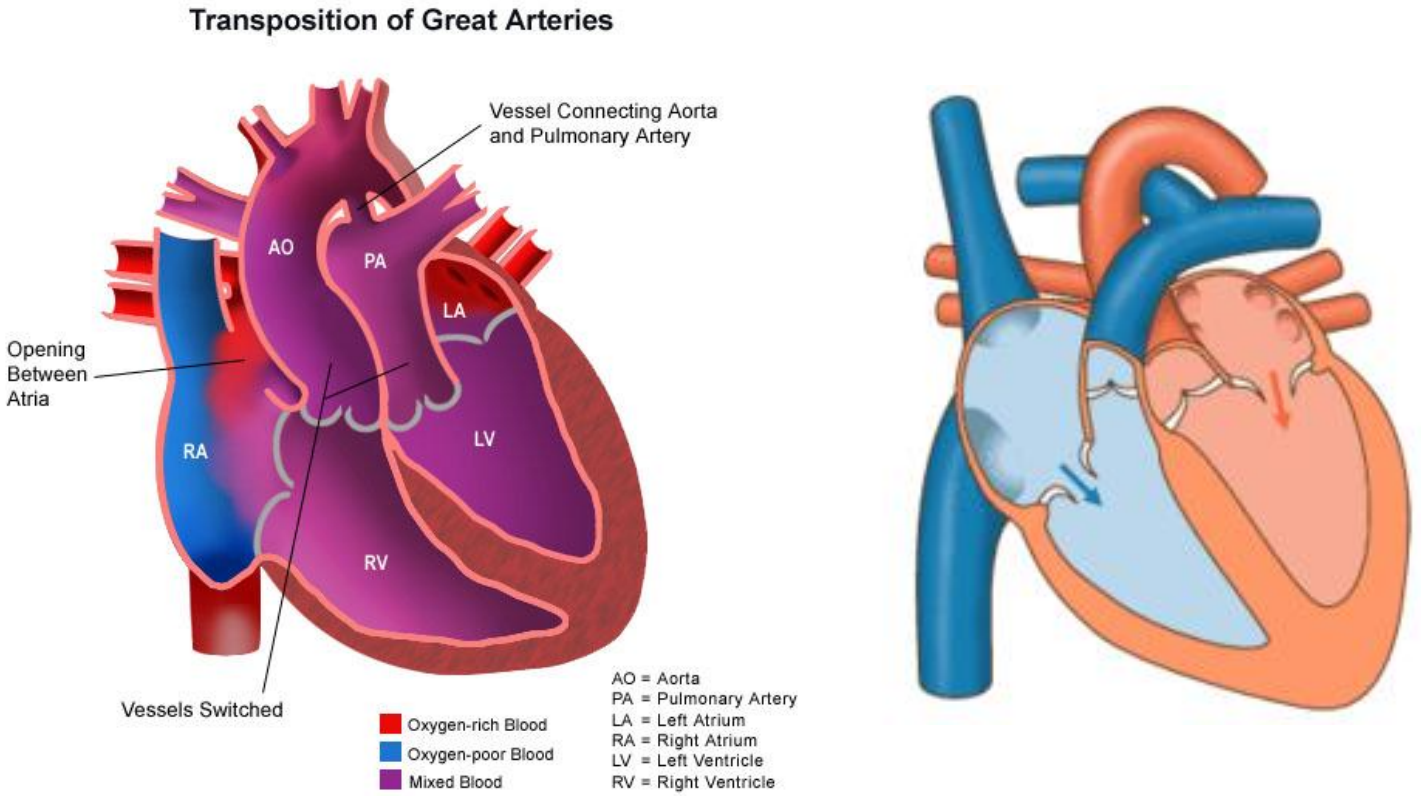
ROOT	Refers to
aort/o	aorta
atri/o	atrium
valv/o, valvul/o	valve
ventricul/o	ventricle

- **The Structure of the Heart**

  The membrane forming the outer lining of the heart is called the epicardium. Immediately beneath the epicardium is the myocardium, comprising the muscles, blood vessels, and nerve tissue that make up the bulk of the heart. The heart's inner surface is called the endocardium.

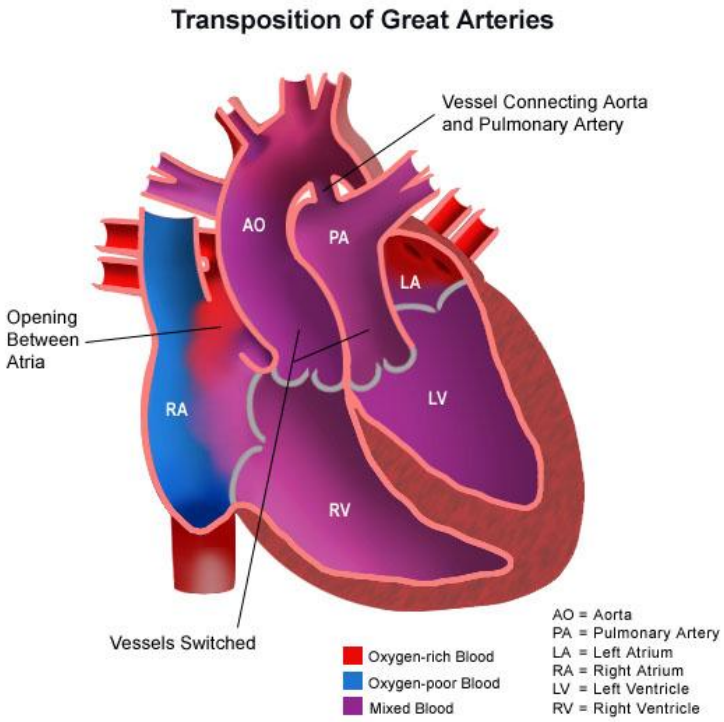
The heart has four chambers: the right atrium, the right ventricle, the left atrium, and the left ventricle.

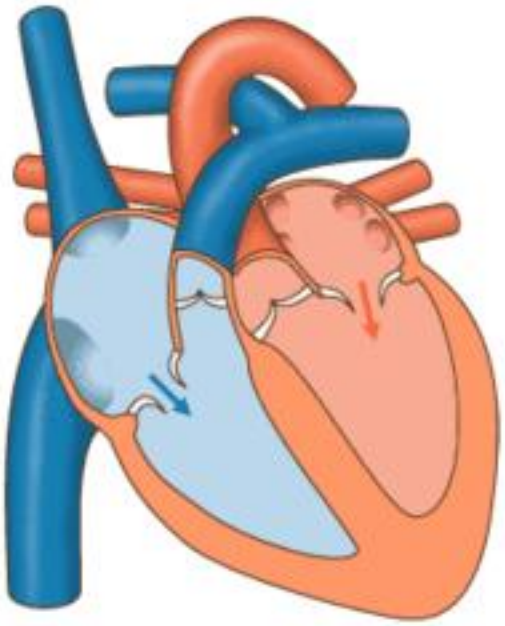
- **A heart valve normally allows blood to flow in only one direction through the heart**



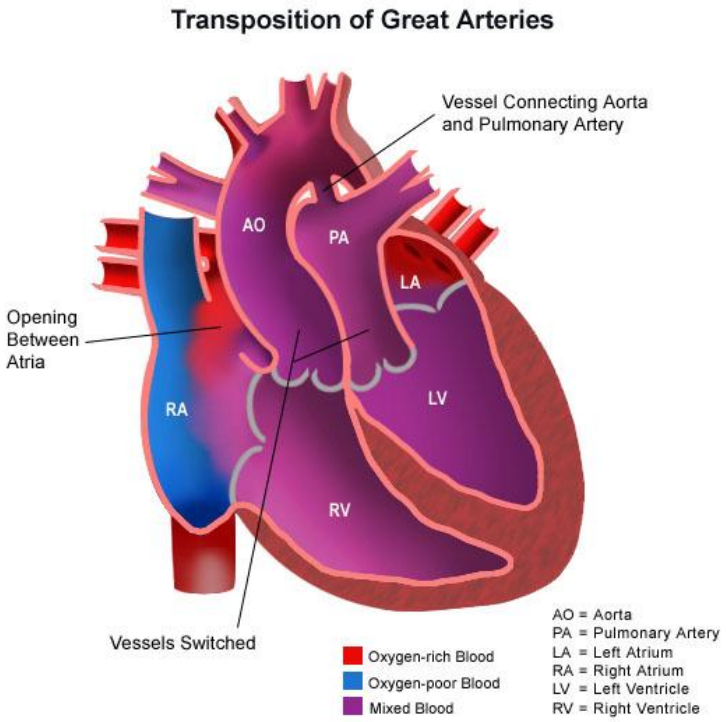
- **The four main valves in the heart are:**

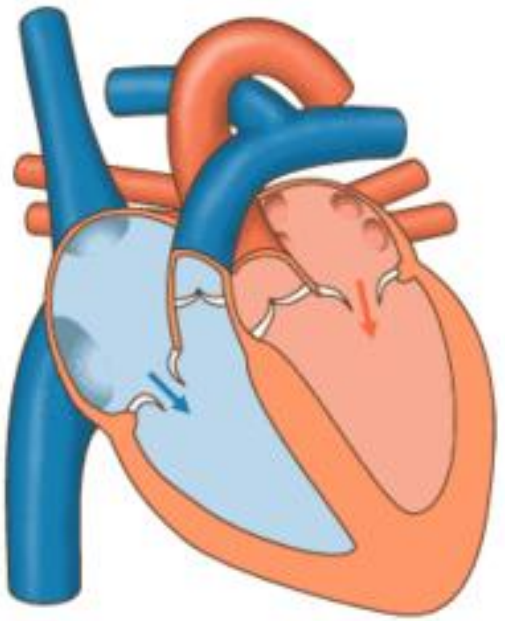
  The two atrioventricular (AV) valves, the mitral valve (bicuspid valve), and the tricuspid valve, which are between the upper chambers (atria) and the lower chambers (ventricles).





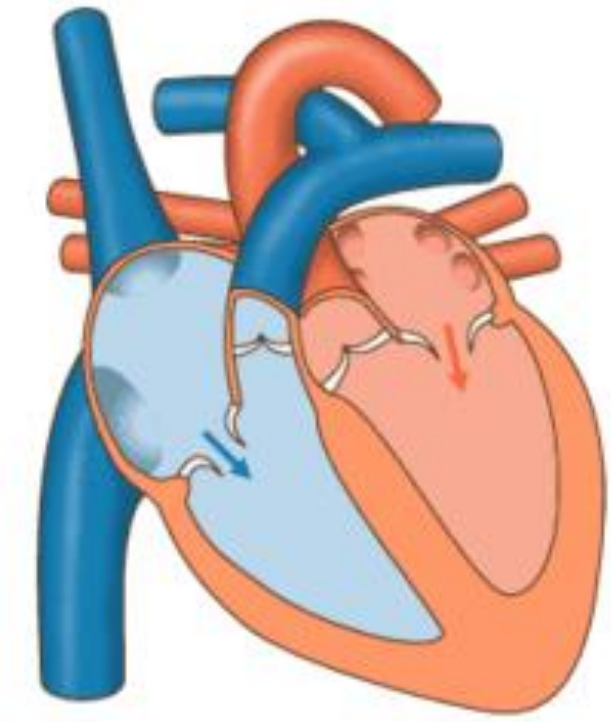
- **The two semilunar (SL) valves, the aortic valve and the pulmonary valve.**
- **The mitral valve and the aortic valve are in the left heart; the tricuspid valve and the pulmonary valve are in the right heart.**



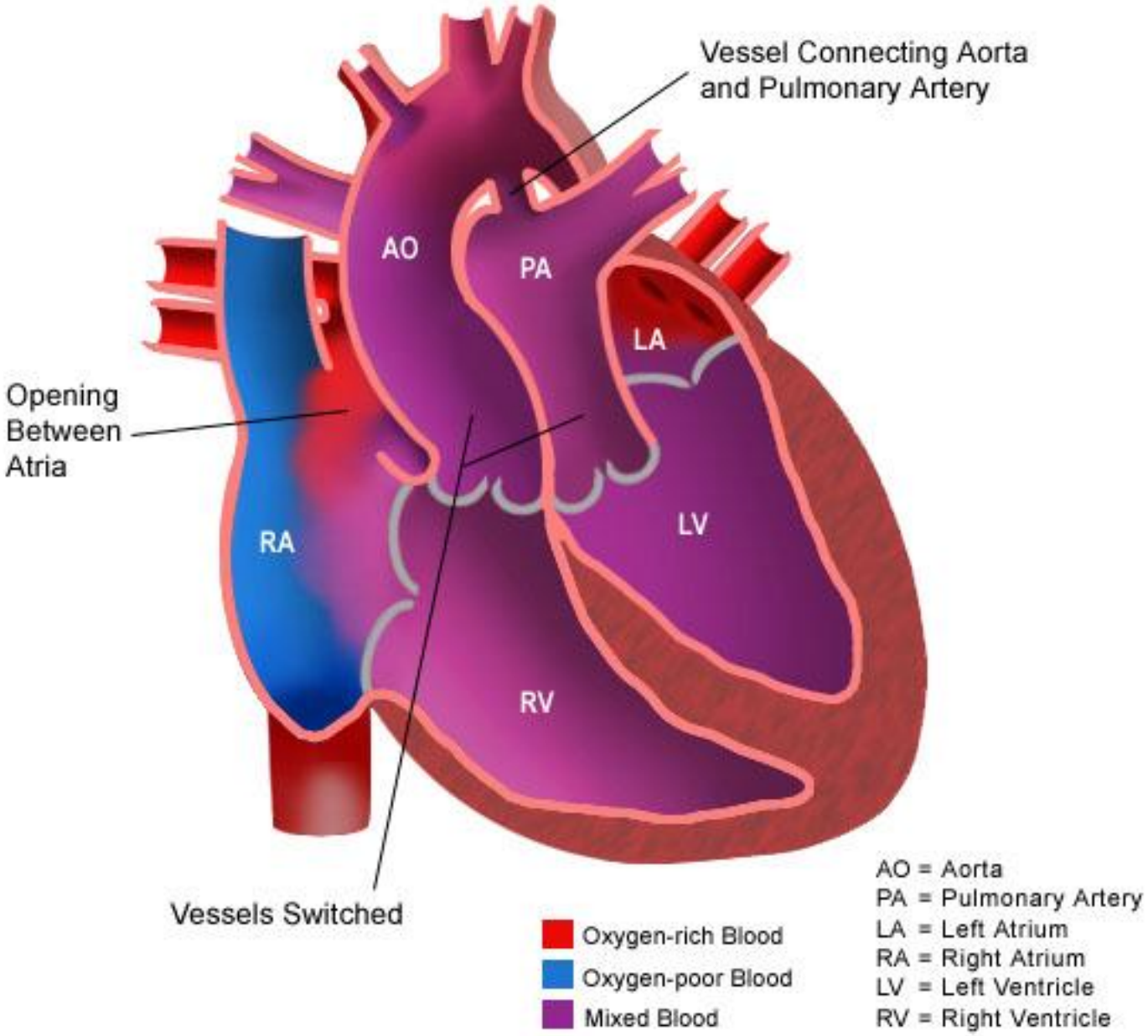


Blood Flow through the Heart

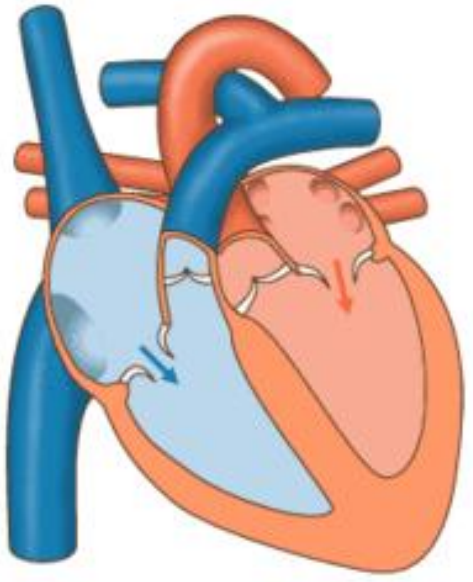
When blood comes back to the heart after having delivered oxygen and other nutrients to the body's cells. It re-enters the heart at the right atrium.



Transposition of Great Arteries



- **From there it moves into the right ventricle and pumped into the lungs. After being recharged with oxygen, the blood moves back into the heart through the left atrium and into the left ventricle and pumped out to the body.**



COMMON DISORDERS AND PROCEDURES ASSOCIATED WITH THE HEART

Term	Definition
bradycardia	also called bradyarrhythmia; abnormally slow heart beat
cardiac arrest	sudden cessation of heart activity
cardiogram, "electrocardiogram" and "electrocardiograph," ECG	a graphic trace of heart functions

cardiomegaly	**enlargement of the heart**
carditis	**inflammation of the heart**
endocarditis	**inflammation of the endocardium**

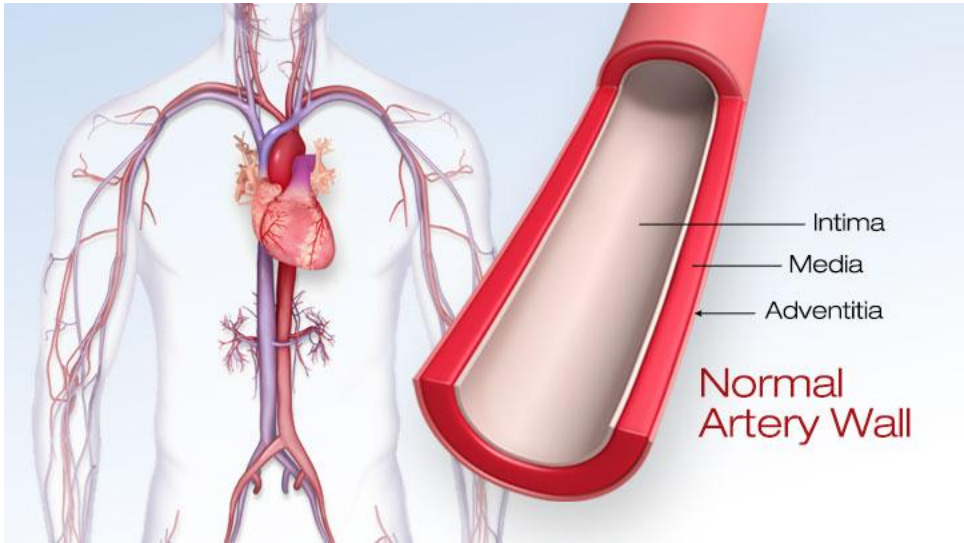
myocarditis	**inflammation of the heart muscle**
tachycardia	**also called tachyarrhythmia; abnormally rapid heartbeat**
myocardial infarction (often abbreviated MI)	**heart attack**

COMMON WORD ELEMENTS RELATED TO THE BLOOD AND BLOOD VESSELS

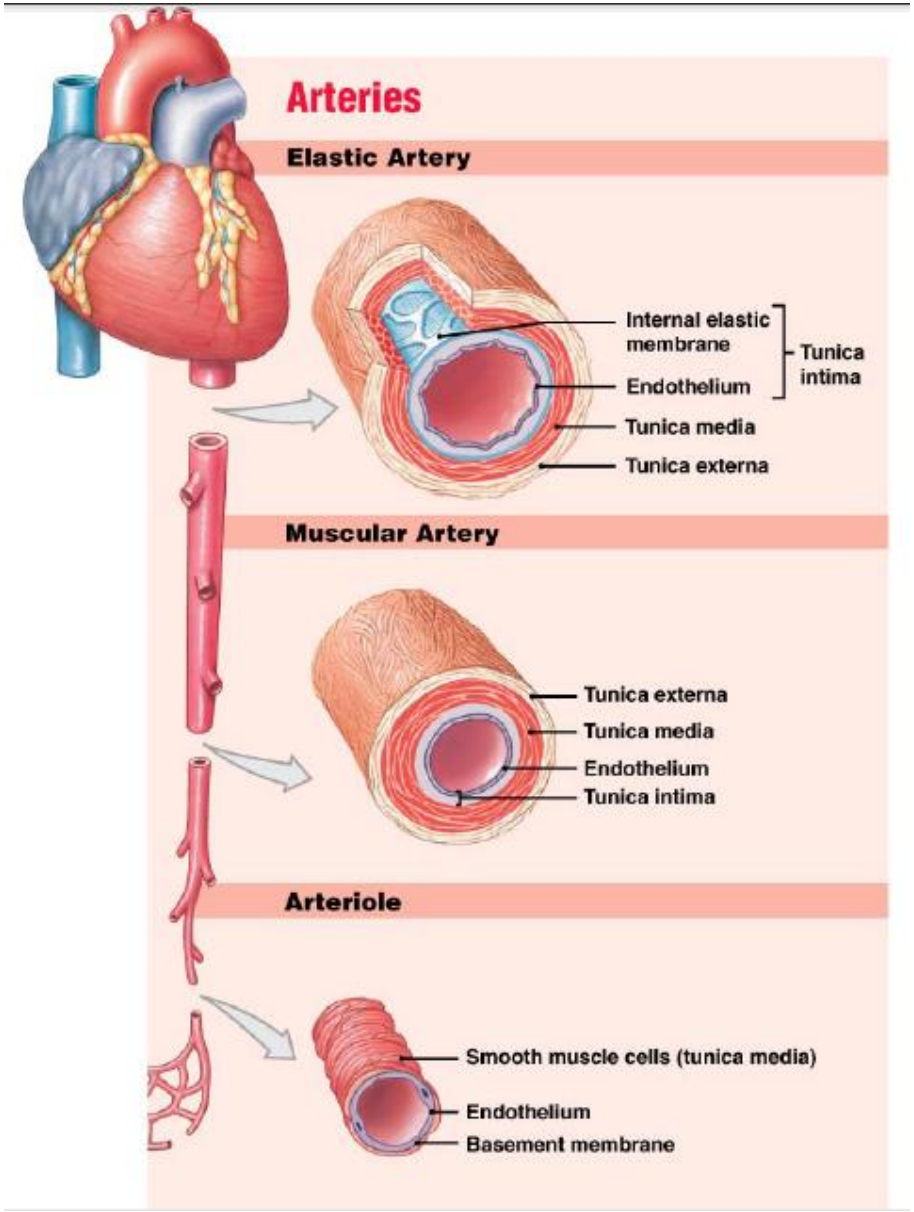
Root	Refers to
ang/i/o	vessel
arteri/o	artery
hem/o; hemat/o	blood
phleb/o	vein
thromb/o	clot
varic/o	a dilated vein
vas/o	vessel
vascul/o	vessel
ven/o	vein

Arteries

Arteries (singular: artery) carry blood away from the heart and, eventually, to the capillaries. Arteries contain muscle tissue, which allows them to vary their diameters. Two terms are associated with this action: they are vasoconstriction (a narrowing of the artery's diameter) and vasodilation (an enlarging of the artery's diameter).



- **The arteries nearest the heart must be able to accommodate the large volume of blood it pumps out with each beat. Artery diameters become smaller as they get nearer to the capillaries.**
- **The three kinds of arteries are conducting arteries, muscular arteries, and arterioles.**



- **Conducting Arteries**

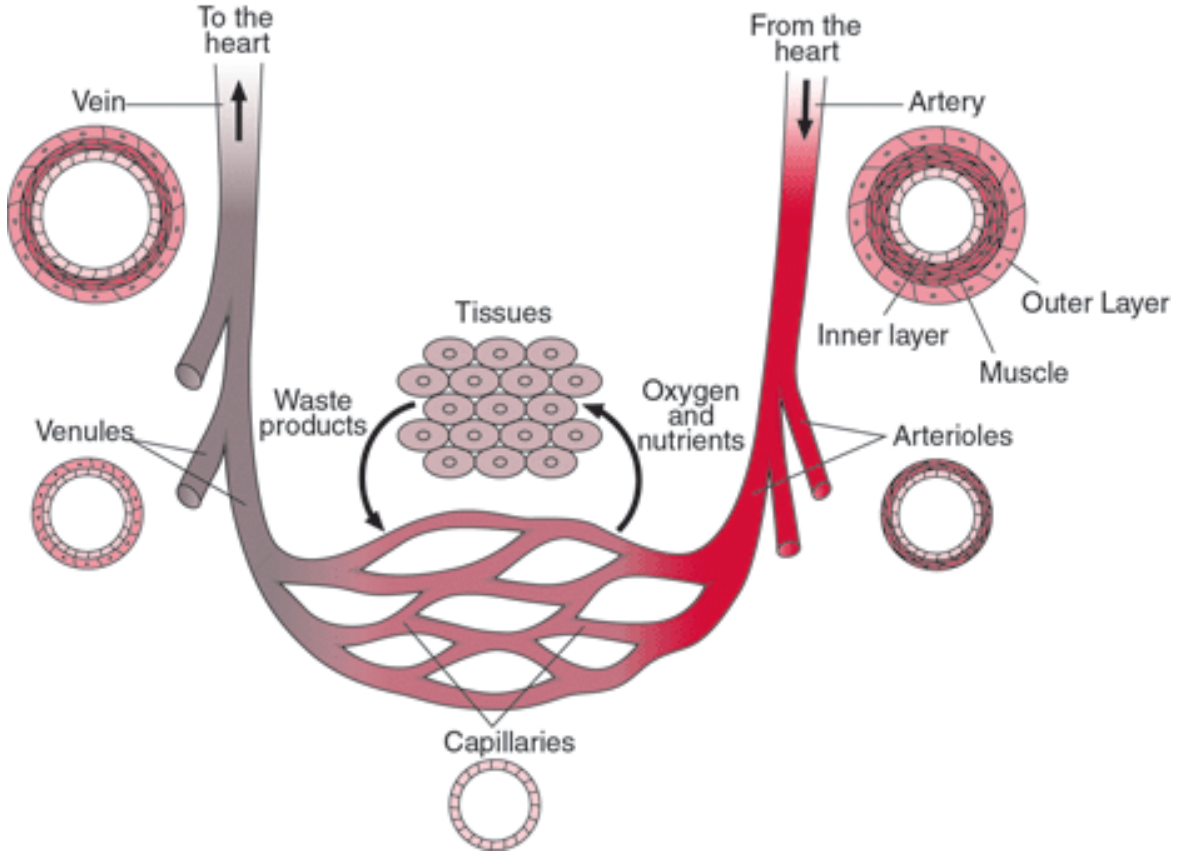
Conducting arteries, sometimes called elastic arteries, can have an inside diameter as great as an inch. The aorta and the pulmonary artery are examples of a conducting artery.

which move blood away from the heart.

- **Medium-Size Arteries (muscular arteries)**

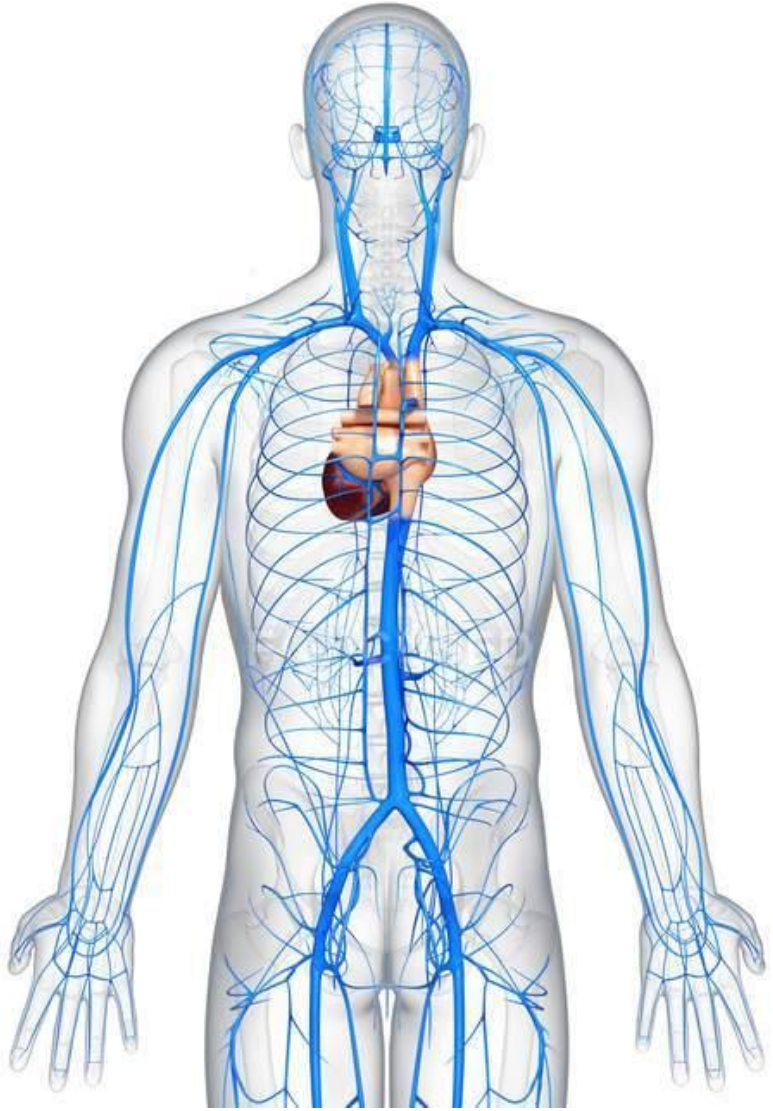
  Because they contain a lot of muscle tissue), typically have an inside diameter of about one-sixth of an inch. The external carotid artery in the neck is an example.

- **Arterioles: are the smallest arteries, with an average inside diameter of 0.0018 of an inch. Arteries and arterioles connect to the capillaries.**

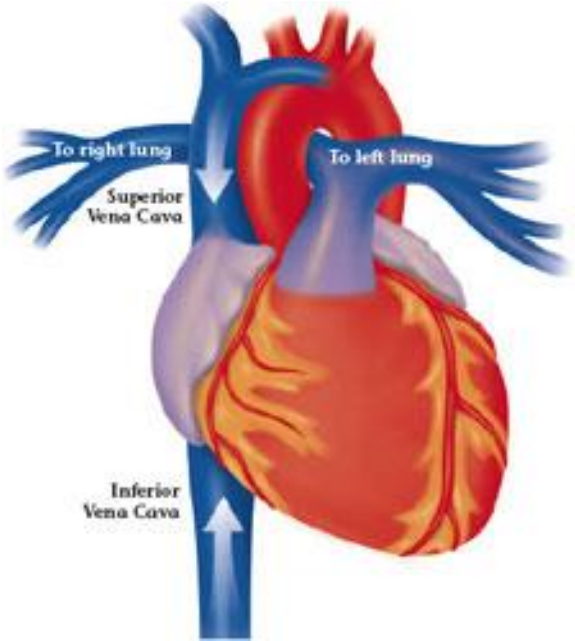


- **Veins**

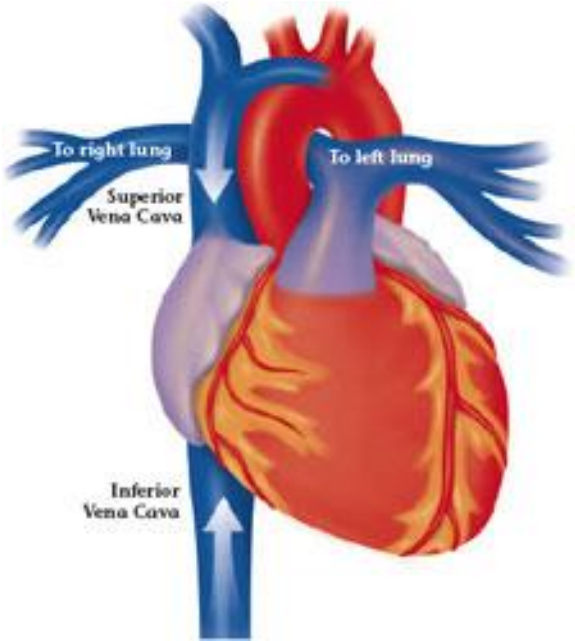
Veins carry blood back to the heart. They follow the same path as the arteries (with blood flowing in the reverse direction). Also, like the arteries, they vary in diameter, becoming larger as they approach the heart because of the increasing volumes of blood they must carry.



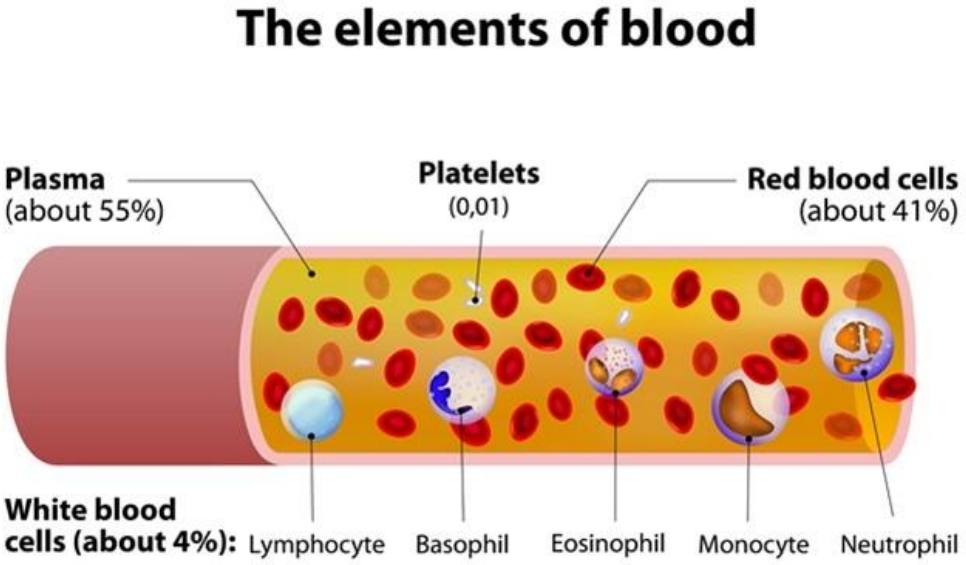
- **The vein counterparts of the conducting arteries are the superior vena cava and the inferior vena cava. All the other large veins of the body system drain into one or the other of these.**
- **The counterparts of the muscular arteries and arterioles are the medium veins and venules.**



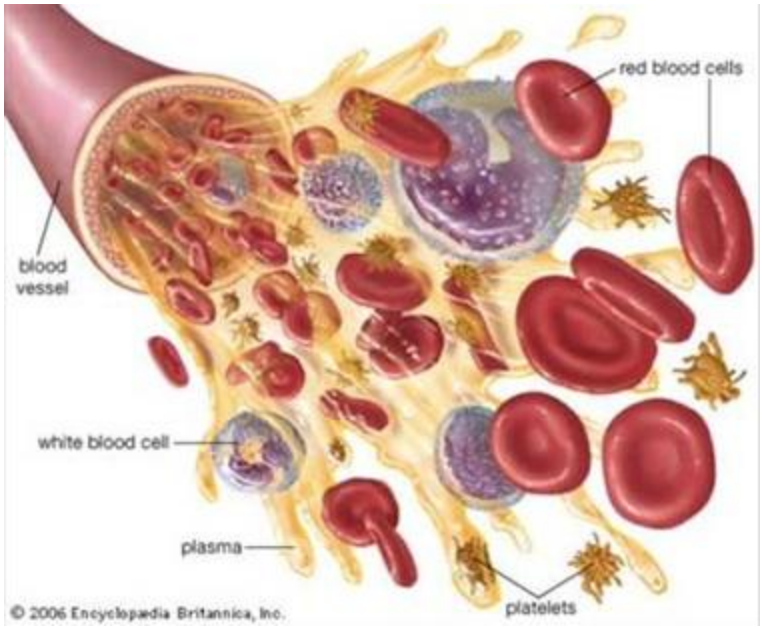
- **The superior vena cava drains blood from the upper body, including the head, neck, shoulders, and arms. The inferior vena cava, likewise, receives blood from the lower body, the dividing line being the diaphragm.**



- **Blood**
- **Whole blood is made up of plasma and the formed elements it contains.**
- **Blood plasma, a yellowish liquid that is 90% water, also contains proteins and other nutrients in solution, such as water-soluble vitamins and minerals.**



- **In addition, it carries the formed elements that are a part of whole blood: namely, erythrocytes, leukocytes, and platelets. Thus, although whole blood remains a fluid, it is about five times denser than water.**



The three main classes of blood plasma proteins are albumins, globulins, and fibrinogens. Two other terms that name common blood proteins are antibodies(also known as immunoglobulins) and lipoproteins.

Major Types:

Albumin *(60%)*

Major component of osmotic pressure of plasma

Globulins *(35%)*

Antibodies (immunoglobulin) and transport proteins

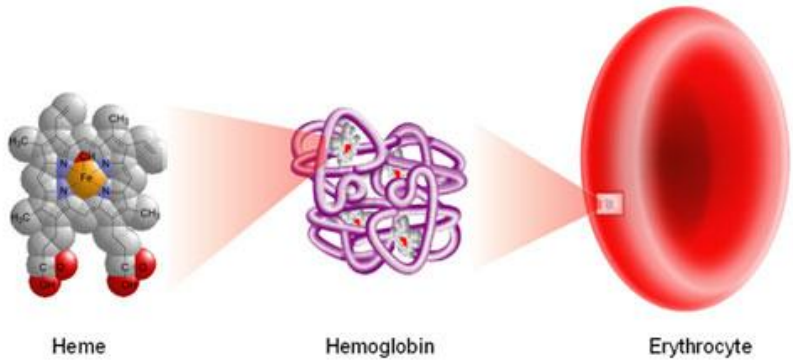
Fibrinogens *(4%)*

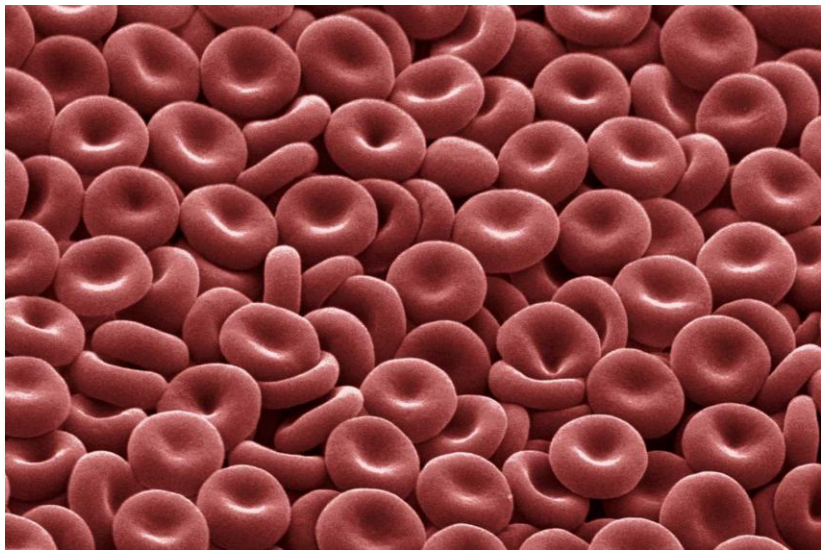
Functions in blood clotting

Other *(<1%)*

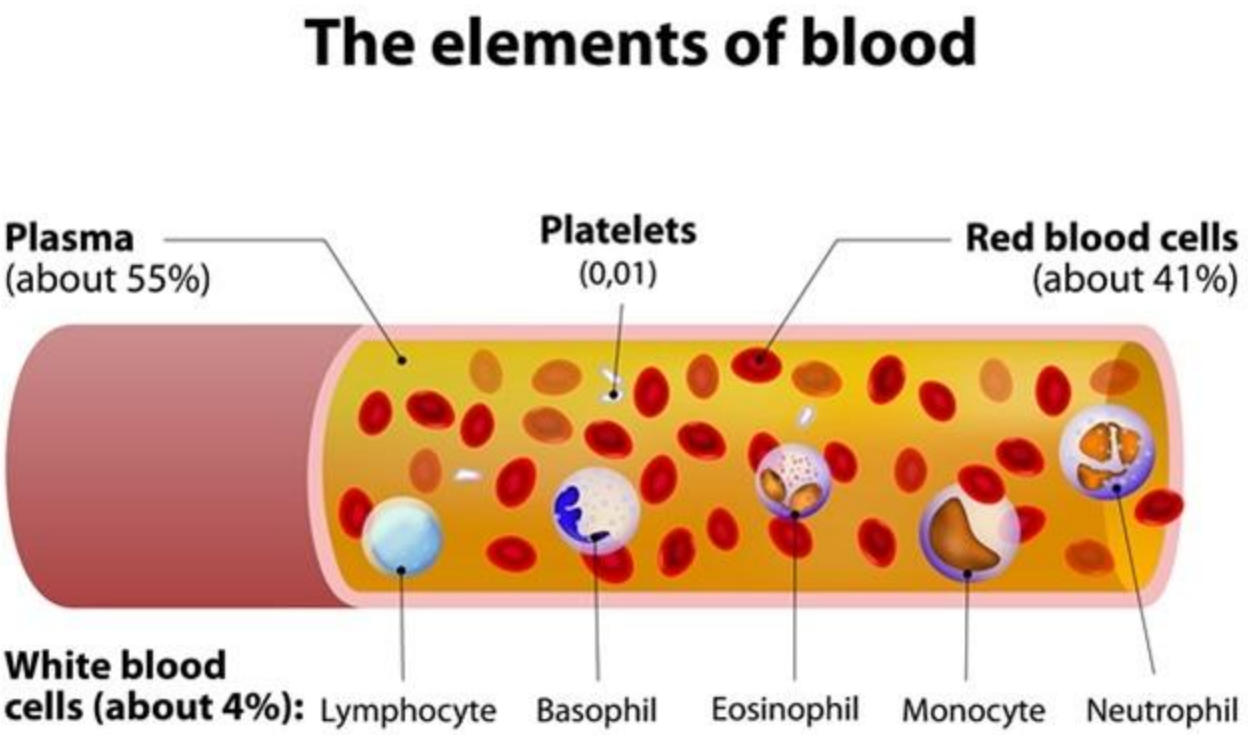
Various roles (α-1-antitrypsin, coagulation factors, etc.)

Erythrocytes are red blood cells, abbreviated RBC, and leukocytes are white blood cells, abbreviated WBC. Red blood cells make up 99.9% of the formed elements in the blood. Hemoglobin, which is abbreviated Hb and binds only to RBCs, gives blood its red color.

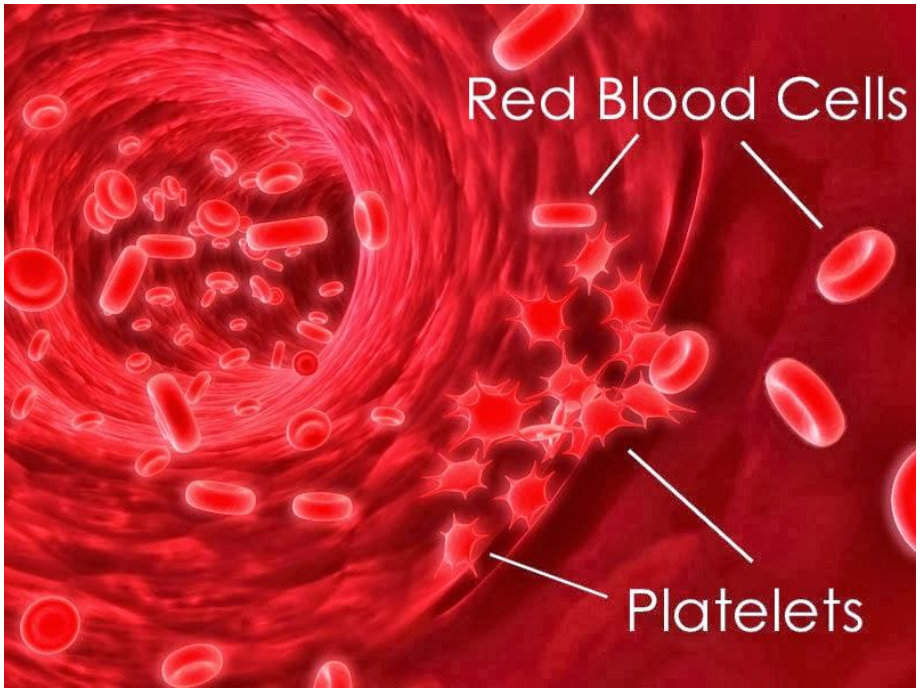




- **White blood cells do not all do the same job and are not all the same size. However, all WBCs are at least slightly larger than RBCs.**



- **Platelets, which are very small in comparison to both RBCs and WBCs, are formed elements that are important in the coagulation process. They are produced in the bone marrow .**



Blood and Blood Vessel Disorders

Term	Definition
hemolysis	change or destruction of red blood cells
hemophilia	congenital disorder affecting the coagulation process
hemorrhage	discharge of blood
vasculitis (also angiitis)	inflammation of a vessel
vasospasm	spasm in blood vessels (angiospasm)

Term	Definition
Aneurysm	a bulge in an artery (or a heart chamber)
angiitis (also vasculitis)	inflammation of a blood vessel
Angiogram	the printed record obtained through angiography
Angiography	radiography of a blood vessel after injection of a contrast medium
angiopathy (also vasculopathy)	any disease of blood vessels
Angioplasty	surgical repair of a blood vessel
Angiorrhaphy	suture of a vessel
Angiospasm	spasm in blood vessels
Angiostenosis	narrowing of a blood vessel
Angiotomy	incision into a blood vessel
Arteriolitis	inflammation of the arterioles

Term	Definition
arteriopathy	any disease of the arteries
arterioplasty	surgical repair of an artery
arteriorrhexis	rupture of an artery
arteriorrhaphy	suturing of an artery
arteriosclerosis	hardening of the arteries
arteriospasm	spasm of an artery
arteriostenosis	narrowing of an artery
arteriotomy	an incision into an artery
arteriovenous	adjectival form of “arteries and veins”

Term	Definition
arteritis	inflammation of an artery or arteries
hemolysis	change or destruction of red blood cells
hemopathy	any disease of the blood
hemophilia	congenital disorder affecting the coagulation process
hemorrhage	discharge of blood
hemorrhagic fever	category that includes a number of viral diseases, one of which is Ebola fever
vasculitis (also angiitis)	inflammation of a vessel
vasculopathy (also angiopathy)	any disease of blood vessels
vasoparalysis	paralysis of blood vessels
vasoparesis	similar to but less severe than vasoparalysis
vasospasm	spasm in blood vessels (angiospasm)

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