



ANATOMY II

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Course name Anatomy II and course code

Semester 1

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Anatomy of the heart

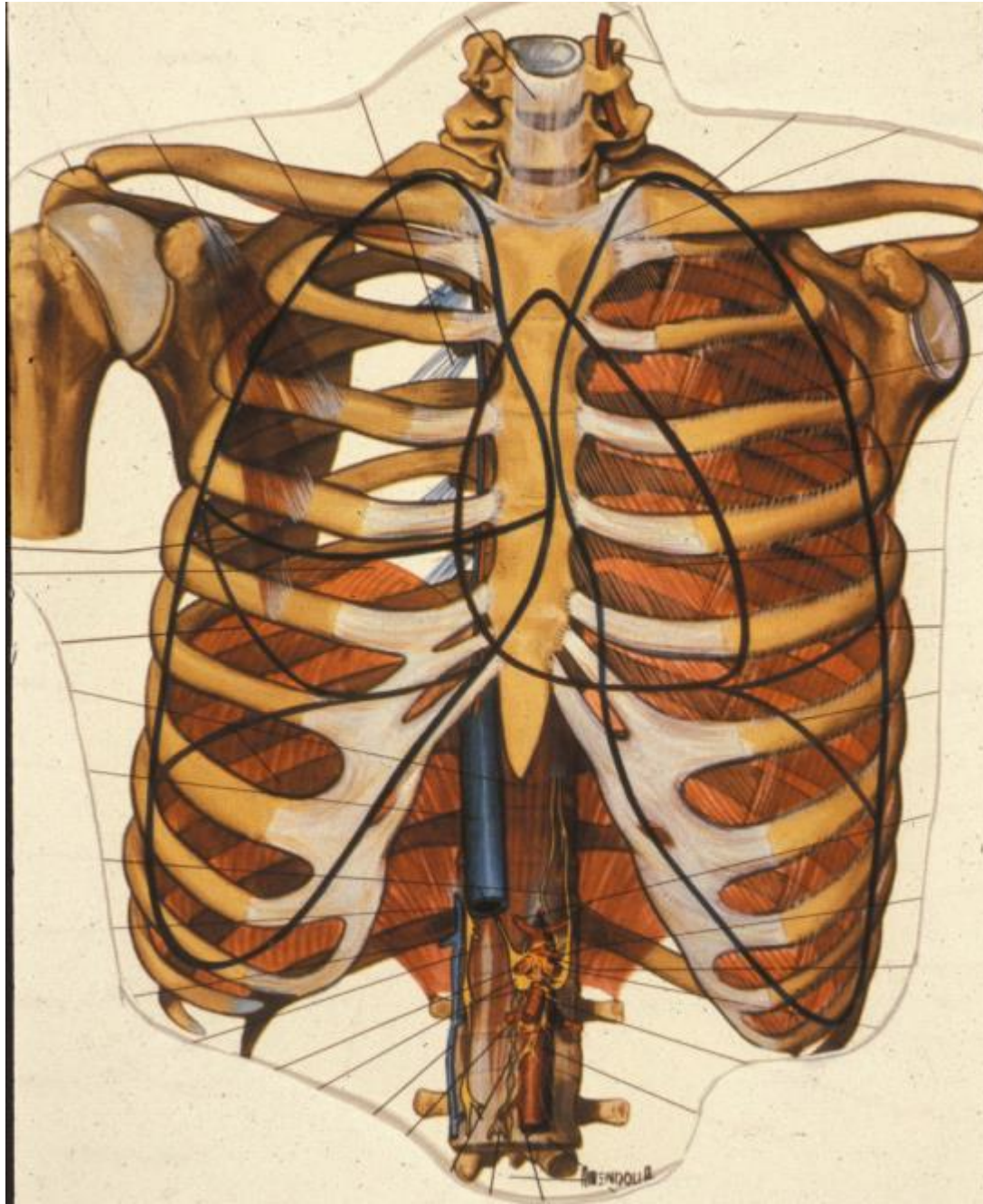
Objectives

- **Describe the external features of the heart**
- **Describe the internal features of the heart**
- **Understanding the conduction system**
- **Blood supply and venous drainage of the heart**

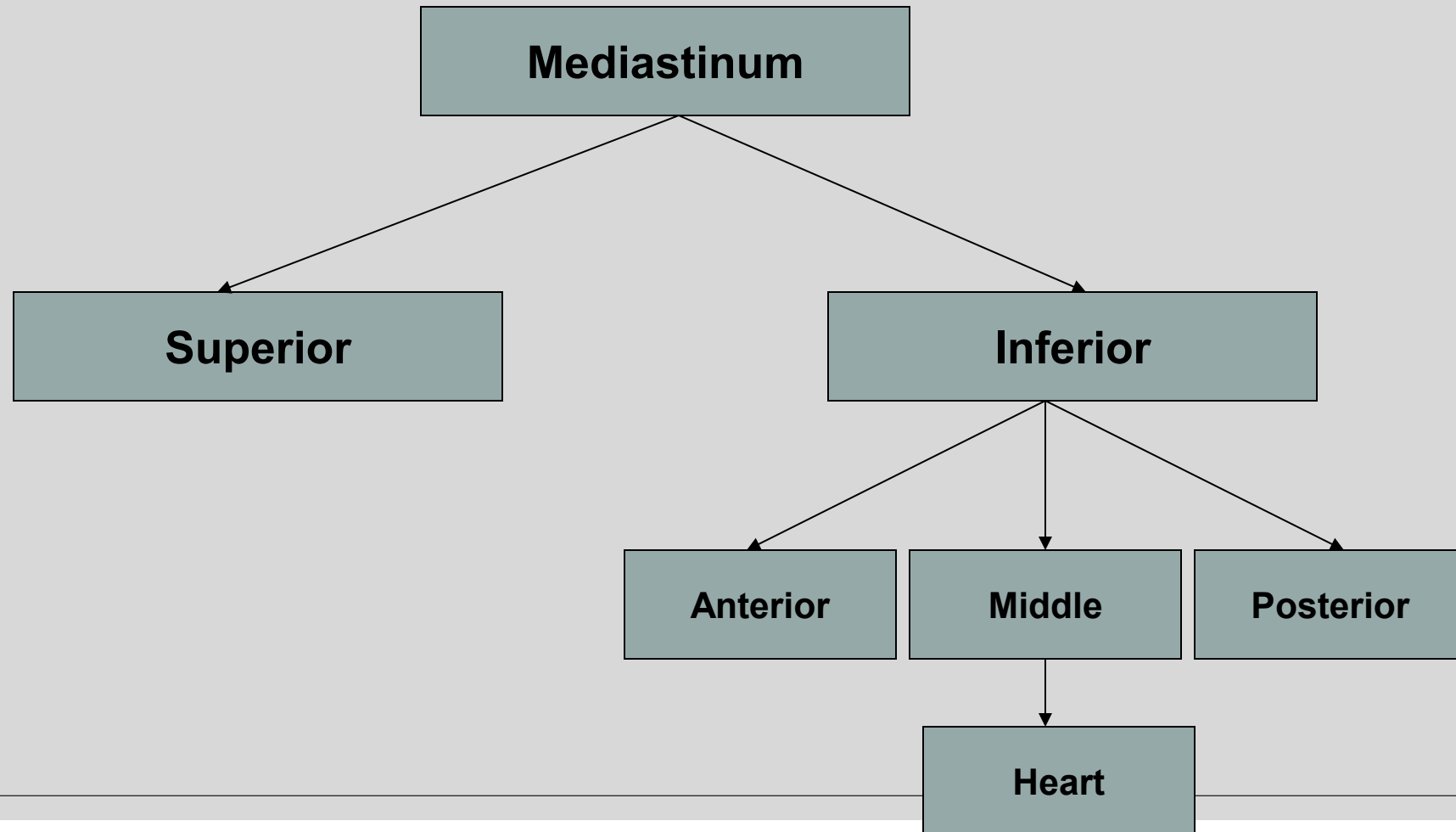
Facts, location, & orientation

- Oblique orientation
- Apex points (down and left)
 - 5th intercostal space
- Base is superior near origins of great vessels
 - 2nd intercostal space
- 2/3 lies left of the midline





Mediastinum

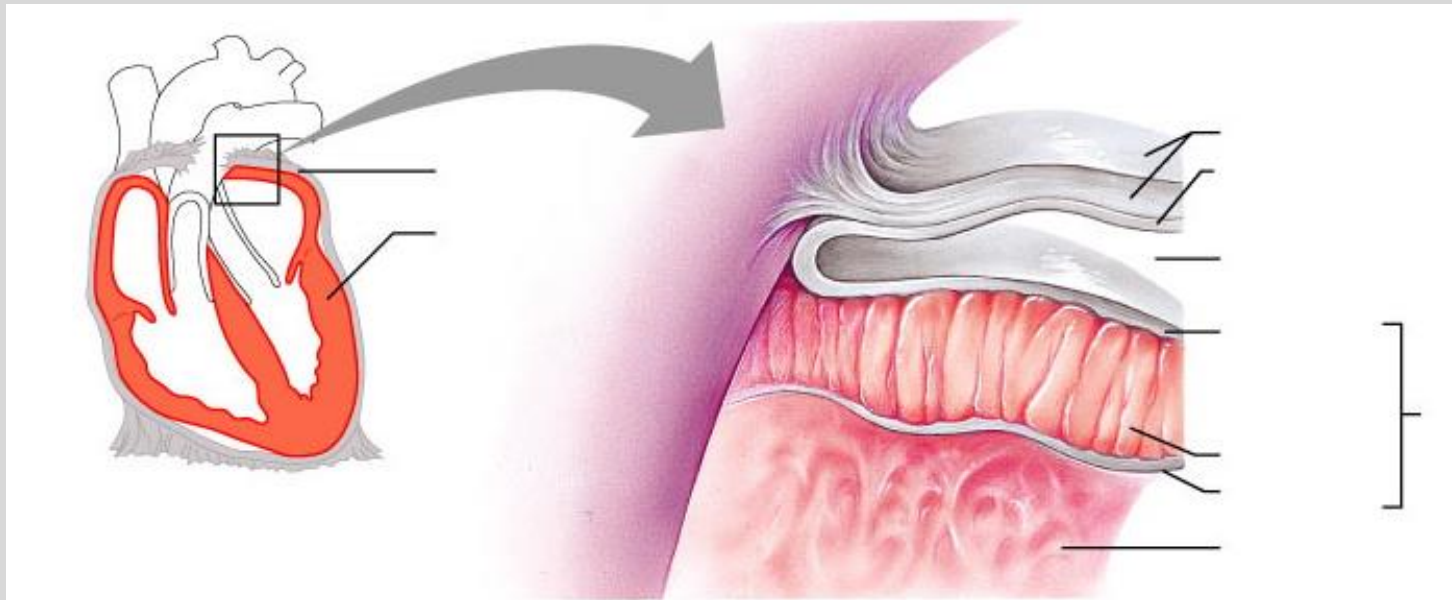


- The mediastinum is divided, for descriptive purposes, to superior and inferior mediastina by an imaginary plane passing horizontally through the sternal angle.
- The inferior mediastinum, in turn, is divided into anterior mediastinum (anterior to pericardium), posterior mediastinum (posterior to pericardium) and middle mediastinum (occupied by heart and pericardium)



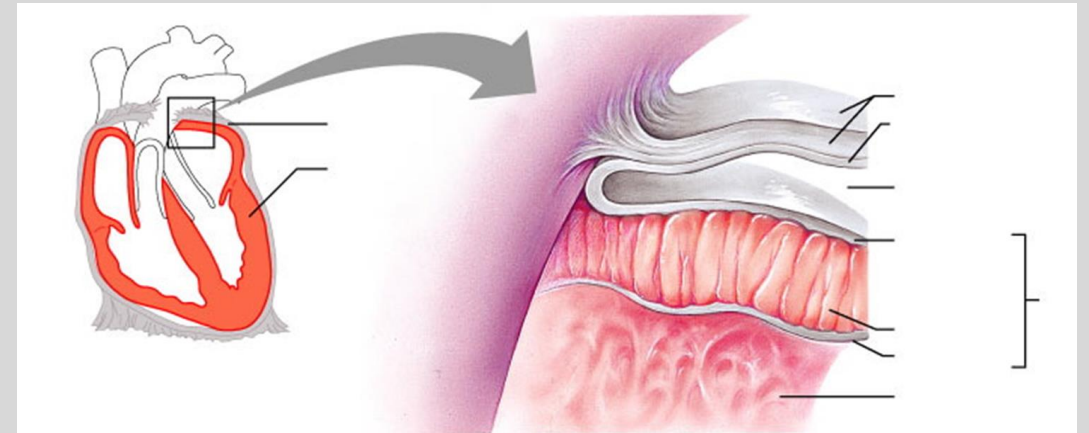
Structure of the Heart – Coverings

- Fibrous pericardium
- Serous pericardium
 - Parietal pericardium
 - Visceral pericardium



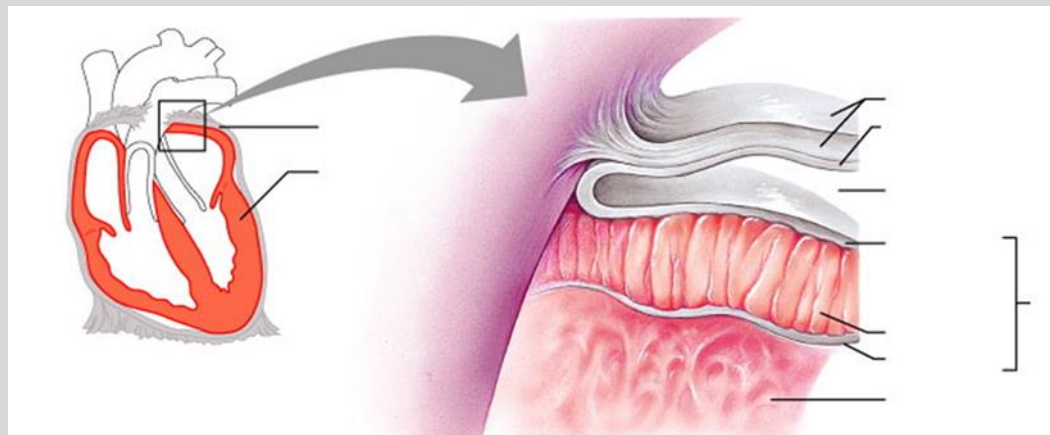
Fibrous pericardium

- Is the strong fibrous part of the sac.
- It is the outermost single layer.
- Inferiorly it is attached firmly to the diaphragm.
- Superiorly it fuses with the outer coat of the great blood vessels that pass through it. (namely the aorta, pulmonary trunk, superior vena cava, inferior vena cava and pulmonary veins.)



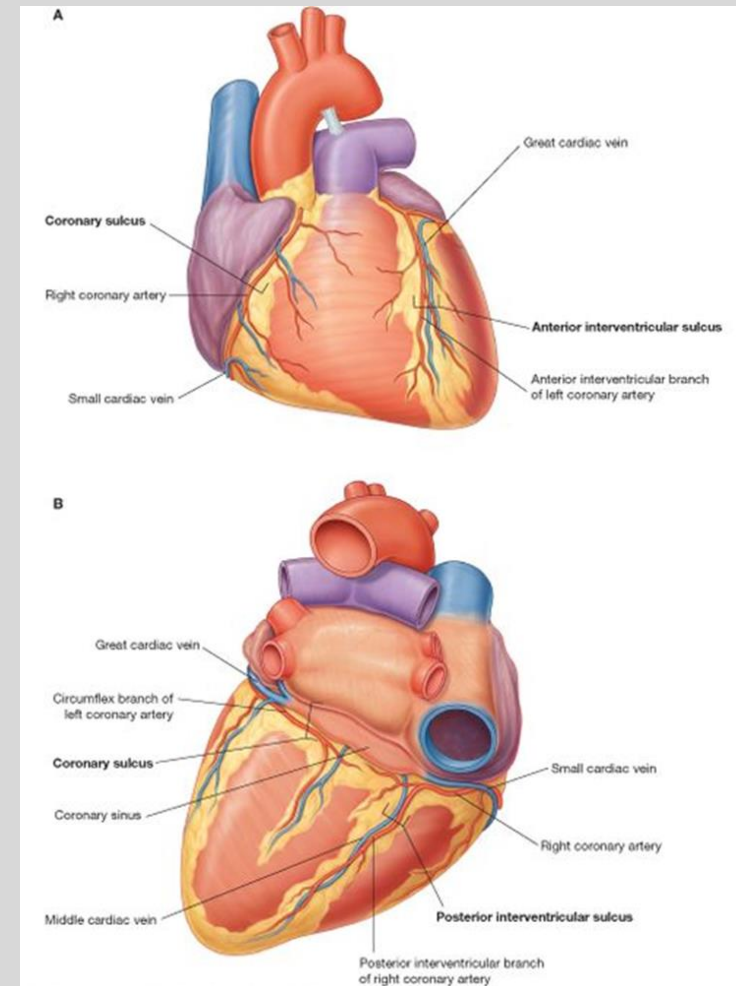
Serous pericardium

- Is a double layer serous membrane. Parietal layer lines the fibrous pericardium, and the visceral layer closely covers the heart.
- Between these two layers is the pericardial cavity which contains little amount of fluid (pericardial fluid) that acts as a lubricant to facilitate movements of the heart.



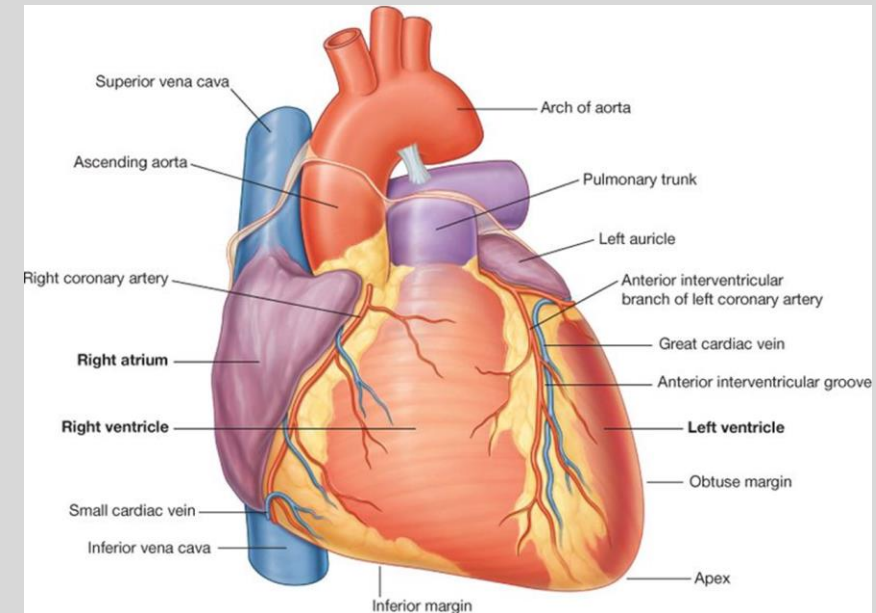
Sulci of the heart

- Coronary sulcus
 - Atrioventricular sulcus
 - Circumvents the heart
- Interventricular sulcus
 - Anterior
 - Posterior



Great vessels

- **Aorta**
 - From left ventricle
- **Pulmonary trunk**
 - Originates anterior to the aorta from right ventricle
- **Superior Vena Cava**
- **Inferior Vena Cava**
 - Both empty into right atrium



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- This anatomical diagram illustrates the human heart and its major associated vessels and structures. The heart is shown in a frontal view, with the right ventricle on the left and the left ventricle on the right. The right atrium is at the top left, and the left atrium is at the top right. The right ventricle is connected to the pulmonary artery, and the left ventricle is connected to the aorta. The diagram shows the following structures and vessels:
- Right Vagus**: A nerve running along the right side of the heart.
 - Recurrent nerve**: A nerve running along the left side of the heart.
 - Thyroid Gland**: Located at the top of the diagram.
 - Right Femoral Vein**: A vein entering the right atrium from the right side.
 - Left Vagus**: A nerve running along the left side of the heart.
 - Left phrenic**: A nerve running along the left side of the heart.
 - Thoracic duct**: A vein entering the left atrium from the left side.
 - Right Innominate vein**: A vein entering the right atrium from the right side.
 - Left Innominate vein**: A vein entering the left atrium from the left side.
 - Arch of Aorta**: The upper part of the aorta, giving off the brachiocephalic trunk and the left subclavian artery.
 - Limit of Pericardium**: A dashed line indicating the boundary of the pericardium.
 - Ascending Aorta**: The lower part of the aorta, entering the right ventricle.
 - Right Ventricle**: The lower right chamber of the heart.
 - Right Auricula**: The right atrium.
 - Left Ventricle**: The lower left chamber of the heart.
 - Left Auricula**: The left atrium.
 - Pulmonary Artery**: A red vessel entering the right ventricle.
 - Pulmonary Vein**: A blue vessel entering the left atrium.
 - Right Coronary Artery**: A red vessel branching from the ascending aorta.
 - Left Coronary Artery**: A red vessel branching from the ascending aorta.
 - Right Vena Cava**: A vein entering the right atrium from the bottom.
 - Left Vena Cava**: A vein entering the left atrium from the bottom.
 - Thoracic Aorta**: The lower part of the aorta, extending downwards.
 - Pericardium**: The sac surrounding the heart.
 - Trachea**: The windpipe, located at the top of the diagram.
 - Esophagus**: The food pipe, located at the top of the diagram.
 - Diaphragm**: The muscular partition separating the thoracic and abdominal cavities.

Heart Features

- **Chambers**

- Right atrium
- Right ventricle
- Left atrium
- Left ventricle

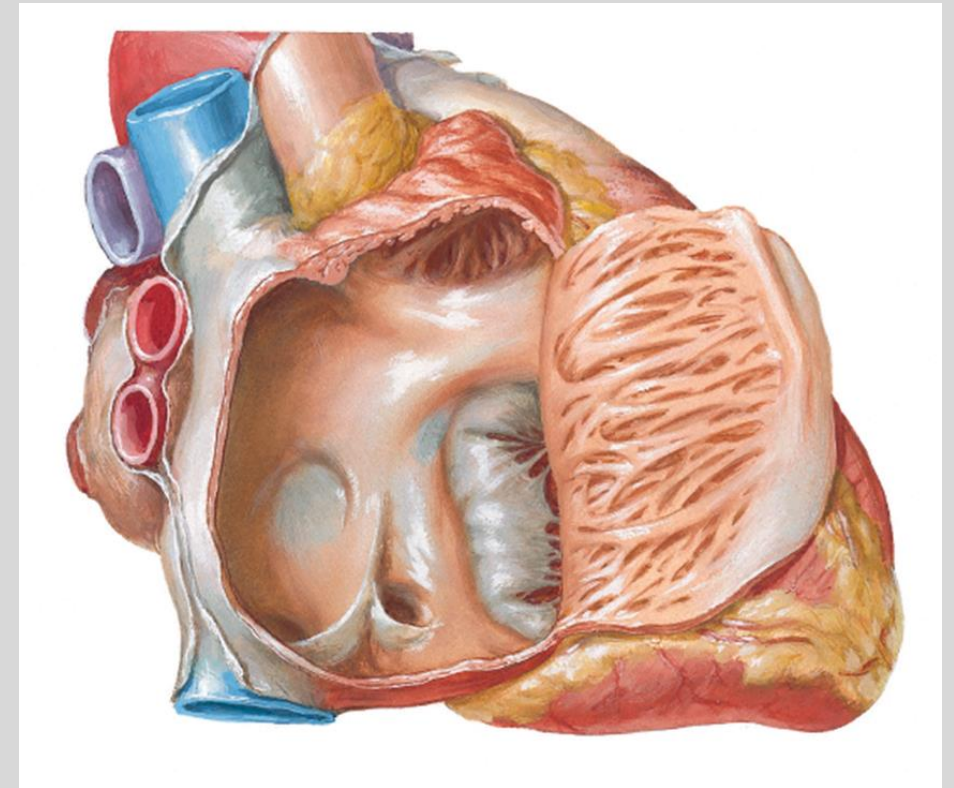
- **Valves**

- **Leaflet valves**
 - Tricuspid
 - Bicuspid (mitral)
- **Cusped (semilunar) valves**
 - Aortic
 - Pulmonic



Right atrium

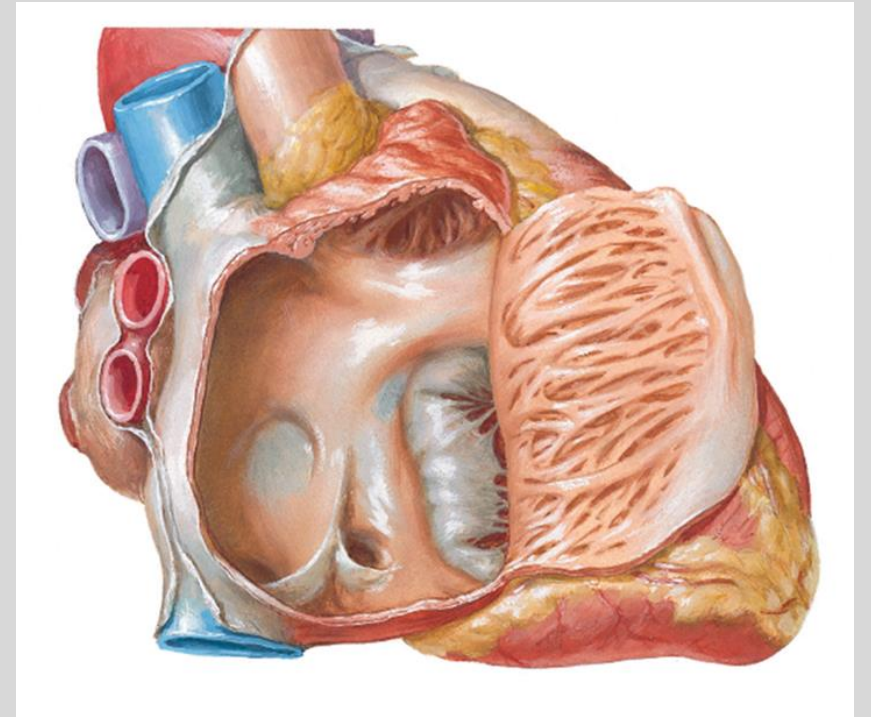
- Auricle (ear)
- Pectinate muscles (rough)
- Sinus venarum (smooth)
 - Crista terminalis
 - Division between rough to smooth
- Openings (ostia)
 - SVC/IVC/Coronary sinus
- Fossa ovalis
 - Foramen ovale in fetus
 - Limbus



Right atrium “valves”



- Superior vena cava
 - No valve
- Inferior vena cava
 - Eustachian valve
 - Incompetent in adult, directs IVC blood through Foramen ovale in fetus
- Coronary Sinus
 - Thebesian valve
 - Prevents backflow into coronary sinus during atrial systole



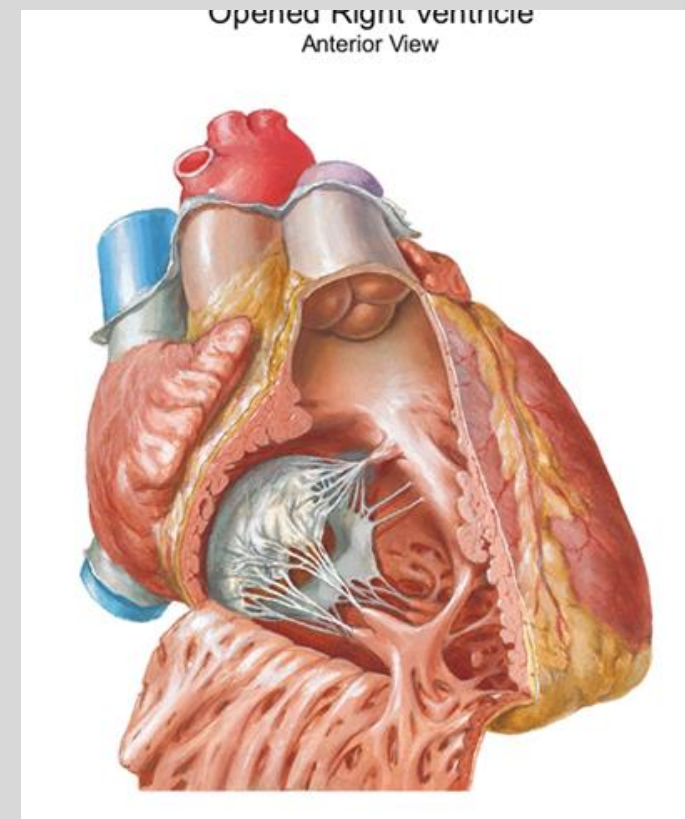
Left atrium

- Ostia of 4 pulmonary veins
 - 2 superior
 - 2 inferior
- Auricle



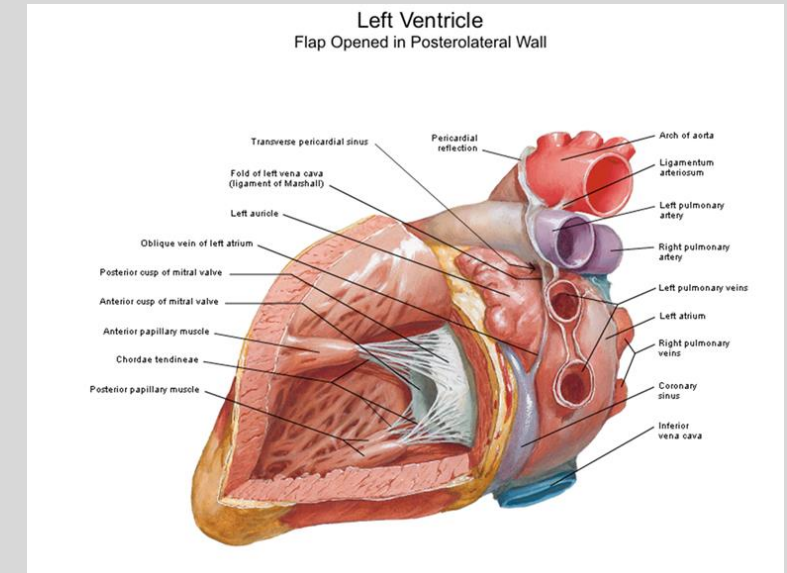
Right ventricle

- Most anterior aspect of heart
- Tricuspid valve (RA-RV)
 - Anterior/Posterior/Septal cusps (leafs)
- Papillary muscles
 - Connected to cusps via **Chordae tendinae**
 - Contract to prevent Tricuspid valve regurgitation
 - Named same as cusps
- Trabeculae carnae
- Moderator band



Left ventricle

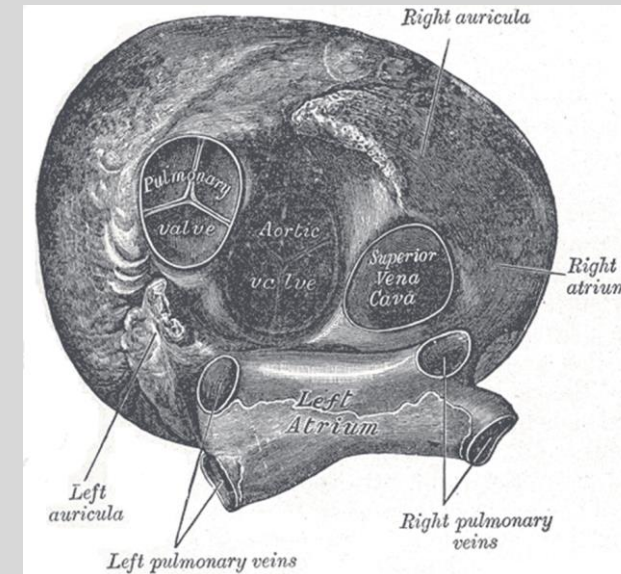
- Trabeculae carnae
- Bicuspid (mitral) valve
 - Anterior/Posterior cusps
- Papillary muscles
 - Chordae tendinea
 - Usually, a greater number than the right, due to the increased pressures and strength necessary to prevent regurgitation



Pulmonic valve



- From RV to pulmonary trunk
- Lies just **anterior** to aortic valve
- 3 semilunar cusps
 - **Anterior**
 - Right
 - Left



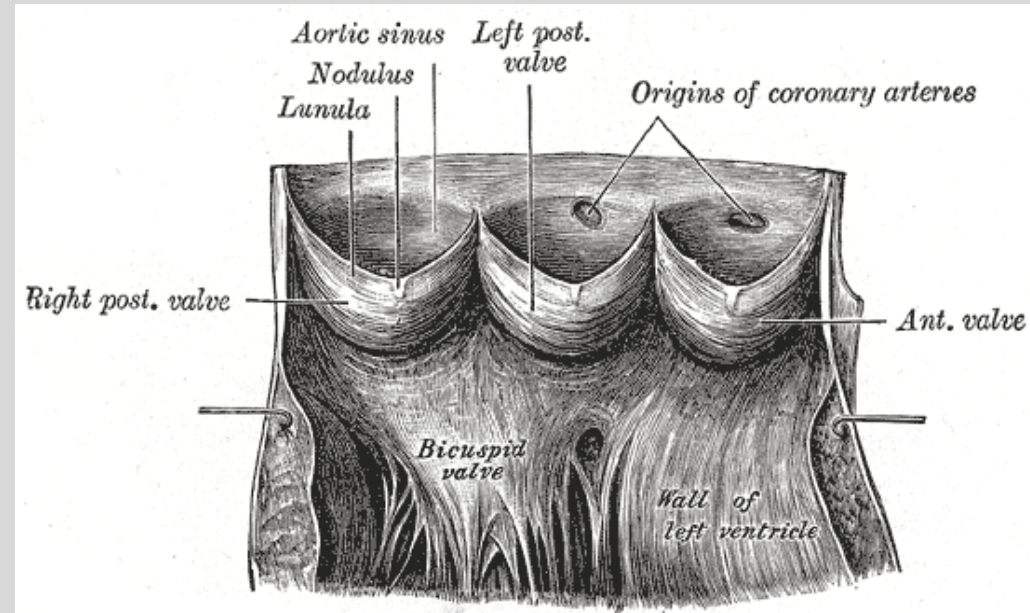
Aortic valve

- **Posterior** to pulmonic valve
- 3 cusps
 - **Posterior** (non-coronary) cusp
 - Right
 - Left
- Just superior to right and left cusps are the openings of the right and left coronary arteries, respectively



Aortic Valve

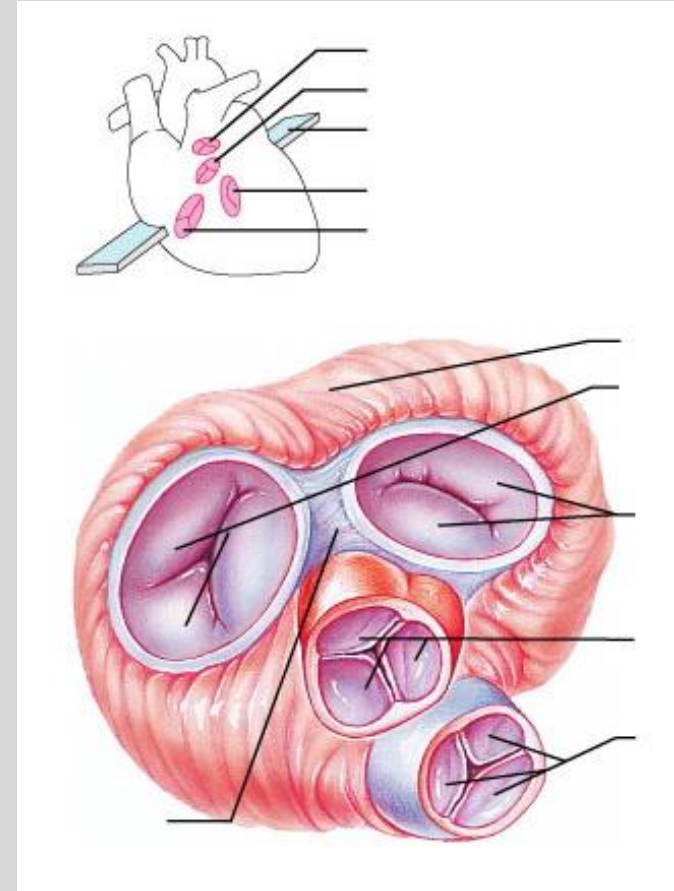




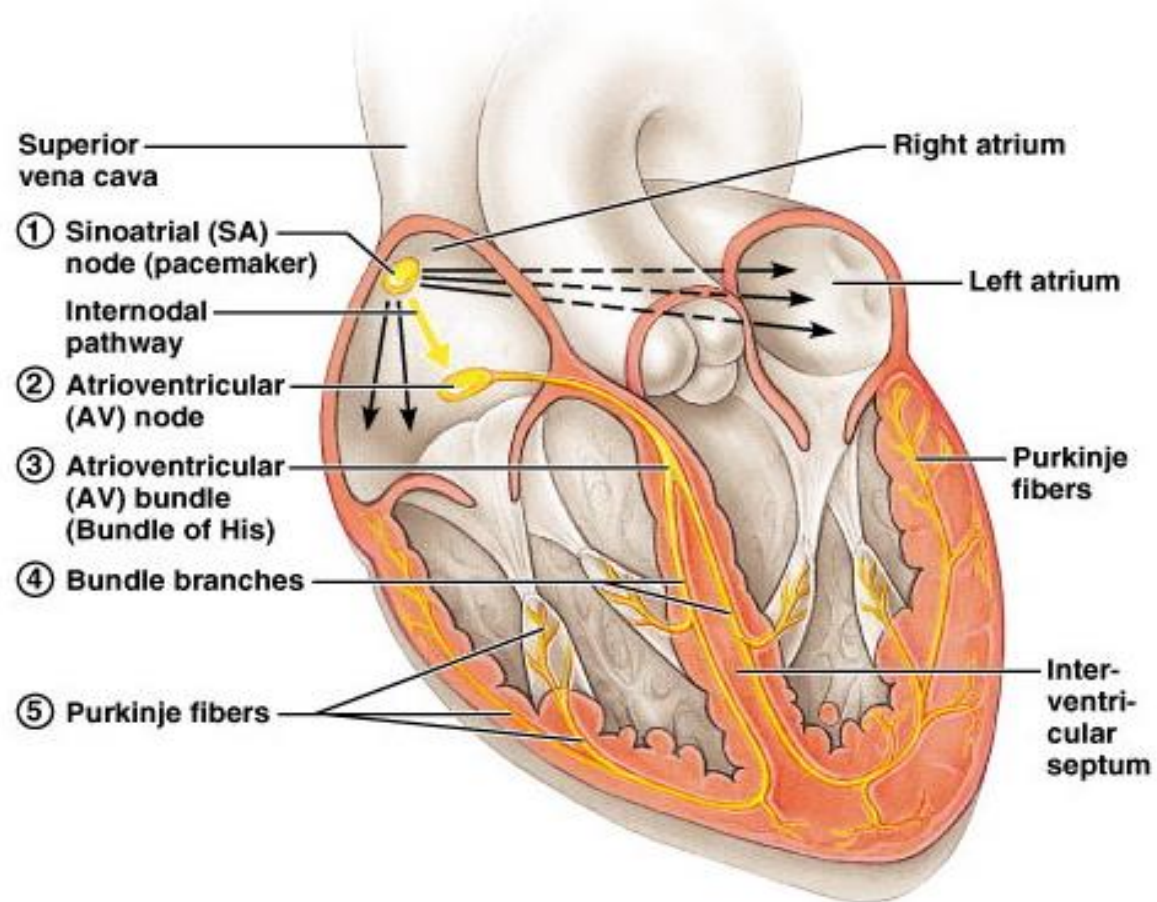
Heart Valves



- **Tricuspid valve**
 - RA – RV
- **Bicuspid valve**
 - LA – LV
 - “Mitral valve”
- **Aortic valve**
 - LV – aorta
- **Pulmonic valve**
 - RV – pulmonary trunk



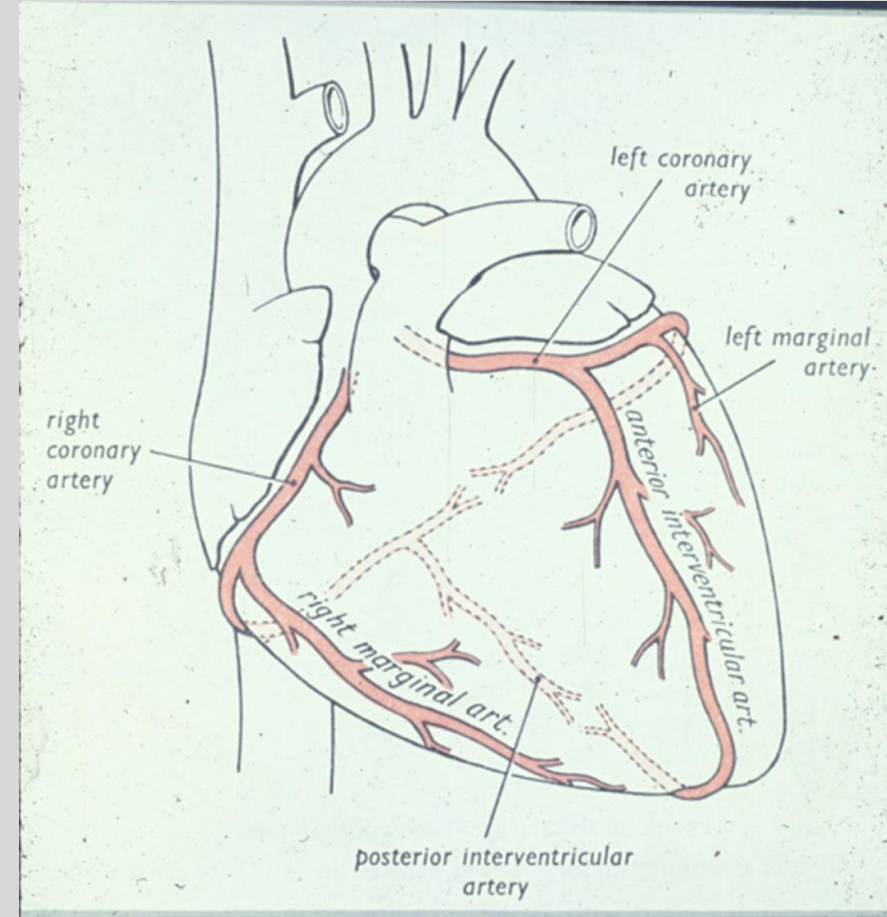
Conducting system



Right coronary blood supply

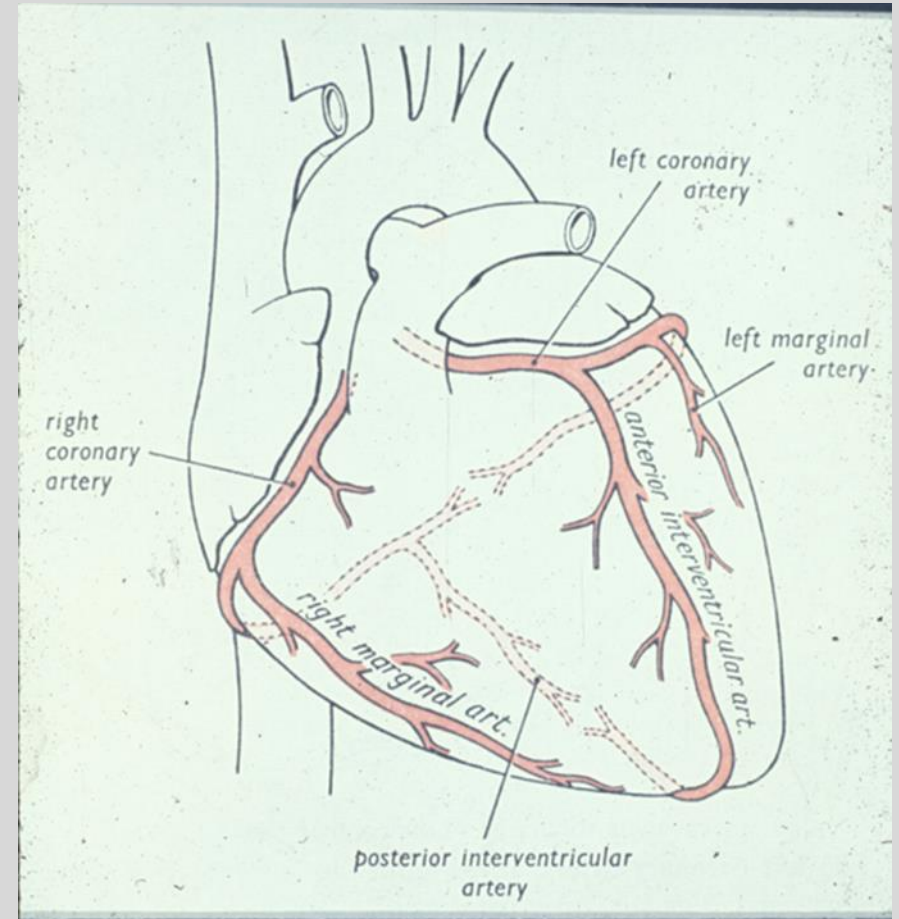


- Right coronary artery
 - Originates from ostia in right aortic sinus
 - Superior to right aortic cusp
 - Travels in right coronary (AV) sulcus
 - Branches
 - Right marginal arteries (acute marginal aa)
 - Posterior interventricular a. (in post. IV sulcus)
 - Sinoatrial nodal a.
 - Atrioventricular nodal a.



Left coronary blood supply

- Left coronary artery
 - Originates from ostia in left aortic sinus
 - Superior to left aortic cusp
- Branches
 - Left anterior descending (LAD) or anterior interventricular a. (lies in anterior IV sulcus)
 - Septal branches.
 - Diagonal branches
 - Left marginal aa. (Obtuse marginal aa.)
 - Left circumflex a.



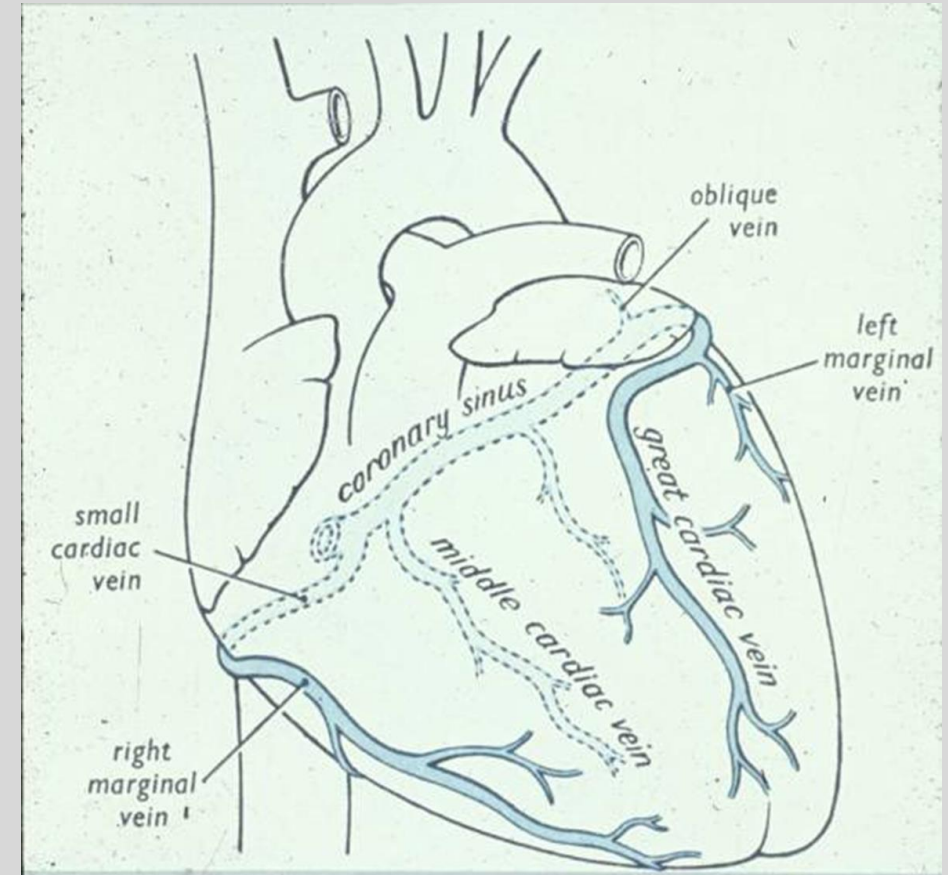


Dominance

- **Defined by branch that gives rise to posterior interventricular a.**
 - **Right (80%)**
 - From right coronary a.
 - **Left (15%)**
 - From left circumflex a.
 - **Co-dominance (5%)**

Venous drainage of the heart

- **Coronary sinus**
 - Lies in coronary (AV) sulcus on posterior
 - Opens directly to right atrium
 - All venous drainage of the heart eventually flows here
- **Great cardiac vein**
 - With anterior interventricular artery in anterior IV sulcus
 - Left marginal vein
- **Middle cardiac vein**
 - With posterior interventricular a.
- **Small cardiac vein**
 - With right coronary a.
 - Right marginal vein
- **Oblique vein (LA)**
- **Posterior vein of the left ventricle**



Inside the Heart...a review

