

**Tishk International University**  
**Dentistry Faculty**  
**Basic Science Department**



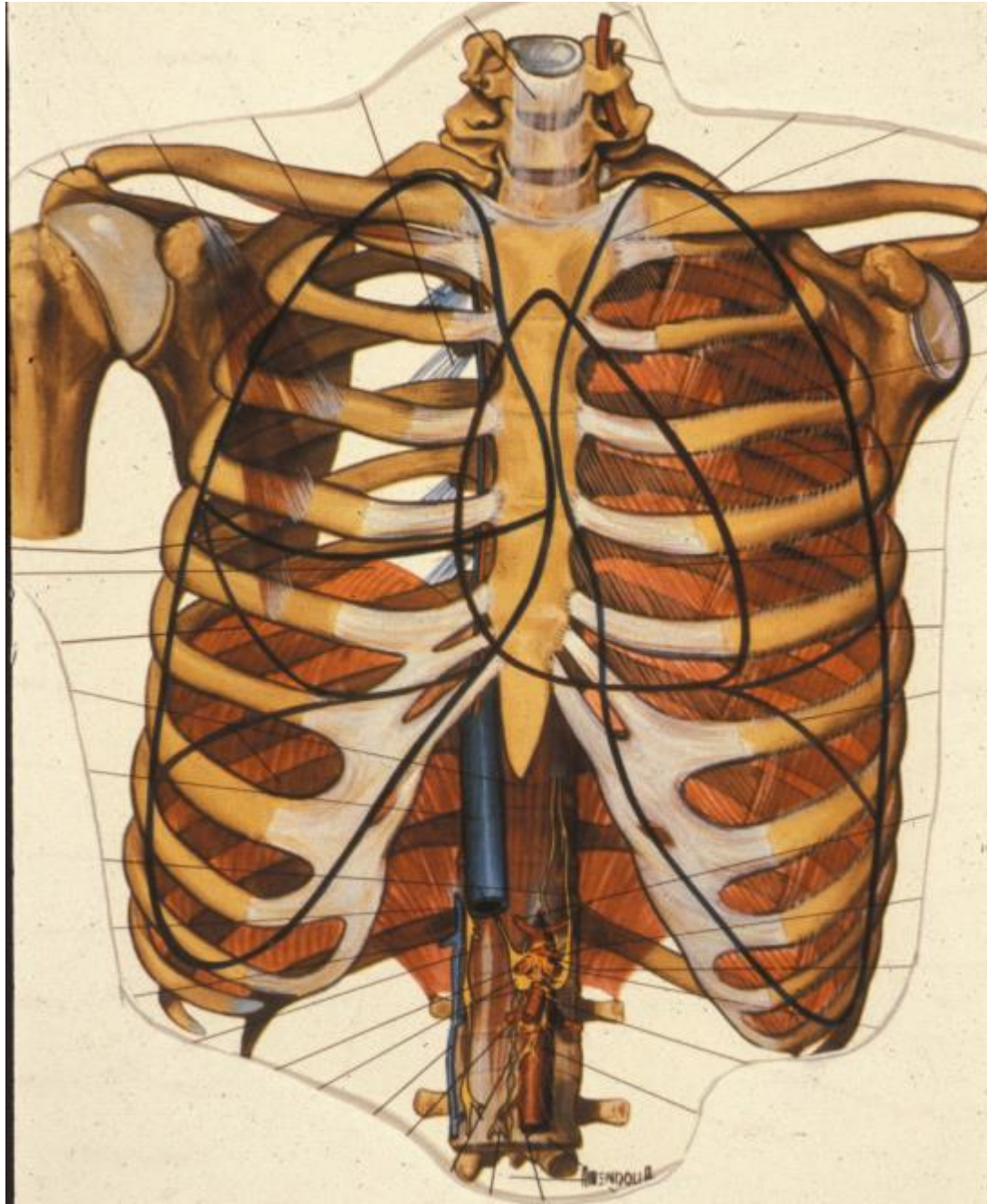
**TOPIC: Anatomy of the heart**

**Instructor: Dr. Paiman Jamal**

# Facts, location, & orientation

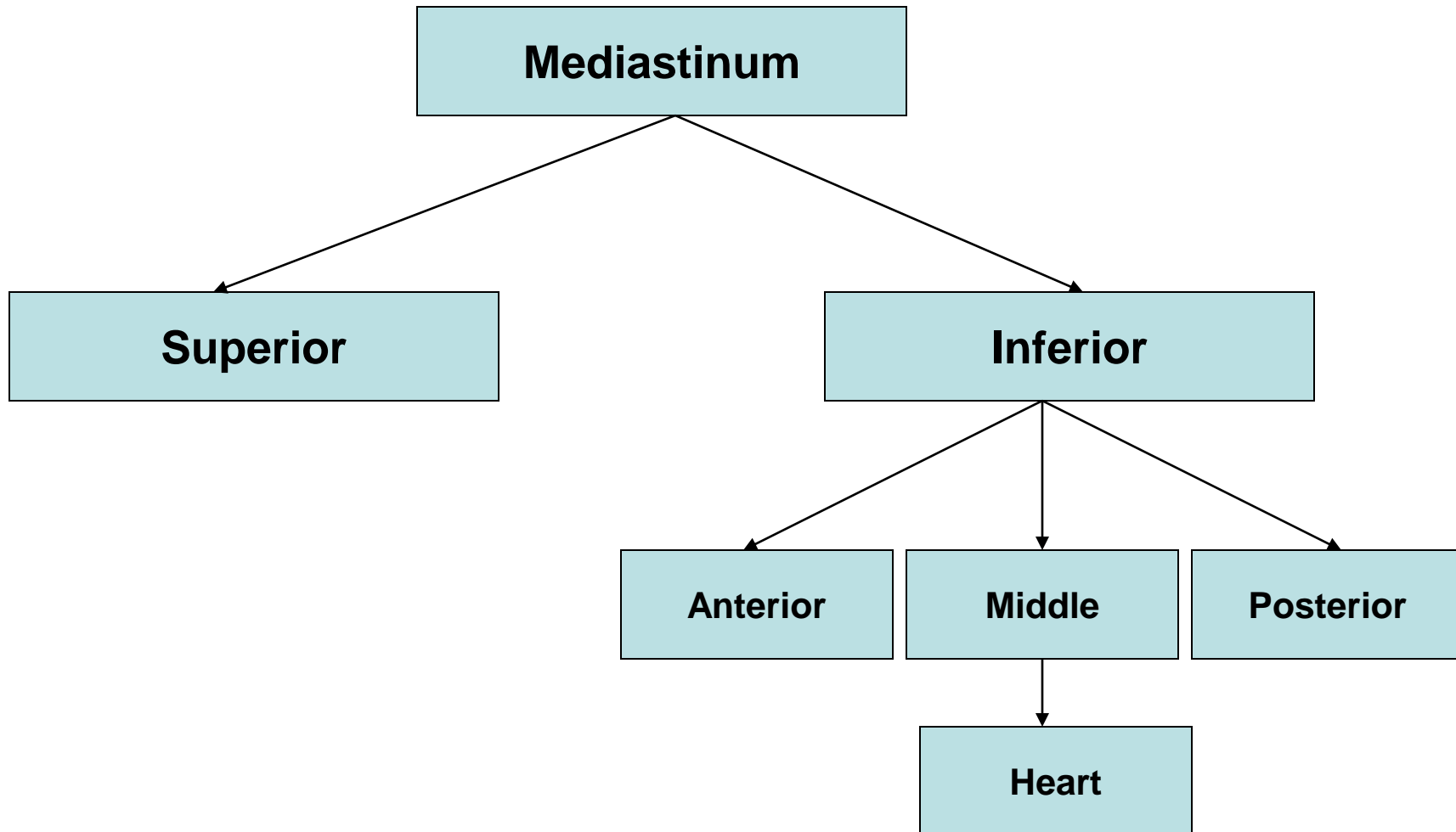


- Oblique orientation
- Apex points (down and left)
  - 5<sup>th</sup> intercostal space
- Base is superior near origins of great vessels
  - 2<sup>nd</sup> intercostal space
- 2/3 lies left of the midline
- For the most part
  - Anterior/inferior aspect of the heart
    - right atrium/ventricle
  - Posterior/superior aspect
    - left atrium/ventricle





# 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)

# 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

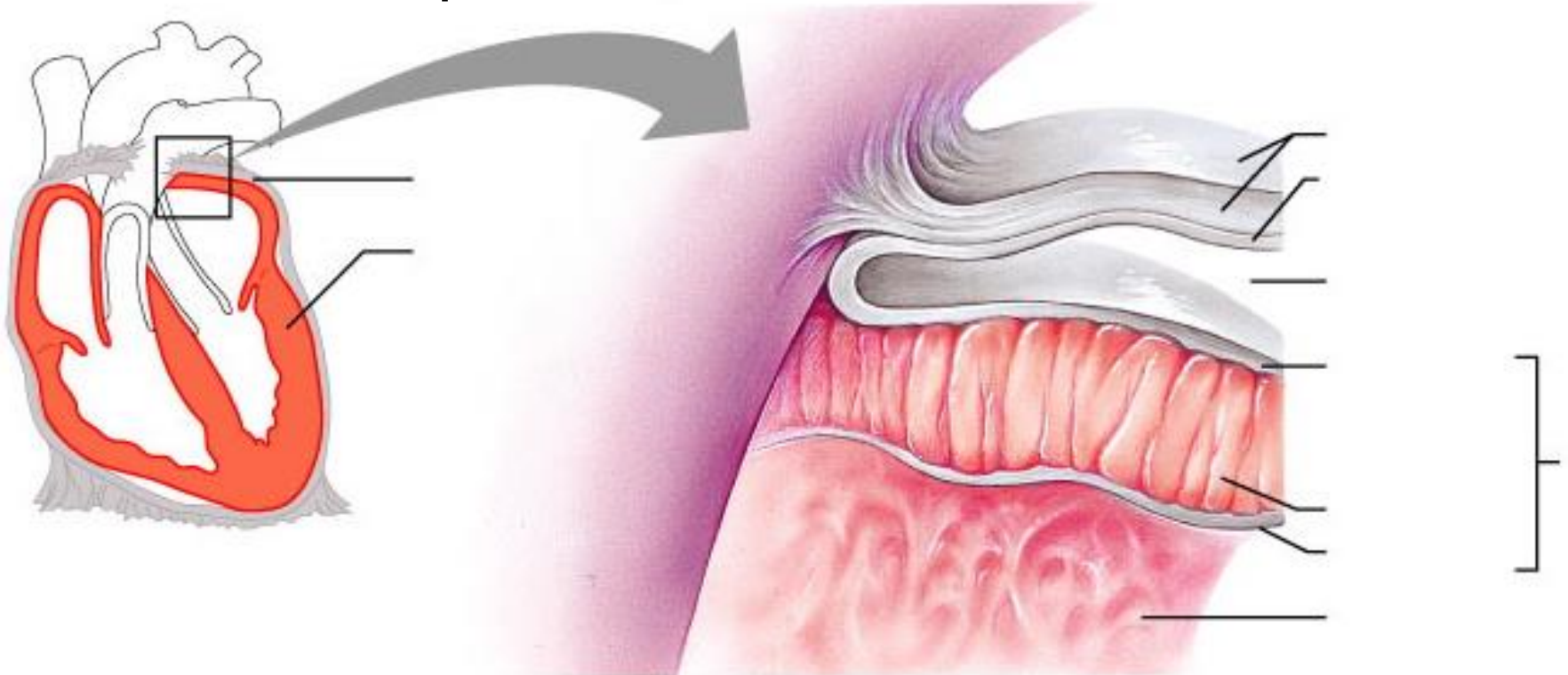


- Is a double layer serous membrane. Parietal layer lines the fibrous pericardium, and the visceral layer closely covers the heart. Between these two layers is the pericardial cavity which contains little amount of fluid (pericardial fluid) that acts as a lubricant to facilitate movements of the heart.

# Structure of the Heart –

## Coverings

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

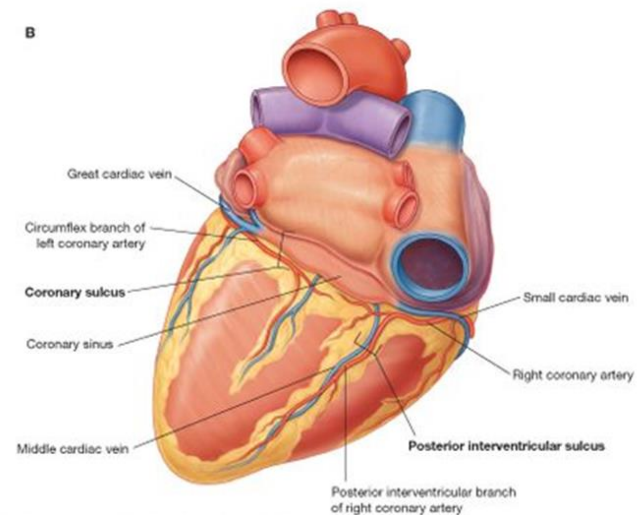
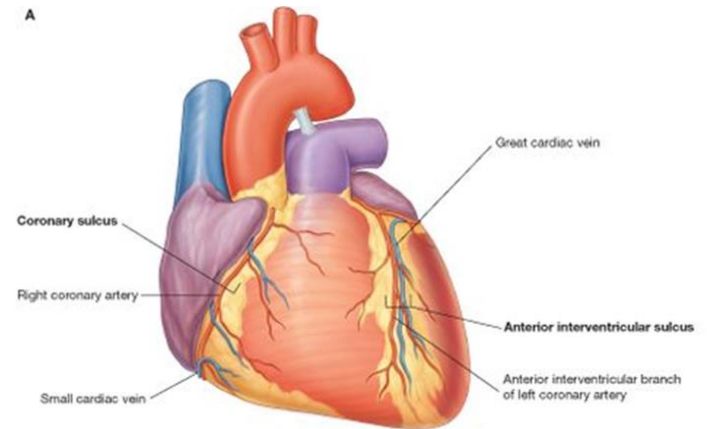




# Sulci of the heart



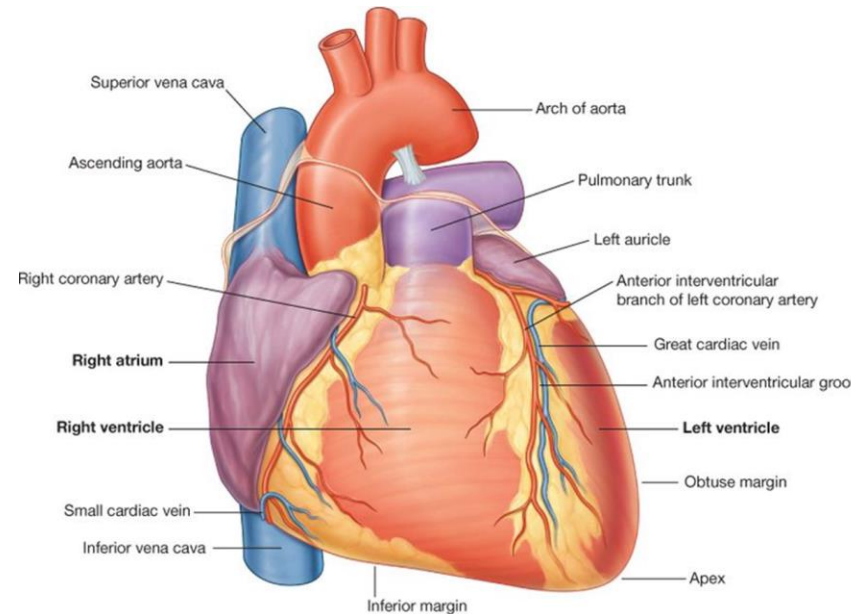
- Coronary sulcus
  - Atrioventricular sulcus
    - Circumvents the heart
- Interventricular sulcus
  - Anterior
  - Posterior



# Great vessels



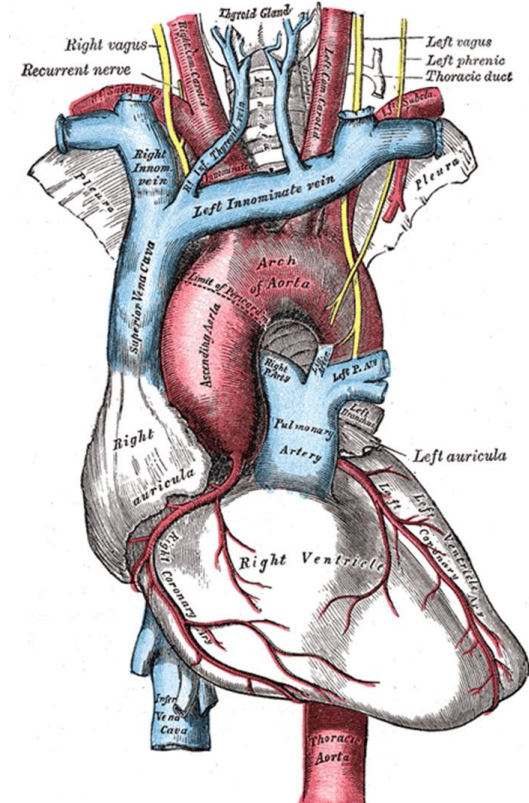
- **Aorta**
  - From left ventricle
- **Pulmonary trunk**
  - Originates anterior to the aorta from right ventricle
- **Superior Vena Cava**
- **Inferior Vena Cava**
  - Both empty into right atrium



# Aorta



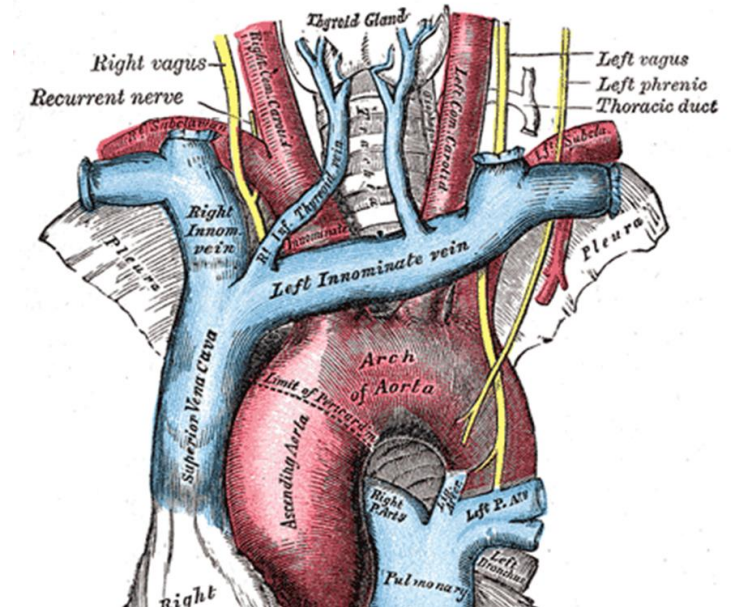
- Ascending aorta
  - Right and left aortic sinuses
- Arch of aorta
  - Begins/ends at T<sub>4</sub>/T<sub>5</sub> or sternal angle level
  - Main branches are:
    - Brachiocephalic a.
    - Left common carotid a.
    - Left subclavian a.
- Thoracic aorta
  - Lies anterior to trachea



# Ligamentum arteriosum



- Remnant of embryonic ductus arteriosus
- Attaches aortic arch superiorly to pulmonary trunk/left pulmonary artery inferiorly
- Identification point for **Left** recurrent laryngeal nerve



# Heart Features



- **Chambers**

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

- **Valves**

- **Leaflet valves**

- Tricuspid
- Bicuspid (mitral)

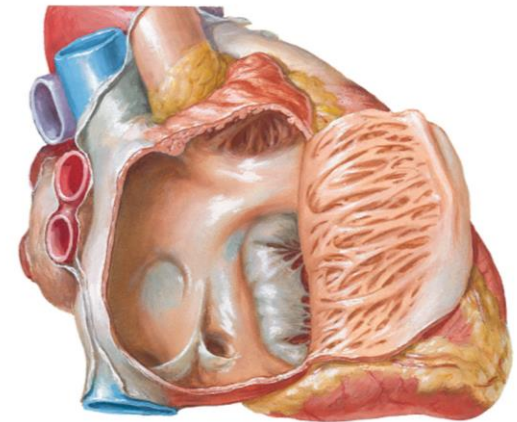
- **Cusped (semilunar) valves**

- 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



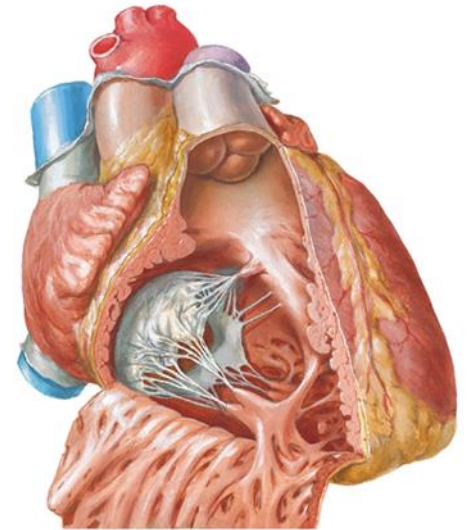


# Right ventricle



- 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

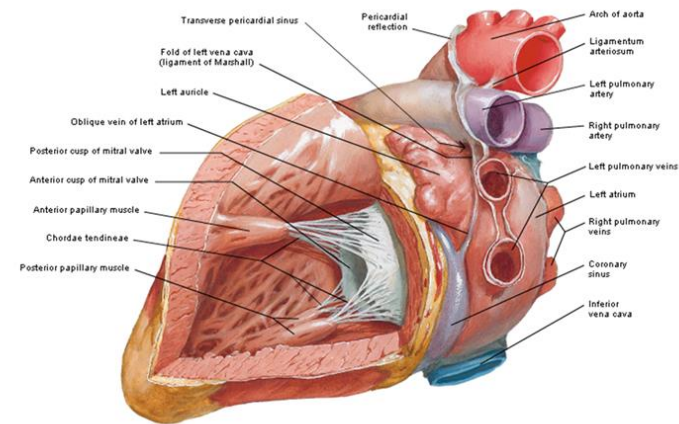
Opened right ventricle  
Anterior View



# Left ventricle



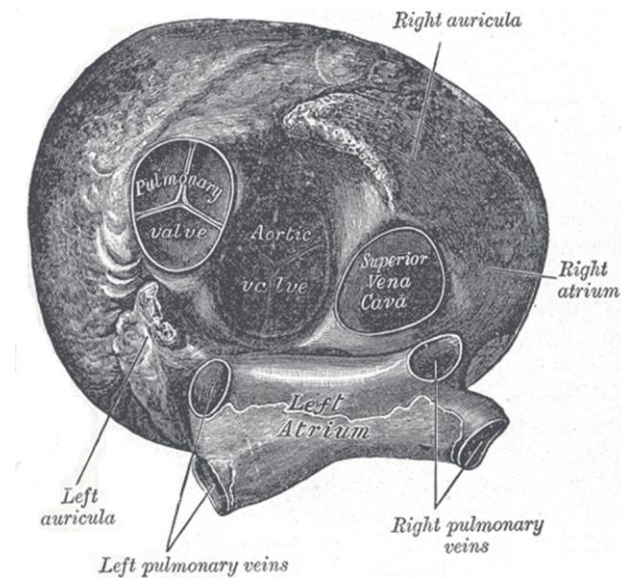
- Trabeculae carnae
- Bicuspid (mitral) valve
  - Anterior/Posterior cusps
- Papillary muscles
  - Chordae tendinae
    - Usually a greater number than the right, due to the increased pressures and strength necessary to prevent regurgitation



# Pulmonic valve



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

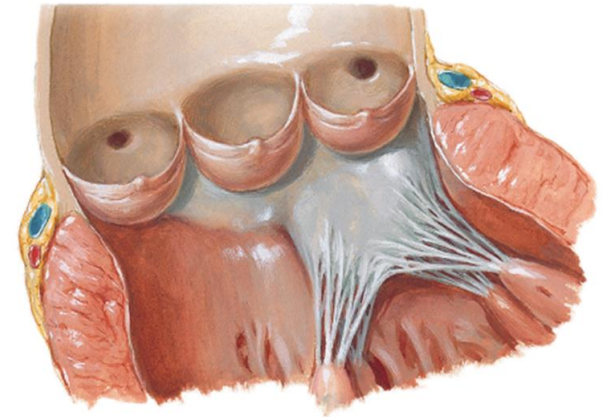


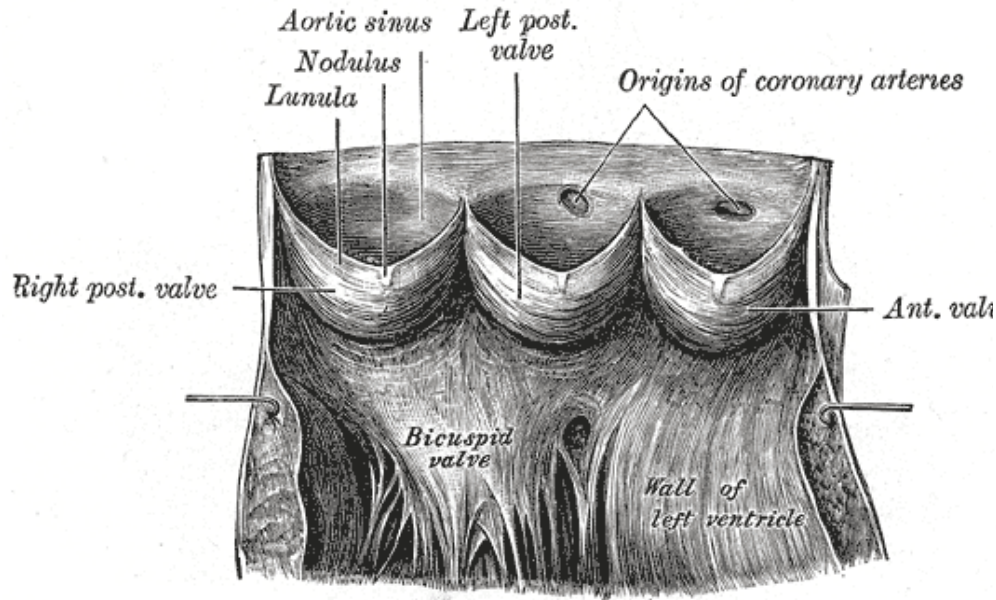
# Aortic valve

- **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

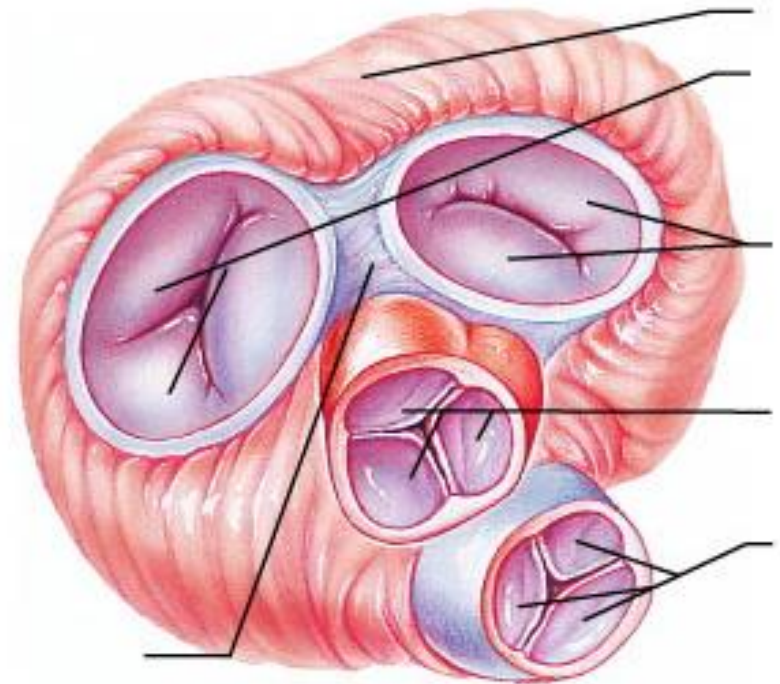
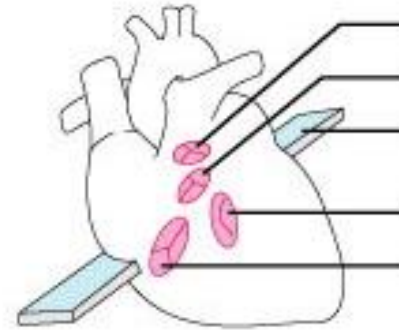




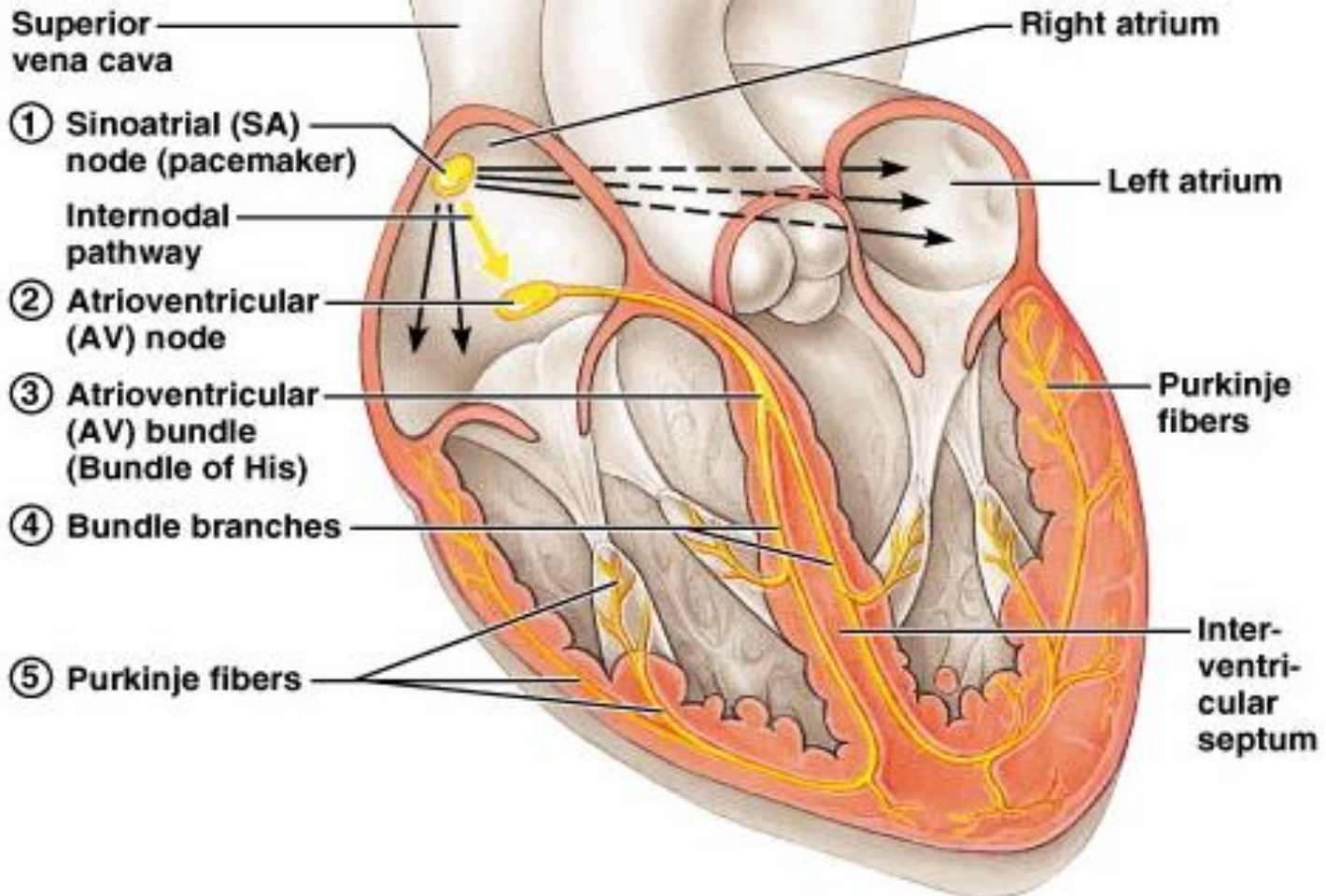
# Heart Valves



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



# Conducting system

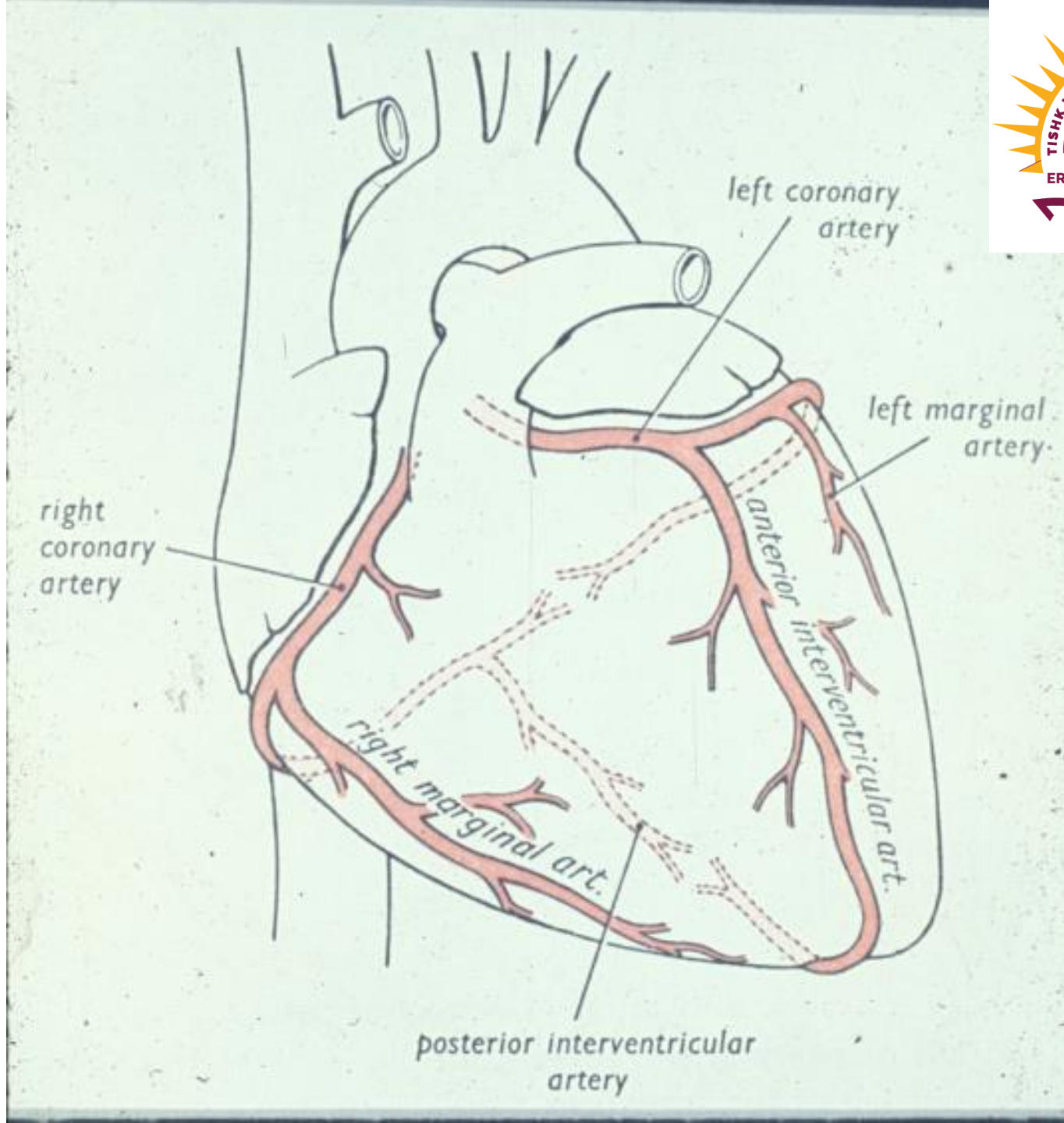


# Right coronary blood supply



- 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.

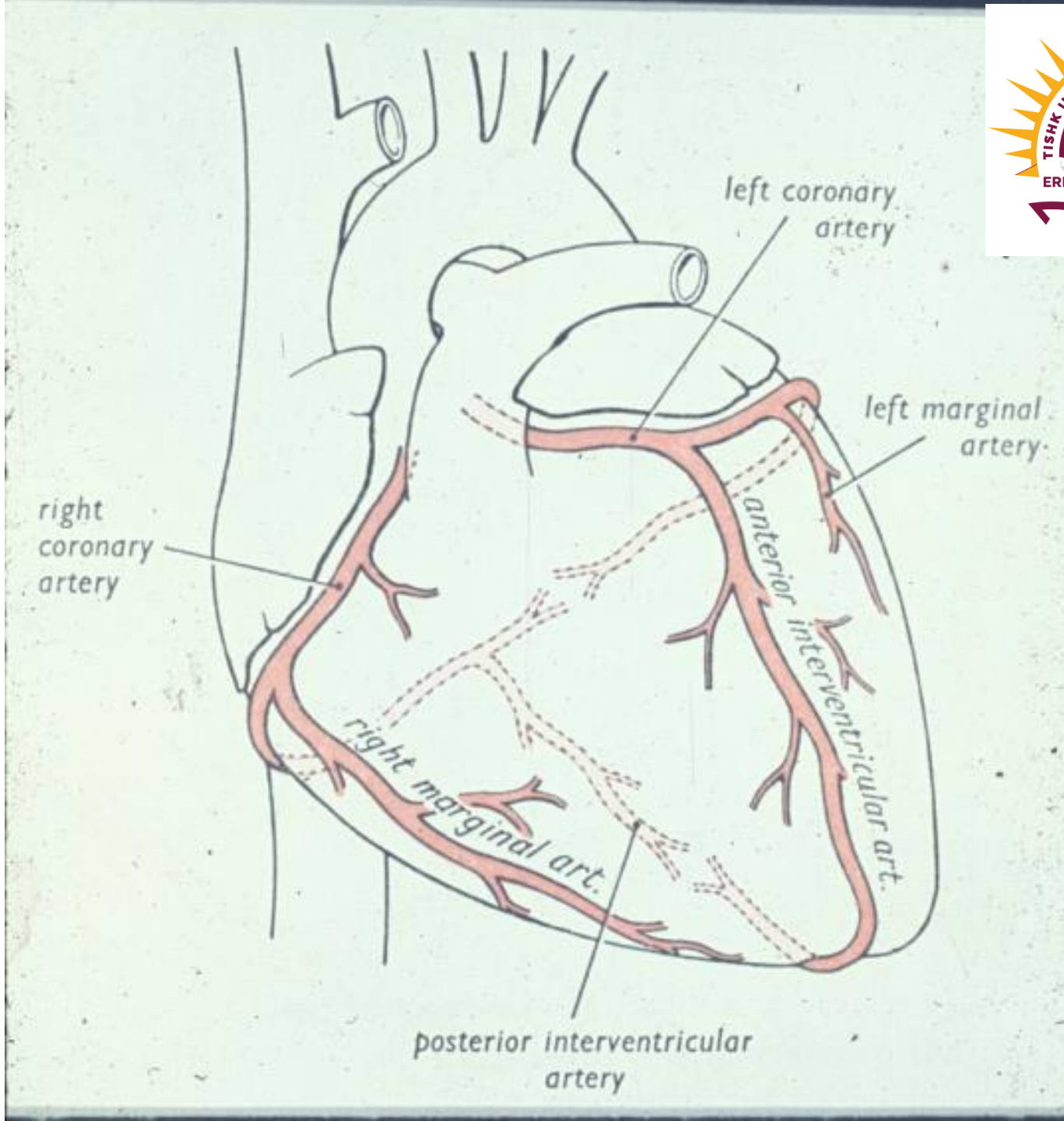




# Left coronary blood supply



- 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

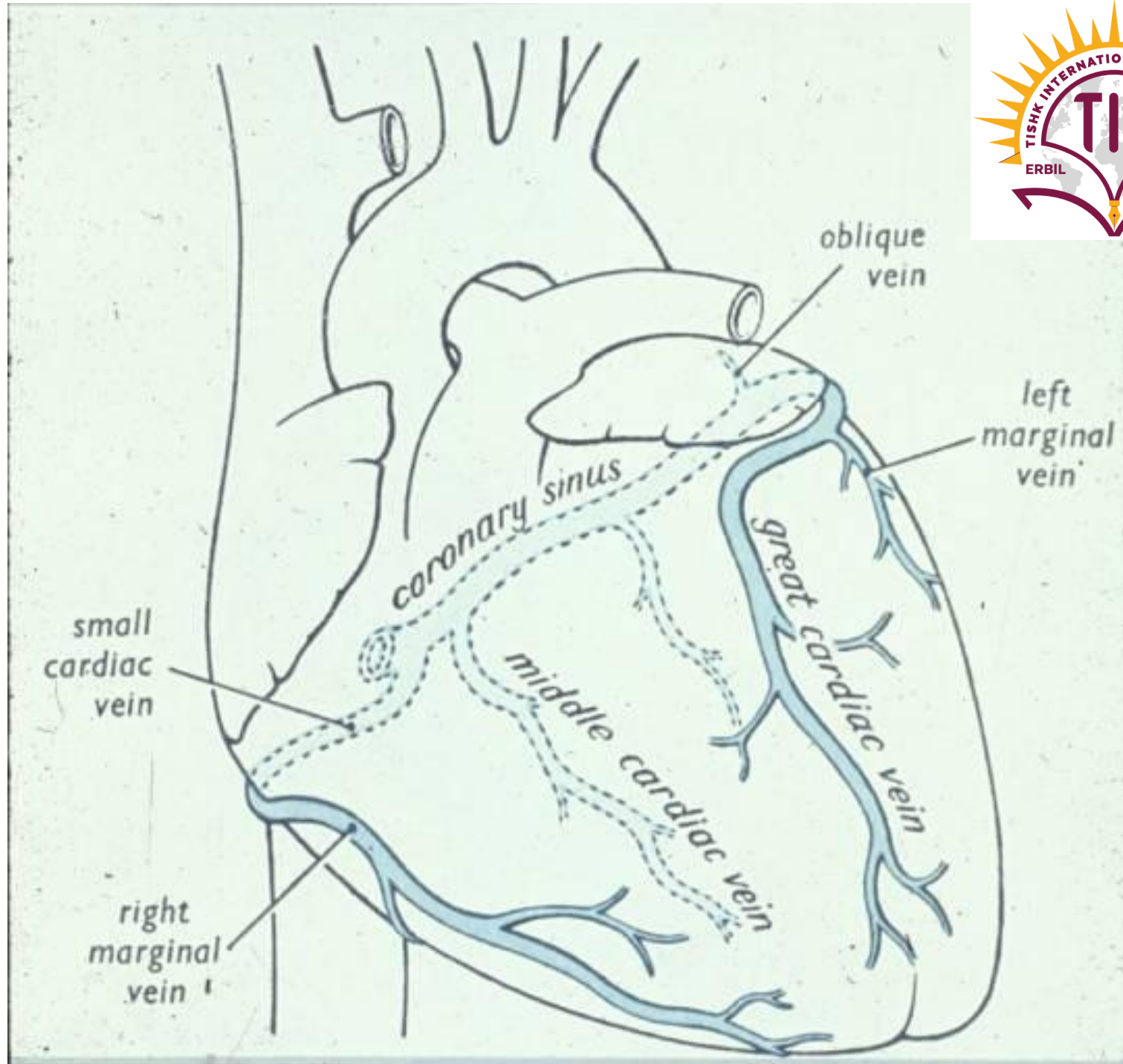


- Defined by branch that gives rise to posterior interventricular a.
  - Right (80%)
    - From right coronary a.
  - Left (15%)
    - From left circumflex a.
  - Co-dominance (5%)

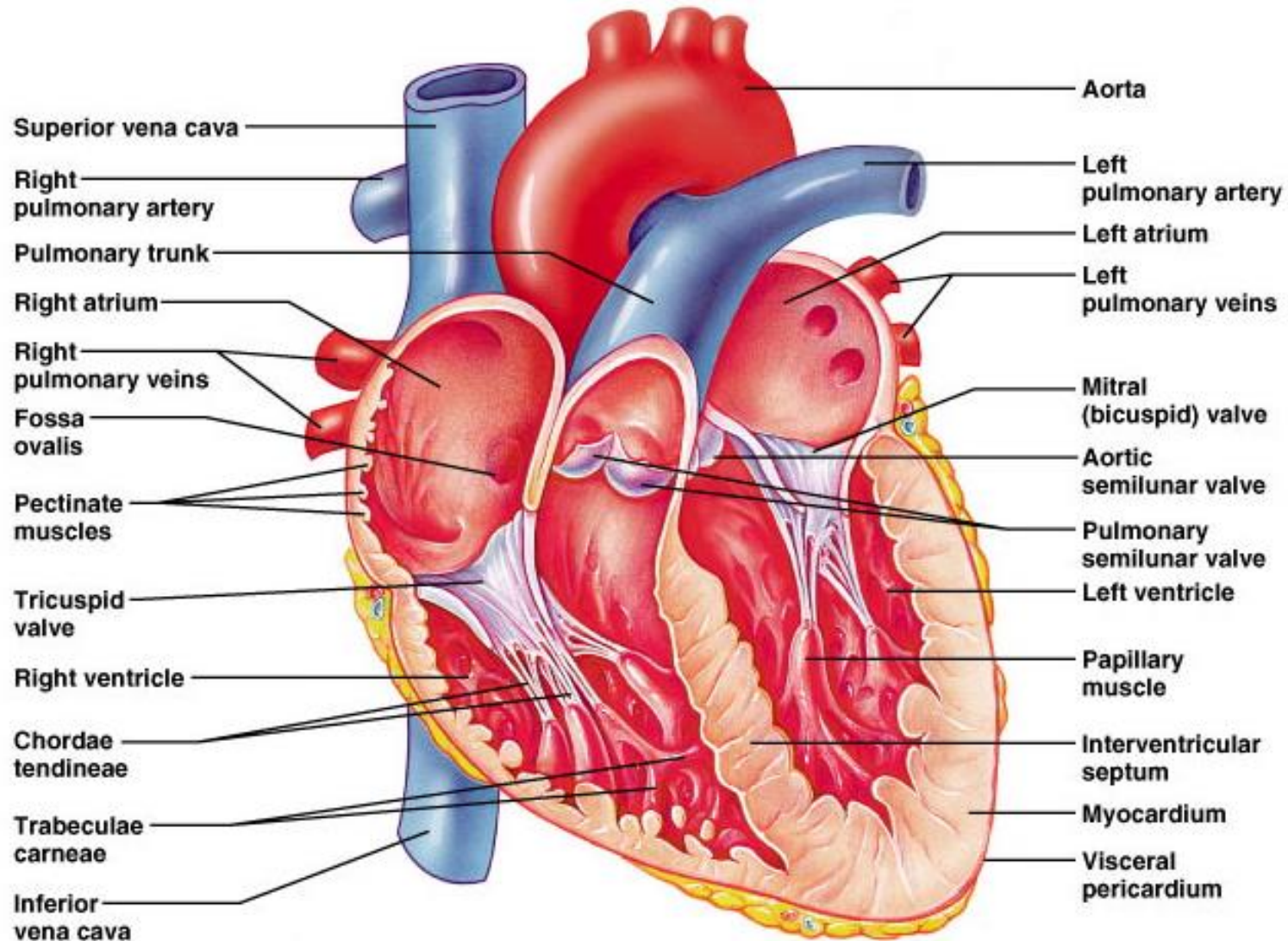
# Venous drainage of the heart



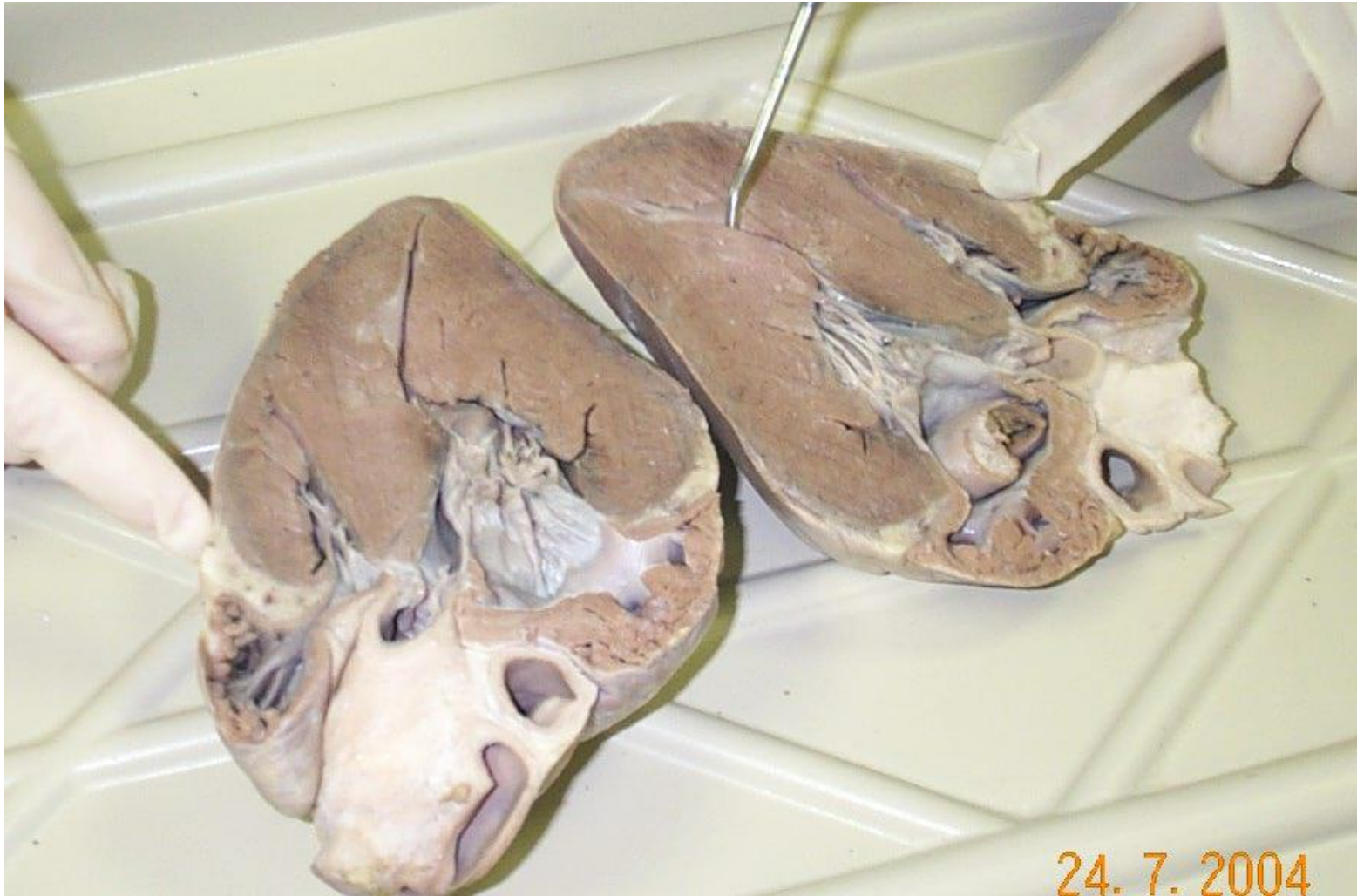
- **Coronary sinus**
  - Lies in coronary (AV) sulcus on posterior
  - Opens directly to right atrium
  - All venous drainage of the heart eventually flows here
- **Great cardiac vein**
  - With LAD in anterior IV sulcus
    - Left marginal vein
- **Middle cardiac vein**
  - With posterior interventricular 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



# Frontal Section of the Heart





# Chambers and Valves

