

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

In the name of Allah, Most Gracious, Most Merciful.

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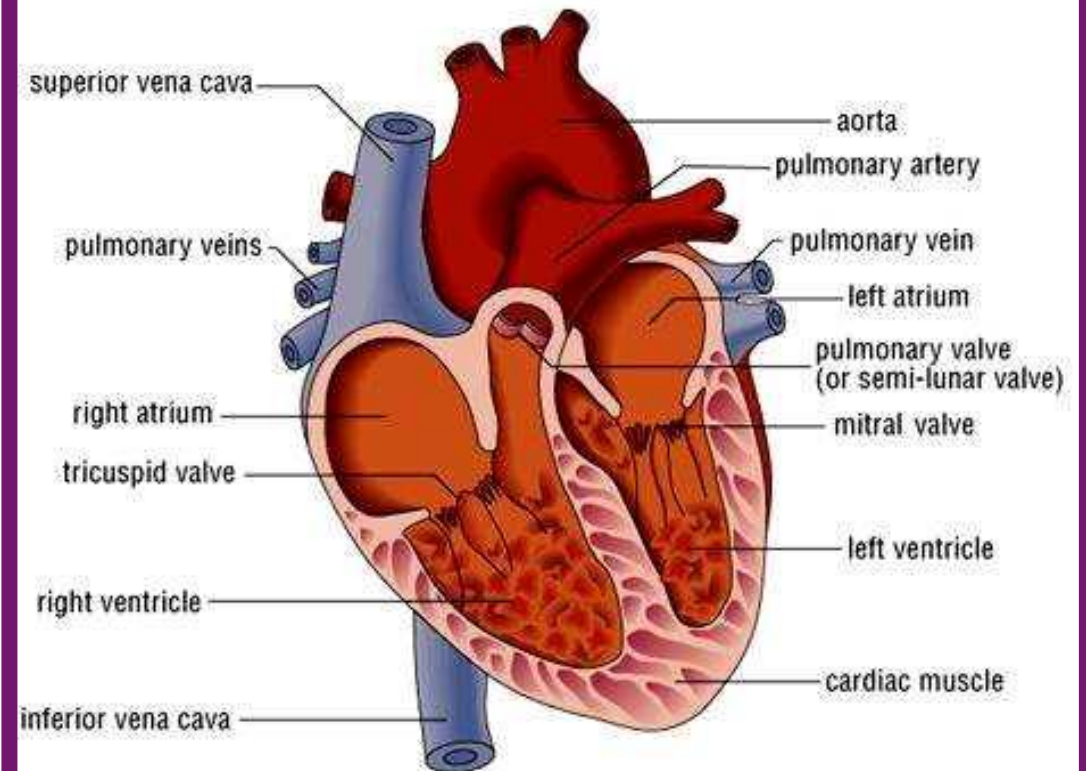
# HUMAN HEART

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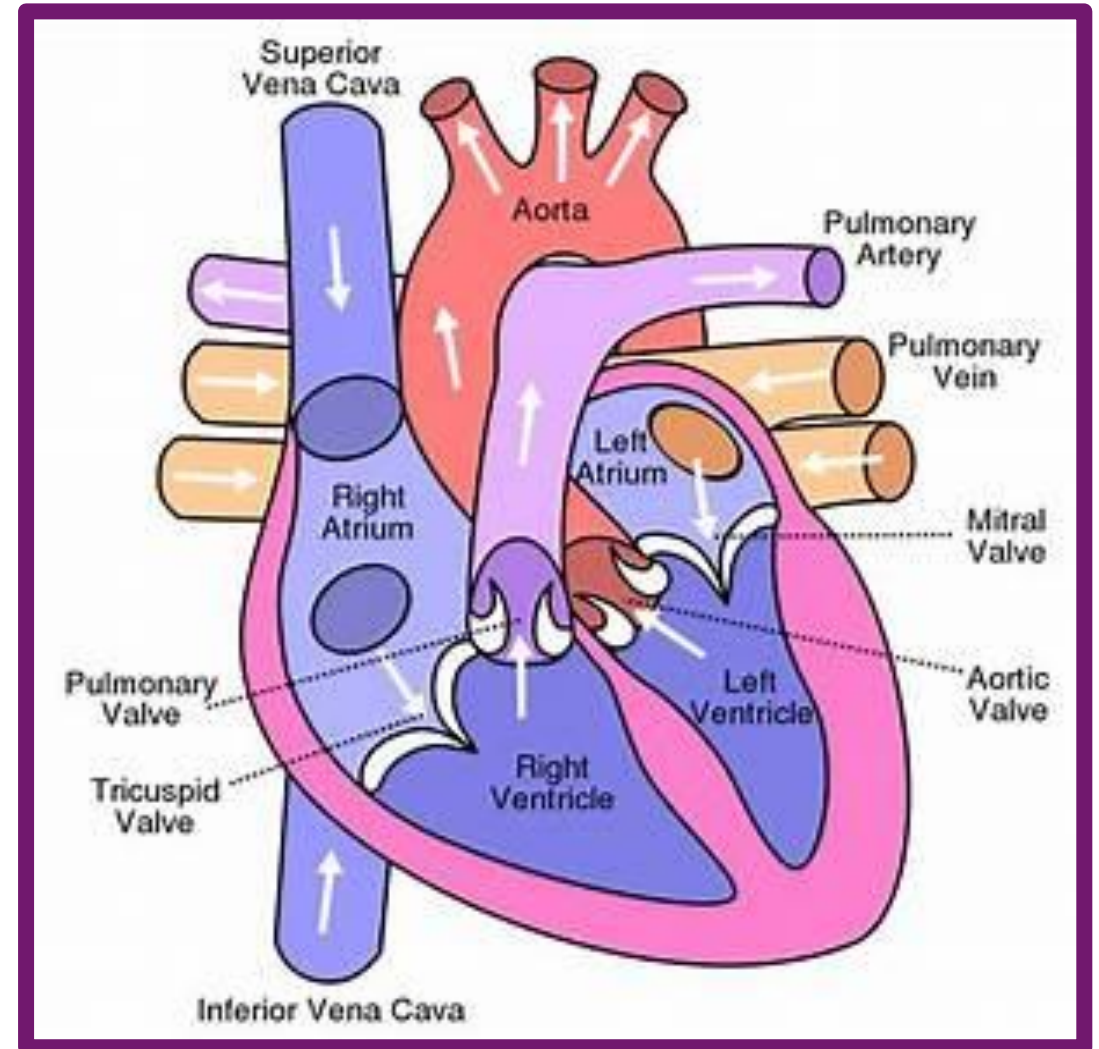
**University of Sargodha**



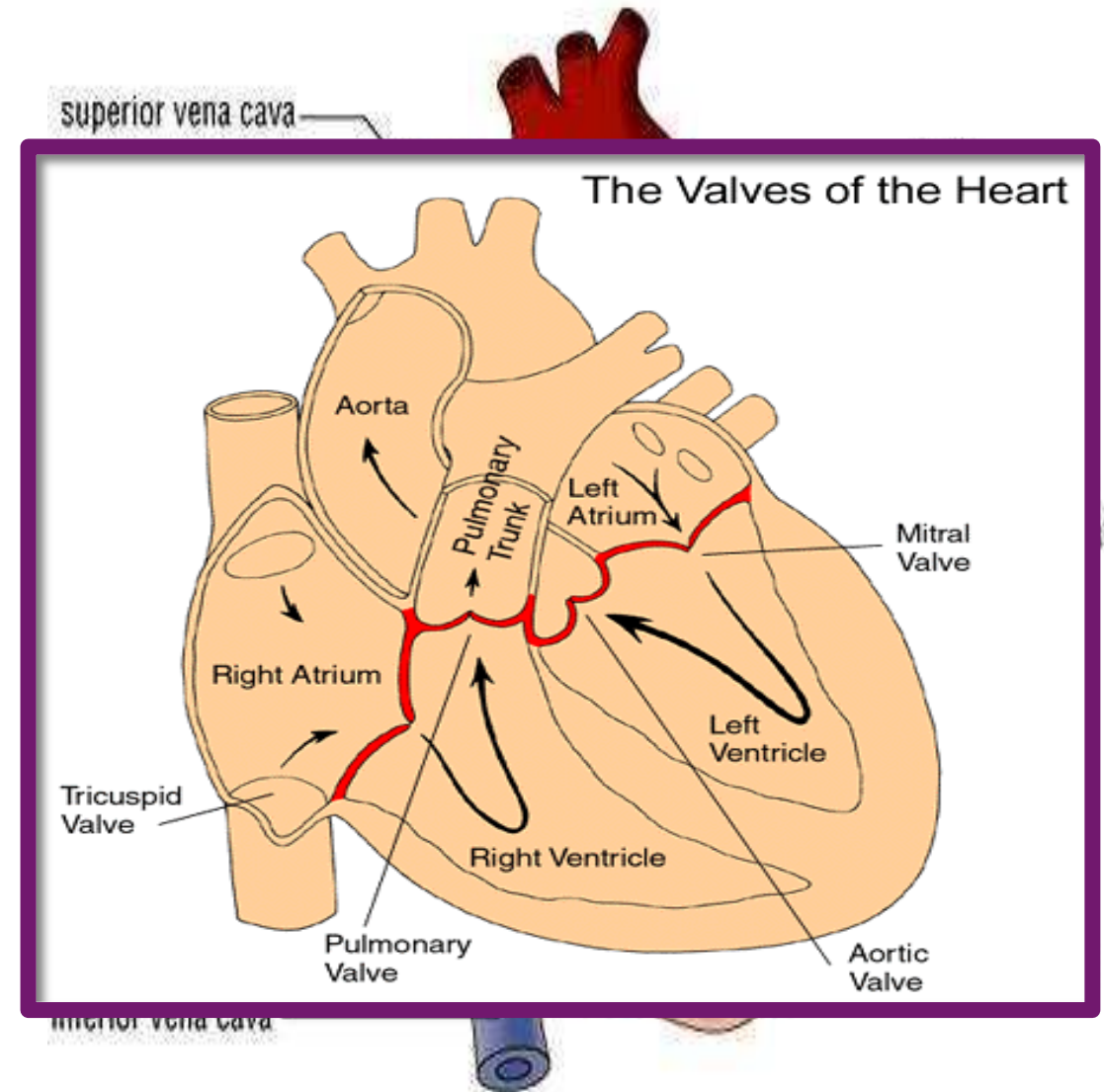
# HEART

It is an organ that pumps blood throughout the body via circulatory system, supplying oxygen and removing carbon dioxide.

The Human Heart beats, 100,000 times in one day, 35 million times in year and >2.5 billions times during average life.



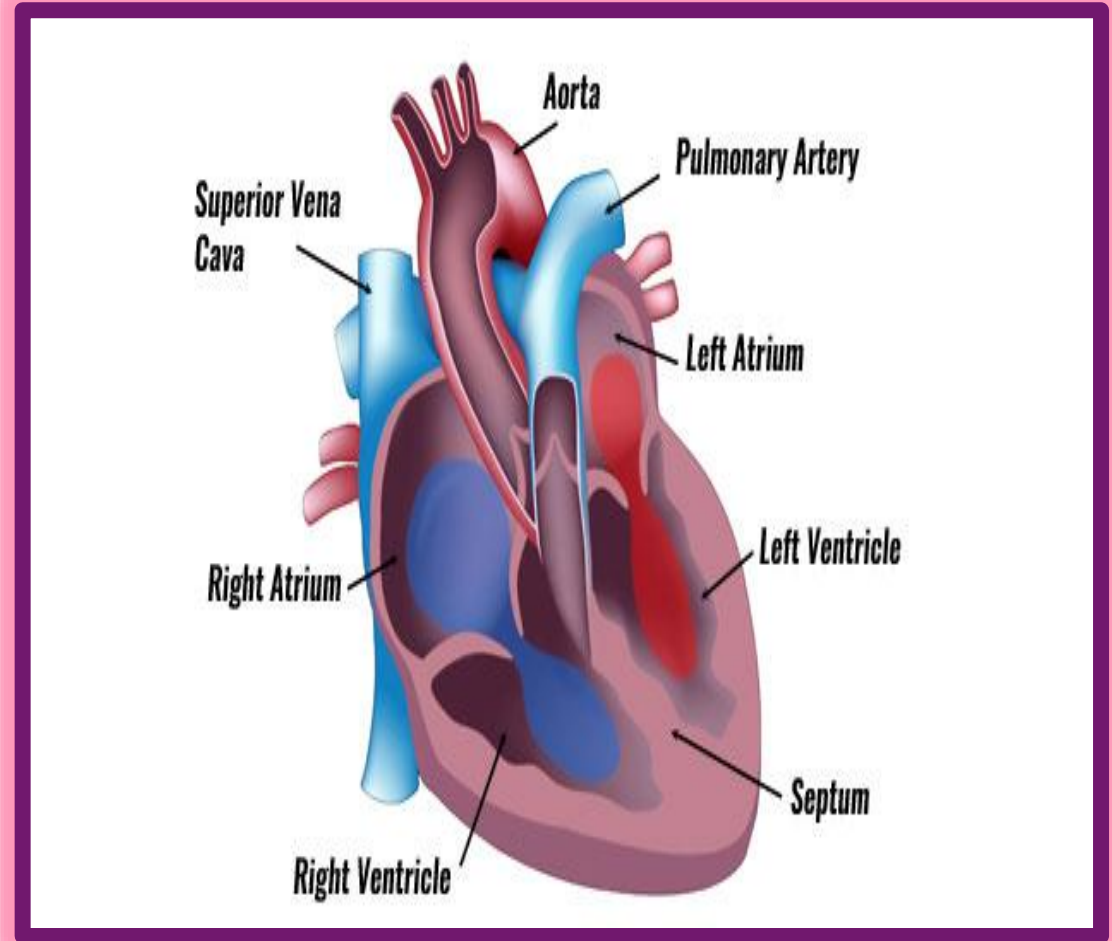
**Heart** is the center of the circulatory system. The heart is made of muscles. The heart is shaped something like a cone, with a pointed bottom and a round top. It is hollow so that it can fill up with blood. An adult's heart is about the size of a large orange or size of a large fist and weighs between about 280 to 340 grams in men and between 230 to 280 grams in women.

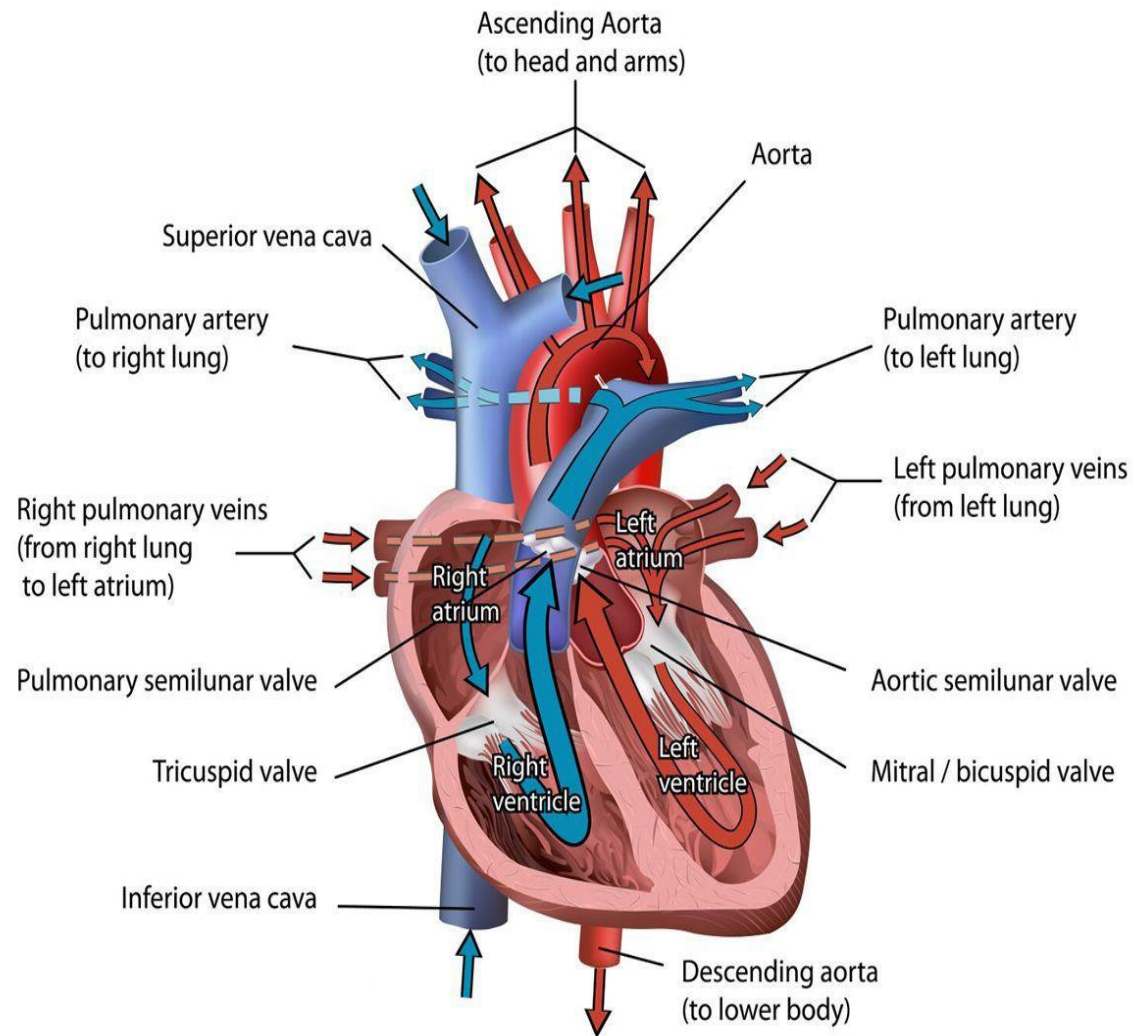


- The heart is in the middle of the chest, between the two lungs.
- It is held in place by the blood vessels that carry the blood to and from its chambers.
- The heart is tipped somewhat so that there is a little more of it on the left side than on the right.
- The pointed tip at the bottom of the heart touches the front wall of the chest.
- Every time the heart beats it goes “thump” against the chest wall. You can feel and listen to them, if you press there with your hand or by your ear.

A wall of muscle divides heart down the middle, into a left half and a right half. The muscular wall is called a **septum**. The septum is solid so that blood cannot flow back and forth between the left and right halves of the heart.

Another wall separates the rounded top part of the heart from the cone-shaped bottom part. So there are actually four chambers (spaces) inside the heart





Each top chamber is called an **atrium** (atria) holding chambers. The bottom chambers are called **ventricles**, pumping chambers. Thus, each side of the heart forms its own separate system, a right heart and a left heart. Each half consists of an atrium and a ventricle, and blood can flow from the top chamber to the bottom chamber, or ventricle, but not between the two sides.

# *RIGHT ATRIUM*

- ❑ It carries deoxygenated blood.
- ❑ The used blood from the body returns to the heart through the network of veins.
- ❑ All of the blood from the body is eventually collected into the two largest veins.
- ❑ The superior vena cava, which receives blood from the upper body.
- ❑ The inferior vena cava, which receives blood from the lower body.
- ❑ Both vena cava empty the blood into the right atrium of the heart region.



# ***RIGHT VENTRICLE***

- \* From here the blood begins its journey through the pulmonary cycle.
- \* From the right atrium two third of blood descends into the right ventricle through the tricuspid valve or Right Atrio ventricular Valve.
- \* When the ventricle contracts, the blood is pushed into the pulmonary artery that branches into two, one going to the left lung, one to the right lung.
- \* The fresh oxygen-rich blood returns to the left atrium of the heart through the pulmonary veins.
- \* When valves are close and come across then the sound produce called LUBB.

## *LEFT ATRIUM*

- the oxygen-rich blood coming from the lungs enters the upper left chamber of the heart, the left atrium.
- There is pulmonary arteries
- In it, again sound produce that is LUBB

# ***LEFT VENTRICLE***

- Blood flows and enters into aorta
- In aorta, 2 portions of coronary arteries
- Right artery protect the right side of heart
- Left artery protect the left side of heart

# Valves

- ❑ Blood can flow from the atria down into the ventricles through **valves** in the walls that separate them.
- ❑ The blood cannot flow backwards into the atria because these valves open in one direction.
- ❑ The blood always flows in only one direction inside the heart.
- ❑ There are also valves at the bottom of the aorta and the pulmonary artery.
- ❑ These valves keep the blood from flowing backward into the heart once it has been pumped out.

# *Circulation of Blood*

The human circulatory system is really a two-part system whose purpose is to bring oxygen-bearing blood to all the tissues of the body. When the heart contracts it pushes the blood out into two major loops or cycles. In the **systemic loop**, the blood circulates into the body's systems, bringing  $O_2$  to all its organs, structures and tissues and collecting  $CO_2$  waste.

## *Circulation of Blood*

- ▶ In the **pulmonary loop**, the blood circulates to and from the lungs, to release the carbon dioxide and pick up new oxygen. The systemic cycle is controlled by the left side of the heart, the pulmonary cycle by the right side of the heart. The systemic loop begins when the oxygen-rich blood coming from the lungs enters the upper left chamber of the heart, the left atrium.

## *Circulation of Blood*

- ▶ As the chamber fills, it presses open the **mitral valve** and the blood flows down into the left ventricle. The blood leaving the aorta brings oxygen to all the body's cells through the network of ever smaller arteries and capillaries.

# *Circulation of Blood*

The walls of heart are made of thick muscle. They can squeeze (contract) to send blood rushing out. The blood does not spill all over the place when it leaves the heart. Instead, it flows smoothly in tubes called **blood vessels**. First, the blood flows into tubes called **arteries**. The arteries leaving the heart are thick tubes.

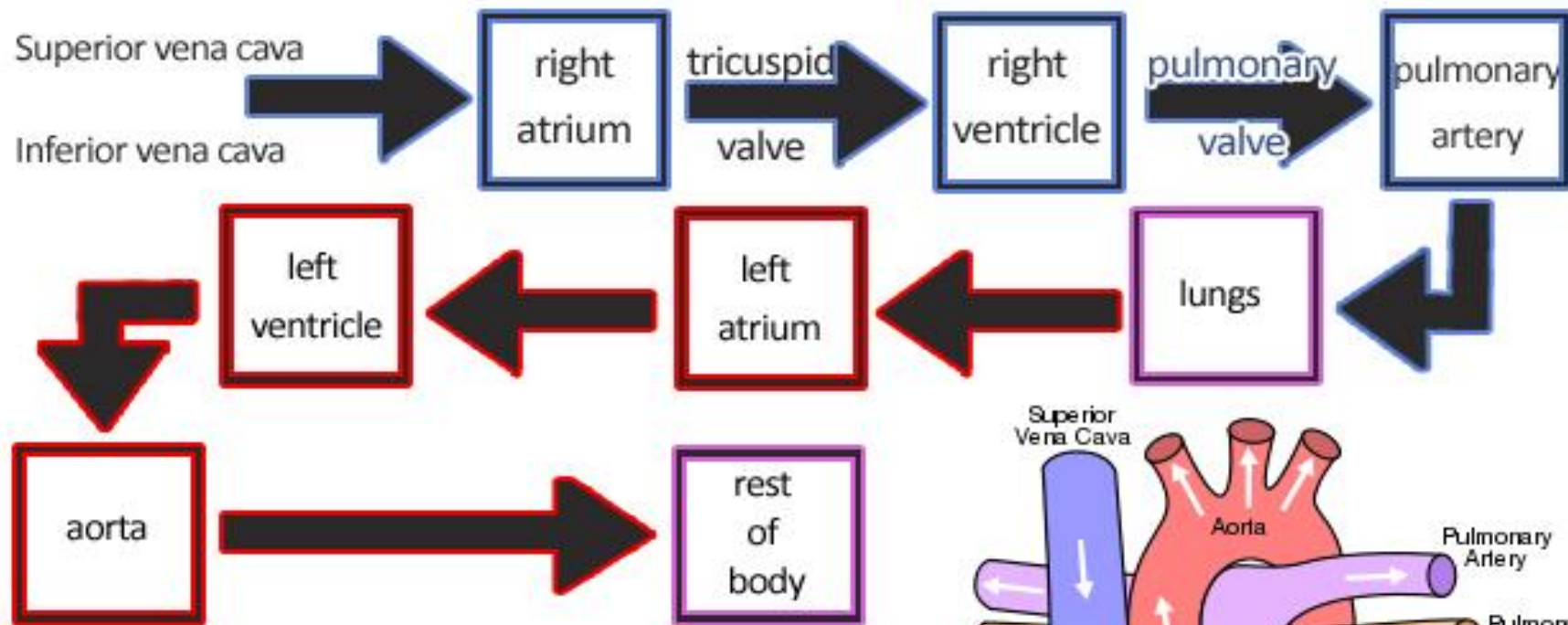
The smallest blood vessels, called **capillaries**, form a fine network of tiny vessels throughout the body. The capillaries have extremely thin walls so that the blood that they carry can come into close contact with the body tissues. The tiny red blood cells can then pass easily through the walls of the capillaries to deliver the oxygen they carry to nearby cells.



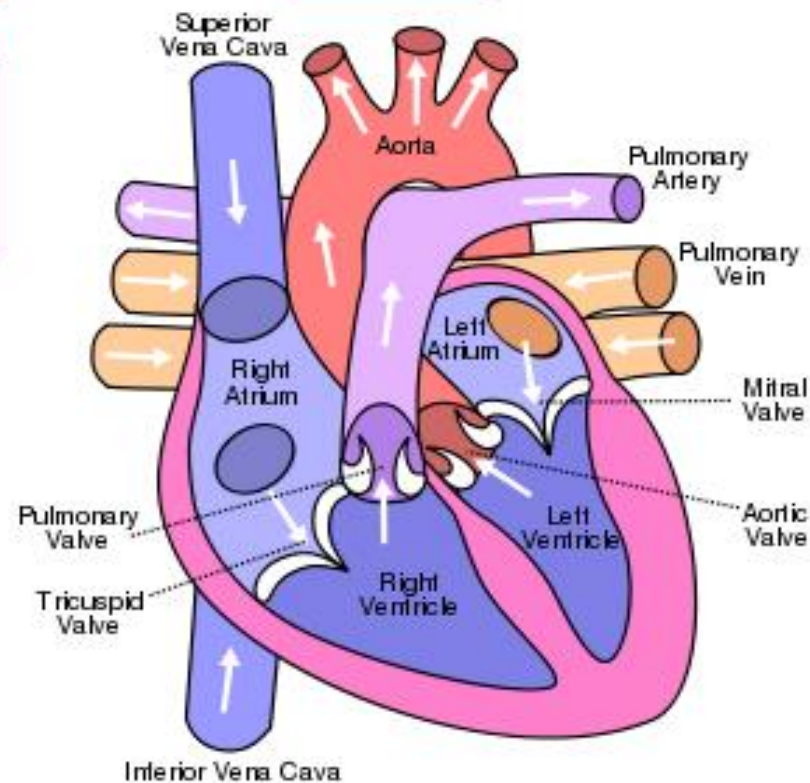
## *Circulation of Blood*

As the blood flows through the capillaries, it also collects carbon dioxide waste from the body cells. The capillaries containing carbon dioxide return this used blood to the heart through a different series of branching tubes. The capillaries join together to form small **veins**. The veins, in turn, unite with each other to form larger veins until the blood from the body is finally collected into the large veins that empty into the heart.

So the blood vessels of the body carry blood in a circle: moving away from the heart in arteries, traveling to various parts of the body in capillaries, and going back to the heart in veins.



# Circulation of Blood Through the Heart:



Pump action performed by heart is achieved by a sequence of contraction and relaxation of heart muscle

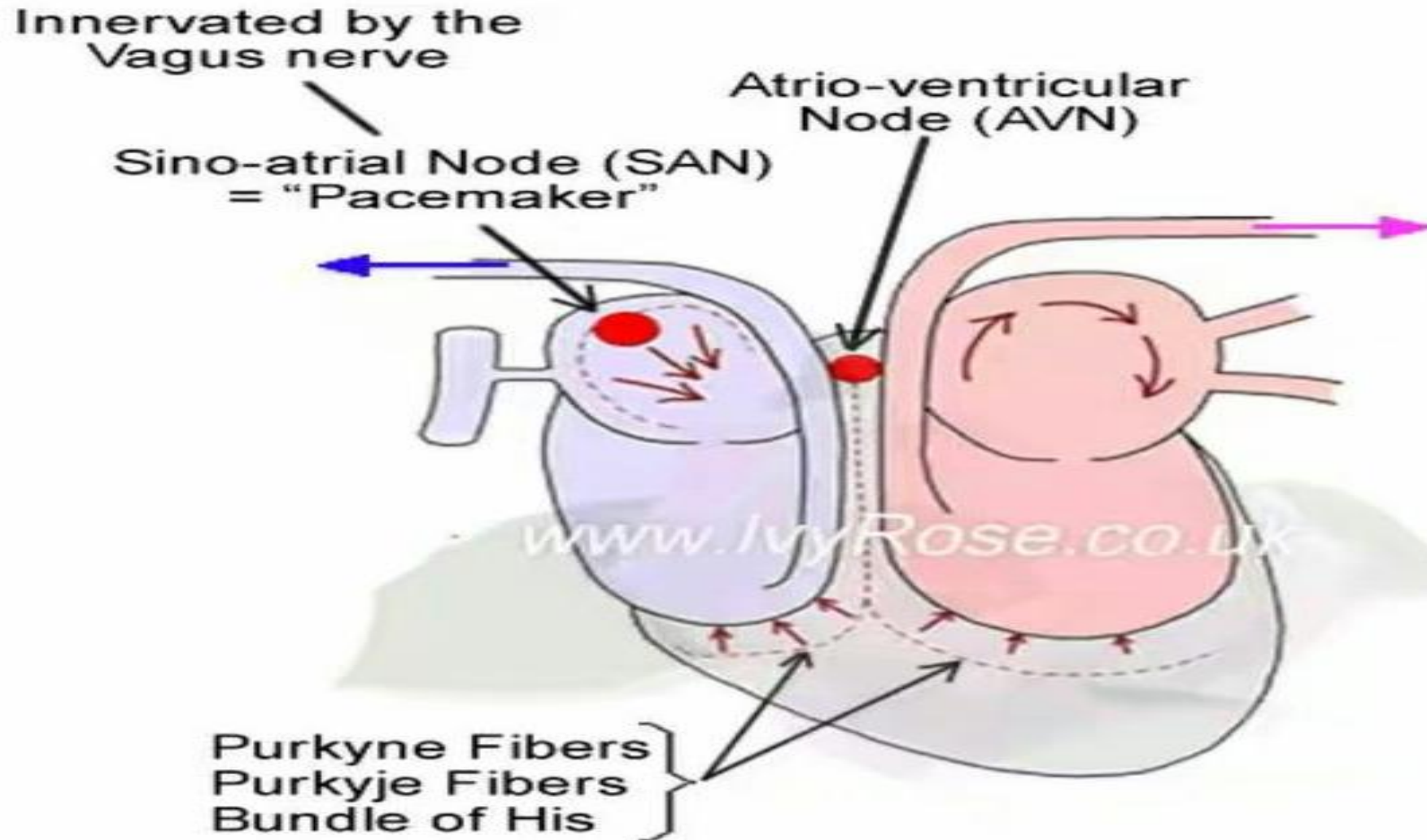
# ***BLOOD PRESSURE***

- Systole refers to the contraction of heart muscle.
- Diastole refers to relaxation of heart muscle.
- Both can be measured when monitoring BLOOD PRESSURE

## ***FIVE STAGES***

- Sinoatrial node
- Simultaneous contraction of both atria
- Atrioventricular node
- Action potential from impulse
- Ventricles to contract

# HEART FUNCTION

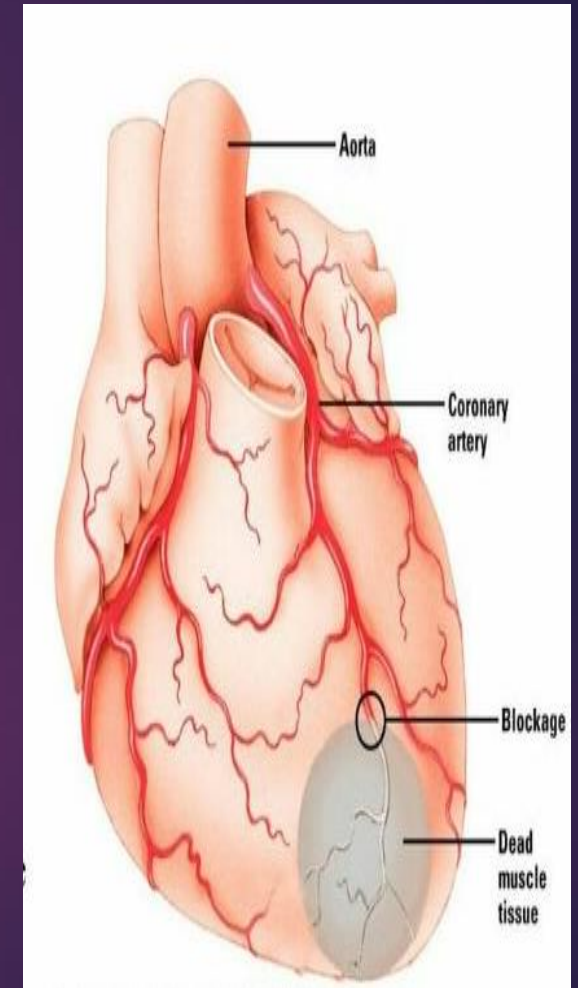


# *DISEASES*

1. Cardiovascular Diseases
2. Heart Failure
3. Hypertensive Heart Diseases

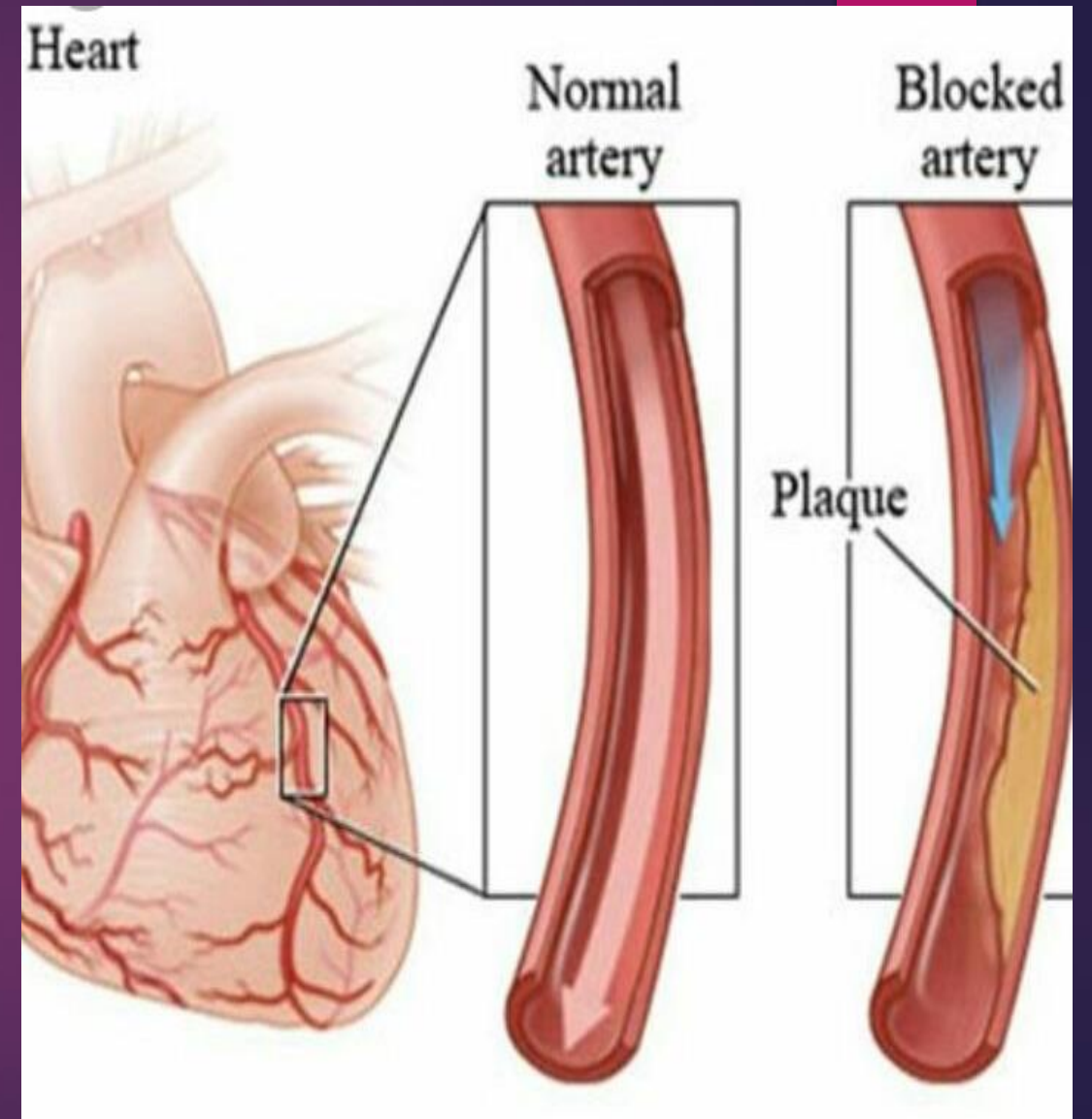
# *Cardiovascular Disease*

- ❑ Effect the heart and blood vessels
- ❑ Heart need O<sub>2</sub> rich blood to maintain its function
- ❑ Coronary arteries supplies oxygenated blood to heart muscles.
- ❑ Due to blockage of this artery, the heart tissue without blood will die quickly
- ❑ Result: Heart attack, failure of heart to function properly



# *Cardiovascular Disease*

- ❑ High blood pressure is a risk factor
- ❑ Major heart diseases due to cardiovascular disease include heart attack, stroke and aneurysm
- ❑ Prevention include balanced diet and exercise



## SYMPTOMS

## TREATMENTS

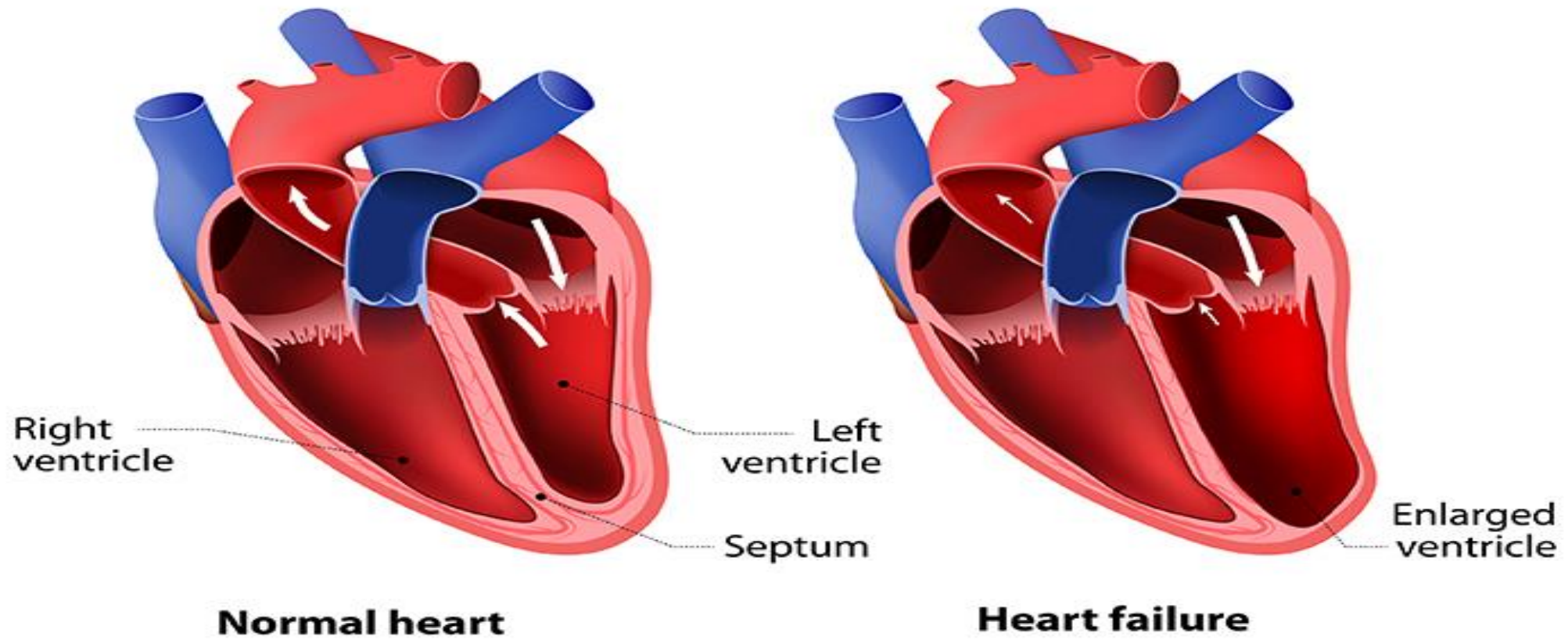
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|----|--|----|---------------------------------------|
| 1. | Pain or pressure in chest which cause ANGINA | 1. | Medications like reducing cholesterol |
| 2. | Pain in the arms, shoulders                  | 2. | Quitting smoking                      |
| 3. | Nausea, fatigue                              | 3. | Diet changes                          |
| 4. | Shortness of breath                          | 4. | Weight control, exercise              |
| 5. | Cold sweat                                   |    |                                       |



# ***HEART FAILURE***

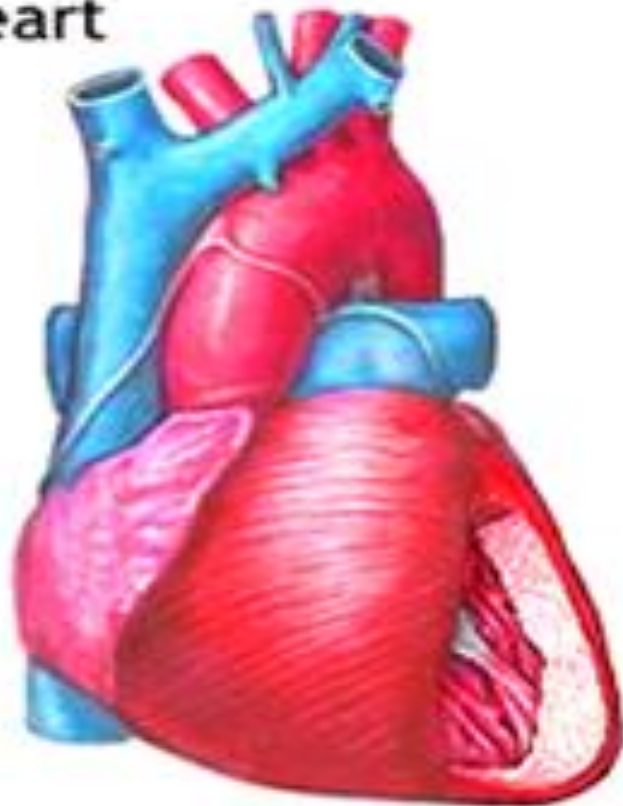
In Heart Failure the heart's pumping power is weaker than normal. As a result blood moves through the heart and body at a slower rate, and pressure in the heart increases. As a result, the heart can not pump enough oxygen and nutrients to meet the body needs. The chambers of heart may respond by stretching to hold more blood to pump through the body or by becoming stiff and thickened. Although the blood moves but the heart muscle walls gradually weaken and become unable to pump blood properly. More complications arise due to this including retention of fluid and salt in body.

# HEART FAILURE



# Hypertensive Heart Disease

Normal heart



Hypertensive heart



Thickening in  
walls of ventricles



## **Diet**

Food rich in fat, salt and sugar, as well as food containing alcohol, increases the risk of atherosclerosis and can cause high blood pressure

## **Ageing**

As people age their cardiovascular system becomes weaker

## **Genetics**

People who have direct family members that have had heart disease are at a higher risk of developing it themselves

# **Causes of Heart Disease**

## **Diabetes**

Hypertension and blood glucose can lead to atherosclerosis and damage to tunica intima

## **Lifestyle**

Aspects of everyday life, from work stress to lack of exercise and tension can increase the risk of heart disease

## **Smoking**

Nicotine and carbon monoxide increase the heart rate, lower the oxygen level in heart muscles and can cause thrombosis

## **Gender**

Men are 3 to 5 times more likely to develop heart diseases than women