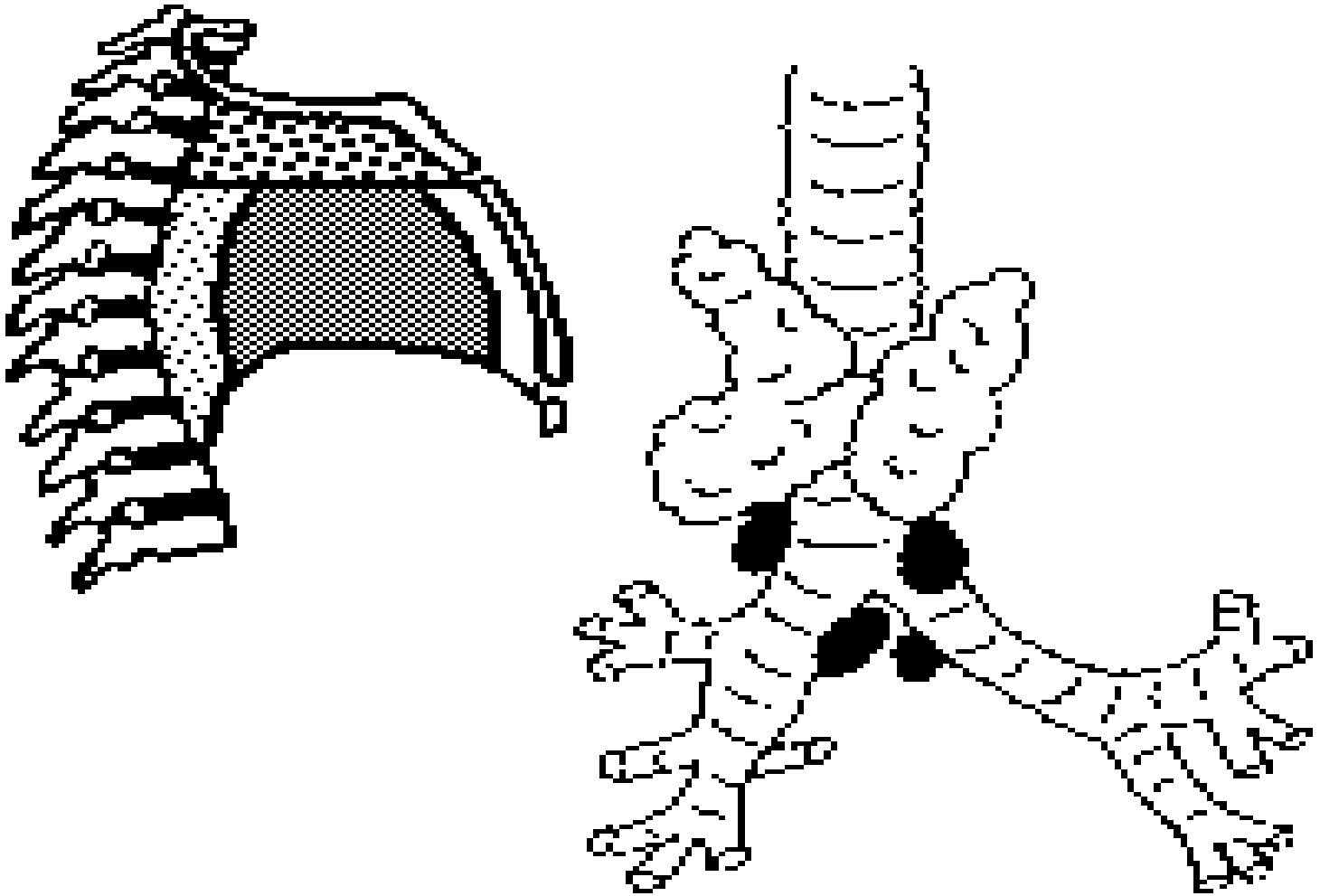
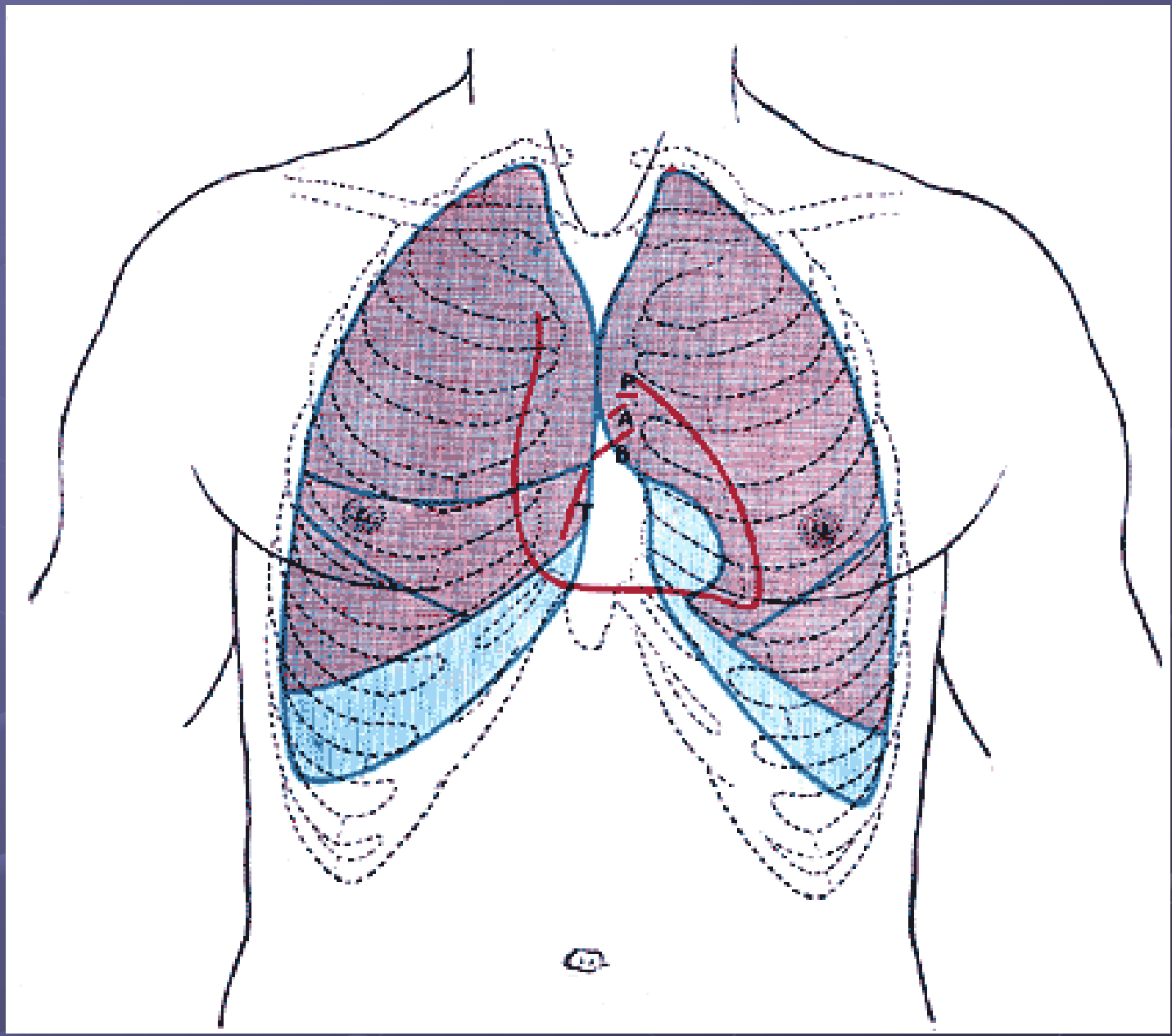
MEDIASTINUM

Mediastinum

- It's a movable partition that extends :
- *Superiorly*\ to the thoracic outlet & root of neck
- *Inferiorly*\ to the diaphragm
- *Anteriorly*\ to the sternum
- *Posteriorly*\ to 12 thoracic vertebrae of vertebral column .



Mediastinum Anatomy


7
8
6

Divisions of Mediastinum

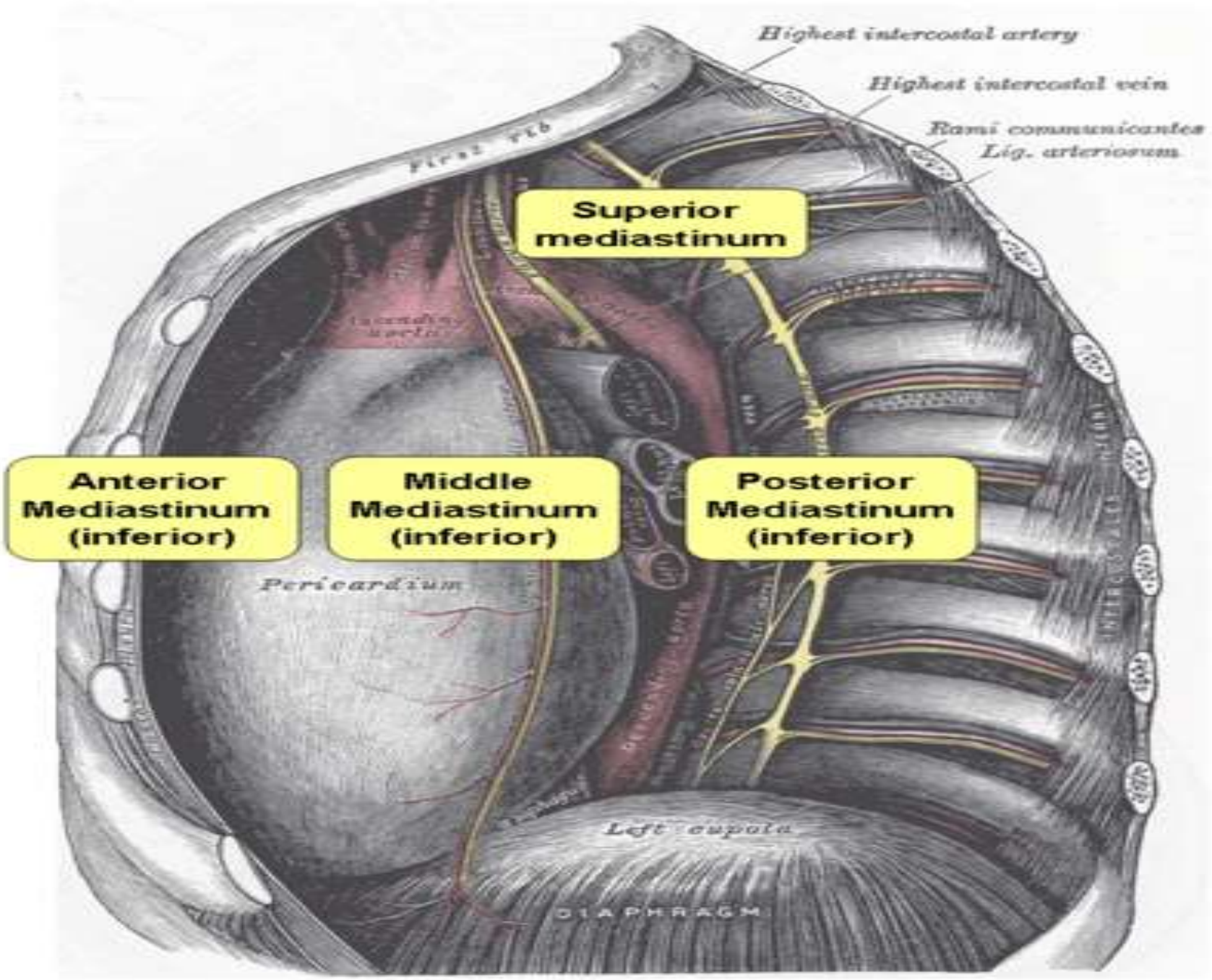
{ sternal angle ⟶ lower border of body T4 }

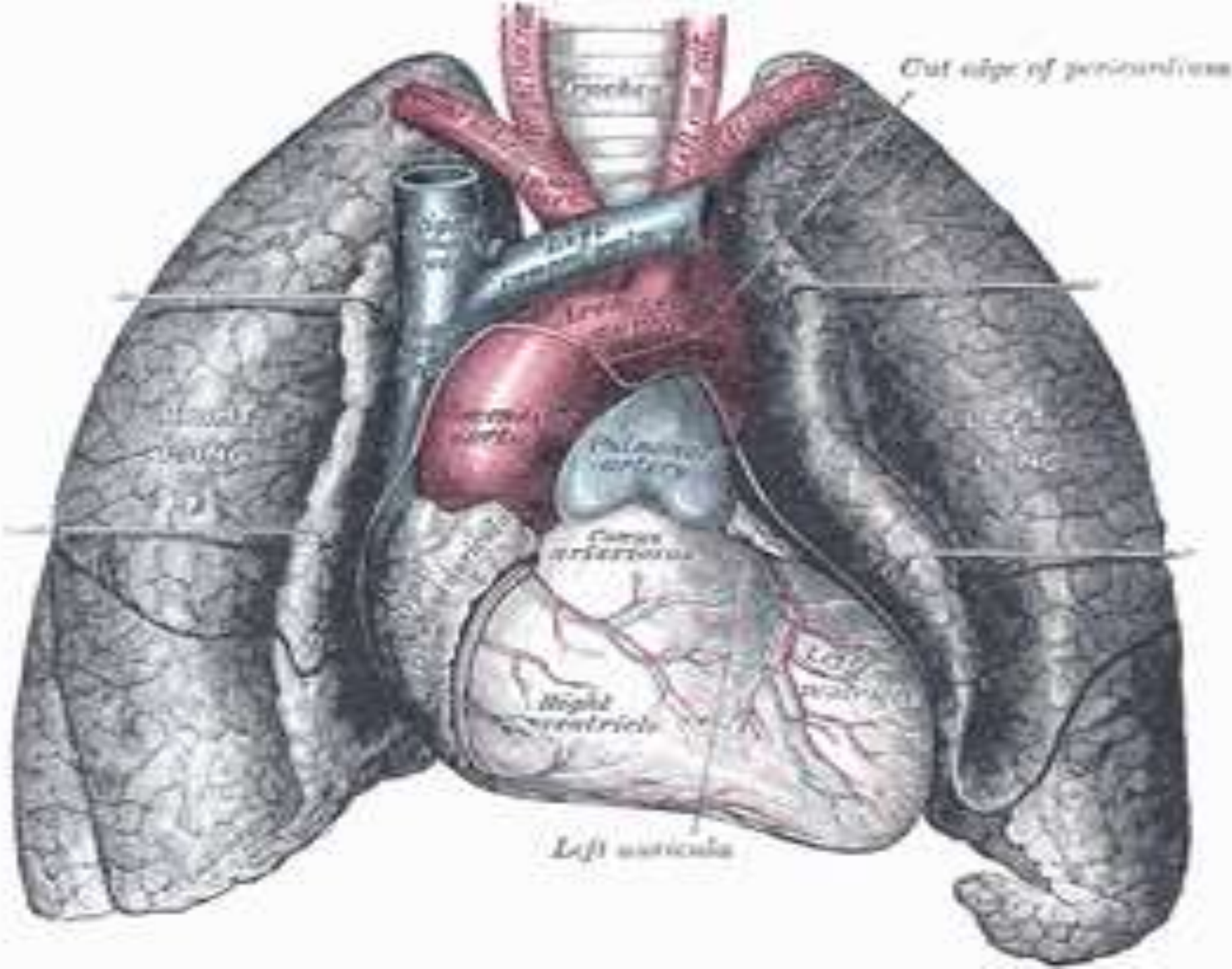
- 1. ***Superior mediastinum***
- 2. ***Inferior medistinum***, subdivided into :

a- **Middle med.** [pericardium & heart]

b- **Anterior med**. [space between pericardium & sternum]

c- **Posterior med.** [lies between pericardium & vertebral column]

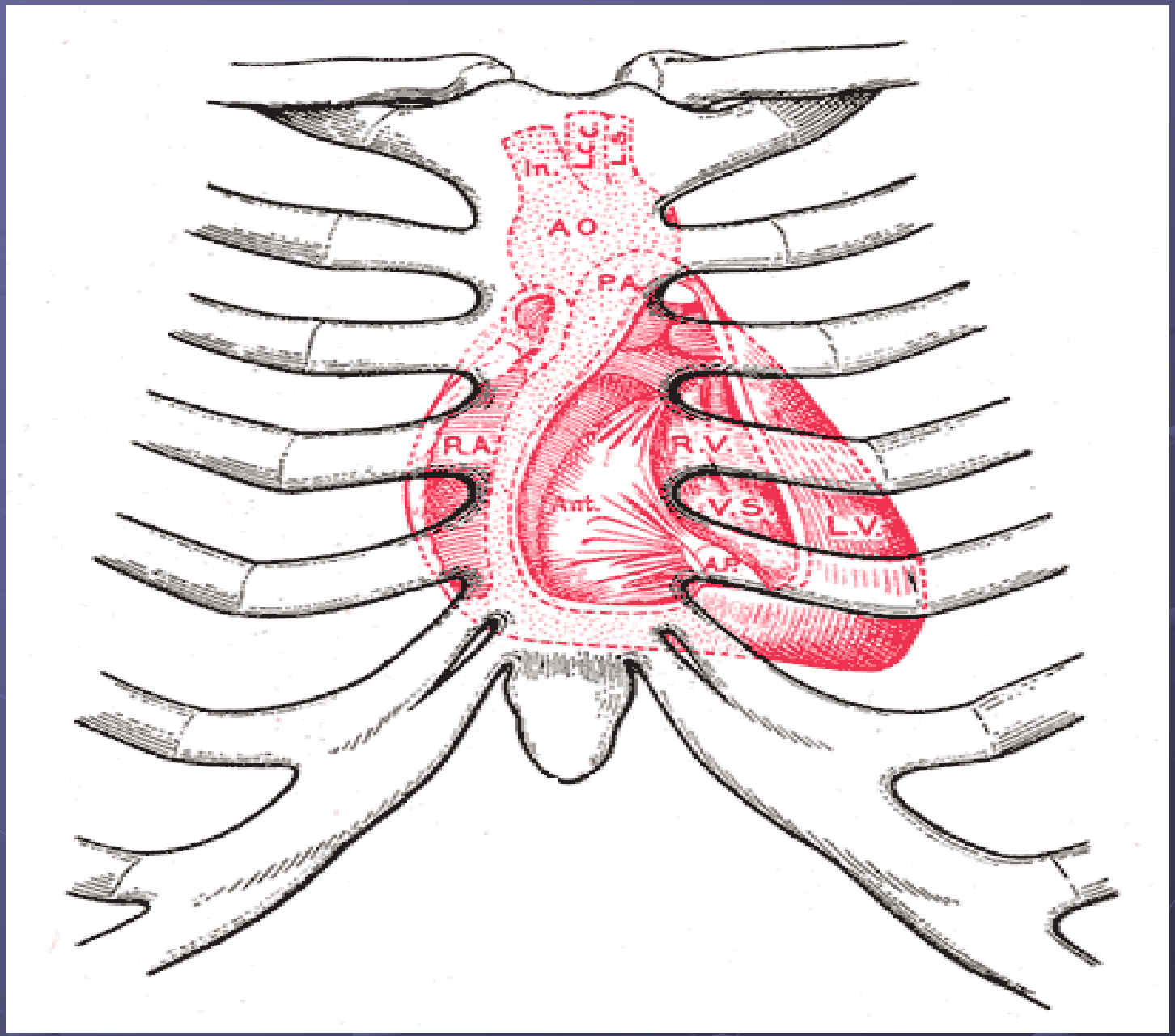

Highest intercostal artery
Highest intercostal vein
Rami communicantes
Lig. arteriosum
Superior mediastinum
Anterior Mediastinum (inferior)
Middle Mediastinum (inferior)
Posterior Mediastinum (inferior)
Pericardium
Left cupola
DIAPHRAGM


Cut edge of pericardium
Trachea
Left ventricle

* Superior Mediastinum :

- It's bounded in front by *manubrium sterni* & behind by *first 4 thoracic vertebrae* .
- Major mediastinal structures arranged in order from anterior to posterior as :

(1) **Thymus**
(2) **Large veins**
(3) **Large arteries**
(4) **Trachea**
(5) **Esophagus & thoracic duct**
(6) **Sympathetic trunks**


In.
L.c.c.
L.s.
A O
P A
R.A.
R.V.
Ant.
V.S.
L.V.
A.P.

* Inferior Mediastinum

- It's bounded in front by *body of sternum* & behind by *lower 8 thoracic vertebrae* .

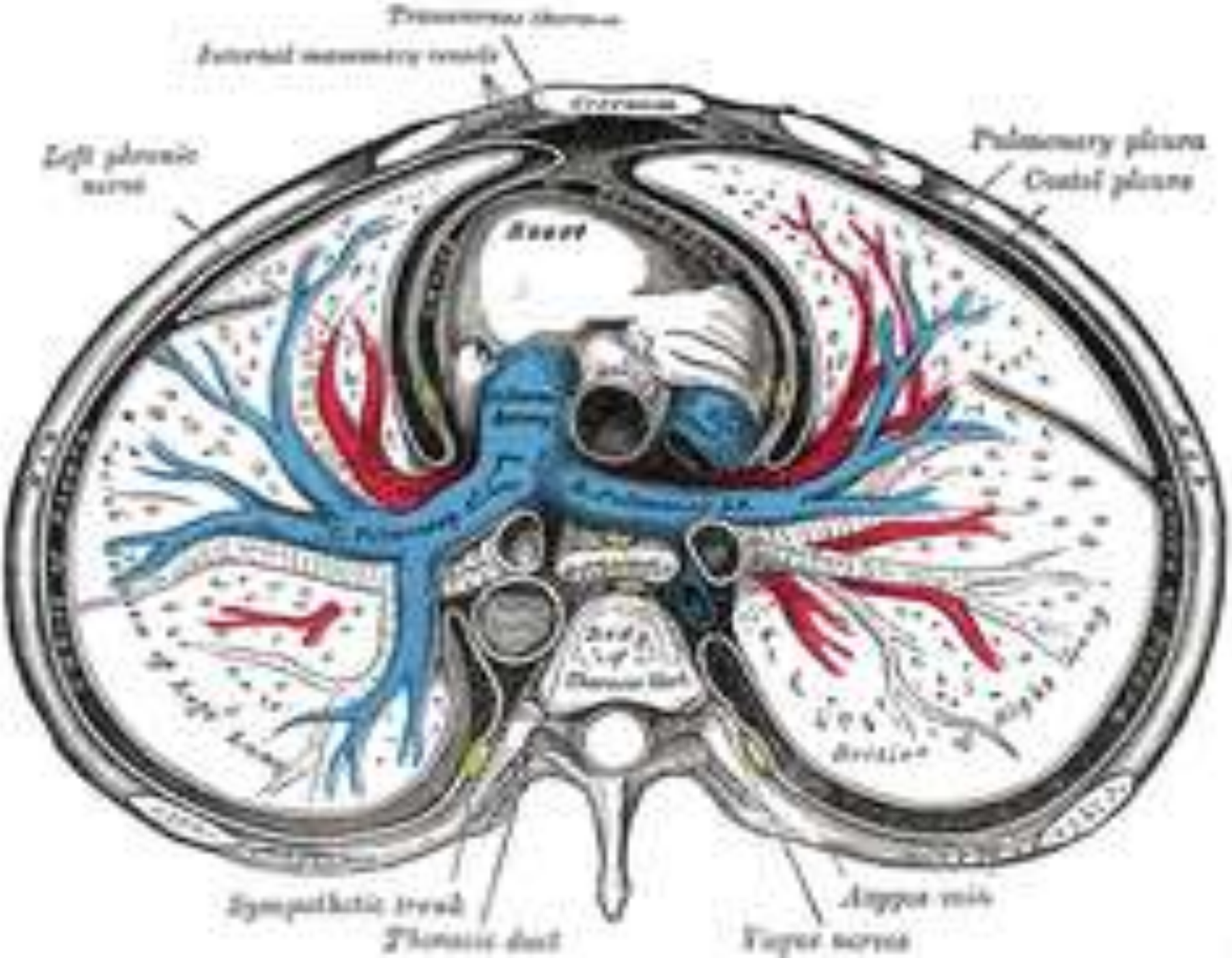
(1) **Thymus**

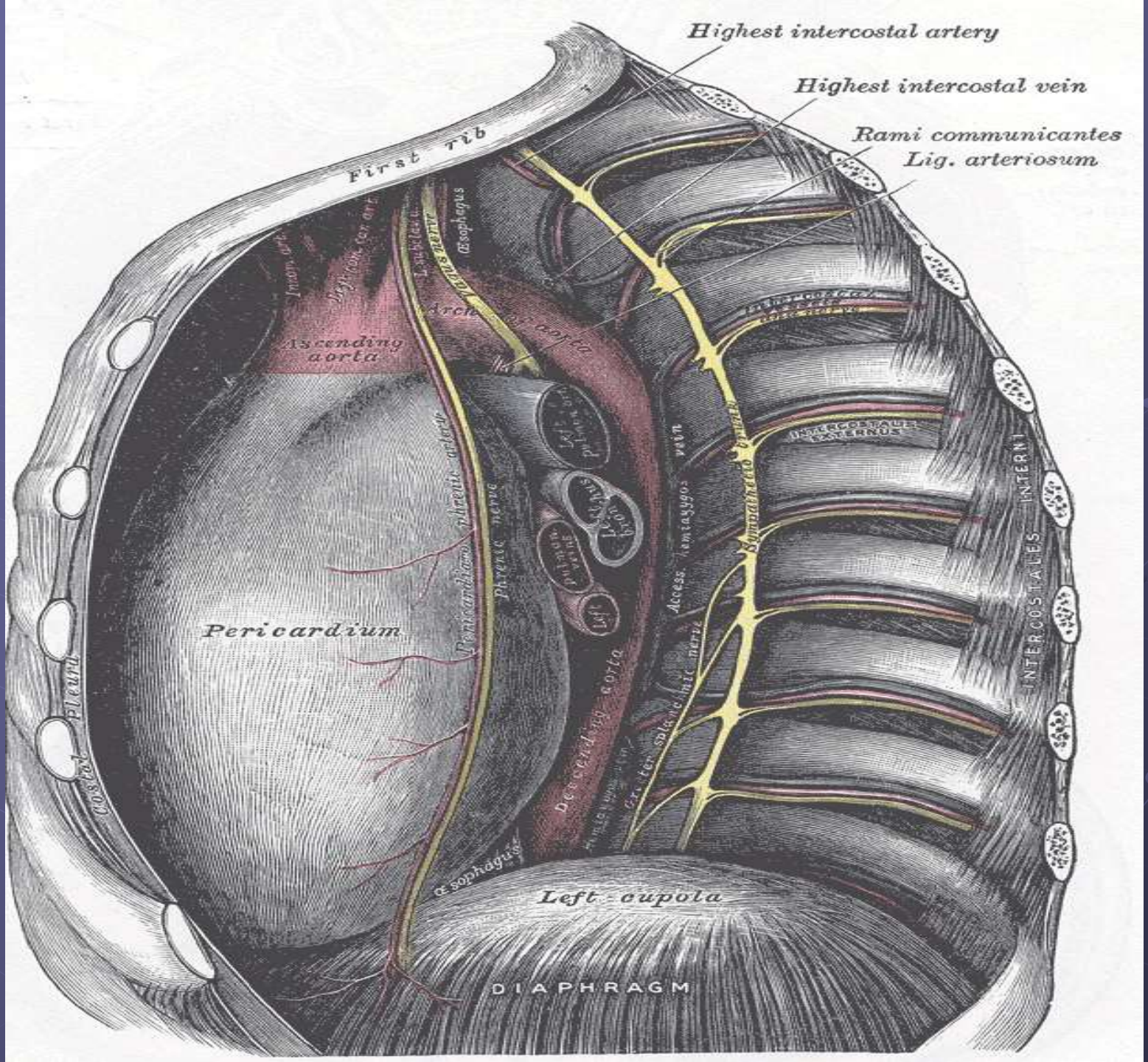
(2) **Heart** within the pericardium with the **phrenic nerves** on each side .

(3) **Esophagus & thoracic duct**

(4) **Descending aorta**

(5) **Sympathetic trunks**


Left phrenic nerve
Pulmonary pleura
Costal pleura
Root
Sympathetic trunk
Thoracic duct
Aygos vein
Vagus nerve


Highest intercostal artery
Highest intercostal vein
Rami communicantes
Lig. arteriosum
First rib
Ascending aorta
Pericardium
Costal pleura
Phrenic nerve
Pericardiacophrenic artery
Descending aorta
Left cupola
DIAPHRAGM
INTERCOSTALES INTERNI

PERICARDIUM

- It's **fibroserous sac** encloses the heart & roots of great vessels .

- **Function :** to restrict excessive movements of heart as a whole & serve as **lubricated container** in which different parts of heart can contract .

Layers of pericardium

* **Fibrous pericardium** : it's the strong fibrous part of the sac .

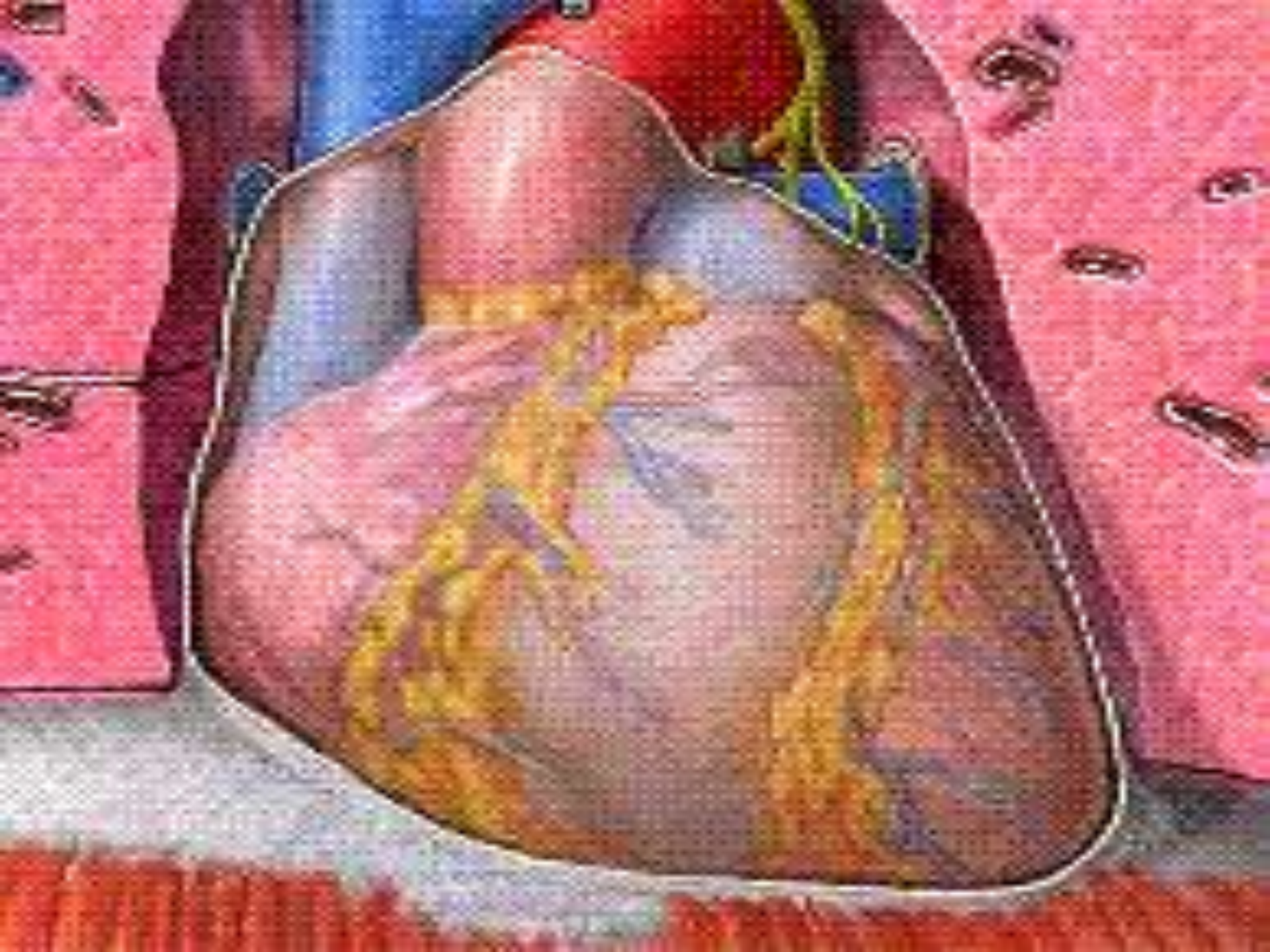
* **Serous pericardium** : lines the fibrous peric. & coats the heart . Divided into 2 layers :-

A. *Parietal layer* lines fibrous peric. & reflected around roots of great vessels to become continuous with the visceral layer of serous peric. that closely covers the heart .

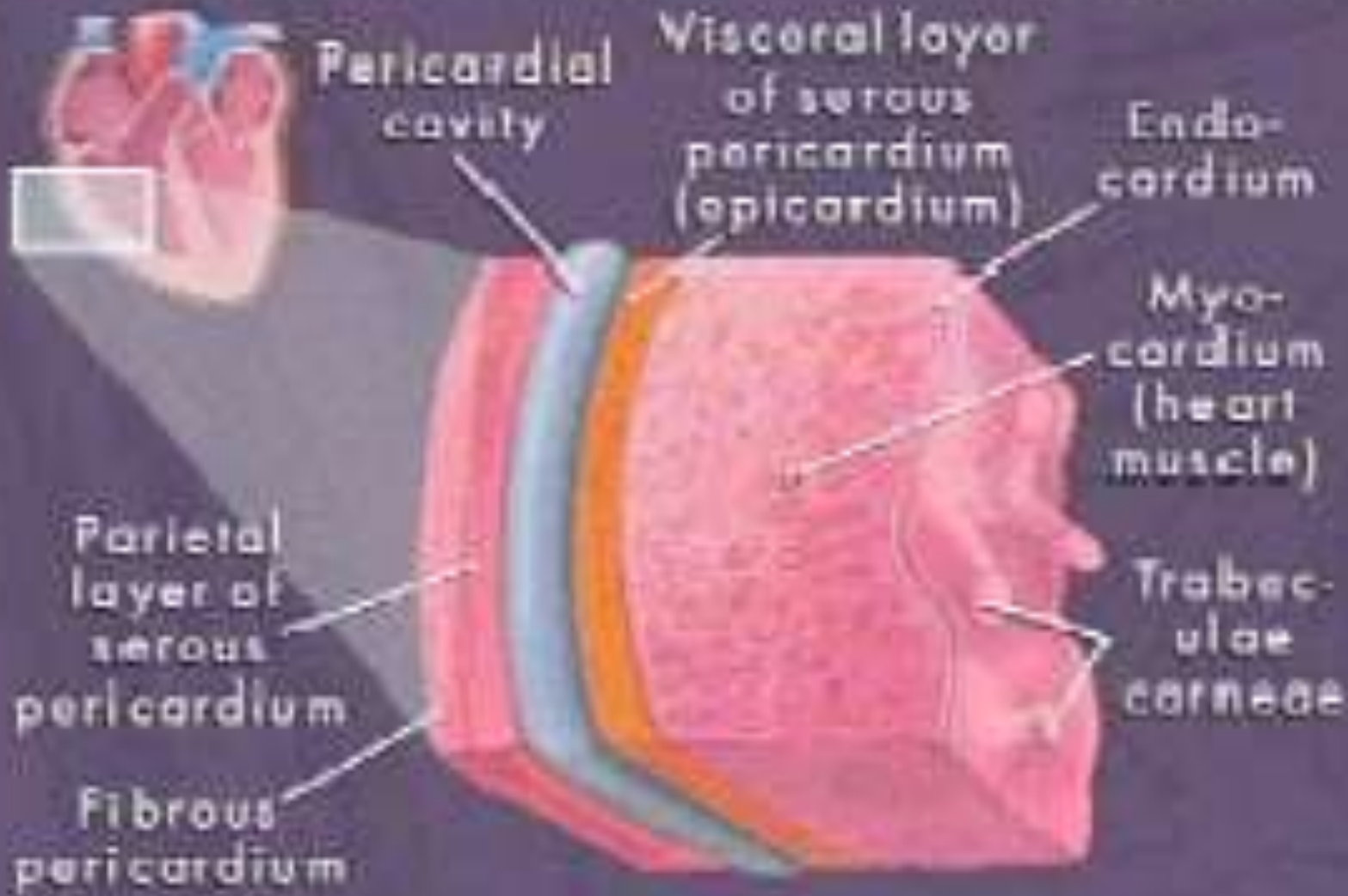
B. *Visceral layer* closely applied to heart & called Epicardium .

- * **Pericardial cavity** : the slitlike space between the parietal & visceral layers .

- * Pericardial fluid : a small amount of *tissue fluid* normally present in peric. Cavity (about 50 ml) acts as a *lubricant* to facilitate movements of the heart .



Pericardium and Heart Wall

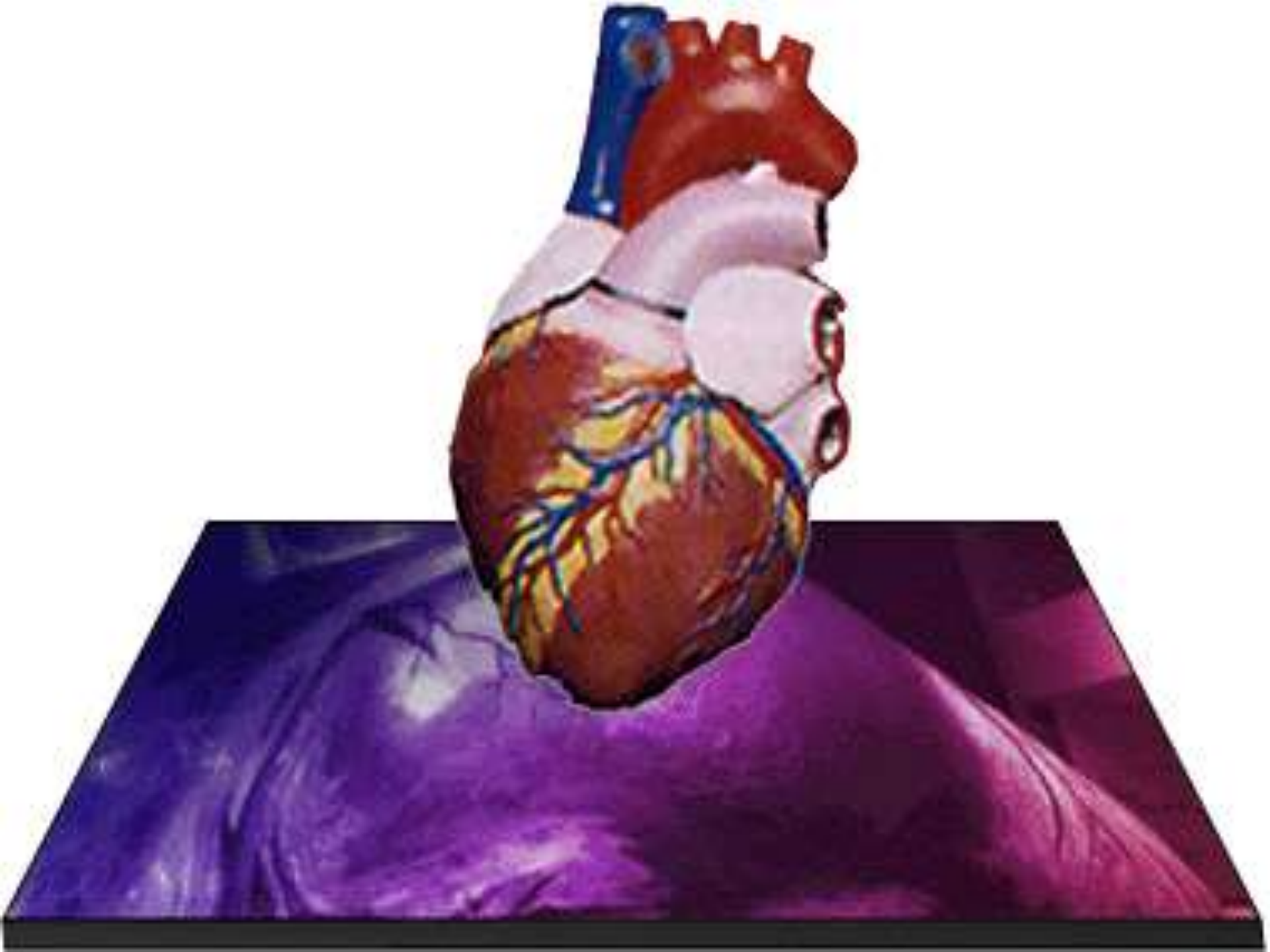


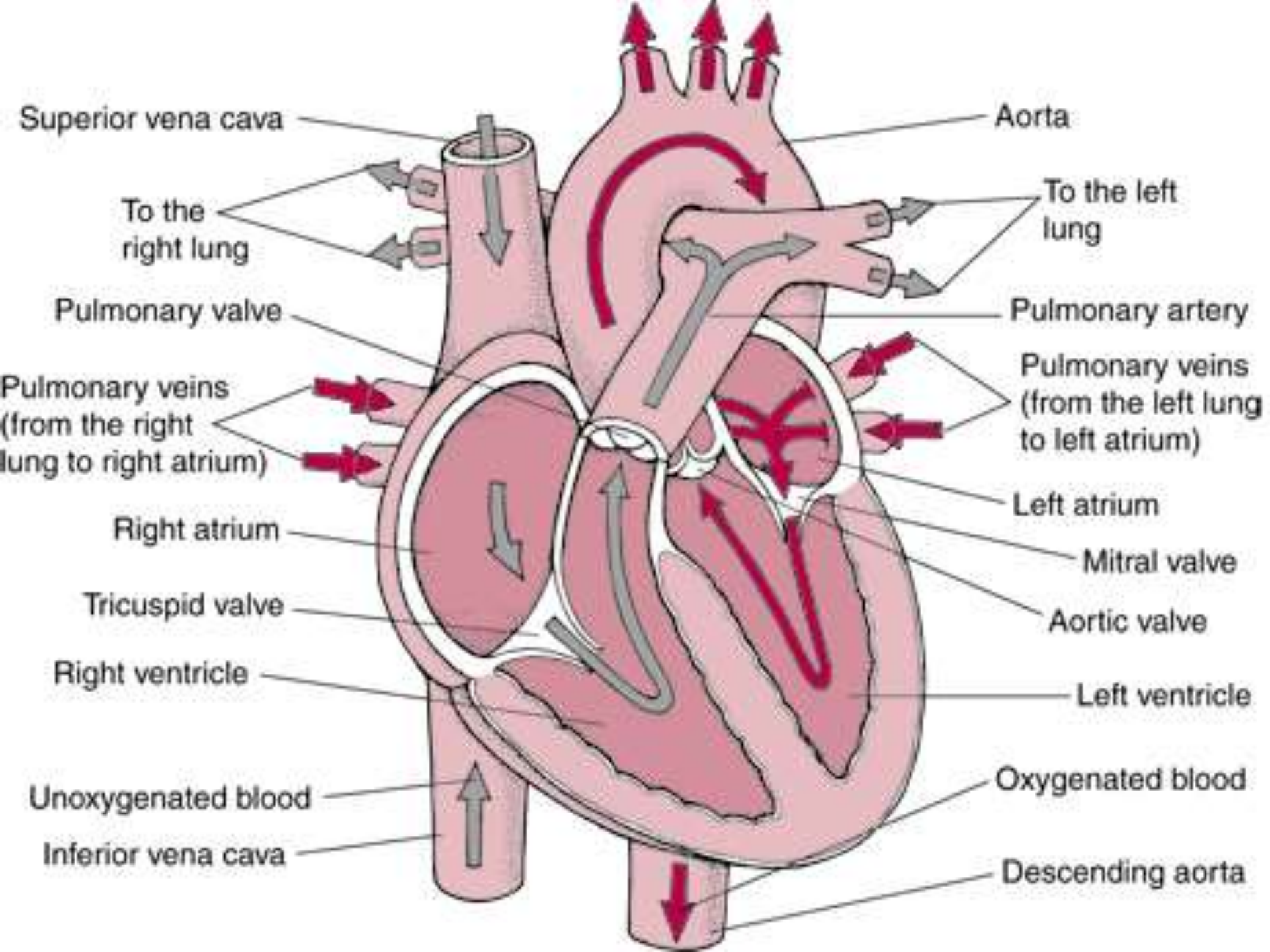
HEART

- It's a hollow *muscular* organ, *pyramid* shaped ,lies within pericard. in mediastinum, Connected to great blood vessels at it's base .

* The heart has three surfaces :

- ***Sternocostal*** (*anterior*) formed by Rt. atrium & Rt. ventricle .
- ***Diaphragmatic*** (*inferior*) ~ ~ Rt. & Lt. ventricles.
- ***Base*** (*posterior*) formed by Lt. atrium .
- Apex formed by Lt. vent. directed downward , forward & to the left .

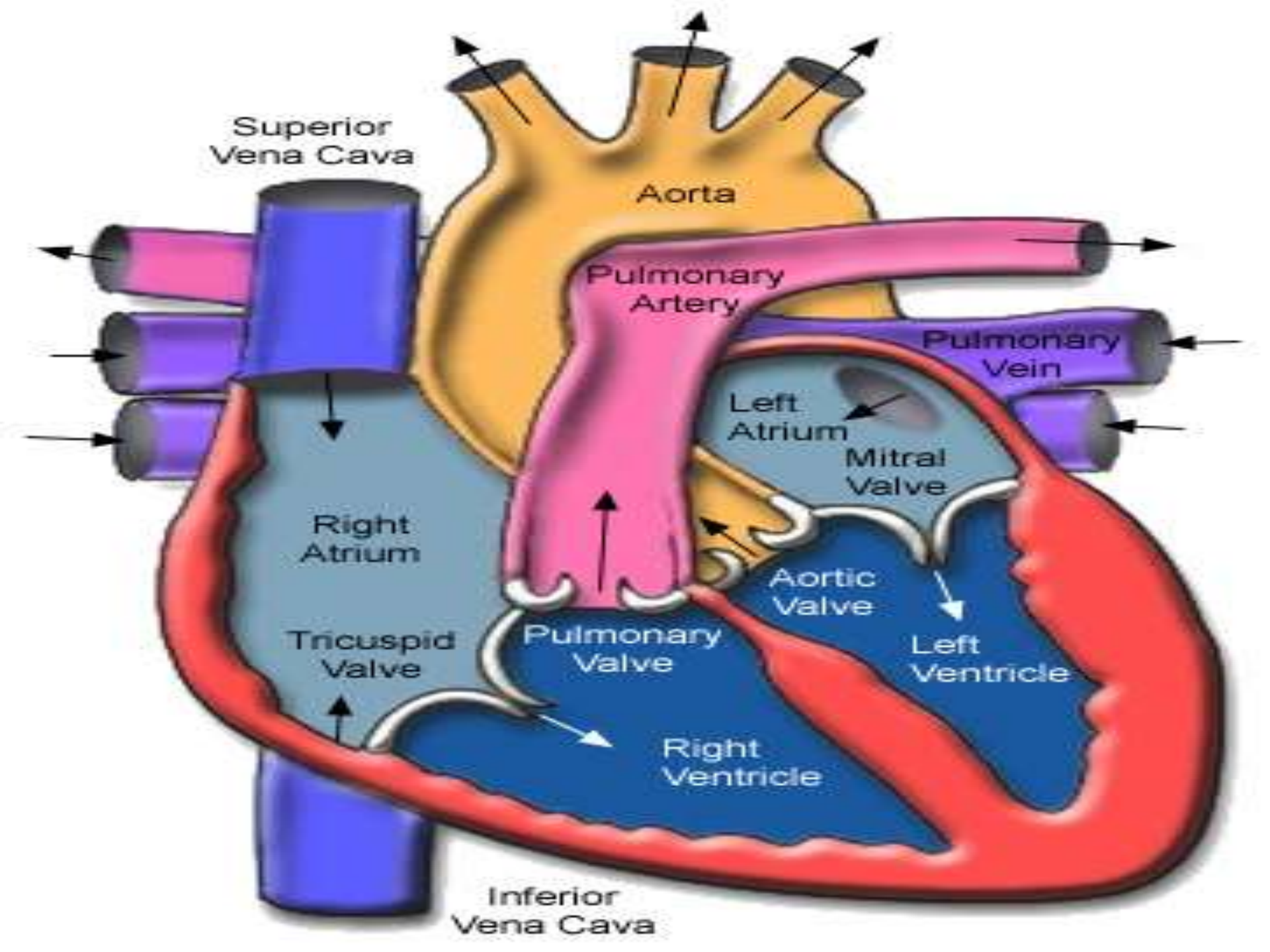


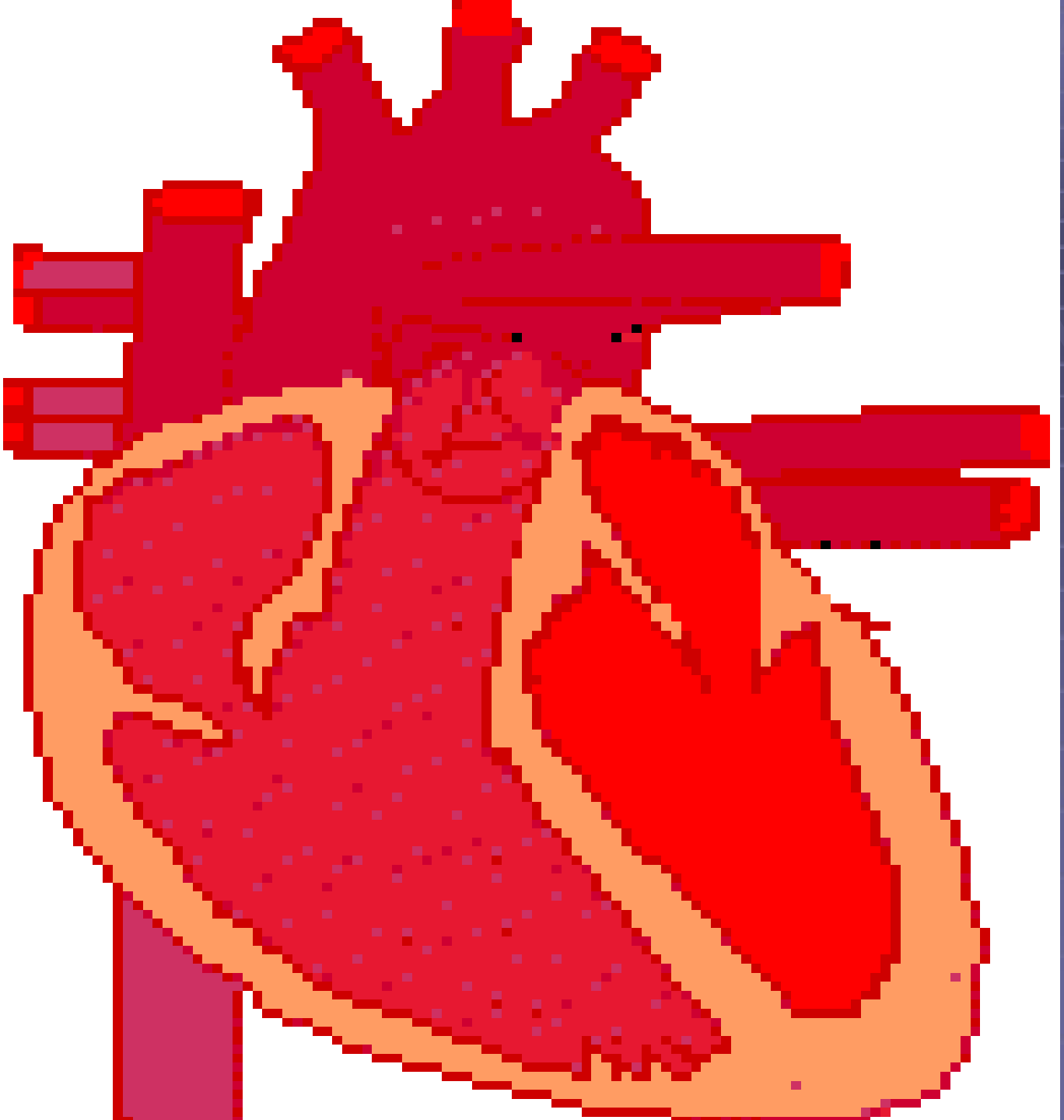

Superior vena cava
Aorta
To the right lung
To the left lung
Pulmonary valve
Pulmonary artery
Pulmonary veins (from the right lung to right atrium)
Pulmonary veins (from the left lung to left atrium)
Left atrium
Right atrium
Mitral valve
Tricuspid valve
Aortic valve
Right ventricle
Left ventricle
Unoxygenated blood
Oxygenated blood
Inferior vena cava
Descending aorta

Chambers of the Heart

The heart is divided by vertical septa into four chambers :

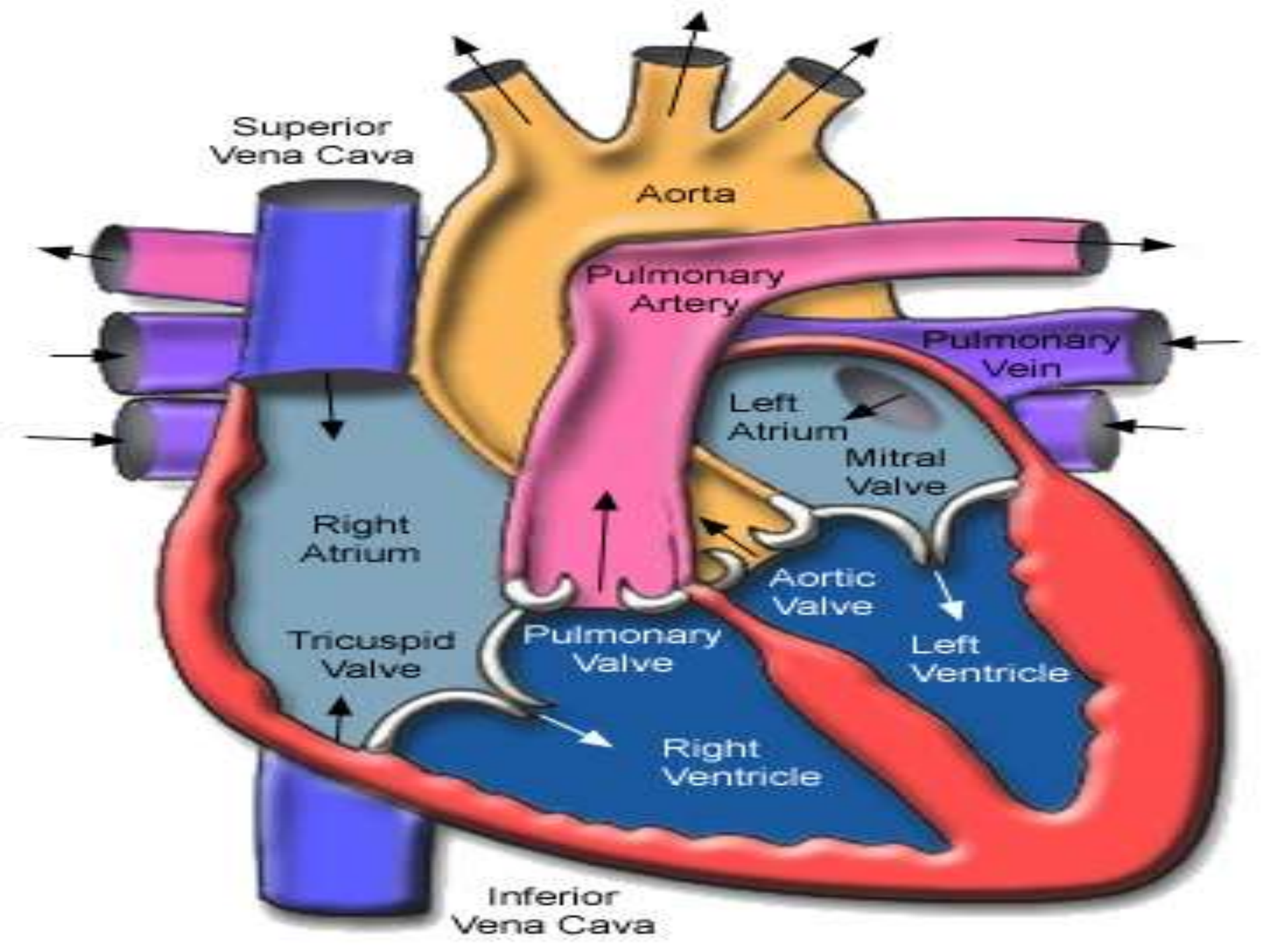
- The Rt. & Lt. **atria** { by atrial or interatrial septum }
- The Rt. & Lt. **ventricles** { by ventricular or interventricular septum }
- The **walls** of heart compose of cardiac muscle , the *myocardium* .

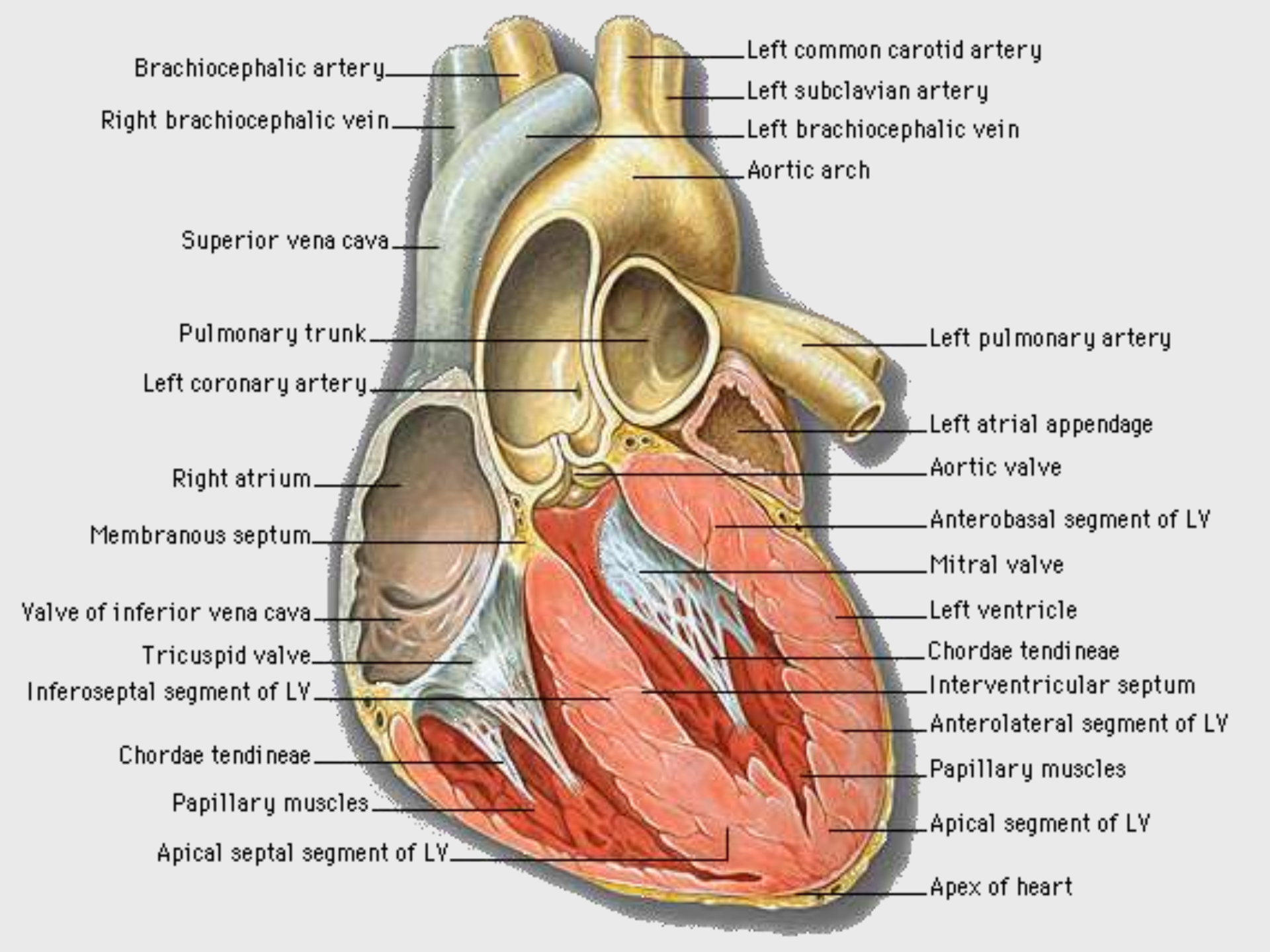

Superior
Vena Cava
Aorta
Pulmonary
Artery
Pulmonary
Vein
Left
Atrium
Mitral
Valve
Right
Atrium
Aortic
Valve
Tricuspid
Valve
Pulmonary
Valve
Left
Ventricle
Right
Ventricle
Inferior
Vena Cava



Openings into the Right Atrium

- (1) **Superior vena cava** : opens into upper part of R.A. it returns blood from *upper half* of the body.
- (2) **Inferior vena cava** : opens into lower part of R.A. it returns blood from *lower half* of the body.
- (3) **Right atrioventricular orifice** : guarded by the Tricuspid valve .


Superior
Vena Cava
Aorta
Pulmonary
Artery
Pulmonary
Vein
Left
Atrium
Mitral
Valve
Right
Atrium
Aortic
Valve
Tricuspid
Valve
Pulmonary
Valve
Left
Ventricle
Right
Ventricle
Inferior
Vena Cava


Brachiocephalic artery
Right brachiocephalic vein
Superior vena cava
Pulmonary trunk
Left coronary artery
Right atrium
Membranous septum
Valve of inferior vena cava
Tricuspid valve
Inferoseptal segment of LV
Chordae tendineae
Papillary muscles
Apical septal segment of LV
Left common carotid artery
Left subclavian artery
Left brachiocephalic vein
Aortic arch
Left pulmonary artery
Left atrial appendage
Aortic valve
Anterobasal segment of LV
Mitral valve
Left ventricle
Chordae tendineae
Interventricular septum
Anterolateral segment of LV
Papillary muscles
Apical segment of LV
Apex of heart

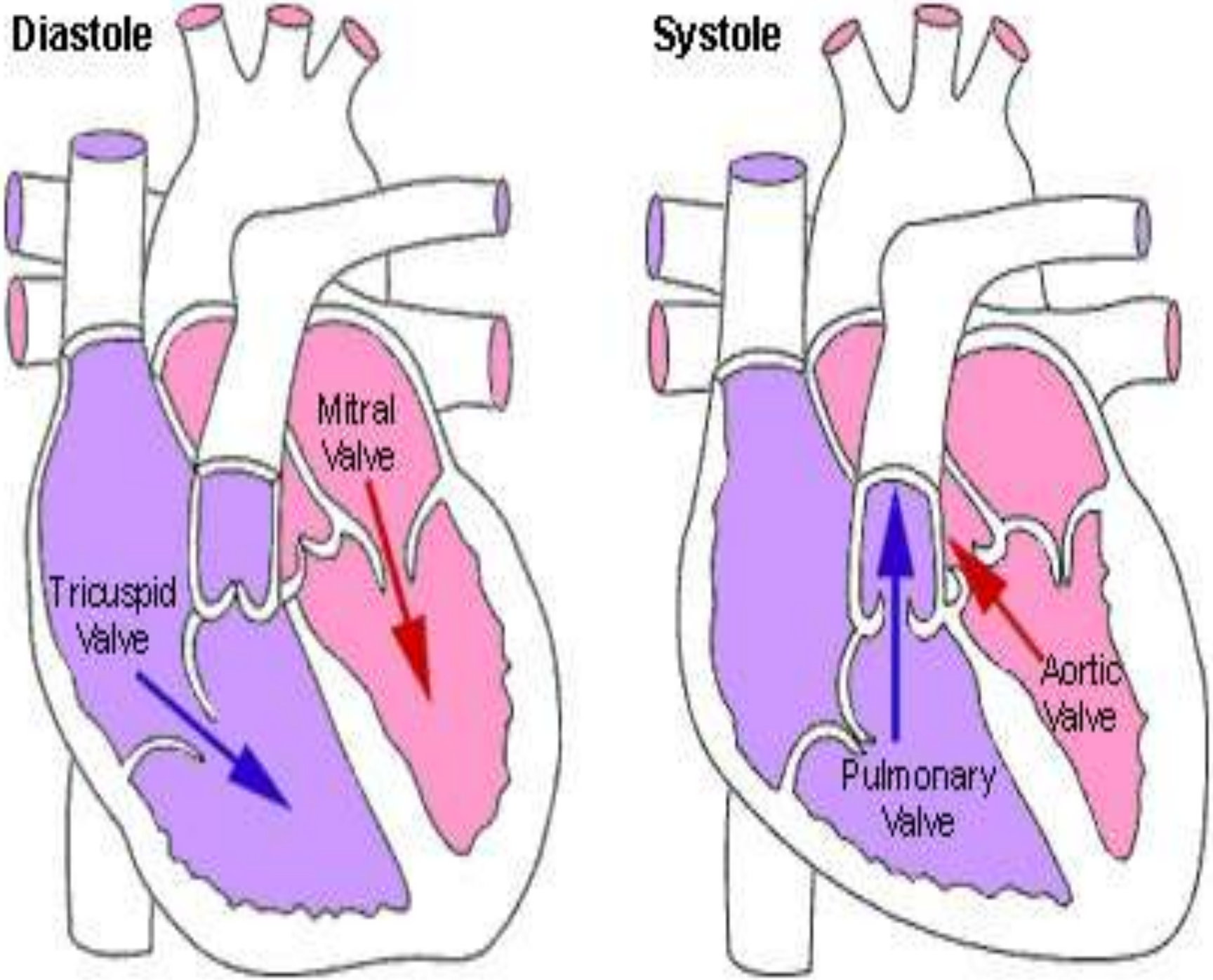
Right Ventricle

It communicates with :

- ***Rt. atrium*** (through atrioventricular orifice) guarded by Tricuspid valve

- ***Pulmonary trunk*** (through pulmonary orifice guarded by pulmonary valve)

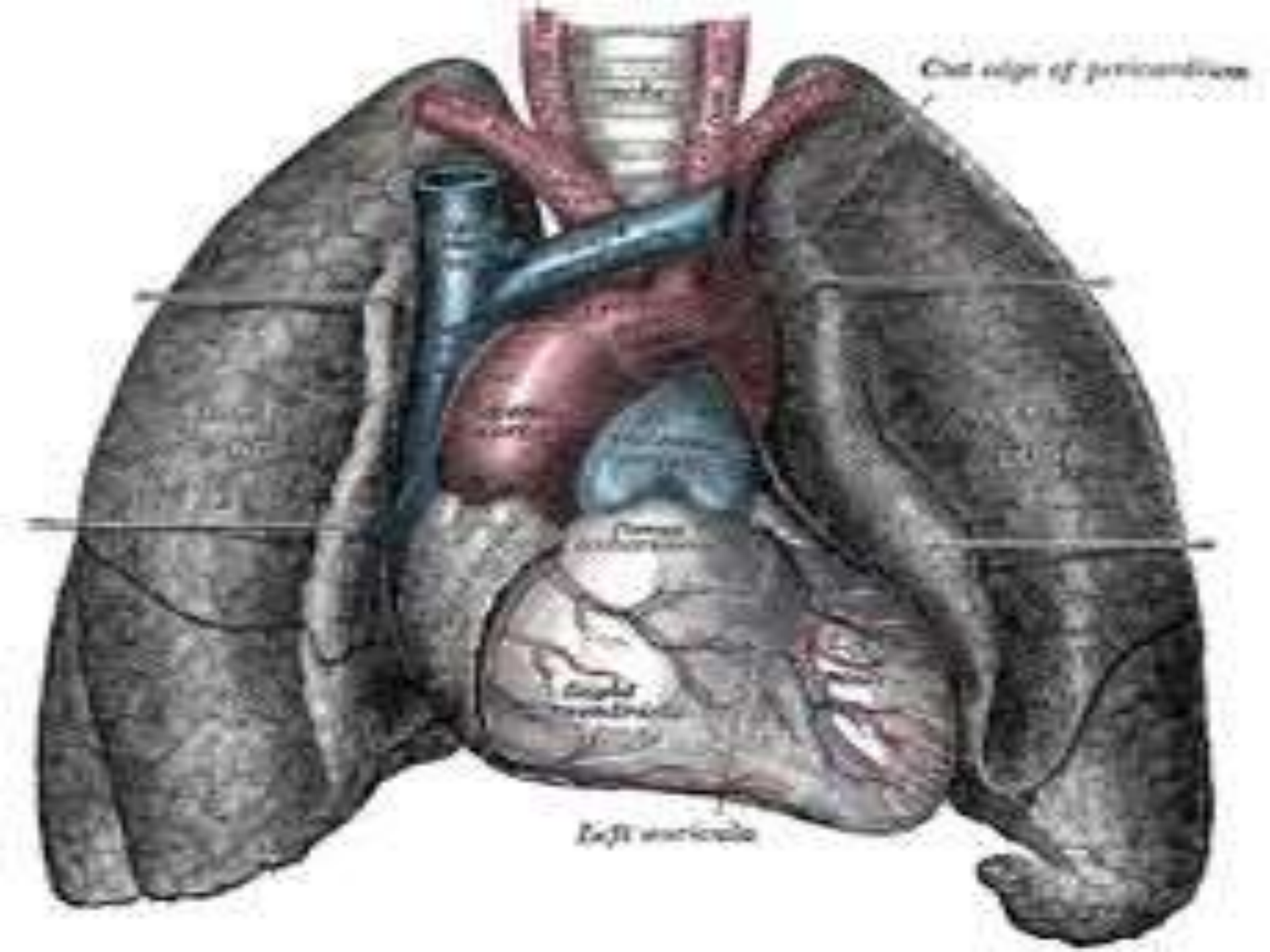
* the pulmonary trunk conveys *deoxygenated* blood from Rt. vent. of heart to lungs .

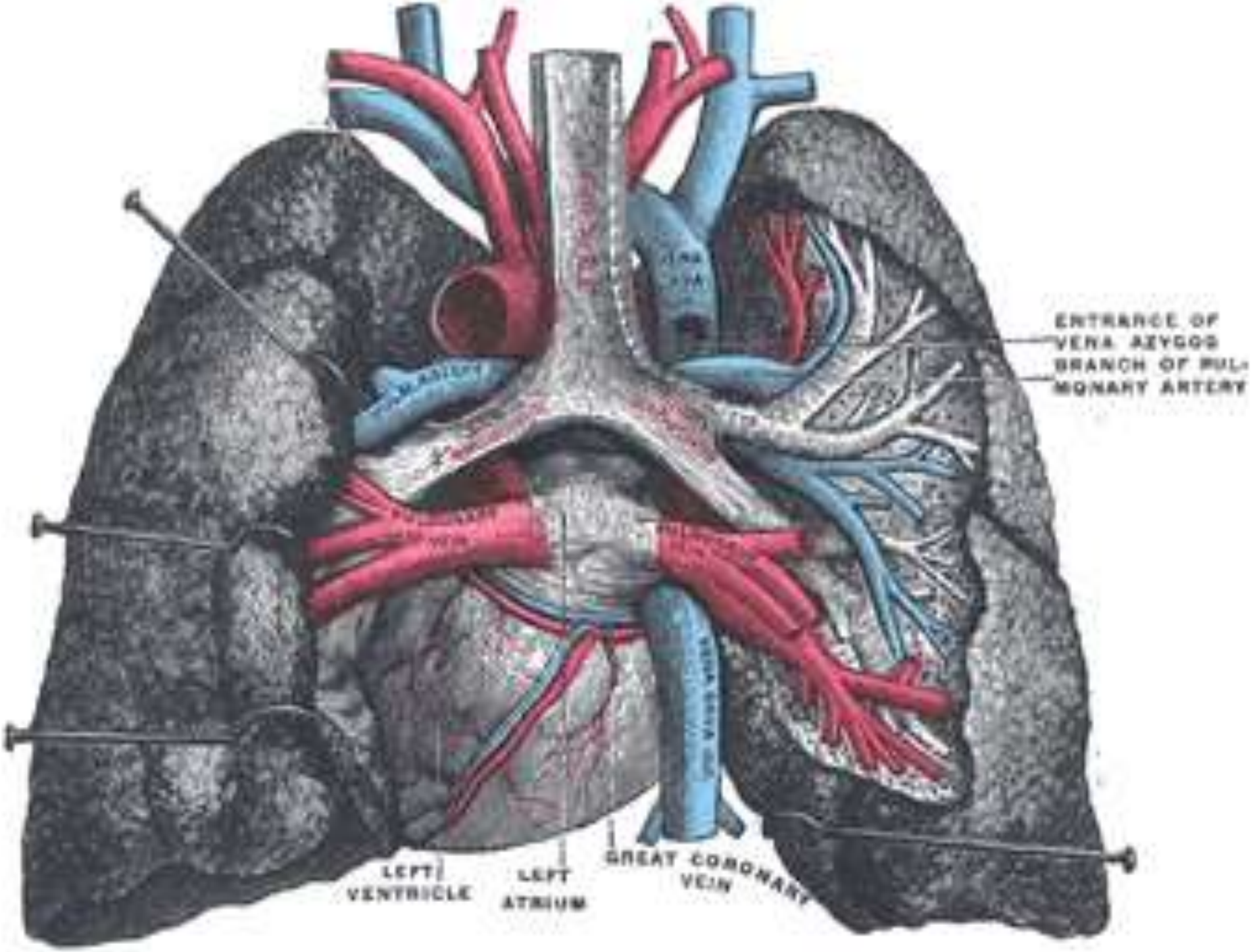

Diastole
Mitral Valve
Tricuspid Valve
Systole
Aortic Valve
Pulmonary Valve

Openings into the Left Atrium

- (1) **Four pulmonary veins** : tow from each lung { carrying *oxygenated* blood }

- (2) **Left atrioventricular orifice** : guarded by the Mitral valve .


Cut edge of pericardium

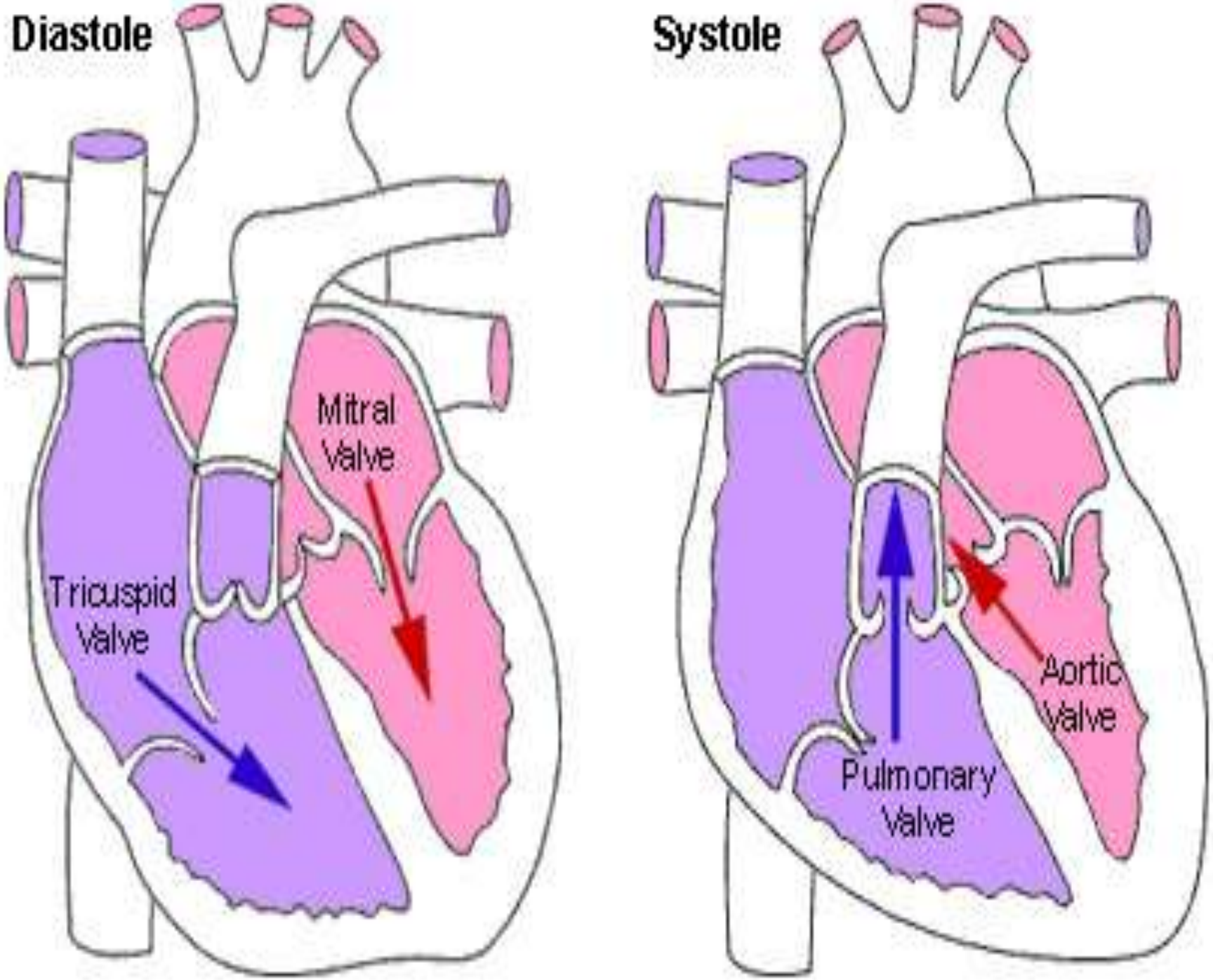

ENTRANCE OF
VENA AZYGOS
BRANCH OF PUL-
MONARY ARTERY
LEFT
VENTRICLE
LEFT
ATRIUM
GREAT CORONARY
VEIN

Left Ventricle

It communicates with :

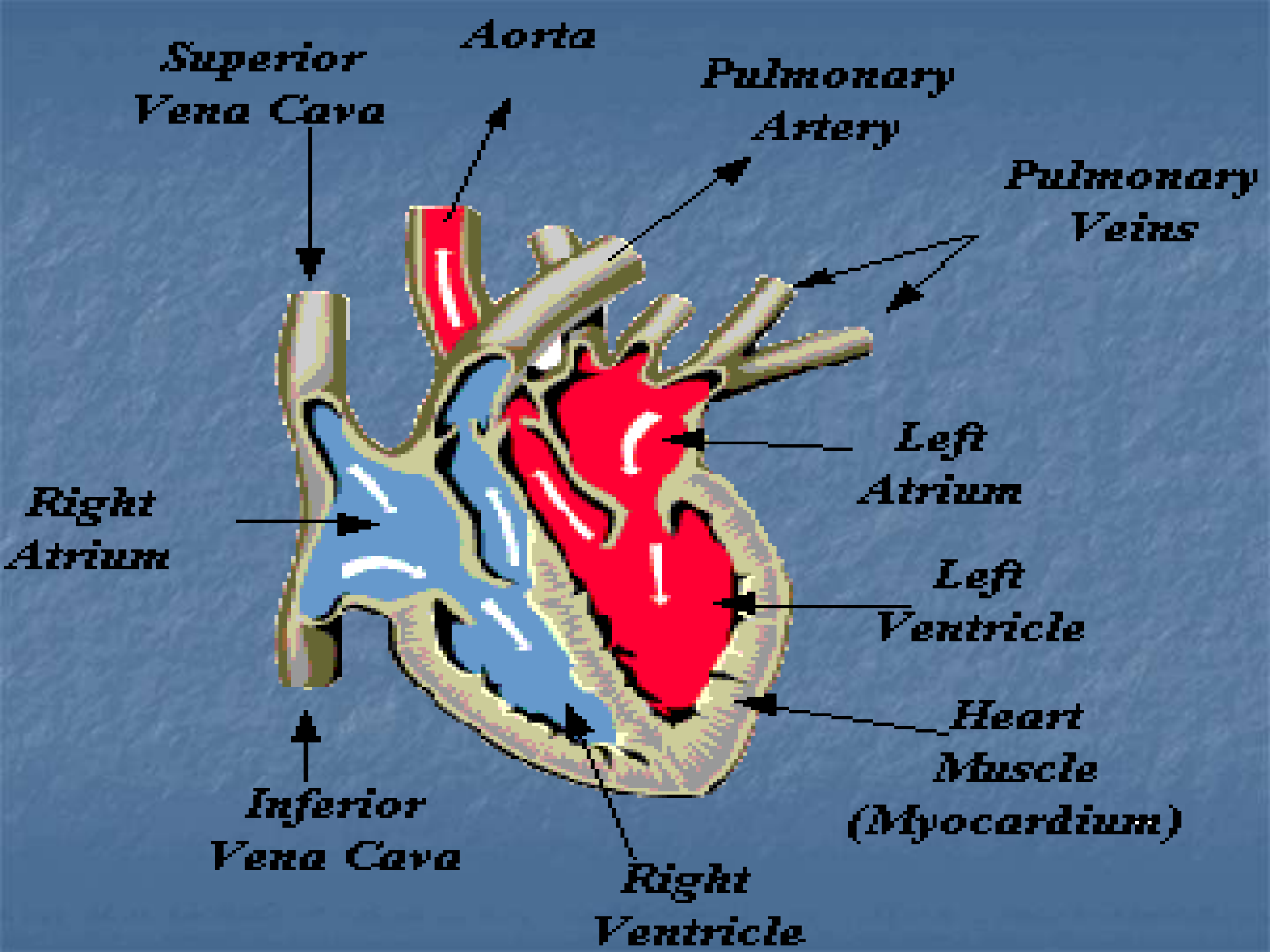
- ***Lt. atrium*** (through atrioventricular orifice)
- ***Aorta*** (~ aortic orifice guarded by aortic valve)

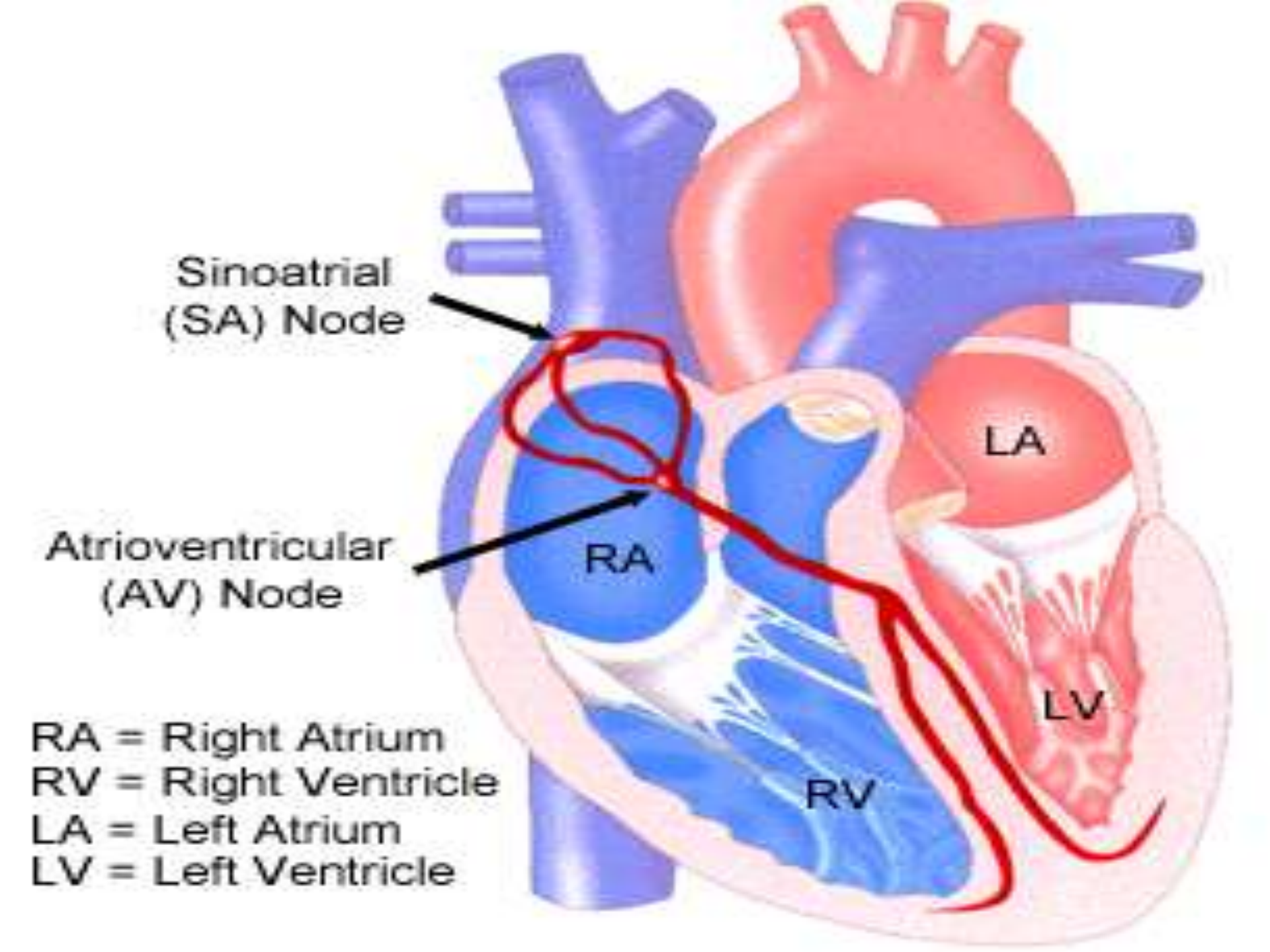
* the *walls* of L.V. are *3 times thicker* than those of R.V. { Lt. intraventricular bl.pr. is *6 times higher* than that inside R.V. }


Diastole
Mitral Valve
Tricuspid Valve
Systole
Aortic Valve
Pulmonary Valve

Conducting system of the Heart

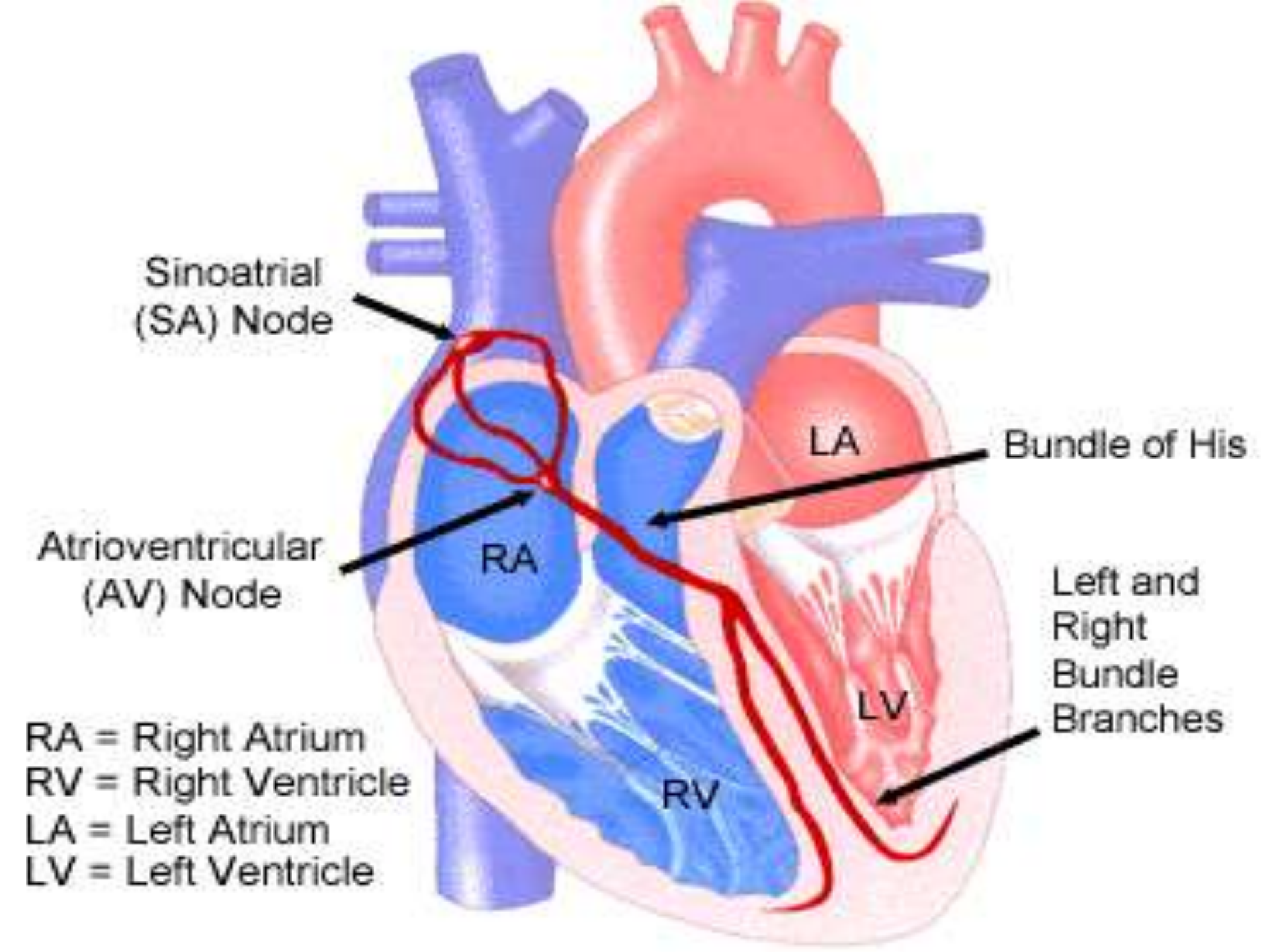
- Normal H.R. about 70-90 *beats/minutes* in resting adult .
- Heart contracts *rhythmically* & *spontaneously* in conducting system of heart .
- The impulse travels to different regions of heart .
- The atria contract first & together, followed by contraction of ventricles together .
- Slight ***delay*** in passage of impulse from atri to ventricles allows atria to empty their blood into ventricles before they contract .

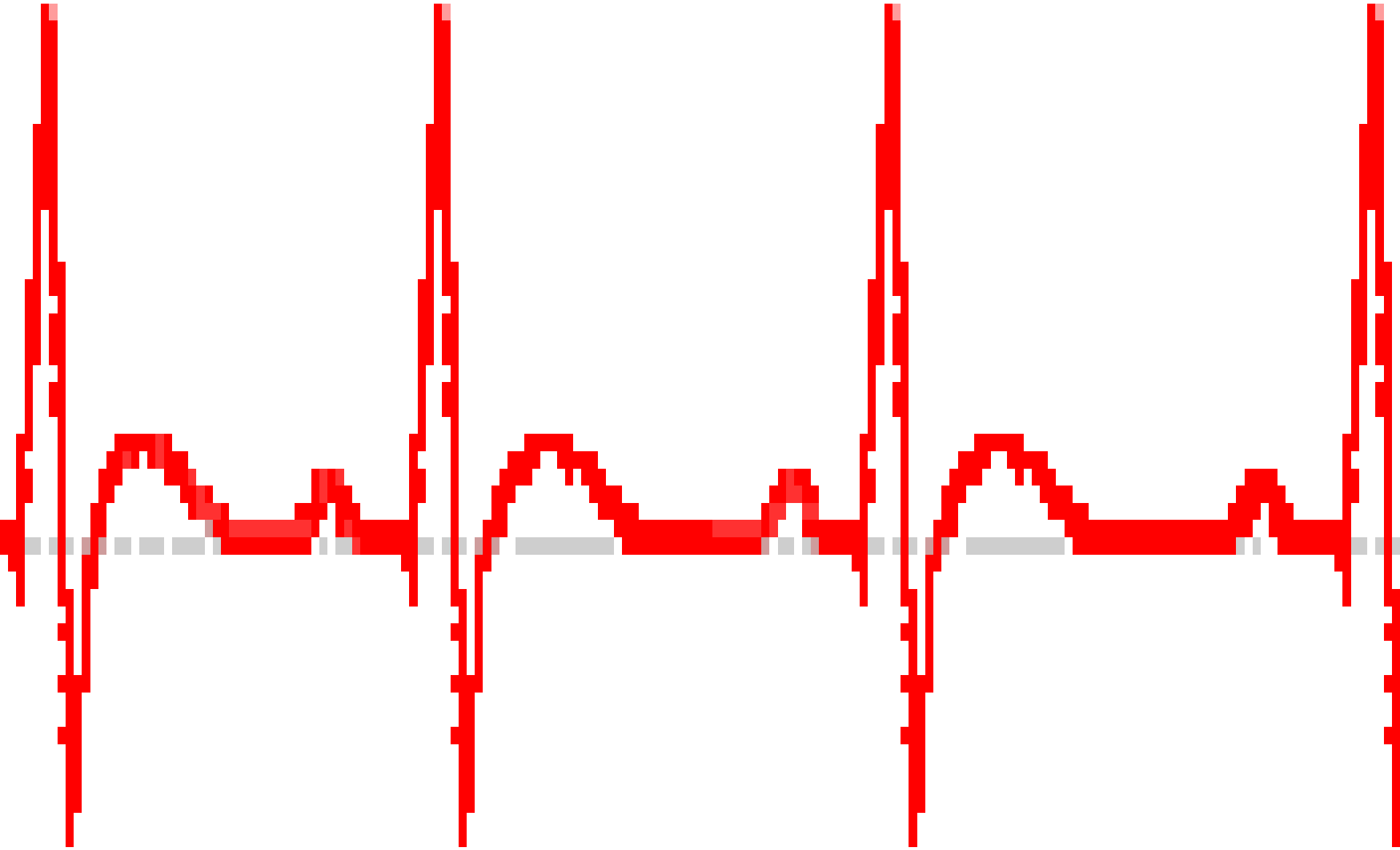

Superior
Vena Cava
Aorta
Pulmonary
Artery
Pulmonary
Veins
Left
Atrium
Right
Atrium
Left
Ventricle
Heart
Muscle
(Myocardium)
Inferior
Vena Cava
Right
Ventricle

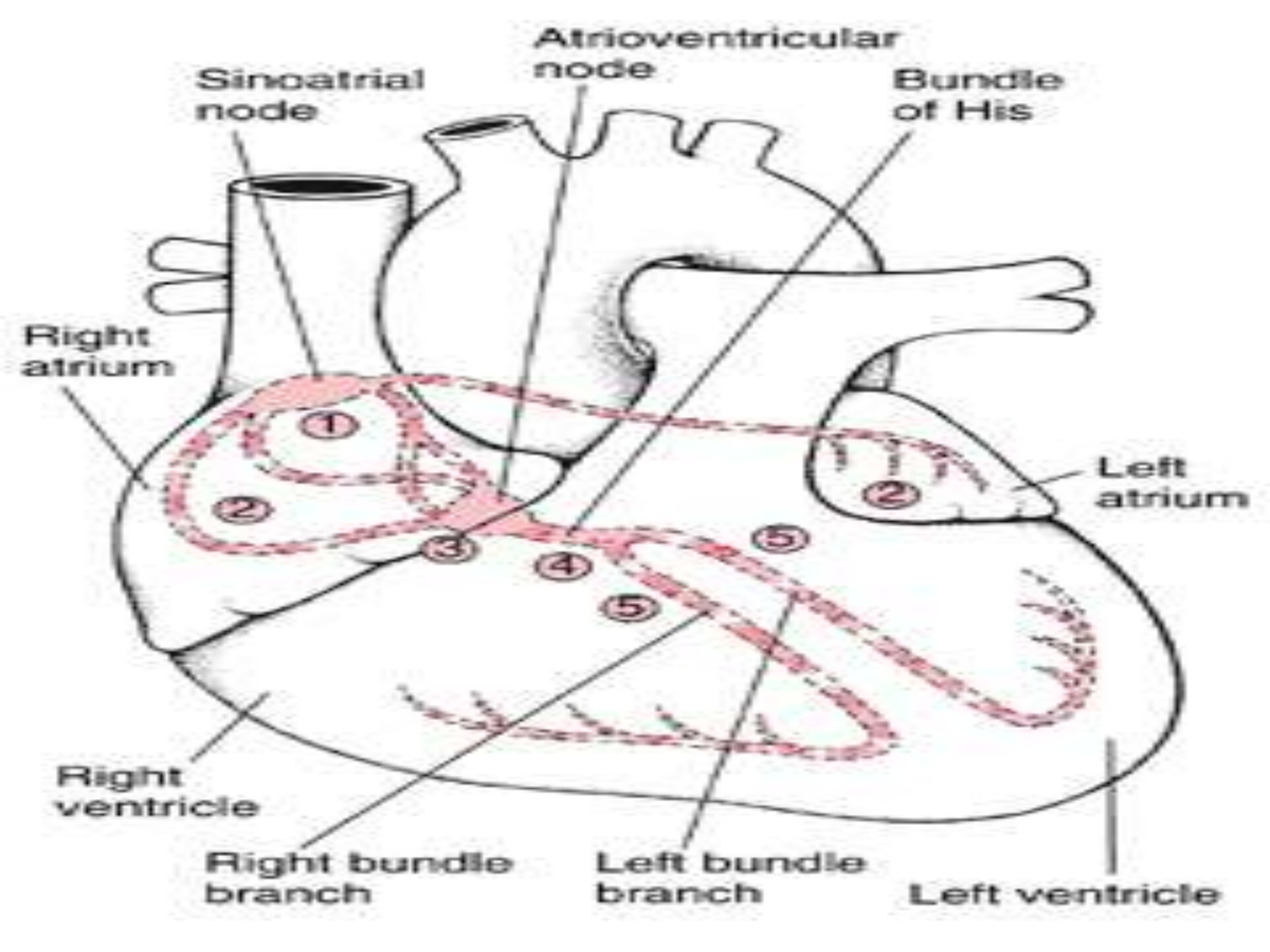

Sinoatrial
(SA) Node
Atrioventricular
(AV) Node
RA = Right Atrium
RV = Right Ventricle
LA = Left Atrium
LV = Left Ventricle
RA
LA
RV
LV

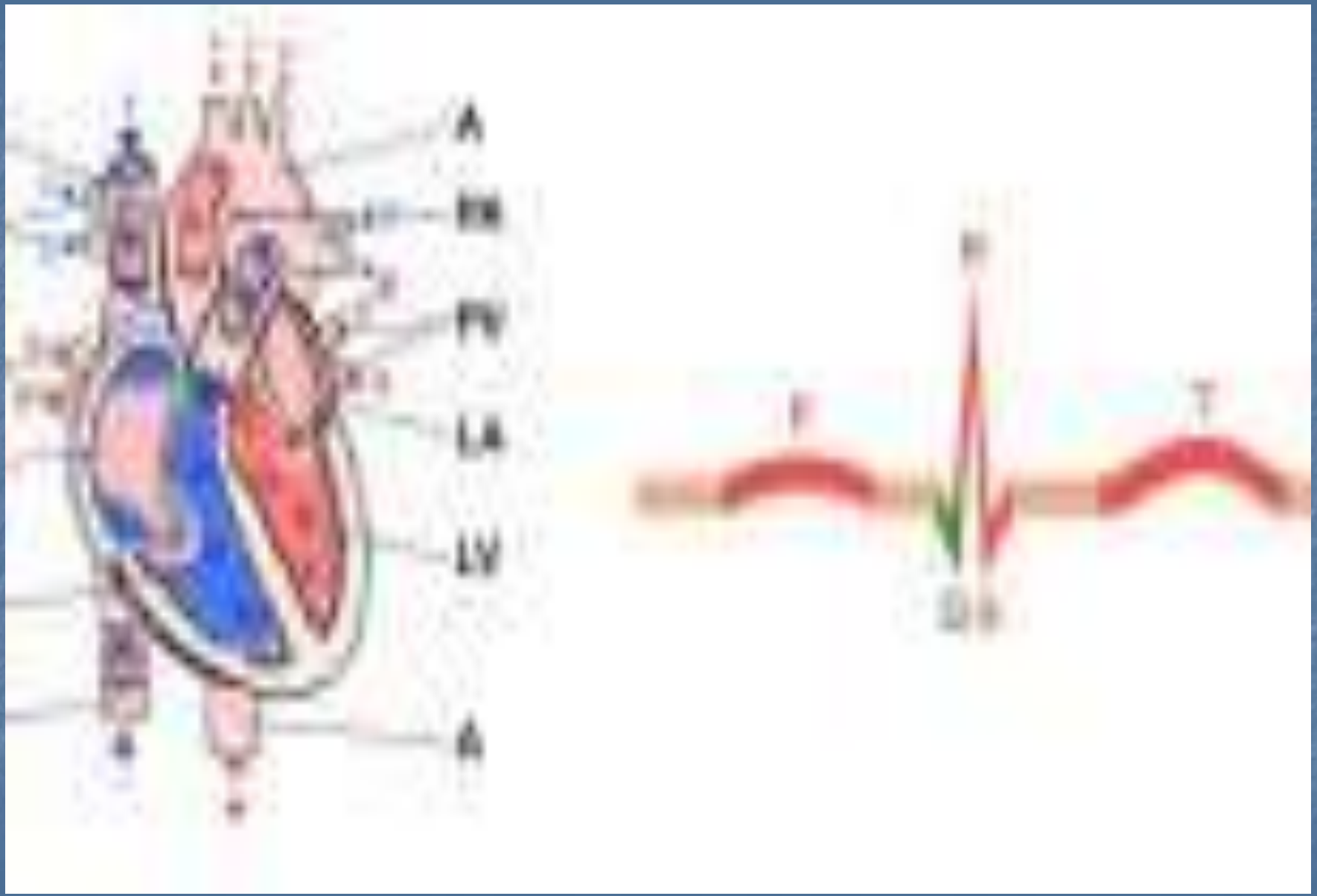
Specialized cardiac muscle of the conducting system of the heart present in the :

- ***Sinuatrial node*** (SA node)
- ***Atrioventricular node*** (AV node)
- ***Atrioventricular bundle*** & it's 2 terminal branches , one for each ventricle :
  Right bundle branch (RBB)
  Left bundle branch (LBB)
- ***Purkinje fibers*** : subendocardial plexus of specialized cardiac muscle fibers .


Sinoatrial
(SA) Node
Atrioventricular
(AV) Node
LA
Bundle of His
RA
Left and
Right
Bundle
Branches
LV
RV
RA = Right Atrium
RV = Right Ventricle
LA = Left Atrium
LV = Left Ventricle




Sinoatrial node
Atrioventricular node
Bundle of His
Right atrium
Left atrium
Right ventricle
Right bundle branch
Left bundle branch
Left ventricle
1
2
2
3
4
5
5


A
PV
LA
LV
A
P
T

The activities of the conducting system of the heart

Influenced by *autonomic nerve supply* to the heart as :

- The parasympathetic nerves → slow the rhythm & diminish rate of conduction of the impulse .
- The sympathetic nerves → opposite effect

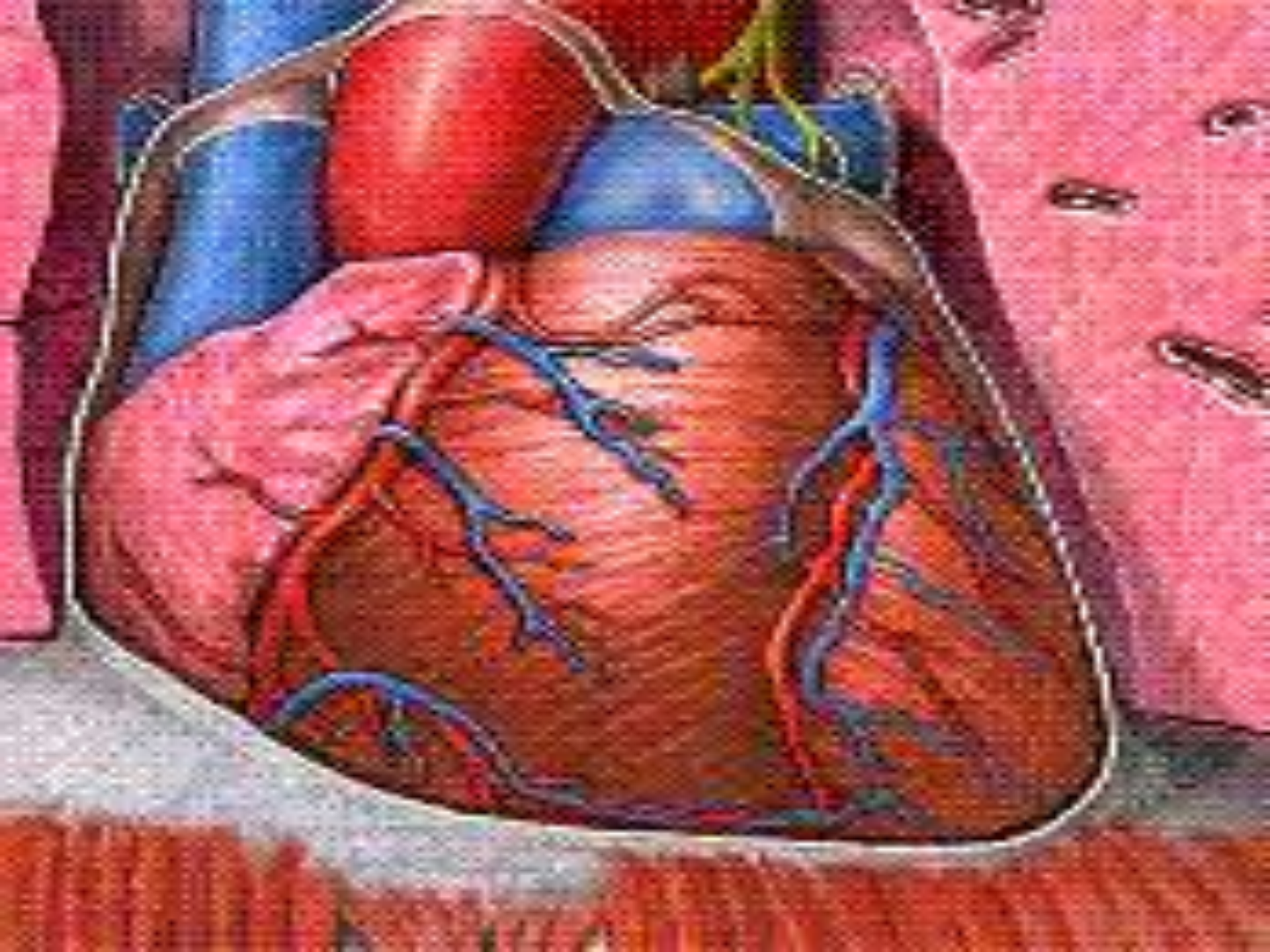
Arterial supply of the heart

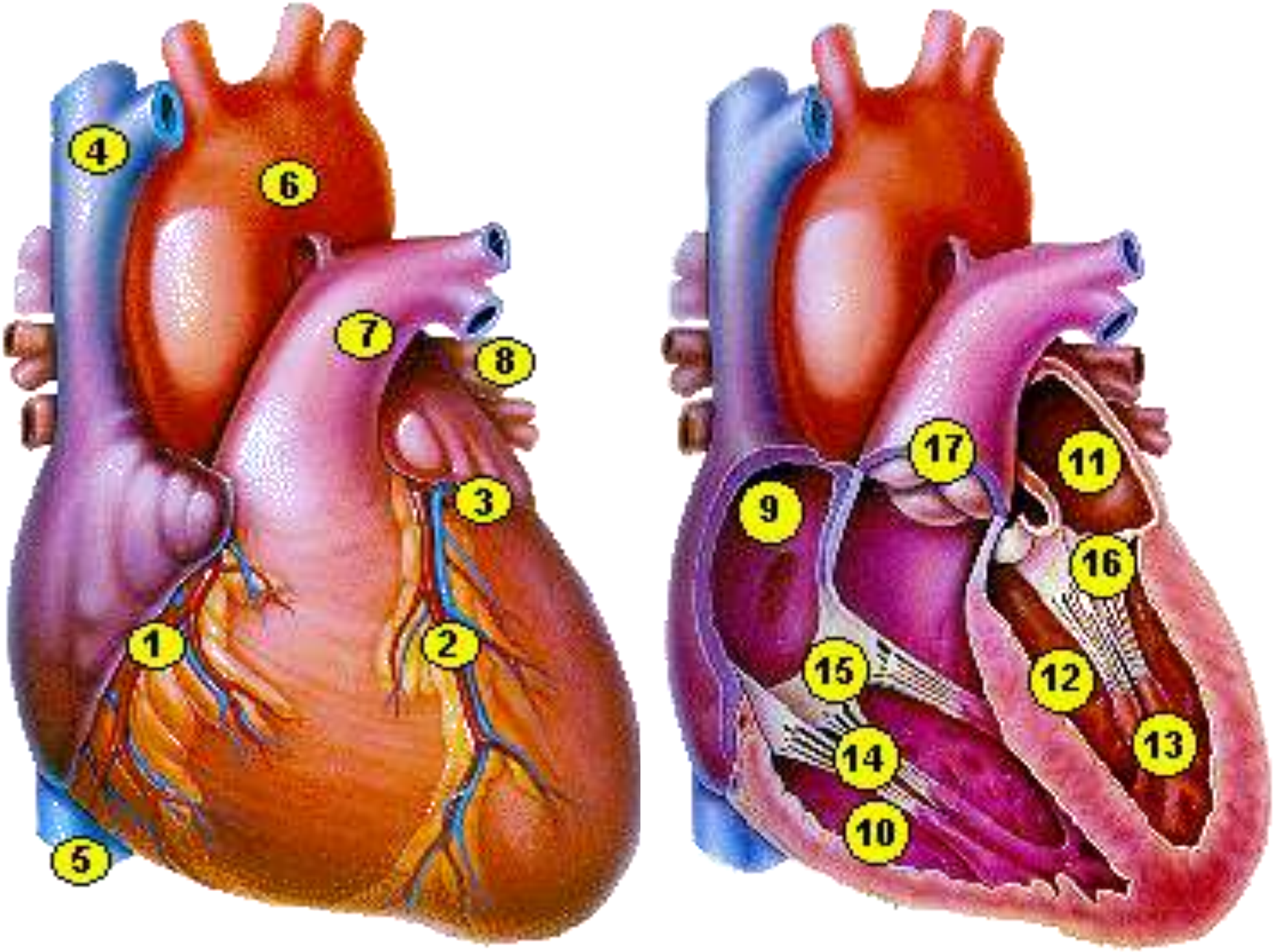
- Provided by Coronary arteries & their branches .

- *Ascending aorta* above aortic valve *coronary aa.* → *Rt.*, *Lt.*

Major branches (lying within *subepicardial connective tiss.*) distributed over the surface of heart .

- **Collateral circulation** : anastomoses between the terminal branches of the Rt. & Lt. coronary arteries .




4
6
7
8
3
1
2
5
17
11
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12
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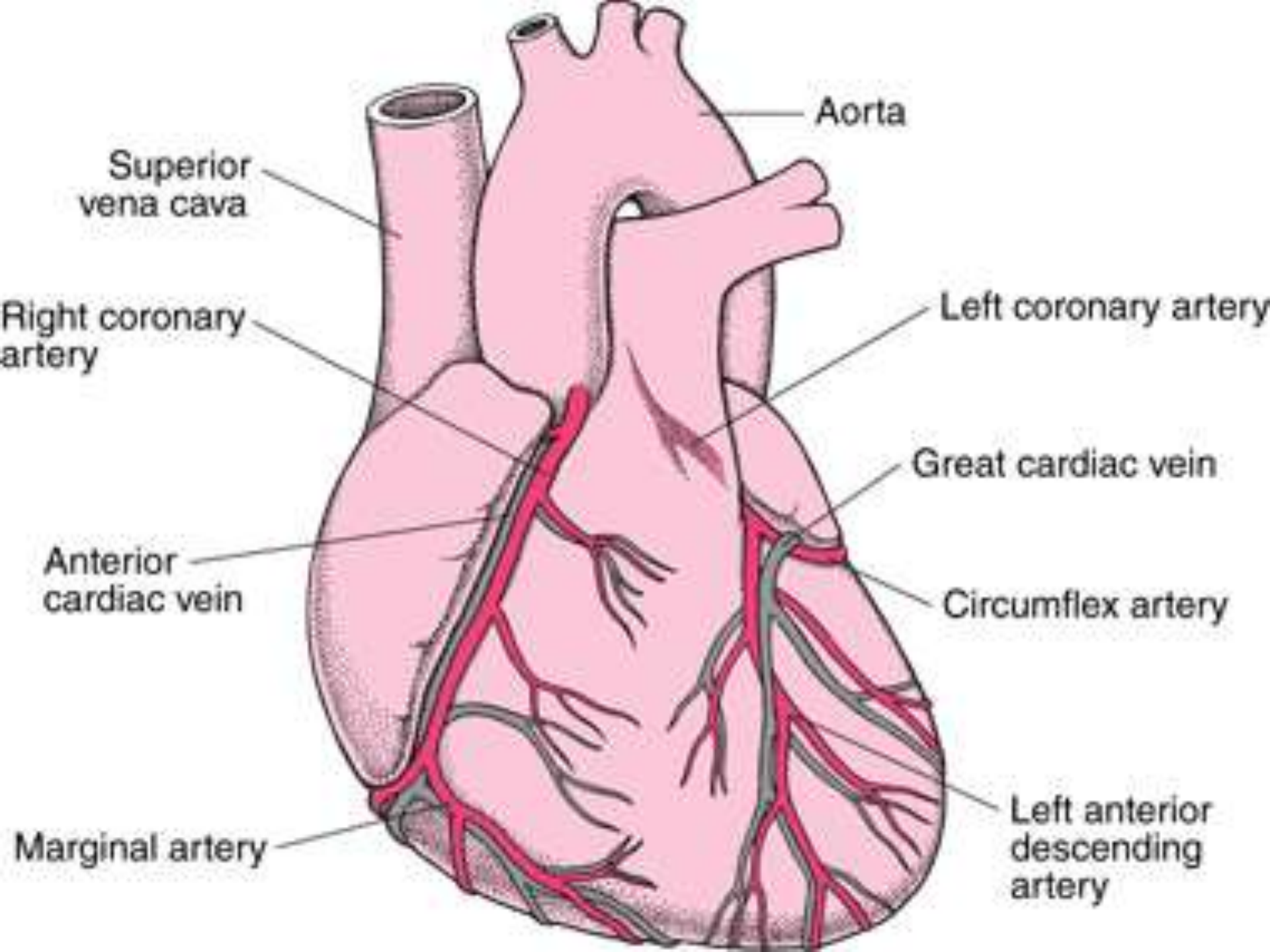
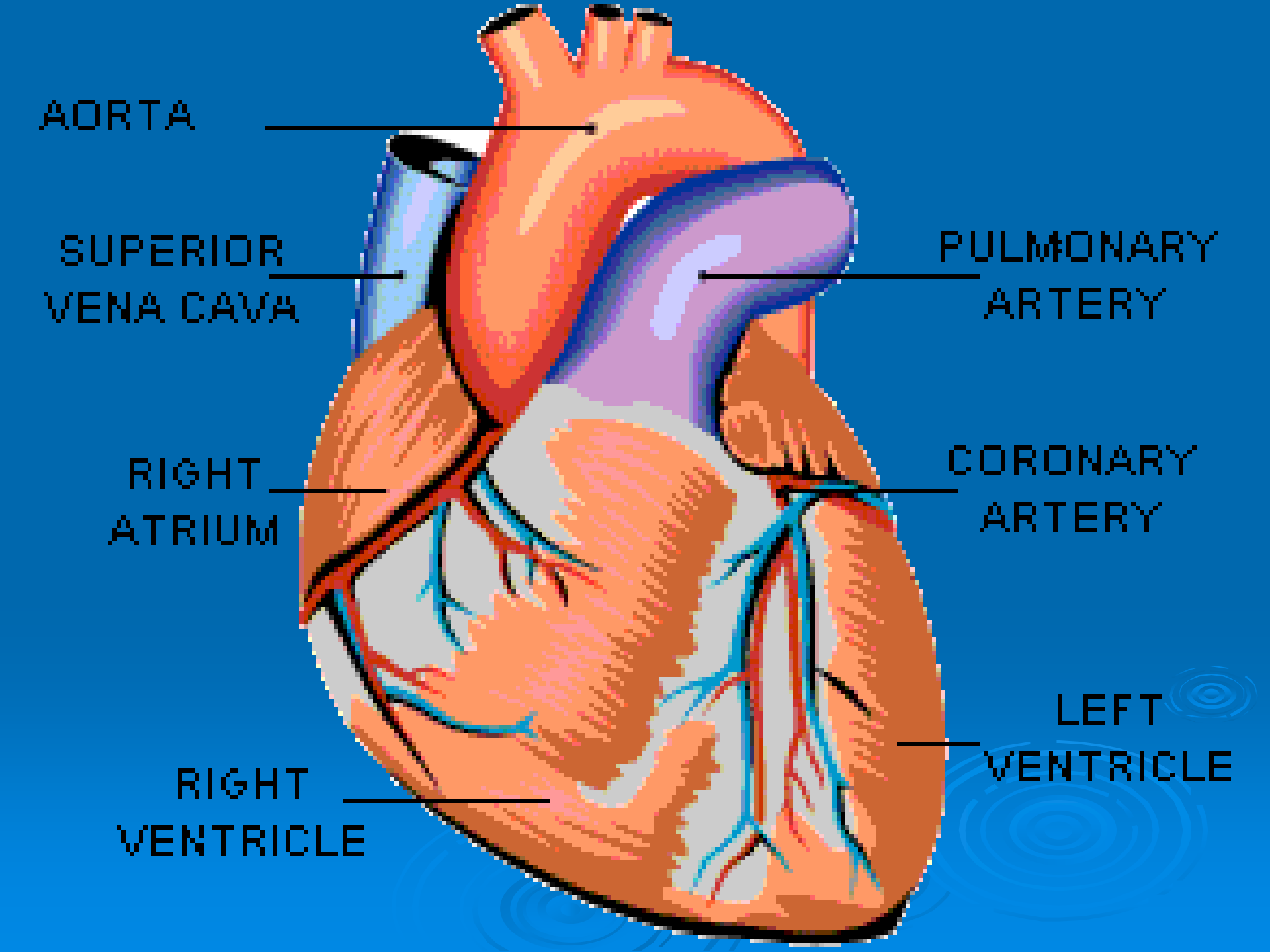
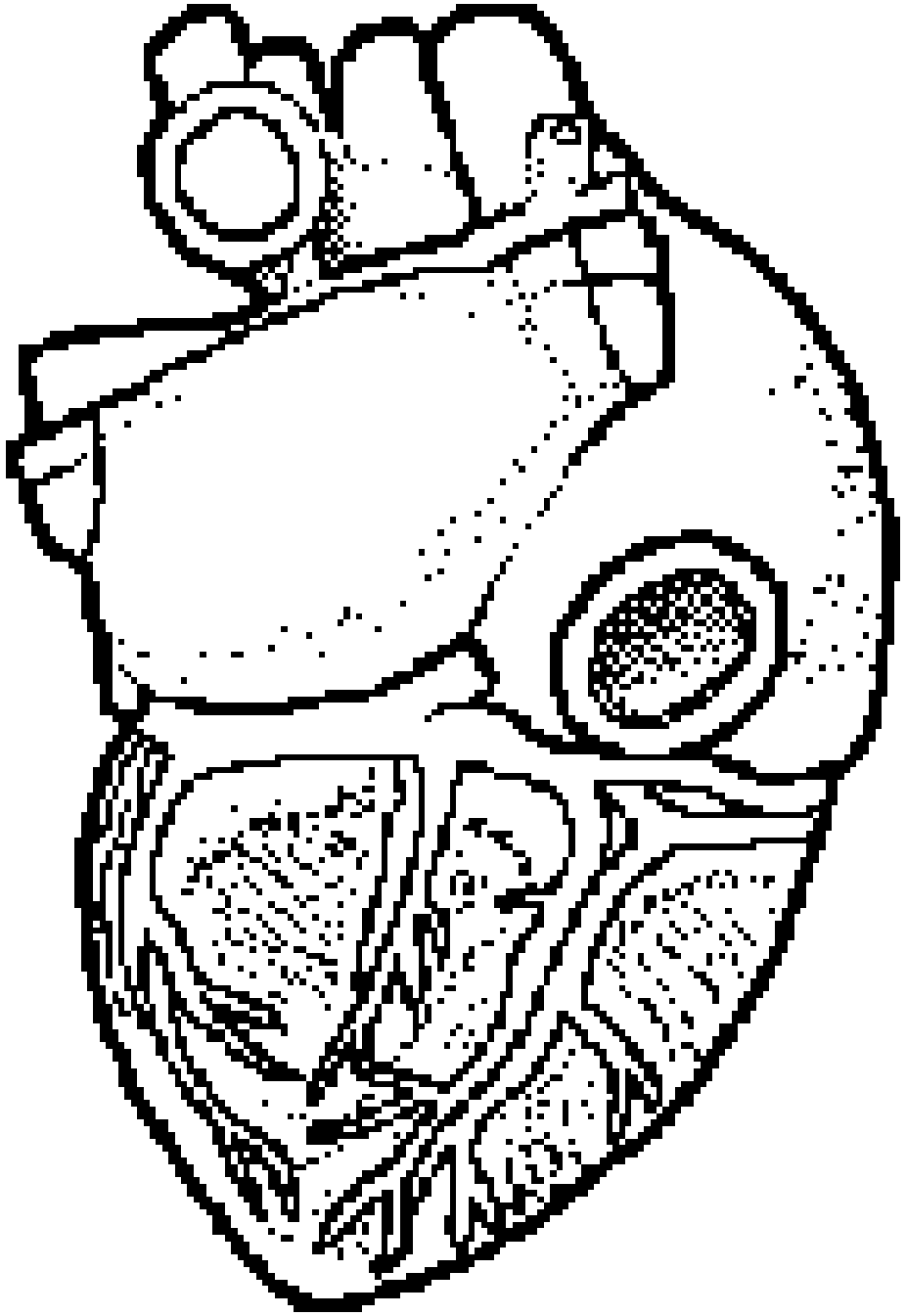
14
10

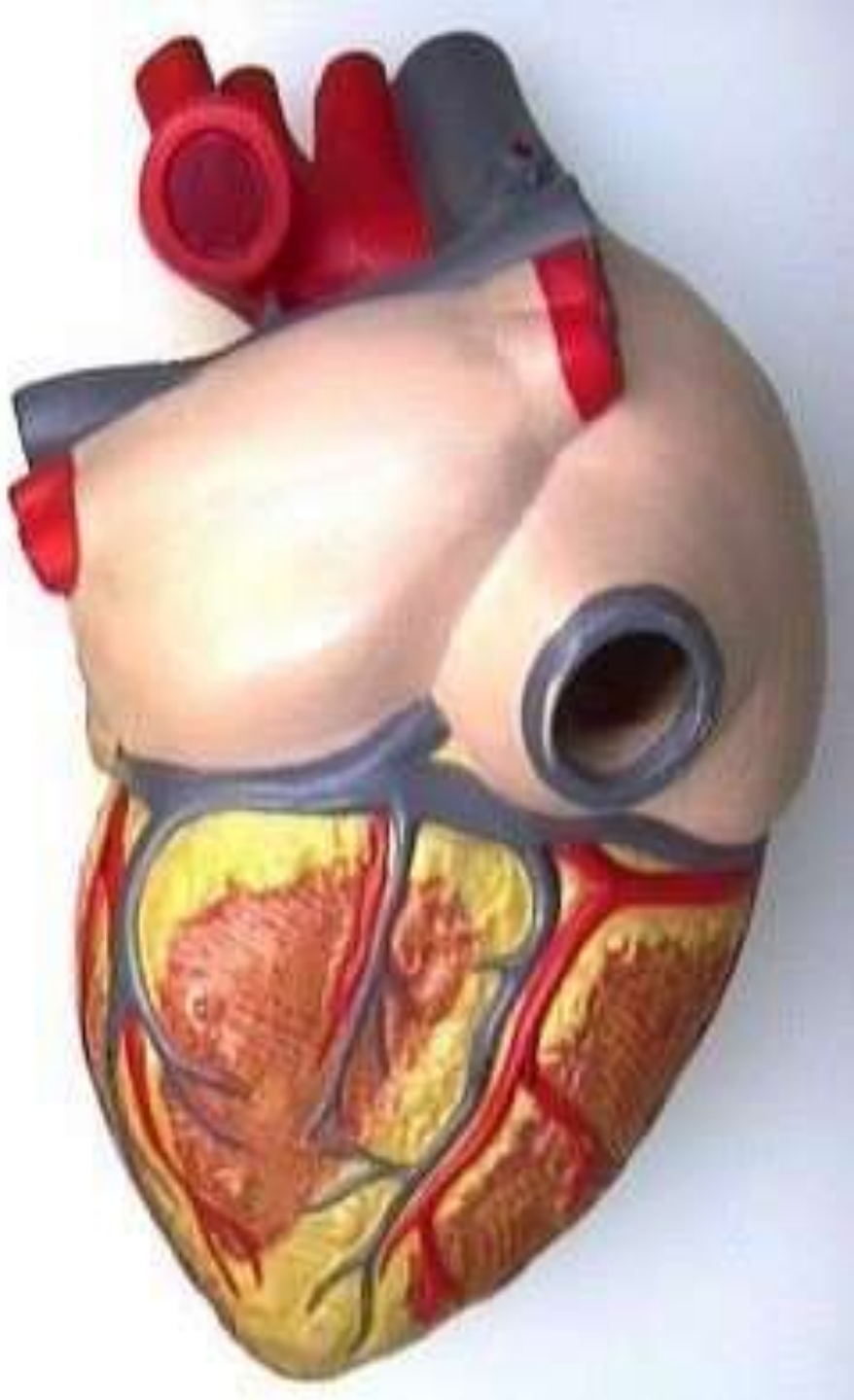

Aorta
Superior vena cava
Right coronary artery
Left coronary artery
Great cardiac vein
Anterior cardiac vein
Circumflex artery
Marginal artery
Left anterior descending artery

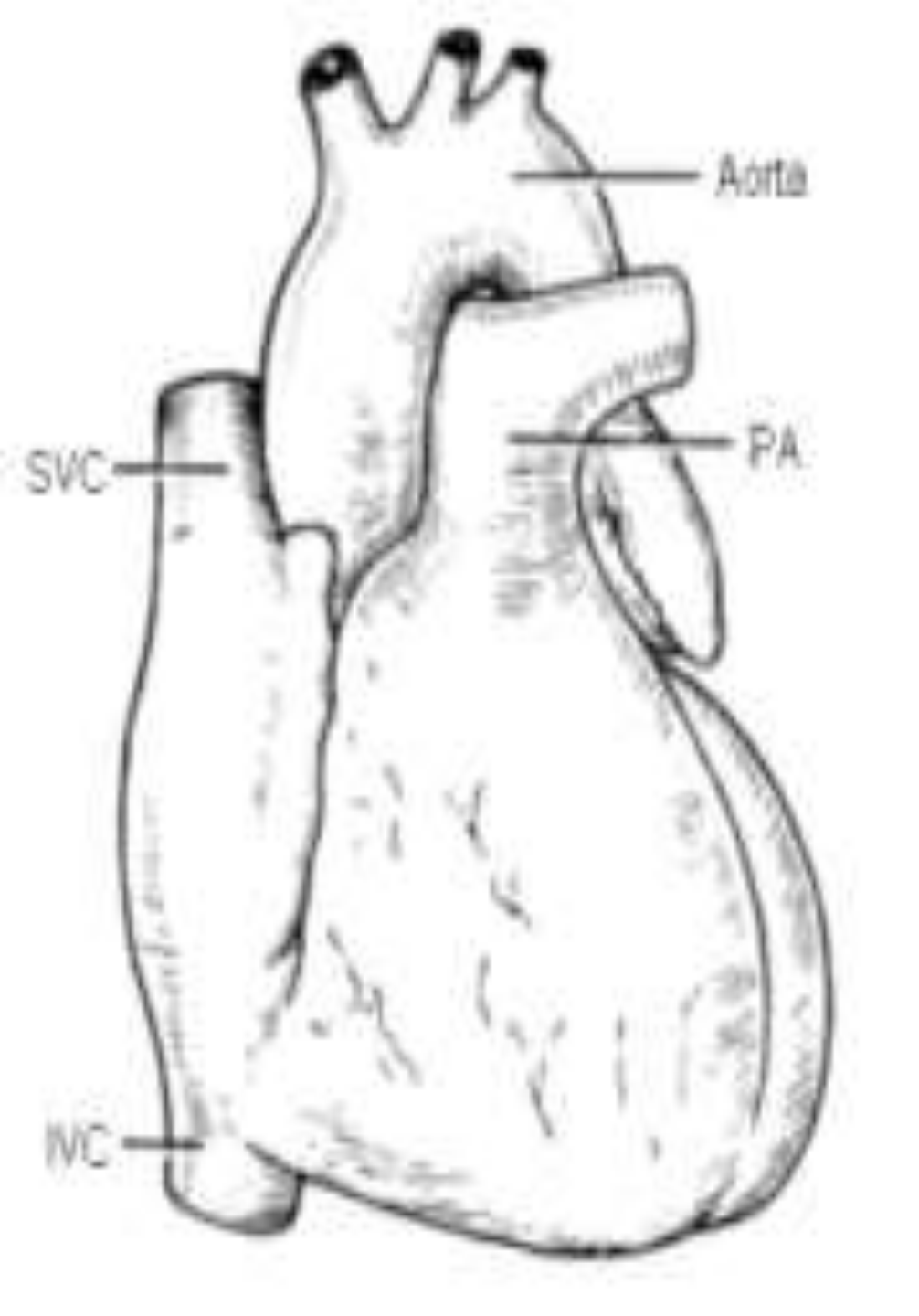
Nerve supply of the heart

- ***Cardiac plexuses*** : (situated below arch of aorta) provide sympathetic & parasympathetic nerve fibers of A.N.S.
- *Cervical & upper thoracic* portions of the **sympathetic trunks** → sympathetic supply .
- ***Vagus nerves*** → parasympathetic supply.
- Rt. & Lt. vagi supply the lungs & esophagus then passes through ***esophageal opening*** in diaphragm to reach the stomach (T10).
- **Rt. Vagus** → *cardiac branches & Rt. Recurrent laryngeal nerve* .
- **Lt. Vagus** → origin to *Lt. recurrent laryngeal nerve* .


AORTA
SUPERIOR VENA CAVA
PULMONARY ARTERY
RIGHT ATRIUM
CORONARY ARTERY
LEFT VENTRICLE
RIGHT VENTRICLE






Aorta
PA
SVC
IVC