

**Ministry of higher education & scientific research  
AL-Mustaqbal University College  
medical physics department**



# ***Anatomy***

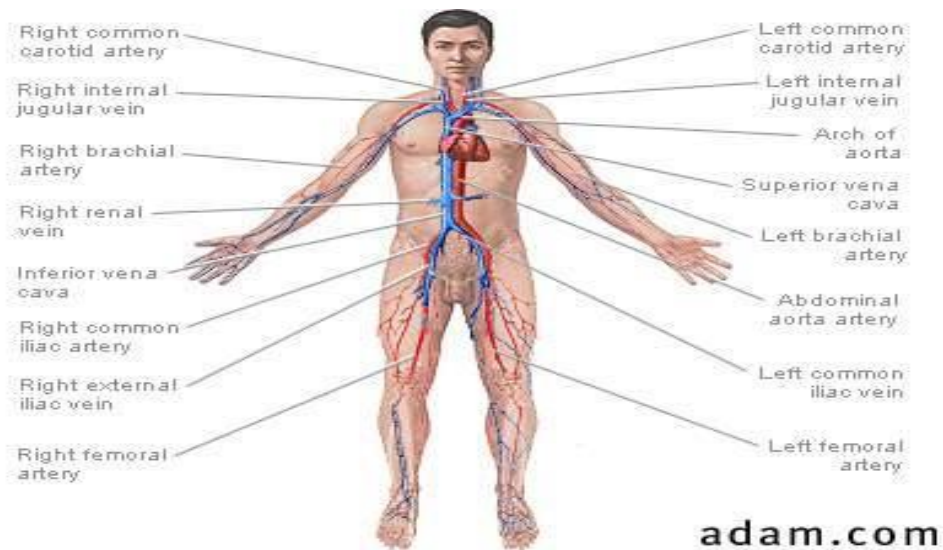
## **Lecture two**

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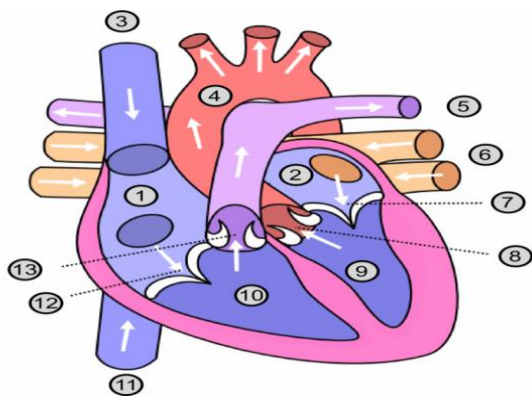
## Circulatory System

The cardiovascular system consists of a network of vessels that circulates blood throughout the body, motored by the action of the heart. We'll be talking about specifics of the heart in a separate lesson, so will concentrate here on the circulatory system.

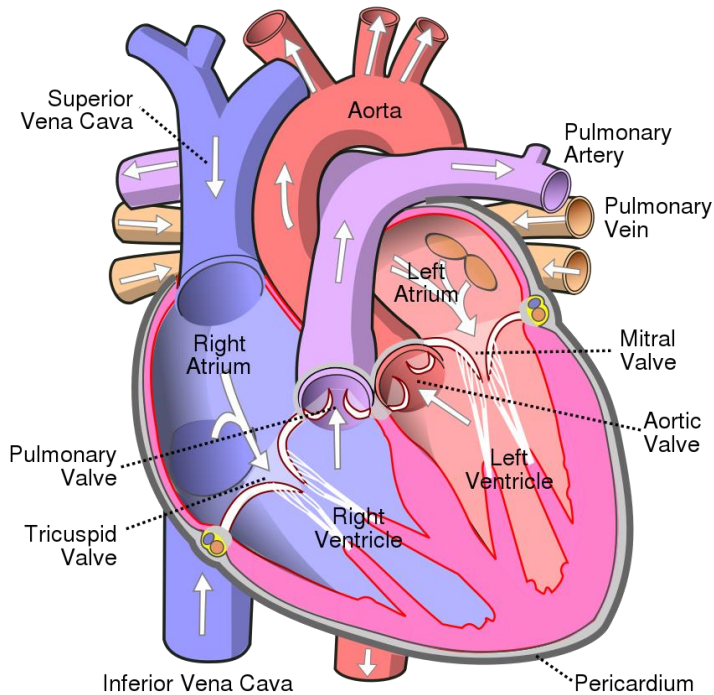


### 1-Tracing the flow of blood...pulmonary circulation

The inferior vena cava is the largest vein of the body. It carries de-oxygenated blood back from the lower part of the body to the right atrium of the heart. This blood is carrying carbon dioxide.



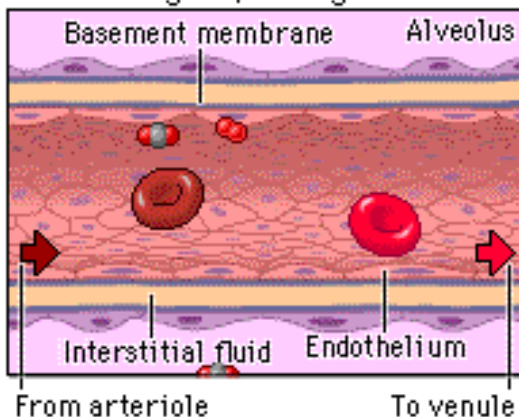
The superior vena cava is above the heart and carries de-oxygenated blood from the head and arms to the right atrium of the heart.



From the right atrium, the blood flows through the tricuspid valve to the right ventricle and then onto the lungs through the pulmonary valve and pulmonary artery.

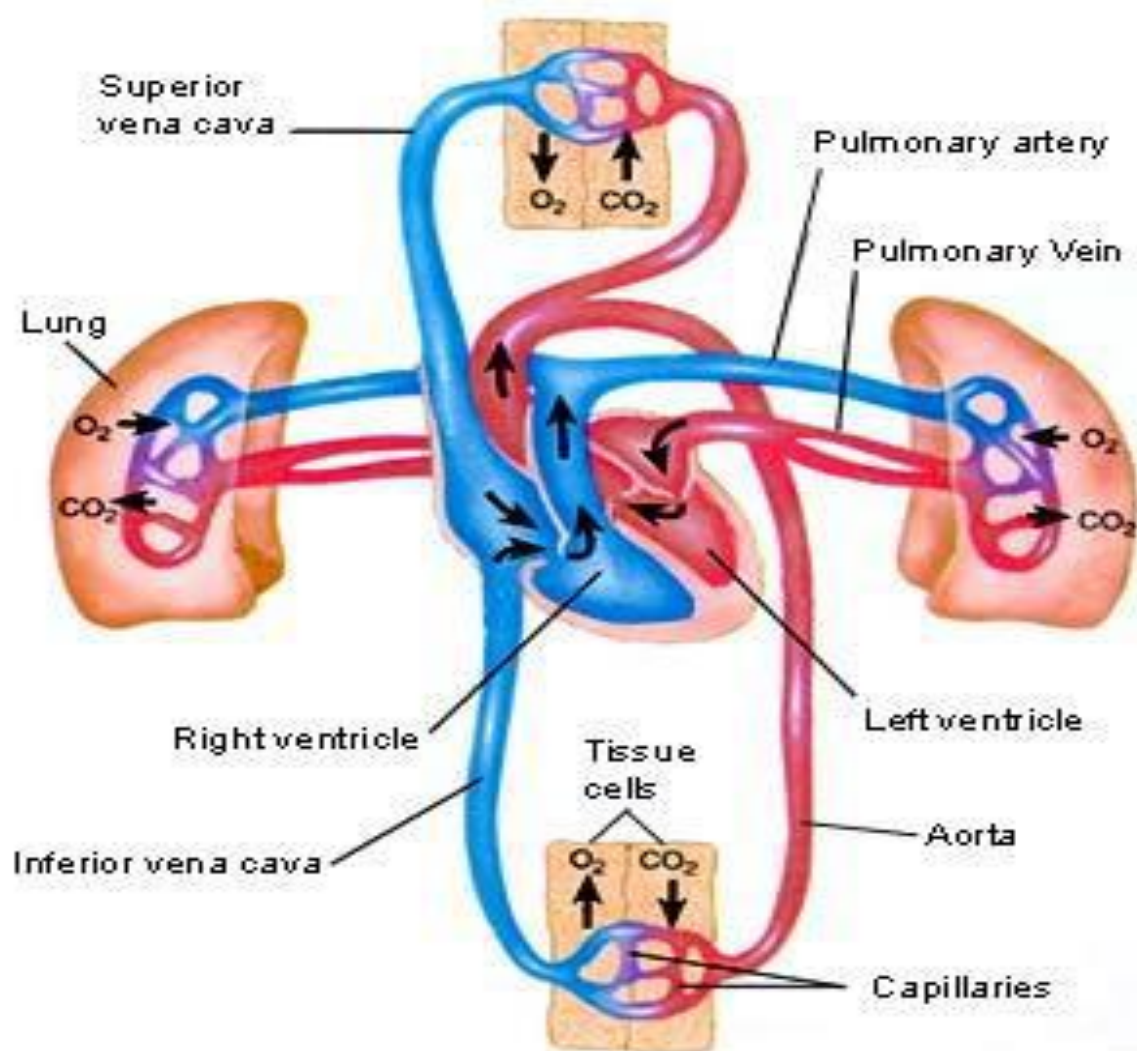
In the lungs, the blood exchanges the carbon dioxide it is carrying for oxygen.

#### Pulmonary Capillary



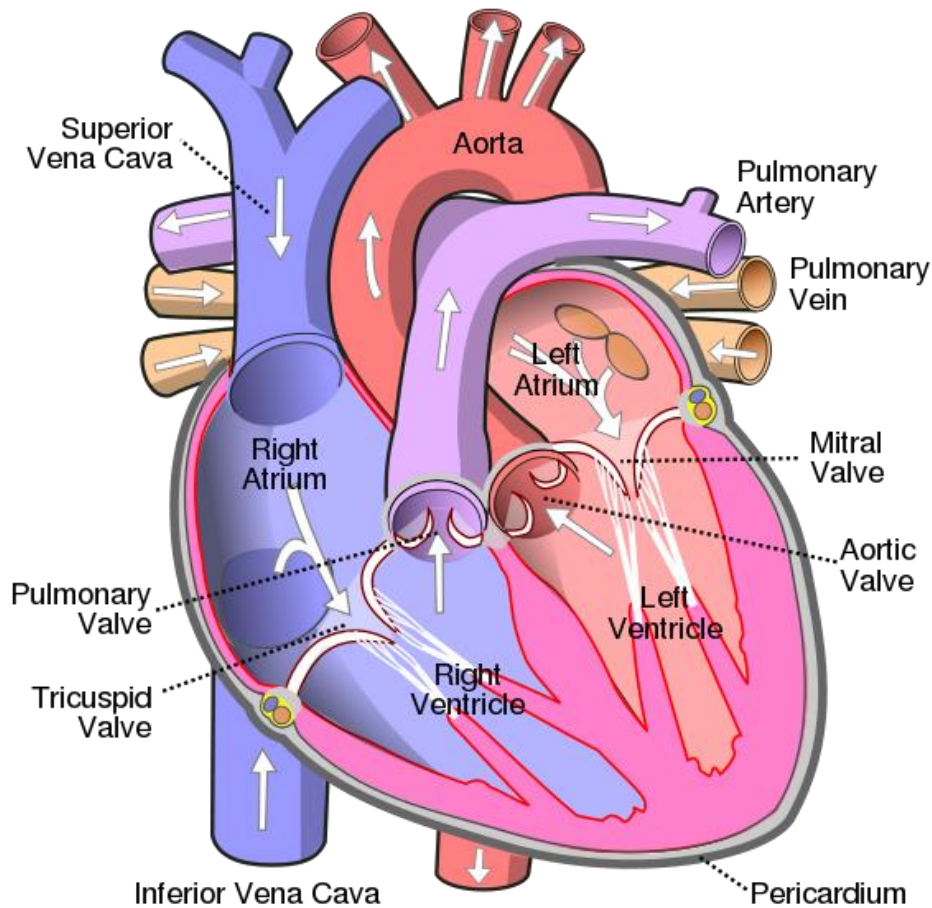
O<sub>2</sub> is loaded from the alveolar air into the blood, while CO<sub>2</sub> is unloaded from the blood into alveolar air.

The fully oxygenated blood now flows BACK to the left atrium of the heart through the pulmonary veins.

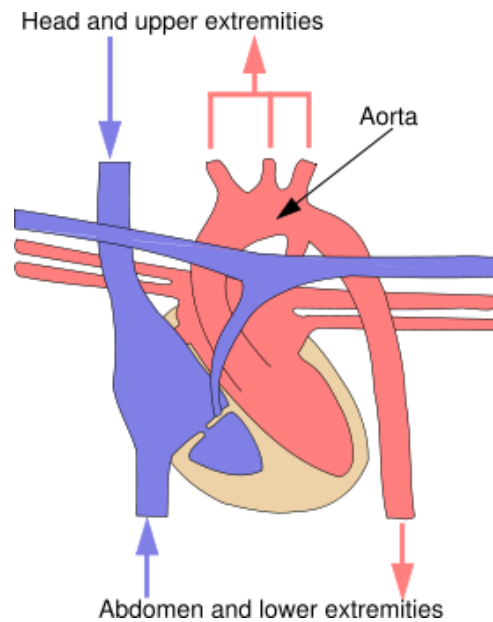


## 2-Tracing the flow of blood...systemic circulation

The oxygenated blood leaves the left atrium through the mitral (bicuspid) valve into the left ventricle, gets pumped from the left ventricle through the aortic valve to the aorta.

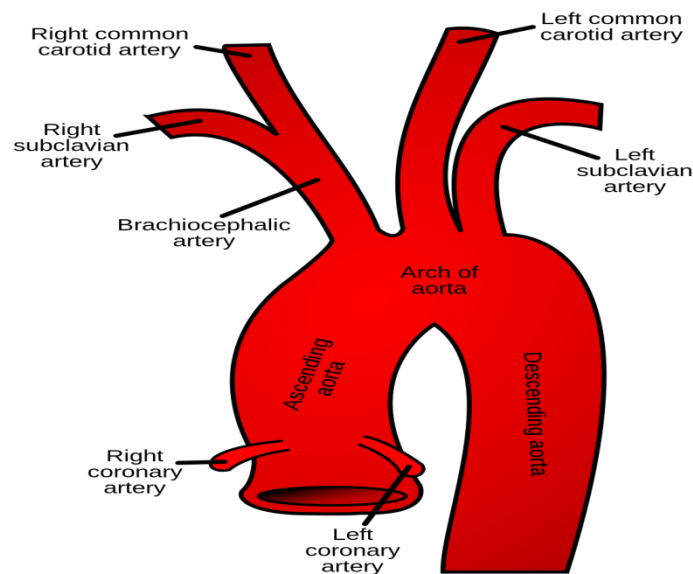


The aorta is the largest artery of the body. The ascending aorta leaves the heart, curves in an inverted 'U' shape making an arch, and then descends downward.



At the arch of the aorta, 3 branches extend upward...

1. The brachiocephalic artery (or innominate artery) quickly divides into the right subclavian artery that supplies blood to the right arm and upper torso AND the right common carotid artery that supplies the head and neck.

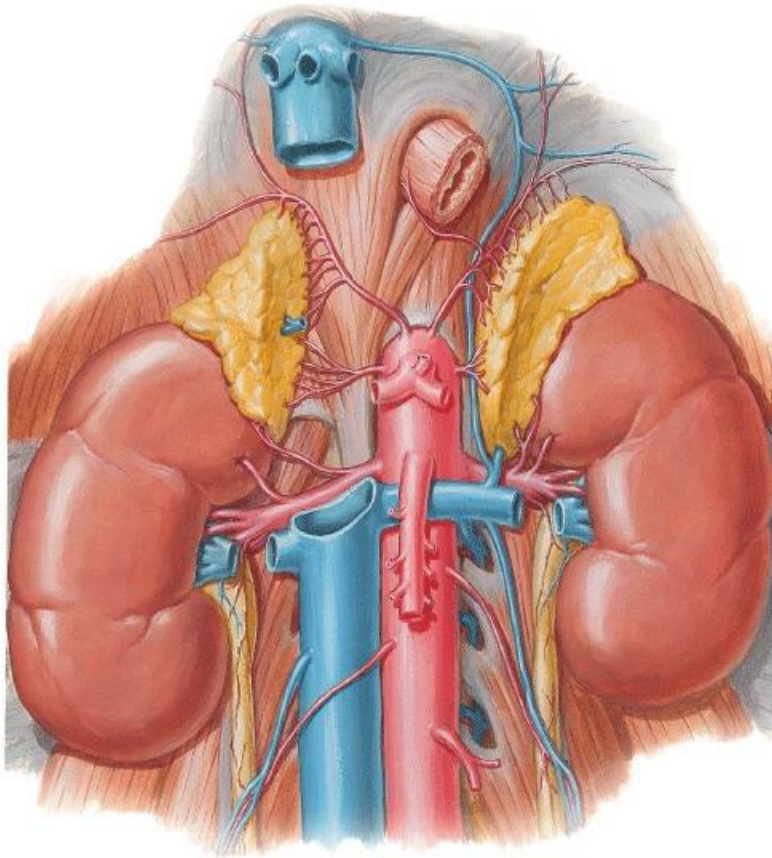


2.The left common carotid artery supplies the head and neck.

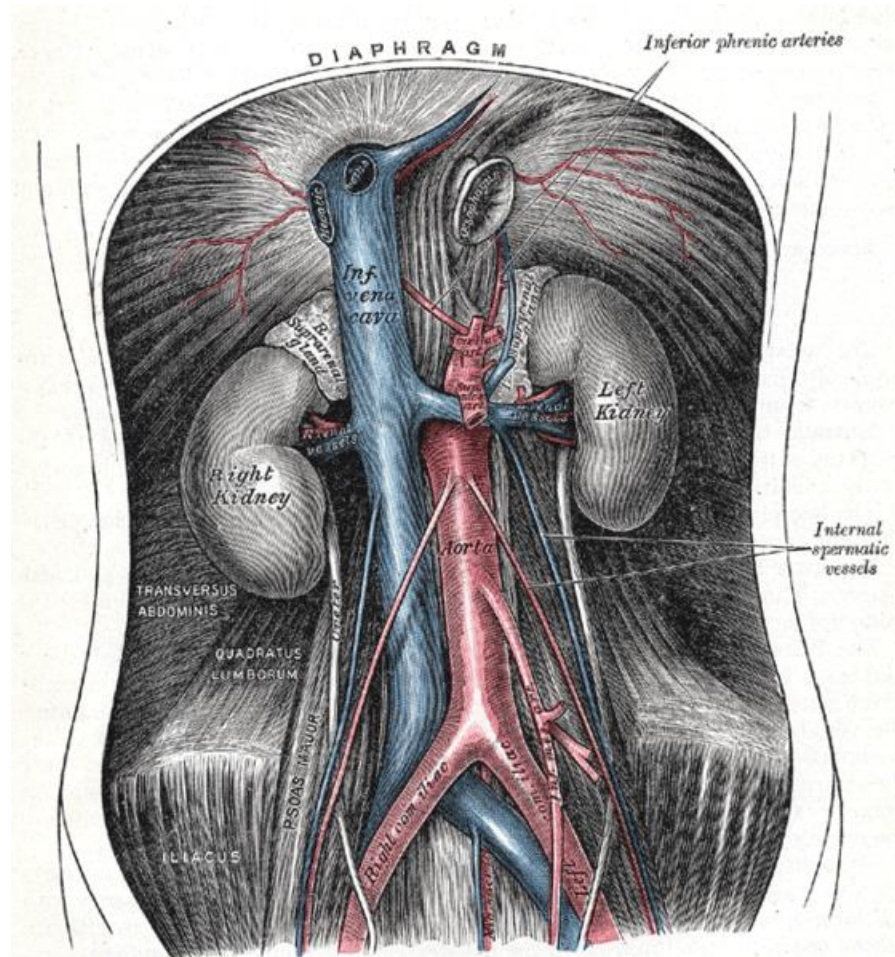
3.The left subclavian artery supplies the left arm and upper torso. 'Subclavian' means it is located below the clavicle... or collarbone.

The descending aortic artery leads downward through the diaphragm and chest...and into the abdomen. About 1/5 to 1/3 of the blood passes through the renal artery into the kidney. The kidney is a filter, and takes some water and waste products out of the blood.

The kidneys excrete the waste products and water out of the body as urine.

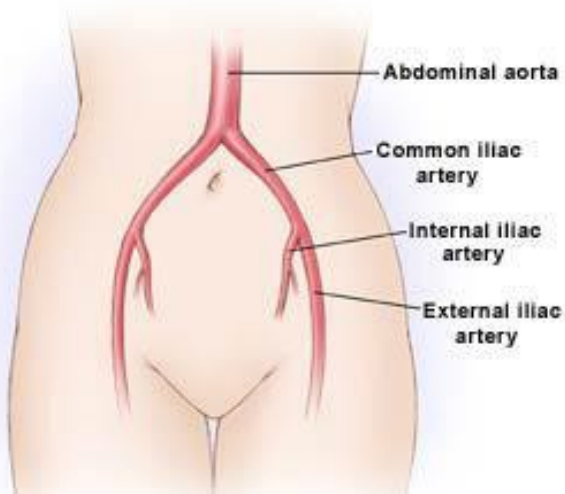


The descending aortic artery continues downward into the abdomen. It then splits into two major branches. This split is called the aortic bifurcation; the two branches are called iliac arteries.

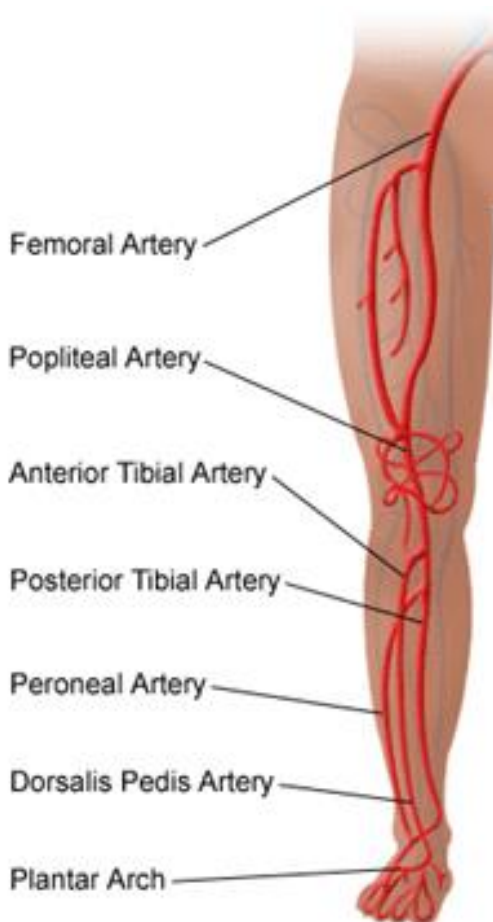




The left iliac artery supplies blood to the left pelvis and leg; the right iliac artery supplies blood to the right pelvis and leg.

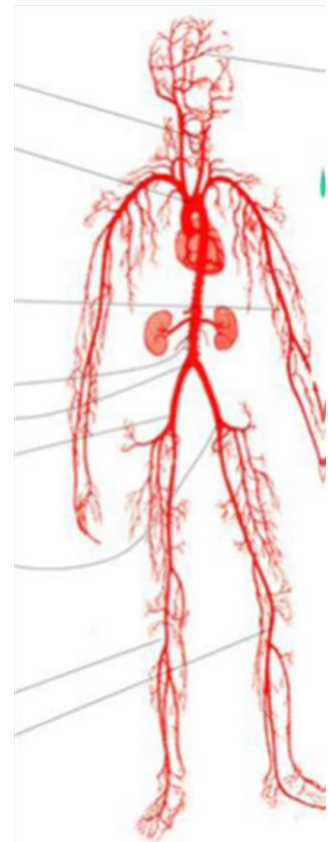


The iliac artery continues down into the leg as the femoral artery and its branches.



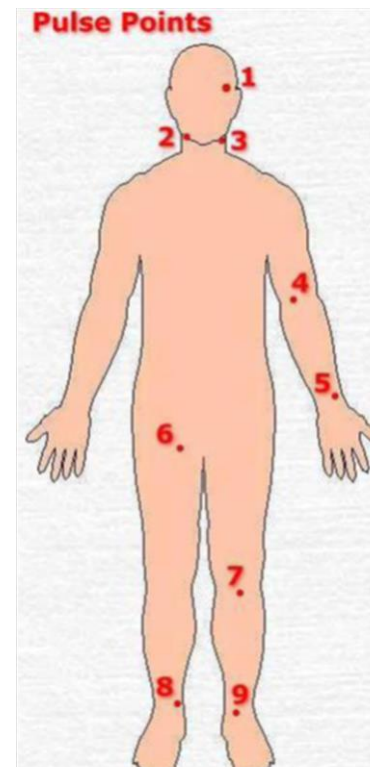
### 3-Tracing the flow of blood... the arteries

Arteries are elastic tubes that carry blood in pulsating waves. The blood exerts pressure against the walls of the arteries as it passes through. The peak pressure occurs during the heart's contraction, and is called systolic pressure. The minimum pressure occurs between contractions when the heart expands and refills, and is called diastolic pressure. This pressure variation within the artery produces a pulse. All arteries have a pulse.



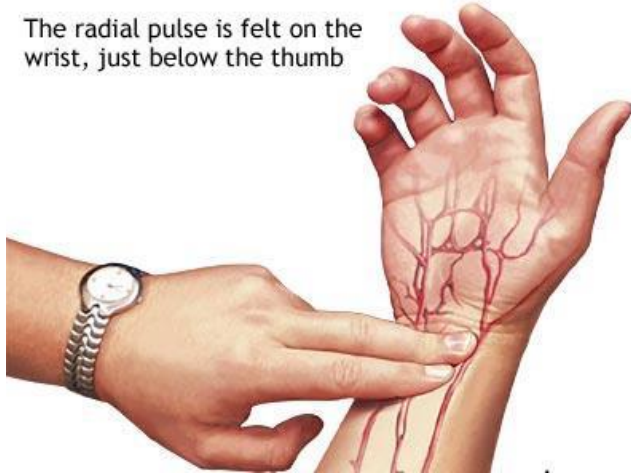
#### Common pulse sites used to check circulation are:

1. TEMPORAL (TEM por ul) - side of forehead
- 2 & 3. CAROTID (kuh RAH did) - neck
4. BRACHIAL (BRAY kee ul) - inside the elbow
5. RADIAL - thumb side of wrist
6. FEMORAL (FEM er all) – groin
7. POPLITEAL (pah plah TEE ul) - behind the knee
- 8 & 9. DORSALIS PEDIS (dor SAL us PED iss) - upper surface of foot



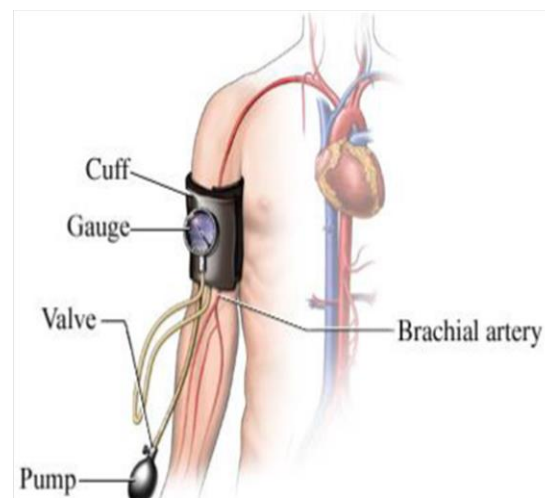
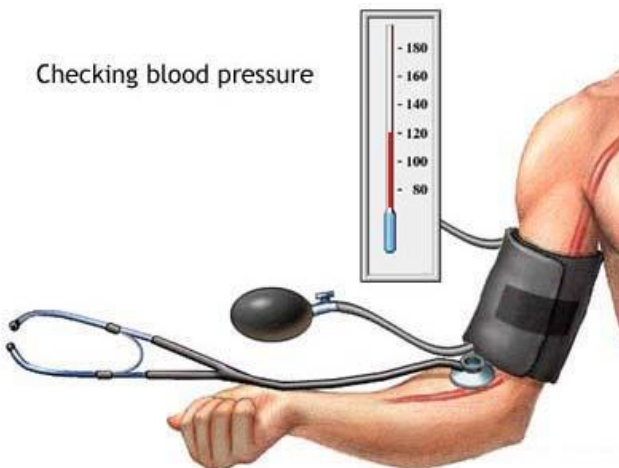
The average pulse rate for a person who is 'resting', would be 70. During exercise, that number might increase to between 130 and 140 beats per minute.

The radial pulse is felt on the wrist, just below the thumb



Count the number of beats for 15 seconds  $\times 4 =$  pulsations per minute

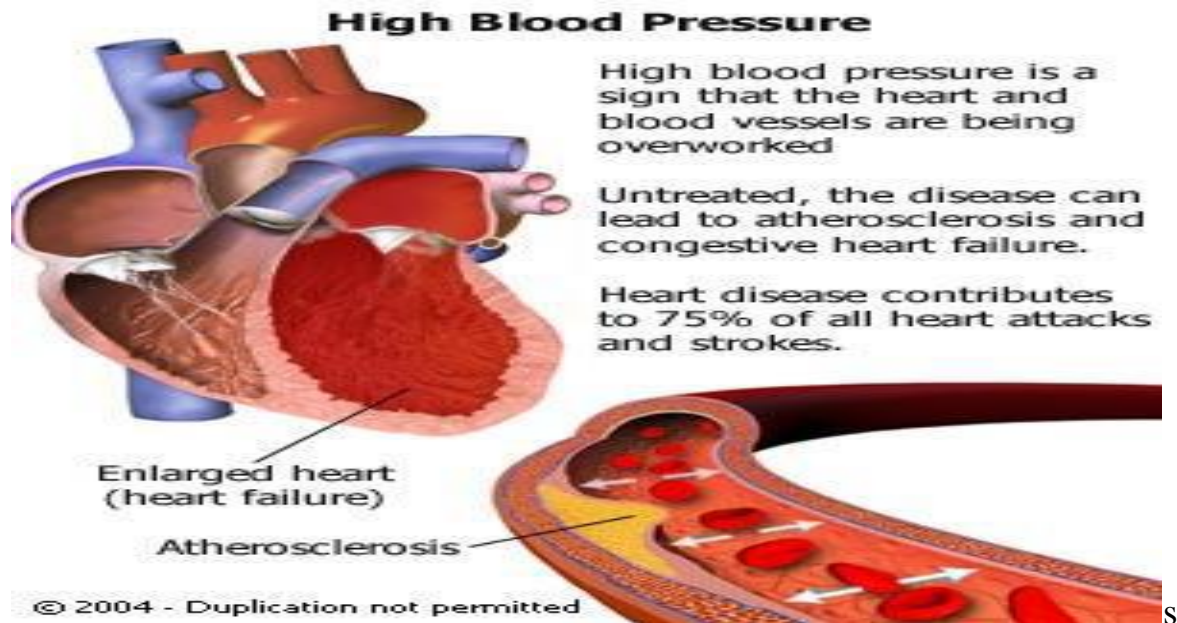
Systolic and diastolic blood pressure can be measured in the brachial artery just above the elbow with an instrument called a sphygmomanometer (sfīg mō mah MOM ah ter) and a stethoscope. Two measurements are taken, and are expressed in millimeters of mercury (the chemical symbol for mercury is Hg).



The two blood pressure measurements are written as a ratio... systolic over diastolic.

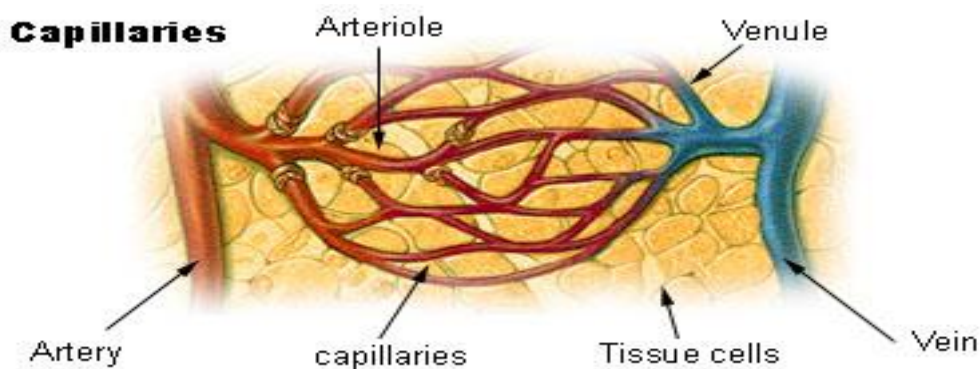
In the average adult, systolic pressure usually ranges between 100 to 140 mm Hg. Diastolic pressure usually ranges between 60 to 90 mm Hg.

A typical blood pressure reading would be expressed as 120/80... 120 over 80. A reading of 140/90 would be considered 'high' blood pressure, and may pose health Risk



#### 4-Tracing the flow of blood... the arterioles

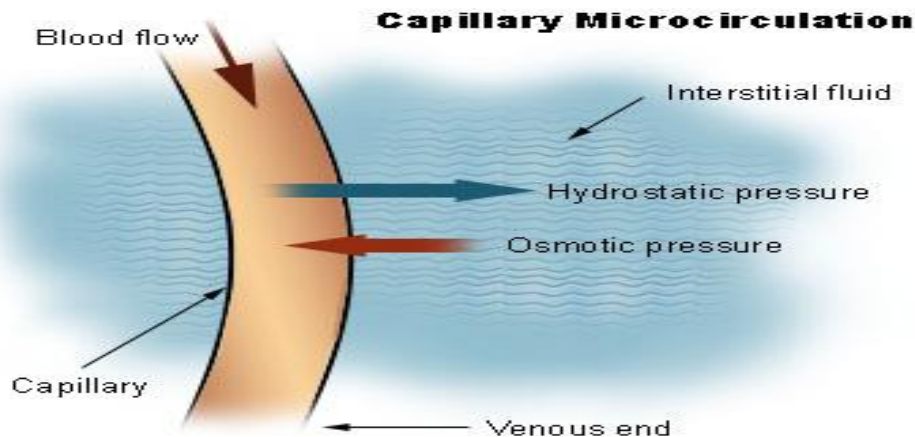
The arteries branch off into even smaller vessels called arterioles, and then to smaller vessels yet called capillaries



Arterioles act like adjustable nozzles in the circulatory system, so they have the greatest influence over blood pressure.

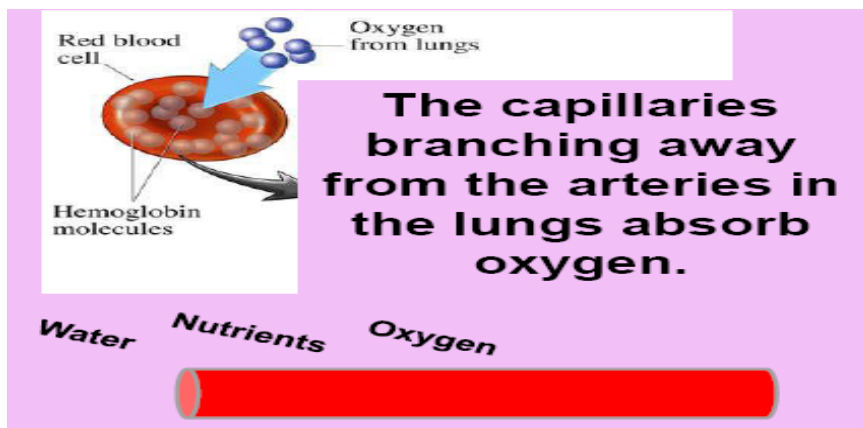
### 5-Tracing the flow of blood... the capillaries

The capillaries are the smallest of the blood vessels, and the walls are so thin that molecules can pass through them. They branch out from the arterioles, passing next to the organs, intestines, and through all the cellular tissue.



In the cellular tissue, the capillaries provide the means of exchange, through the process of absorption.

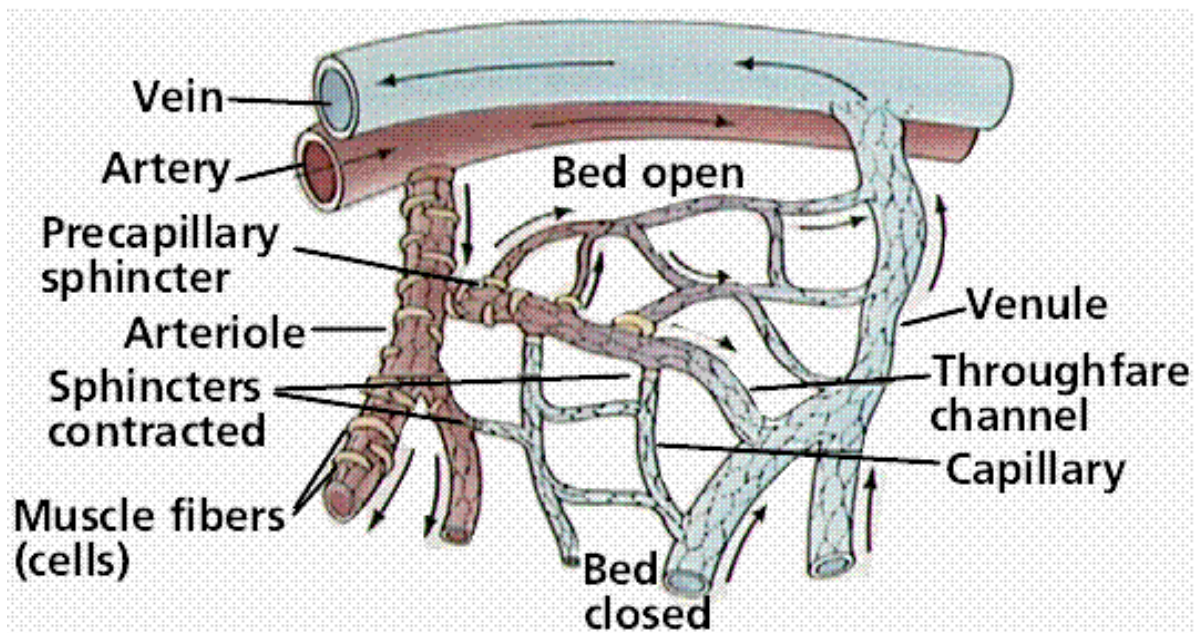
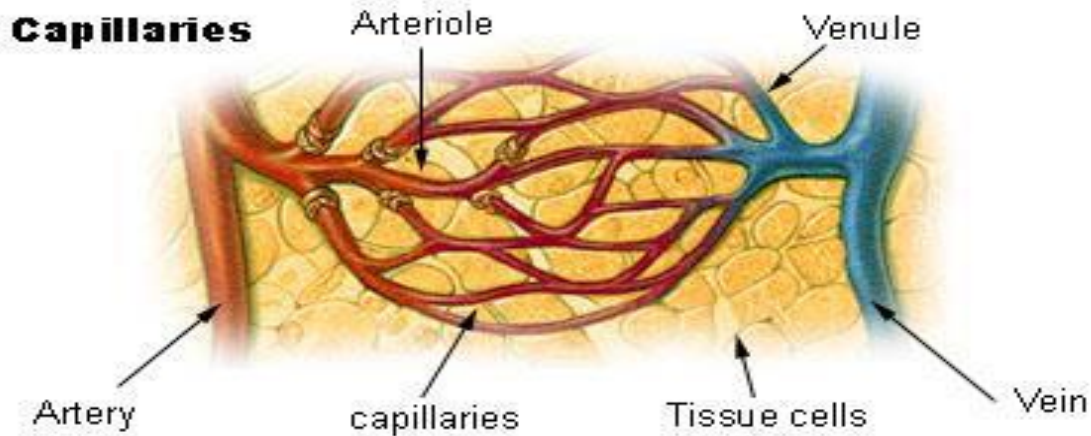
The capillaries branching away from the arteries in the abdomen pass by the liver and intestines, picking up nutrients and water.



The capillaries in the cellular tissue exchange their oxygen, nutrients, and water... and pick up carbon dioxide and other wastes.

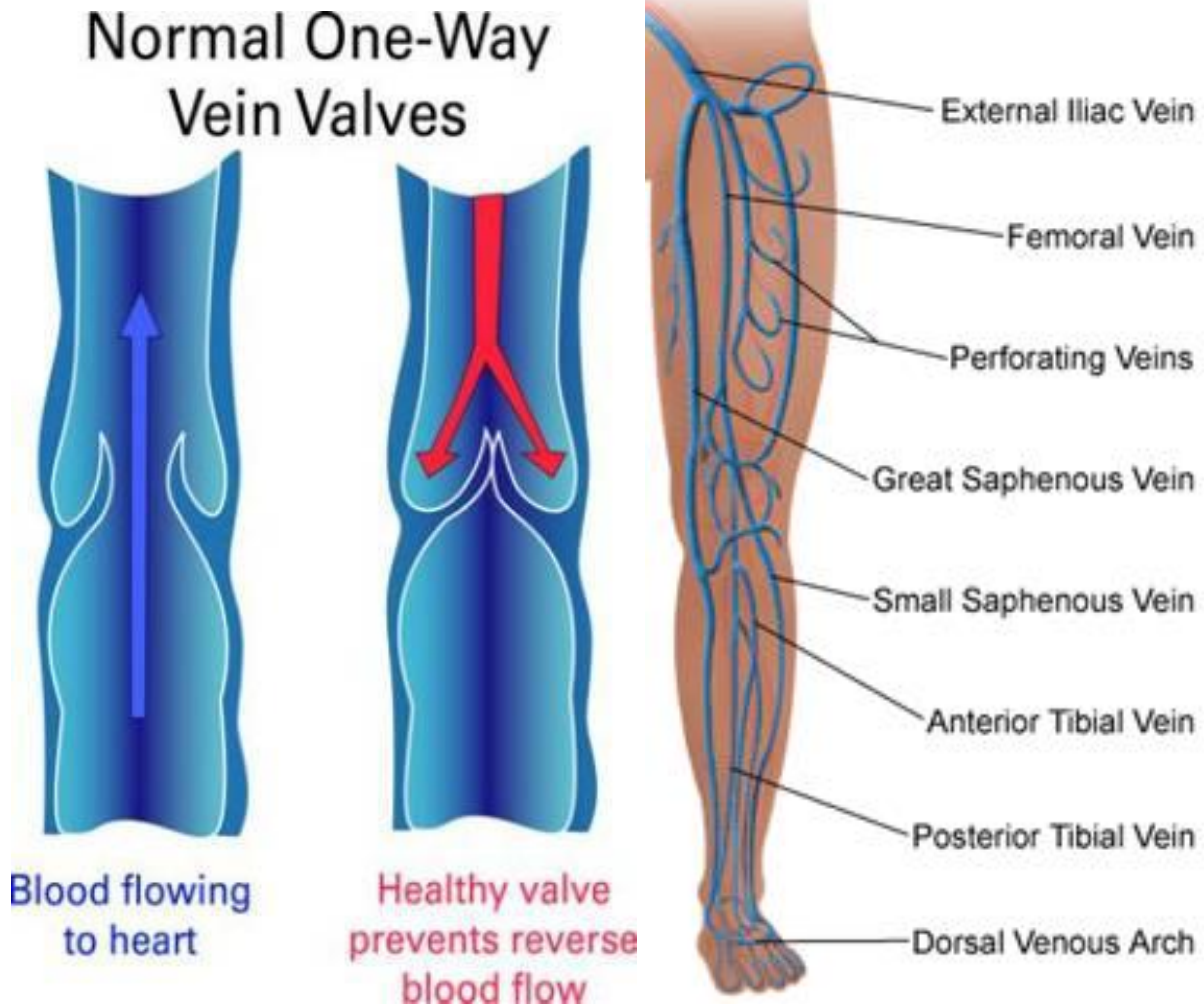
## 6-Tracing the flow of blood... the venules

The capillaries, now carrying carbon dioxide and cell wastes, start merging into bigger vessels called venules (VEEN or VEN yoo als) The venules widen even further, emptying into veins.



7-Tracing the flow of blood... the veins

The veins have valves that prevent the backflow of blood. Veins lead back to the heart.



The veins carry the blood BACK toward the heart. The blood still carries a small amount of oxygen along with cellular waste, but has fairly low pressure compared to blood in arteries. It finally travels through the superior and inferior vena cava, and back into the right atrium of the heart. Circulation is complete, and starts over again.

