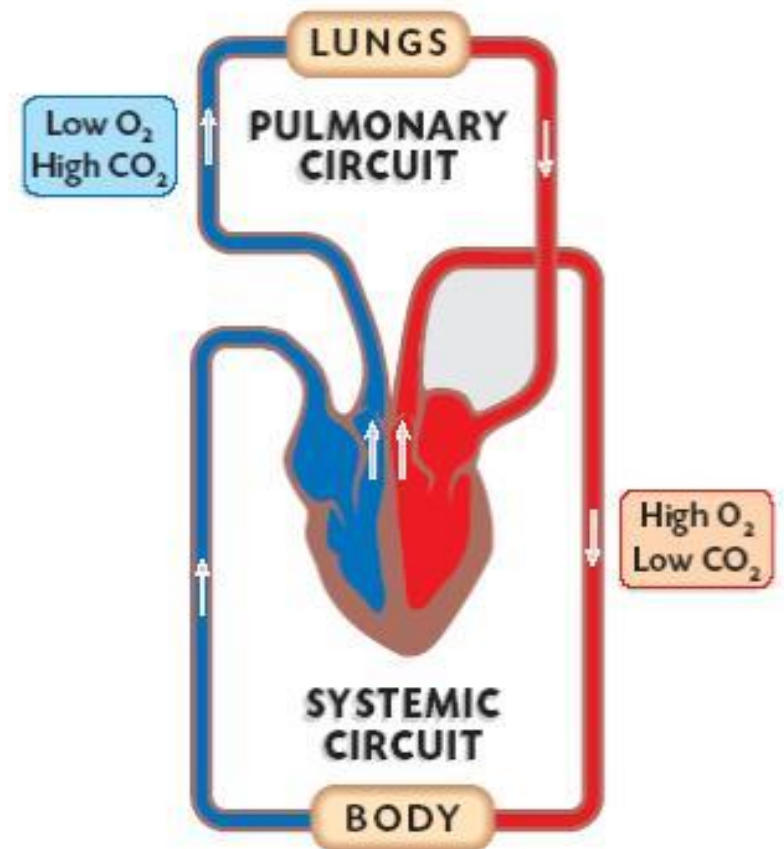


# Matters of the Heart

# Heart Chambers & Valves

**Your heart is a double pump.**

**Circulation is a double circuit.**



# Systemic

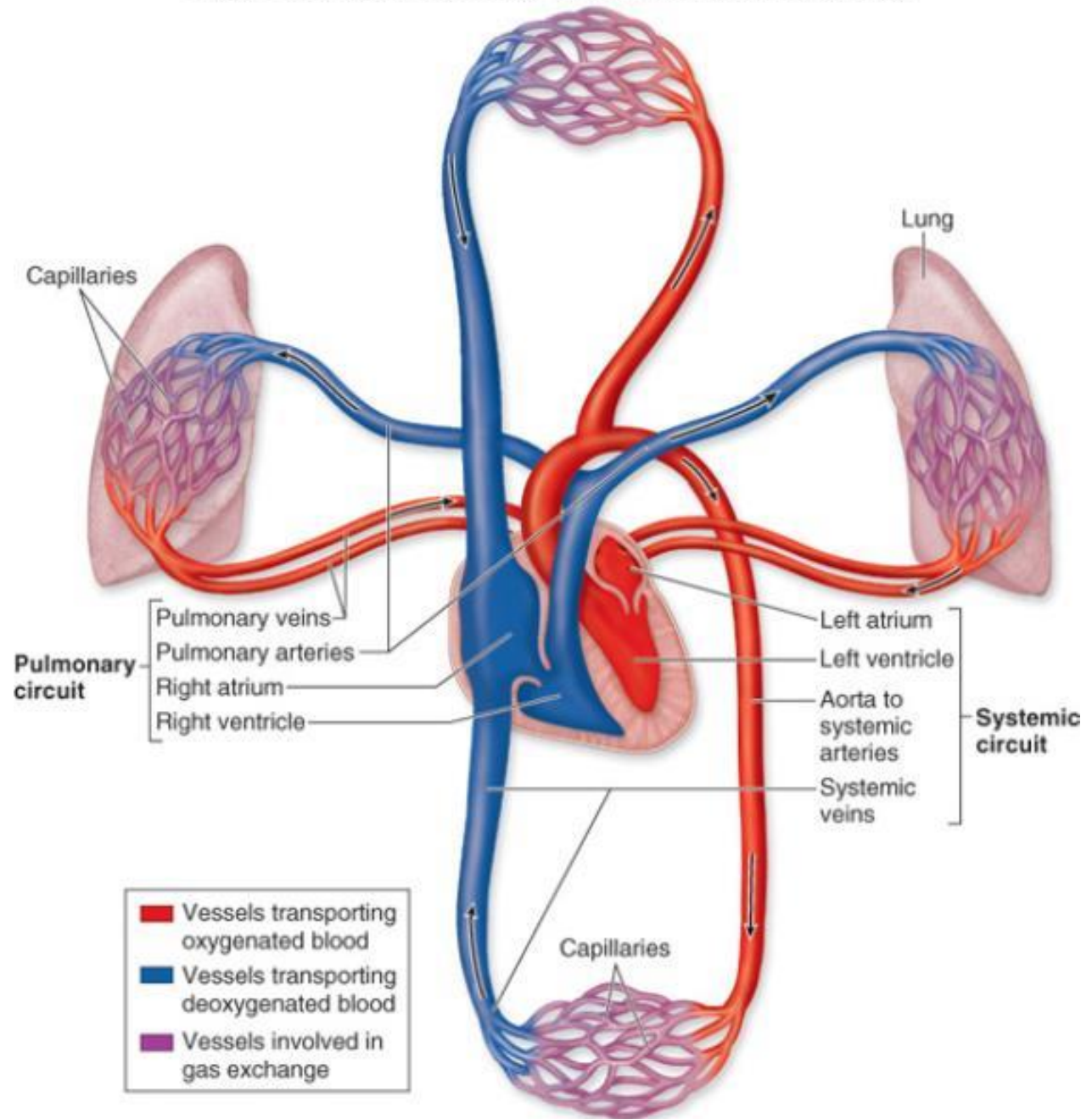
## Circulation –

delivers blood to all body cells and carries away waste

# Pulmonary

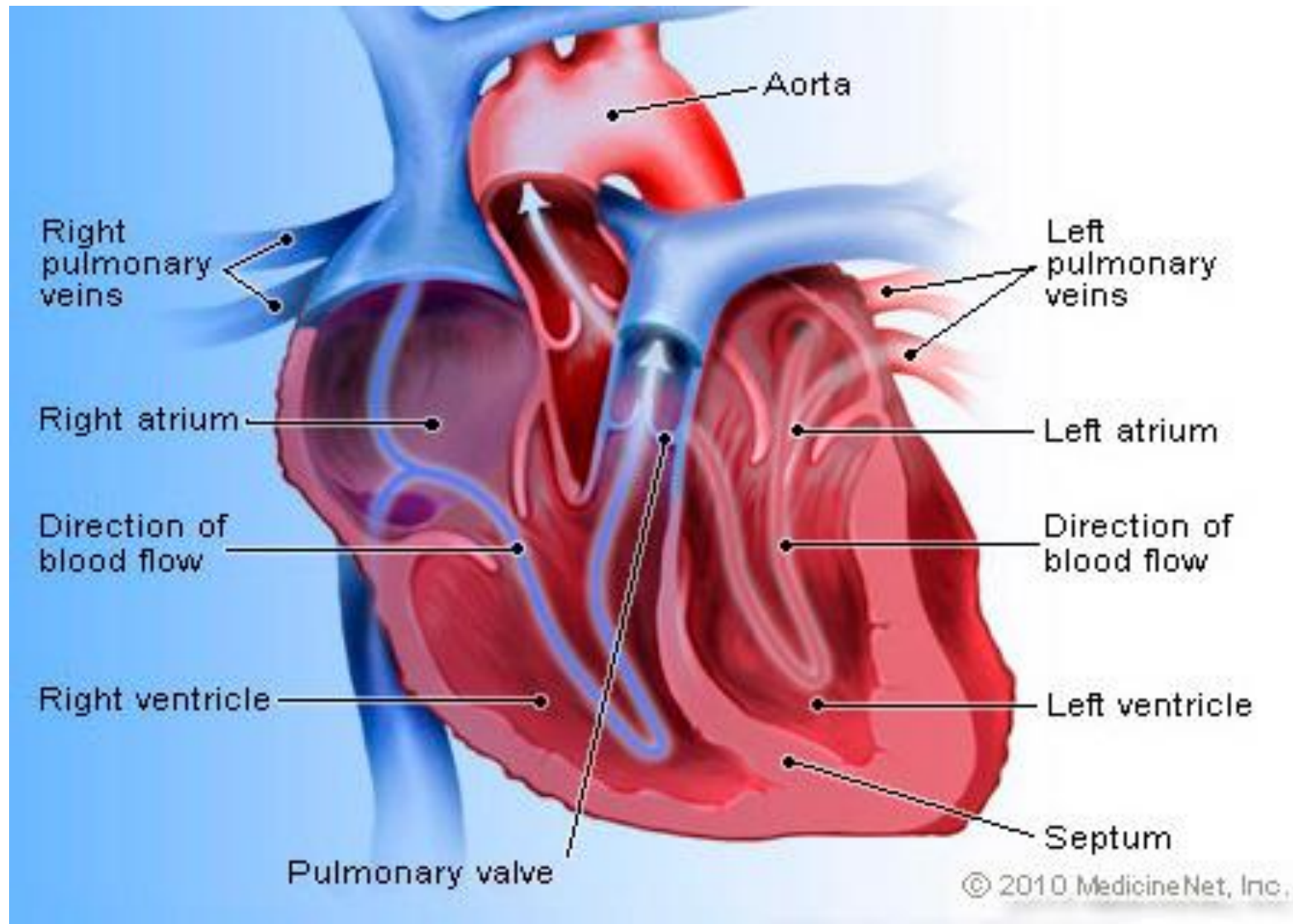
## Circulation –

eliminates carbon dioxide and oxygenates blood (lung pathway)



# Blood Flow

Pulmonary veins > left atrium > left ventricle > aorta > body >  
Right atrium > right ventricle > pulmonary artery > lungs



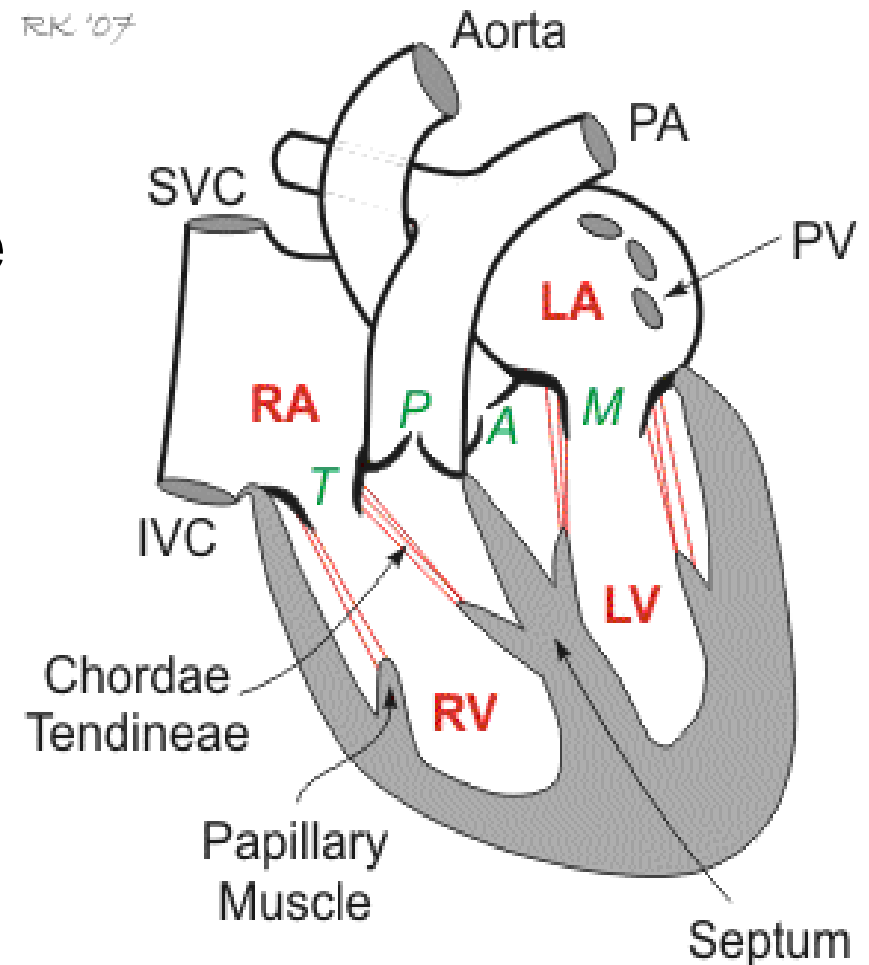
# Heart has 4 chambers:

## 2 Atria –

thin upper chambers that receive blood through veins

## 2 Ventricles –

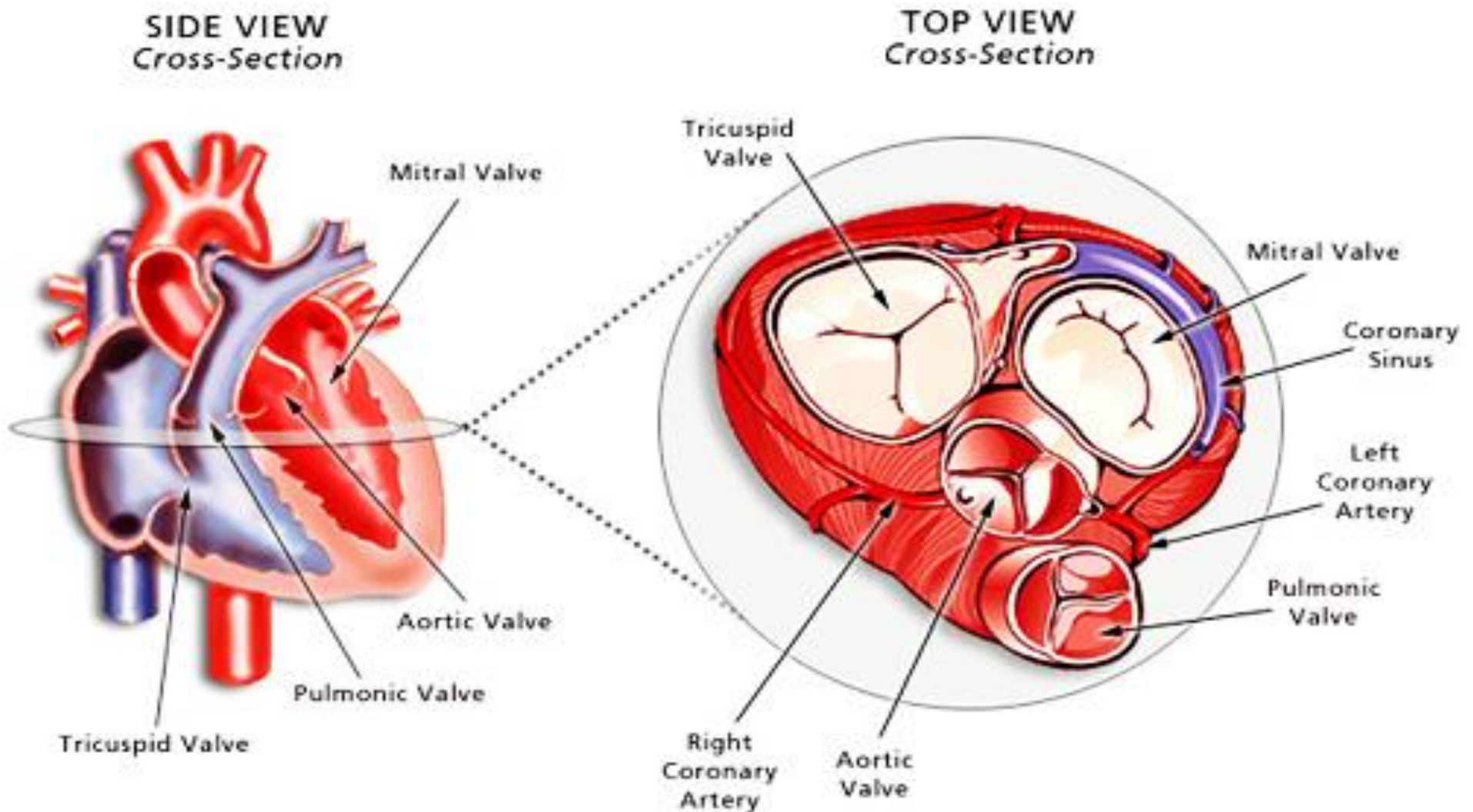
thick, muscular lower chambers. Receive blood & then pump out through arteries.



Abbreviations: RA, right atrium; RV, right ventricle; LA, left atrium; LV, left ventricle; T, tricuspid valve; P, pulmonic valve; M, mitral valve; A, aortic valve; SVC, superior vena cava; IVC, inferior vena cava; PA, pulmonary artery; PV, pulmonary veins

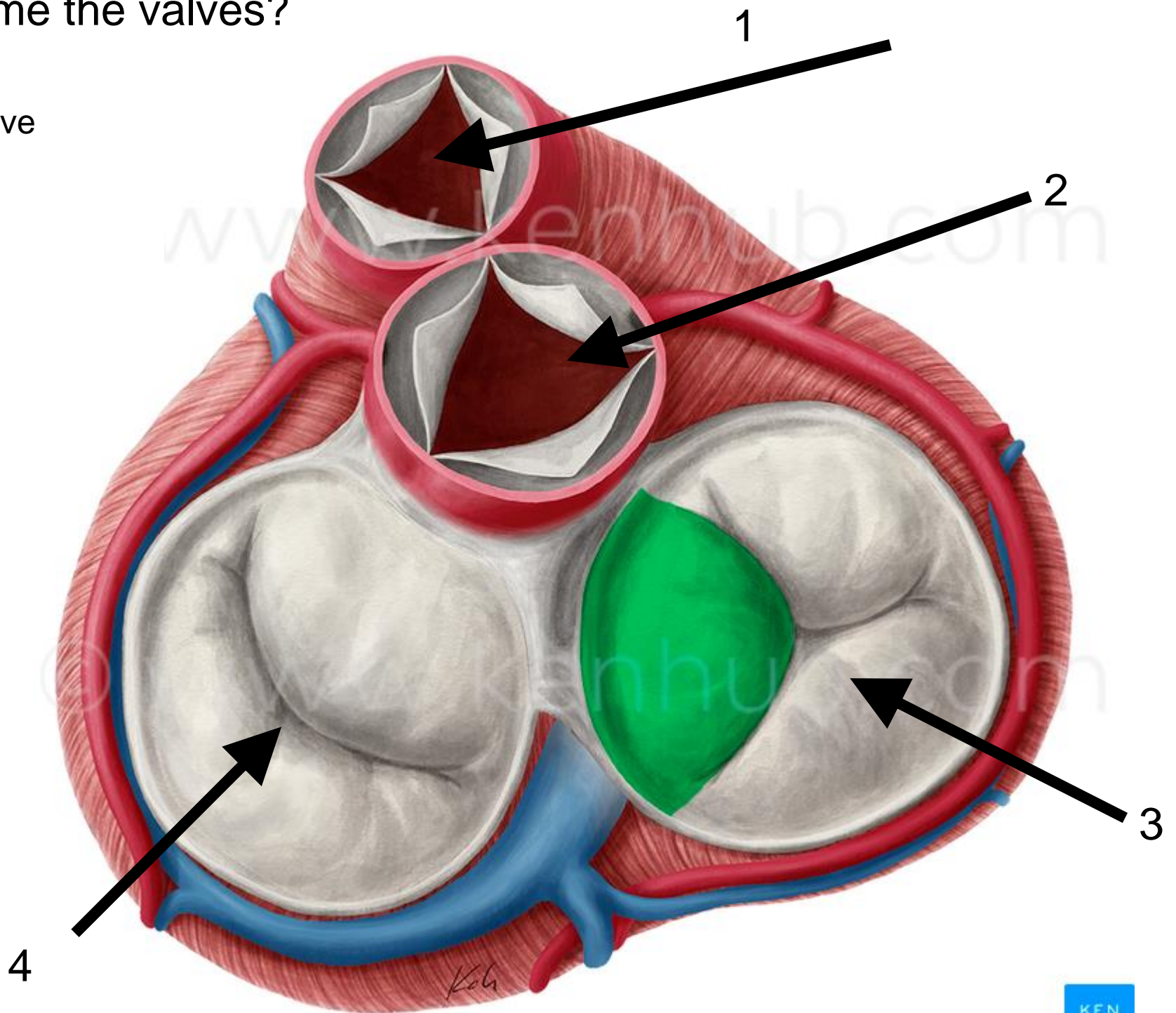
# Valves of the Heart – allow one-way flow of blood.

## 2 Atrioventricular Valves (AV) & 2 Semilunar valves



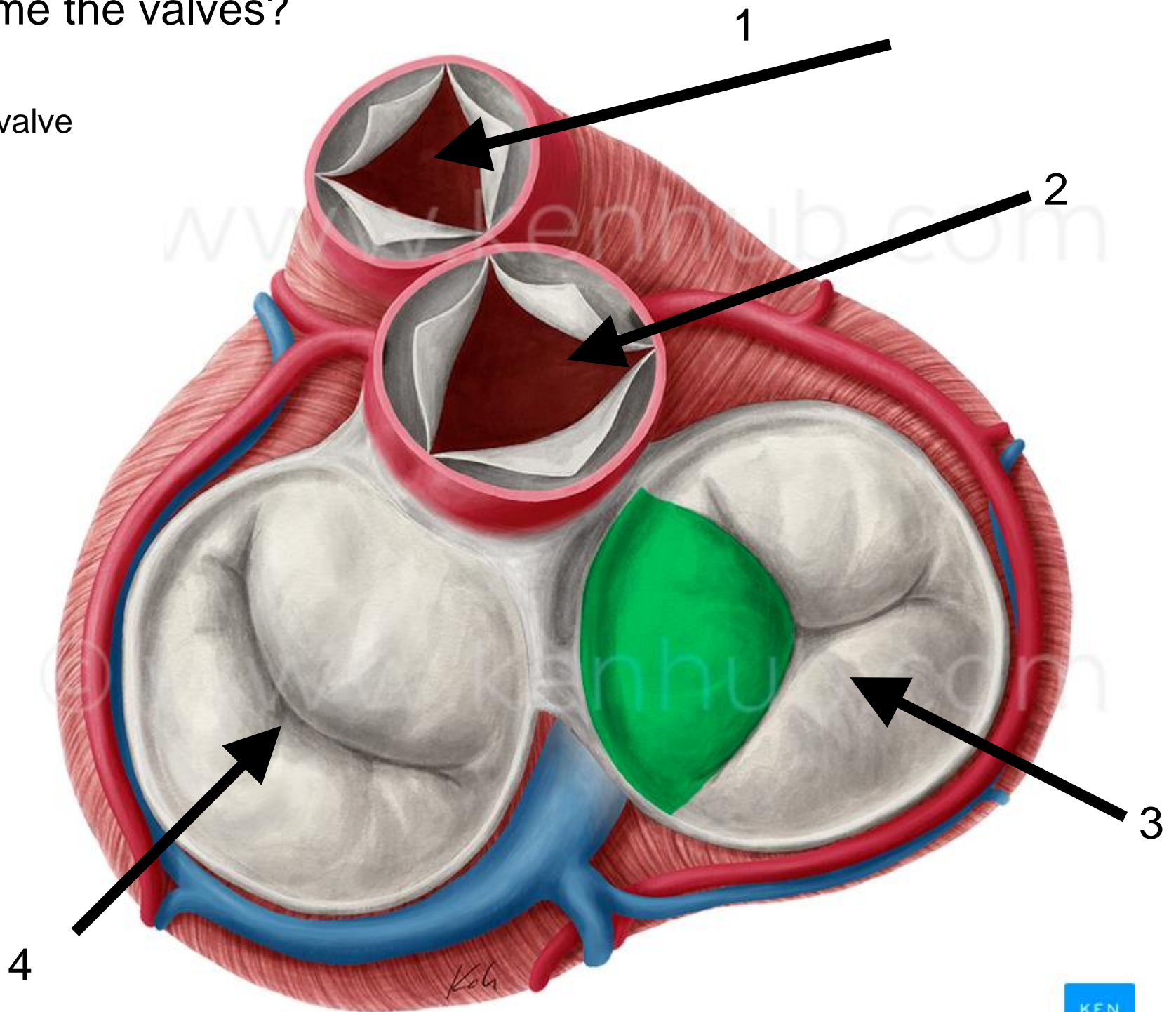
# Can you name the valves?

Pulmonary valve  
Aortic valve  
Tricuspid  
Bicuspid



# Can you name the valves?

1. Pulmonary valve
2. Aortic valve
3. Tricuspid
4. Bicuspid



4



# Heart Actions

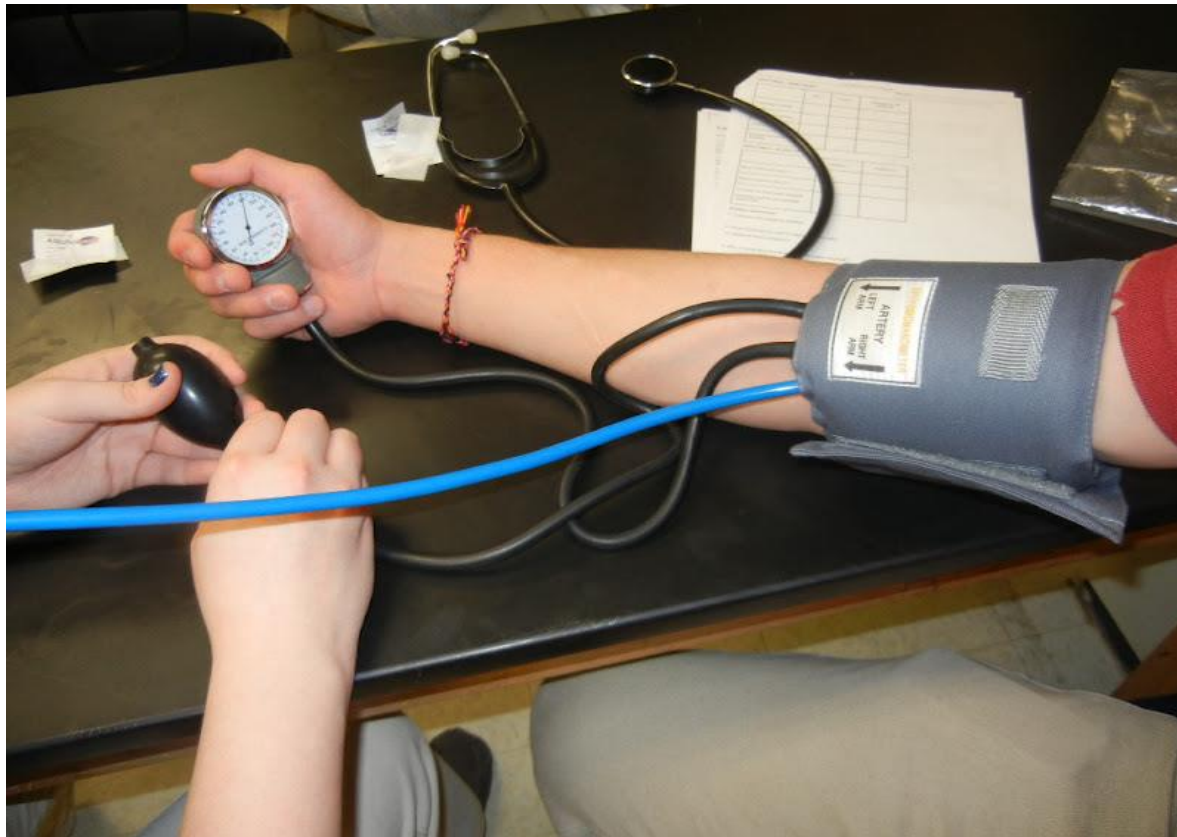
- **Cardiac Cycle:** One complete heartbeat.
- Contraction is systole
- Relaxation is diastole.

Blood pressure is the force of blood against the walls of arteries.

Blood pressure is recorded as two numbers—the systolic pressure (as the heart beats) over the diastolic pressure (as the heart relaxes between beats).



The average (normal) blood pressure for an adult is 120/80. This number varies by person and it is best if you know what is \*normal\* for you, so that you (or your doctor) recognize when something is not normal.



**SPHYGMOMANOMETER**

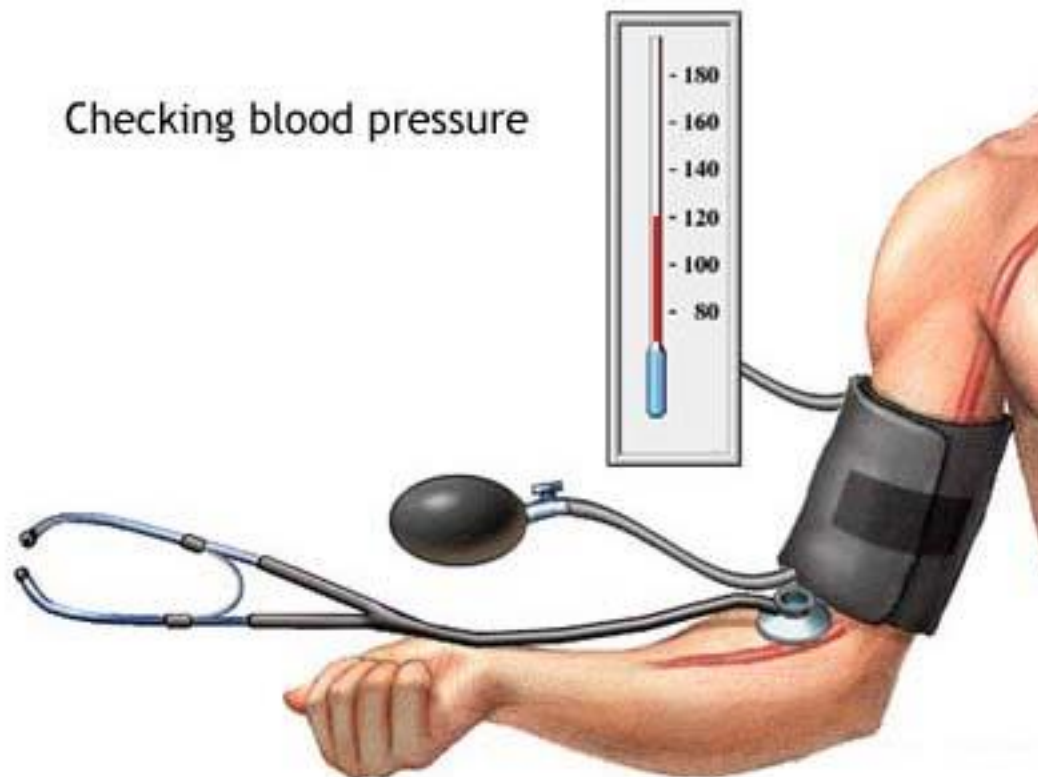
## Factors affecting blood pressure:

Average is

120/80 (higher number is the systolic pressure)

1. Cardiac Output
2. Blood volume (5 liters for avg adult)
3. Blood Viscosity
4. Peripheral Resistance

Cardiac output =  
stroke volume x  
heart rate



# Heart Sounds - Opening and Closing of Valves, "Lub Dub"

Different sounds of the heart:

Normal  
Heart Murmurs  
Mitral Regurgitation  
Stenosis



**Stethoscope** - instrument to listen and measure heart sounds

# Cardiac Output

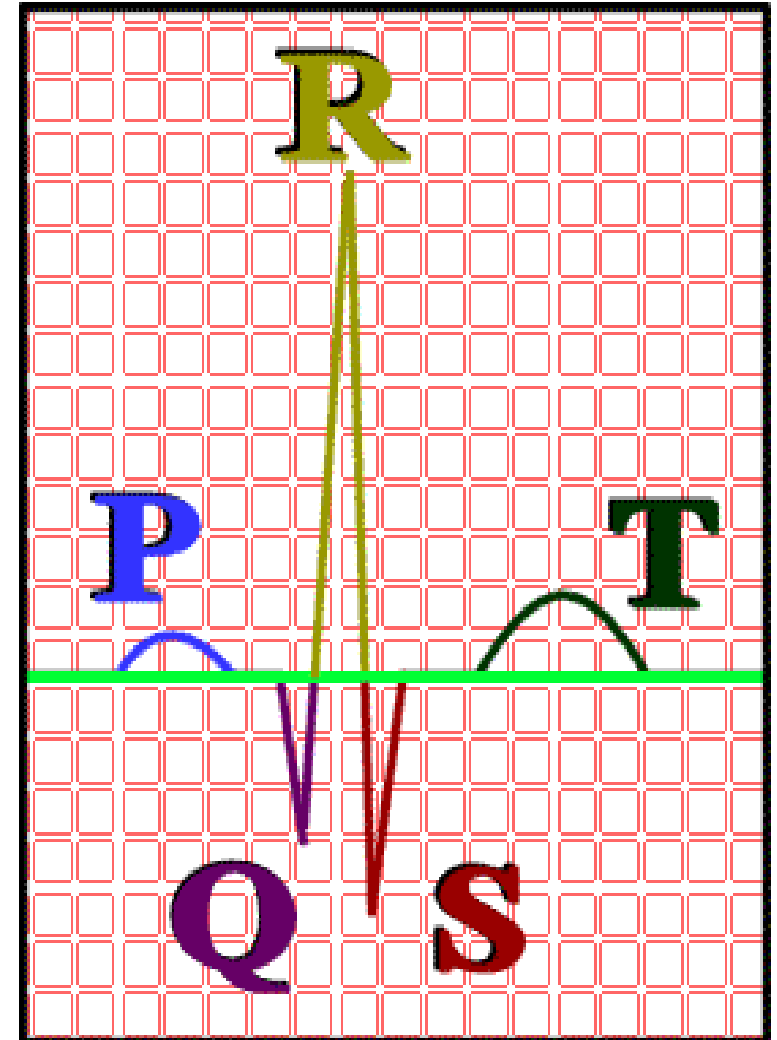
Cardiac Output = Stroke Volume x Heart Rate



# ECG – electrocardiogram

a recording of the electrical events (changes) during a cardiac cycle

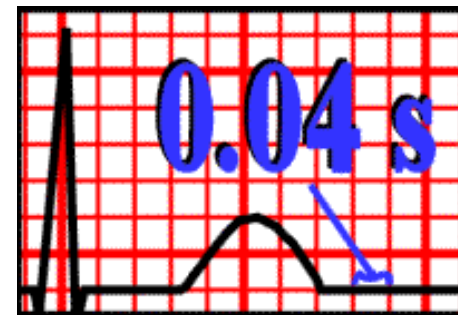
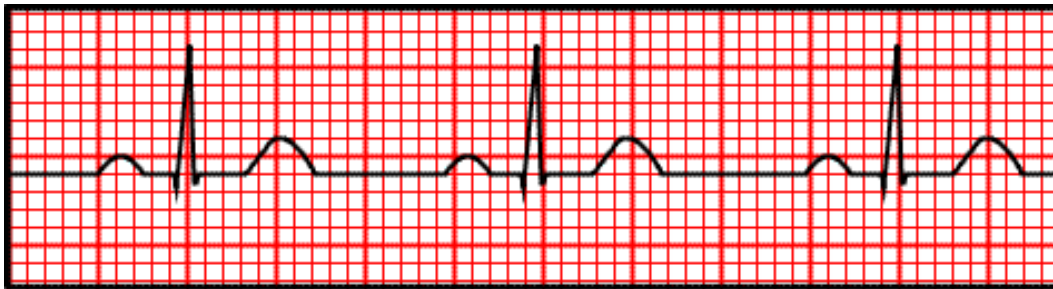
- P Wave – depolarization of the atria (atrial contraction)
- QRS Complex – depolarization of the ventricles (ventricular contraction)
- T Wave – Repolarization of the ventricles



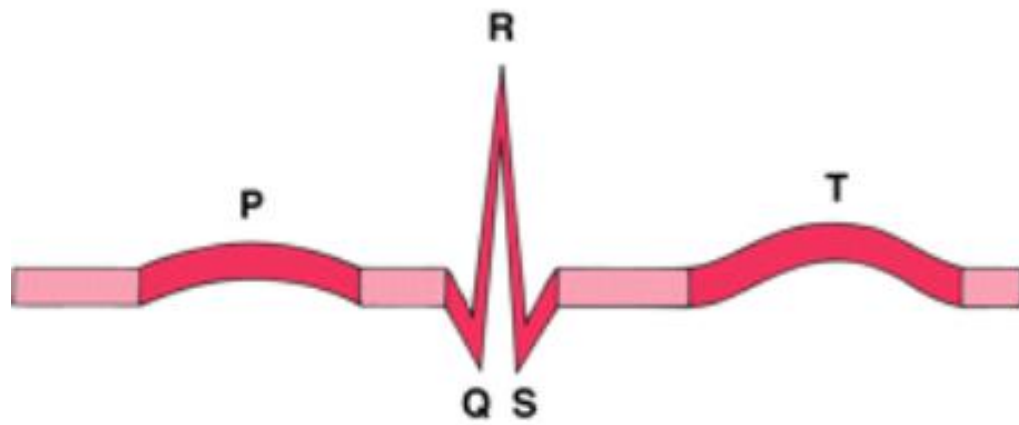
# Interpreting ECGs

An ECG is printed on paper covered with a grid of squares. Notice that five small squares on the paper form a larger square. The width of a single small square on ECG paper represents 0.04 seconds.

A common length of an ECG printout is 6 seconds; this is known as a "six second strip."



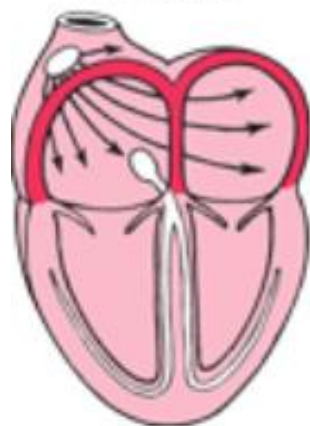




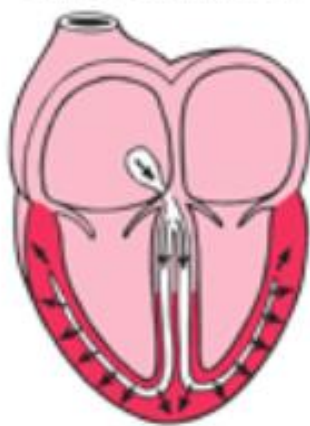
**P Wave**

**QRS Complex**

**T Wave**



Activation of the atria

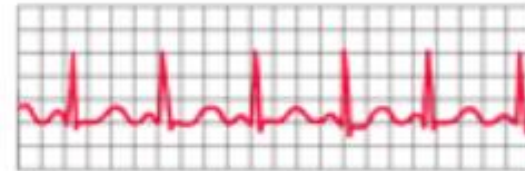


Activation of the ventricles

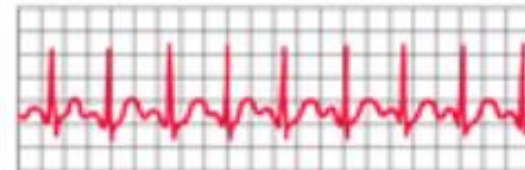


Recovery wave

**Normal Heartbeat**



**Fast Heartbeat**



**Slow Heartbeat**



**Irregular Heartbeat**



## 13.4 BLOOD VESSELS

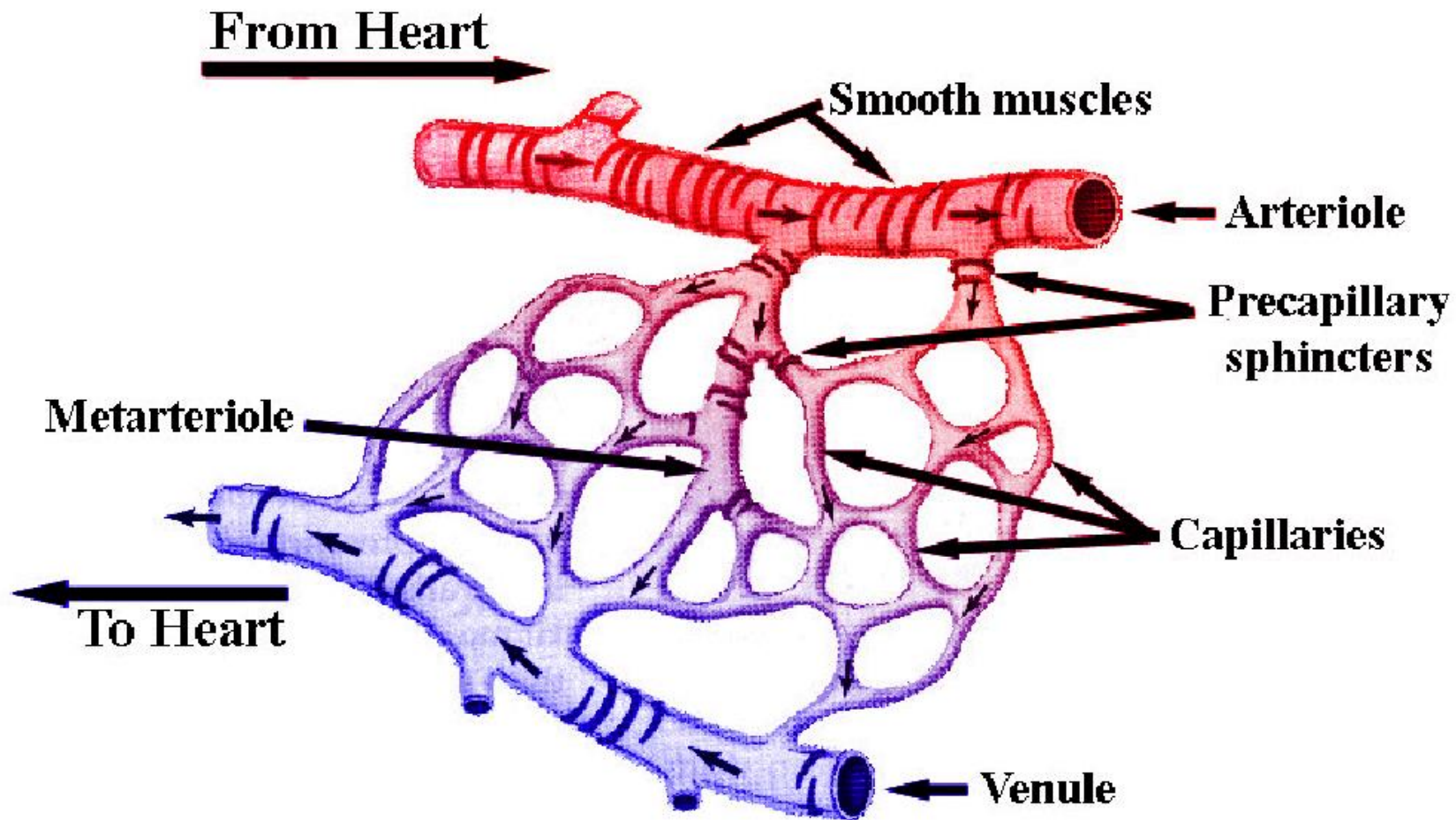
Blood Vessels: arteries, veins, capillaries

**ARTERIES**: strong elastic vessels which carry blood moving away from the heart. Smallest ones are arterioles which connect to capillaries.

**VEINS** - Thinner, less muscular vessels carrying blood toward the heart.

Smallest ones are called venules which connect to capillaries. Contain valves.

**Capillaries**: Penetrate nearly all tissues. Walls are composed of a single layer of squamous cells – very thin. Critical function: allows exchange of materials (oxygen, nutrients) between blood and tissues.



# Control of Blood Flow:

Precapillary sphincters – circular, valve-like muscle at arteriole-capillary junction

Vasoconstriction – narrowing of vessel

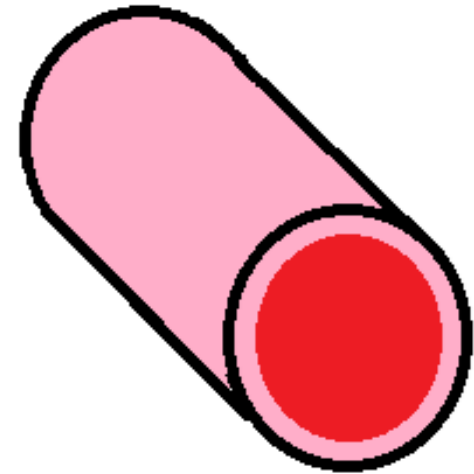
Vasodilation –expanding blood vessel



Normal Cross Section



Vasoconstriction



Vasodilation