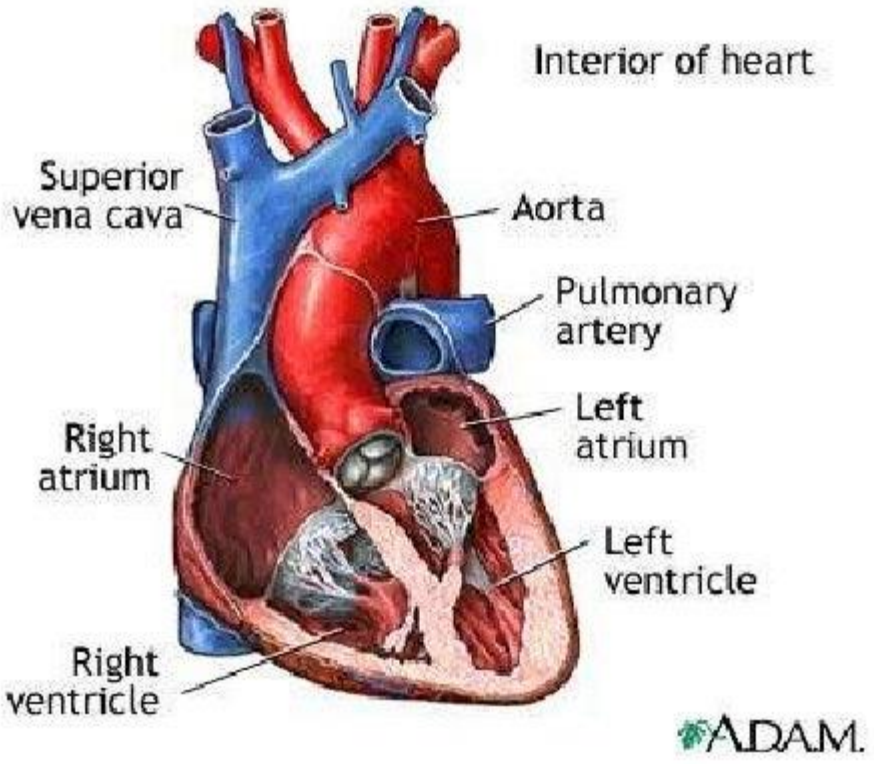
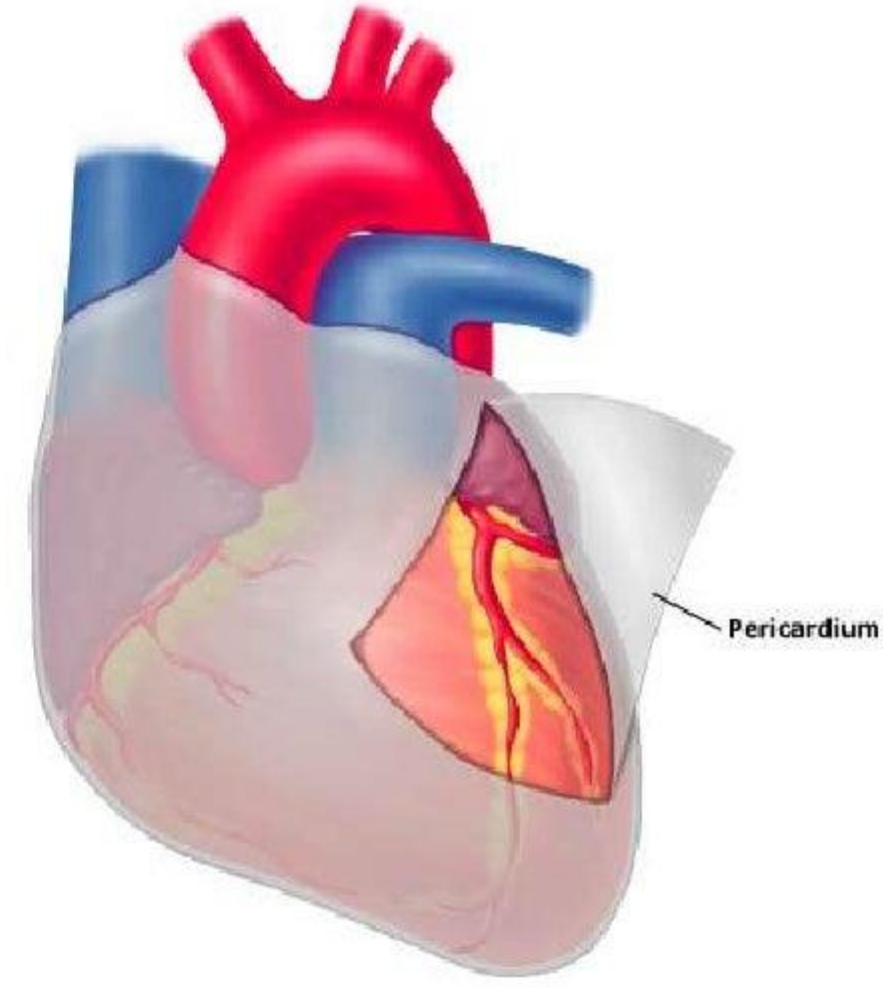
HEART



- A hollow muscular organ.
- Located in thorax between 2 lungs.
- 4 Chambers.
- 4 Valves.
- 2 Atriums & 2 Ventricles.
- 2 separate pumps (R&L sides)
- ***Right side*** receives blood from the body and sends it to the lungs (pulmonary)
- ***Left side*** receives blood from lungs and sends it to the body (systemic)

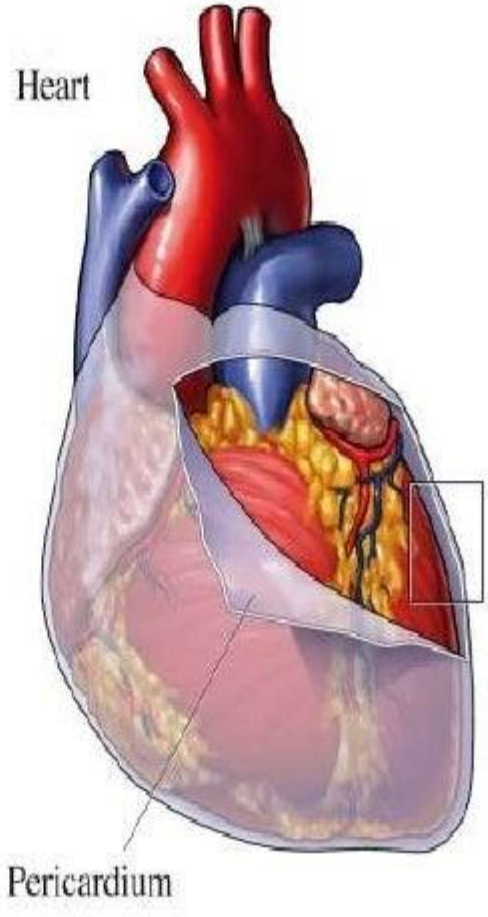
HEART

- The heart is surrounded by membrane called **Pericardium**.



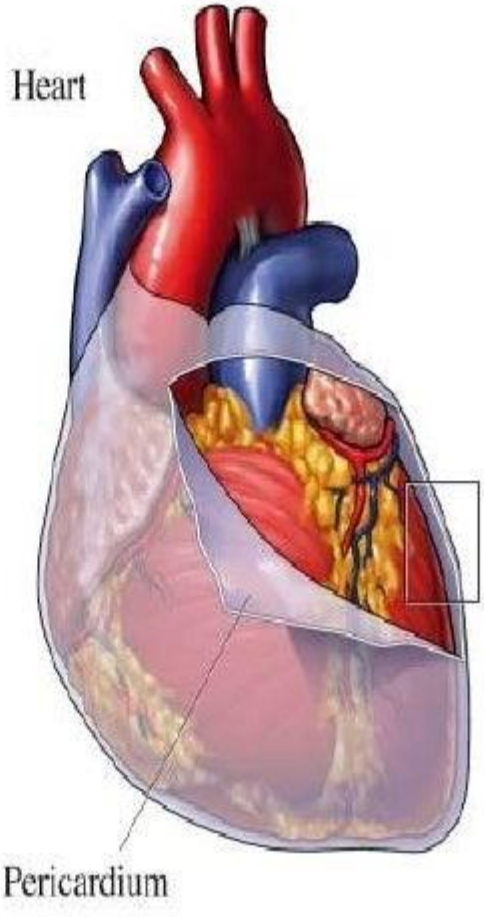
The Pericardium

- The pericardium is a fibroserous sac that encloses the heart and the roots of the great vessels.
- The pericardium lies within the middle mediastinum.



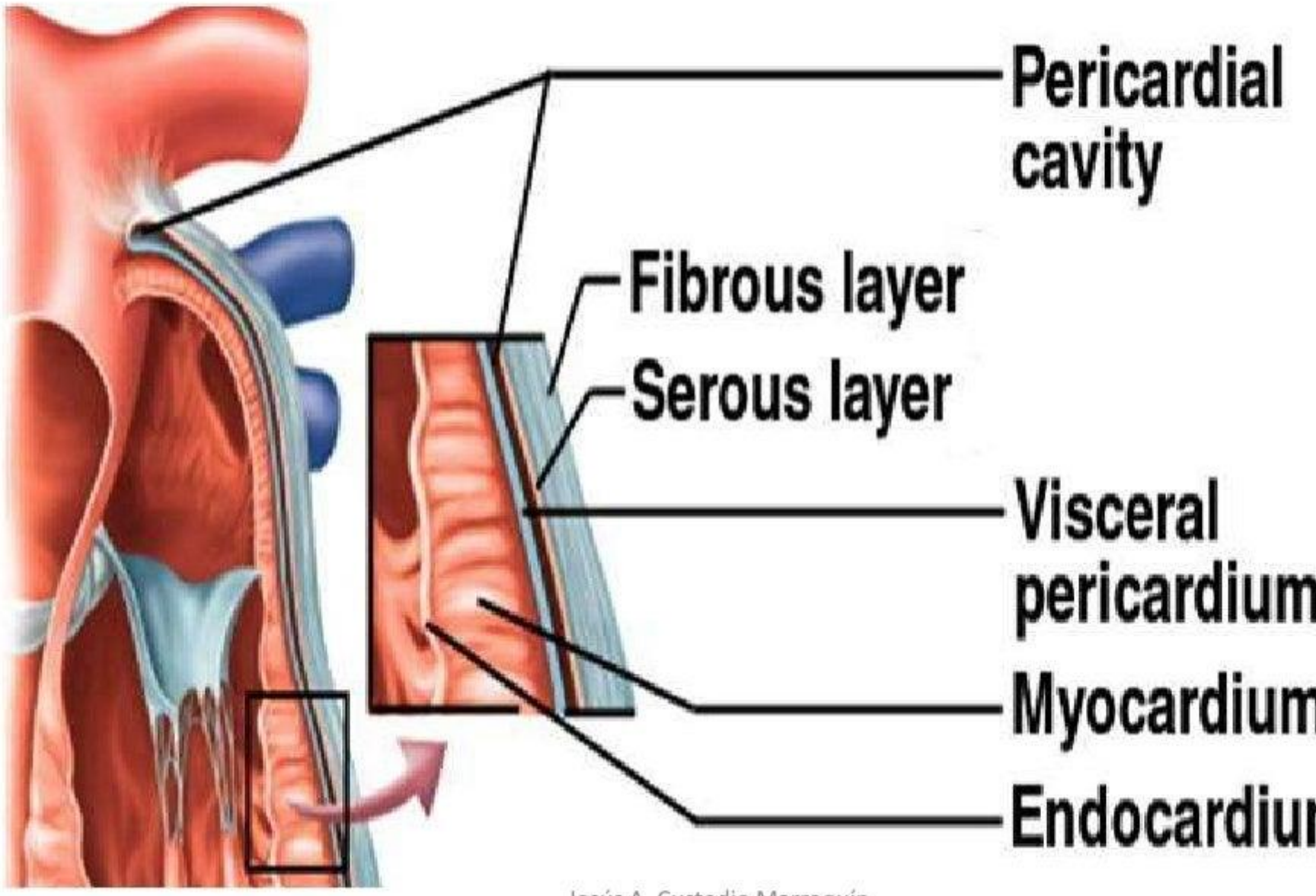
The Pericardium

- Its function is to restrict excessive movements of the heart as a whole and to serve as a lubricated container in which the different parts of the heart can contract.



Heart Wall

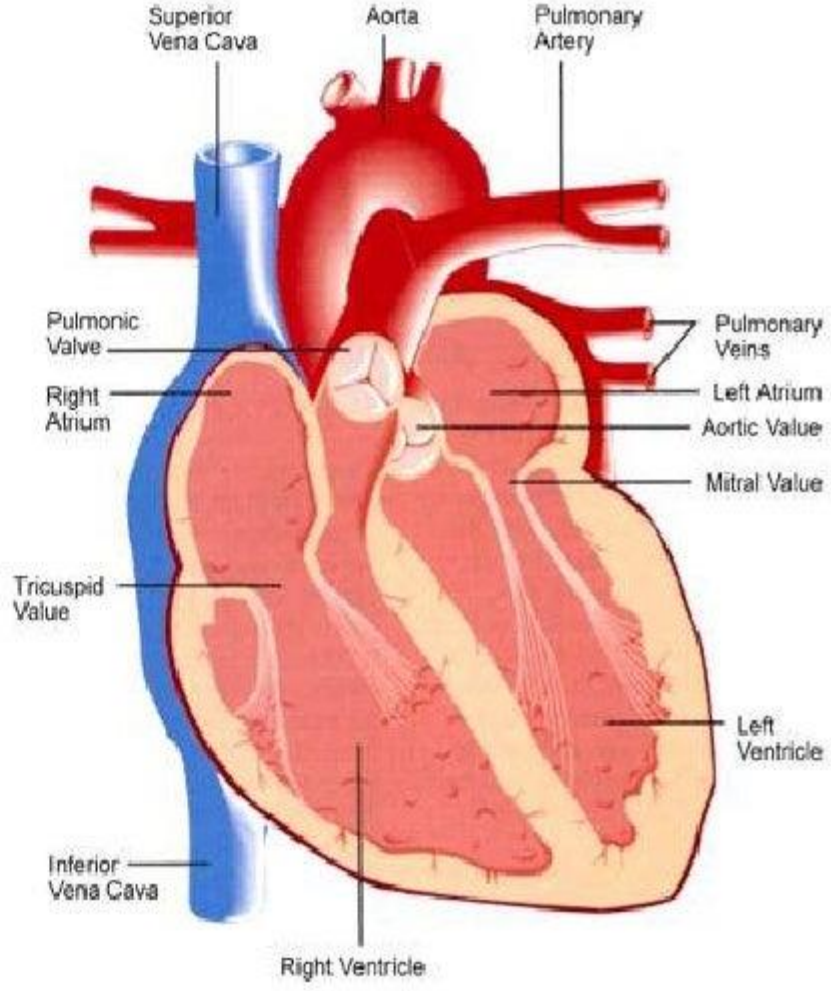
- Endocardium
  - deepest layer of the heart
  - smooth lining to reduce friction of bloodflow
- Myocardium
  - middle layer of the heart
  - location of muscle fibers responsible for pumping
- Pericardium
  - outer protective layer
  - composed of :
  - visceral pericardium
  - paricardial cavity
  - parietal pericardium



Jesús A. Custodio Marroquín

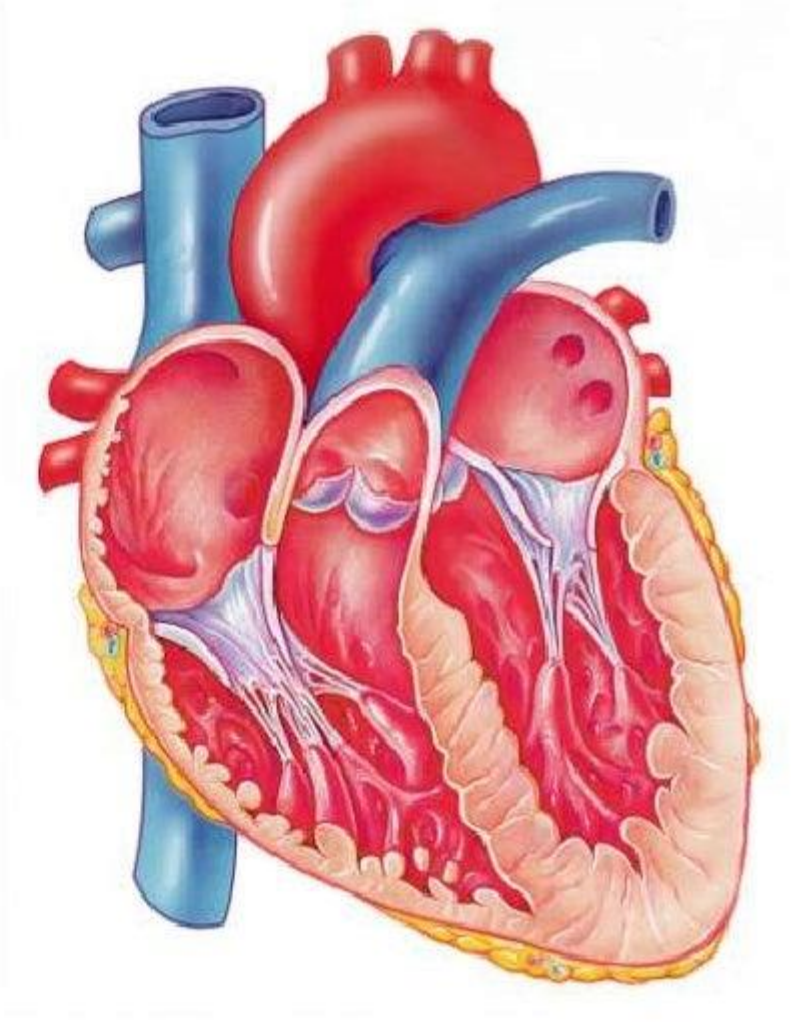
The Heart Chambers

- Four chambers
  - Two atria (Right and Left)
  - Two ventricles (Right and Left)



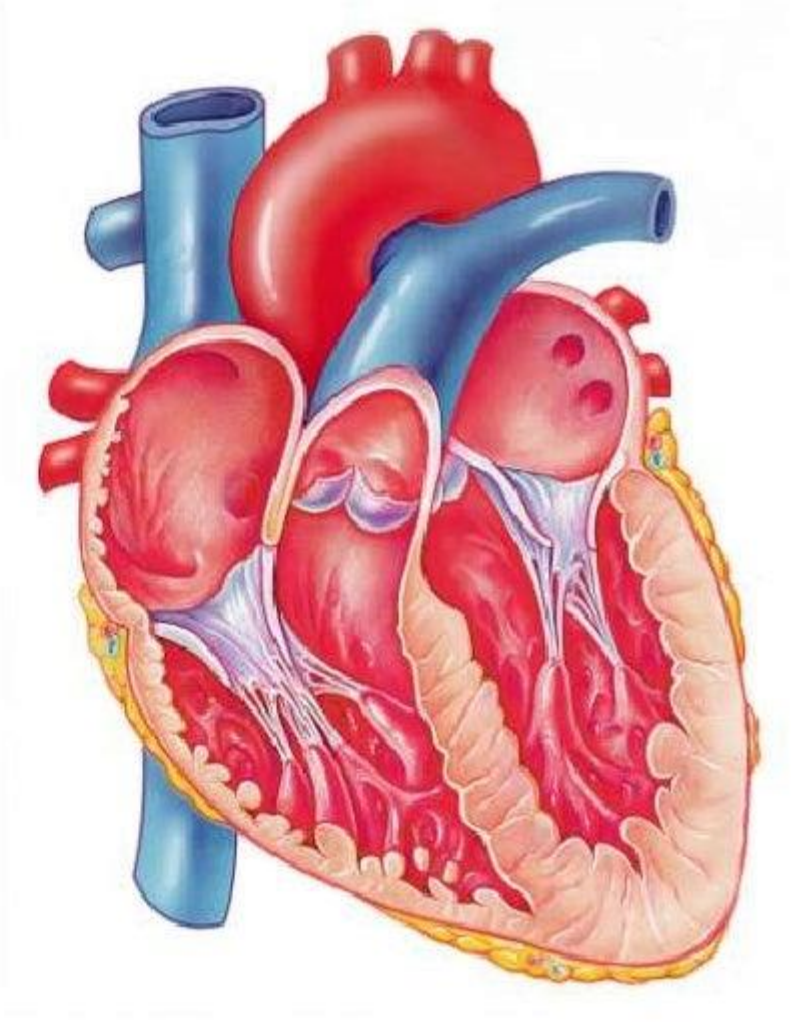
The Heart Chambers

- Atria
  - *Features*
    - small, thin-walled chambers
  - *Functions*
    - receiving chambers for blood returning to the heart from the circulation
    - push the blood into the adjacent ventricles.



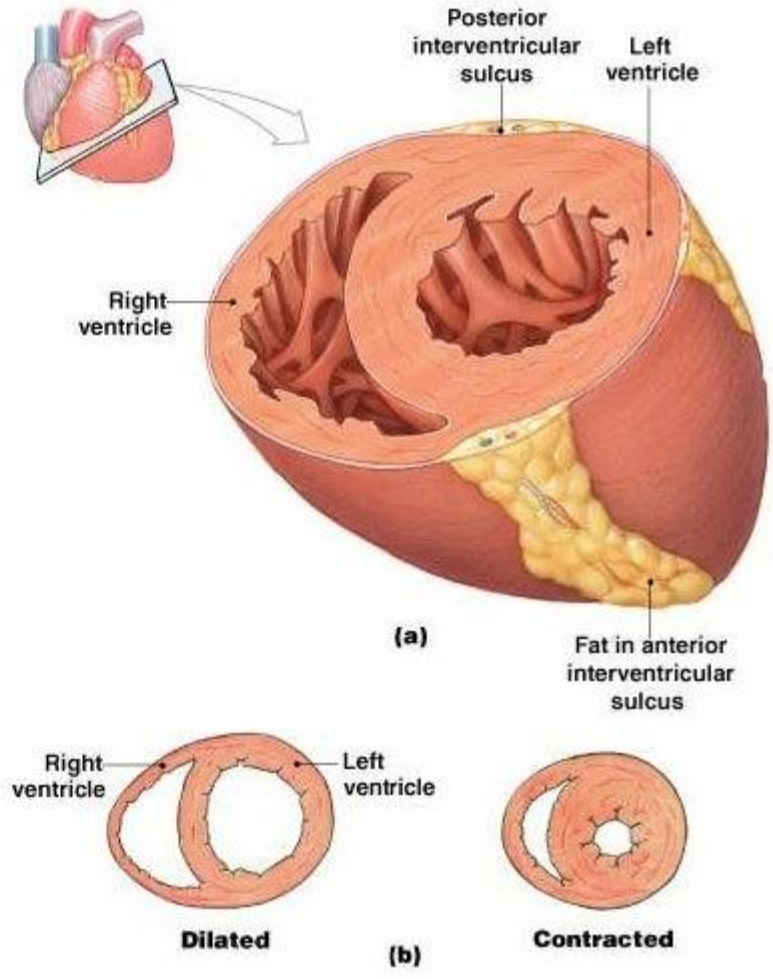
The Heart Chambers

- Atria
  - Receive blood from
    - ➢ *Right side*
      - ❖ Superior and Inferior Vena Cava
    - ➢ *Left side*
      - ❖ Pulmonary Veins



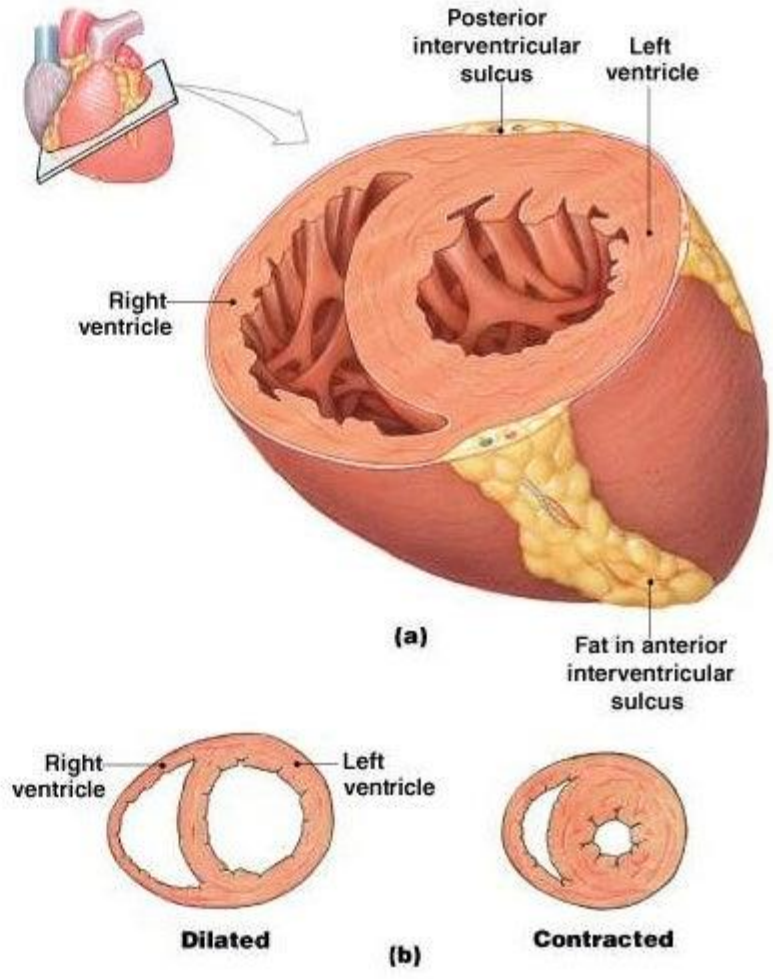
The Heart Chambers

- Ventricles
  - Features
    - ➢ make up most of the mass of the heart
    - ➢ the walls of the left ventricle are 3X thicker than those of the right



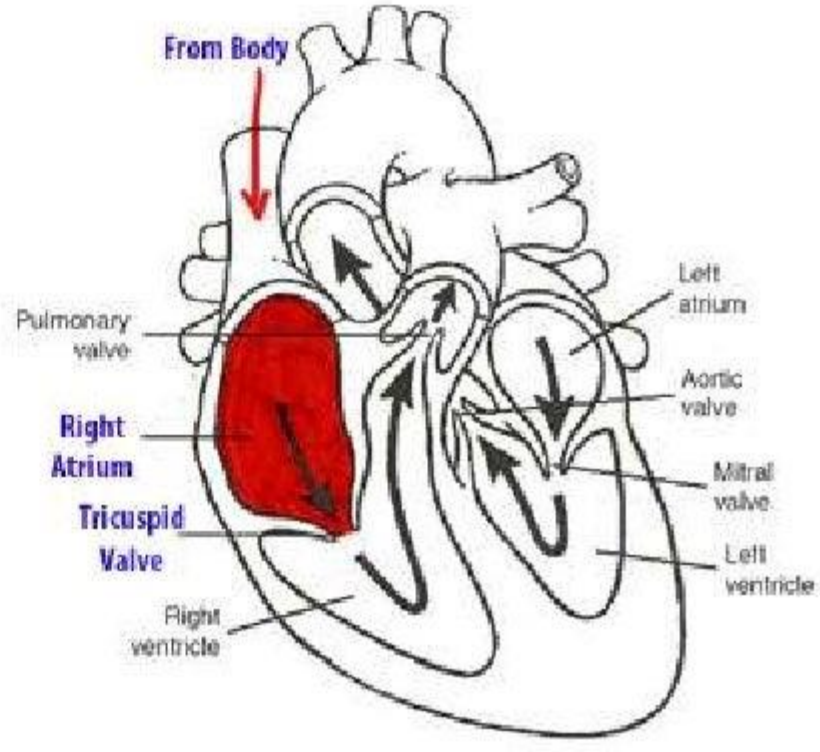
The Heart Chambers

- Ventricles
  - Functions
    - discharging chambers of the heart
    - propel blood to Pulmonary Trunk (right ventricle), Aorta (left ventricle)



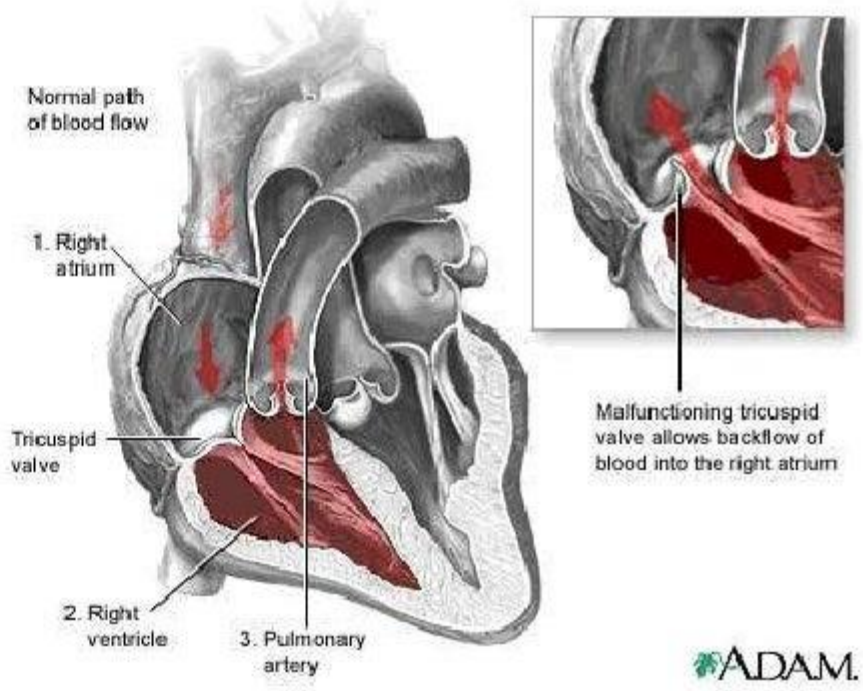
The Right Atrium

- Receives deoxygenated blood from the inferior vena cava below and from the superior vena cava above.



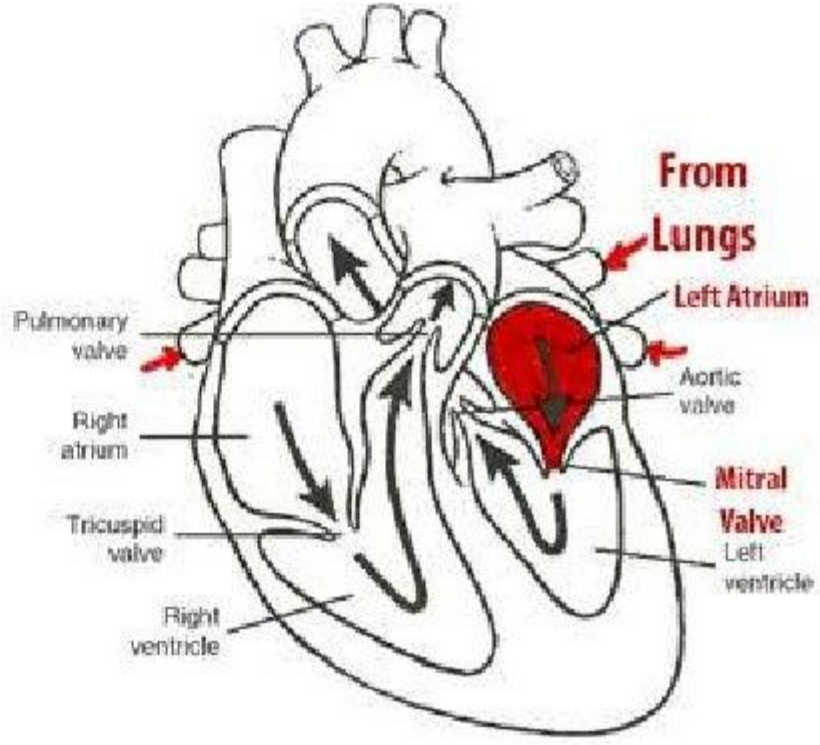
The Right Ventricle

- Receives blood from the right atrium through the **tricuspid valve** .



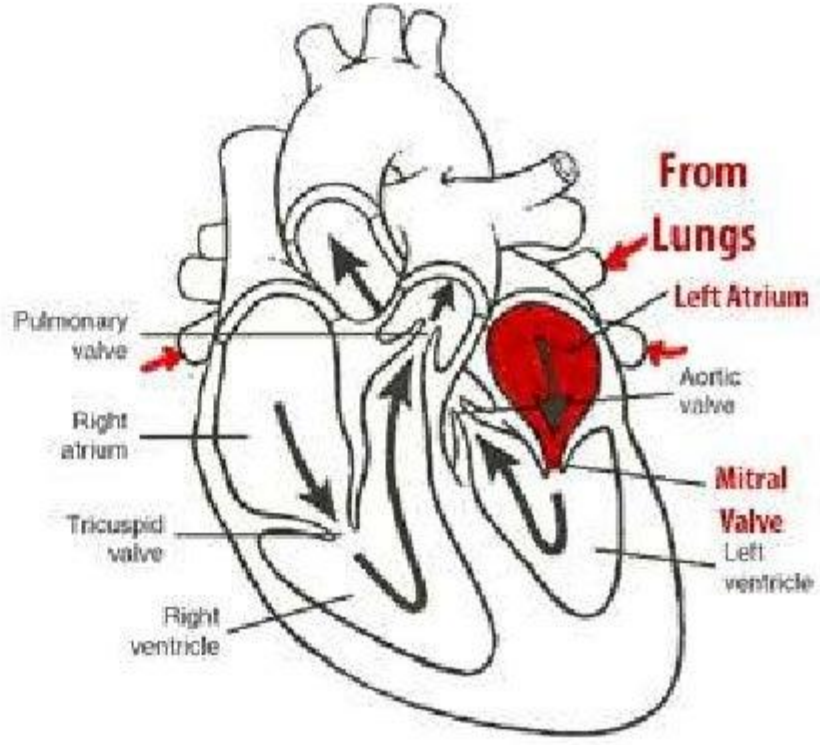
The Left Atrium

- Receives oxygenated blood from four pulmonary veins which drain posteriorly.



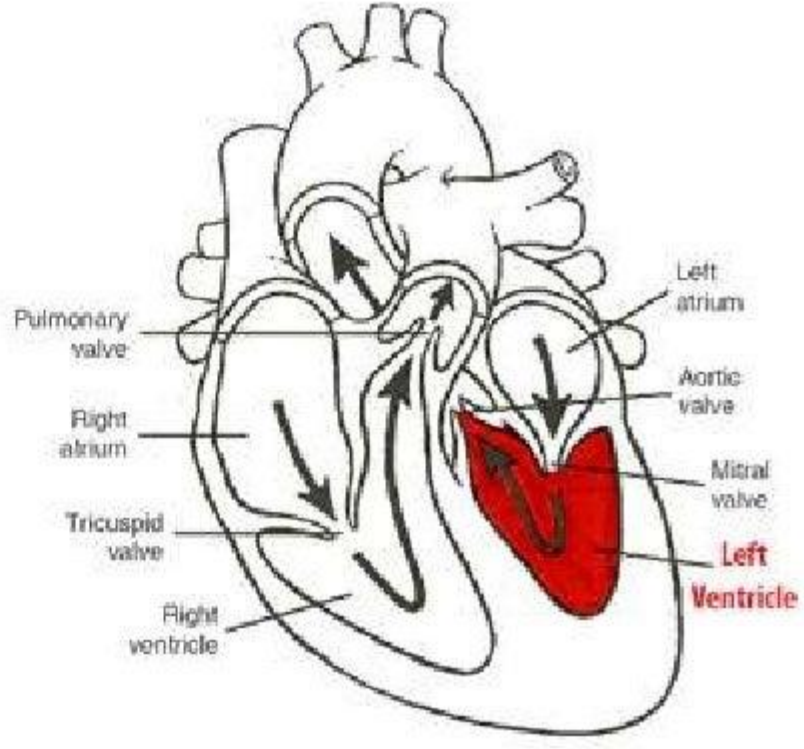
The Left Atrium

- The ***mitral*** (***bicuspid***) valve guards the passage of blood from the left atrium to the left ventricle.



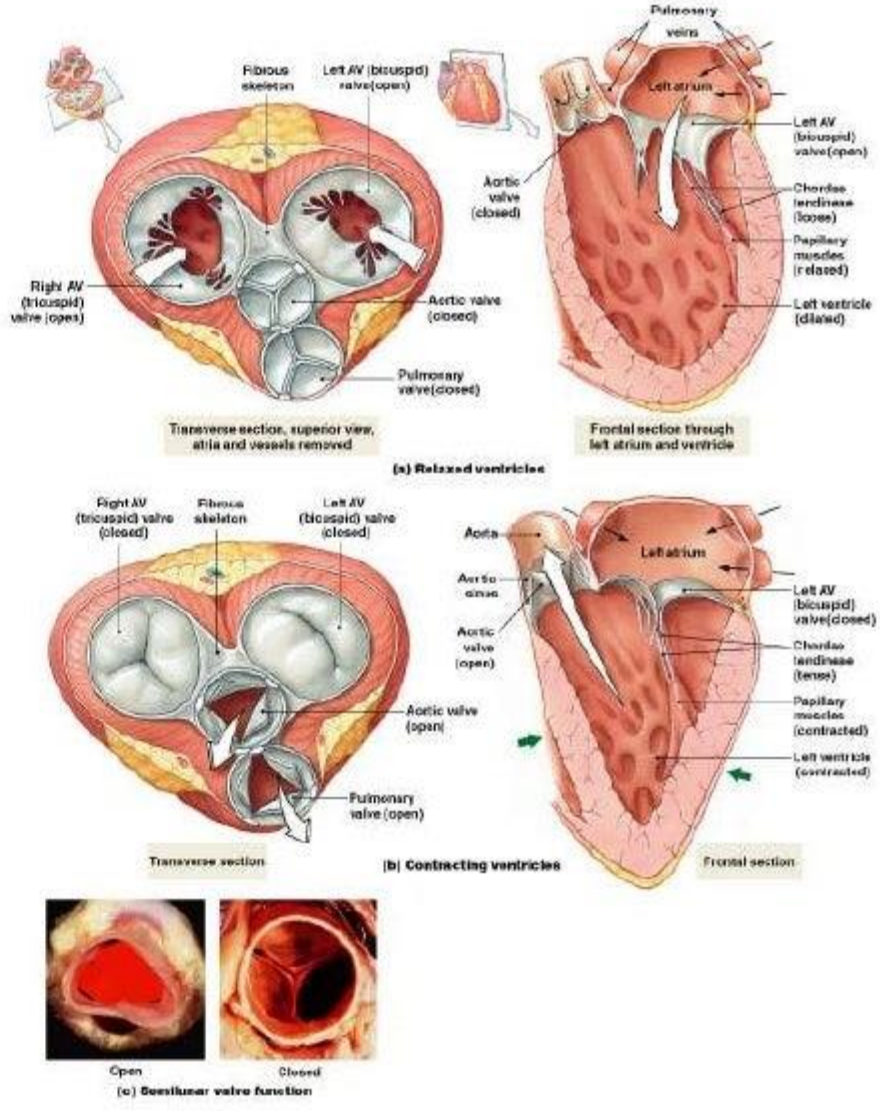
The Left Ventricle

- The wall of the left ventricle is thicker than the right ventricle but the structure is similar.
- The thick wall is necessary to pump oxygenated blood at high pressure through the systemic circulation.

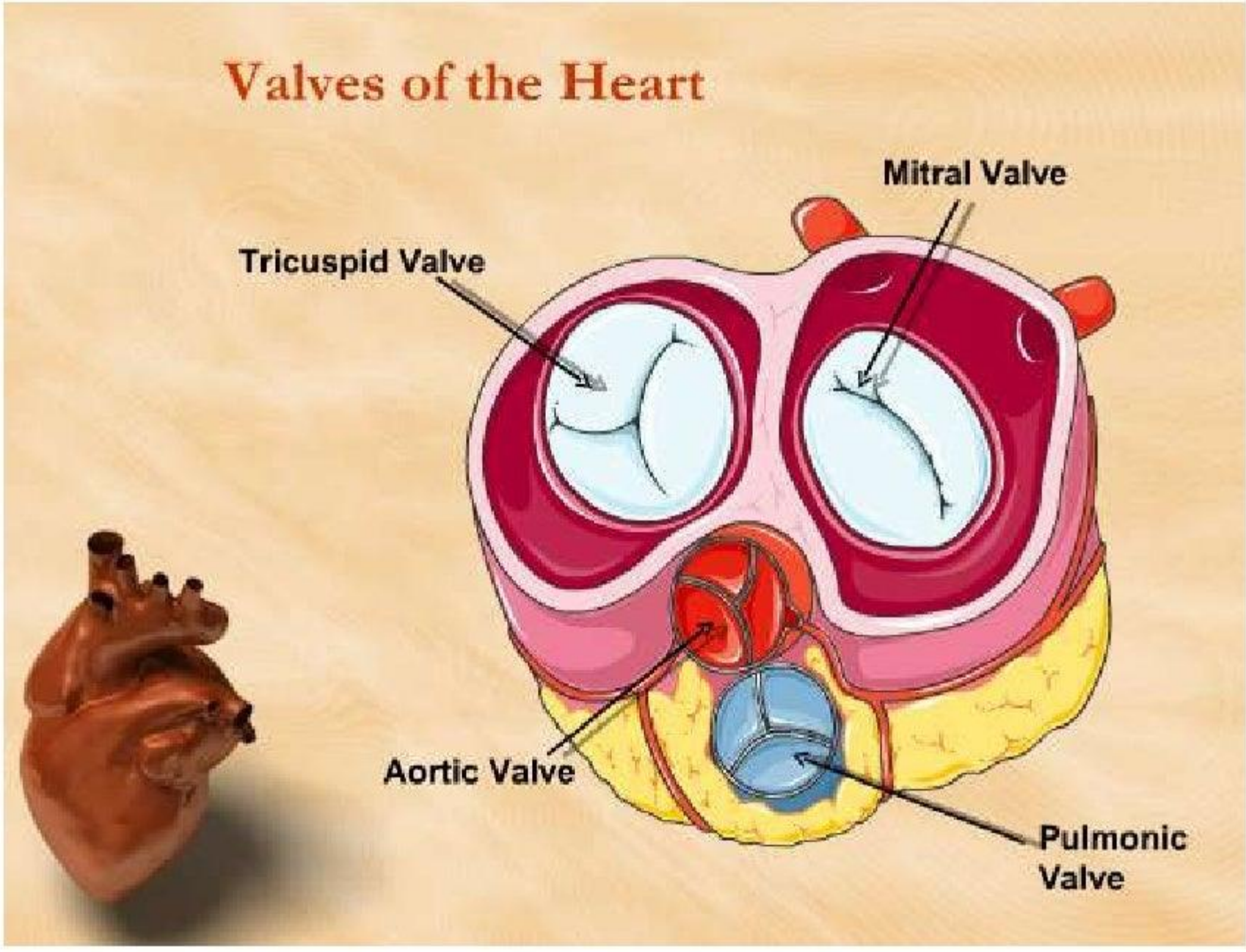


The Heart Valves

- Heart valves ensure unidirectional blood flow through the heart
  - Composed of an endocardium with a connective tissue core.
- Two major types
  - Atrioventricular valves
  - Semilunar valves

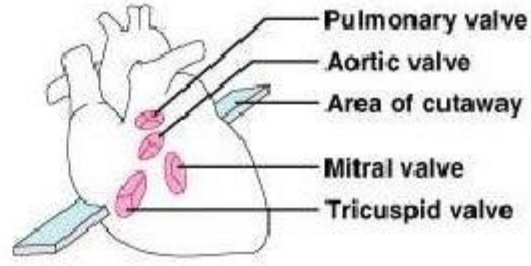


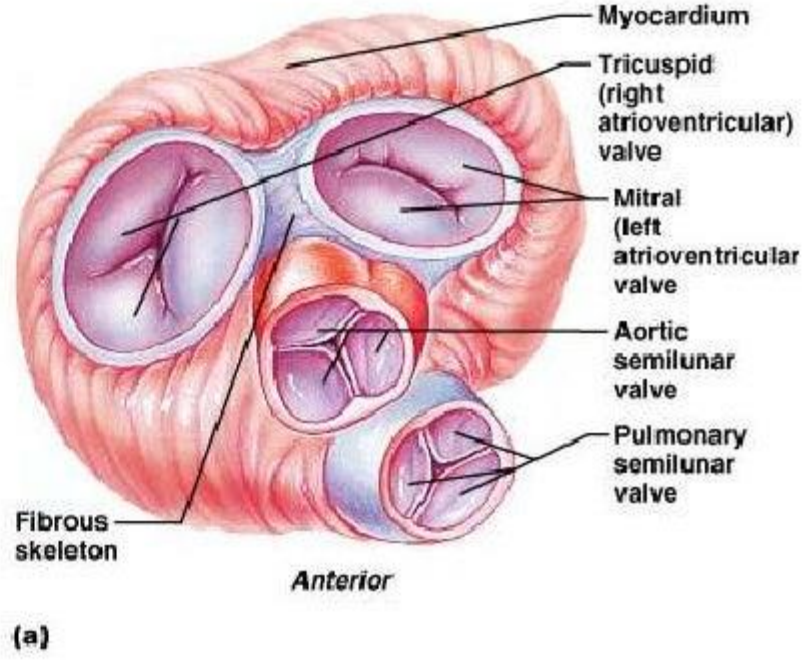
Valves of the Heart



Atrioventricular (AV) Valves

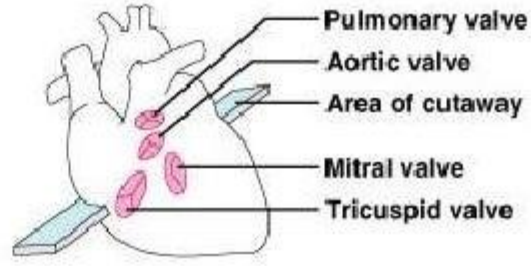
- Atrioventricular (AV) valves lie between the atria and the ventricles
  - R-AV valve = tricuspid valve
  - L-AV valve = bicuspid or mitral valve
- AV valves prevent backflow of blood into the atria when ventricles contract

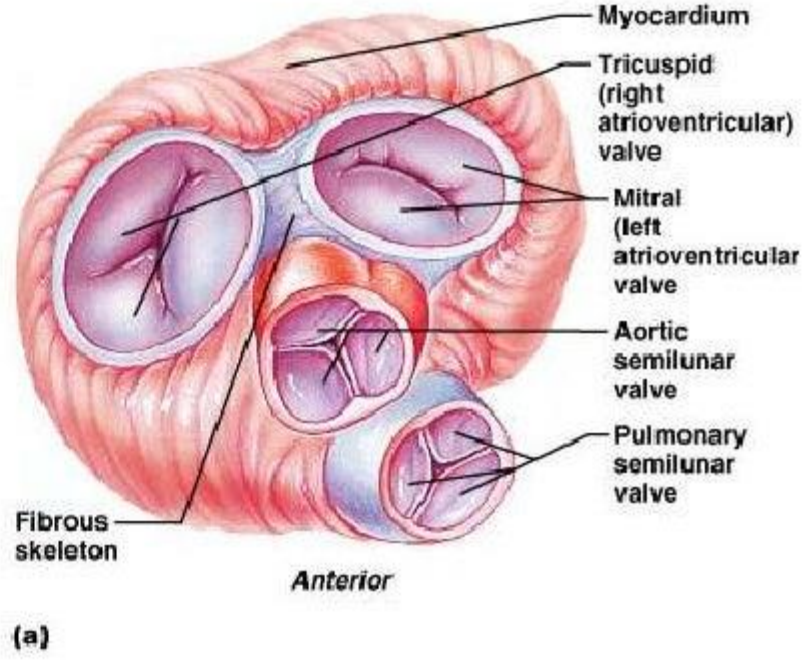




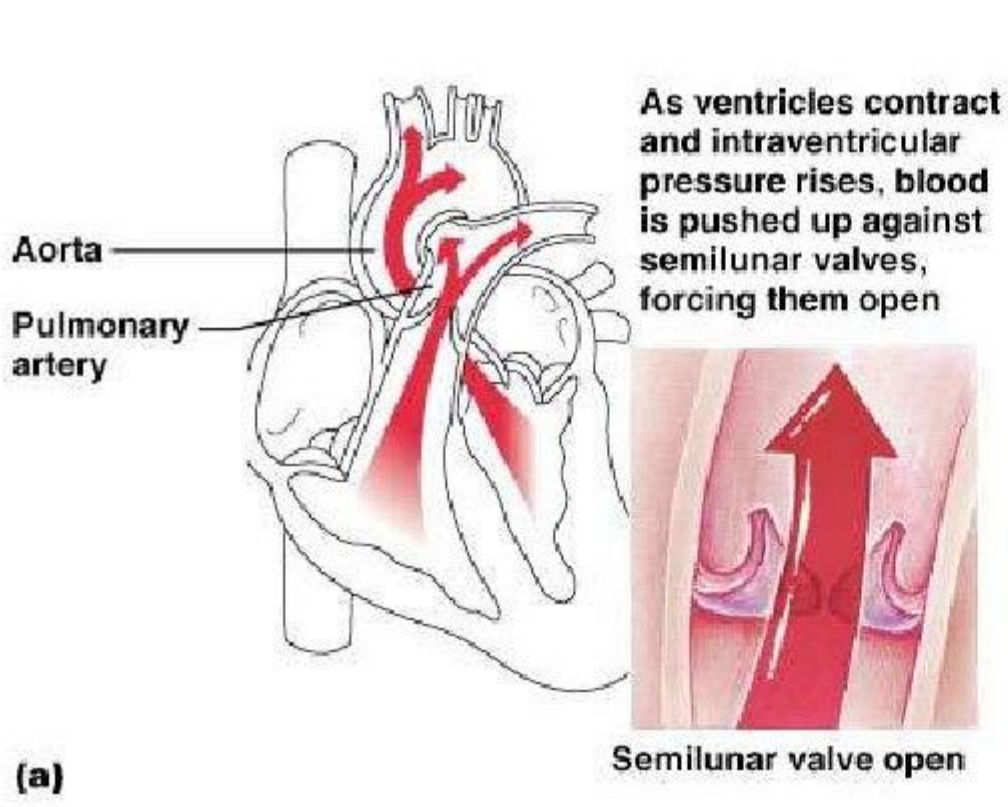
Semilunar Heart Valves

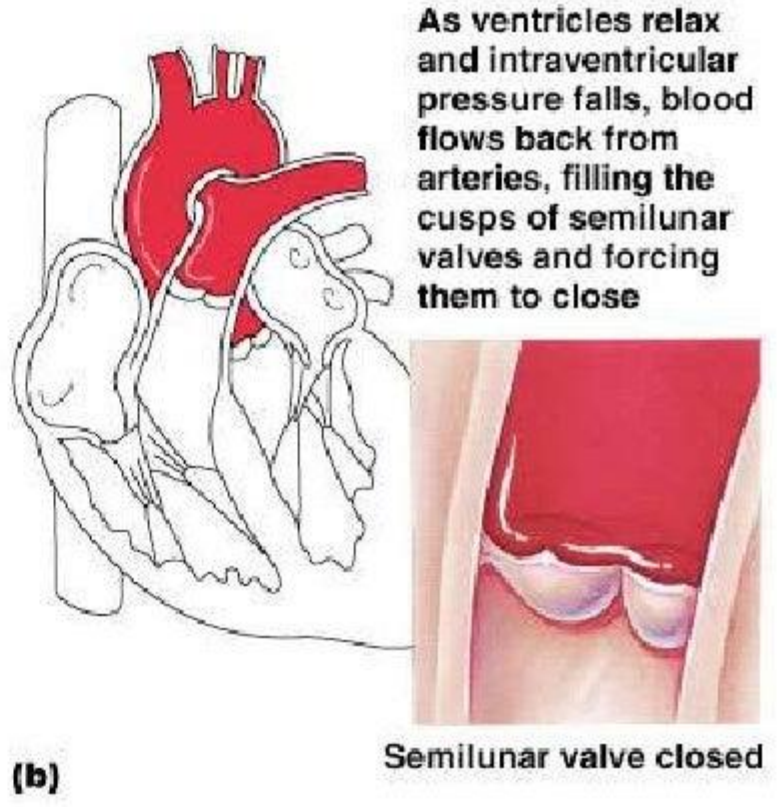
- Semilunar valves prevent backflow of blood into the ventricles
- Aortic semilunar valve lies between the left ventricle and the aorta
- Pulmonary semilunar valve lies between the right ventricle and pulmonary trunk
- Heart sounds ("lub-dup") due to valves closing
  - "Lub" - closing of atrioventricular valves
  - "Dub"- closing of semilunar valves





Semilunar Valve





The Heart Valves

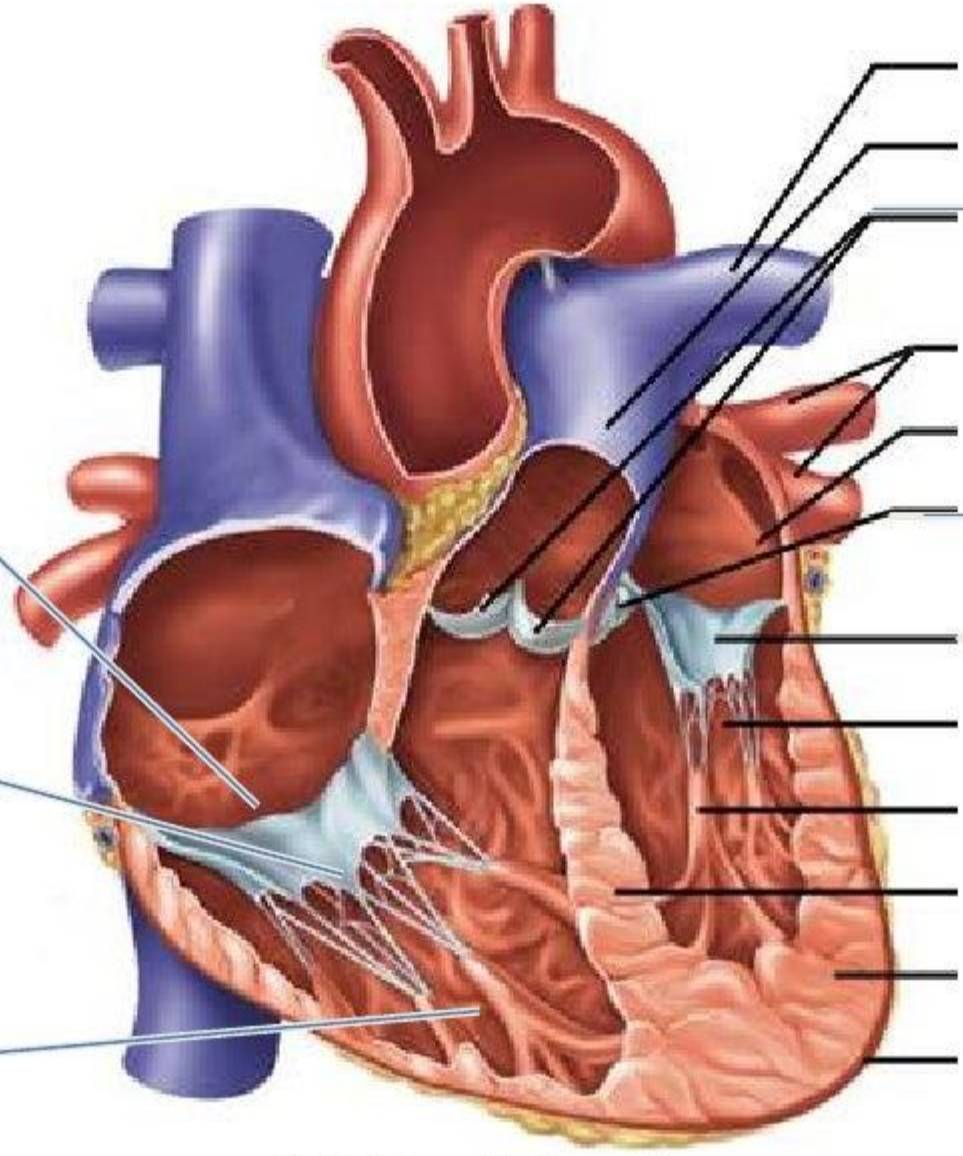
Atrioventricular valves

- Right AV (Tricuspid)
  - separates the right atrium from the right ventricle. Prevents backflow into atrium.
- Left AV (Bicuspid)
  - separates the left atrium from the left ventricle. Prevents backflow into atrium.

Semilunar valves

- Pulmonary valve
  - separates the right ventricle from the pulmonary arteries. Prevents backflow after ventricular contraction.
- Aortic valve
  - separates the left ventricle from the aorta. Prevents backflow after ventricular contraction .

The Heart Valves



Pulmonary semilunar valve

Aortic semilunar valve

Left AV (bicuspid) valve

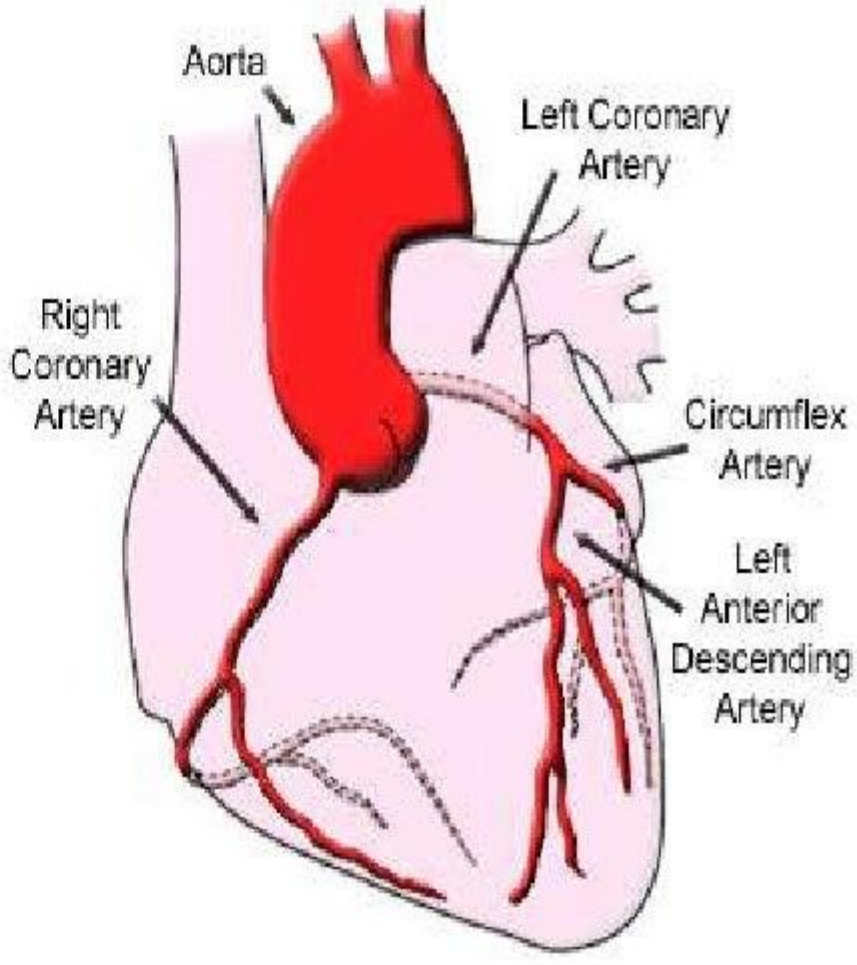
Right AV (tricuspid) valve

Chordai tendineae

Papillary muscle

Arterial Supply of the Heart

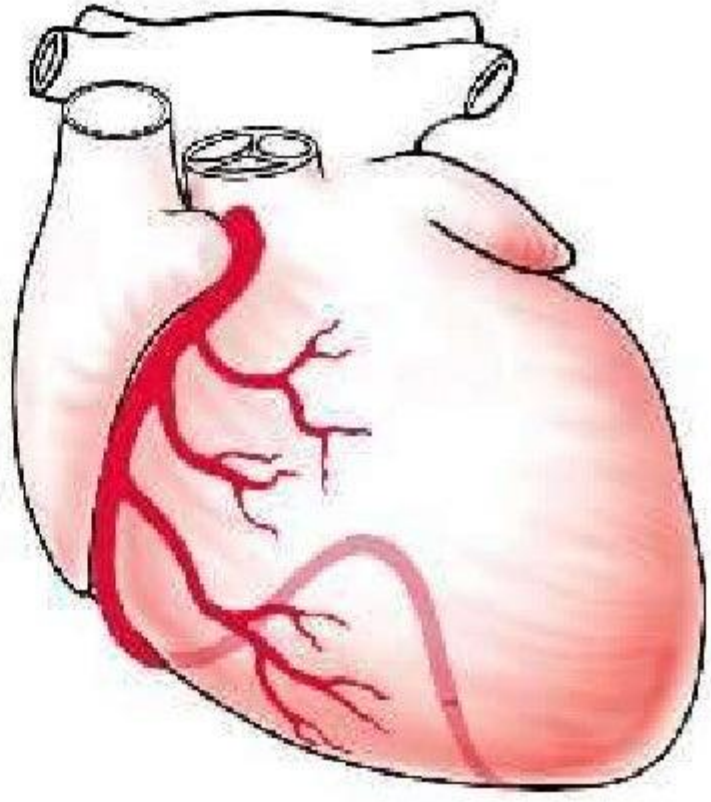
- The arterial supply of the heart is provided by the **right** and **left** coronary arteries, which arise from the **ascending aorta** immediately above the aortic valve.



Right coronary artery

Branches

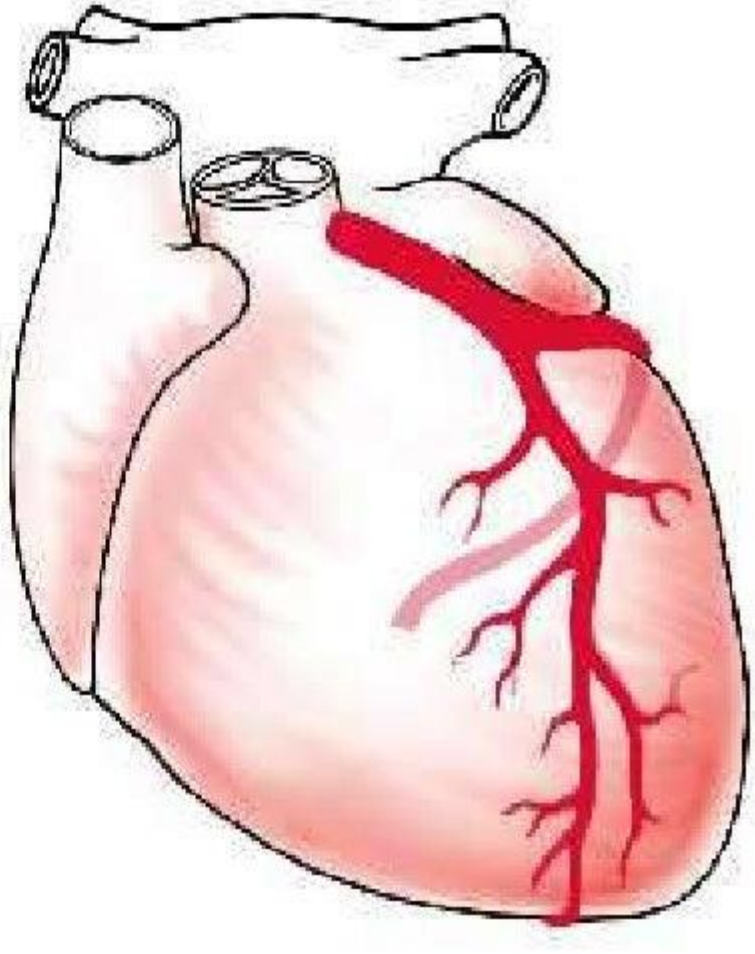
- Right marginal arteries (acute marginal artery)
- Posterior interventricular artery. (in post. IV sulcus)
- Sinoatrial nodal artery.
- Atrioventricular nodal artery.



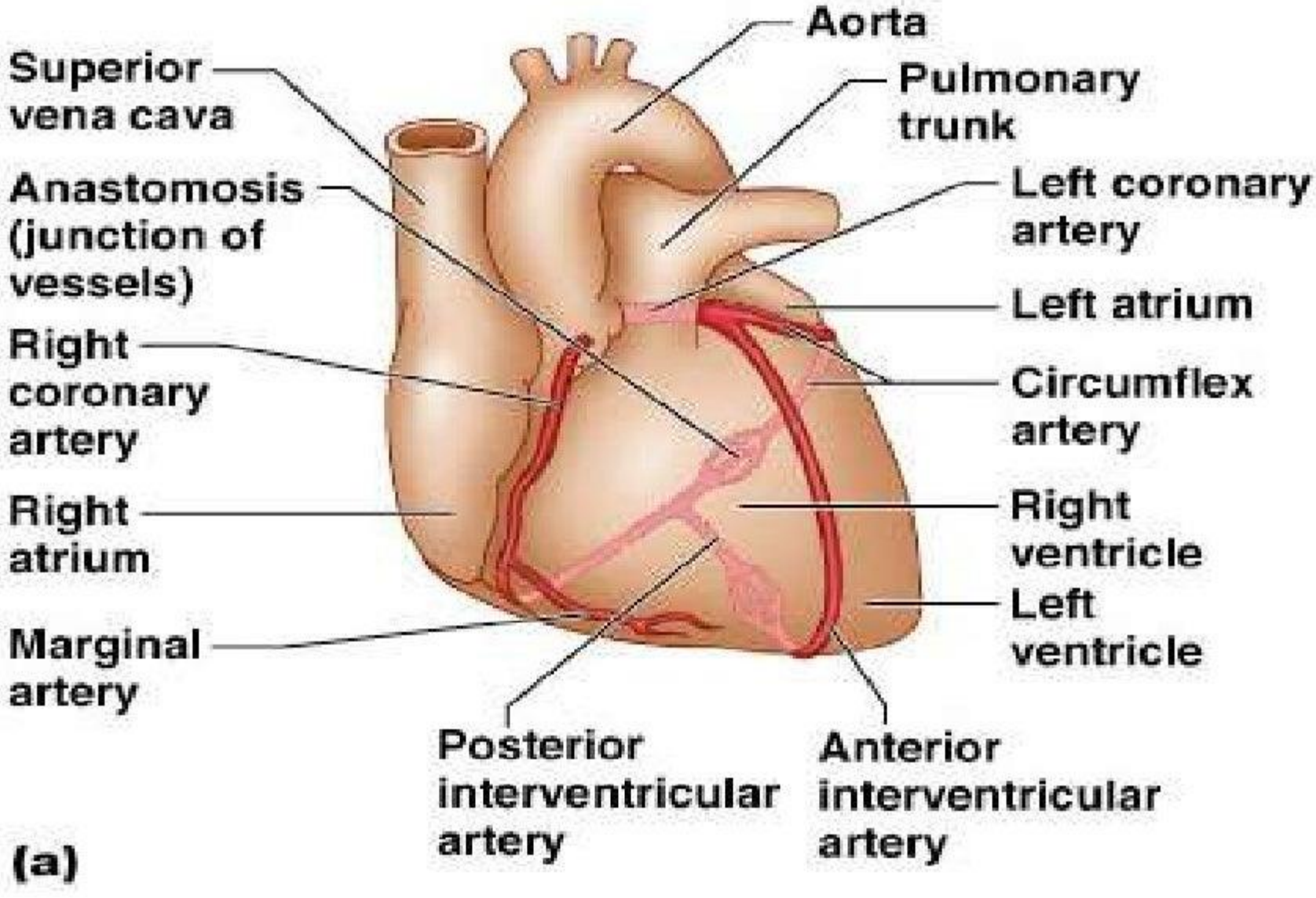
Left coronary artery

Branches

- Left anterior descending (LAD) or anterior interventricular artery. (lies in anterior IV sulcus)
  - Septal branches.
  - Diagonal branches
- Left marginal artery. (Obtuse marginal artery)
- Left circumflex artery.

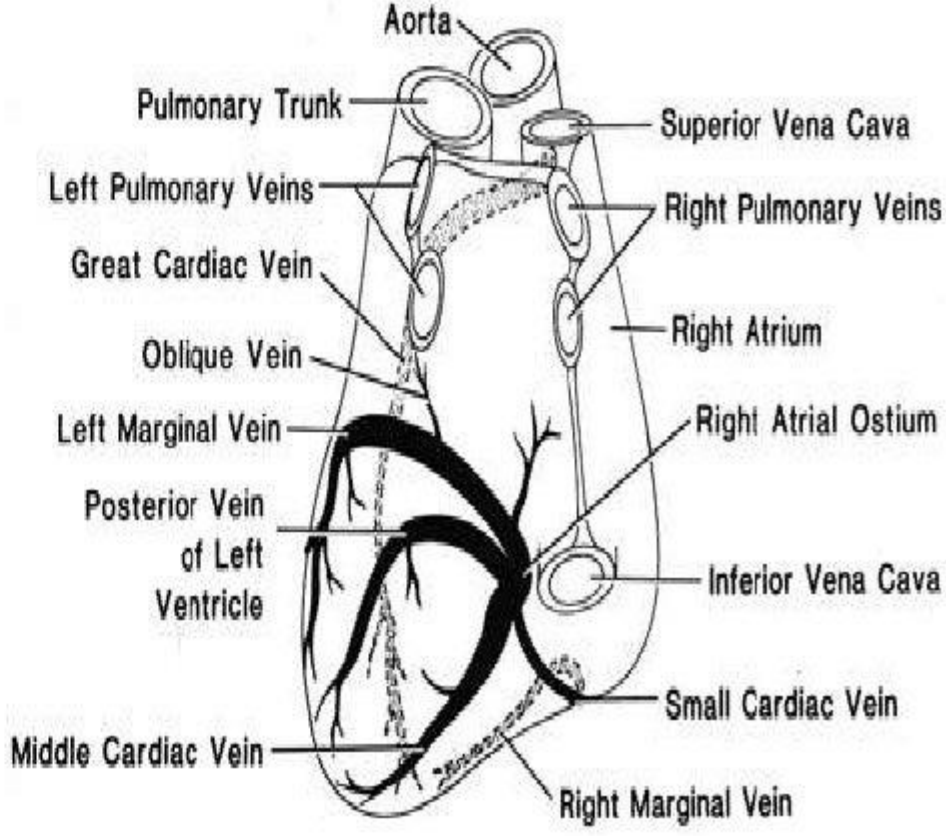


Coronary Arteries

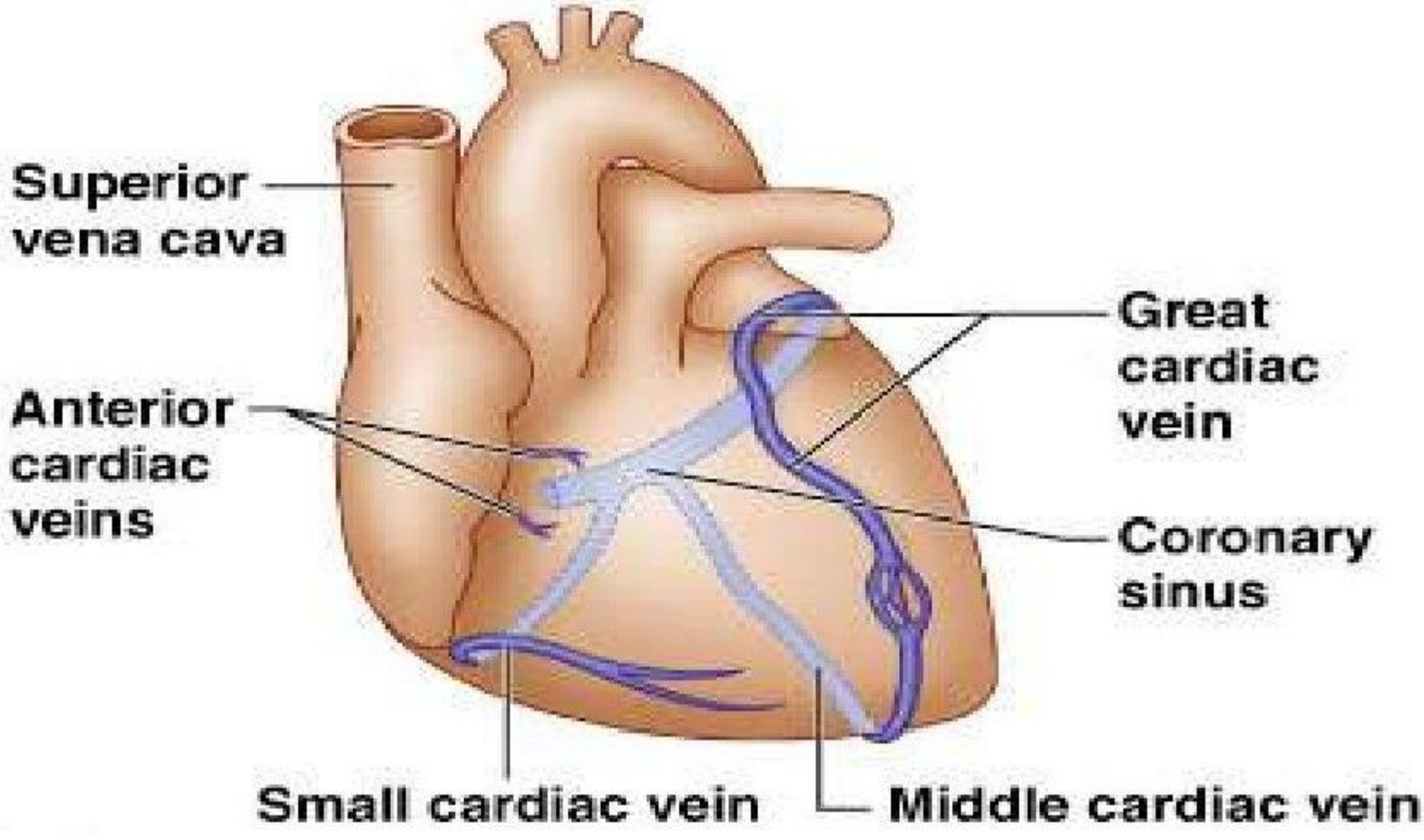


Venous Drainage of the Heart

- Most blood from the heart wall drains into the right atrium through the ***coronary sinus*** ,which lies in the posterior part of the atrioventricular groove .
- It is a continuation of the ***great cardiac vein***.
- It opens into the right atrium to the left of the inferior vena cava



Venous Drainage of the Heart



Nerve Supply of the Heart

- The heart is innervated by sympathetic and parasympathetic fibers of the autonomic nervous system via the cardiac plexuses situated below the arch of the aorta.


THANX