

# CONCEPT MAP

## HUMAN HEART : STRUCTURE AND FUNCTION

Human heart is a hollow, four chambered, fibro-muscular organ of somewhat conical or pyramidal shape having upper broad base and lower narrow apex. Apex is slightly directed towards the left.

### Structure of Heart

- Entire heart is enclosed by a double layered sac called **pericardium**. In between the two layers, **pericardial cavity** is present. It normally contains 5-30 mL of **pericardial fluid** which lubricates the heart, permits it to contract with minimal friction and protects the heart from external injury. Internally, heart contains four chambers *i.e.*, two thin walled **atria** separated from each other by interatrial septum and two thick walled **ventricles** separated from each other by interventricular septum. Of the two ventricles, left ventricle is thicker.

### Location and Size

- Heart is located between the lungs in the thoracic cavity. An average adult heart is about 12 cm.
- It weighs around 280-340 gms (in an average male) and 230-280 gms (in an average female).



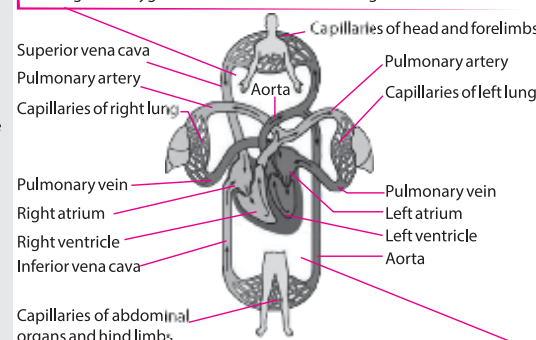
### Cardiac Cycle

Cardiac cycle consist of one cycle of contraction and relaxation of cardiac muscles.

### Function of Heart

Function of heart is to pump blood throughout the body via the circulatory system supplying oxygen and nutrients to the tissues and removing carbon dioxide and other wastes from the same. The heart circulates the blood through two pathways (**double circulation**) *i.e.*, pulmonary and systemic circuits. It checks mixing of blood.

In **pulmonary circuit**, deoxygenated blood flows from right ventricle to the lungs and oxygenated blood returns from lungs to the left atrium.



In **systemic circuit**, oxygenated blood leaves the body from the left ventricle via aorta and from there it enters arteries and capillaries which supply the body's tissue with oxygen. Deoxygenated blood returns via veins to the venae cavae, re-entering the heart's right atrium.

**Superior vena cava** : Carries blood from body's upper region to right atrium.

**SA node** : Pacemaker of the heart, which spreads waves of contraction across walls of atria.

**Right atrium** : It receives deoxygenated blood from systemic circulation via superior and inferior venae cavae and coronary sinus.

**AV node** : Pacesetter of the heart.

**Pulmonary valve** : Allows unidirectional flow of deoxygenated blood from right ventricle to pulmonary artery.

**Tricuspid valve** : Guards the right atrio-ventricular opening.

**Inferior vena cava** : Carries blood from body's lower region to the heart.

**Aorta** : The main artery from which all other arteries arise and run through different body regions.

**Pulmonary artery** : Carries deoxygenated blood from right ventricle to lungs.

**Pulmonary veins** : Carry oxygenated blood from lungs to left atrium.

**Left atrium** : It receives oxygenated blood from lungs via pulmonary veins.

**Bicuspid valve** : Also known as **mitral valve**. It guards the left atrio-ventricular opening.

**Aortic valve** : It is situated at the aortic orifice which leads from left ventricle to the aorta.

**Left ventricle** : It supplies oxygenated blood to different body tissues.

**Purkinje fibres** : Network of fine fibres, formed by division of Bundle of His. Bundle of His and Purkinje fibres convey impulse of contraction from AV node to the myocardium of the ventricles.

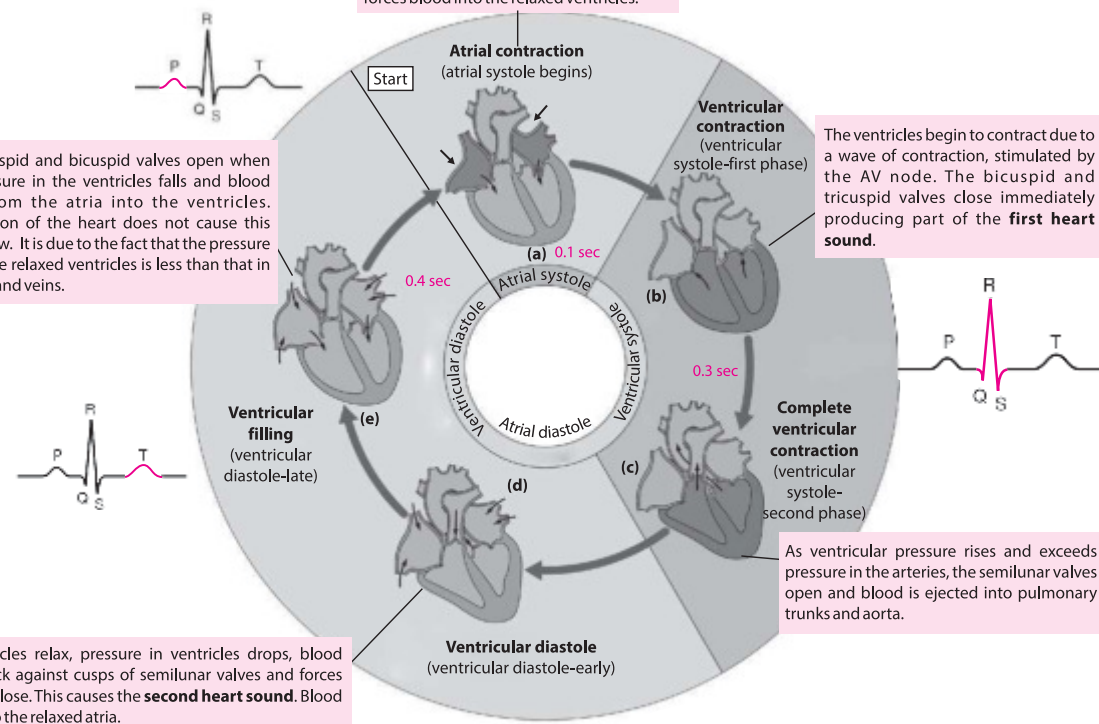
**Right ventricle** : It supplies deoxygenated blood to the lungs via pulmonary artery for oxygenation.

**Bundle of His** : Mass of specialised fibres, originating from AV node.

Contraction of atria stimulated by SA node, forces blood into the relaxed ventricles.

The tricuspid and bicuspid valves open when the pressure in the ventricles falls and blood flows from the atria into the ventricles. Contraction of the heart does not cause this blood flow. It is due to the fact that the pressure within the relaxed ventricles is less than that in the atria and veins.

As ventricles relax, pressure in ventricles drops, blood flows back against cusps of semilunar valves and forces them to close. This causes the **second heart sound**. Blood flows into the relaxed atria.



The ventricles begin to contract due to a wave of contraction, stimulated by the AV node. The bicuspid and tricuspid valves close immediately producing part of the **first heart sound**.

As ventricular pressure rises and exceeds pressure in the arteries, the semilunar valves open and blood is ejected into pulmonary trunks and aorta.