



# General Anatomy (Heart)

## The Heart:

Four chambered muscular pump.  
It's pear shaped : apex (towards left hip joint) and base (right shoulder)  
The size is the size of the fist

Apex located in the left 5<sup>th</sup> intercostal space on the midclavicular line.  
The heart occupies the middle mediastinum.

**Mediastinum** : sternum line divides the space to two parts superior mediastinum and inferior mediastinum. Also, anterior, posterior and middle.

Heart divided to two main cavities by a septum > atrioventricular septum AV > upper and lower cavities

Upper cavity is subdivided into two small cavities : interatrial septum (left atrium and right atrium)

Lower cavity divided by interventricular septum : left ventricle and right ventricle

Attached to the heart is large blood vessels : right atrium two large veins : **superior vena cava** (venous blood from the upper part of the body) and **inferior vena cava** (venous blood from the lower half of the body)

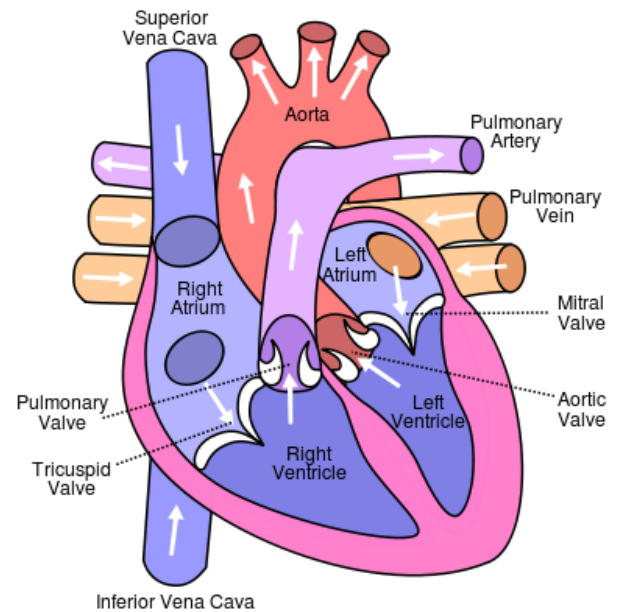
Blood comes to the right atrium should pass to the right ventricle through an opening > **tricuspid valve**

From the right ventricle a large blood vessel arise > **pulmonary trunk** > it has a valve **pulmonary valve**

Blood leaves through the pulmonary trunk to the lungs to be oxidized then back to the heart through **pulmonary veins**

Enters the left atrium and then t left ventricle through a valve called **mitral valve** (bicuspid valve)

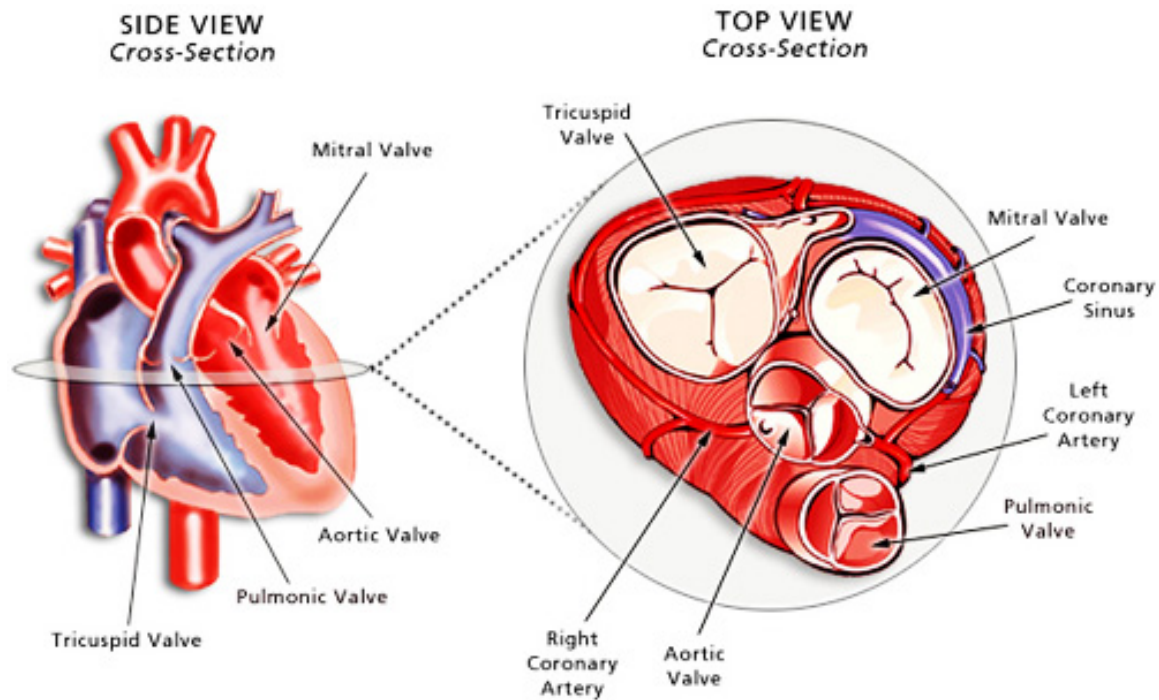
From the left ventricle there's **aortic valve** to the **aorta** then back to whole body



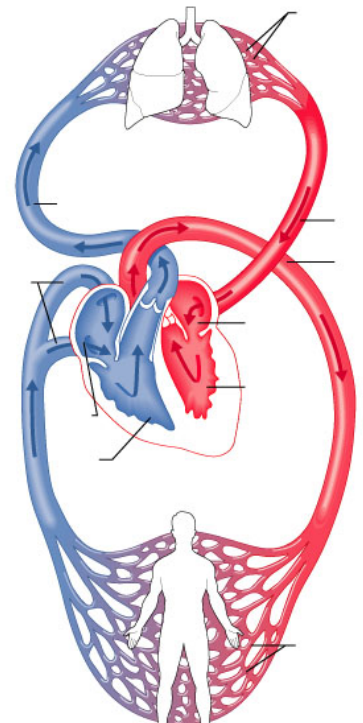


## Valves:

- **Semilunar valve** ( pulmonary and aortic ) closure at the same time > second heart sound when it closes
- **Atrioventricular valves** ( tricuspid and mitral ) closure happens at the same time > first heart sound when it closes



Systemic circulation > starts from left ventricle and ends in the right atrium.  
Pulmonary circulation > from the right ventricle through pulmonary trunk to the lungs then left atrium.





### From the inside to the outside:

First layer inside the heart is epithelium lining > **Endocardium**

Thicker layer of muscle > **myocardium** after endocardium

Membrane formed by two layers: close to the muscle > **visceral pericardium**

Next to it **parietal pericardium**

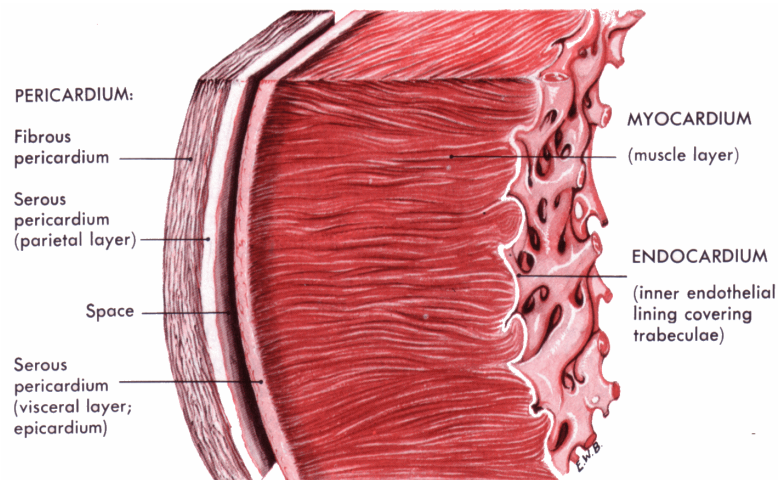
The outermost layer > **Fibrous pericardium**

### Pericardium : Fibrous and Serous

Serous (watery fluid, thick is mucous): Parietal and visceral (epicardium)

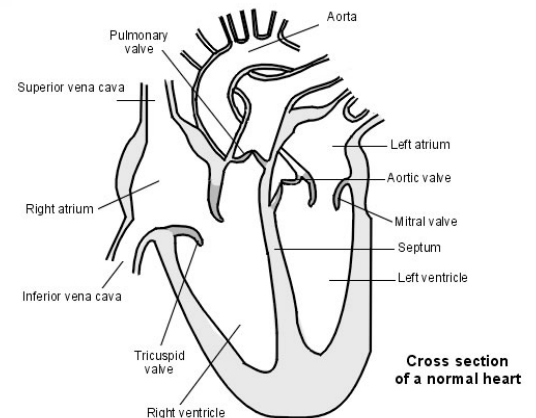
Between serous layers there's a space contains serous fluid > pericardial fluid

Lubricate two surfaces during contraction there's no friction (smooth)

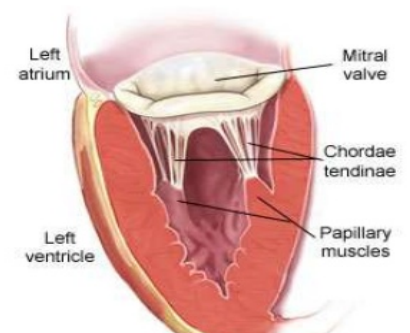


Section of the heart wall showing the components of the outer pericardium (heart sac), muscle layer (myocardium), and inner lining (endocardium).

- Atria have thinner walls than ventricles because needs little force .
- Left ventricle is thicker than right ventricle because left ventricle pumps blood to the whole body so it needs more force



Thin tendons **chordae tendineae** and **papillary muscles** prevents the valves from going up to the atrium

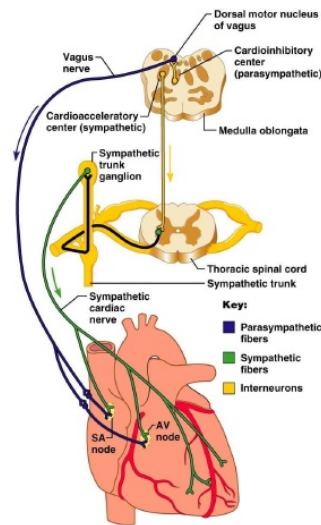




## Innervation:

- **Extrinsic:** start somewhere else than go to the target tissue. Nerve supply from outside and inside the heart. ANS > sympathetic (increase contraction and heart rate) increases cardiac function during emergency for example and parasympathetic (keeps heart rate and contractility low, slows things down) stimulates vagus nerve. When nerve supply is cut off it can work > because of the intrinsic it has a pacemaker

## Extrinsic Innervation

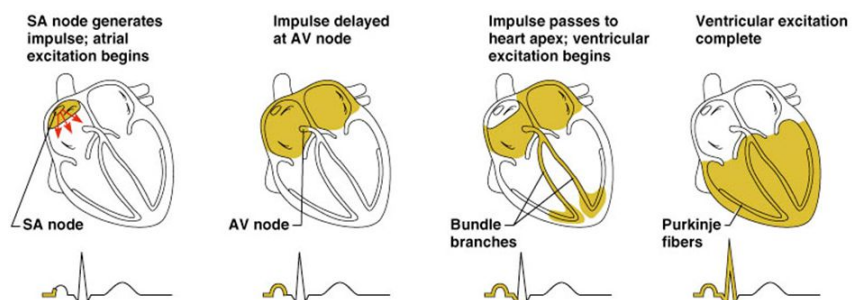


- Heart is stimulated by the sympathetic cardioacceleratory center
- Heart is inhibited by the parasympathetic cardioinhibitory center

- **Intrinsic :** start in the tissue itself and end there. Conduction system. Sinoatrial **SA Node** called pacemaker of the heart (problems uncoordinated heart beats/rate) in right atria > send signals to the walls of the atria to contract. In the AV septum on the right side we have another Node **AV node** > a signal will come from the SA node to AV node. AV node delays the signal to the ventricle and make it more strong then we have **bundle of his** attached to it then bundle branches right and left and they'll give small branches > **purkenje fibers**.

## Intrinsic Conduction System

- Autorhythmic cells: cells that spontaneously generating action potentials without any influence from the CNS.
  - Main pacemaker of the heart is the (SA node)
    - sets cardiac heart rate. →
  - Atrioventricular node (AV node) leads into Bundle of His → which splits into branch bundles
  - Purkinje fibers carry the impulse to the ventricular myocardium

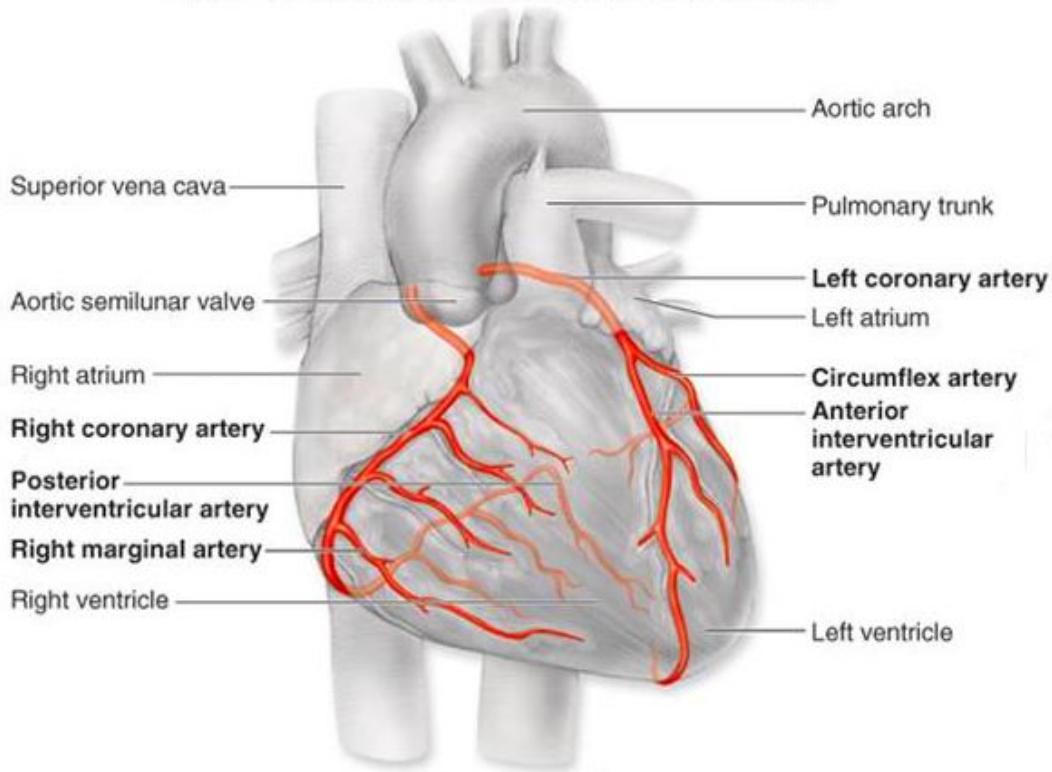




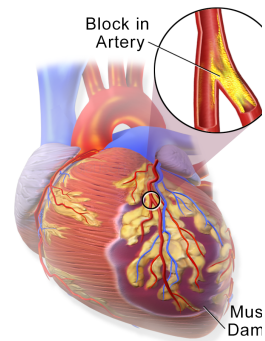
## Blood supply:

**Coronary circulation:** ascending aorta (going up) between right and left coronary arteries. They arise above the aortic valve (arise from ascending aorta above the aortic valve)

- Left coronary artery > circumflex artery **and** left anterior descending artery.
- Right coronary artery > marginal artery **and** posterior interventricular artery



**Death of myocardium** : is called infarction > myocardial infarction block of any of the branches (arteries) irreversible.



## Venous drainage of the heart:

- Middle cardiac vein
- Great cardiac vein
- Lesser cardiac vein

**All enter in coronary sinus and enter right atrium of the heart**

