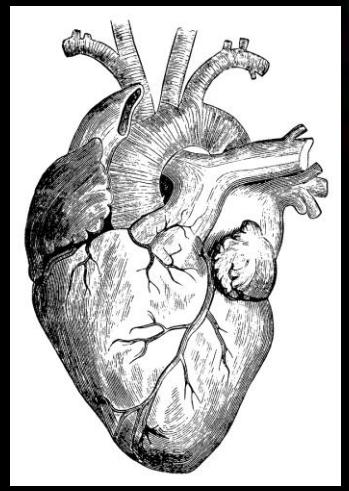
THE HEART



MUDr. Azzat Al-Redouan

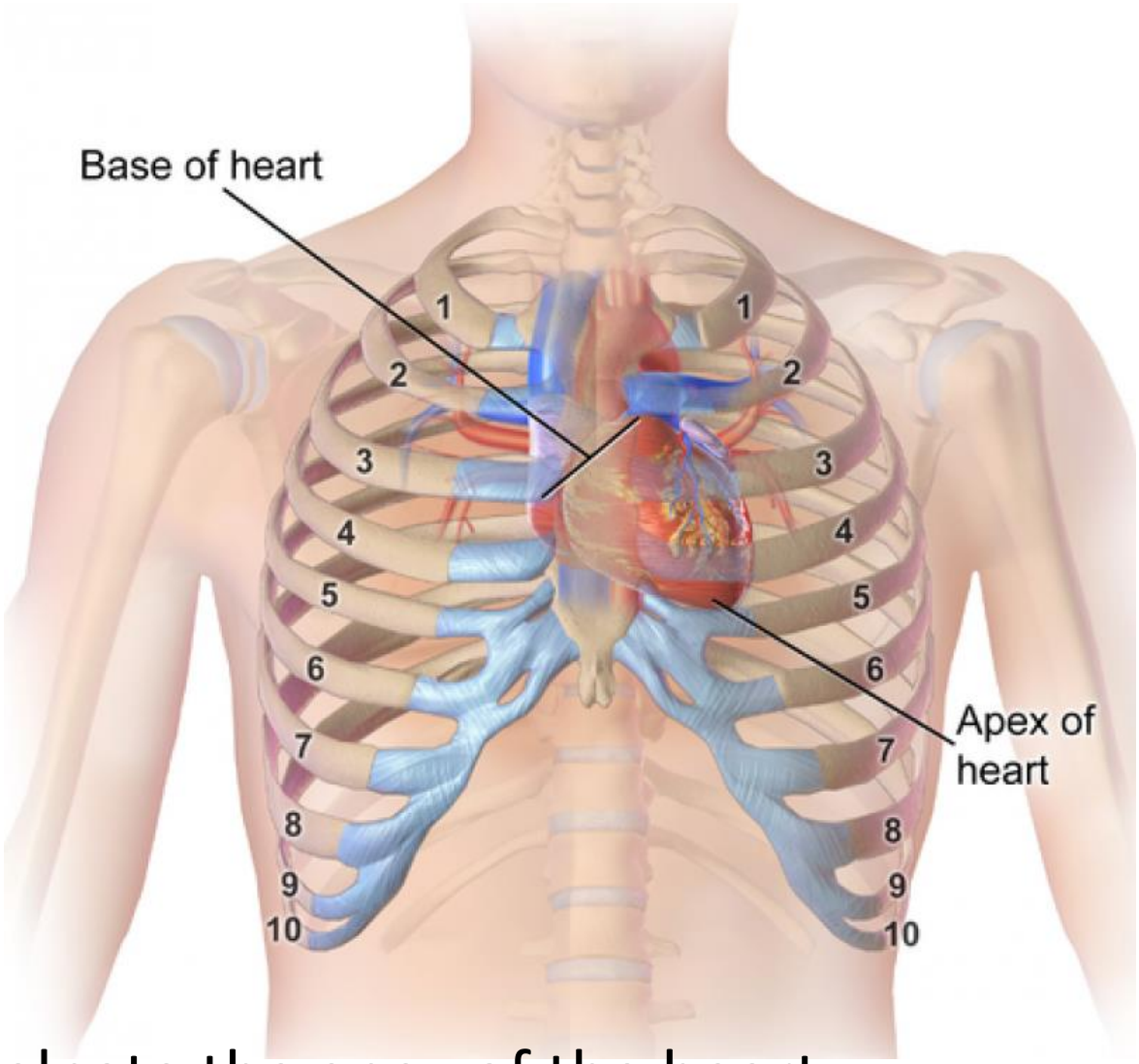
Jan.2022

How does my anatomy knowledge of the heart apply in basic medicine ?!!

A) Structural anomalies ↑↓ B) Functional anomalies → **Mechanical Disturbances**

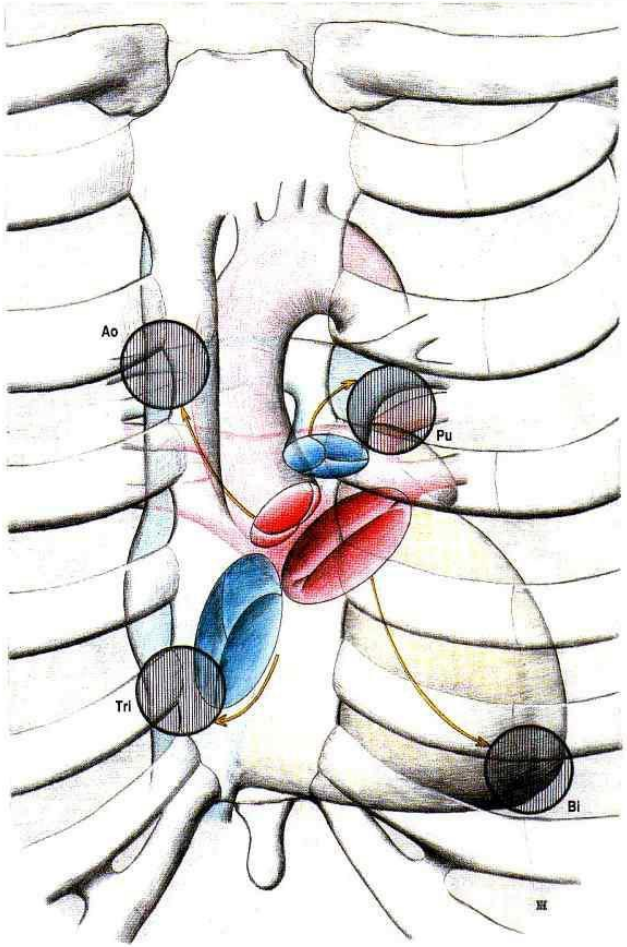
1) **Arrest** → Cease of contraction
2) **Failure** → Insufficient pump (blood stasis) a) Right b) Left
3) **Arrhythmia** → Irregular conduction
4) **Rate** → Shift in ANS control a) ↑ Tachycardia b) ↓ Bradycardia
5) **Infarction** → Defect in coronary arteries
6) **Valvular** → a) Def-Closure → **Regurgitation** b) Def-Opening → **Stenosis**
7) **Congenital Malformation** → Abnormal structures and function
8) **Wall** → *Septal-Nonseptal *Endocardium, Myocardium, Pericardium
9) **Trauma** → Damage to structures
10) **Mediastinum** → Defect within anatomical topography

5th left intercostal space at miclavicular line



- It’s where you can palpate the apex of the heart. *[clinical physical examination]
- Stab by a sharp object will penetrate the heart!!! *[traumatology]

“Auscultation points”



Sites of auscultation of valves

AORTIC
PULMONIC
TRICUSPID
MITRAL

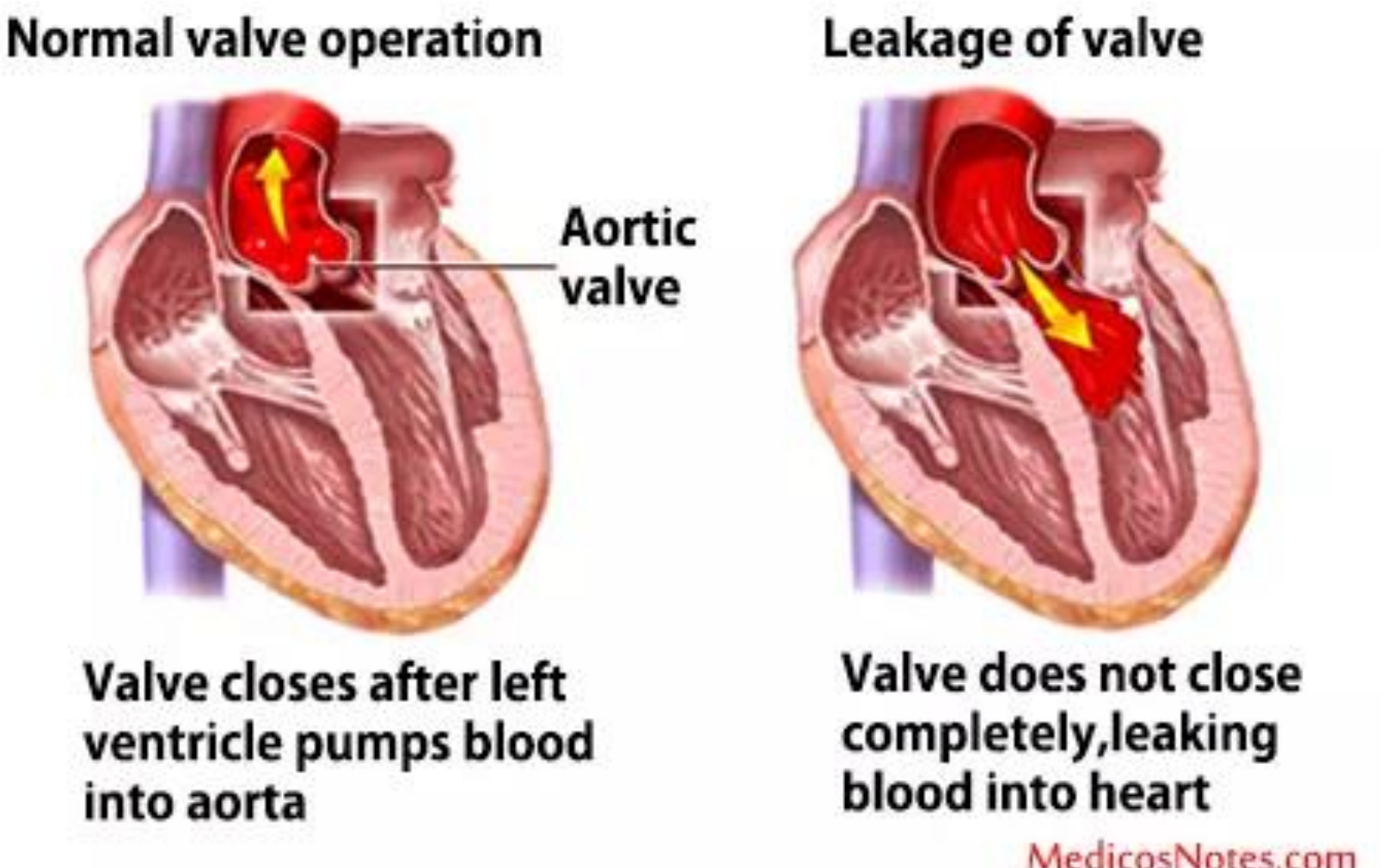
1 1
2 2
3 3
4 4
5 5
6 6
7 7

Location of valves

PULMONIC
AORTIC
TRICUSPID
MITRAL

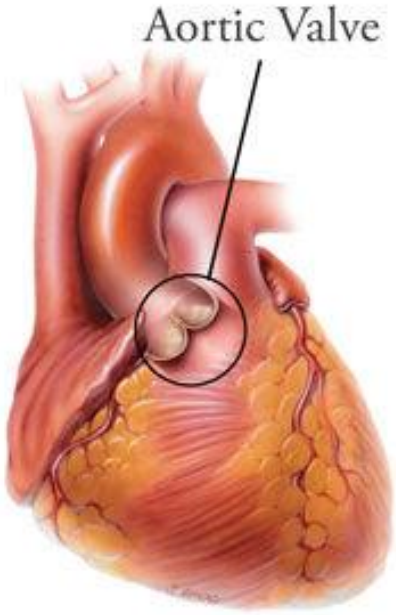
Abnormal Valve Closure → Regurgitation

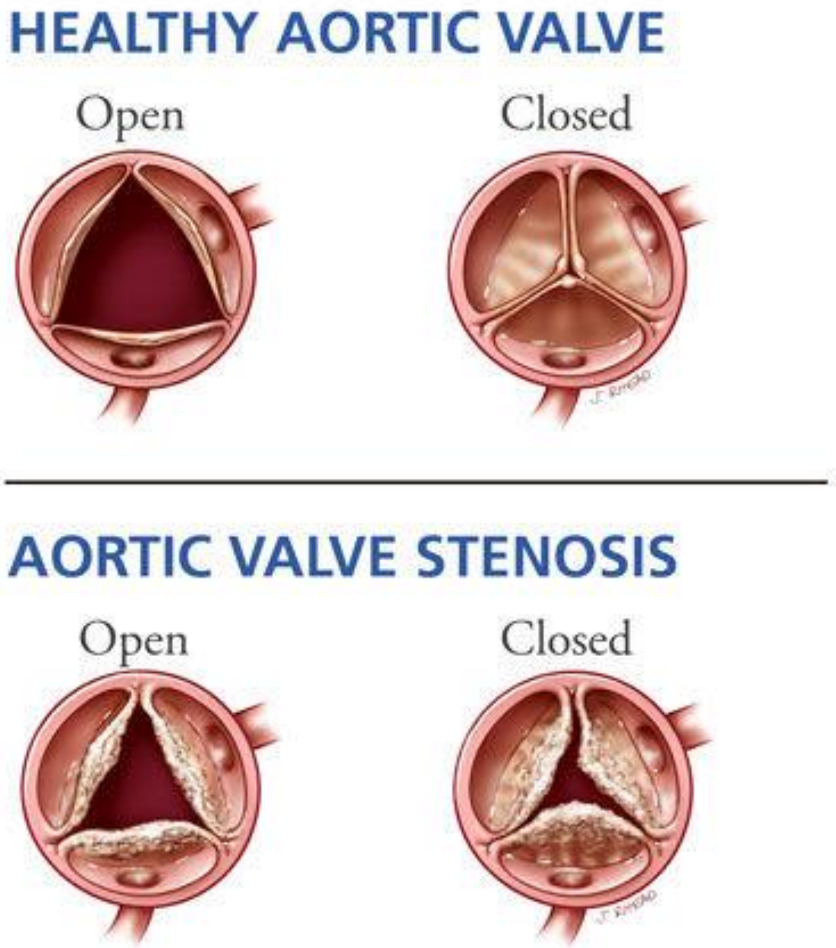
BACKFLOW

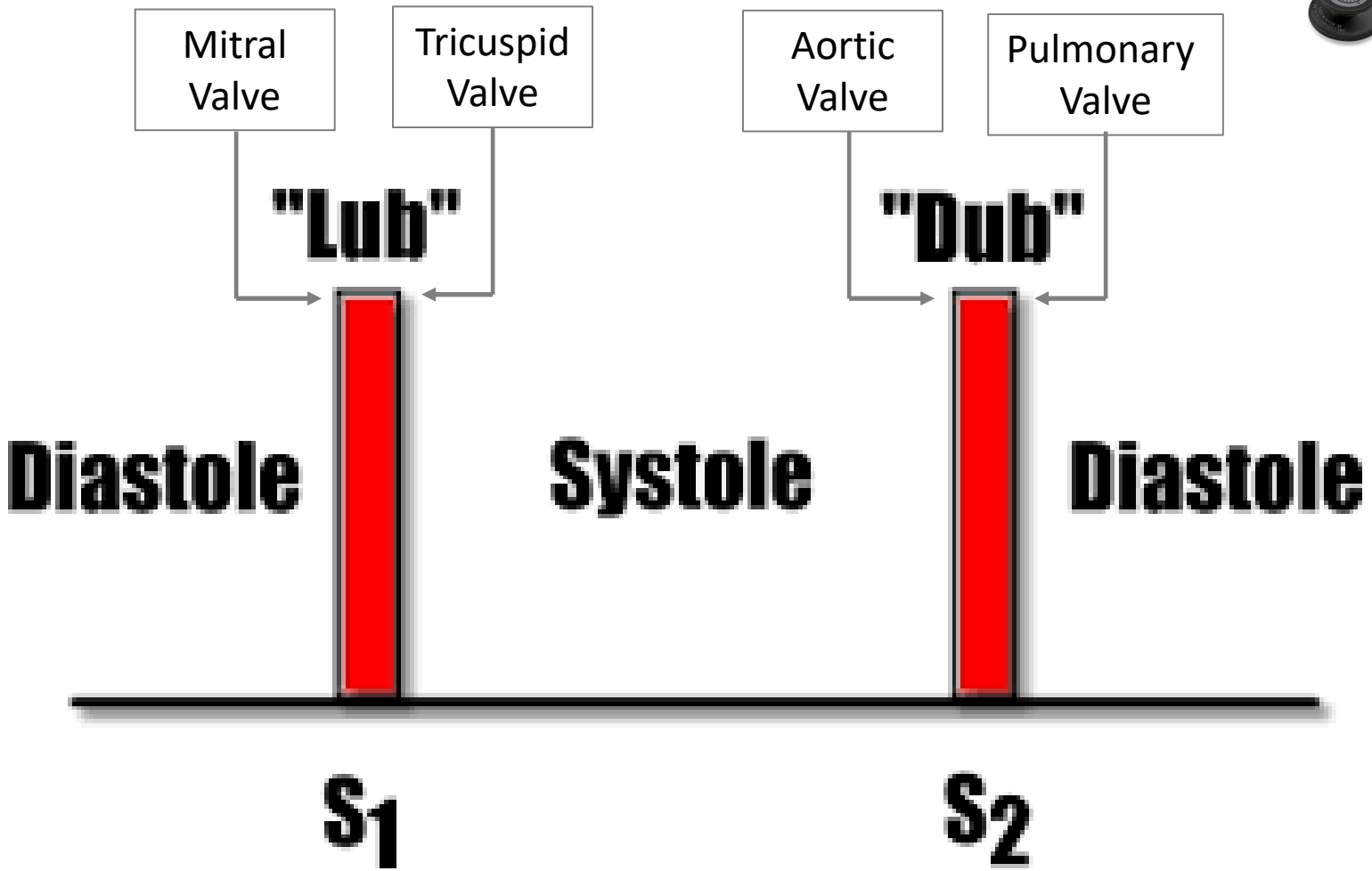


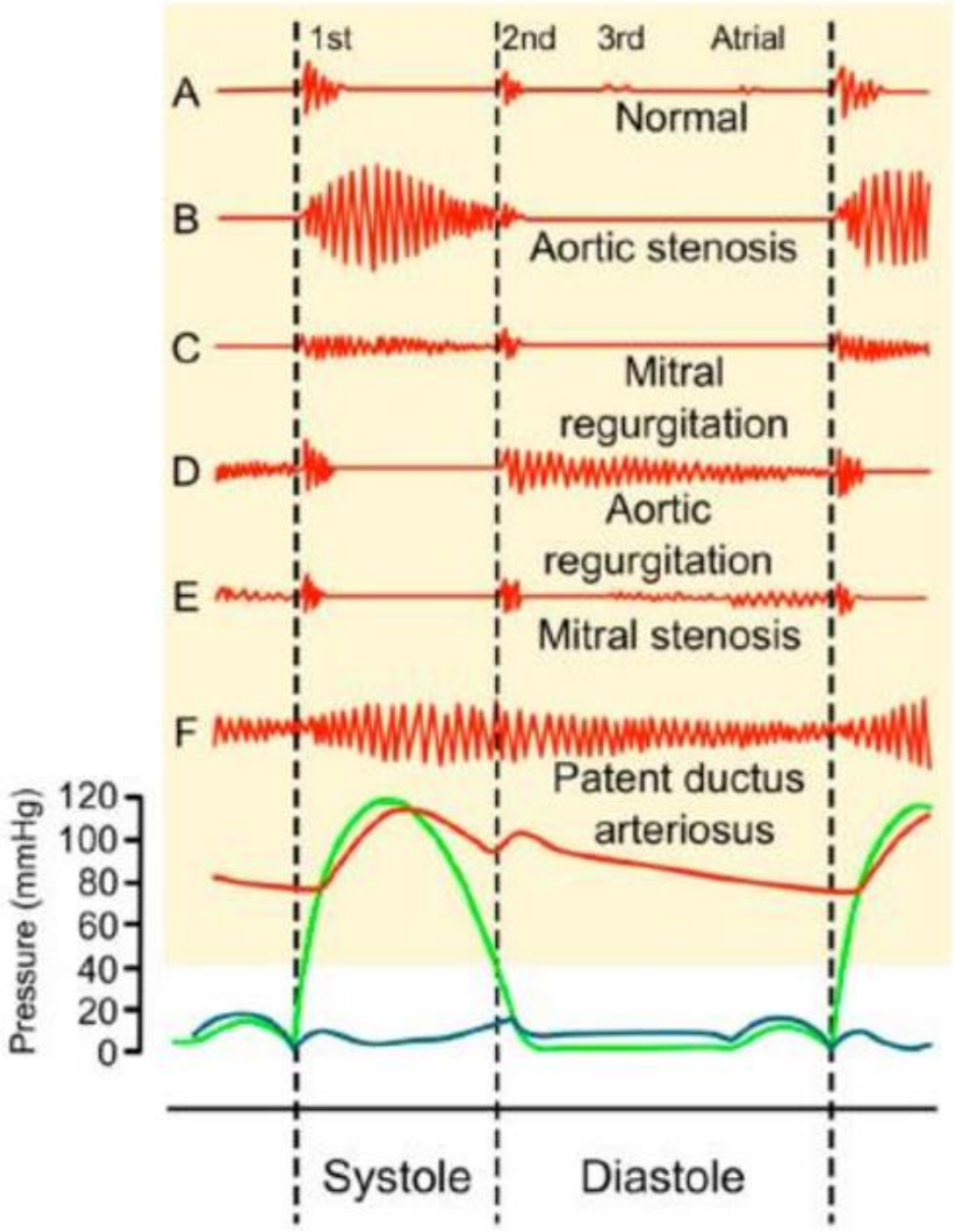
Abnormal Valve Opening → Stenosis

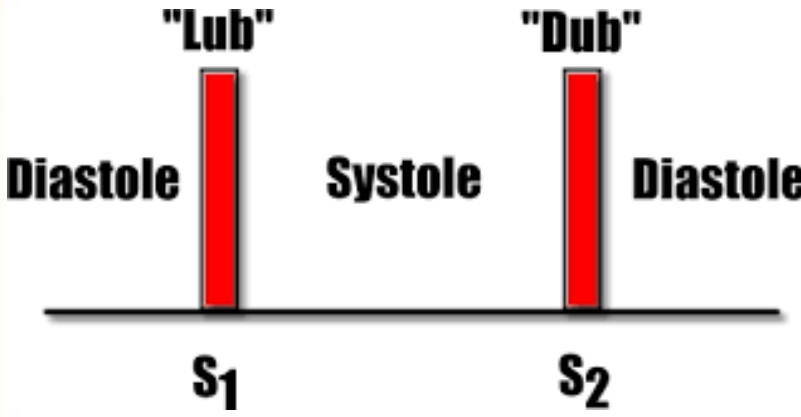
OUTFLOW OBSTRUCTION





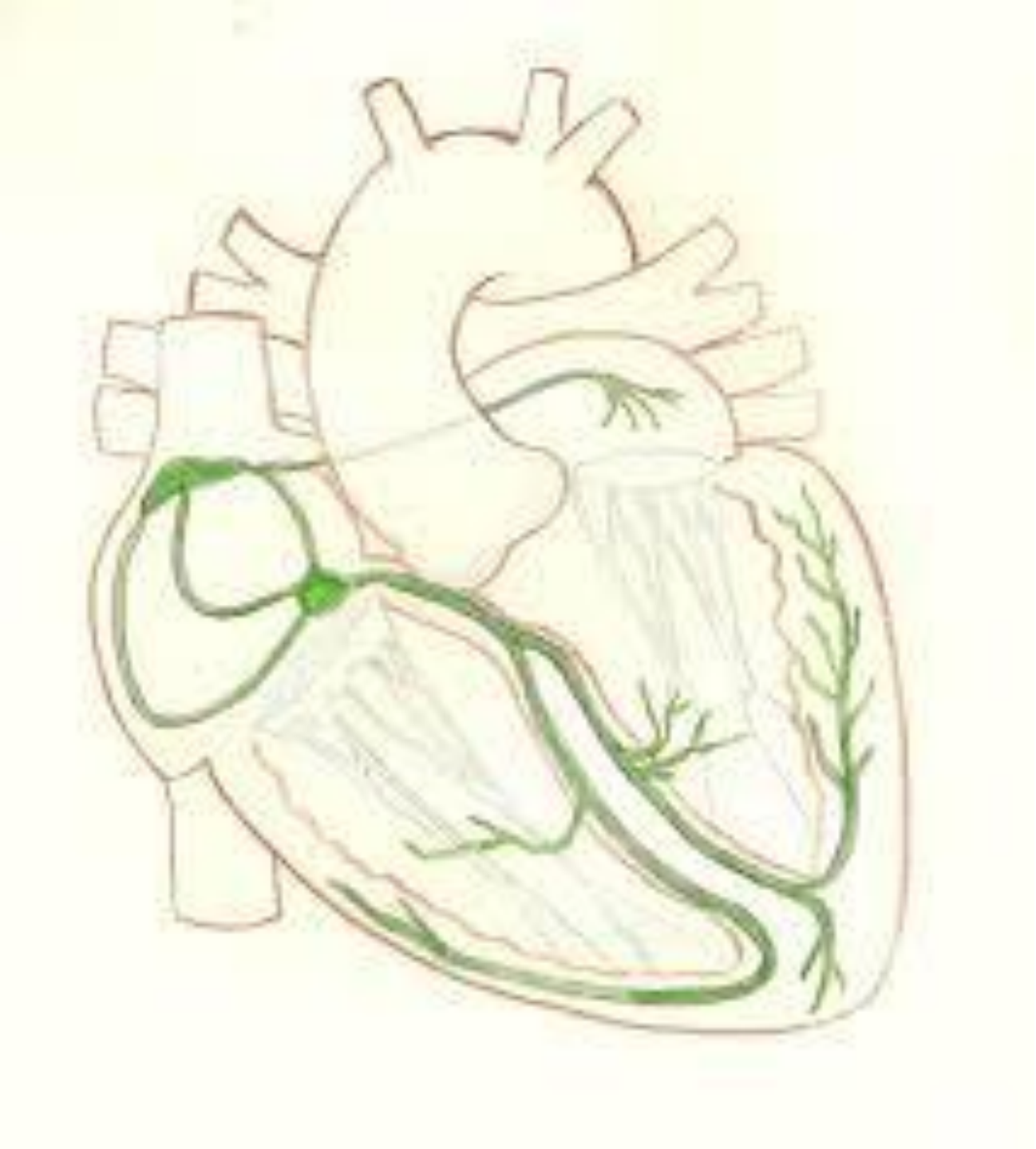

Mitral Valve
Tricuspid Valve
"Lub"
Aortic Valve
Pulmonary Valve
"Dub"
Diastole
Systole
Diastole
S1
S2


1st
2nd
3rd
Atrial
A
Normal
B
Aortic stenosis
C
Mitral regurgitation
D
Aortic regurgitation
E
Mitral stenosis
F
Patent ductus arteriosus
Pressure (mmHg)
120
100
80
60
40
20
0
Systole
Diastole


"Lub"
"Dub"
Diastole
Systole
Diastole
S1
S2

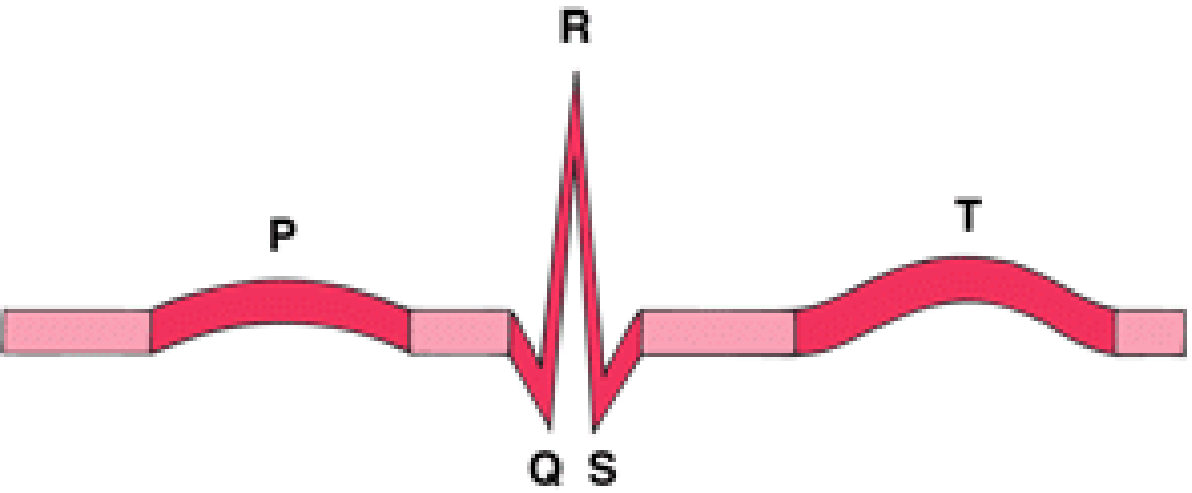
“Auscultation points”

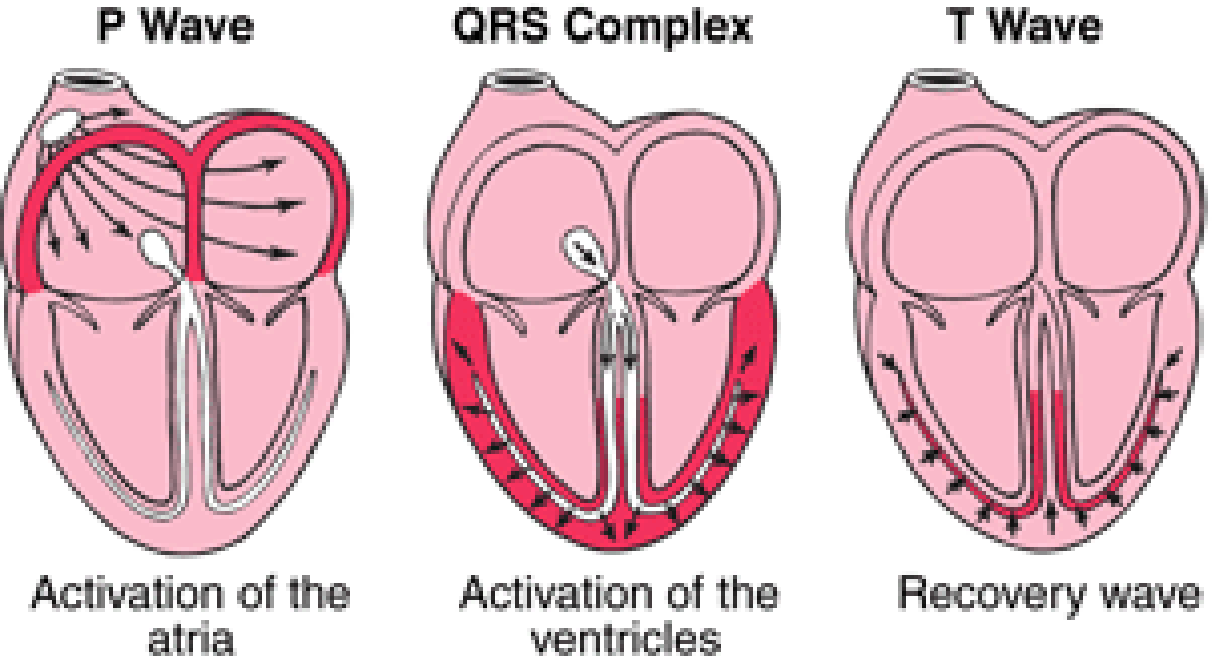
- Anatomic location
- Corresponding functional structures
- ***Practice it to master it’s locations!***



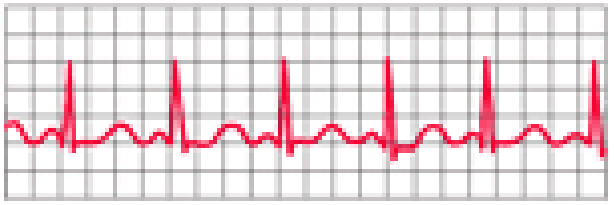
EKG/ECG in relation to heart anatomy

60 -100 beats/min

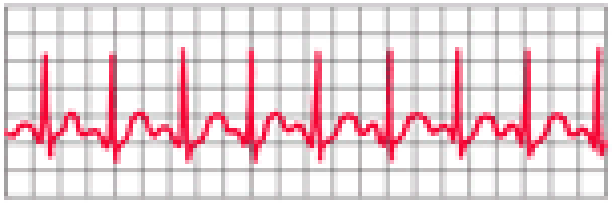




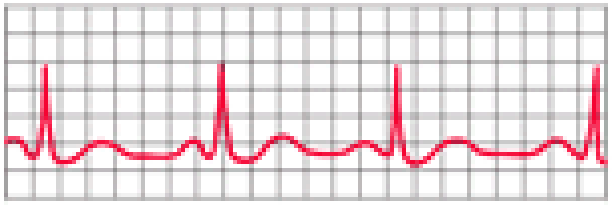
Normal Heartbeat



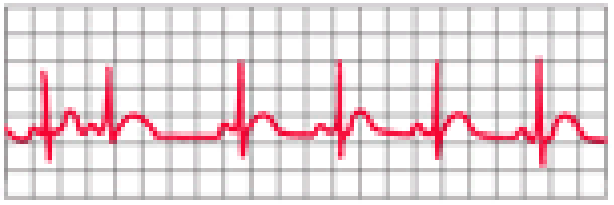
Fast Heartbeat

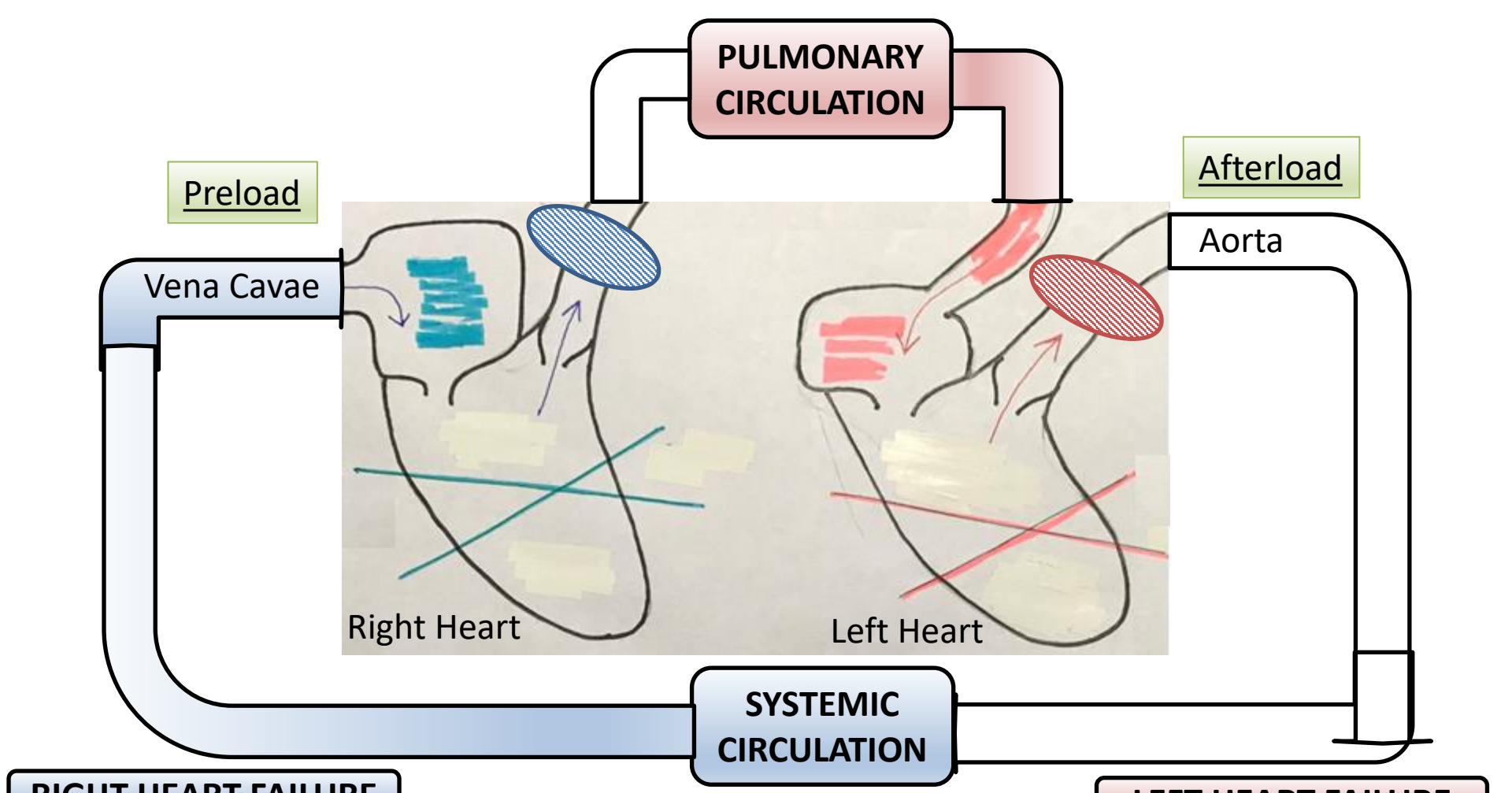


Slow Heartbeat



Irregular Heartbeat





RIGHT HEART FAILURE

- ↑ Preload
- ↓ blood flow into lungs
- Blood accumulation in systemic circulation
- Edema in legs

↓ O2 - Cynosis

LEFT HEART FAILURE

- ↑ Afterload
- ↓ blood flow into systemic circulation
- Blood accumulation in lungs
- Pulmonary hypertension

↑ Lungs P - Coughing

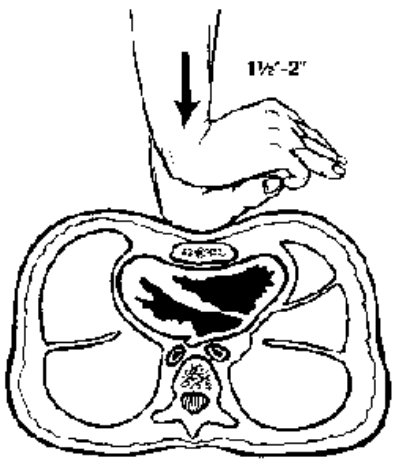
What is the concept of CPR (Cardiopulmonary resuscitation) ?

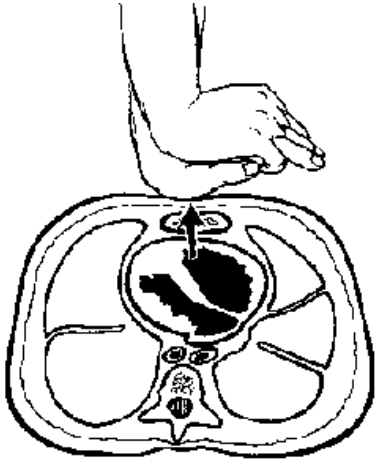
Compress → Squeezing heart between sternum and vertebrae → **Blood eject**

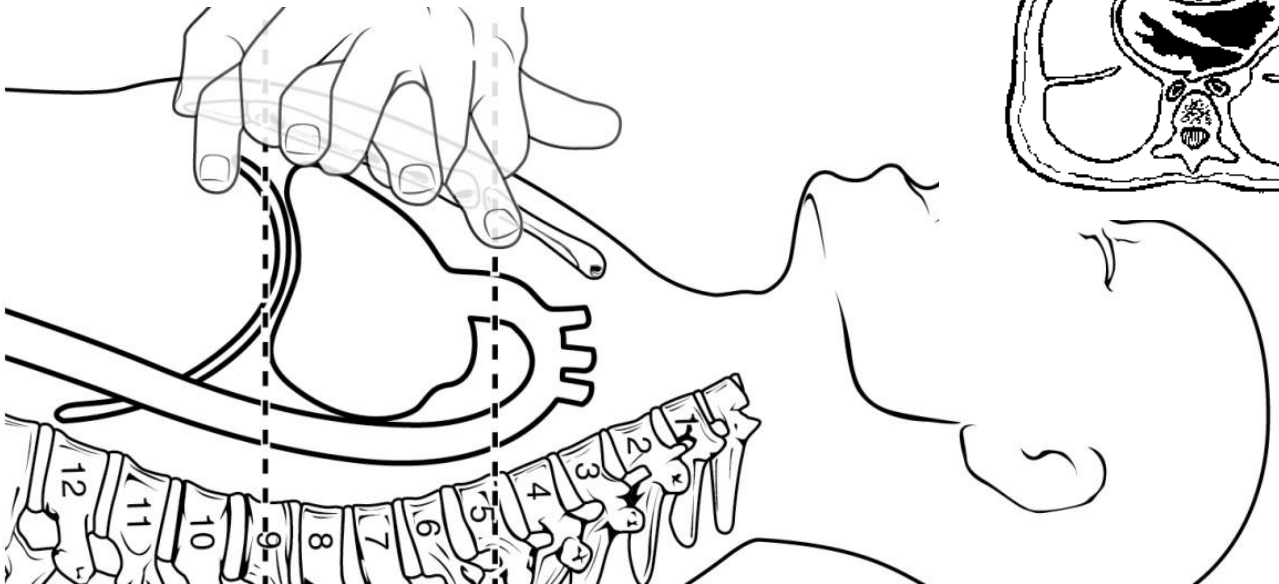
Decompress → heart chambers expand back → **Blood fill**

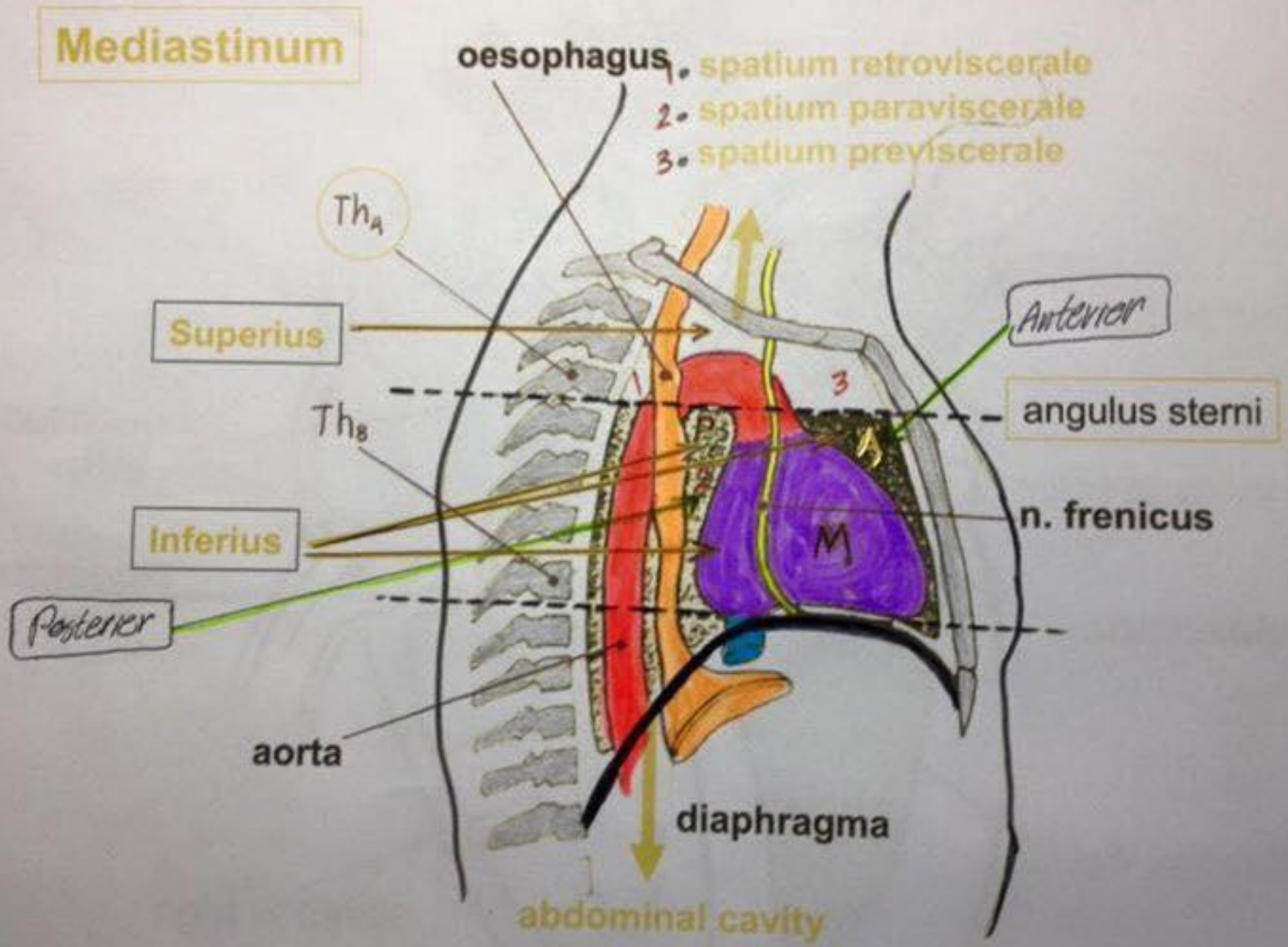
Cycles of compression → mechanical pump of blood

ENSURE CONTINOUS BLOOD SUPPLY TO THE ***BRAIN***

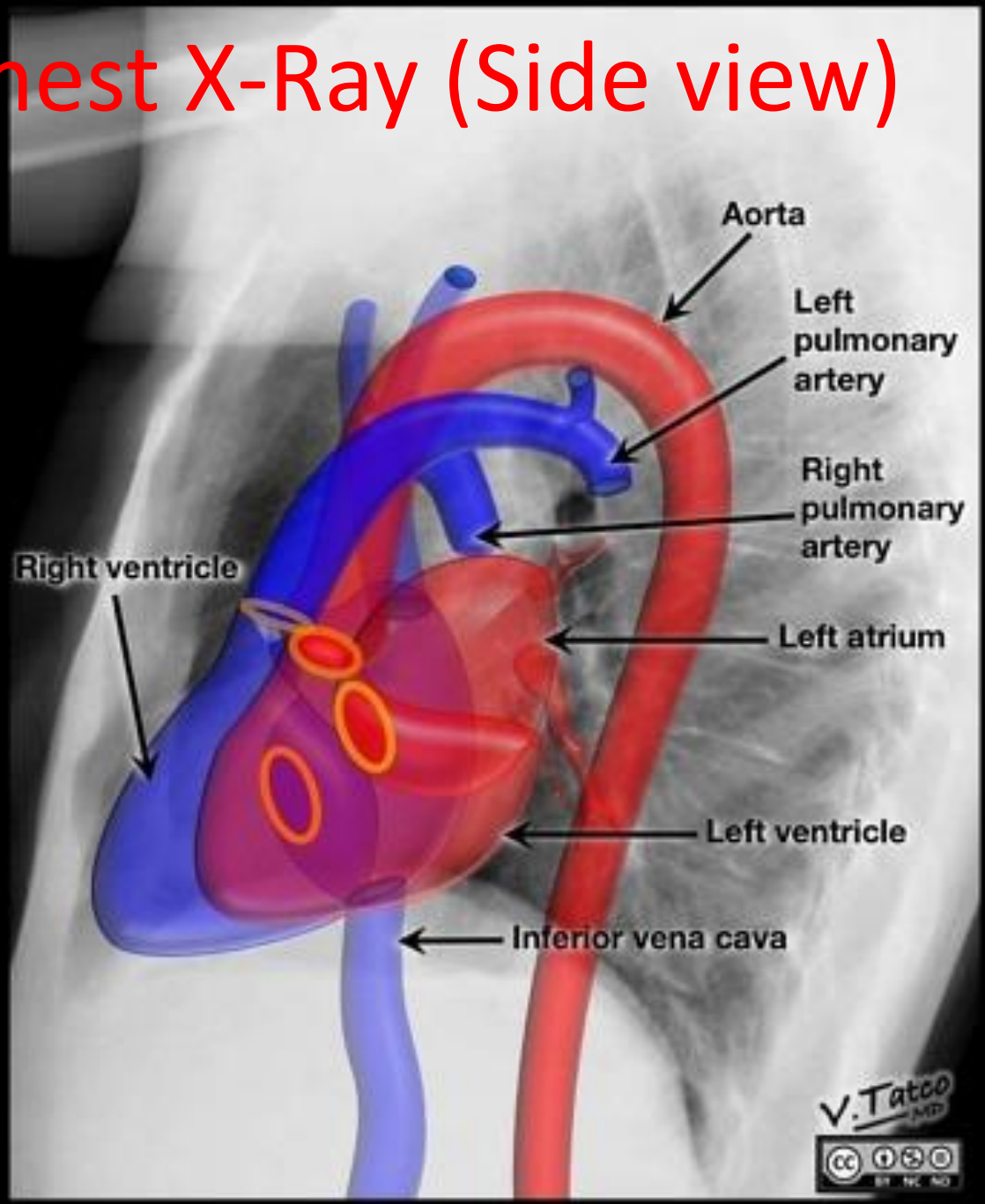




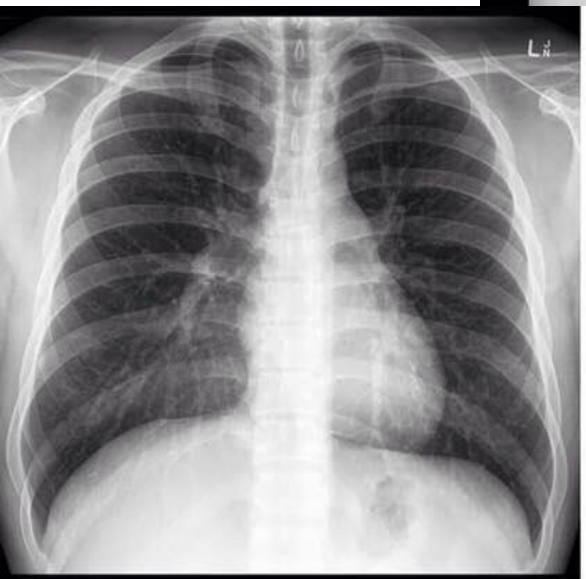


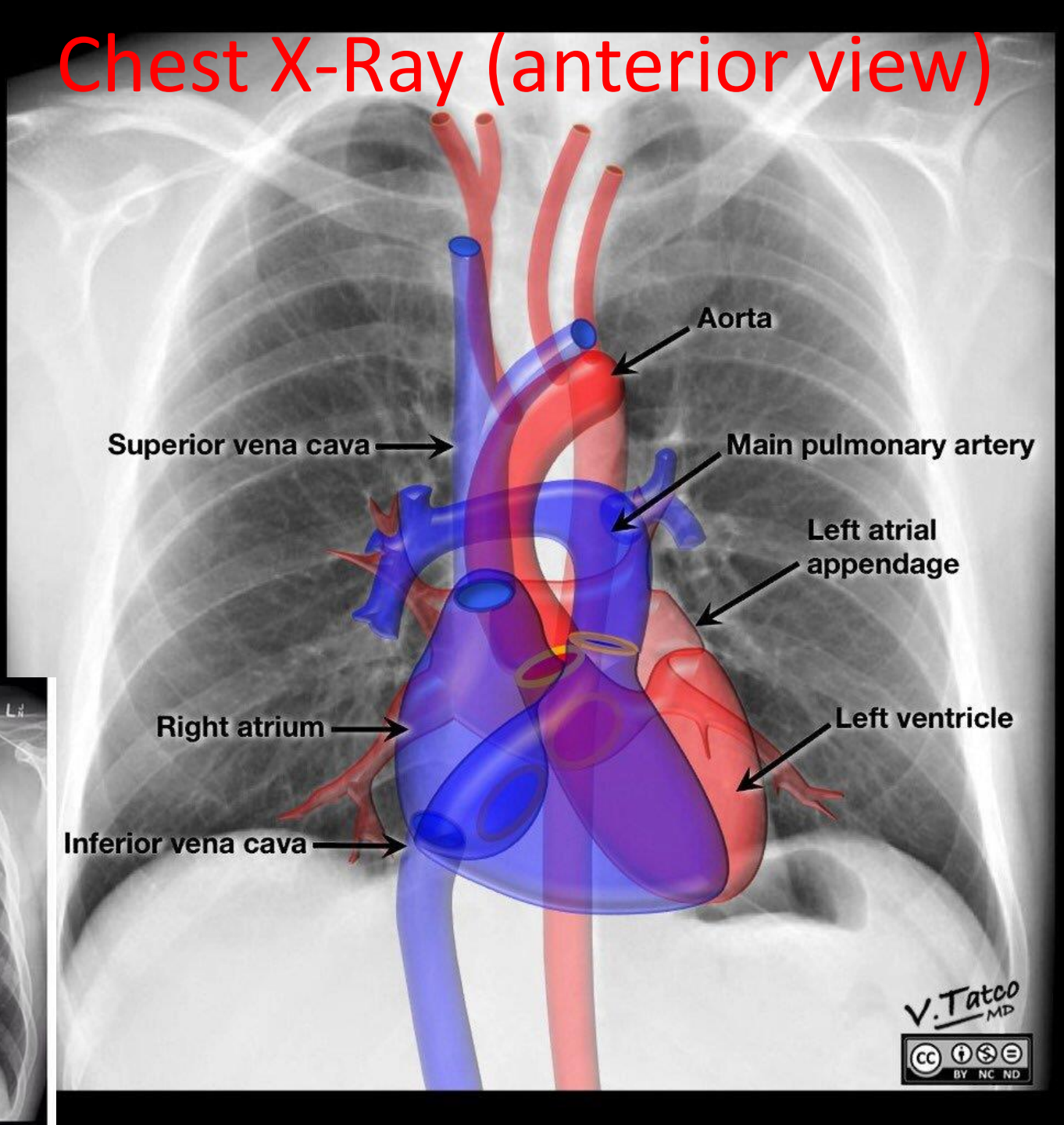

Mediastinum
oesophagus
1. spatium retroviscerale
2. spatium paraviscerale
3. spatium previscerale
Th4
Superius
Anterior
angulus sterni
Th8
Inferius
n. frenicus
Posterior
aorta
diaphragma
abdominal cavity

Chest X-Ray (Side view)

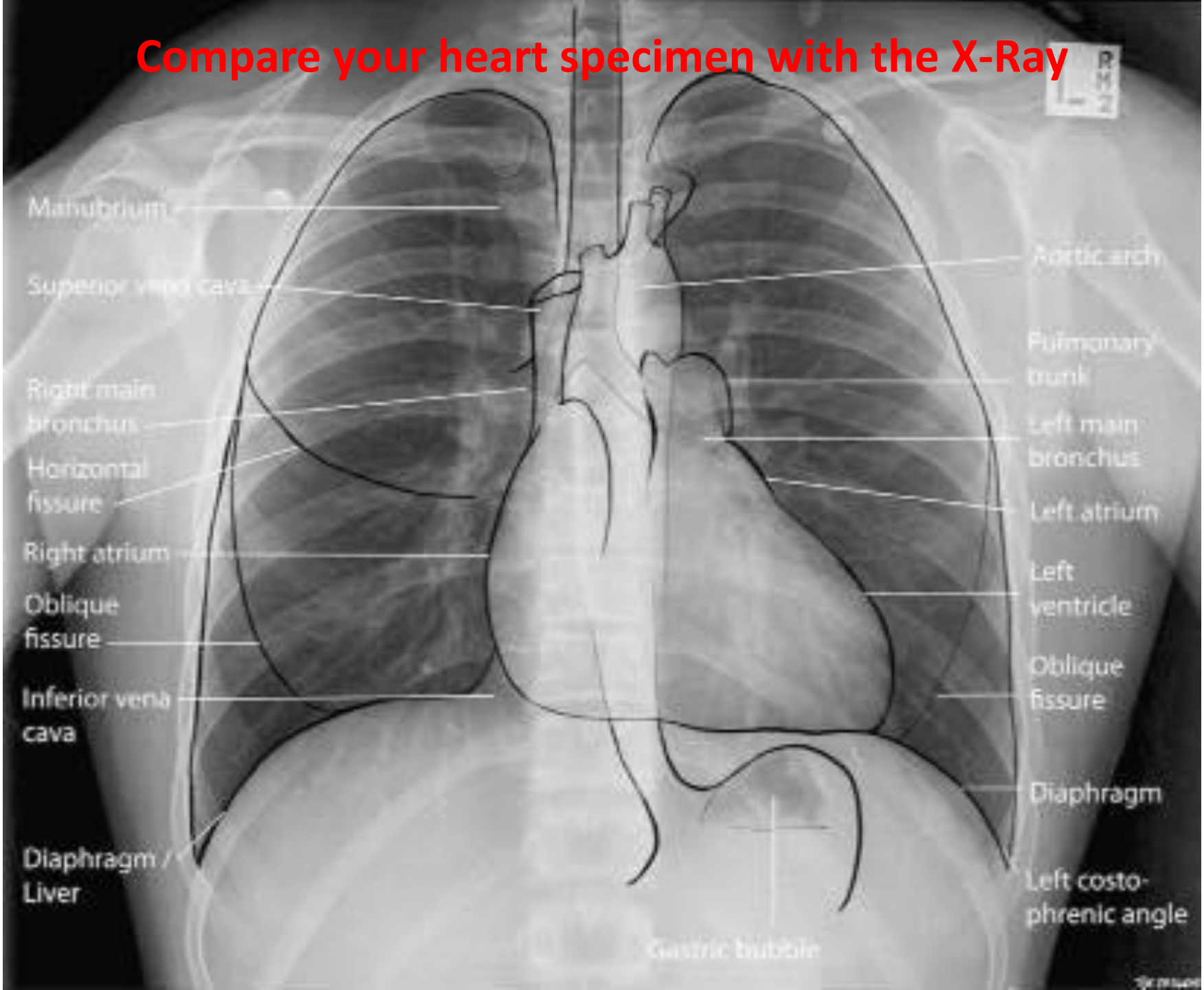


Chest X-Ray (anterior view)

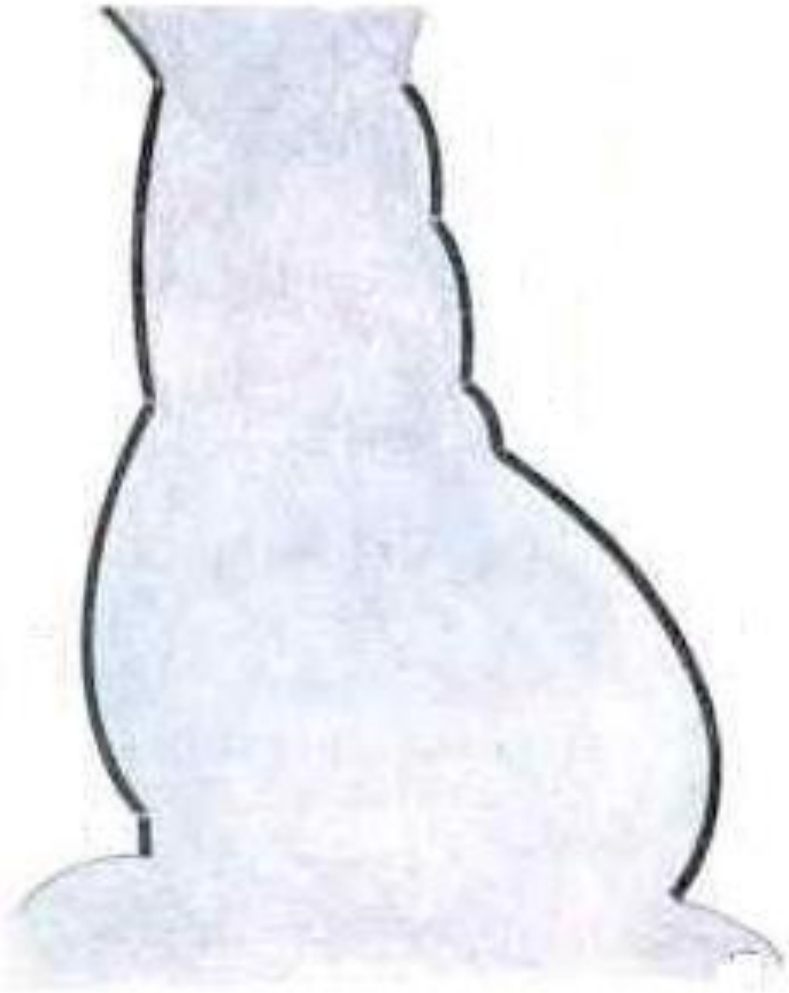


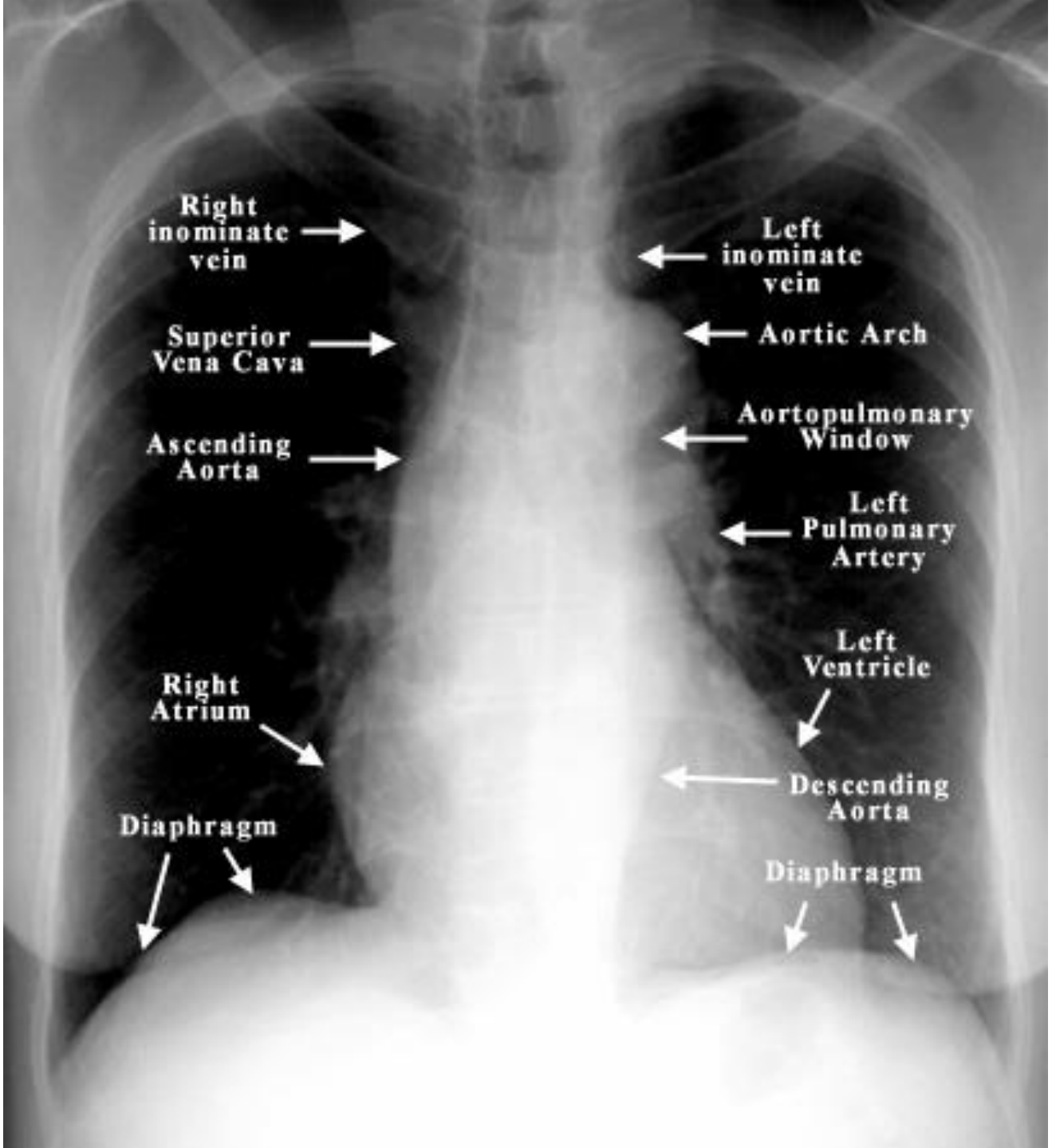


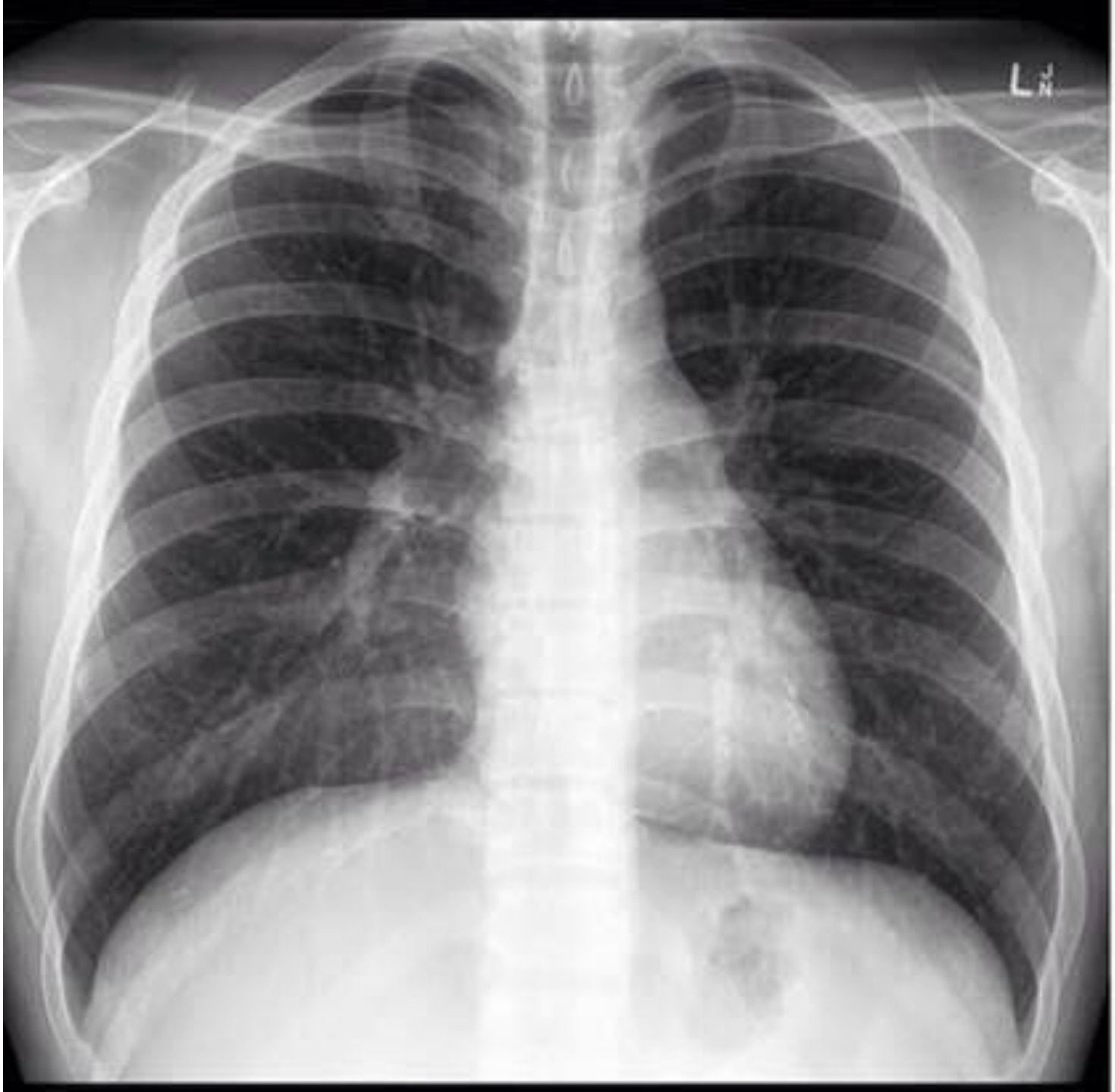
Compare your heart specimen with the X-Ray



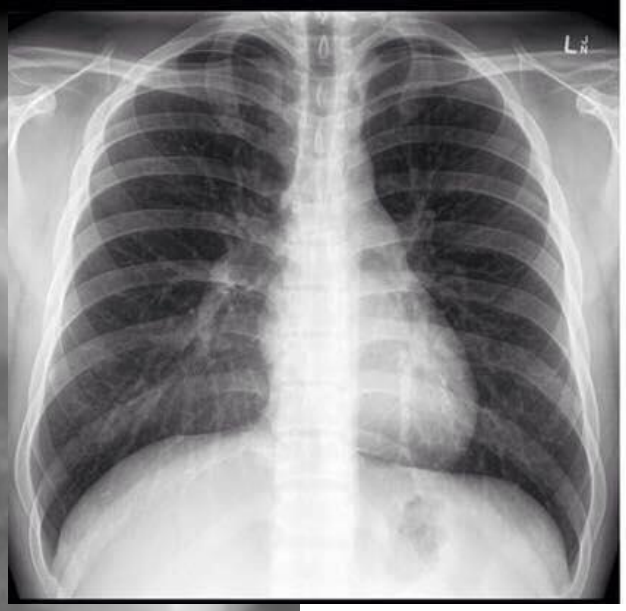
Heart silhouette



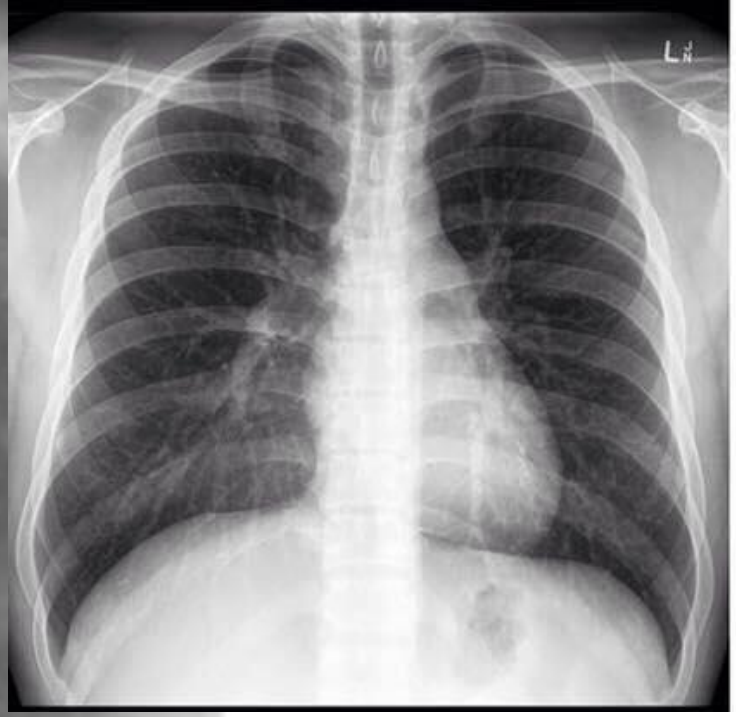

Right inominate vein
Superior Vena Cava
Ascending Aorta
Right Atrium
Diaphragm
Left inominate vein
Aortic Arch
Aortopulmonary Window
Left Pulmonary Artery
Left Ventricle
Descending Aorta
Diaphragm



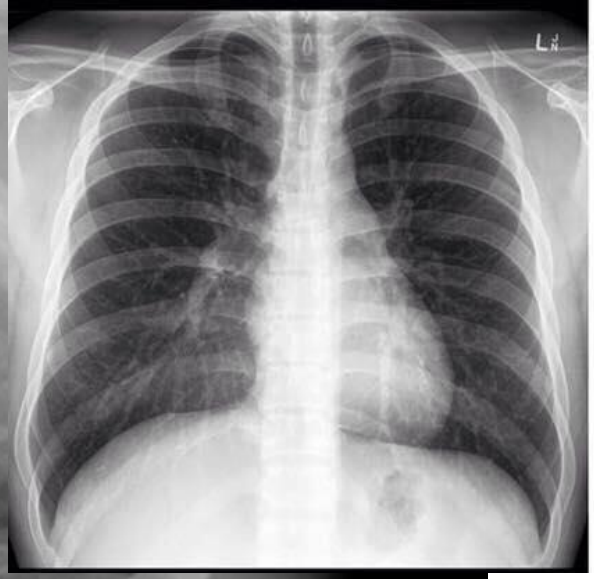
Cardiomegaly



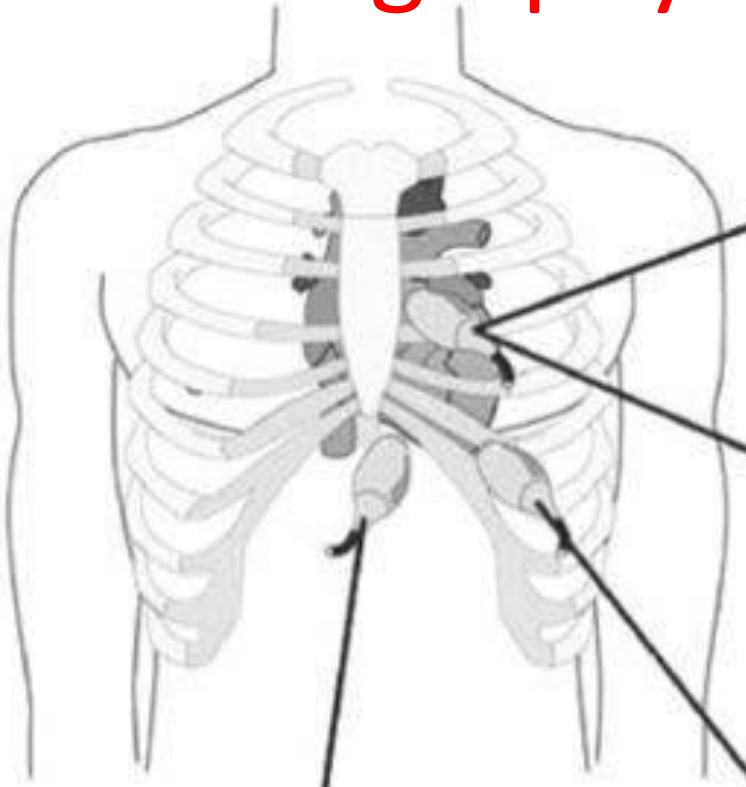
Left Ventricular Hypertrophy



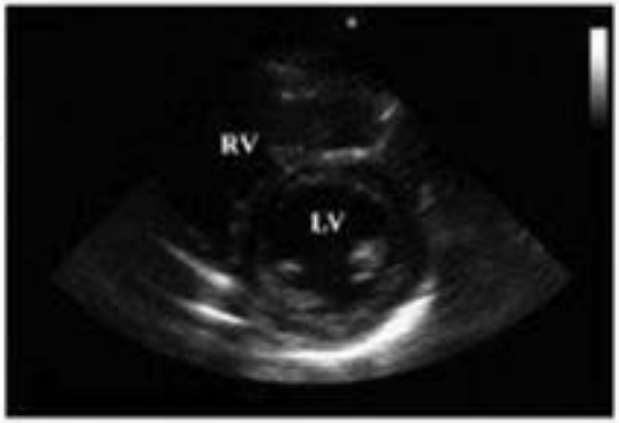
Right Ventricular Hypertrophy



Ecocardiography



A



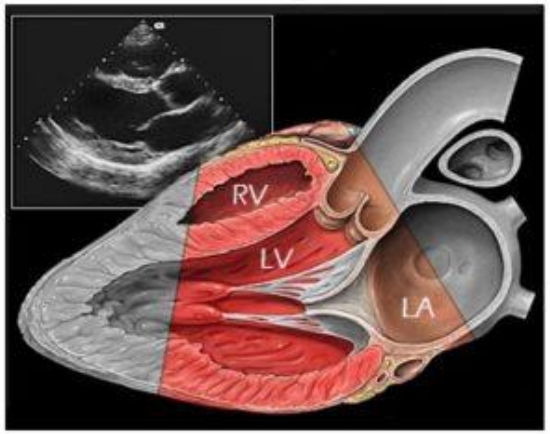
B

D

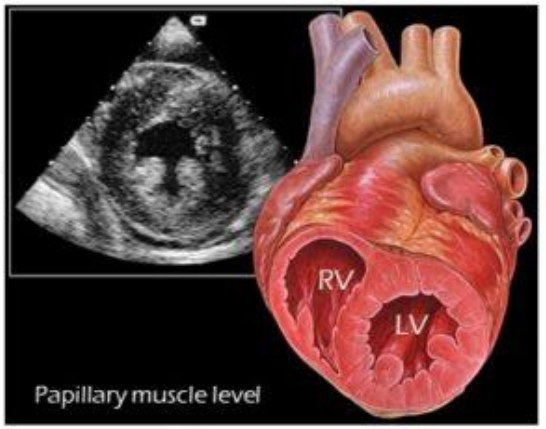
C

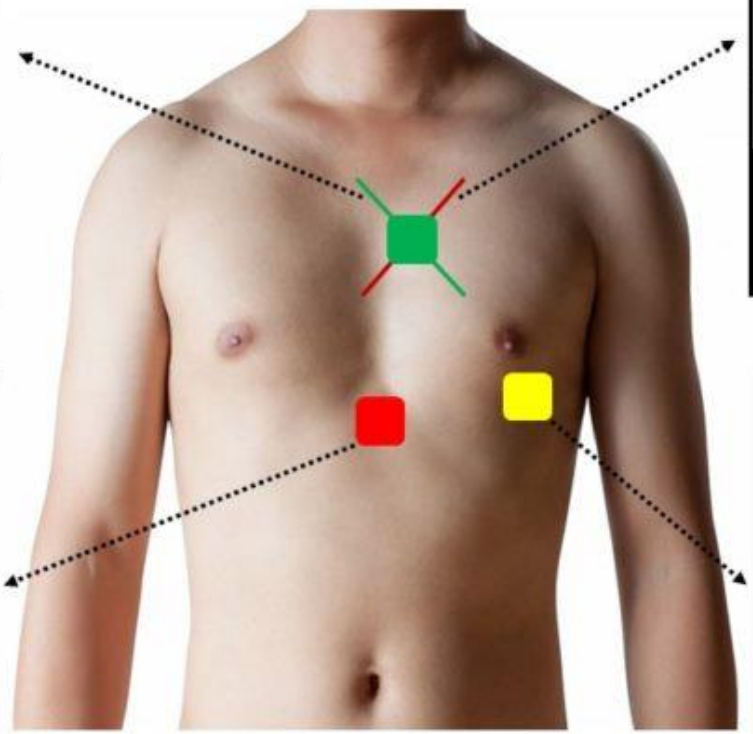
THE BASIC VIEWS OF FoCUS

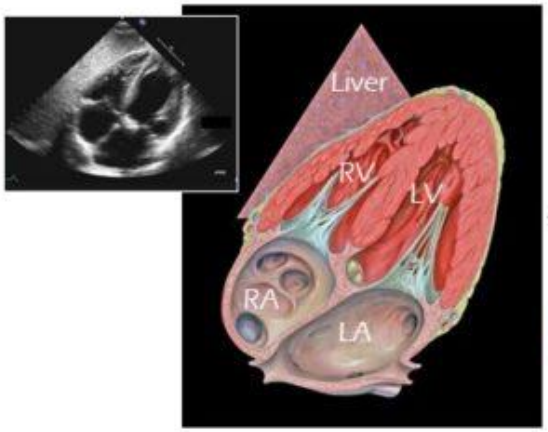
Parasternal Long Axis (PLAX)



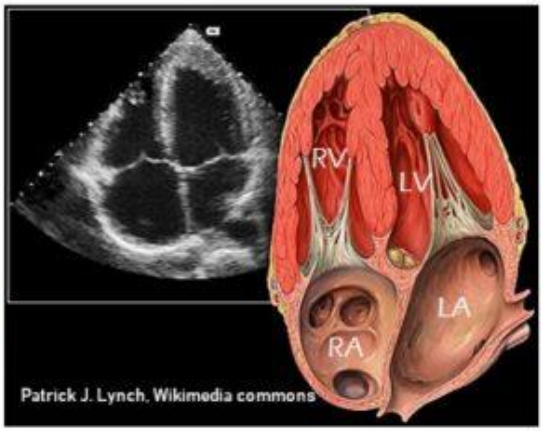
Parasternal Short Axis (PLAX)





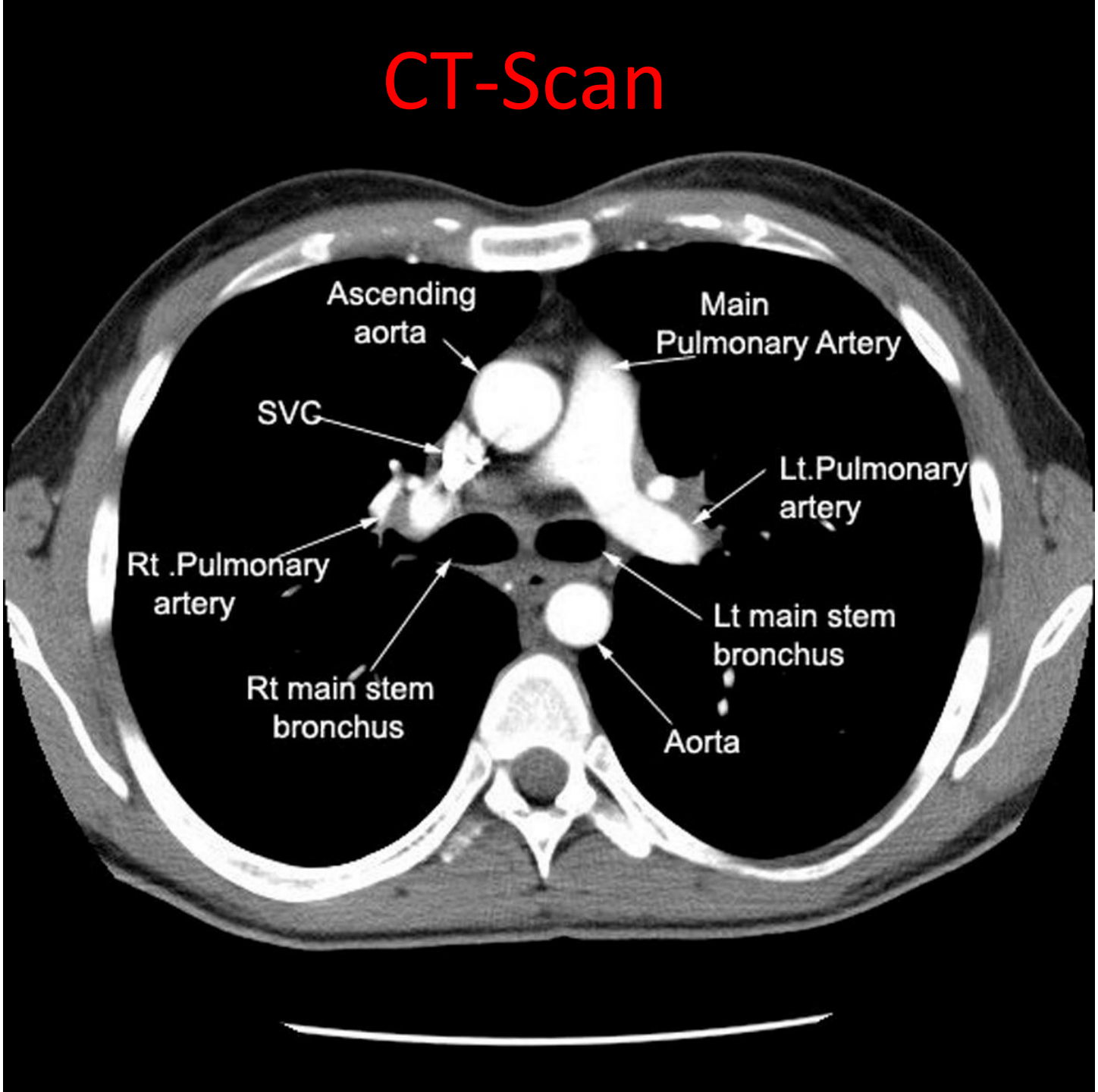


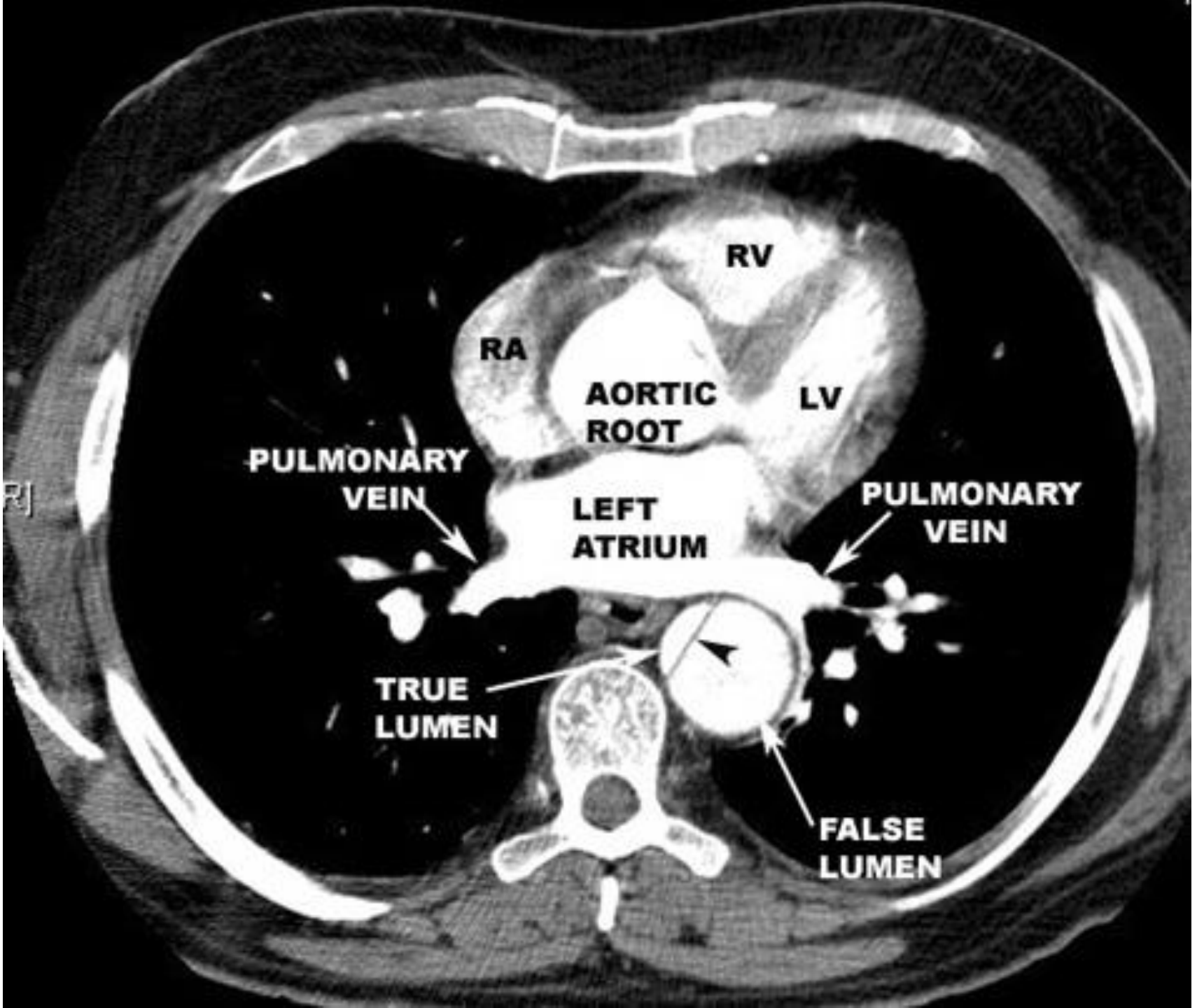
Subxiphoid 4-chamber

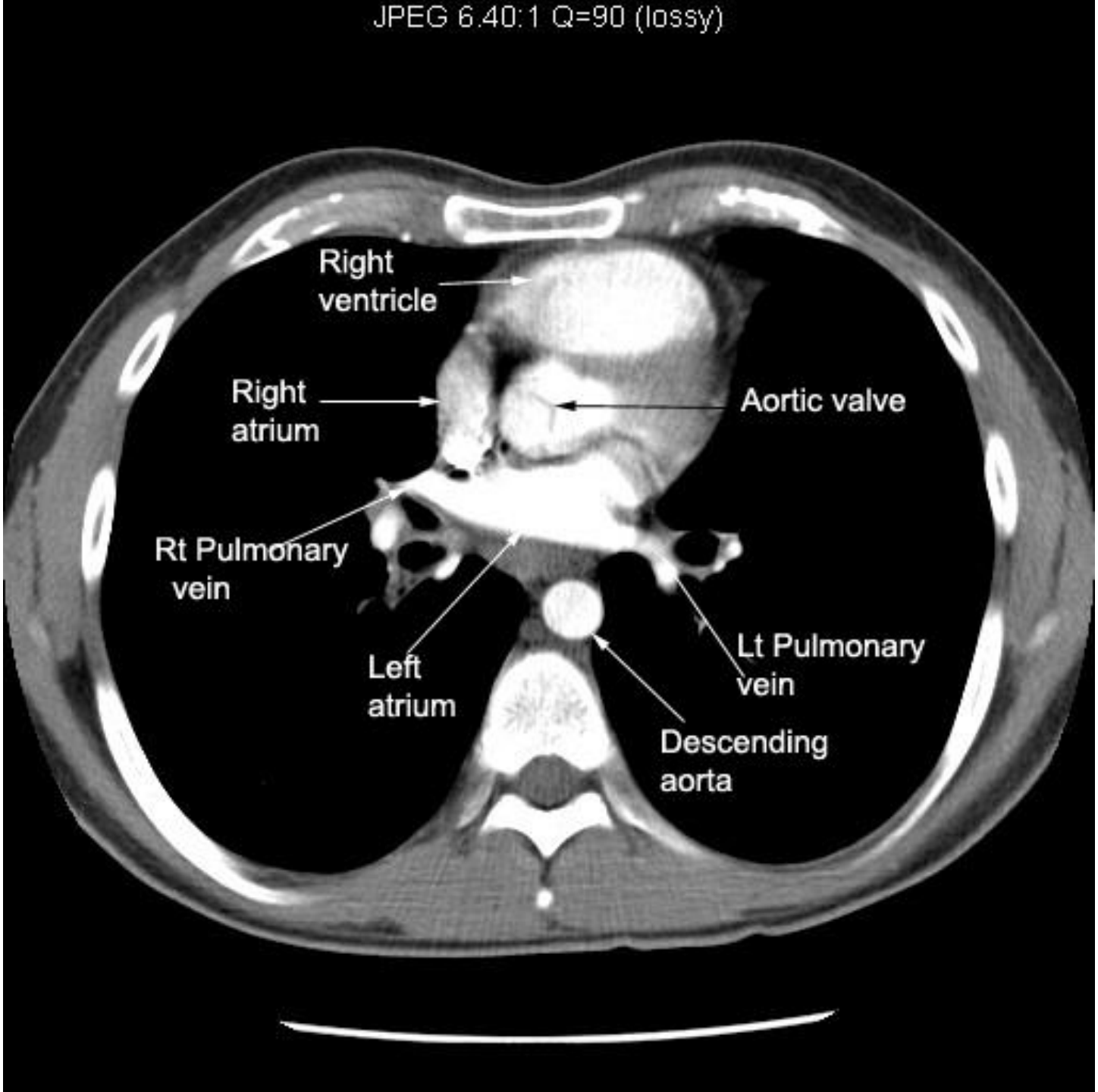


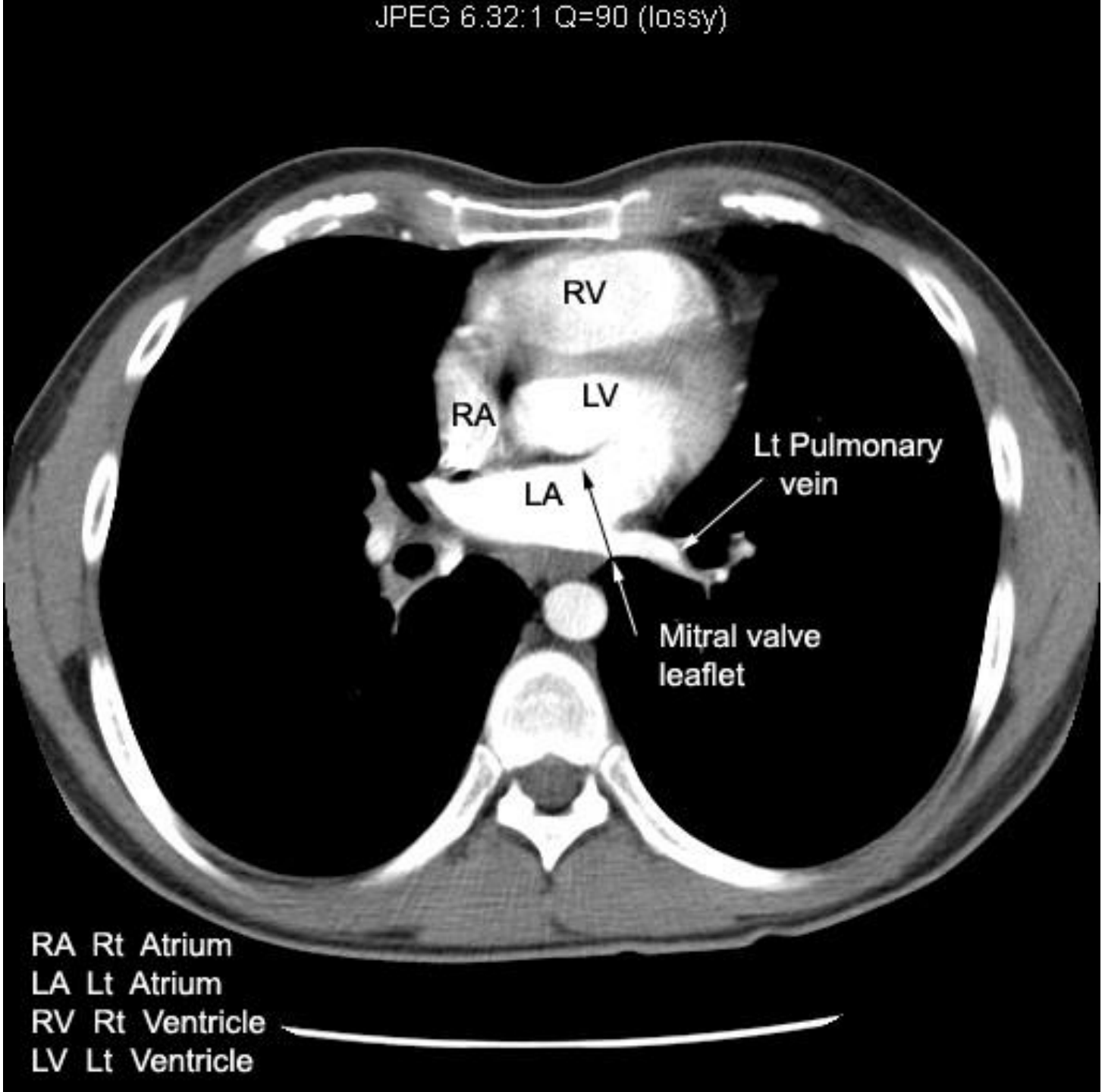
Apical 4-chamber

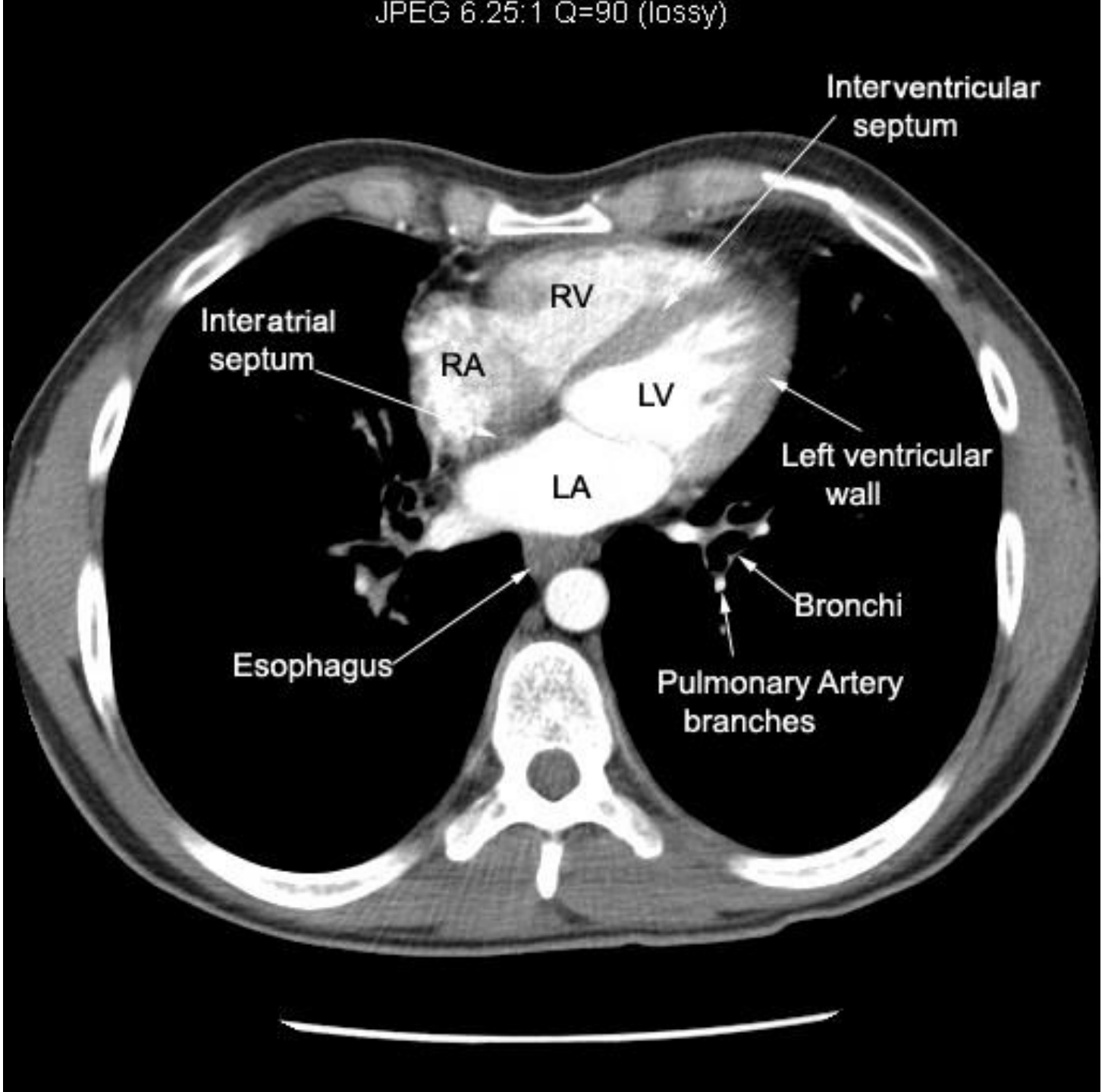
CT-Scan

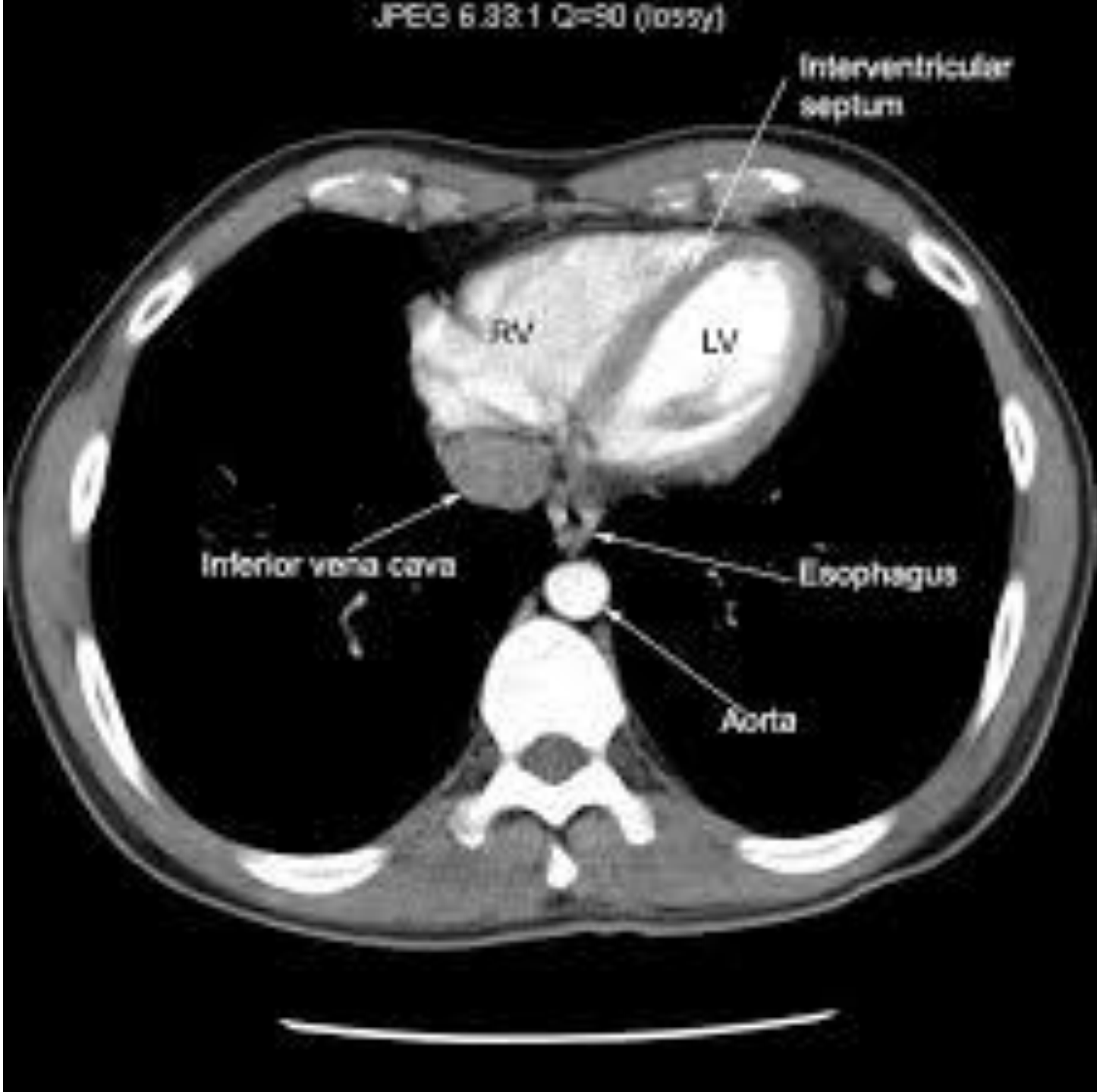

Ascending aorta
Main Pulmonary Artery
SVC
Lt.Pulmonary artery
Rt .Pulmonary artery
Lt main stem bronchus
Rt main stem bronchus
Aorta

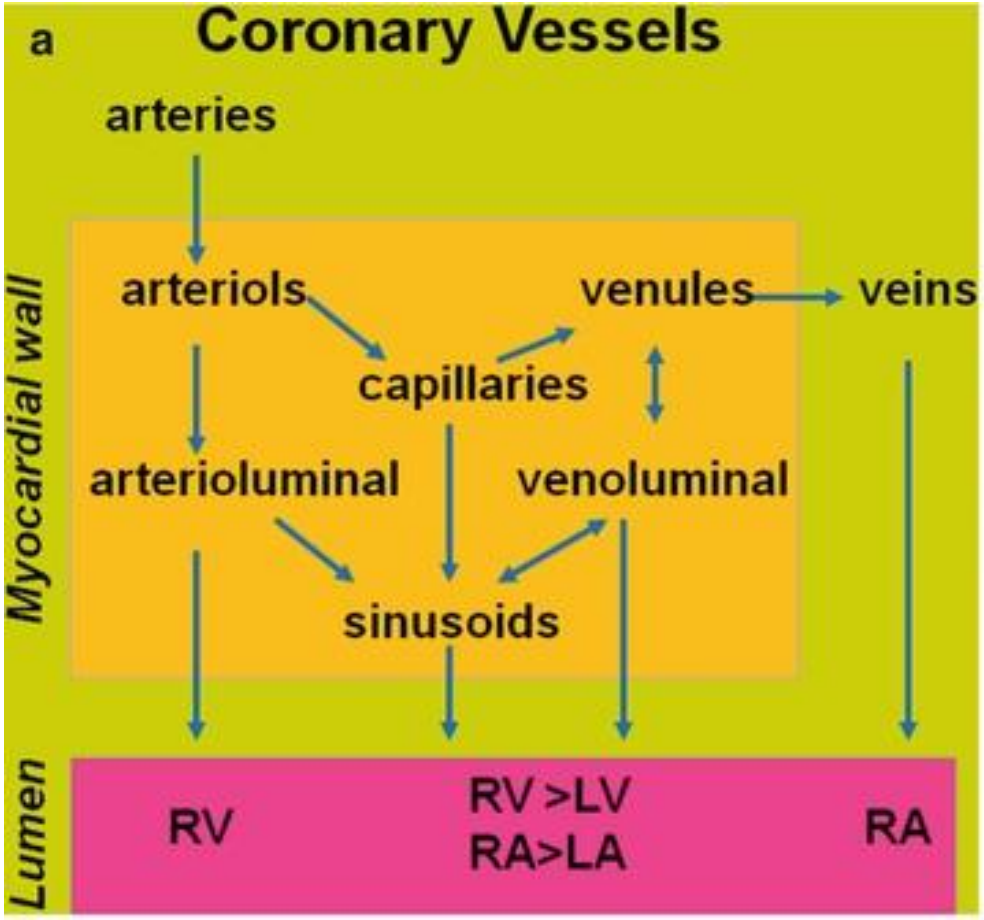

RV
RA
AORTIC ROOT
LV
PULMONARY VEIN
LEFT ATRIUM
PULMONARY VEIN
TRUE LUMEN
FALSE LUMEN

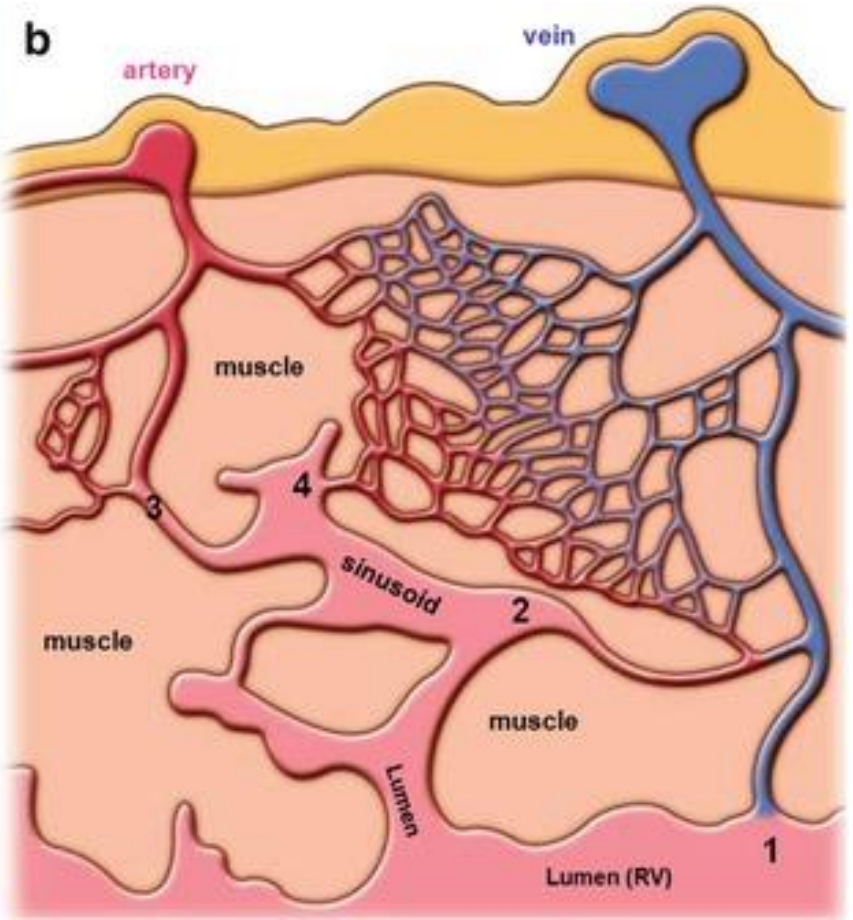

JPEG 6.40:1 Q=90 (lossy)
Right ventricle
Right atrium
Aortic valve
Rt Pulmonary vein
Left atrium
Lt Pulmonary vein
Descending aorta

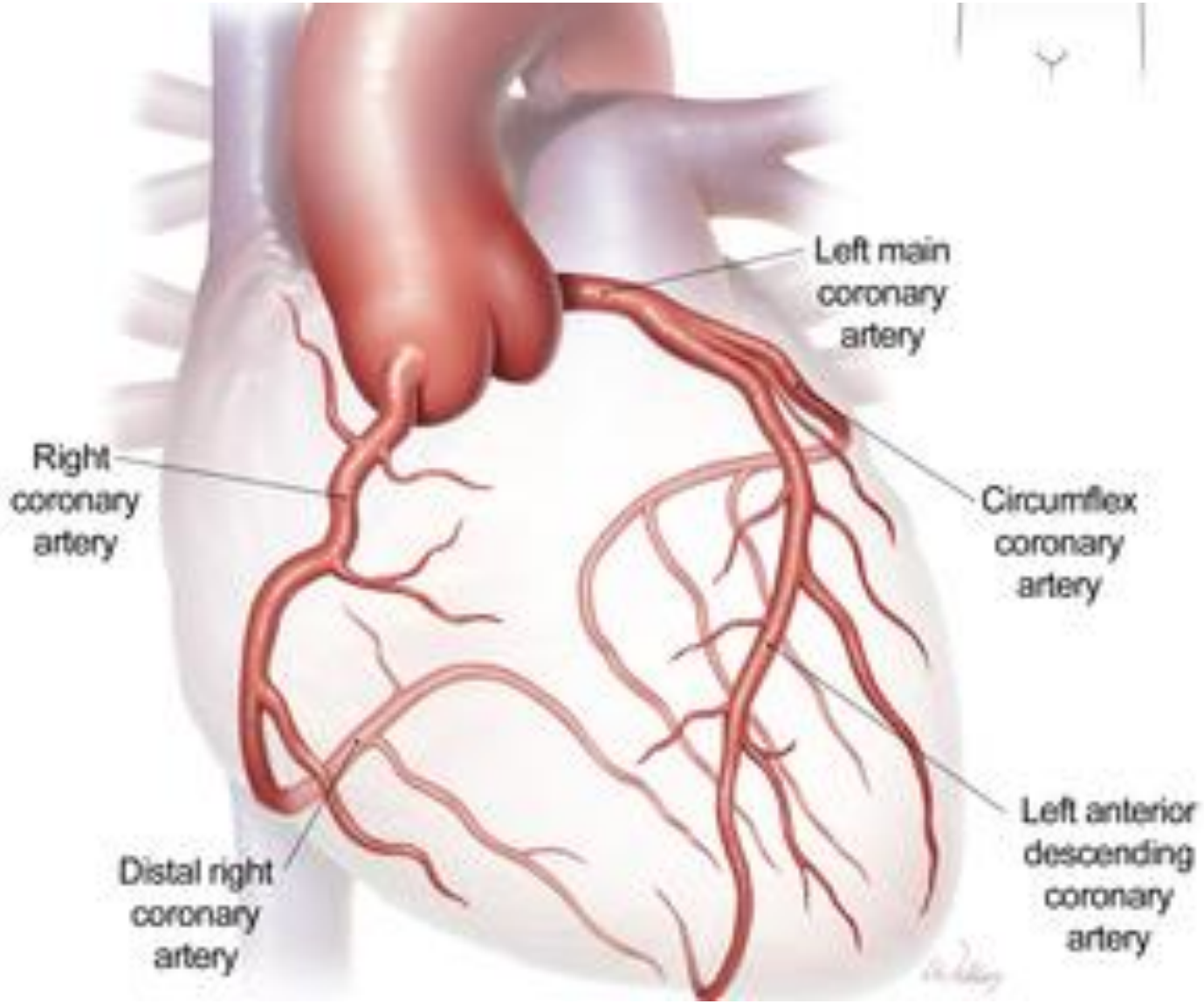

JPEG 6.32:1 Q=90 (lossy)
RV
LV
RA
LA
Lt Pulmonary vein
Mitral valve leaflet
RA Rt Atrium
LA Lt Atrium
RV Rt Ventricle
LV Lt Ventricle

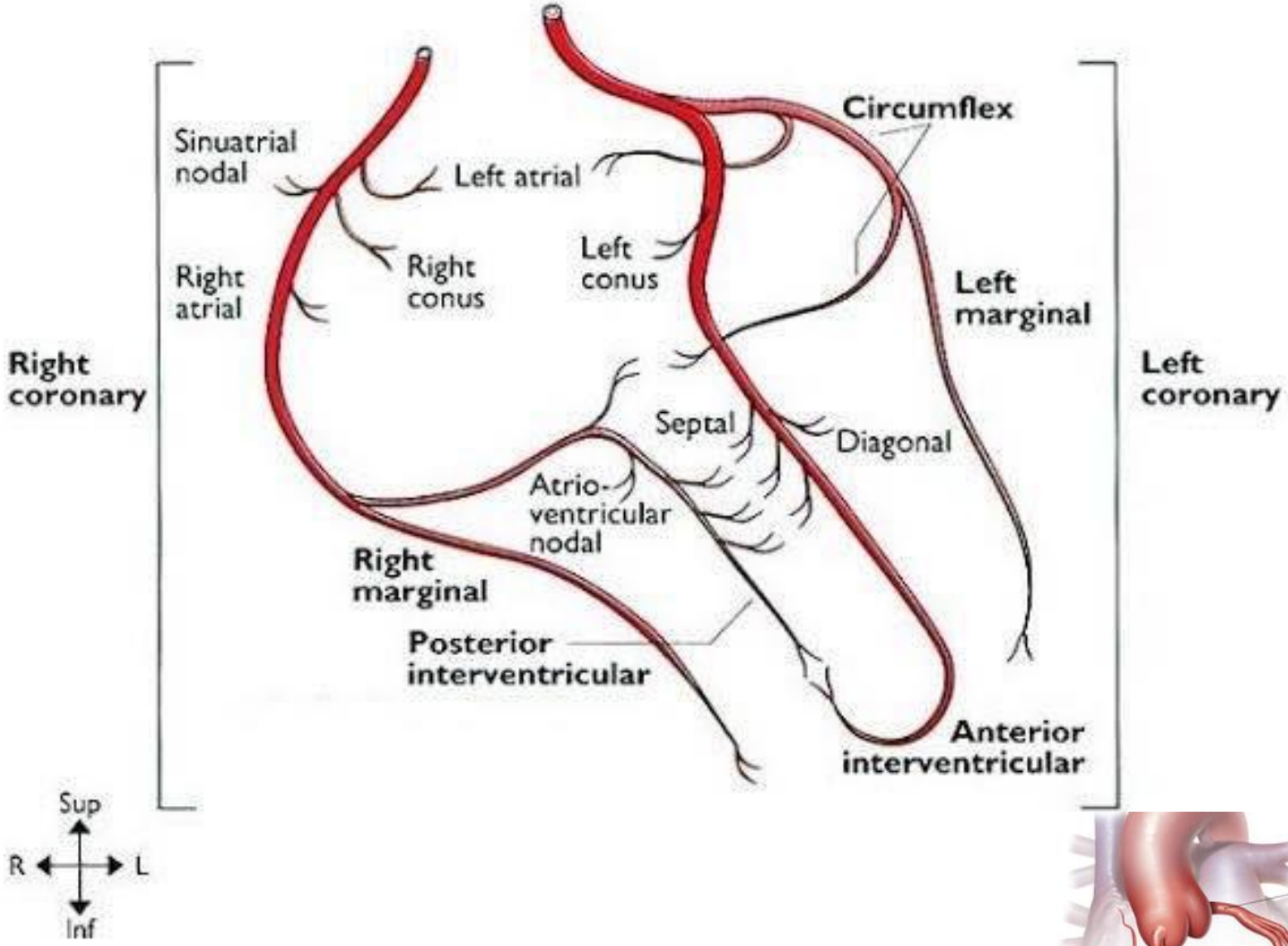

JPEG 6.25:1 Q=90 (lossy)
Interventricular septum
RV
Interatrial septum
RA
LV
Left ventricular wall
LA
Bronchi
Esophagus
Pulmonary Artery branches

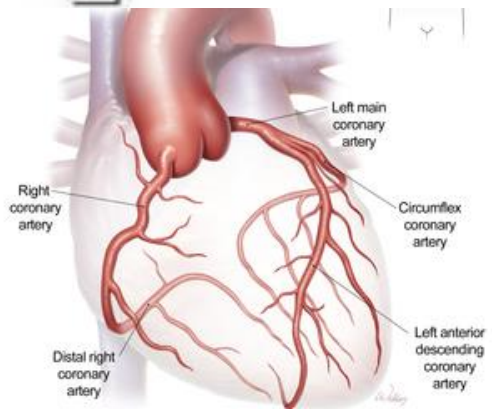

JPEG 6.33:1 Q=90 (lossy)
Interventricular septum
RV
LV
Inferior vena cava
Esophagus
Aorta


a
Coronary Vessels
arteries
arteriols
venules
veins
capillaries
arterioluminal
venoluminal
sinusoids
Myocardial wall
Lumen
RV
RV >LV
RA>LA
RA


b
artery
vein
muscle
3
4
sinusoid
2
muscle
muscle
Lumen
1
Lumen (RV)

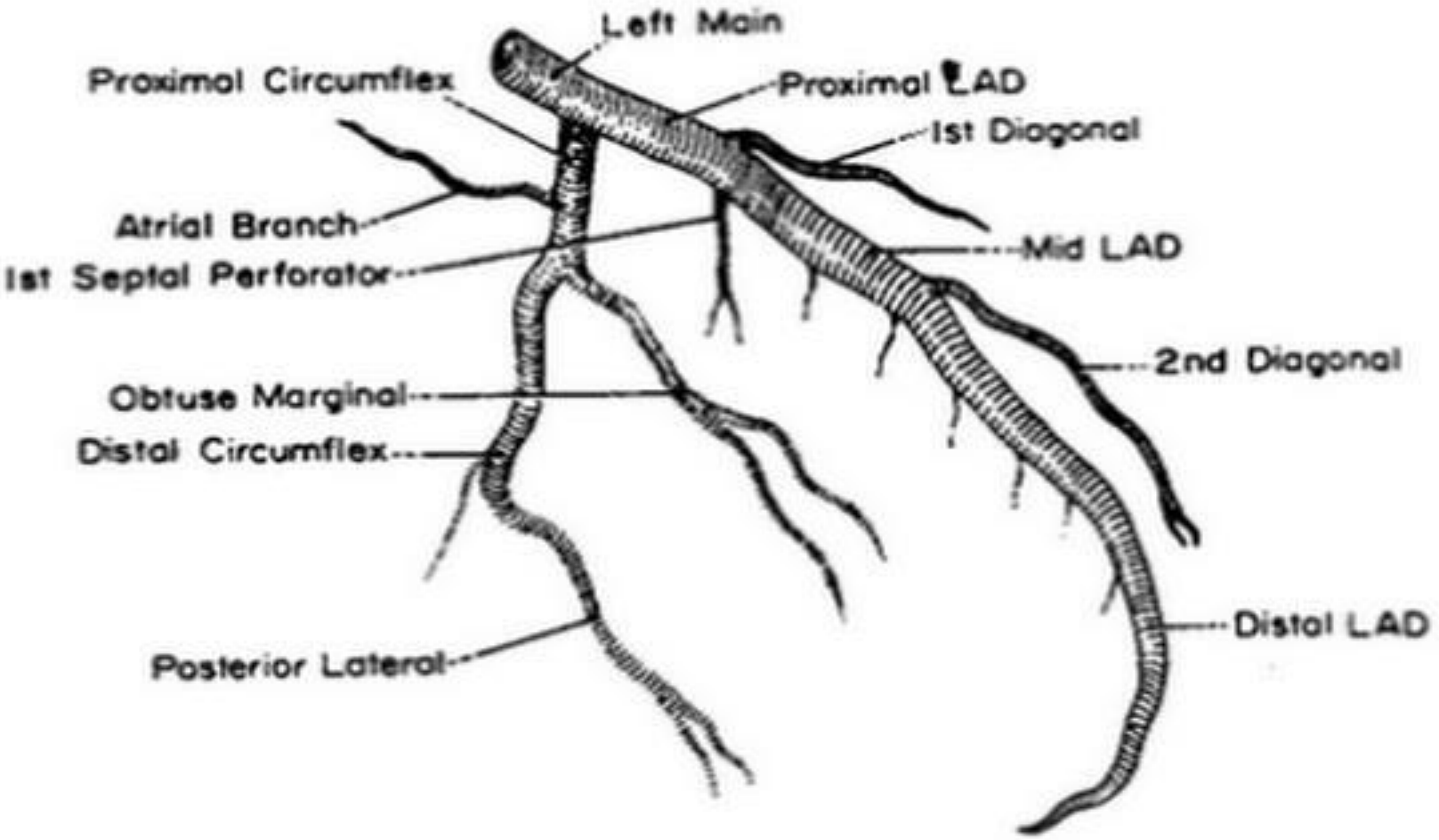

Left main coronary artery
Right coronary artery
Circumflex coronary artery
Left anterior descending coronary artery
Distal right coronary artery



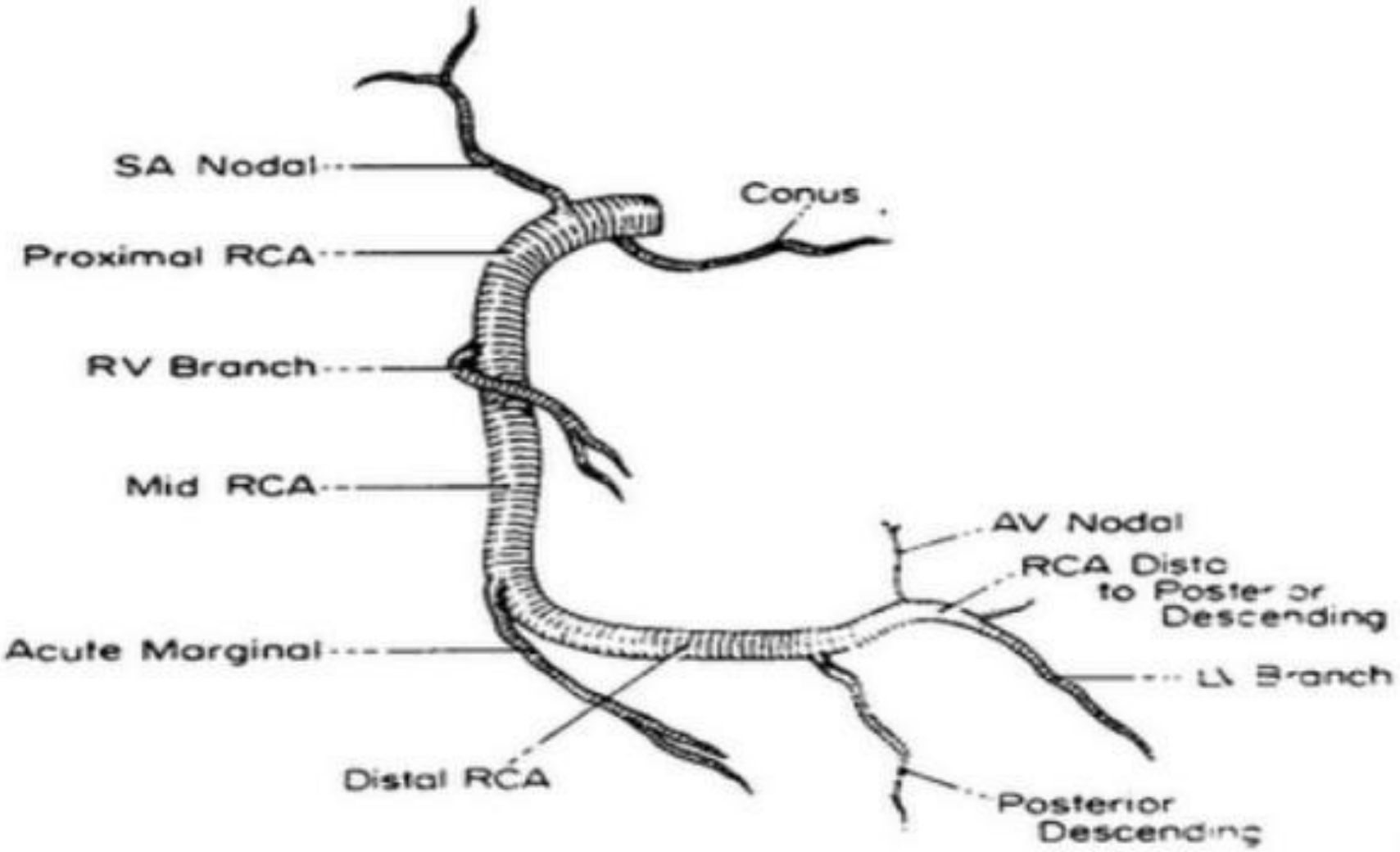


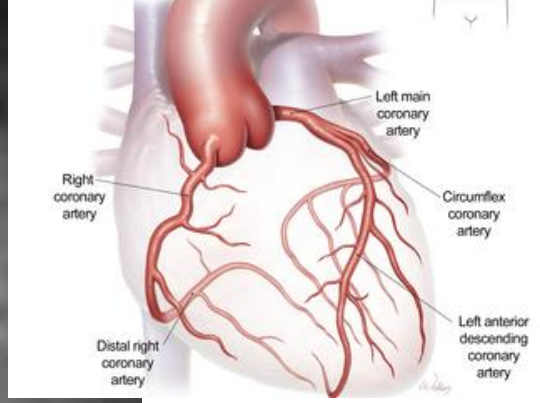
Coronary arteries

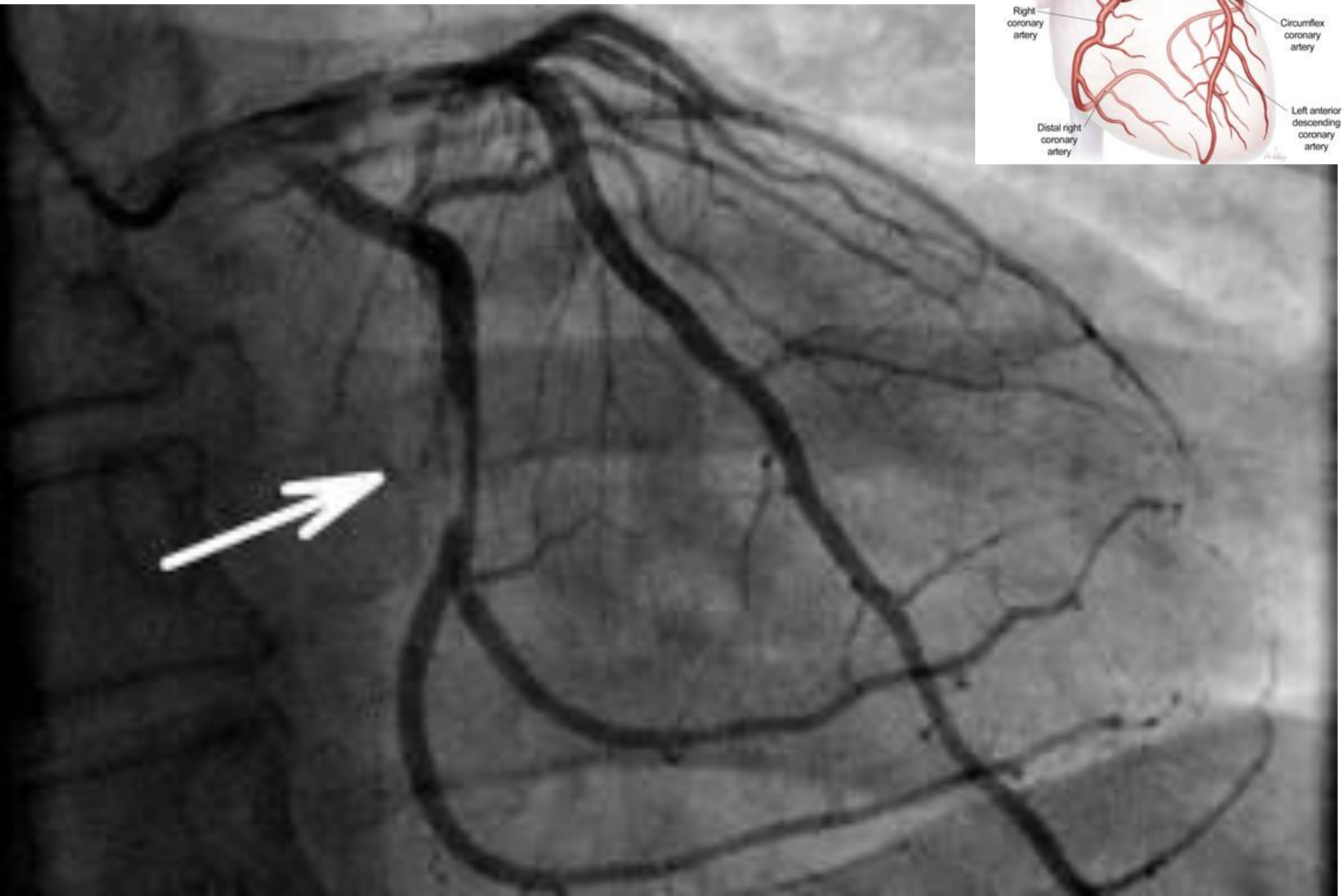
LEFT CORONARY ARTERY (Right Oblique)



RIGHT CORONARY ARTERY




Left main coronary artery
Right coronary artery
Circumflex coronary artery
Left anterior descending coronary artery
Distal right coronary artery


Left main coronary artery
Right coronary artery
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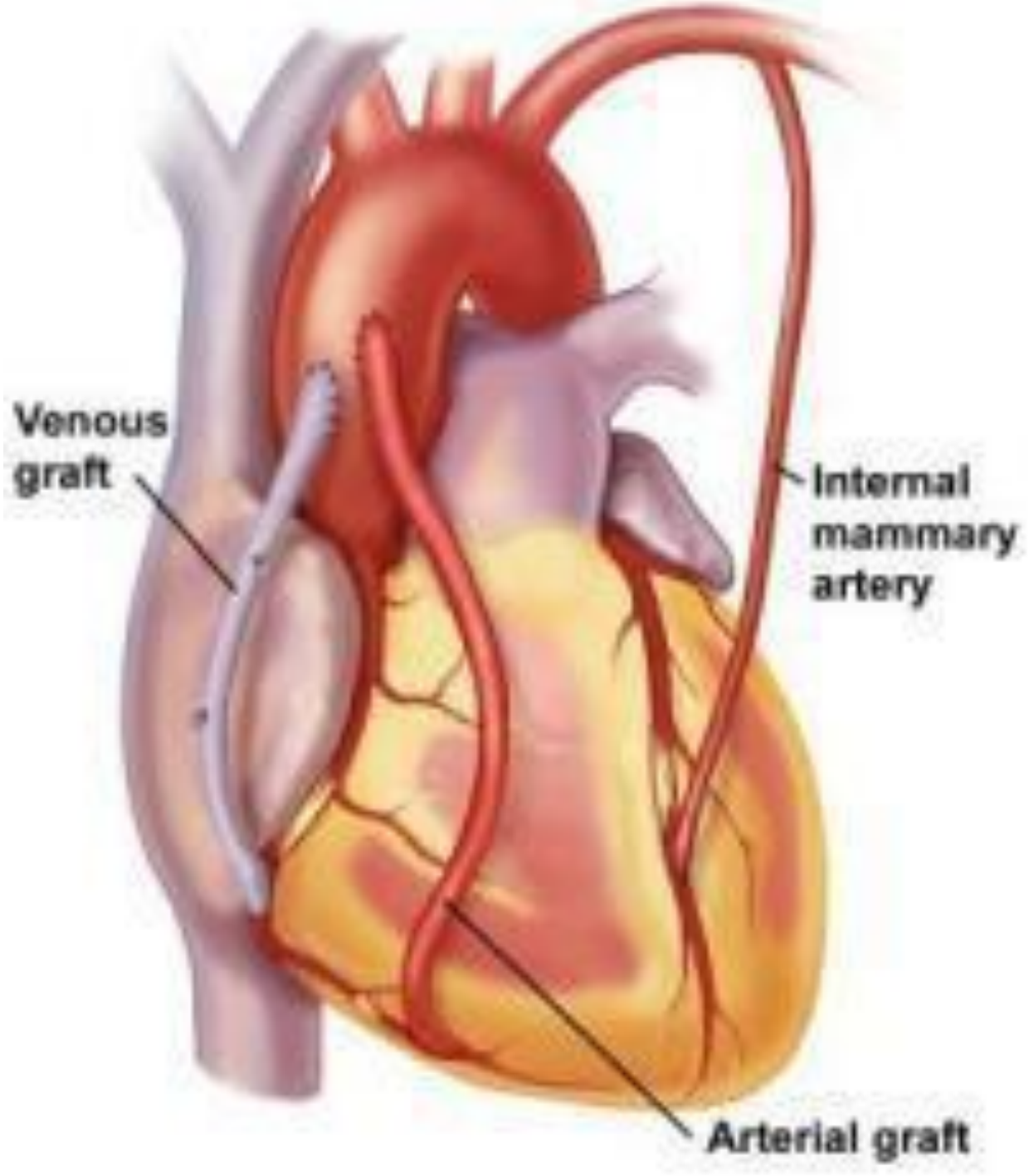
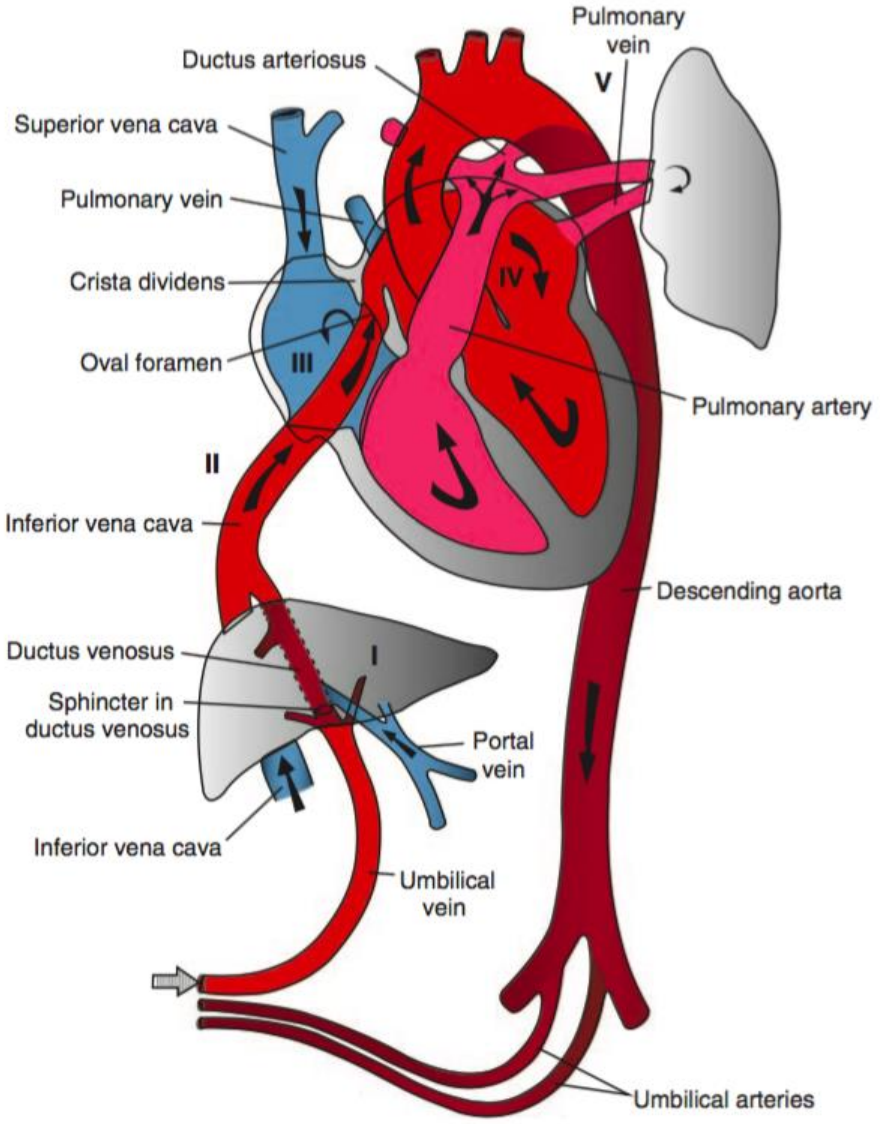
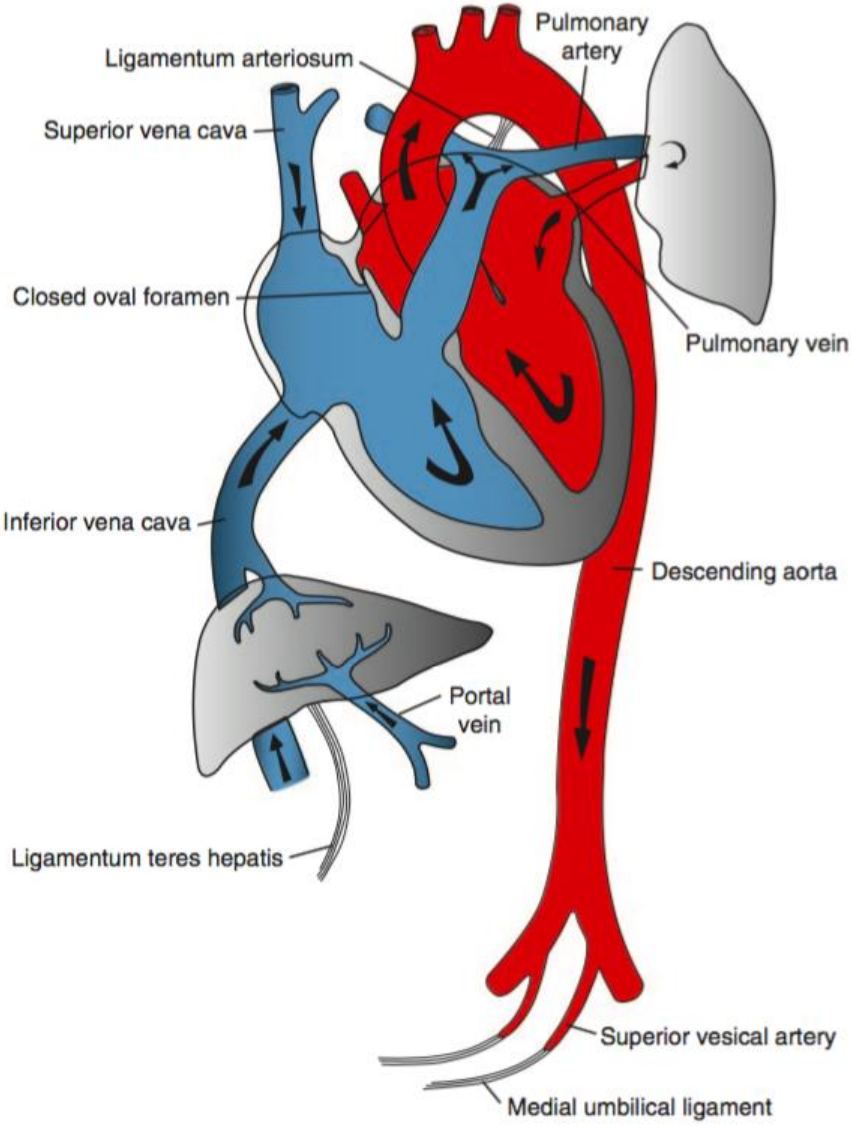
Left anterior descending coronary artery
Distal right coronary artery


Venous graft
Internal mammary artery
Arterial graft

PEDIATRICS & CONGENITAL DISORDERS

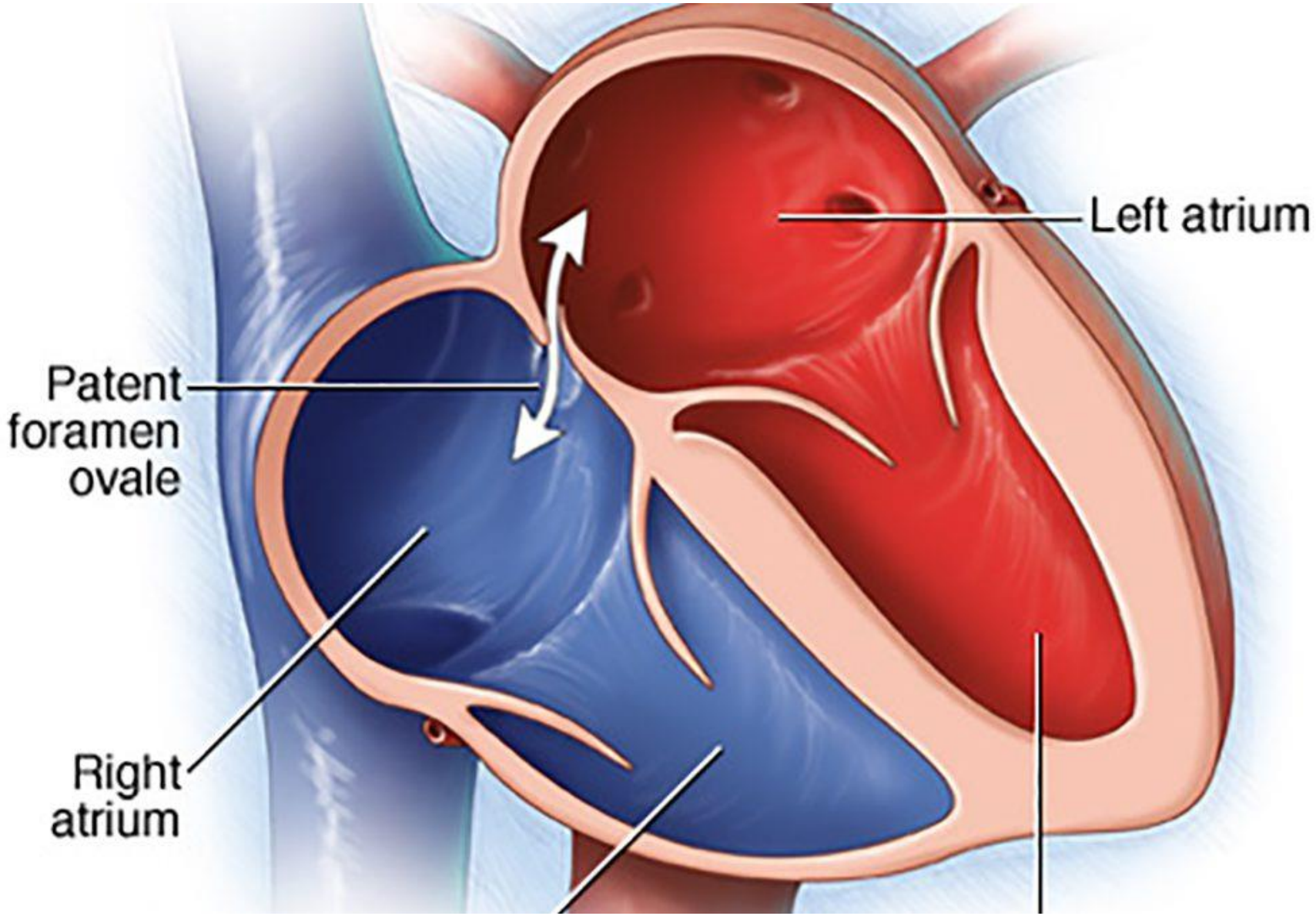


Fetal Circulation

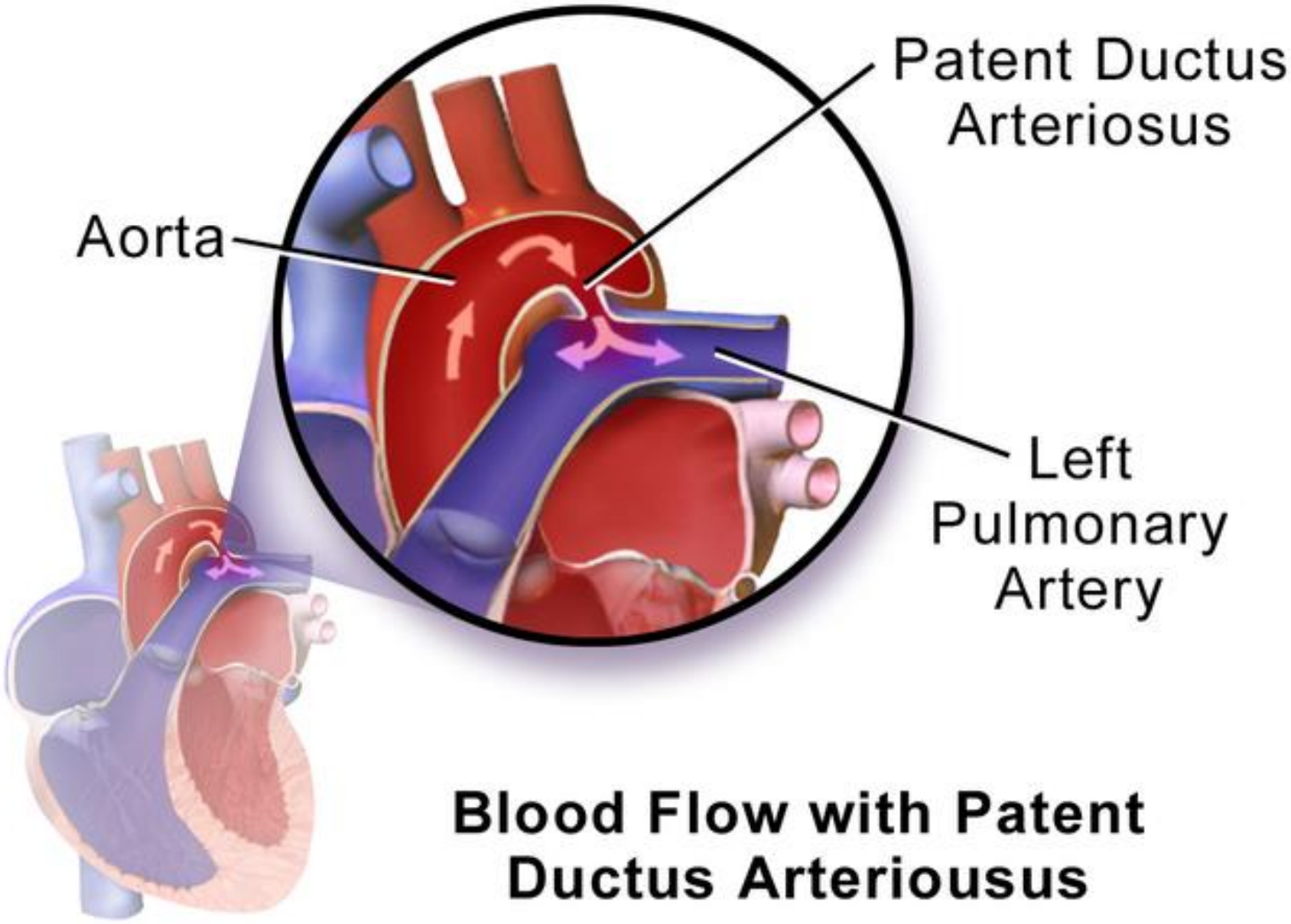


Post Transition Circulation

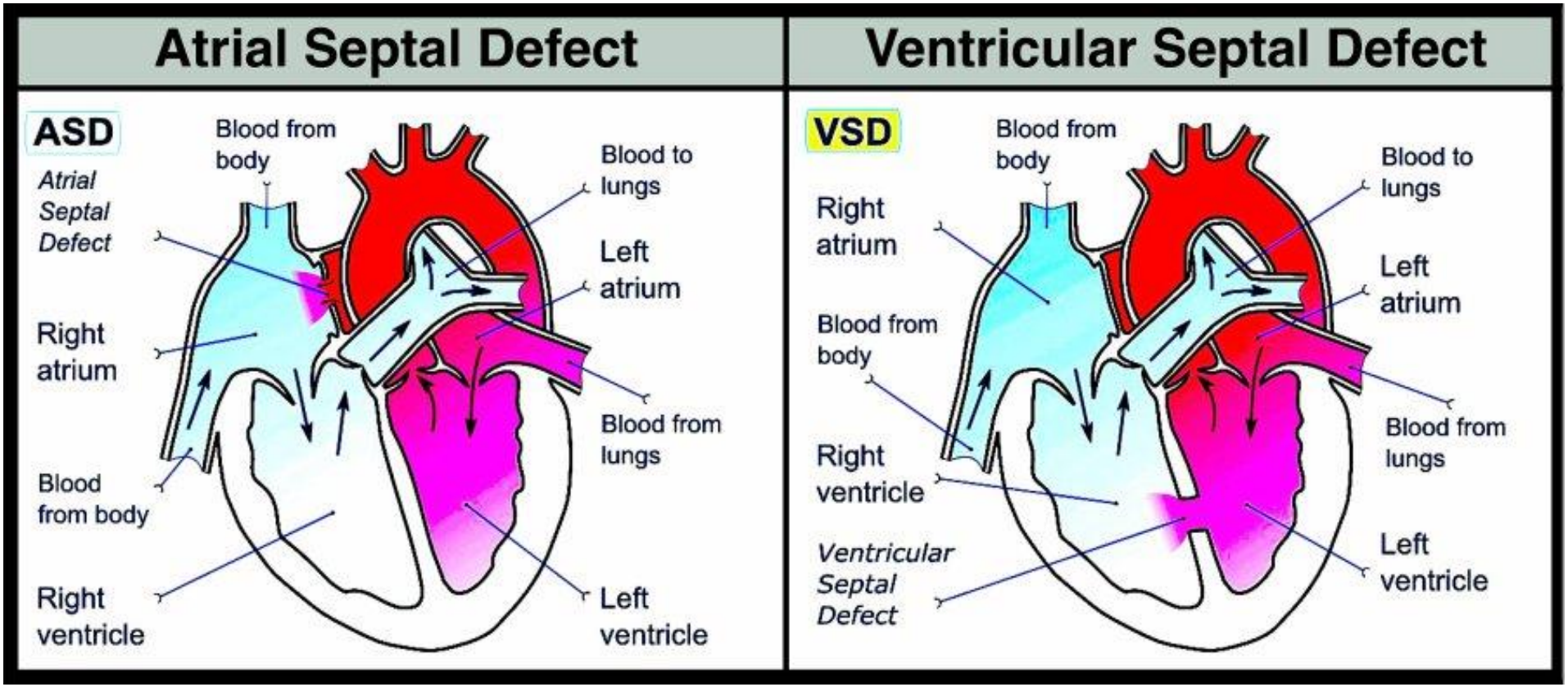
Cardiac Shunts – Patent Foramen Ovale



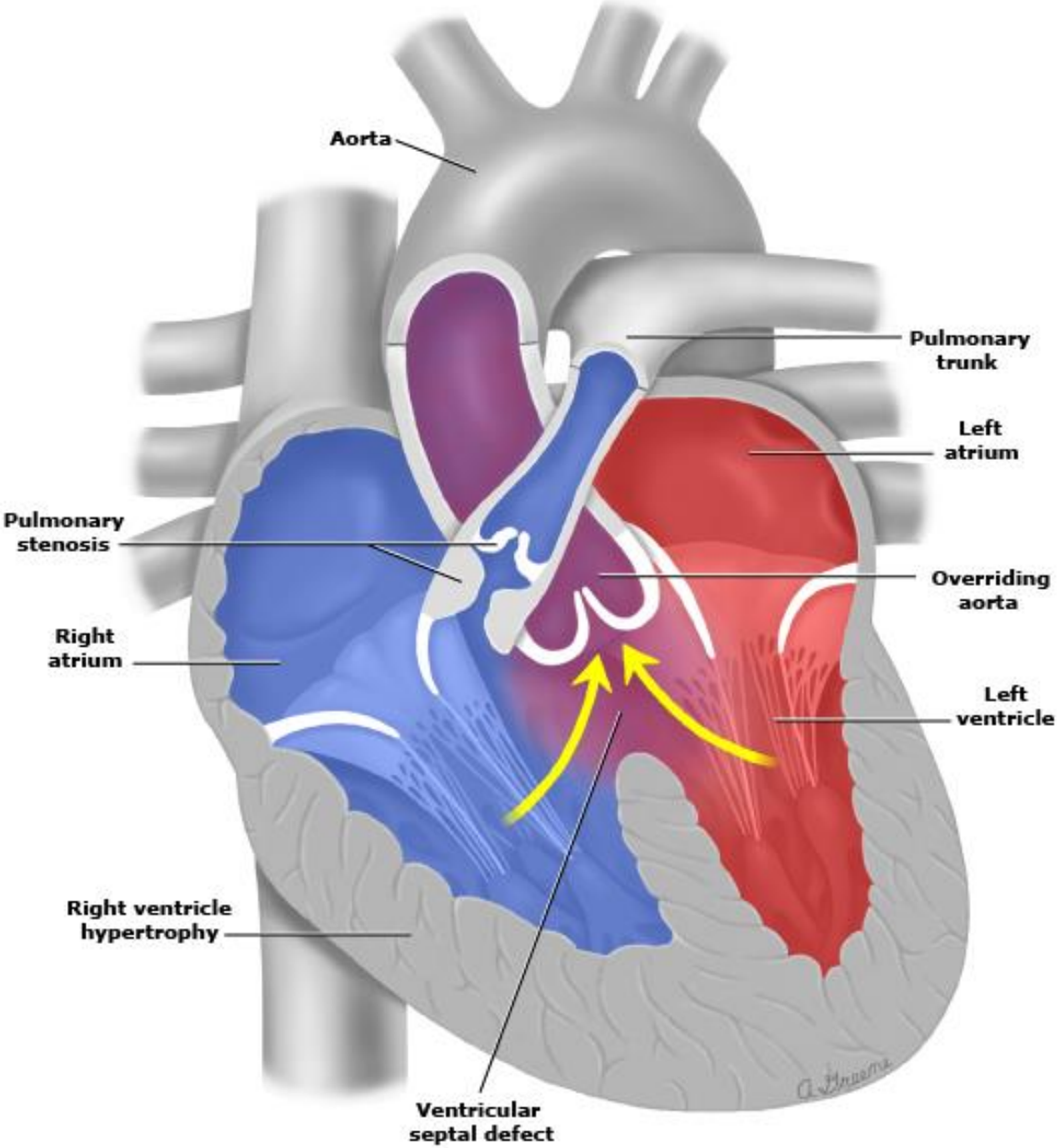
Cardiac Shunts – Ductus Arteriosus



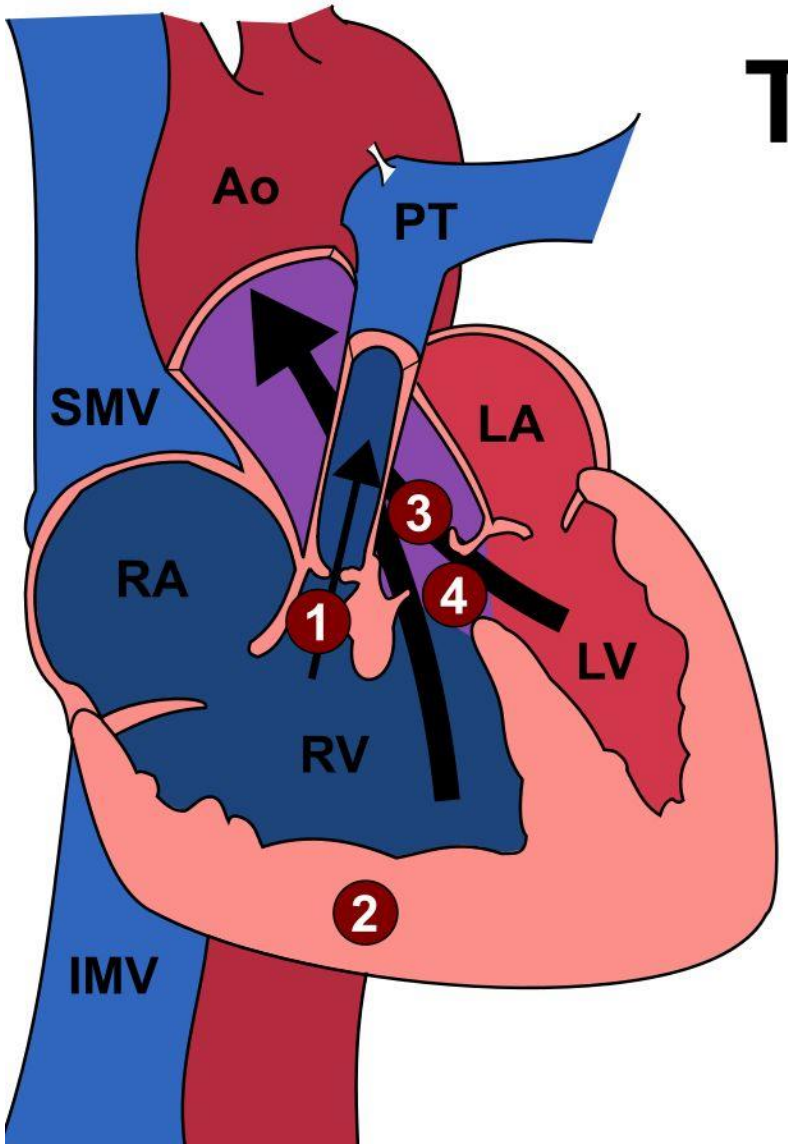
Cardiac Shunts – Septal Defects



Cardiac Shunts – Overriding Aorta



Tetralogy of Fallot

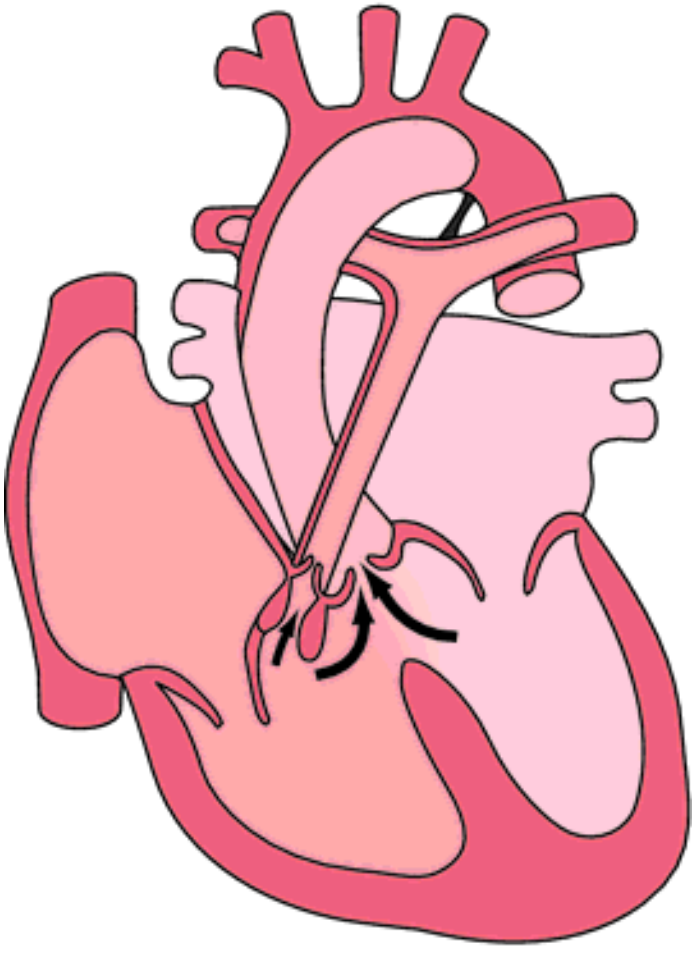


Tetralogy of Fallot

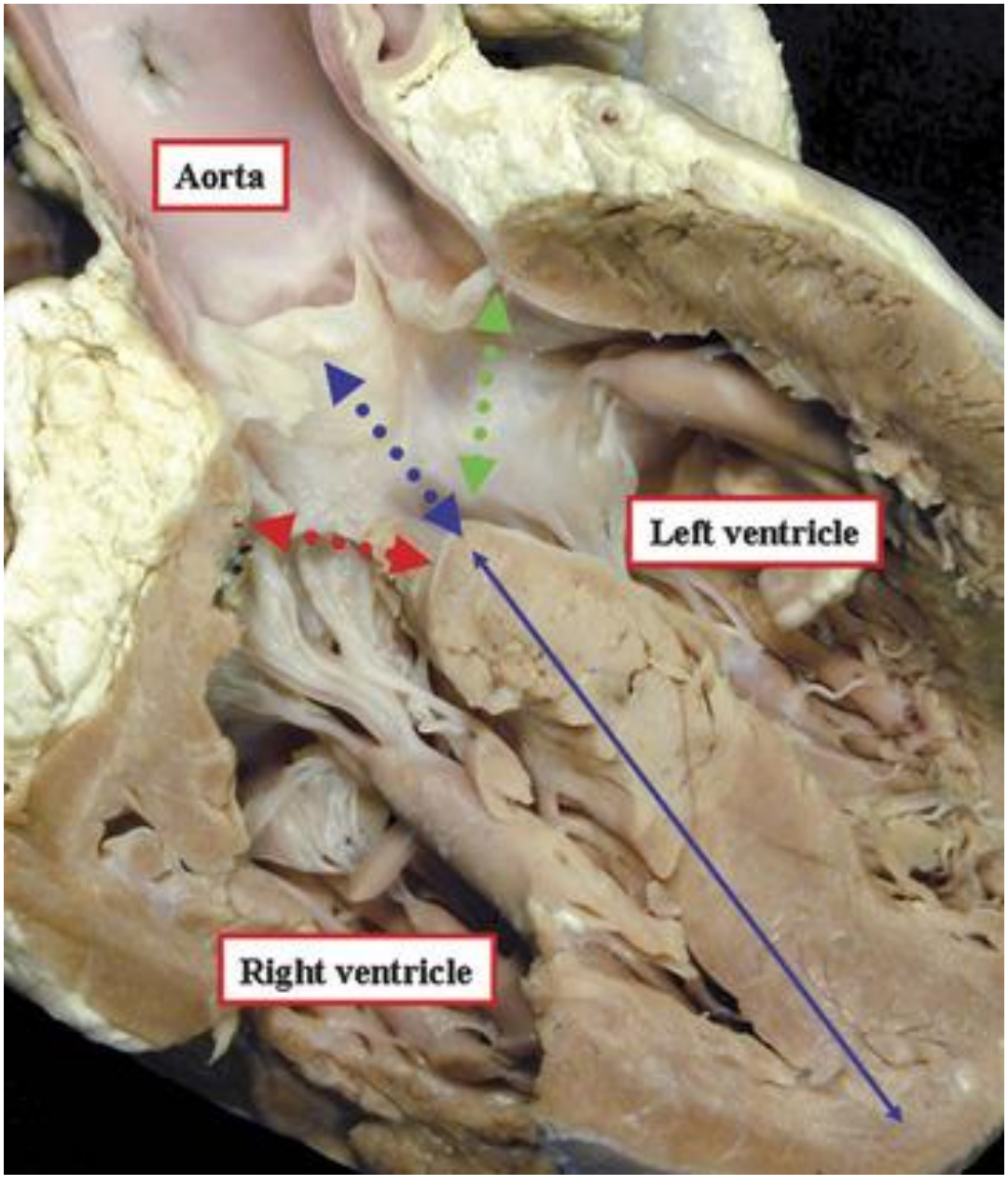
Major Defects

1. Pulmonary Stenosis
2. Right Ventricular Hypertrophy
3. Overriding Aorta
4. Ventricular Septal Defect

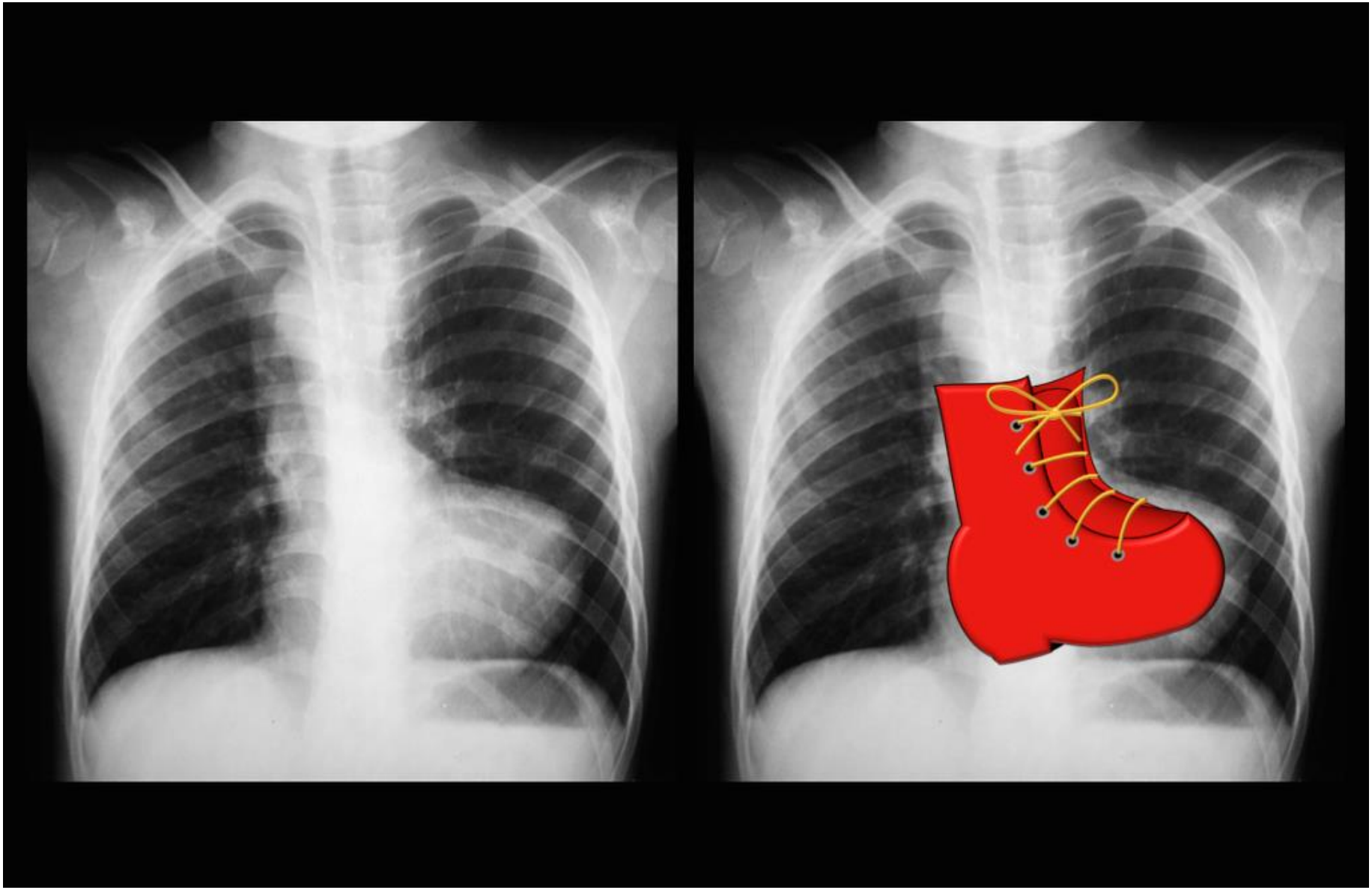
Tetralogy of Fallot



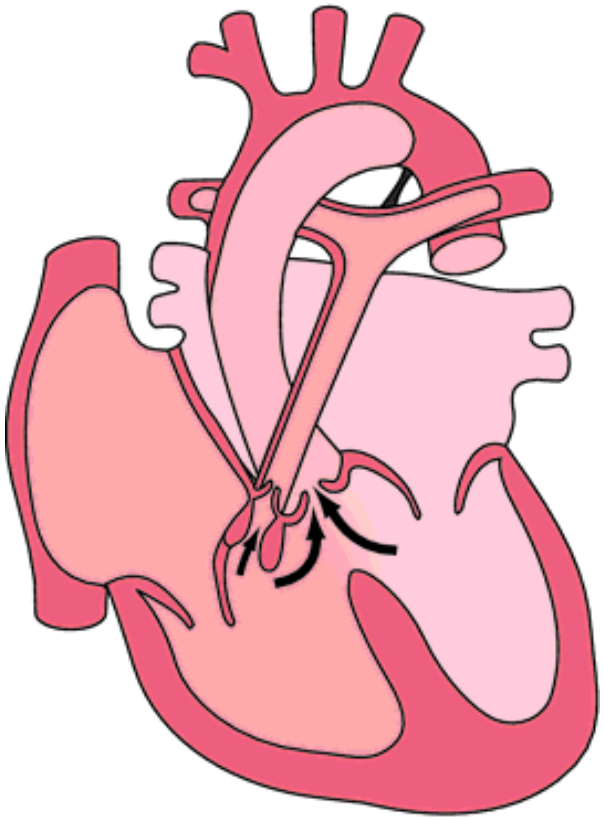
Tetralogy of Fallot



Tetralogy of Fallot



Tetralogy of Fallot



Tetralogy of Fallot