



# DAY 4

- Cardiac Cycle
  - ECG Lab



DAY 5  
MARCH 7 AND 8

- Cardiac Cycle
  - ECG Lab finish

## Heart Sounds –

- opening and closing of the valves (LUB, DUB),
- flow of blood into and out of the chambers,
- vibrations in muscle

<http://depts.washington.edu/physdx/heart/demo.html>

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



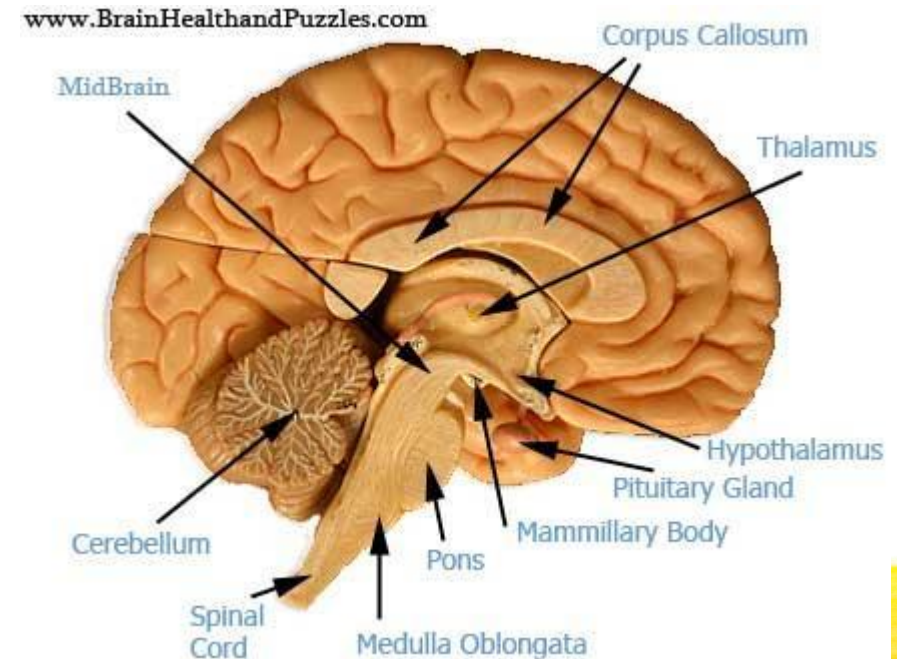
# CARDIAC CYCLE

One complete  
heartbeat.

<http://www.blaufuss.org/tutorial/index1.html>

# REGULATION OF CARDIAC CYCLE

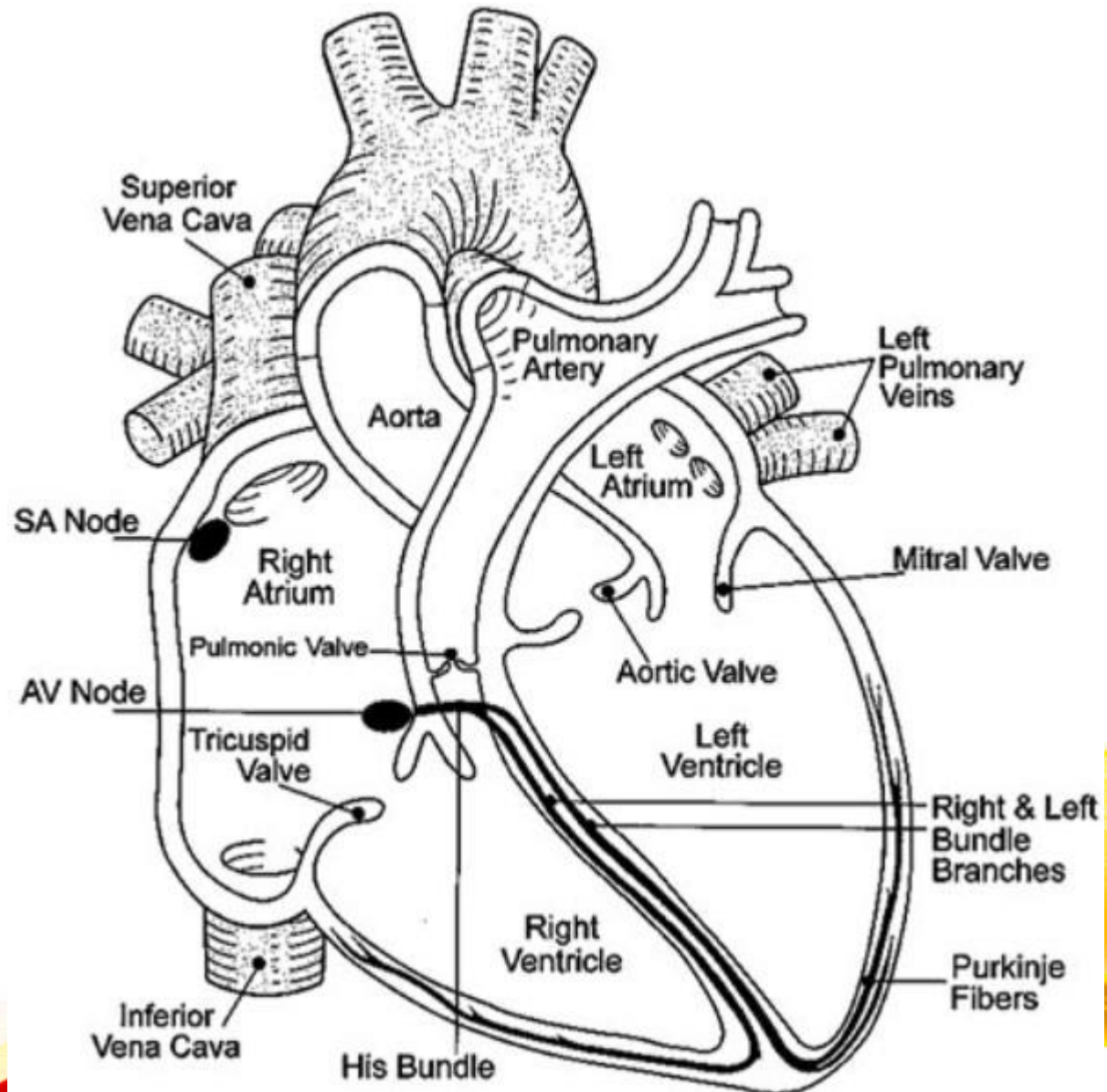
- Brainstem determines in cardiac cycle needs to change pace
- communicates with SA/AV nodes



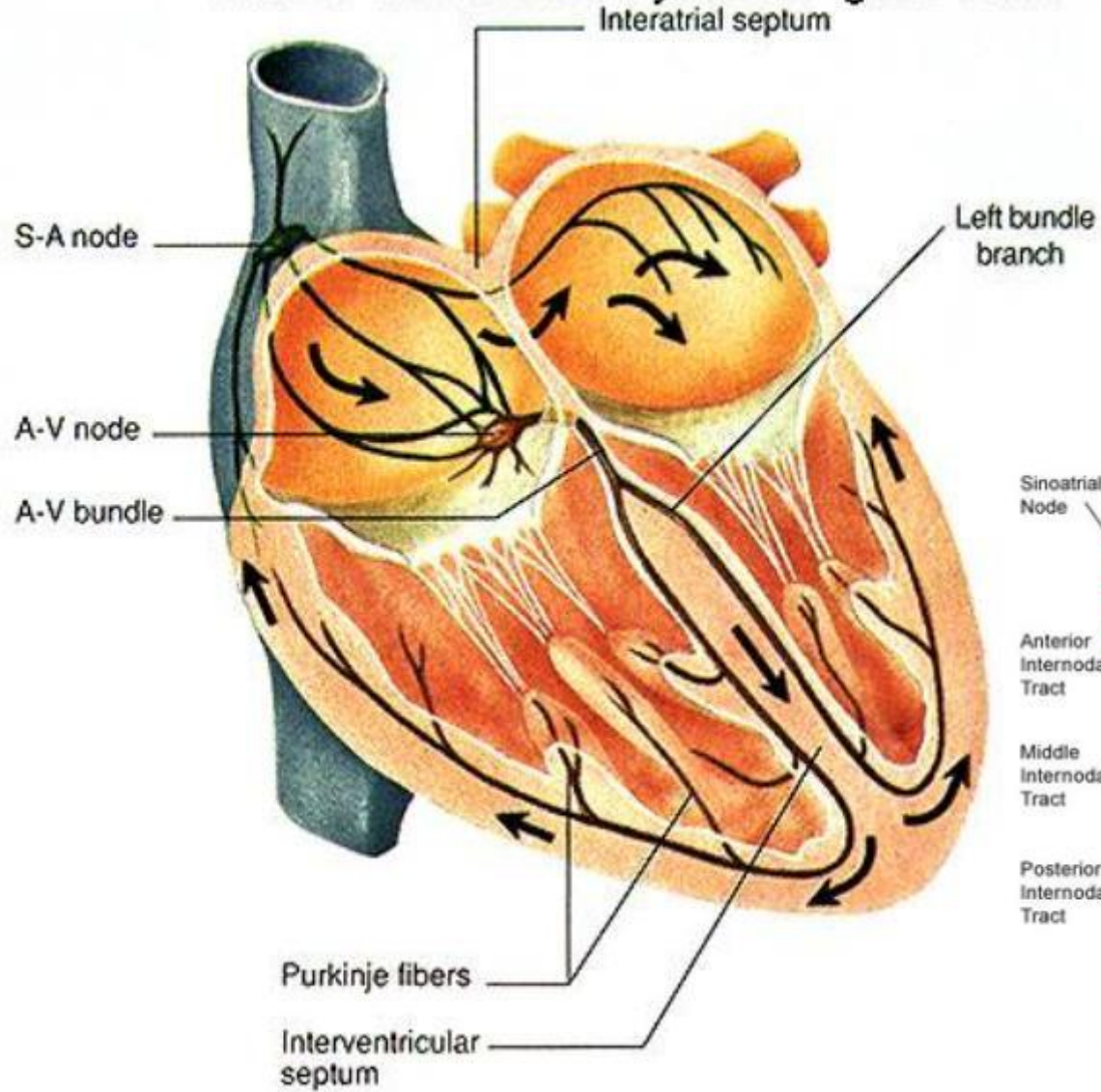
# CONDUCTION

S-A Node

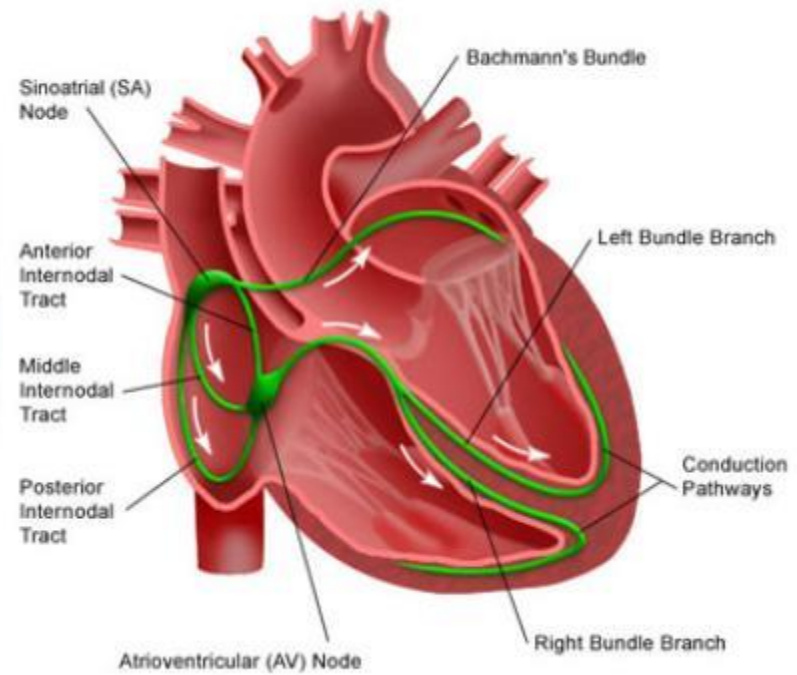
A-V Node



# Cardiac Conduction System. Figure 15.19



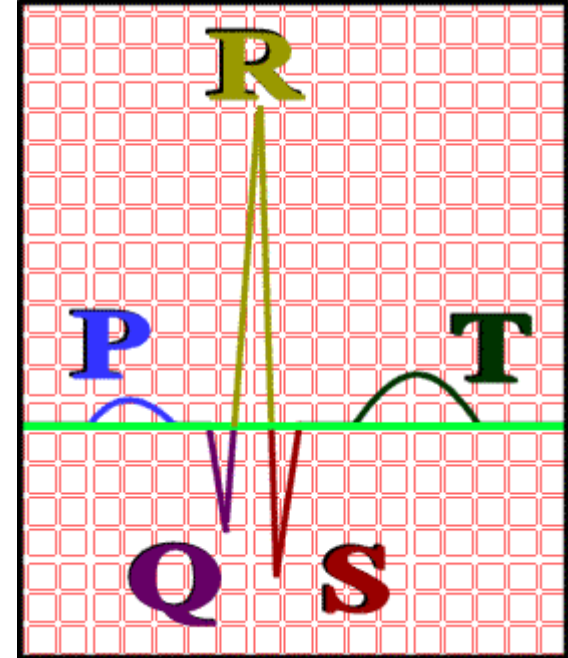
## Electrical System of the Heart



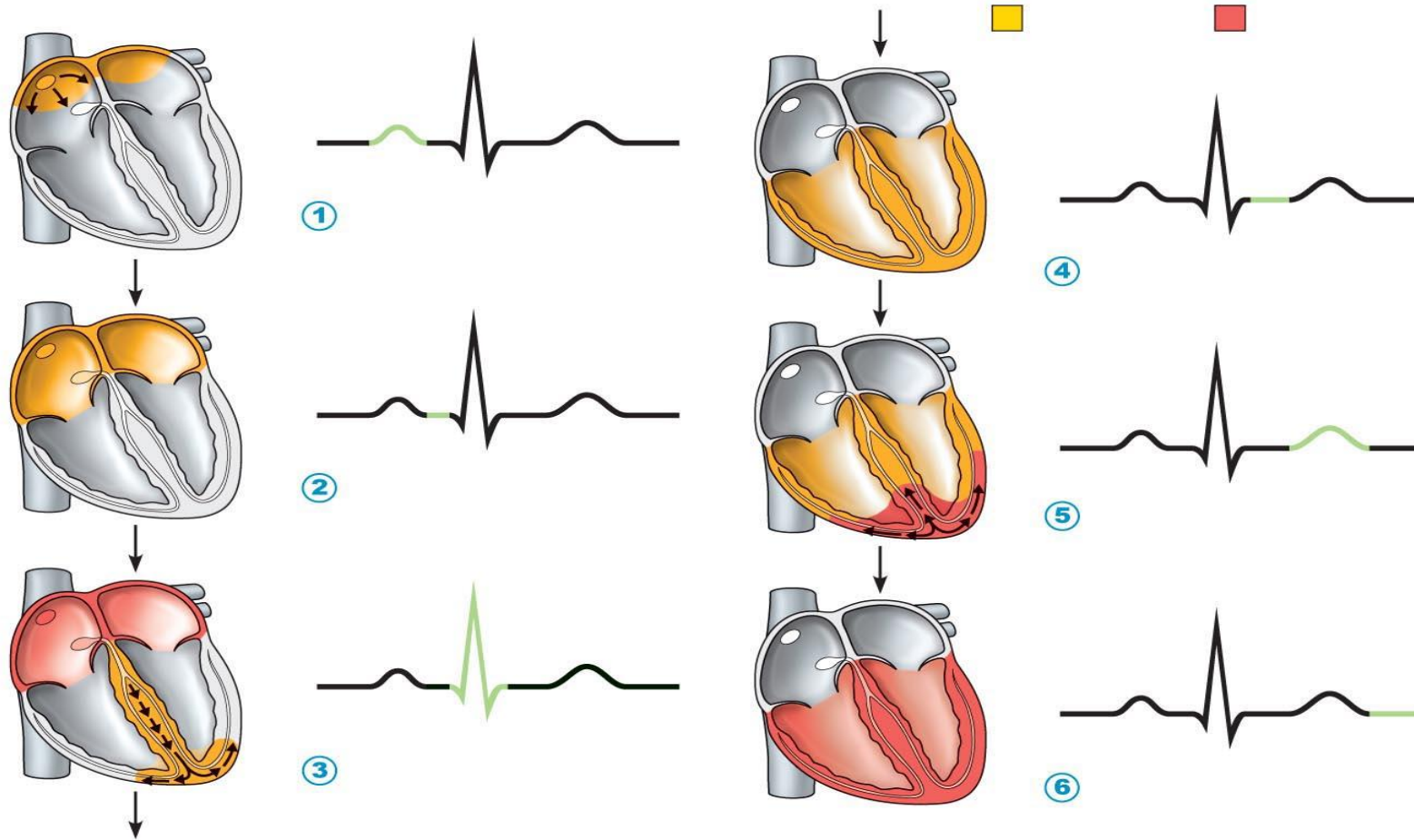


# PARTS OF THE EKG

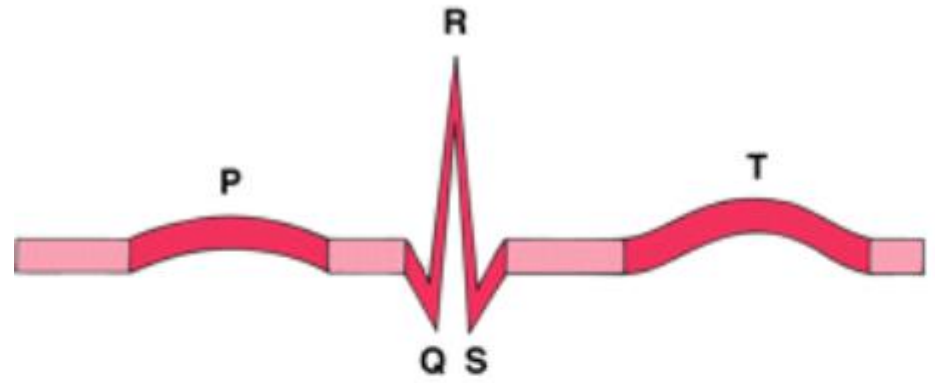
- P Wave – Atrial contraction
- QRS Complex – Ventricular contraction
- T Wave – ventricular recovery



# ECG OR EKG



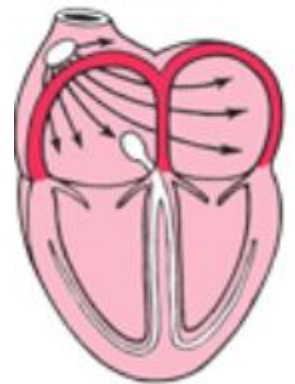
recording of  
the electrical  
changes  
during a  
cardiac cycle



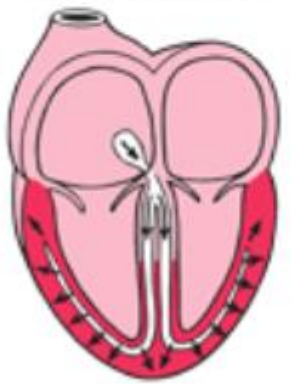
**P Wave**

**QRS Complex**

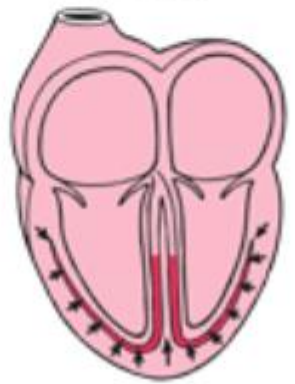
**T Wave**



Activation of the atria

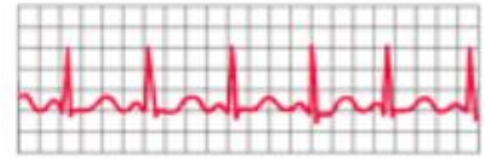


Activation of the ventricles

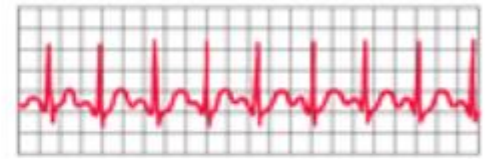


Recovery wave

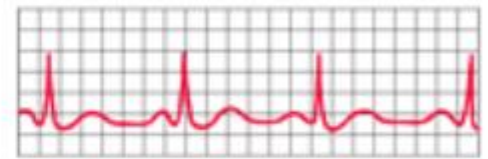
**Normal Heartbeat**



**Fast Heartbeat**



**Slow Heartbeat**

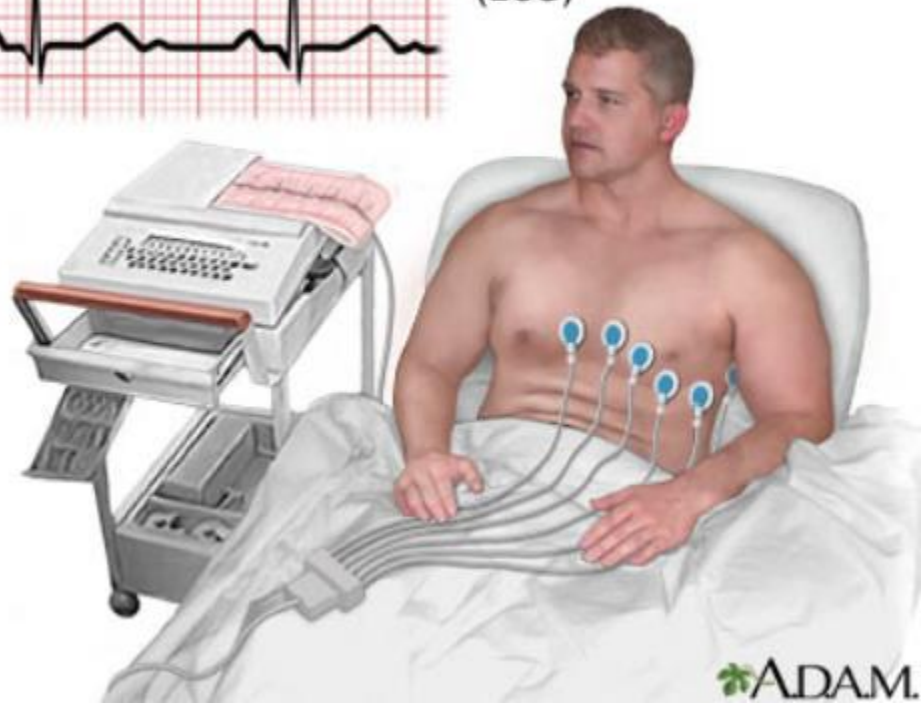
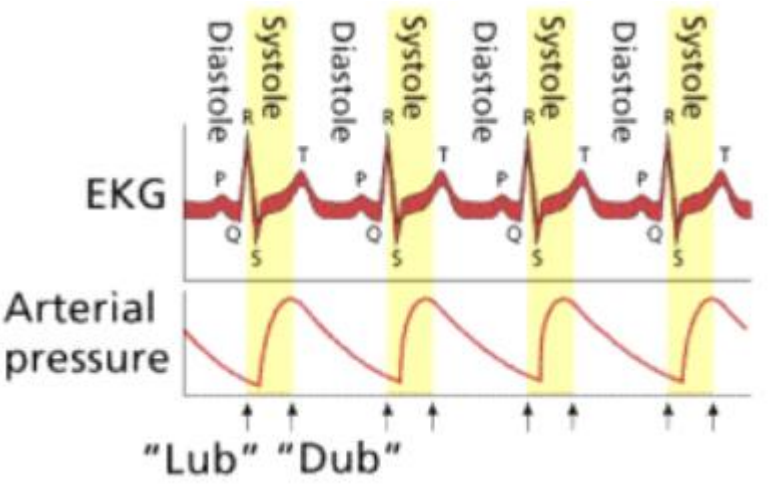


**Irregular Heartbeat**

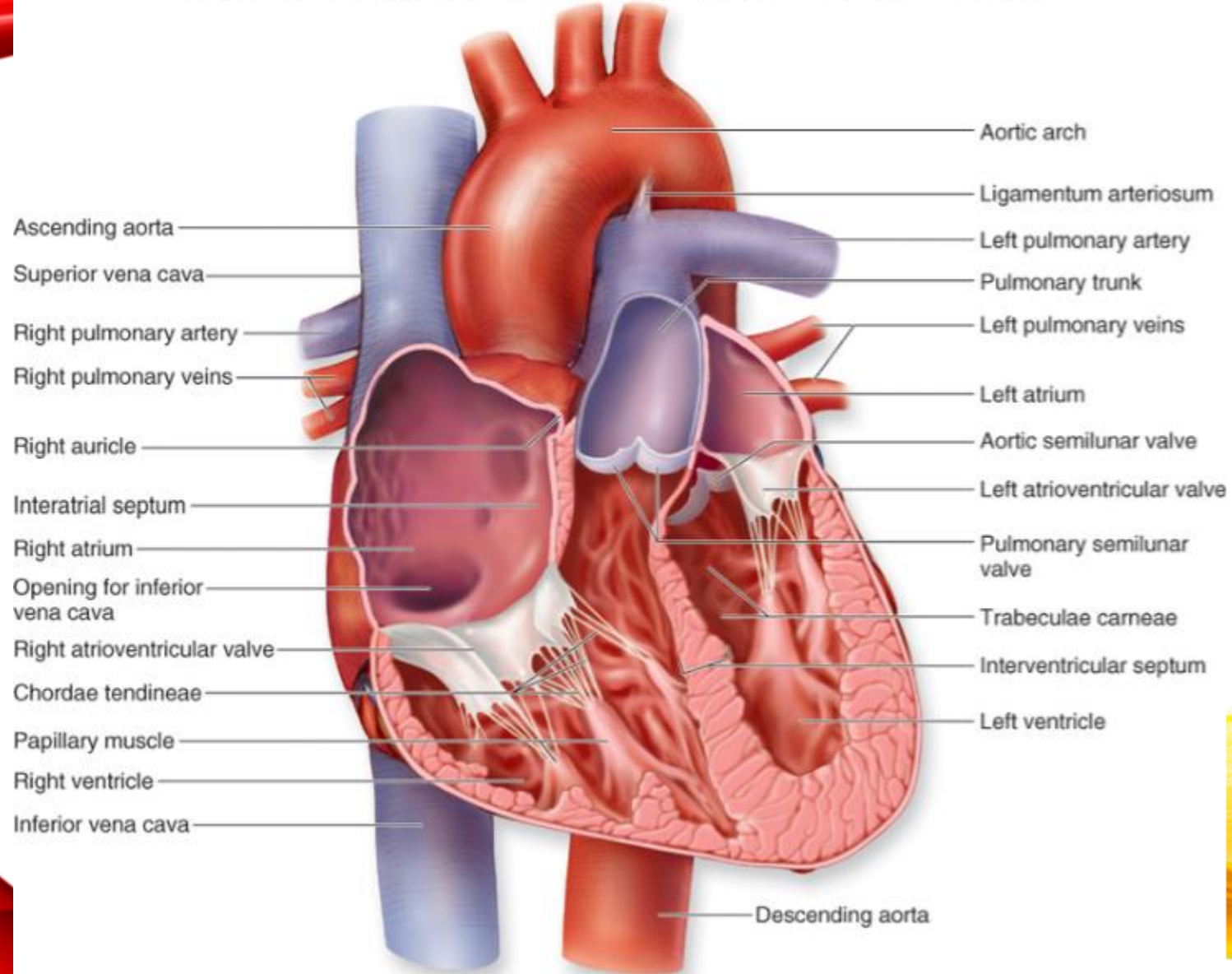




Electrocardiogram (ECG)



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## DAY 6

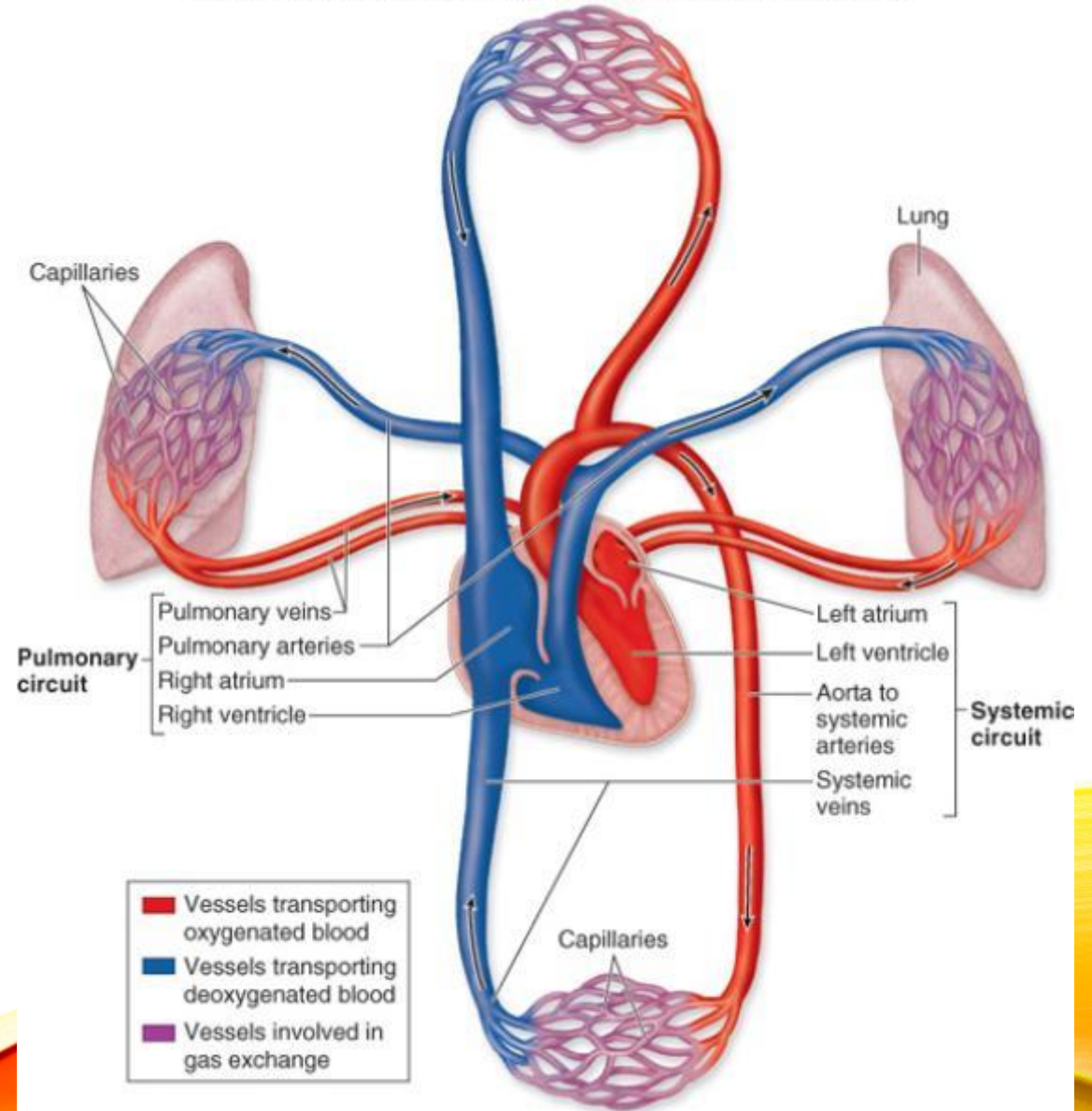
- Pulmonary and systemic circulations
  - Blood vessels
  - Returning blood to the heart
  - Differences between systemic and pulmonary

## Systemic Circulation

- to body
- Left side of heart

## Pulmonary Circulation

- to lungs
- Right side of heart



# FUNCTION OF EACH CIRCULATION

## Systemic Circulation

- delivers blood to all body cells and carries away waste

## Pulmonary Circulation

- releases carbon dioxide and gathers oxygen (lung pathway)

## Coronary circulation

- Provides blood to the heart tissue
- Others: Cerebral, hepatic, renal, abdominal...





# VESSELS

- ARTERIES
  - Carry blood away from the heart
- VEINS
  - Carry blood toward the heart
- CAPILLARIES
  - Where gas exchange occurs

## **Arteries :**

Strong  
elastic  
Away from heart  
Smaller called arterioles

## **VEINS –**

Thinner,  
less muscular vessels  
carrying blood toward the heart.  
Smallest ones are called venules.  
Contain valves.

## **Capillaries:**

Penetrate nearly all tissues.  
Walls are composed of a single layer of squamous cells – very thin.  
Exchange of gases



# RETURNING BLOOD TO YOUR HEART

Veins have 3 adaptations to help return blood to your heart

1. Valves
2. Skeletal muscles
3. Slightly muscular walls of the veins

## Major Blood Vessels

Aorta - The aorta is the largest artery. (leaves left ventricle)

Pulmonary Trunk/Artery – splits into left and right, both lead to the lungs (leaves left ventricle)

Pulmonary Veins – return blood from the lungs to the heart (connects to left atrium)

Superior and Inferior Vena Cava – return blood from the head and body to the heart (connects to right atrium)



# PULSE

- Every time the heart beats there is a pulse or surge of blood in your arteries.
- Average pulse rate is 70 – 80 beats per minute (bpm)
- Easiest to feel it closer to your heart.



# DAY 7

- Blood Pressure
  - Notes
  - Lab



# BLOOD PRESSURE

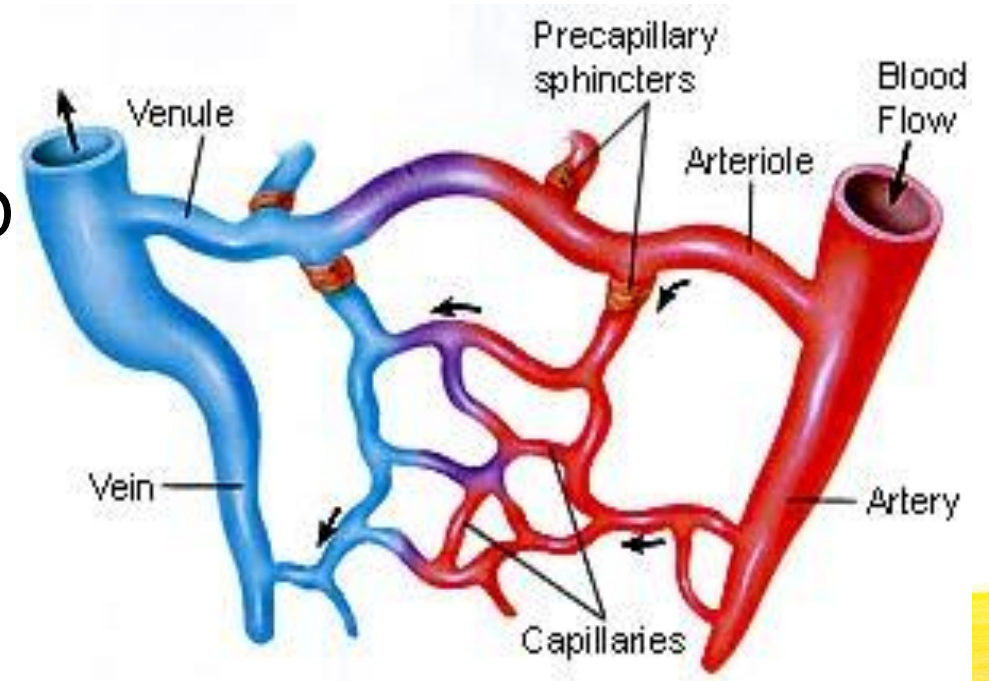
- CAUSED BY THE PUSH OF THE BLOOD ON THE VESSELS AFTER THE BLOOD EXITS THE HEART
- HIGHEST PRESSURE IN THE AORTA AND ARTERIES,
- LOWEST PRESSURE IN THE VENA CAVA AND OTHER VEINS

CONTROL OF BLOOD FLOW:

VASOCONSTRICTION –  
NARROWING BLOOD VESSEL'S  
DIAMETER

VASODILATION – EXPANDING BLOOD  
VESSEL'S DIAMETER

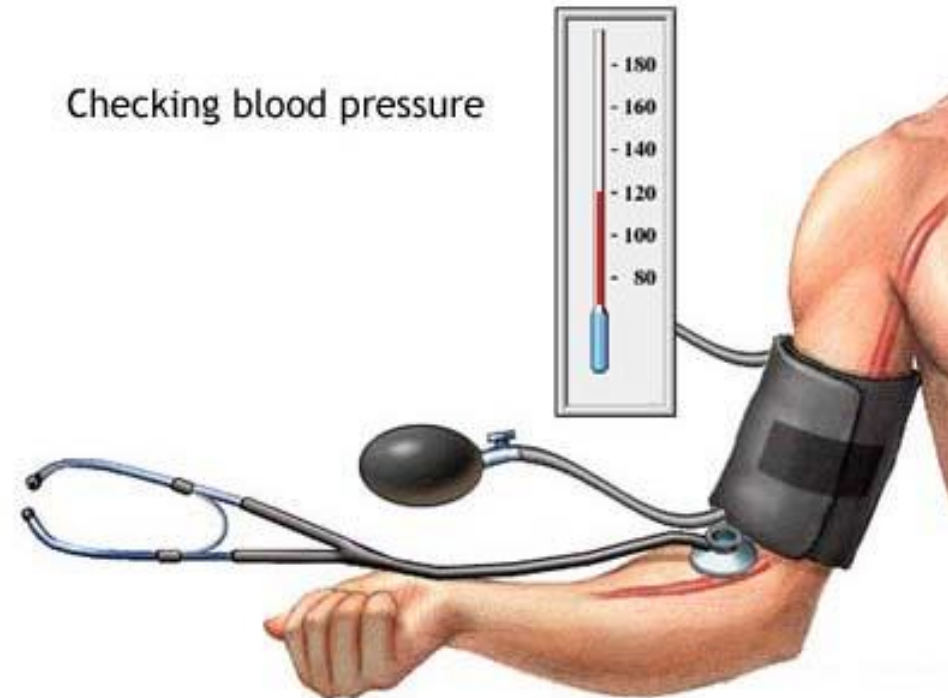
CONTROLLED BY MUSCLES  
AROUND THE VESSELS MAKING  
VESSEL OPENING LARGER OR  
SMALLER





## Factors affecting blood pressure:

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



# PARTS OF THE CUFF AND STETHOSCOPE

- Cuff
- Valve/pump
- Meter
  
- Ear buds
- bell



# DAY 8

- Review
- Jeopardy

- 
- Extra slides

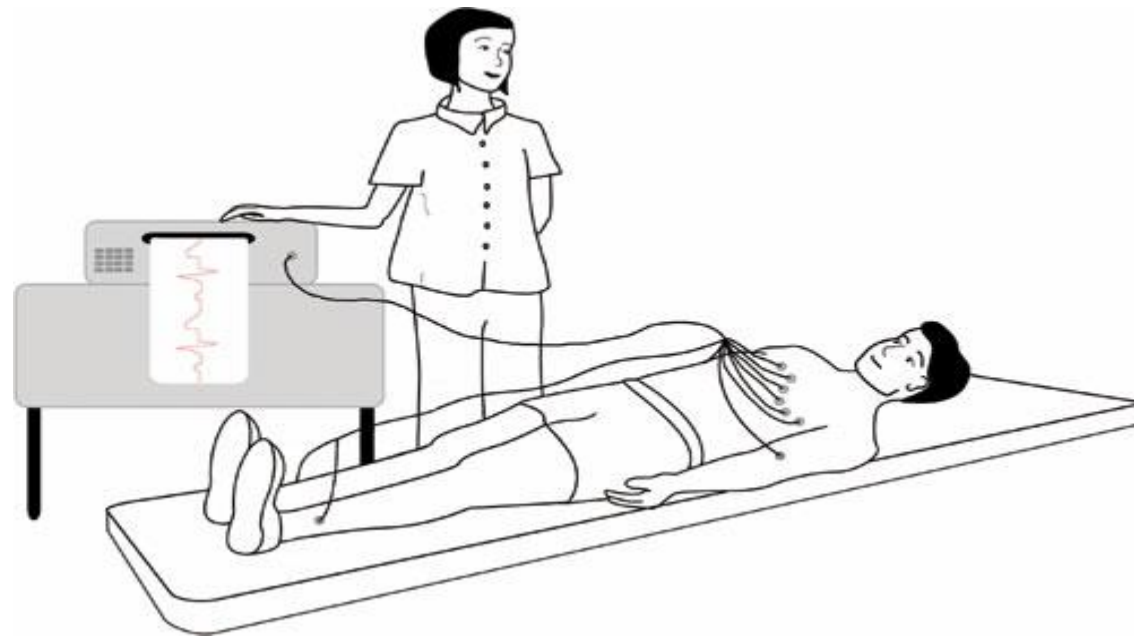
# CARDIAC OUTPUT

Cardiac Output = Stroke Volume x Heart Rate



# SADS = (SUDDEN ARRHYTHMIA DEATH SYNDROMES OR SUDDEN ADULT DEATH SYNDROME)

Routine ECG Screening may help prevent deaths in young people

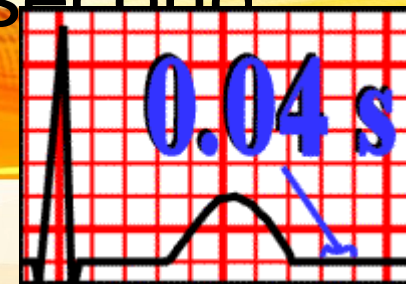
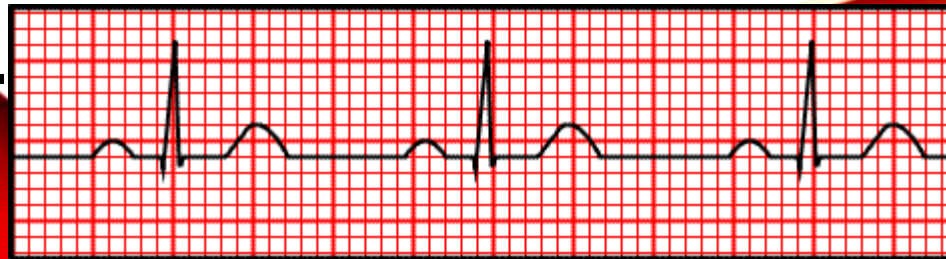


# INTERPRETING EKGs

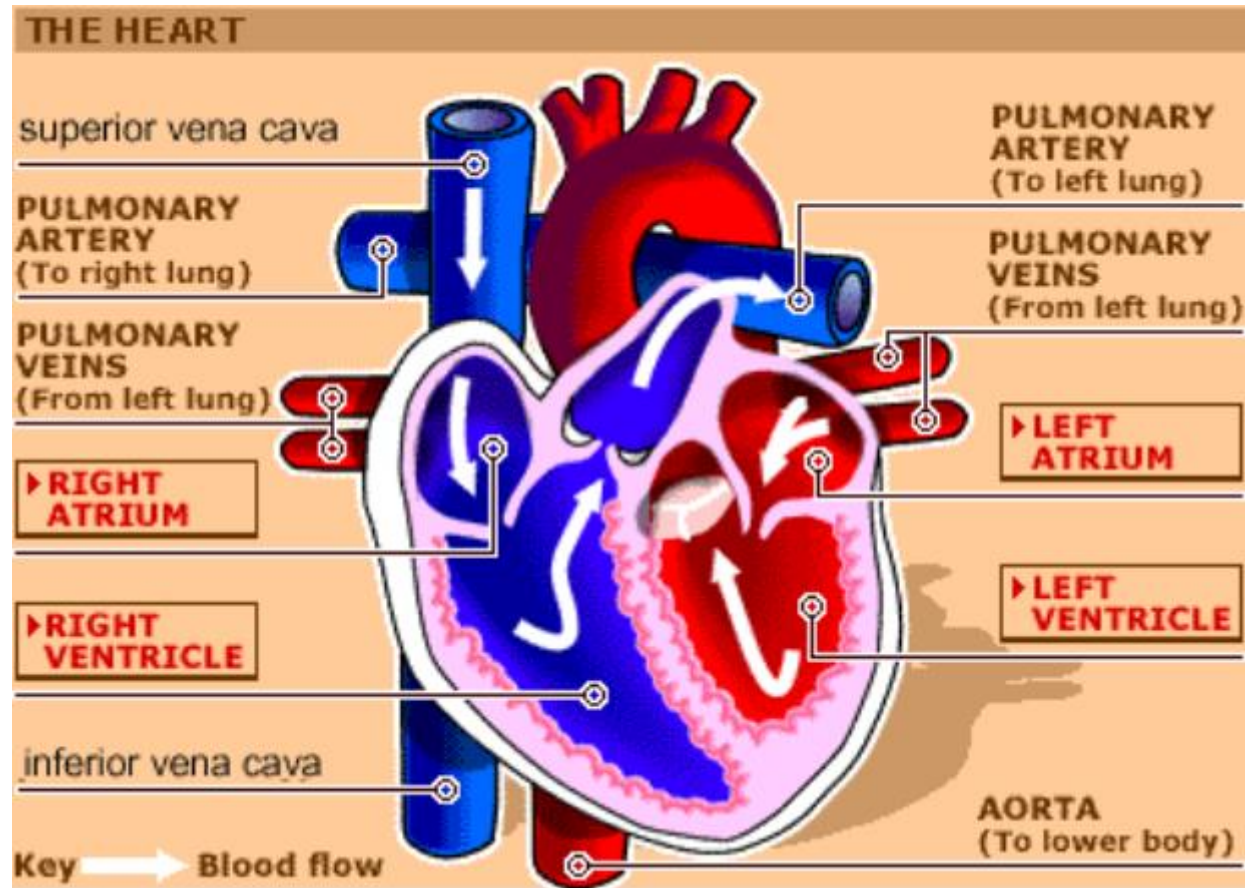
An ECG is printed on paper covered with a grid of squares.

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."



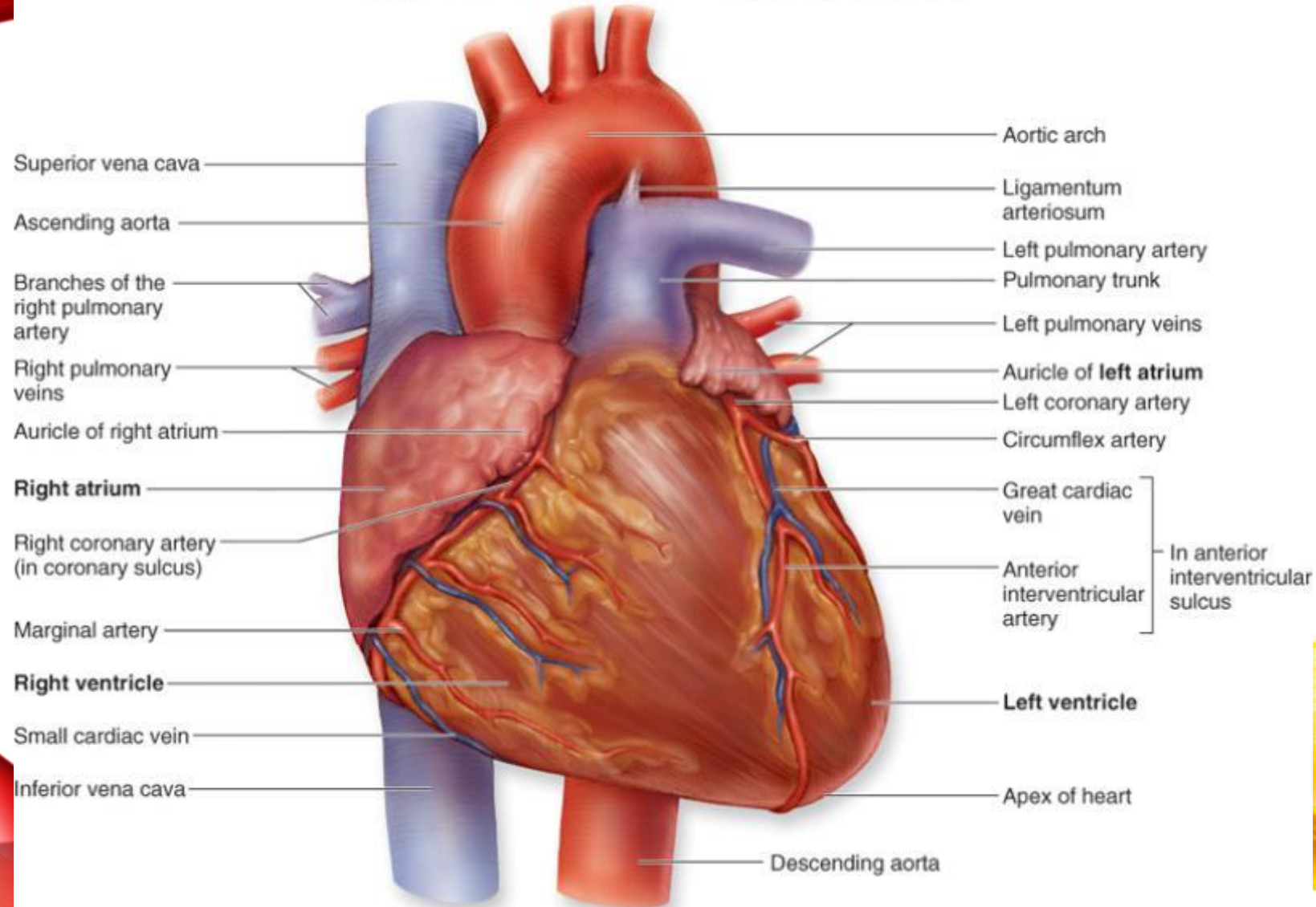
# PATH OF BLOOD FLOW





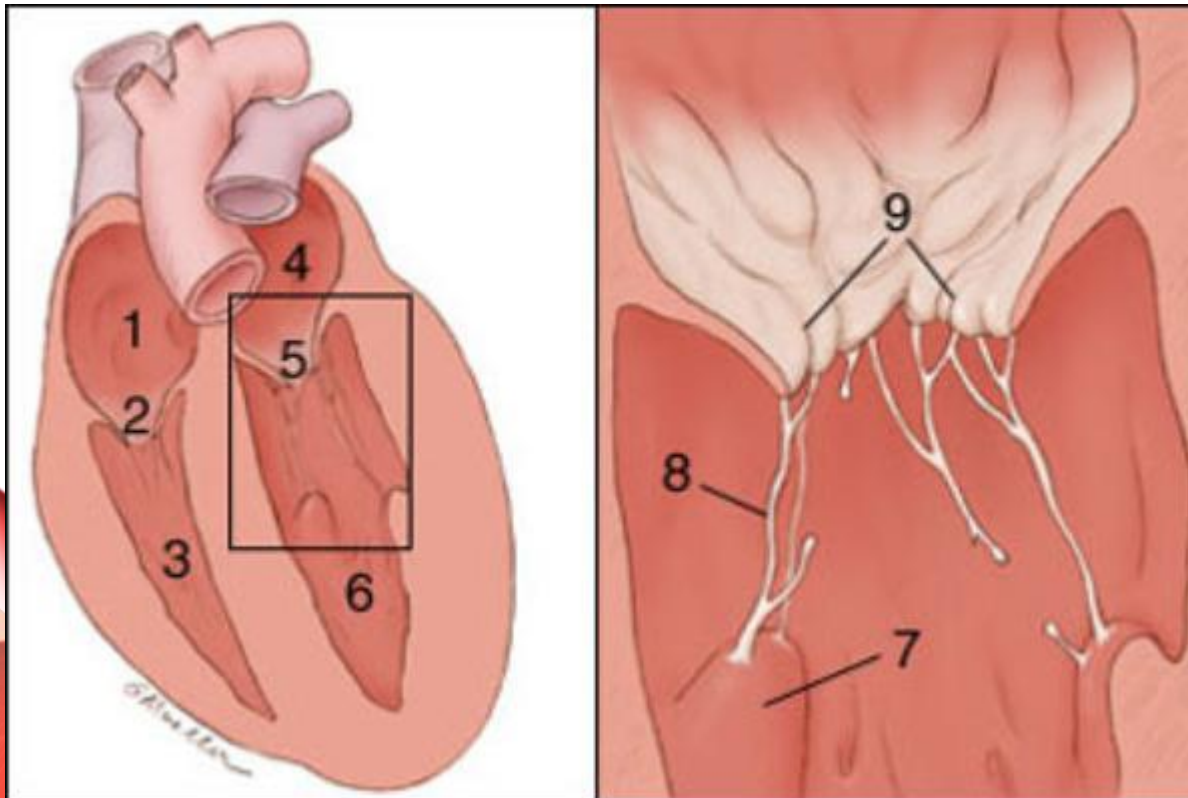
# Check your labels!

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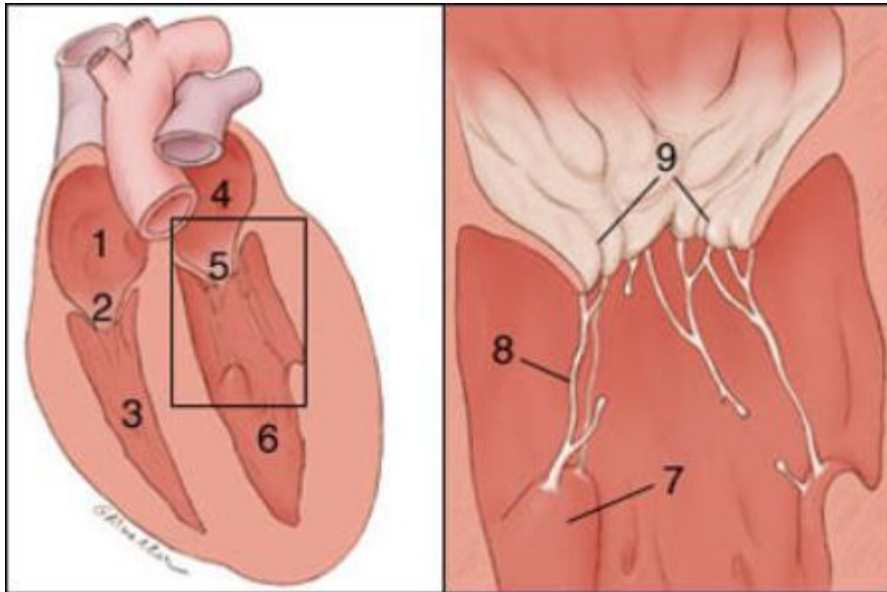


The flaps of the bicuspid and tricuspid valves are anchored to the ventricle walls

This prevents the valves from being pushed up into the atria during ventricular systole (contraction)

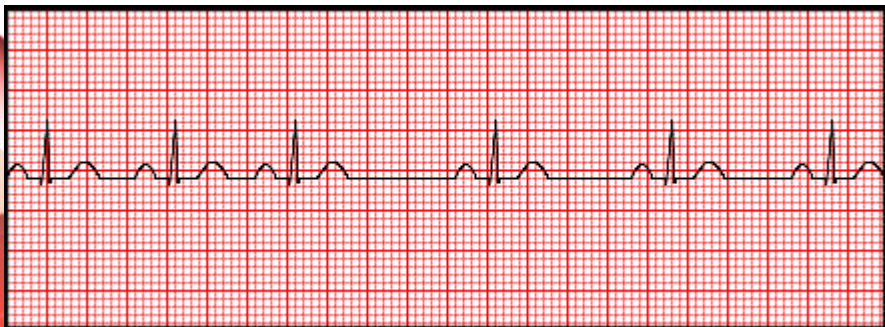
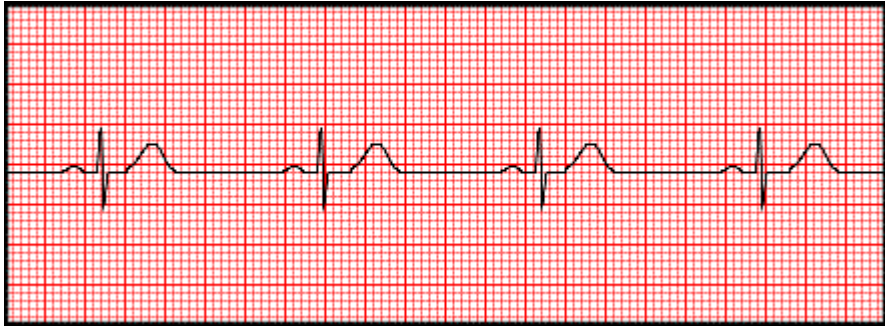


Can you identify these parts?

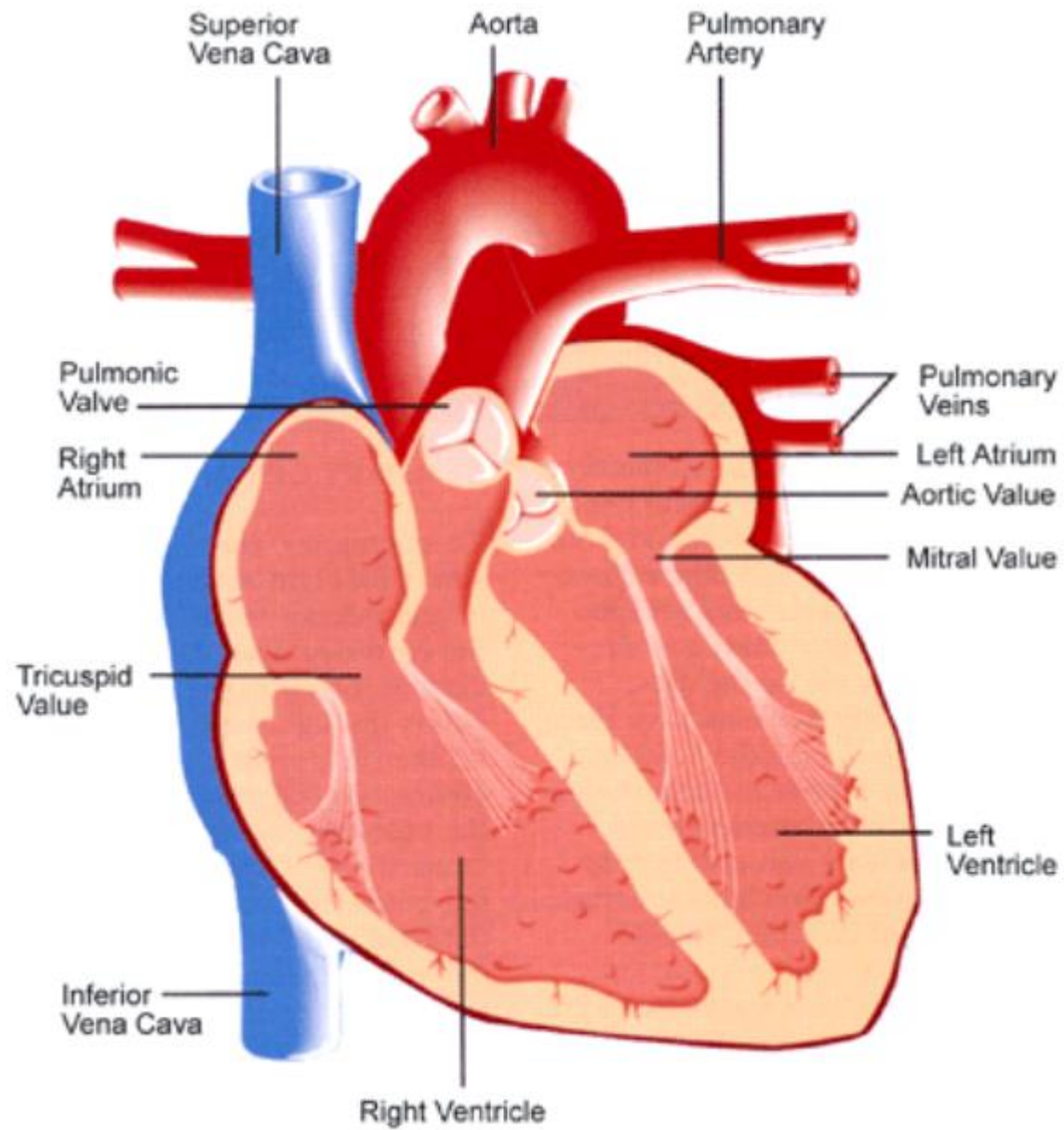


1. Right Atrium
2. Right Atrioventricular Valve (Tricuspid Valve)
3. Right Ventricle
4. Left Atrium
5. Left Atrioventricular Valve (Mitral Valve)
6. Left Ventricle
7. Papillary Muscle
8. Chordae Tendinae
9. Mitral Valve cusps

# ANALYZE AN ECG

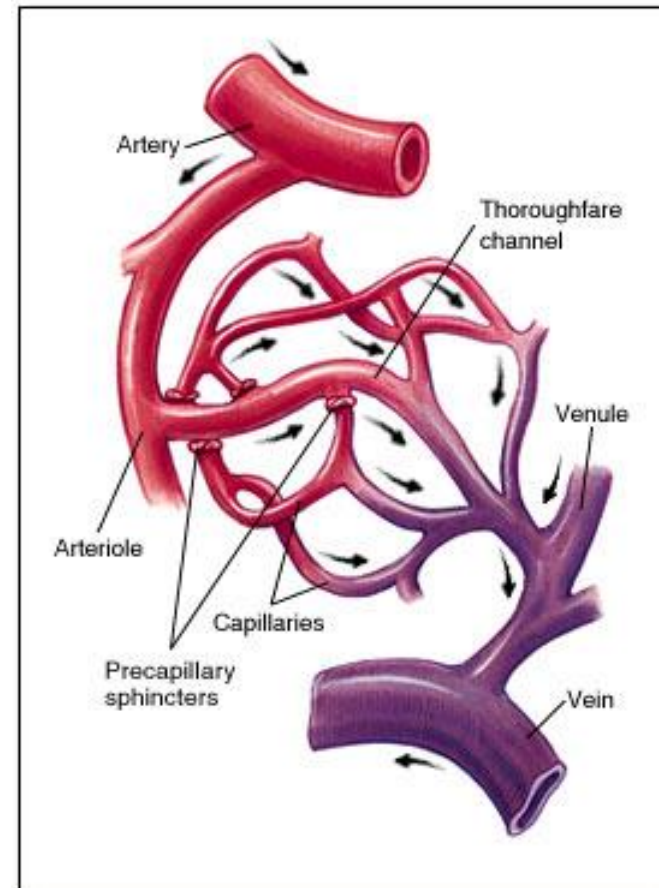


Each one of the figures represents an ECG pattern displaying three types of abnormal rhythms: **Tachycardia**, **Bradycardia**, and **Arrhythmia**. Identify each.



Blood flow through veins – not very efficient. Slow, weak “pushing” by arterial blood pressure is not much of a factor at all. Important factors include:

1. Contraction of the diaphragm.
2. Pumping action of the skeletal muscles.
3. Valves in the veins.



## Disorders of the Circulatory System

1. MVP - mitral valve prolapse, the mitral valve does not close all the way; this creates a clicking sound at the end of a contraction.
2. Heart Murmurs – valves do not close completely, causing an (often) harmless murmur sound. Sometimes holes can occur in the septum of the heart which can also cause a murmur
3. Myocardial Infarction (MI) - a blood clot obstructs a coronary artery, commonly called a “heart attack”

4. **Atherosclerosis** – deposits of fatty materials such as cholesterol form a “plaque” in the arteries which reduces blood flow. Advanced forms are called arteriosclerosis. Treatment: Angioplasty, where a catheter is inserted into the artery and a balloon is used to stretch the walls open. A bypass can also treat clogged arteries, a vein is used to replace a clogged artery. Coronary bypass refers to a procedure where the coronary artery is bypassed to supply blood to the heart. (The phrase “quadruple bypass” means that 4 arteries were bypassed.)

<http://www.mayoclinic.com/health/carotid-angioplasty-and-stenting/MM00772>

(Mayo Clinic)

5. **Hypertension** – high blood pressure, the force within the arteries is too high. A sphygmomanometer can be used to diagnose hypertension