Left Heart Failure (LHF): occurs when the left side of the heart is unable to pump the total volume of blood it receives from the right side of the heart

↓

As a result the the pulmonary circulation becomes congested with blood (backward effect) that cannot be moved forward and the systemic blood pressure falls (forward effect).

↓

The most common cause of left heart failure is **MI** (myocardial infarction); other causes include systemic hypertension, valvular → stenosis or insufficiency

Backward effects

* ↓ emptying of lt. ventricle *

↓

↑ end-diastolic volume & pressure in lt. ventricle

↓

↑ volume (pressure) in the lt. atrium

↓

↑ volume in pulmonary veins

↓

↑ volume in pulmonary capillary bed

↓

Transudation of fluid from capillaries into the interstitial spaces around the alveoli & finally into the alveoli

chronic!! ↓

(Acute) Pulmonary oedema

↓

impair gas exchange which can be life-threatening

↓

Affected individuals exhibit dyspnea & orthopnea → inability to breath in the supine position

Substantial

Forward effects

↓ cardiac output → ↓ systemic blood pressure *

↓ perfusion of body tissues

↓

↓ blood flow to kidneys and glands

↓

Renin-angiotensin-aldosterone system is stimulated ⟹ further vasoconstriction & Na^+ and H_2O retention

↓

↑ extracellular fluid volume

↓

↑ total blood volume

↓

↑ systemic blood pressure

↓

Pt. c/o → Easy fatigue weakness & dizziness

occurs when hypoxia of body tissues occurs because of ↓ cardiac output and ↓ O_2 saturation of the blood

weakness → loss of K^+ by ↑ levels of aldosterone

dizziness → caused by brain hypoxia

Right heart failure (RHF) occures when the output of the right ventricle is less than the input from the systemic venous circulation (venous return). → As a result the systemic venous circulation is congested (backward effects) and the output to the lungs decreases (forward effects)

The major cause of RHF ↓ is LHF ⟹ the right ventricle fails because of the excessive pulmonary pressure generated by failure of the left heart *

other causes include COPD !!, congenital heart defects especially those that involve ↑ blood flow to the lungs and pulmonary hypertension

Backward effects (diastolic dysfunction)

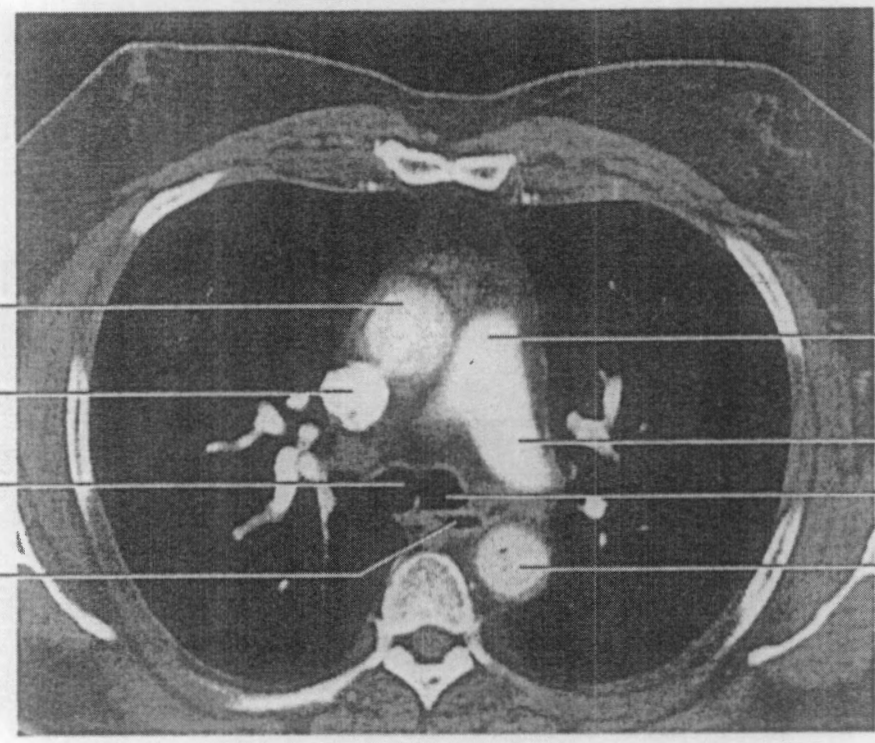
↓ emptying of Rt. ventricle
↓
↑ volume and end-diastolic pressure in Rt. ventricle
↓
↑ volume (pressure) in Rt. atrium (central venous pressure) CVP
↓
↑ volume and pressure in the great veins (CVP)
↓
↑ volume in the systemic venous circulation
↓
↑ volume in distensible organs (hepatomegaly & splenomegaly)
↓
↑ pressure at capillary line
↓
[Dependent oedema]

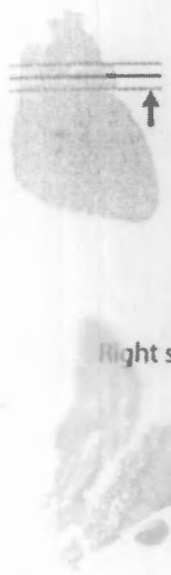
Forward effects (systolic dysfunction)

↓ volume from the right ventricle to the lungs
↓
↓ blood return to the Lt. atrium and subsequent ↓ cardiac output
↓
All the forward effects of left heart failure
↓
↑ blood volume and vasoconstriction

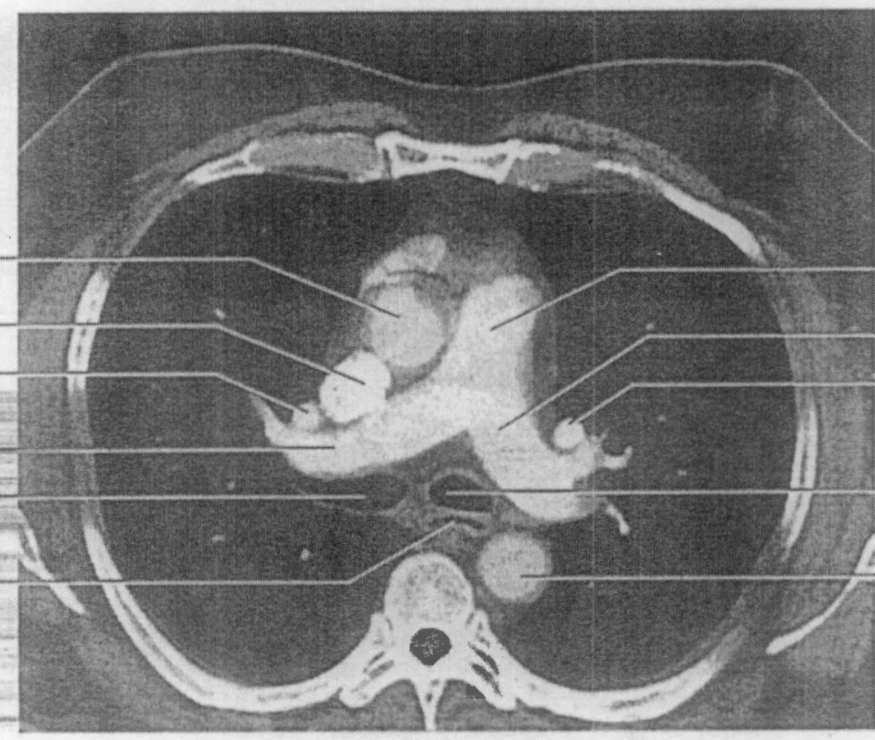
Bustami

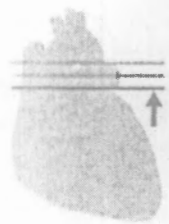
A





B





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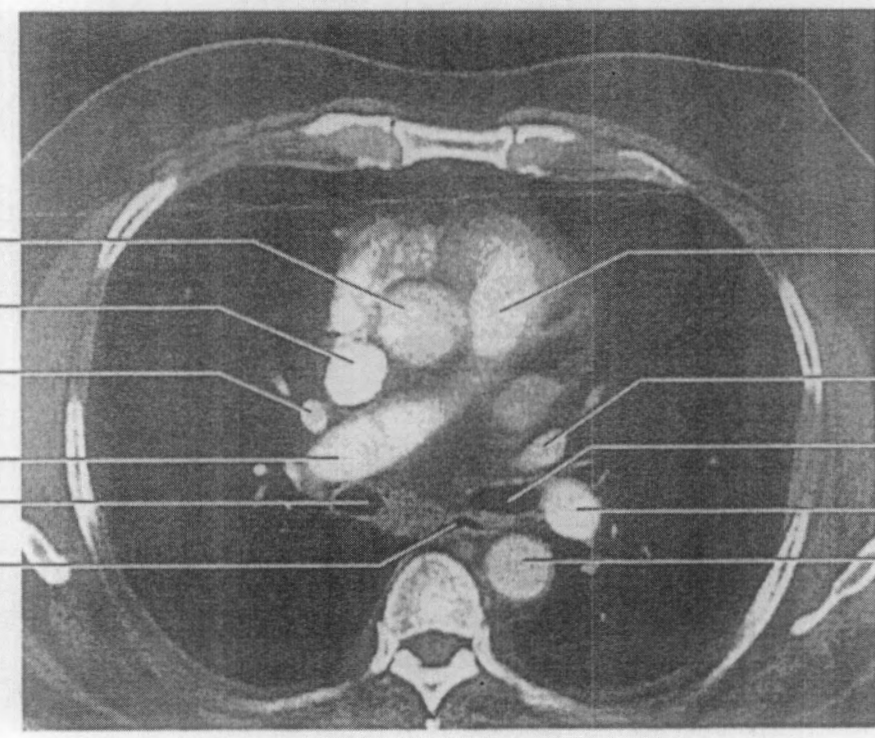
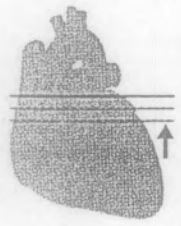
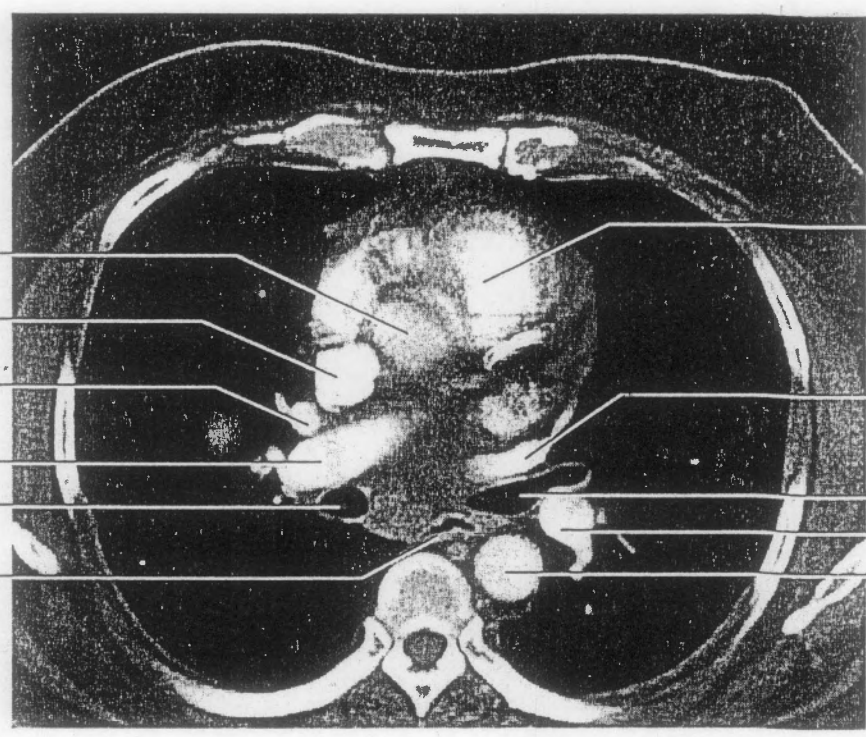
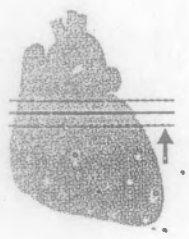


A through C – Relationships of the pulmonary arteries, pulmonary veins, and bronchi in the mediastinum.
CT images, with contrast, in axial plane

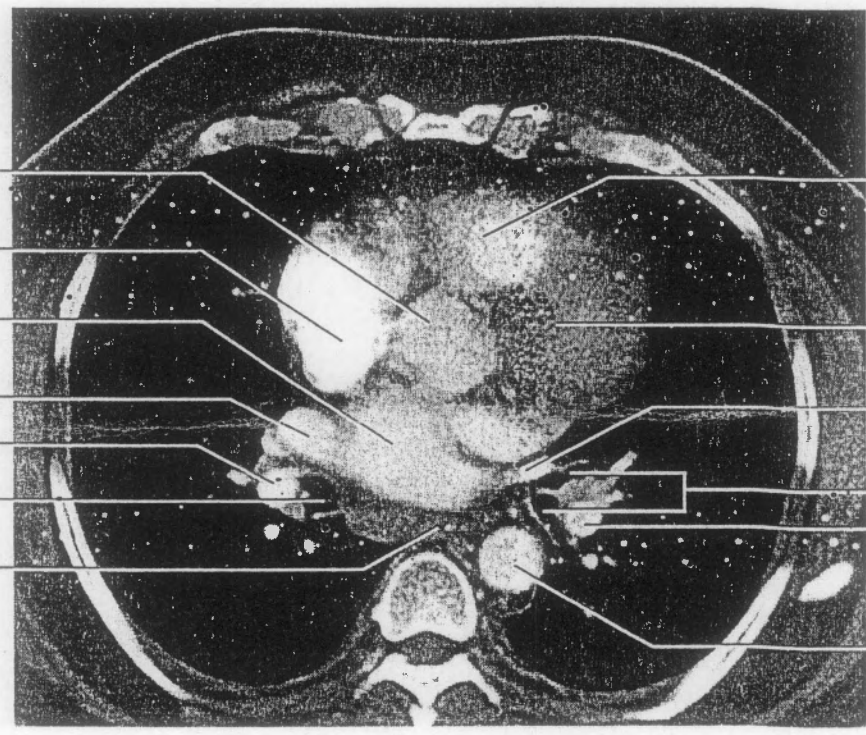


D

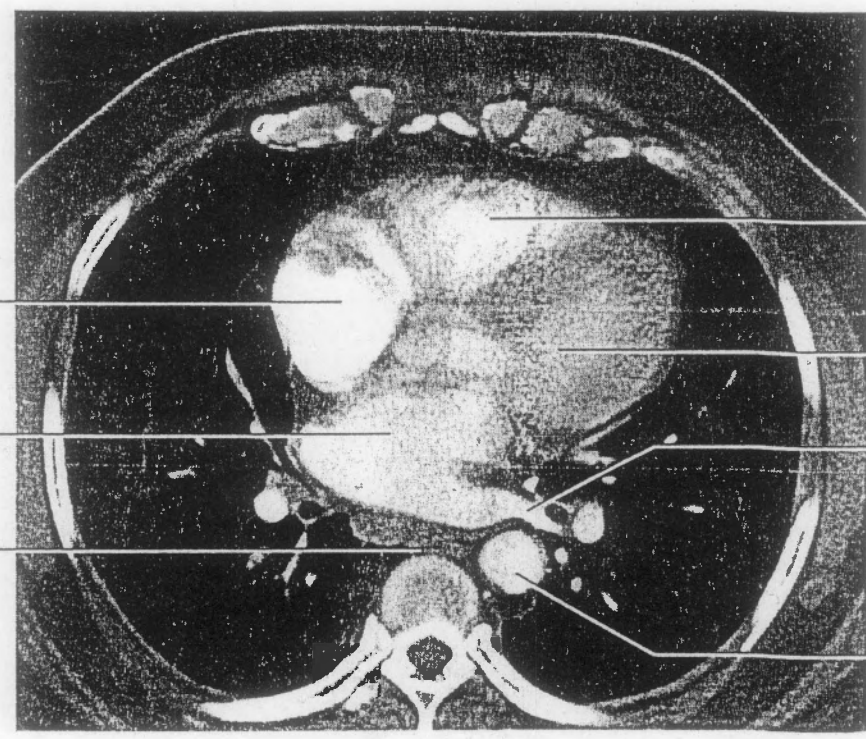




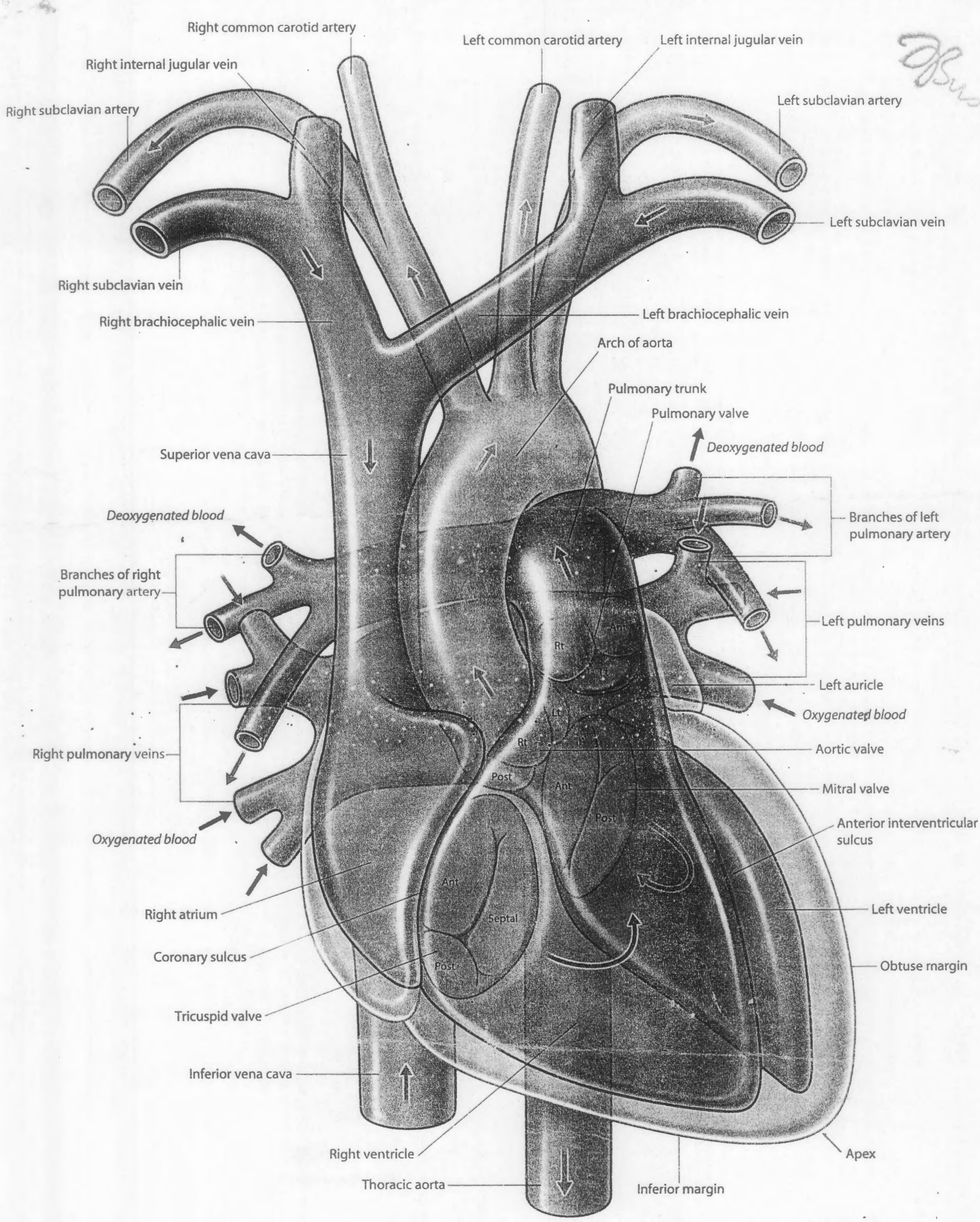
E



F



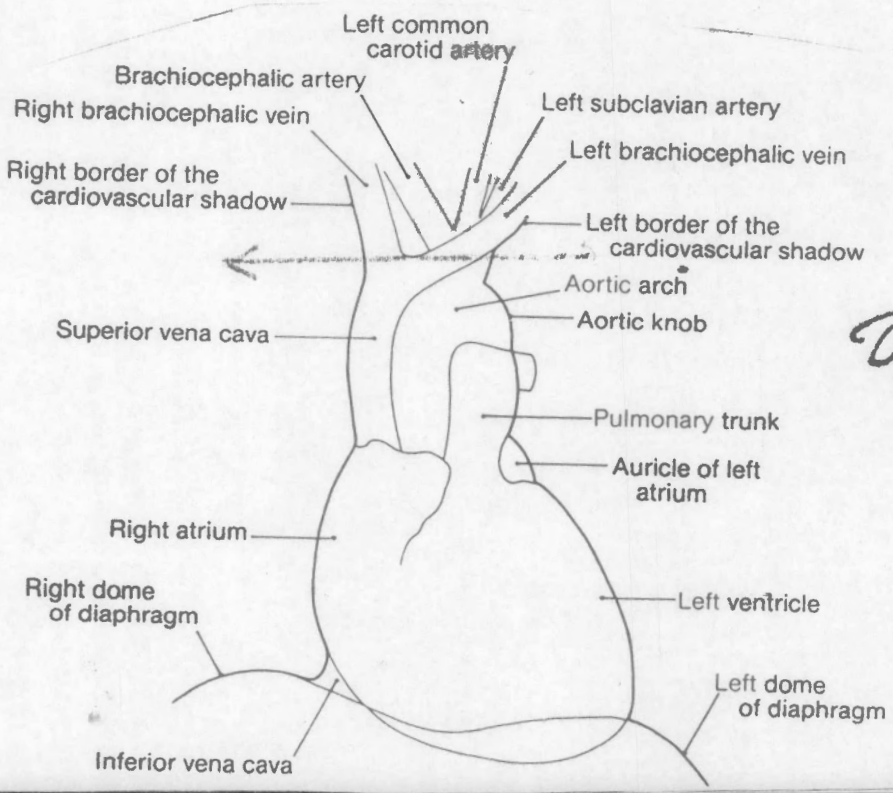
D through F – Relationships of the pulmonary arteries, pulmonary veins, and bronchi in the mediastinum.
CT images, with contrast, in axial plane



Cardiac chambers and direction of blood flow

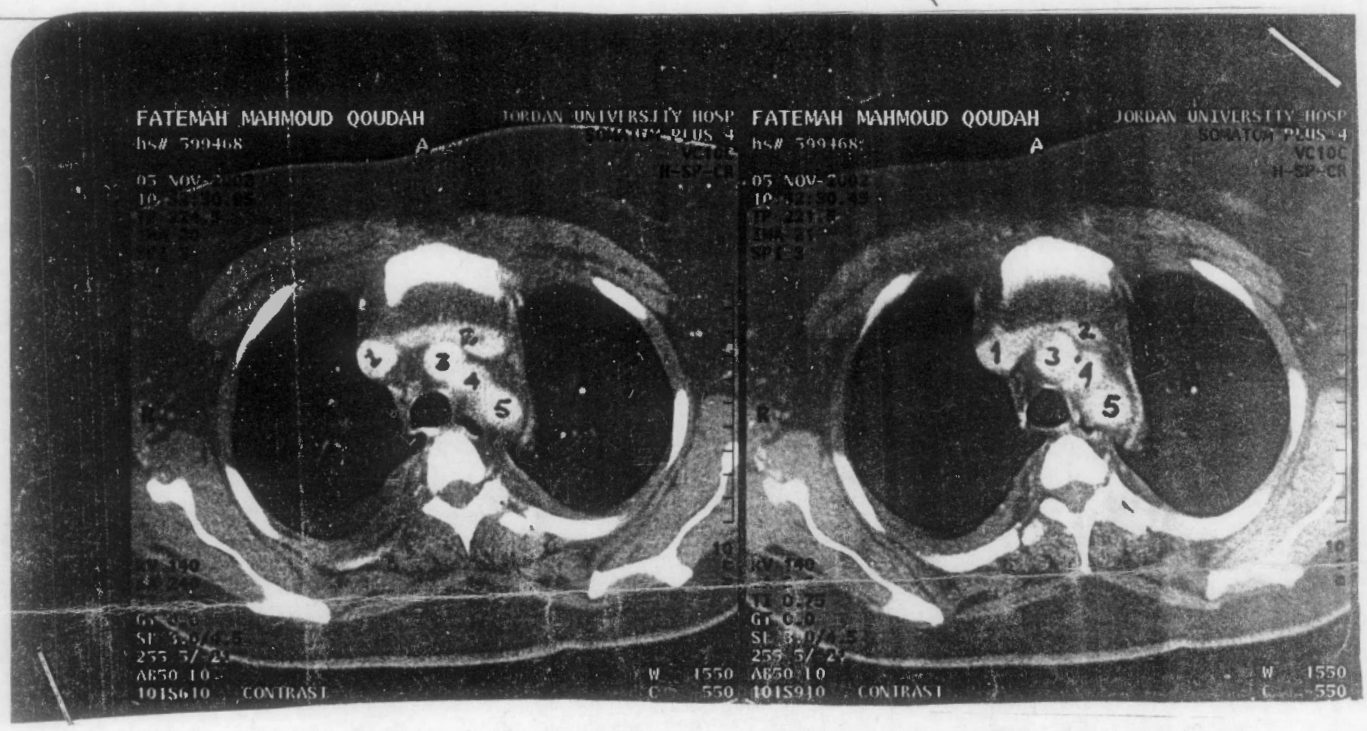
I

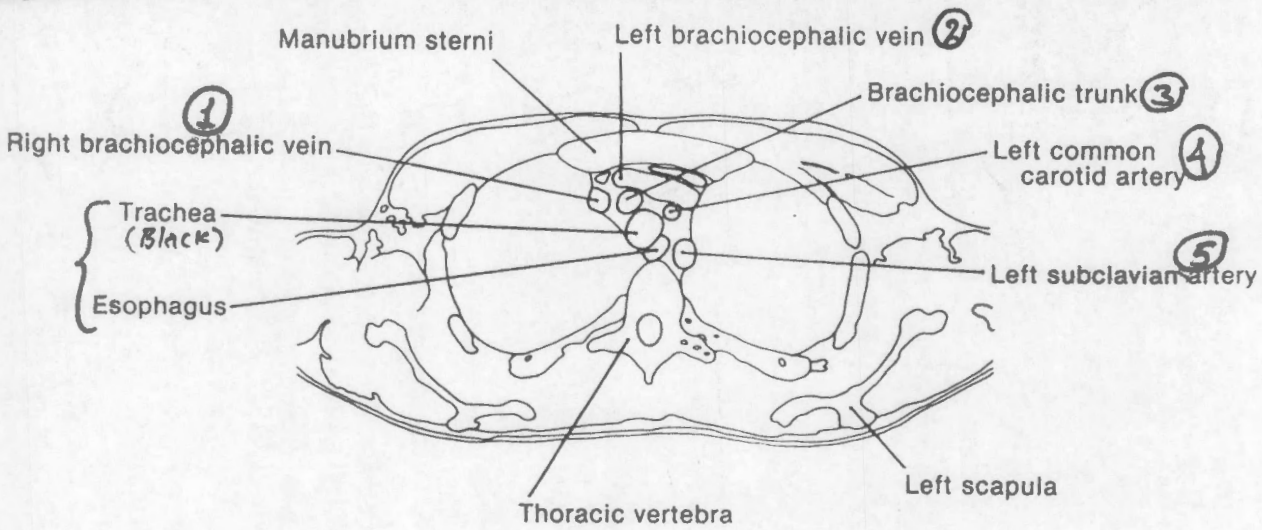
Bustami



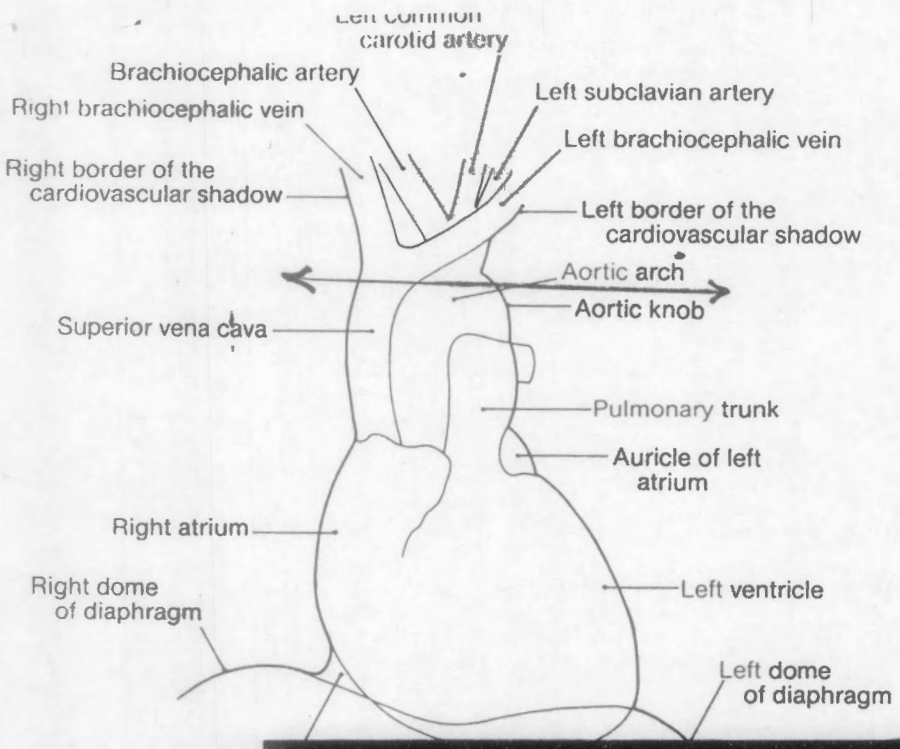
I

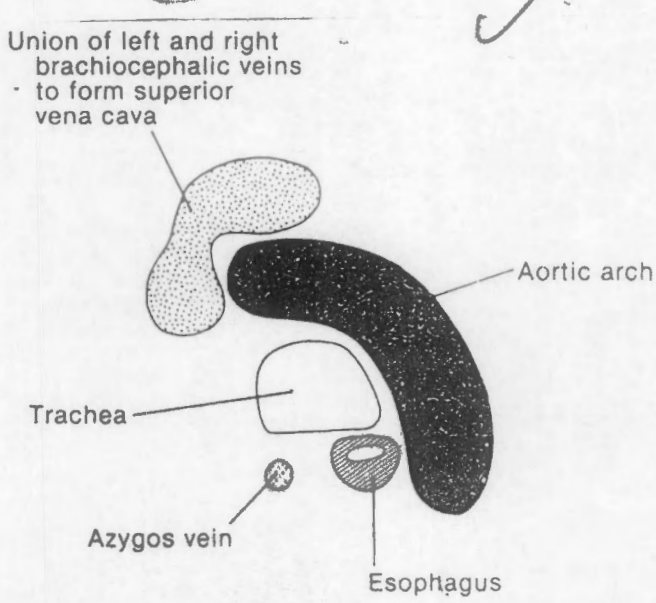
Bustami

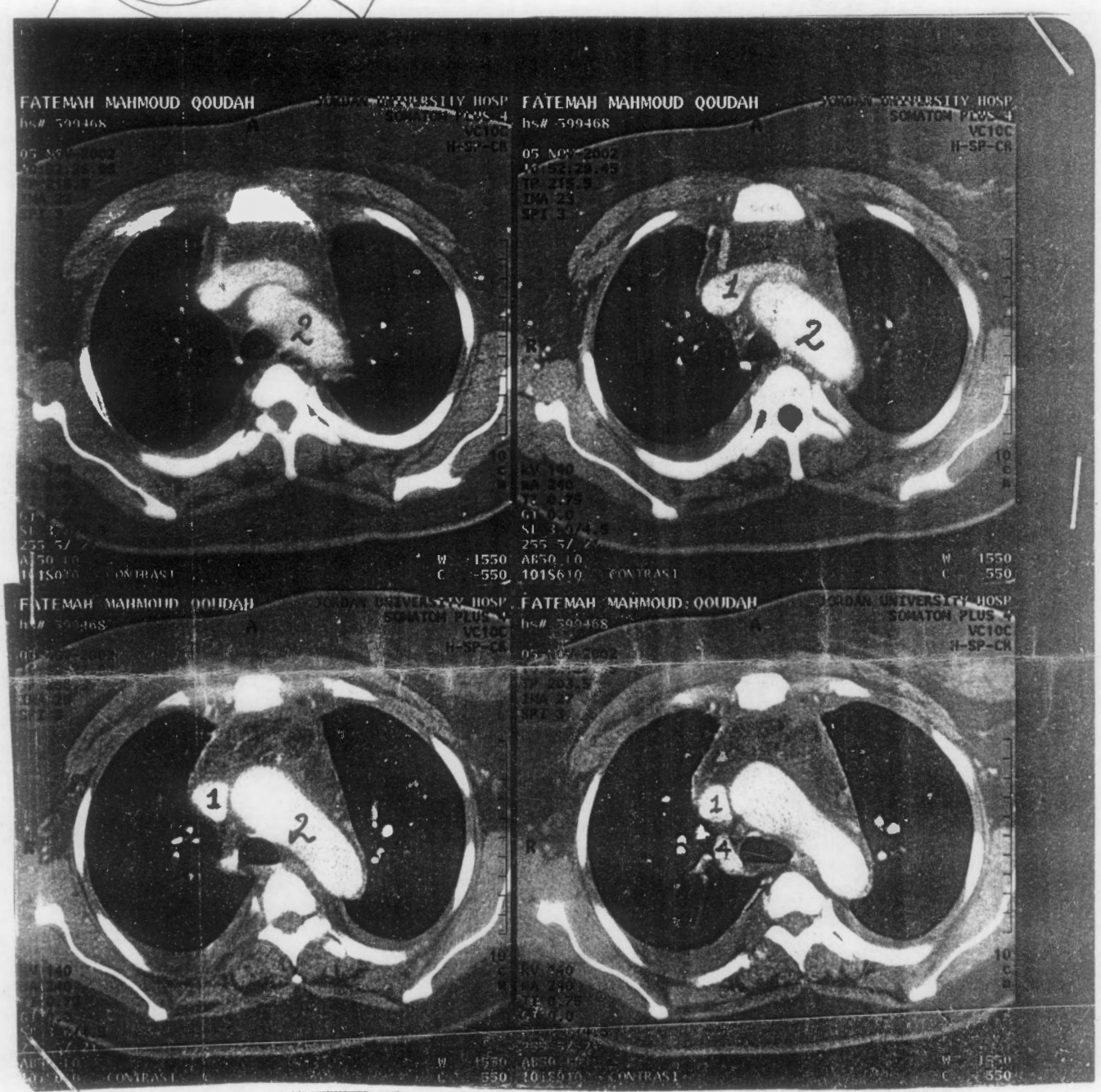


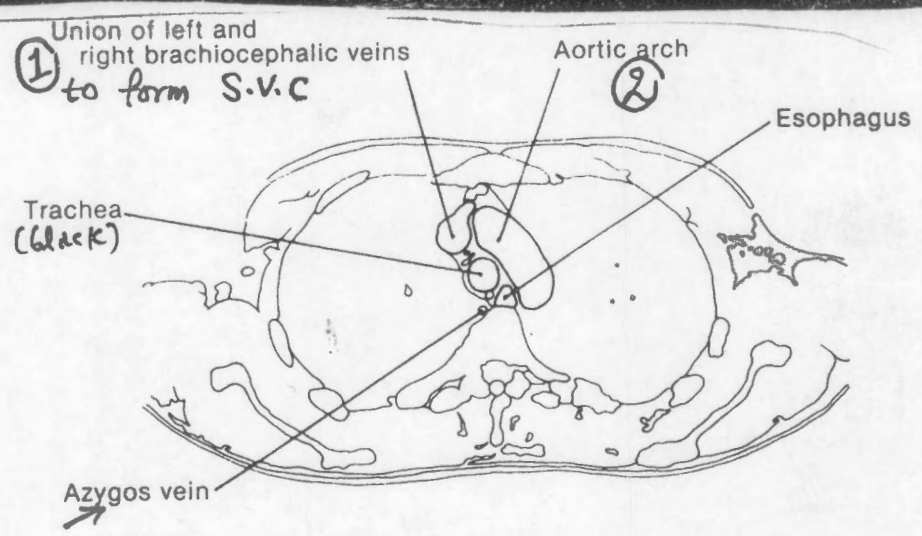


II





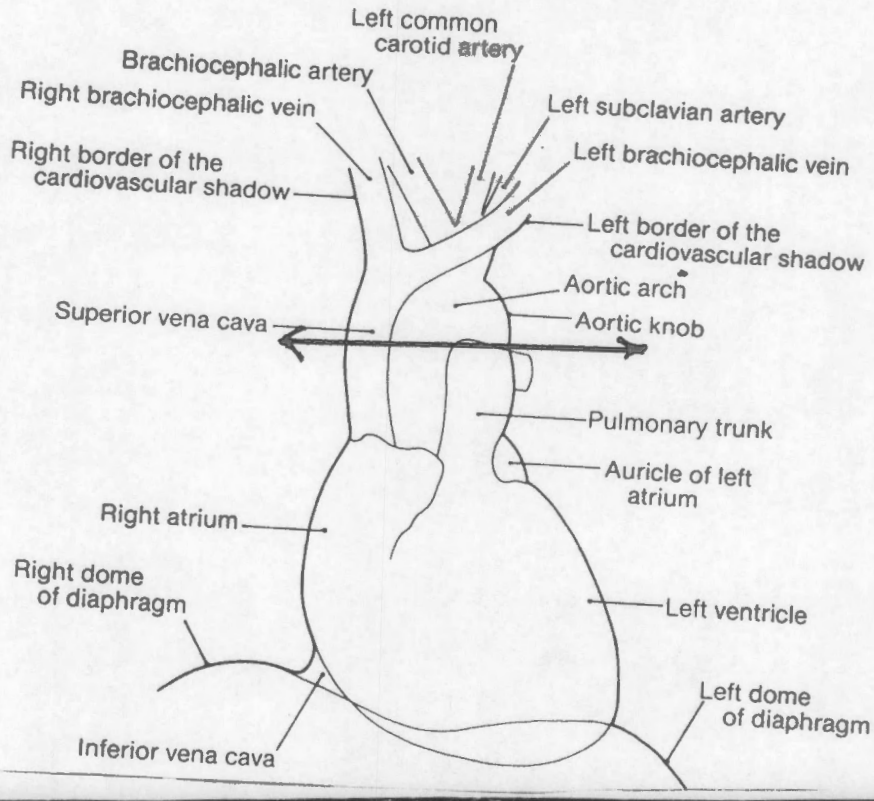


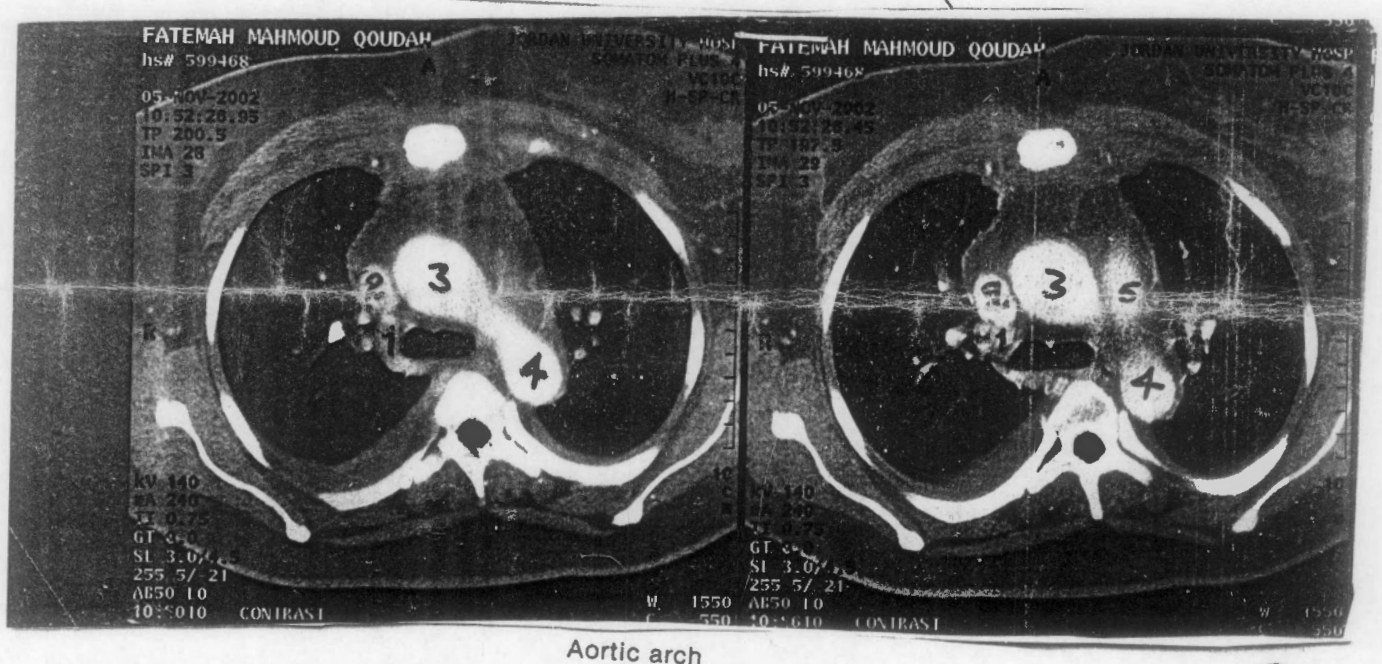


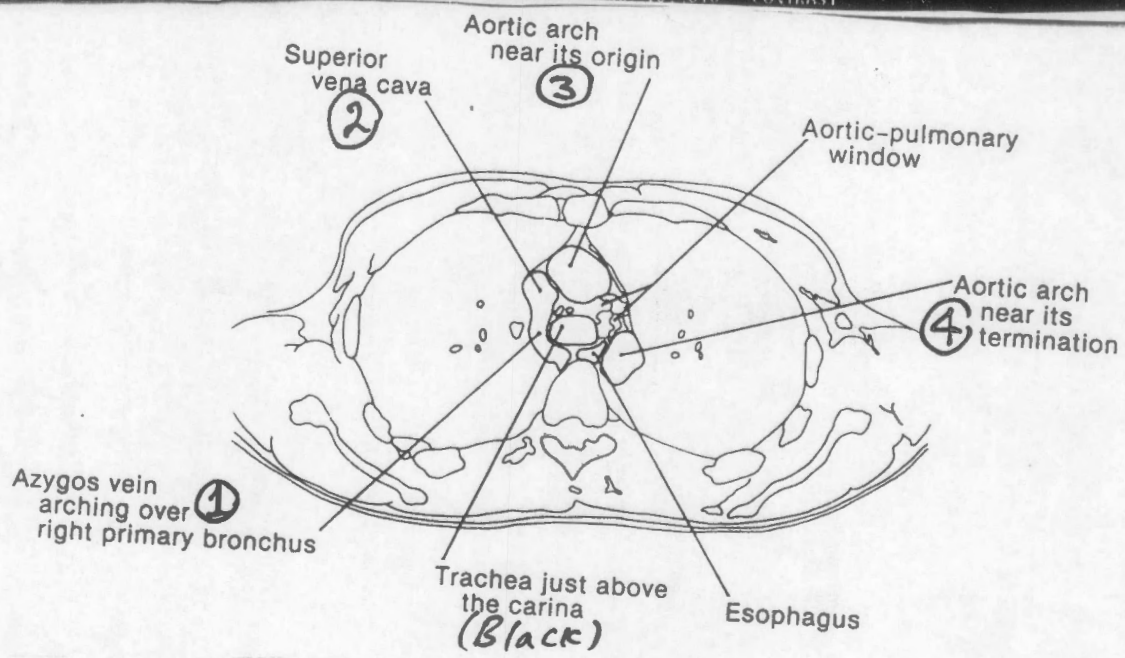
4 = azygous vein

III

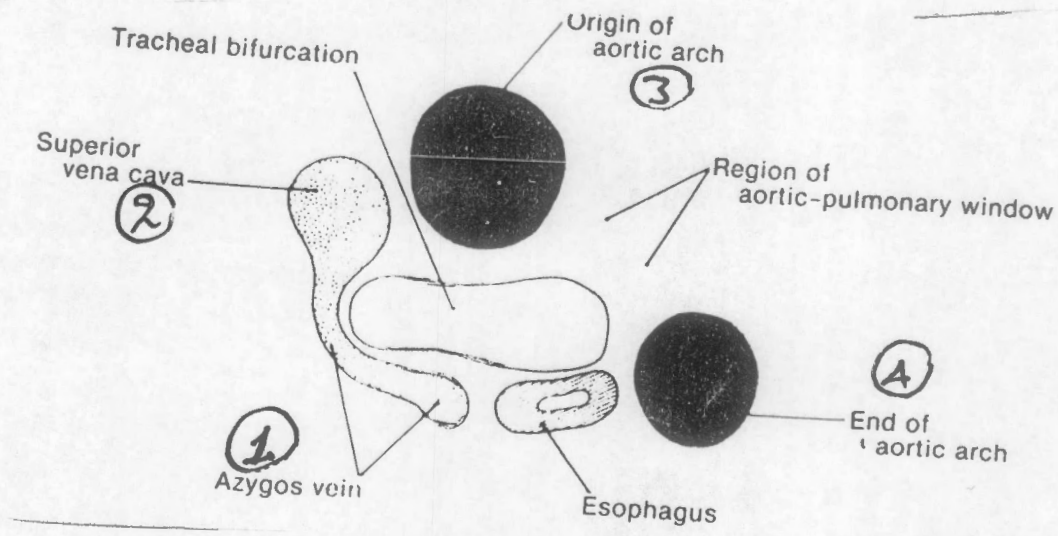
III



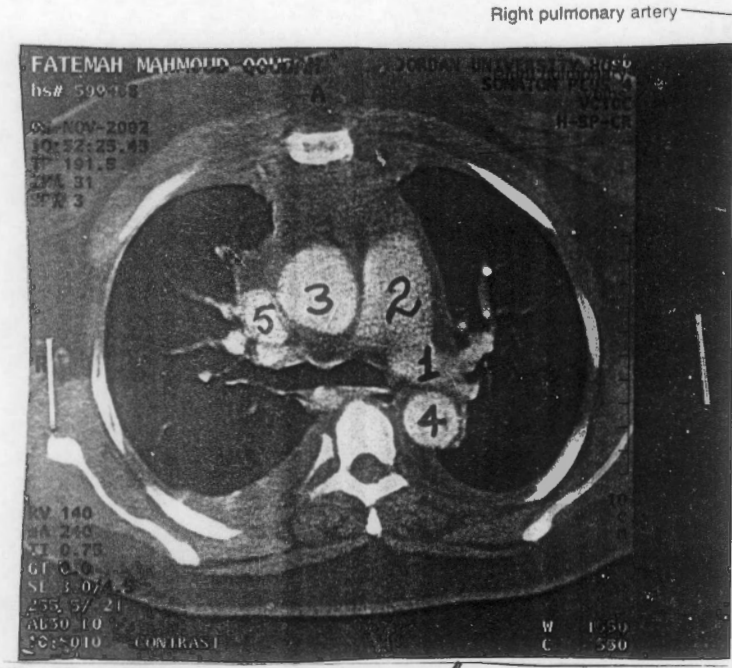




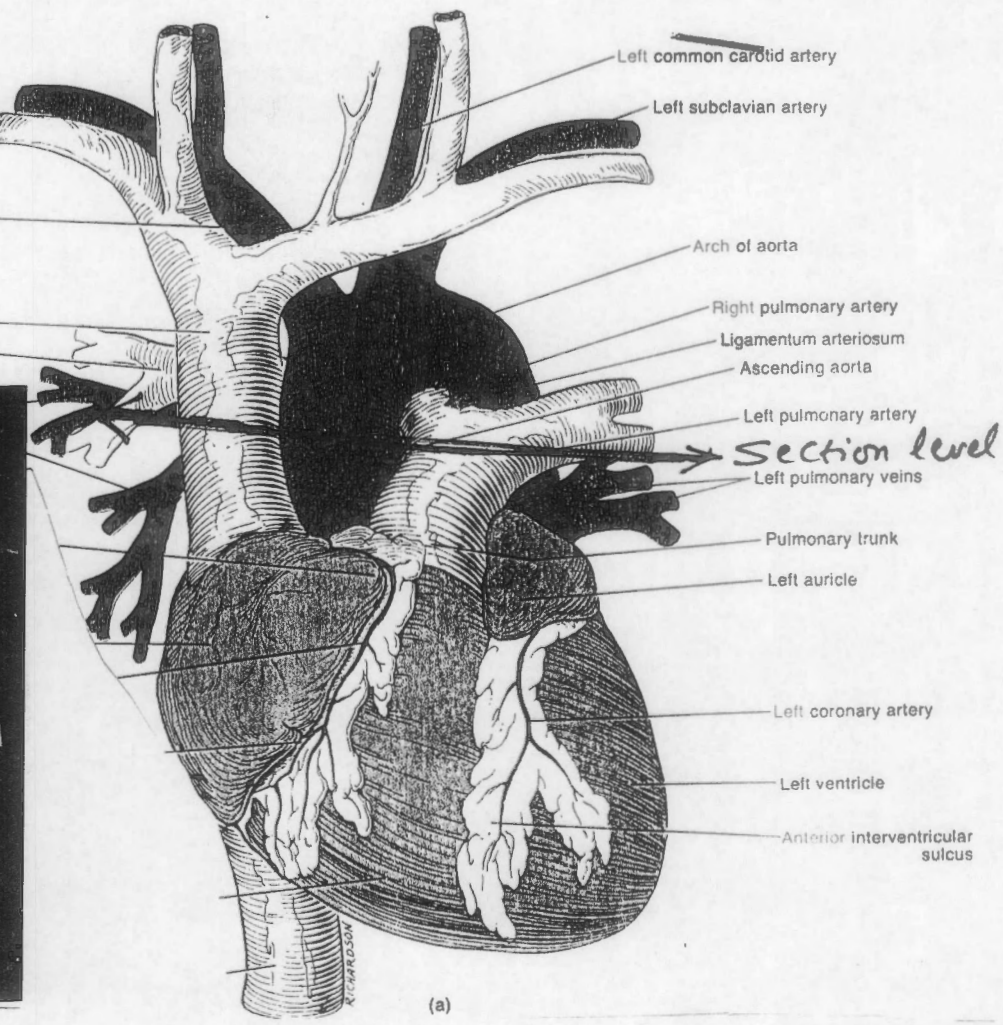
5 = upper part of pulmonary trunk

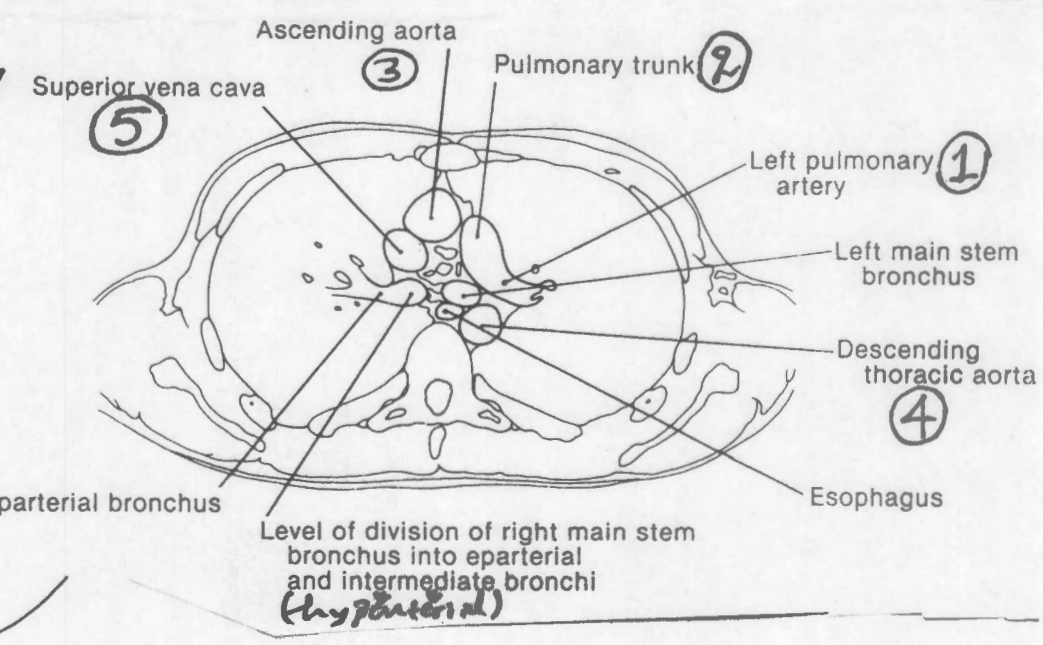


IV

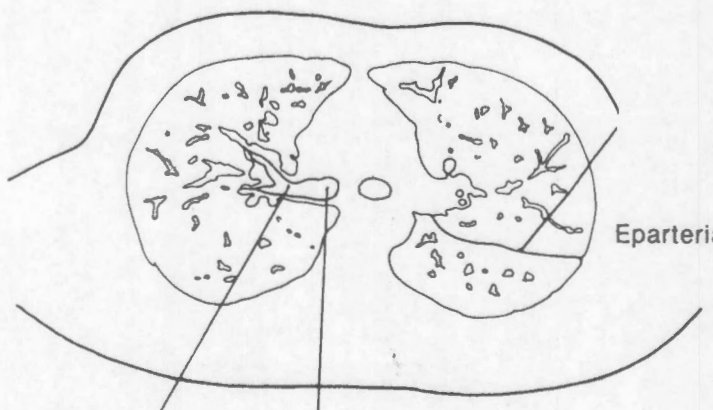


CT Scan at the level of the origin of the left Pulmonary artery (1)





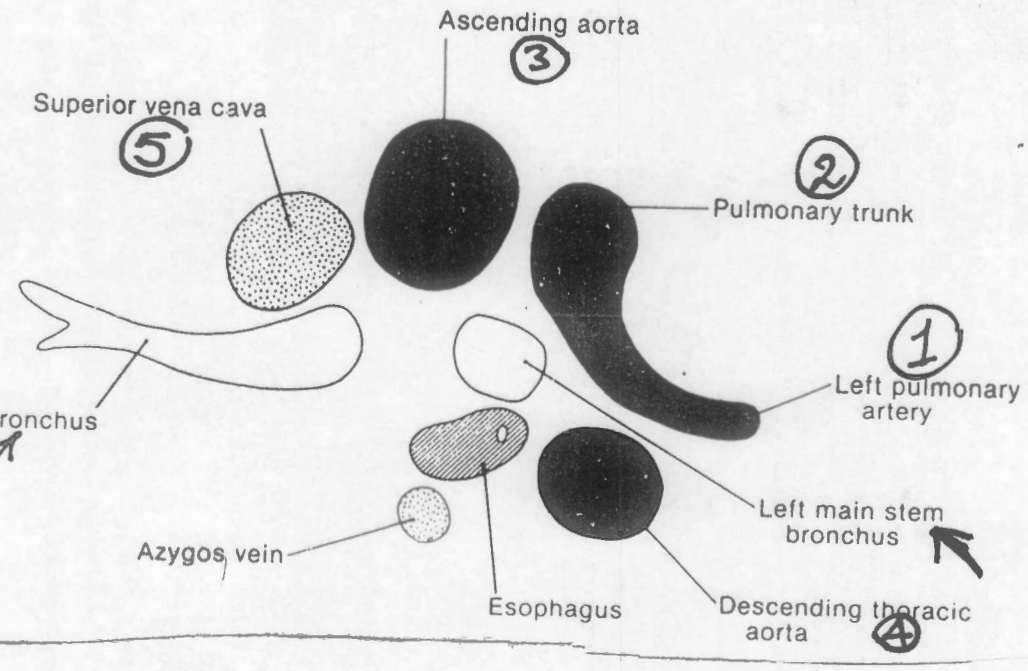
D



Level of division of right main stem bronchus into eparterial and intermediate bronchi

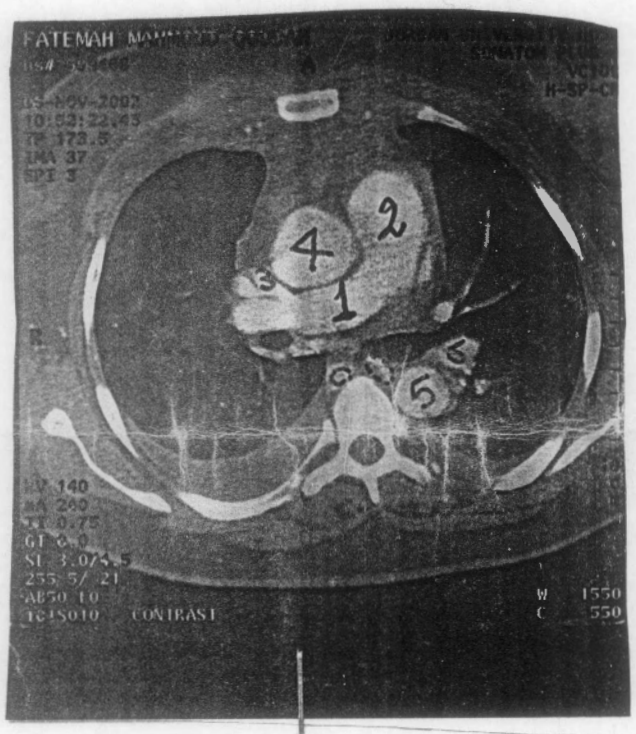
hyparterial

E

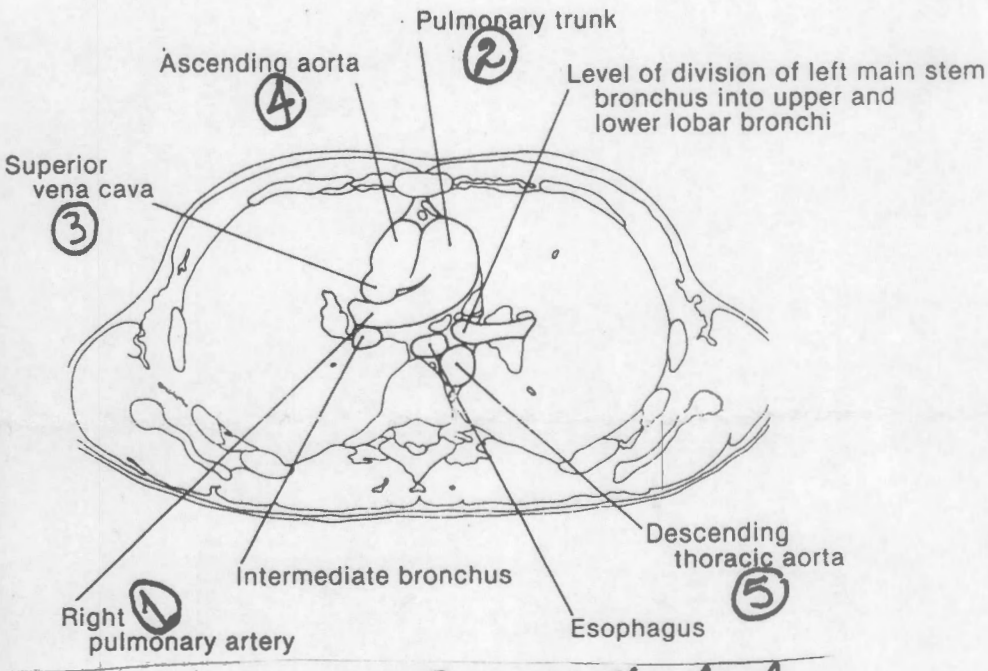


V

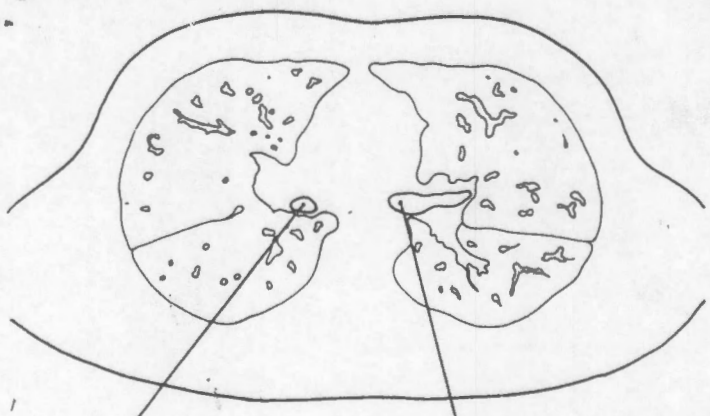
V Dr Bustami



6 = Lt. Pulm. a.



CT Scan at the level of the origin of the Rt. Pulmonary artery



Intermediate bronchus

Level of division of left main stem bronchus into upper and lower lobar bronchi