

Medical terminology: Circulation system

Dr Bahn Agha

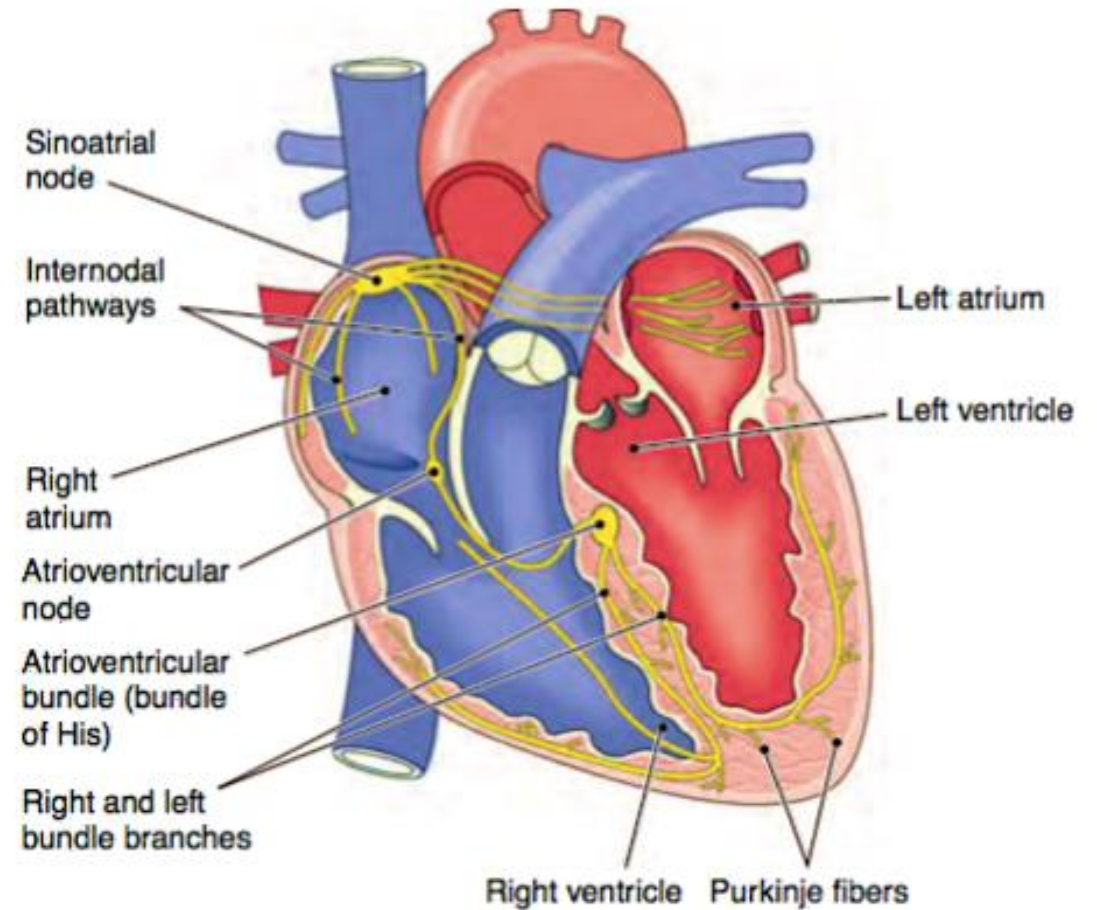
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THE CARDIOVASCULAR SYSTEM

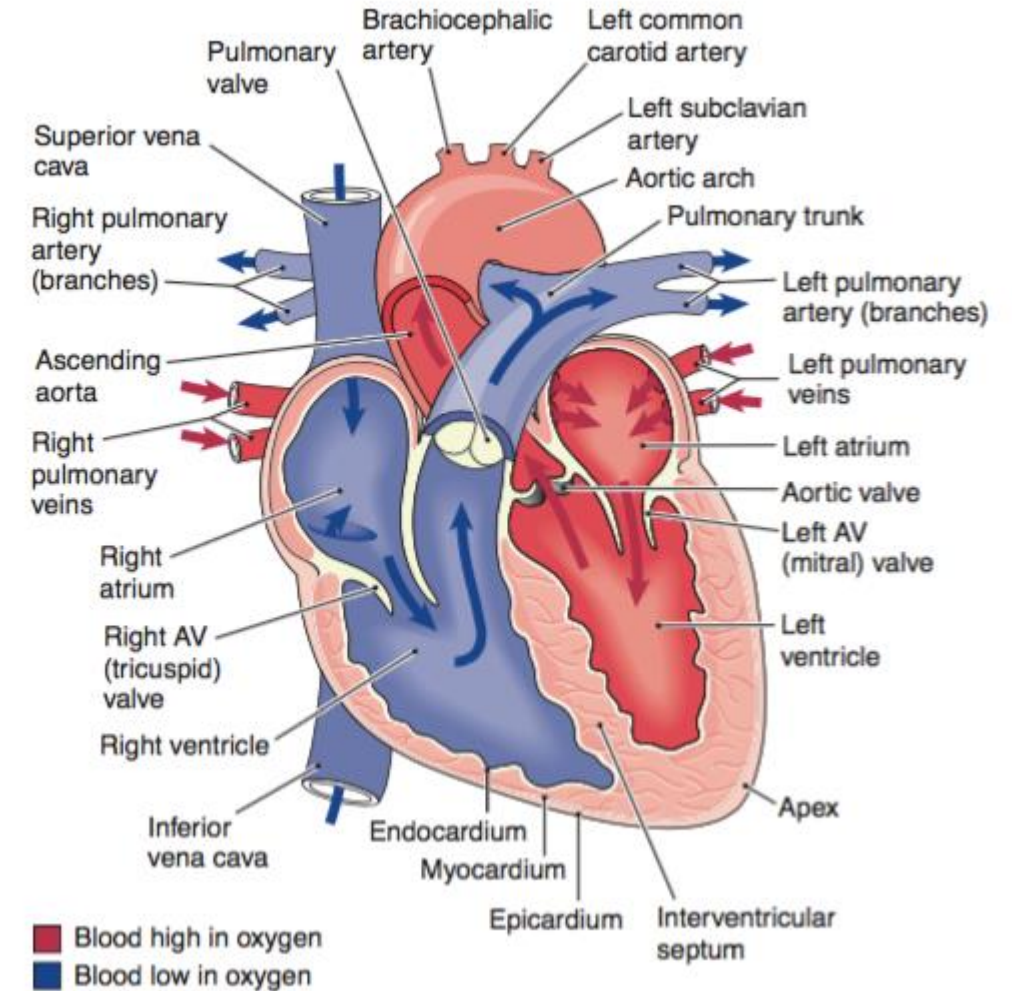
- Blood circulates throughout the body in the **cardiovascular system**, which consists of the **heart** and the blood **vessels**. This system forms a continuous circuit that
- delivers oxygen and nutrients to all cells and carries away waste products. The lymphatic system also functions in circulation. Its vessels drain fluid and proteins left in the tissues and return them to the bloodstream. The lymphatic system plays a part in immunity and in the digestive process as well.



THE HEART

The heart is located between the lungs, with its point, or **apex**, directed toward the inferior and left. The wall of the heart consists of three layers, all named with the root *cardi*, meaning “heart.” Moving from the innermost to the outermost layer, these are the:

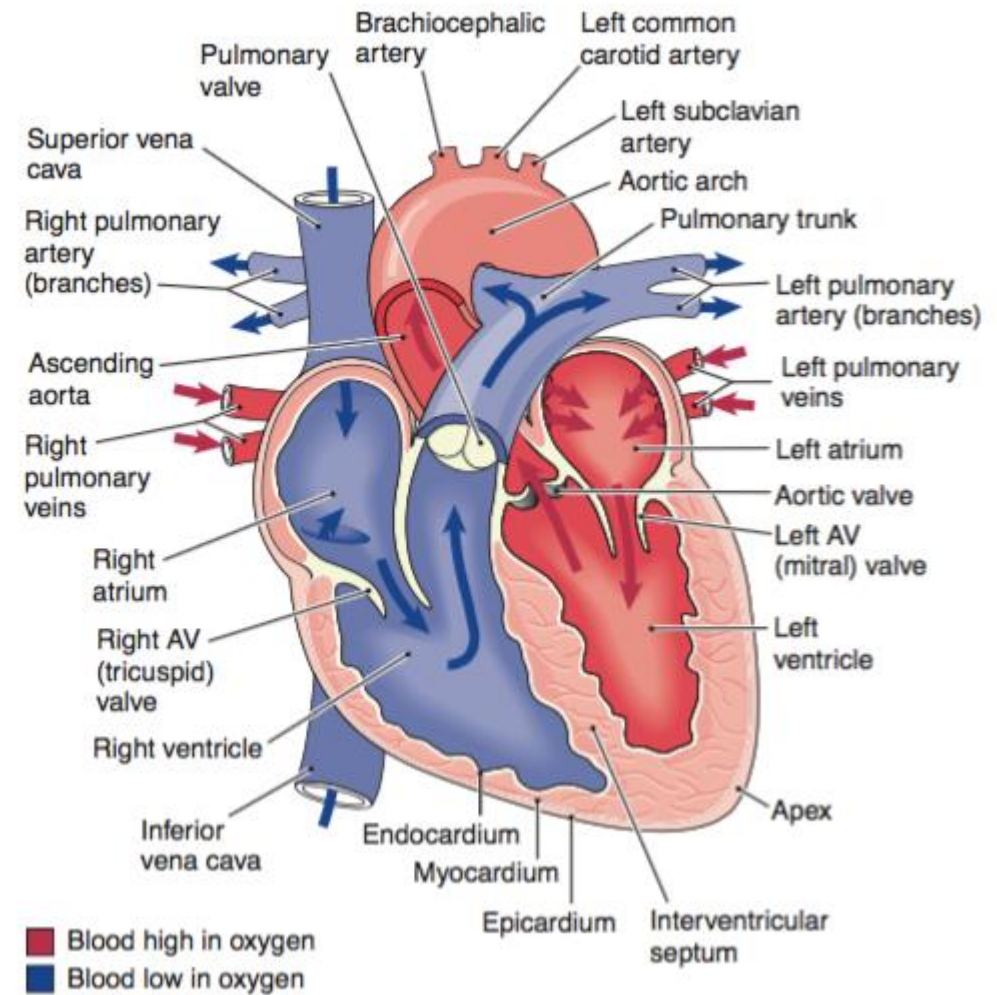
1. **Endocardium**—a thin membrane that lines the chambers and **valves** (the prefix *endo-* means “within”).
2. **Myocardium**—the thick muscle layer that makes up most of the heart wall (the root *my/o* means “muscle”).
3. **Epicardium**—a thin membrane that covers the heart (the prefix *epi-* means “on”).



THE HEART

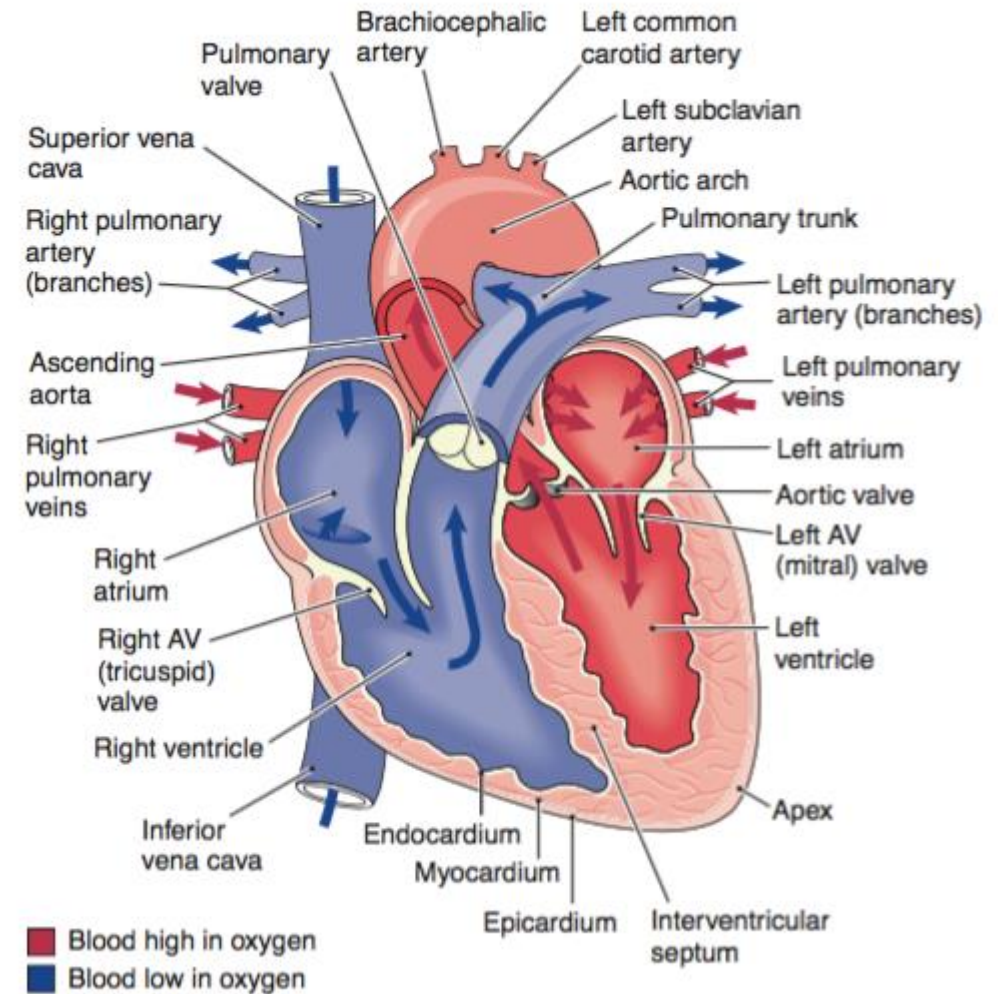
A fibrous sac, the **pericardium**, contains the heart and anchors it to surrounding structures, such as the sternum (breastbone) and diaphragm (the prefix *peri-* means “around”).

Each of the heart's upper receiving chambers is an **atrium** (plural: atria). Each of the lower pumping chambers is a **ventricle** (plural: ventricles).



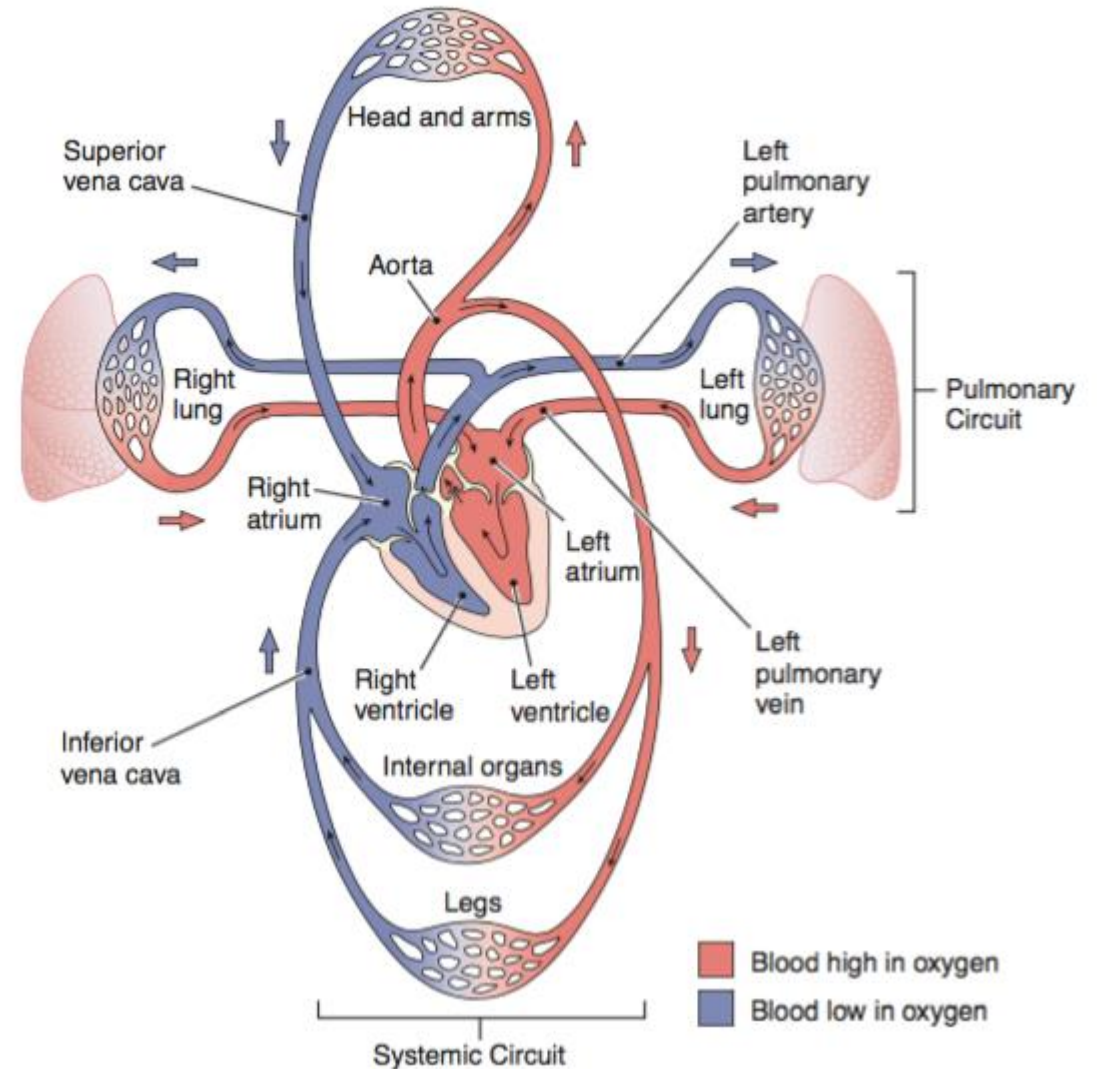
THE HEART

The chambers of the heart are divided by walls, each of which is called a septum. The interventricular septum separates the two ventricles; the interatrial septum divides the two atria. There is also a septum between the atrium and ventricle on each side.



Blood Circulation

The heart pumps blood through two circuits. The right side pumps blood to the lungs to be oxygenated through the **pulmonary circuit**. The left side pumps to the remainder of the body through the **systemic circuit**



The Vascular System

The vascular system consists of:

1. **Arteries** that carry blood away from the heart
2. **Arterioles**, vessels smaller than arteries that lead into the capillaries
3. Capillaries, the smallest vessels, through which exchanges take place between the blood and the tissues
4. **Venules**, small vessels that receive blood from the capillaries and drain into the veins
5. **Veins** that carry blood back to the heart

All arteries, except the pulmonary artery (and the umbilical artery in the fetus), carry highly oxygenated blood. They are thick-walled, elastic vessels that carry blood under high pressure. All veins, except the pulmonary vein (and the umbilical vein in the fetus), carry blood low in oxygen. Veins have thinner, less elastic walls and tend to give way under pressure. Like the heart, veins have one-way valves that keep blood flowing forward.

Root for the Heart

Root	Meaning	Example	Definition of Example
cardi/o	heart	cardiomyopathy* <i>kar-dē-ō-mī-OP-a-thē</i>	any disease of the heart muscle
oatri/o	atrium	Atriotomy <i>ā-trē-OT-ō-mē</i>	surgical incision of an atrium
ventricul/o	cavity, ventricle	Supraventricular <i>sū-pra-ven-TRIK-ū-lar</i>	above a ventricle
valv/o, valvul/o	valve	Valvulotome <i>VAL-vū-lō-tōm</i>	instrument for incising a valve

Roots for the Blood Vessels

Root	Meaning	Example	Definition of Example
angi/o*	vessel	angiography <i>an-jē-OG-ra-fē</i>	x-ray imaging of a vessel
vas/o, vascul/o	vessel, duct	vasospasm <i>VĀ-sō-spazm</i>	sudden contraction of a vessel
arter/o, arteri/o	artery	endarterial <i>end-ar-TĒ-rē-al</i>	within an artery
arteriol/o	arteriole	arteriolar <i>ar-tē-rē-Ō-lar</i>	pertaining to an arteriole
aort/o	aorta	aortoptosis <i>ā-or-top-TŌ-sis</i>	downward displacement of the aorta
ven/o, ven/i	vein	venous <i>VĒ-nus</i>	pertaining to a vein
phleb/o	vein	phlebotomy <i>fle-BOT-ō-mē</i>	incision of a vein to withdraw blood

*The root *angi/o* usually refers to a blood vessel but is used for other types of vessels as well. *Hemangi/o* refers specifically to a blood vessel.

Cardiovascular Disorders

Term	Definition
arrhythmia <i>a-RITH-mē-a</i>	Any abnormality in the rate or rhythm of the heartbeat (literally “without rhythm;” note doubled r). Also called dysrhythmia
arteriosclerosis <i>ar-tēr-ē-ō-skler-Ō-sis</i>	Hardening (sclerosis) of the arteries, with loss of capacity and loss of elasticity, as from fatty deposits (plaque), deposit of calcium salts, or scar tissue formation
atherosclerosis <i>ath-er-ō-skler-Ō-sis</i>	The development of fatty, fibrous patches (plaques) in the lining of arteries, causing narrowing of the lumen and hardening of the vessel wall. The most common form of arteriosclerosis is hardening of the arteries. The root ather/o means “porridge” or “gruel”
angina pectoris <i>an-JĪ-na PEK-tō-ris</i>	A feeling of constriction around the heart or pain that may radiate to the left arm or shoulder, usually brought on by exertion; caused by insufficient blood supply to the heart
cerebrovascular accident (CVA) or stroke <i>ser-e-brō-VAS-kū-lar</i>	Sudden damage to the brain resulting from reduction of blood flow. Causes include atherosclerosis, embolism, thrombosis, or hemorrhage from a ruptured aneurysm; commonly called stroke
shock	Circulatory failure resulting in an inadequate blood supply to the tissues. Cardiogenic shock is caused by heart failure; hypovolemic shock is caused by a loss of blood volume; septic shock is caused by bacterial infection

Cardiovascular Disorders

Term	Definition
occlusion <i>ō-KLŪ-zhun</i>	A closing off or obstruction, as of a vessel
plaque <i>plak</i>	A patch. With regard to the cardiovascular system, a deposit of fatty material and other substances on a vessel wall that impedes blood flow and may block the vessel; atheromatous plaque
dyspnea <i>DISP-nē-a</i>	Difficult or labored breathing (-pnea)
embolism <i>EM-bō-lizm</i>	Obstruction of a blood vessel by a blood clot or other matter carried in the circulation
embolus <i>EM-bō-lus</i>	A mass carried in the circulation. Usually a blood clot, but also may be air, fat, bacteria, or other solid matter from within or from outside the body
edema <i>e-DĒ-ma</i>	Swelling of body tissues caused by the presence of excess fluid. Causes include cardiovascular disturbances, kidney failure, inflammation, and malnutrition
fibrillation <i>fi-bri-LĀ-shun</i>	Spontaneous, quivering, and ineffectual contraction of muscle fibers, as in the atria or the ventricles

Cardiovascular Disorders

Term	Definition
hypertension <i>hī-per-TEN-shun</i>	A condition of higher-than-normal blood pressure. Essential (primary, idiopathic) hyper- tension has no known cause
infarct <i>in-FARKT</i>	An area of localized tissue necrosis (death) resulting from a blockage or a narrowing of the artery that supplies the area
ischemia <i>is-KĒ-mē-a</i>	Local deficiency of blood supply caused by circulatory obstruction (root: hem/o)
syonosis <i>sī-a-NŌ-sis</i>	bluish discoloration of the skin caused by lack of oxygen
phlebitis <i>fle-BĪ-tis</i>	Inflammation of a vein
deep vein thrombosis (DVT)	Thrombophlebitis involving the deep veins
bradycardia <i>brad-ē-KAR-dē-a</i>	A slow heart rate, of less than 60 bpm
tachycardia <i>tak-i-KAR-dē-a</i>	An abnormally rapid heart rate, usually over 100 bpm

Cardiovascular Disorders

Term	Definition
myocardial infarction (MI) <i>mī-ō-KAR-dē-al in-FARK- shun</i>	Localized necrosis (death) of cardiac muscle tissue resulting from blockage or narrowing of the coronary artery that supplies that area. Myocardial infarction is usually caused by formation of a thrombus (clot) in a vessel
rheumatic heart disease <i>rū-MAT-ik</i>	Damage to heart valves after infection with a type of <i>Streptococcus</i> (group A hemolytic <i>Streptococcus</i>). The antibodies produced in response to the infection produce valvular scarring usually involving the mitral valve
septal defect <i>SEP-tal</i>	An opening in the septum between the atria or ventricles; a common cause is persistence of the foramen ovale (<i>for-Ā-men ō-VAL-ē</i>), an opening between the atria that bypasses the lungs in fetal circulation
heart failure	A condition caused by the inability of the heart to maintain adequate blood circulation
angina pectoris <i>an-JĪ-na PEK-tō-ris</i>	A feeling of constriction around the heart or pain that may radiate to the left arm or shoulder, usually brought on by exertion; caused by insufficient blood supply to the heart
patent ductus arteriosus <i>PĀ-tent DUK-tus ar-tēr-ē- Ō-sus</i>	Persistence of the ductus arteriosus after birth. The ductus arteriosus is a vessel that connects the pulmonary artery to the descending aorta in the fetus to bypass the lungs

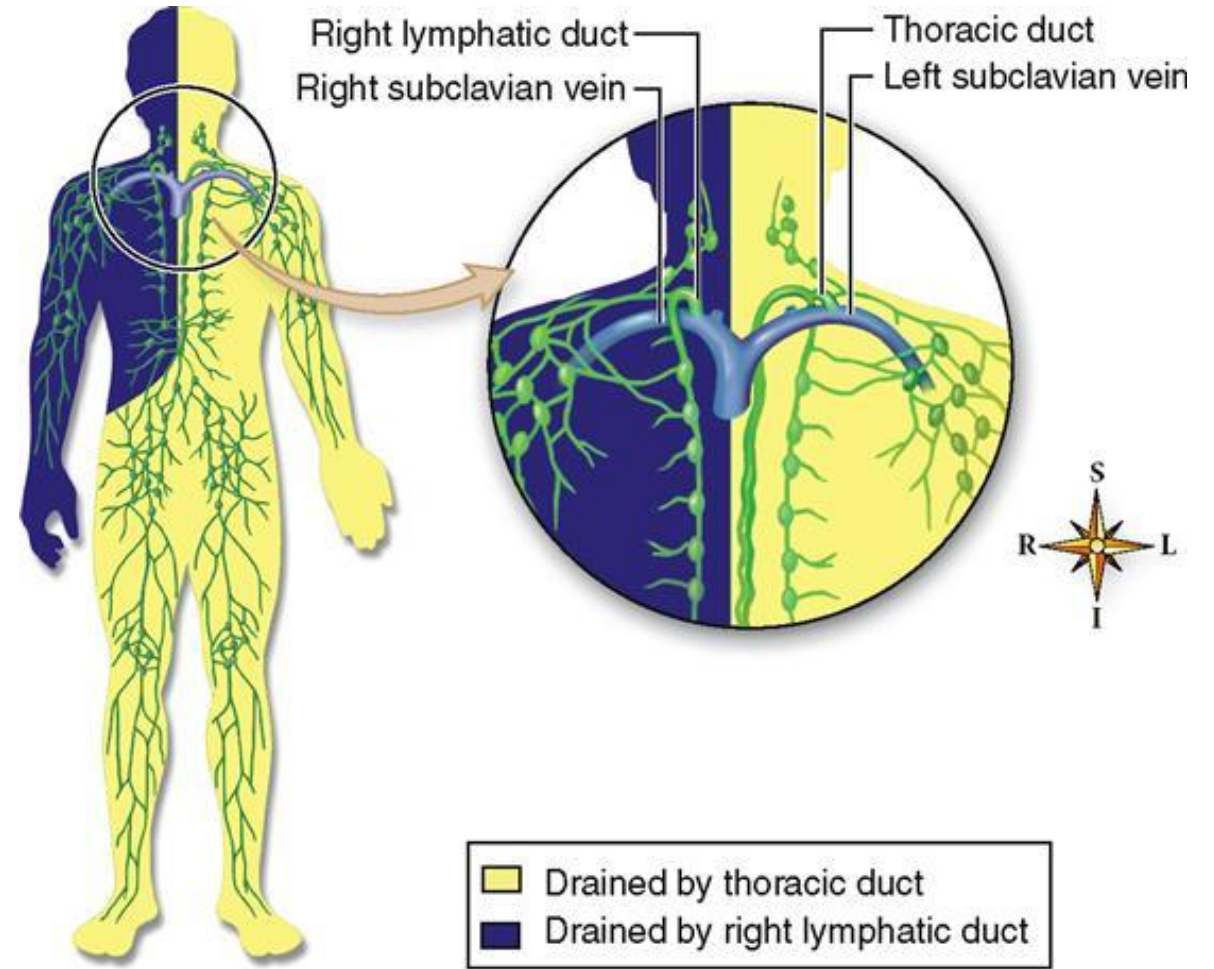
THE LYMPHATIC SYSTEM

Dr Bahn Agha

The lymphatic system is a widely distributed system with multiple functions. **Its role in circulation is to return excess fluid and proteins from the tissues to the bloodstream.**

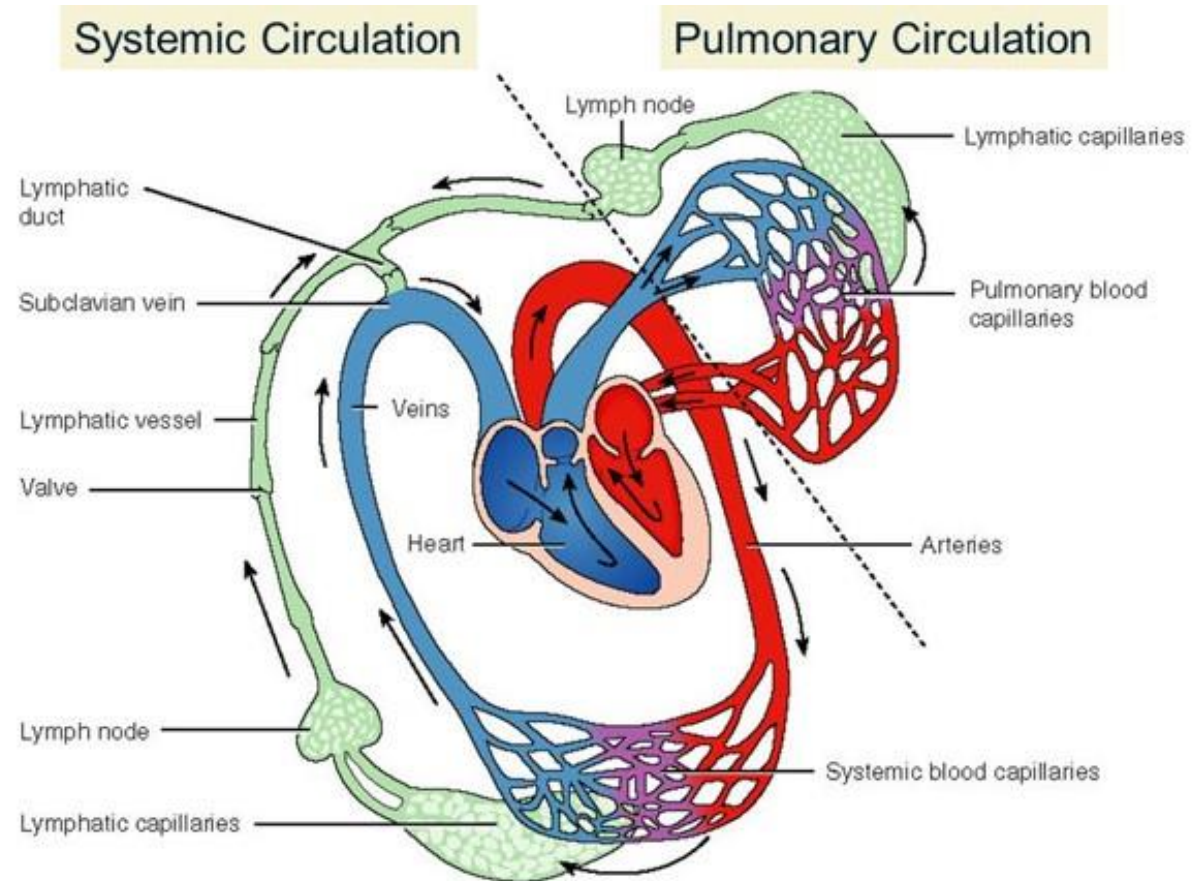
Blind-ended lymphatic capillaries pick up these materials in the tissues and carry them into larger vessels. The fluid carried in the lymphatic system is called lymph. Lymph drains from the lower part of the body and the upper left side into the thoracic duct (left lymphatic duct), which travels upward through the chest and empties into the left subclavian vein near the heart.

The right lymphatic duct drains the body's upper right side and empties into the right subclavian vein.



Lymphatic Circulation

Another major function of the lymphatic system is **to protect the body from impurities and invading microorganisms**. Along the path of the lymphatic vessels are small masses of lymphoid tissue, the lymph nodes. Their function is to filter the lymph as it passes through. They are concentrated in the cervical (neck), axillary (armpit), mediastinal (chest), and inguinal (groin) regions.



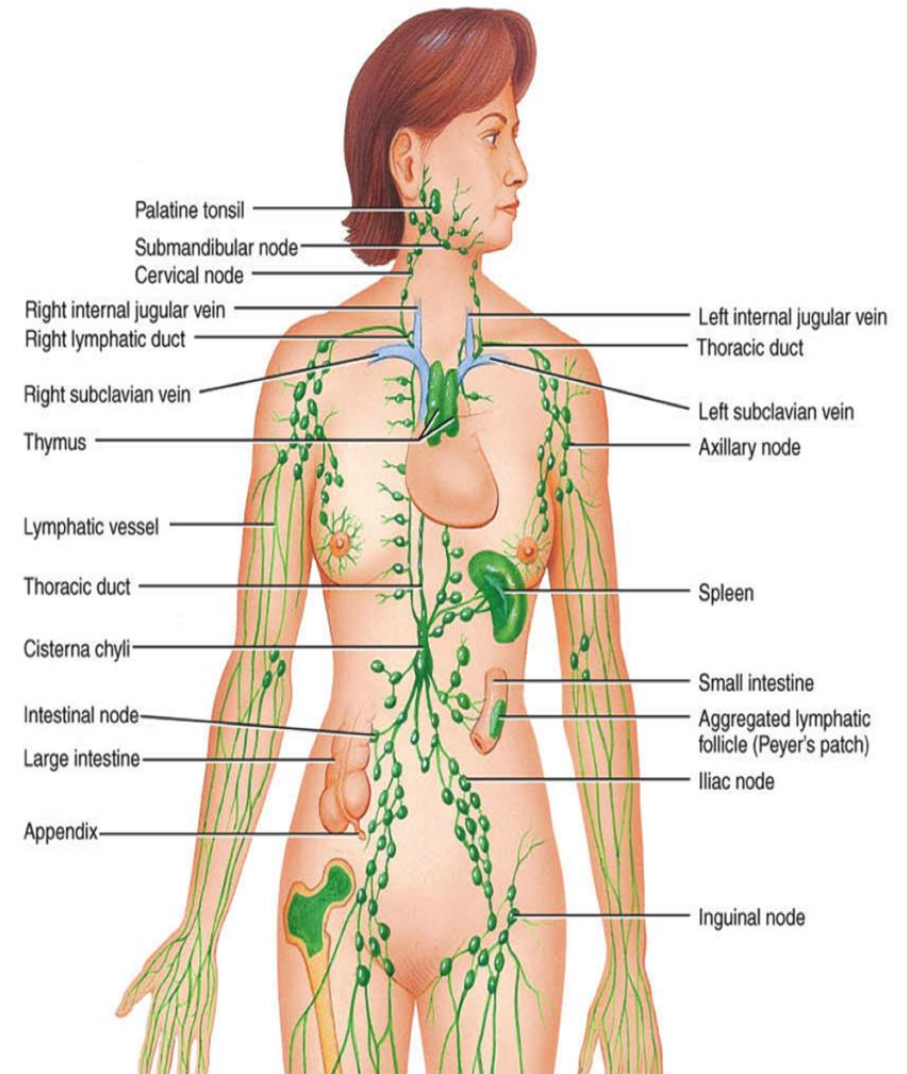
Arrows show direction of flow of lymph and blood

Lymphatic Circulation

Other protective organs and tissues of the lymphatic system include the:

1. Tonsils, located in the throat (pharynx). They filter inhaled or swallowed materials and aid in immunity early in life.
2. Thymus in the chest, above the heart. It processes and stimulates lymphocytes active in immunity.
3. Spleen in the upper left region of the abdomen. It filters blood and destroys old red blood cells.
4. Appendix, attached to the large intestine. It may aid in the development of immunity.
5. Peyer patches, in the lining of the intestine. They help protect against invading microorganisms.

A final function of the lymphatic system is to **absorb digested fats from the small intestine**. These fats are then added to the blood with the lymph that drains from the thoracic duct.



Roots for the Lymphatic System

Root	Meaning	Example	Definition of Example
lymph/o	lymph, lymphatic system	lymphoid <i>LIM-foyd</i>	resembling lymph or lymphatic tissue
lymphaden/o	lymph node	lymphadenitis <i>lim-fad-e-NĪ-tis</i>	inflammation of a lymph node
lymphangi/o	lymphatic vessel	lymphangiogram <i>lim-FAN-jē-ō-gram</i>	x-ray image of lymphatic vessels
splen/o	spleen	splenalgia <i>splē-NAL-jē-a</i>	pain in the spleen
thym/o	thymus	athymia <i>a-THĪ-mē-a</i>	absence of the thymus
tonsil/o	tonsil	tonsillar <i>TON-sil-ar</i>	pertaining to a tonsil

Key Clinical Terms

Term	Definition
lymphedema <i>lim-fe-DĒ-ma</i>	swelling of tissues with lymph caused by obstruction or excision of lymphatic vessels
lymphoma <i>lim-FŌ-ma</i>	any neoplastic disease of lymphoid tissue
Lymphangitis <i>lim-fan-JĪ-tis</i>	is inflammation of lymphatic vessels. Note the linear red streak proximal to a skin infection