

# Medical Terminology

## Lecture 6

### Cardiovascular System

#### Learning Objects:

- Examine the anatomy of the heart
- Determine the main functions of the cardiovascular system
- Differentiate cardiovascular system medical terms and common abbreviations
- Recognize the medical specialties associated with the cardiovascular system
- Discover common diseases, disorders, and procedures related to the cardiovascular system

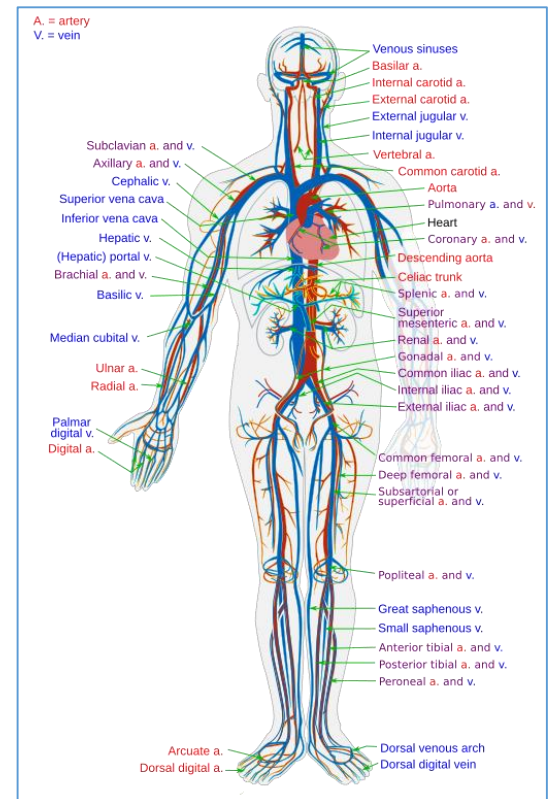
### Overview and Functions

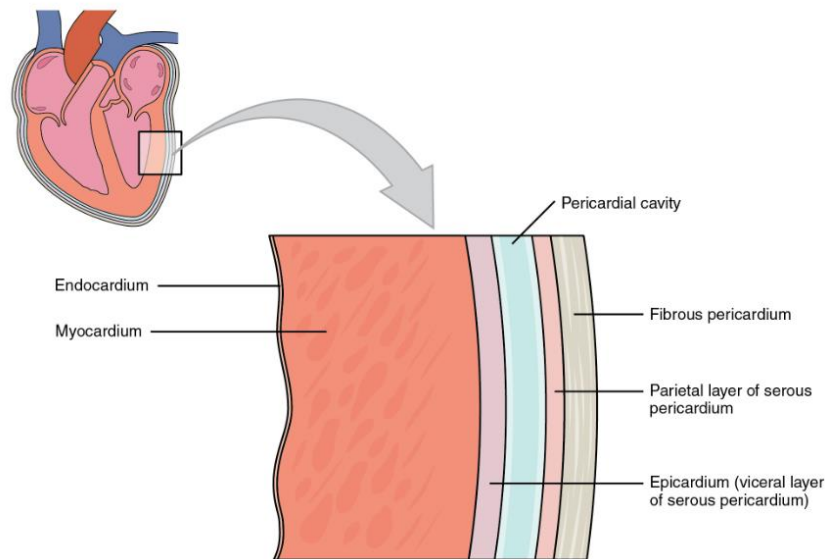
The cardiovascular system uses blood to deliver nutrients and remove wastes from the trillions of cells in the human body. The heart, which is the primary organ in this system, pumps blood throughout the body via a network of blood vessels. These three components—blood, blood vessels, and the heart—make up this complex system. The cardiovascular system also helps regulate body temperature and collects waste products from the cells.

#### The Heart

The heart is a four-chambered hollow organ with three layers. The innermost layer is called the **endocardium** [endo- (within); cardi/o (heart)]. The middle layer, which is the actual heart muscle and the thickest of the three layers, is called the **myocardium** [my/o (muscle); cardi/o (heart)]. The outer layer of the heart is called the **epicardium**, which is surrounded by the pericardium [peri- (surrounding); cardi/o (heart)], a sac that surrounds the heart.

The heart acts as a double pump separated by a wall called a **septum** [from the Latin word saeptum (a fence)]. The right-side pumps deoxygenated blood to the lungs where it picks up oxygen, and the left side of the heart pumps the oxygenated blood to all other parts of the body through the entire body. This delivery system operates through the four chambers of the heart. The four chambers are as follows:





- **Right atrium** [a Latin word meaning “entry hall”]: an upper right chamber that receives blood from all body parts except the lungs; the interatrial septum separates the right and left atria (plural of atrium).
- **Right ventricle** [from the Latin word venter (belly)]: a lower right chamber that receives blood from the right atrium and pumps it to the lungs; the interventricular septum separates the right and left ventricles.
- **Left atrium**: upper left chamber that receives oxygen-rich blood as it returns from the lungs.
- **Left ventricle**: lower left chamber that pumps blood to all parts of the body.

Each heart contraction, called **systole** [a Greek word meaning “contraction”], is followed by a relaxation called **diastole** [from the Greek word diastole (dilation)]. These two phases make up the cardiac cycle.

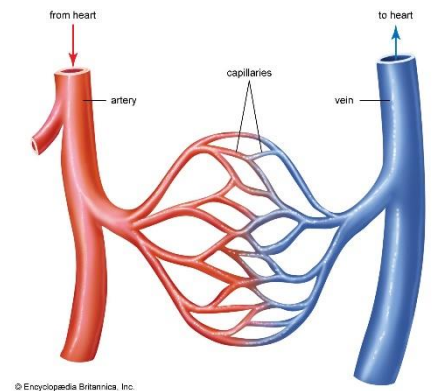
Heart rate is determined by how many times the heart beats per minute. The electrical activity of the heart can be recorded on an **electrocardiogram** [electro (electricity); cardi/o (heart); -gram (record or picture)]. The machine that does the recording is called an **electrocardiograph** [electro (electricity); cardi/o (heart); -graph (an instrument used to record)].

## **The Blood and Blood Vessels**

The blood vessels include the **arteries, capillaries, and veins**. Blood brings oxygen and nutrients to body cells and removes waste products. Blood itself is divisible into two main components: **plasma** [a Greek word meaning “something molded” or “created”], which is the liquid part, and the formed elements within the plasma. Blood plasma, which is clear and straw-colored, is composed mostly of water (91%), along with proteins and other nutrients in solution.

**The names of blood vessels in the cardiovascular system are listed here:**

- **Arteries** [from the Greek word *arteria* (windpipe)]: thick-walled, elastic blood vessels that carry oxygenated blood away from the heart (note one exception: the pulmonary arteries carry unoxygenated blood).
- **Arterioles** [diminutive form of *arteria*]: branches of the arteries that carry oxygenated blood to the capillaries.
- **Capillaries** [from the Latin word *capillus* (hair)]: blood vessels that connect the arterial and venous systems; they are only one cell in thickness and exchange nutrients and waste material.



- **Venules** [diminutive form of *vena* [blood vessel]]: branches of the veins that receive blood from the capillaries and transport it to the veins.
- **Veins** [from the Latin word *vena* (blood vessel)]: blood vessels that return deoxygenated blood to the heart.

The lumen of a blood vessel is the opening through which blood flows. The nervous system can stimulate the lumen to be opened, a condition called **vasodilation** [vas/o (duct, blood vessel); from the Latin word *dilatare* (to make wider, enlarge)], or closed, a condition called

vasoconstriction [vas/o (duct, blood vessel); from the Latin word constringe (to draw tight)]. Vasodilation and vasoconstriction each can affect blood pressure.

**Blood pressure** is a measurement of the amount of pressure exerted against the walls of blood vessels. Blood pressure is recorded as a fractional number: systolic over diastolic. Blood pressure can be measured by an instrument called a **sphygmomanometer** [from the Greek words sphygmos (pulse), manos (thin), metros (measure)].

**Blood:** Blood is composed of many different compounds and can be analyzed using lab tests to determine the various levels of these compounds present in the body. The main components of blood are the following:

**Plasma: Consists of water, proteins, nutrients, and hormones**

**Hematocrit: Consists of red blood cells**

**Buffy coat: Consists of white blood cells and platelets**

The primary function of blood is *to deliver oxygen and nutrients to the body's cells and to remove wastes from those same cells*. Blood also has other functions, including *defense, distribution of heat, and maintenance of homeostasis*.

### **Common Pathologies**

**Coronary Artery Disease:** which is a progressive build-up of plaque that can cause the lumen of coronary arteries to narrow. A deficiency of blood flow and oxygen to the myocardium is called **ischemia** [from the Greek word iskhaimos (a stopping of the blood); -ia (condition)]. One cause of plaque build-up in the coronary arteries is a condition called **hyperlipidemia** [hyper- (above normal); lip/o (fat); -demia (from hema [blood])].

**Cardiomegaly** [cardi/o (heart); -megaly (enlargement)]: enlargement of the heart.

**Cardiomyopathy** [cardi/o (heart); my/o (muscle); -pathy (disease)]: disease of the heart muscle (myocardium).

**Myocardial Infarction** [my/o (muscle); cardi/o (heart); -al (adjective suffix); from the Latin word *infractionem* (a breaking)]: A myocardial infarction (MI), commonly called a heart attack, results from a lack of oxygen supply to the myocardium.

**Myocarditis** [my/o (muscle); cardi/o (heart); -itis (inflammation)]: inflammation of the heart muscle.

**Pericarditis** [peri- (surrounding); cardi/o (heart); -itis (inflammation)]: inflammation of the pericardium.

**Hemolysis** [hem/o (blood); -lysis (destruction)]: destruction of red blood cells.

**Hemorrhage** [hem/o (blood); -rrhage (burst forth)]: discharge of blood.

**Deep vein thrombosis (DVT)**: A deep vein thrombosis is a blood clot that forms in one of the larger blood vessels, often in the calf of the leg. It is more likely to occur after a long plane flight or a period of immobility.

**Angina**: Angina is characterized by chest pain and is caused by poor blood flow to the heart. Often it can be treated with nitroglycerin, a vasodilator medication that increases blood flow back to and through the heart and rest.

### **Medical Specialties Related to the Cardiovascular System**

**Cardiologists and Thoracic Surgeons**: Cardiologists are medical doctors who specialize in diagnosing and treating heart diseases. Thoracic surgeons provide surgical treatments on the heart and other thoracic organs.

**Cardiology Technologists**: Cardiology technologists perform diagnostic tests such as electrocardiography and stress testing, as well as pacemaker monitoring.

**Cardiovascular Perfusionists**: Cardiovascular perfusionists complete a college training program and are responsible for operation of the heart-lung bypass machine during open heart surgery. They also monitor the patient's vitals and administer medications.

| COMBINING FORM | MEANING      | EXAMPLE OF USE IN MEDICAL TERMS |
|----------------|--------------|---------------------------------|
| angi/o         | blood vessel | angioplasty                     |
| aort/o         | Aorta        | aortic                          |
| arteri/o       | Artery       | arteriosclerosis                |
| arteriol/o     | Arteriole    | arteriolitis                    |
| cardi/o        | Heart        | cardiomegaly                    |
| coron/o        | Heart        | coronary                        |
| hem/o          | Blood        | hemoglobin                      |
| hemat/o        | Blood        | hematoma                        |
| Mediastin/o    | Mediastinum  | mediastinotomy                  |
| phleb/o        | vein         | phlebotomy                      |
| vas/o          | blood vessel | vasoconstriction                |
| ven/o          | vein         | intravenous                     |
| venul/o        | venule       | venulectasia                    |

## Suffixes

-ac (pertaining to)

-apheresis (removal)

-ar (pertaining to)

-centesis (surgical puncture to aspirate fluid)

-ectomy (excision, surgical removal)

-genic (producing, originating, causing)

-gram (record, radiographic image)

-graph (instrument used to record)

-graphy (process of recording, radiographic imaging)

-ia (condition of, diseased state, abnormal state)

-itis (inflammation)

-lysis (loosening, dissolution, separating)

-megaly (enlarged, enlargement)

-logist (specialist, physician who studies and treats)

-oma (tumor)

pan- (all, total)

-osis (abnormal condition)

peri- (surrounding, around)

-tomy (cut into, incision)

tachy- (fast, rapid)

-ous (pertaining to)

-pathy (disease)

-penia (abnormal reduction in number)

-pexy (surgical fixation, suspension)

-plasty (surgical repair)

-poiesis (formation)

-sclerosis (hardening)

-scope (instrument used to view)

-scopy (process of viewing)

-stasis (stop, stopping, controlling)

-stenosis (narrowing, constriction)

## **Prefix**

brady- (slow)

endo- (within, in)

epi- (on, upon, over)

hyper- (above, excessive)

hypo- (below, deficient)

inter- (between)