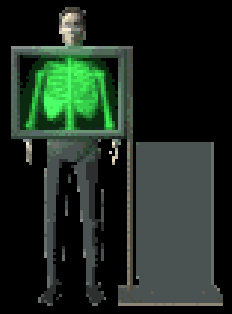
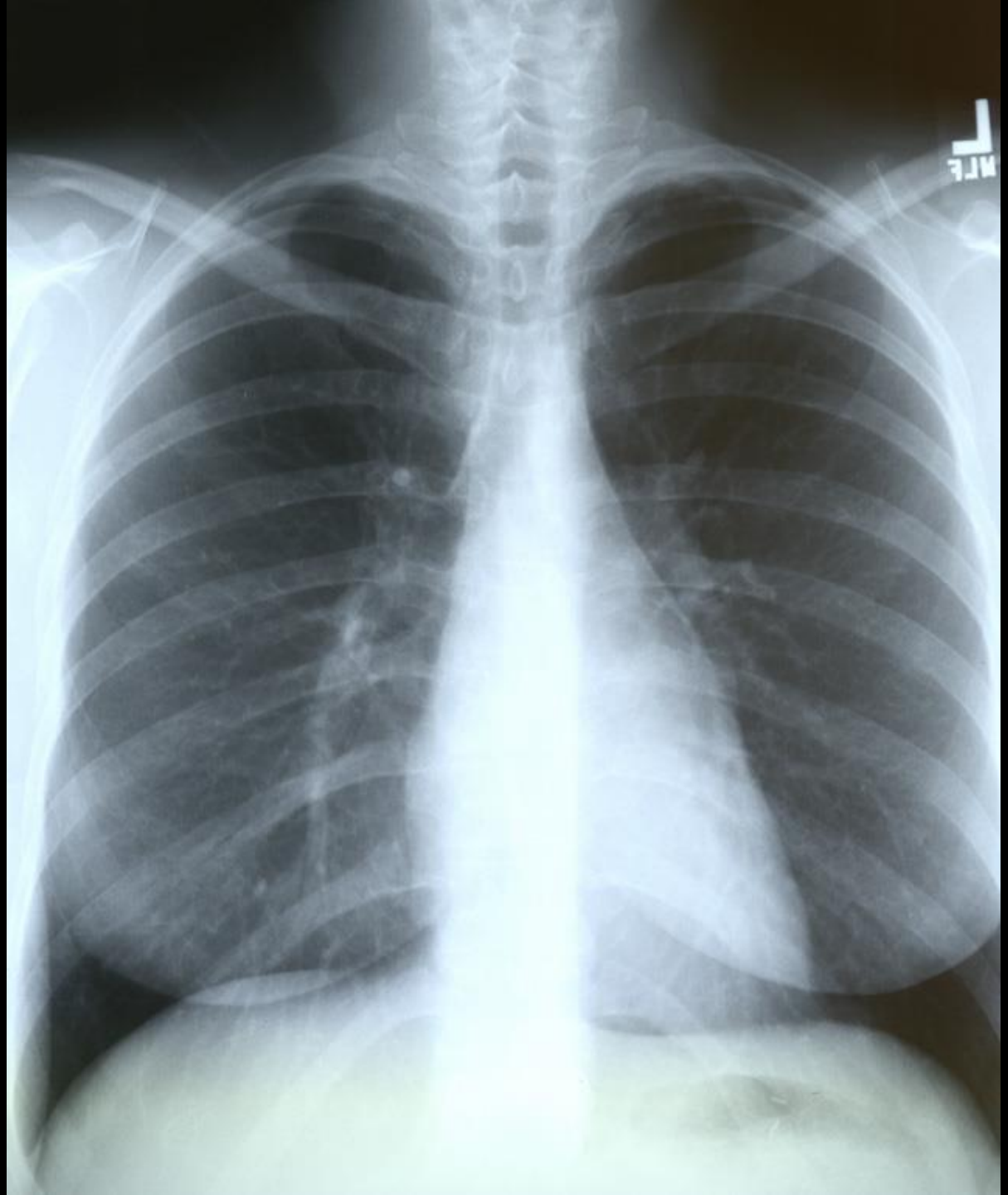
Plain Chest Radiographs





The 12-Step Program

- **1**: Name
- **2**: Date
- **3**: Old films

} **Pre-read**

- **4**: What type of **view(s)**
- **5**: Penetration
- **6**: Inspiration
- **7**: Rotation
- **8**: Angulation

} **Quality Control**

- **9**: Soft tissues / bony structures
- **10**: Mediastinum
- **11**: Diaphragms
- **12**: Lung Fields

} **Findings**

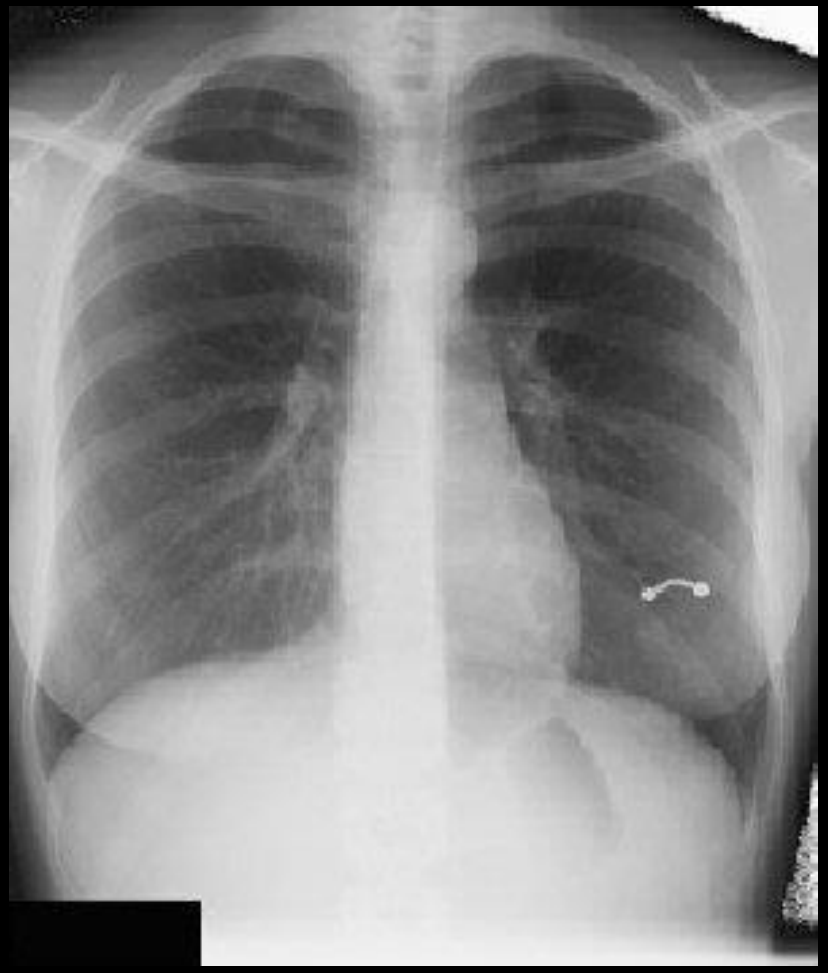
Pre-Reading

- **1**. Check the name
- **2**. Check the date
- **3**. Obtain old films if available

- **4**. Which **view(s)** do you have?
  - PA / AP, lateral, decubitus, AP lordotic

Techniques - Projection

- P-A (relation of x-ray beam to patient)



Techniques - Projection

(continued)

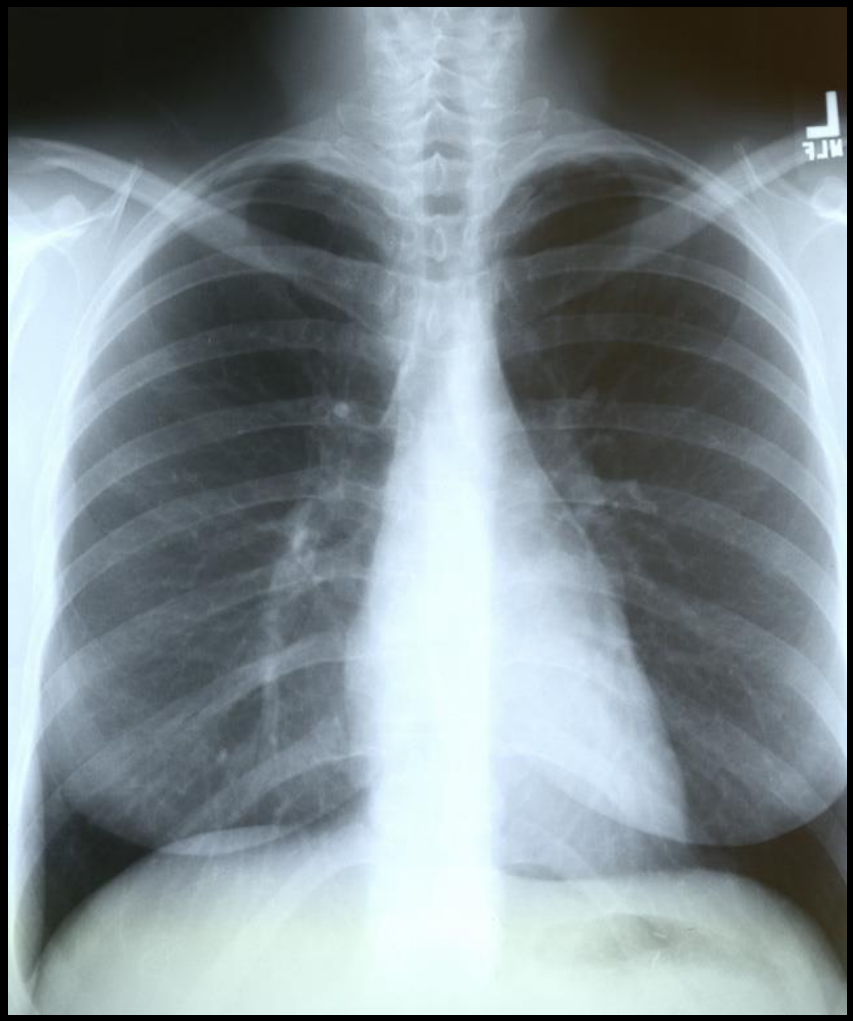
- Lateral

Techniques - Projection
(continued)

- Lateral Decubitus

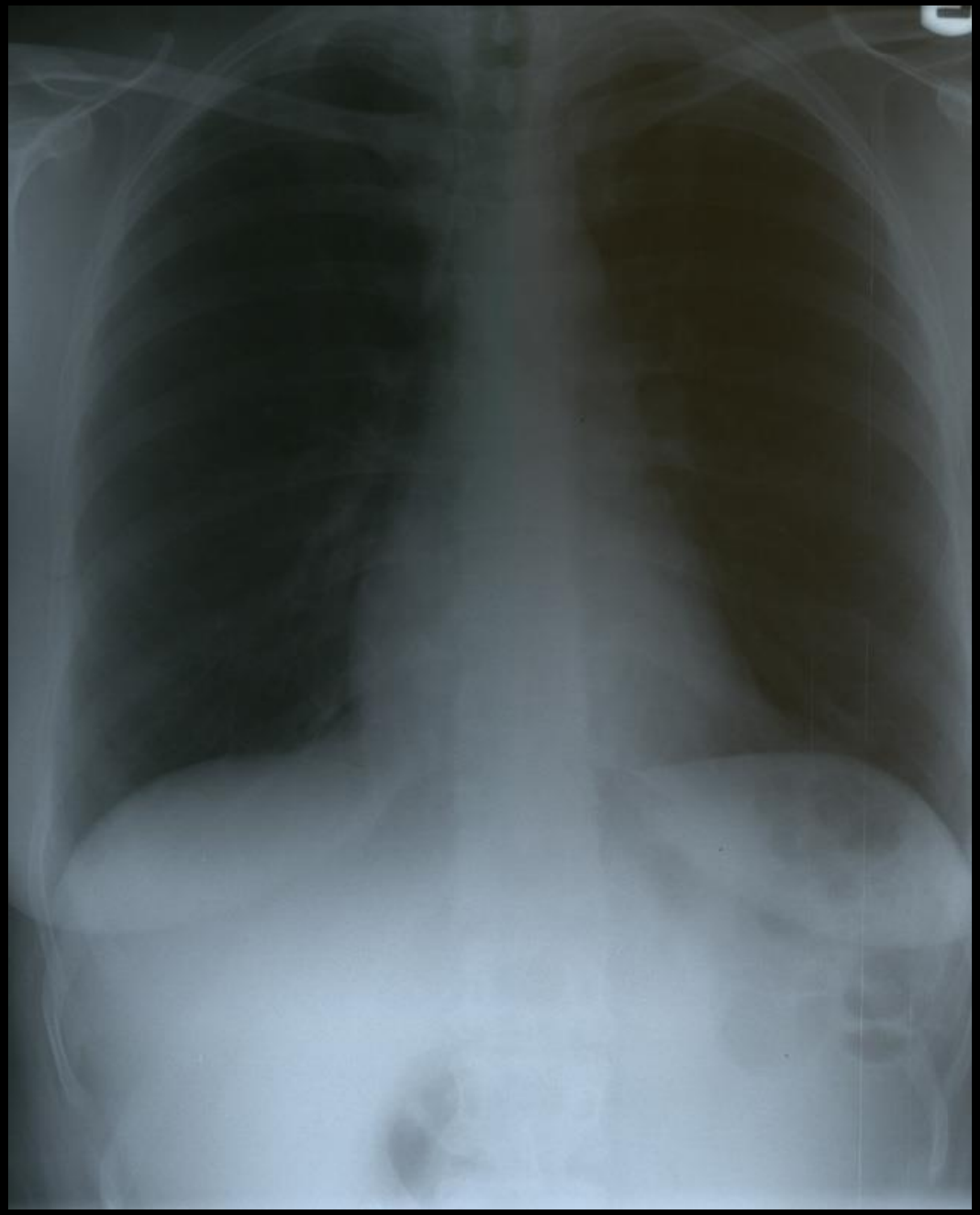
Quality Control

- **5. Penetration**
  - Should see ribs through the heart
  - Barely see the spine through the heart
  - Should see pulmonary vessels nearly to the edges of the lungs



Overpenetrated Film

- Lung fields darker than normal—may obscure subtle pathologies
- See spine well beyond the diaphragms
- Inadequate lung detail

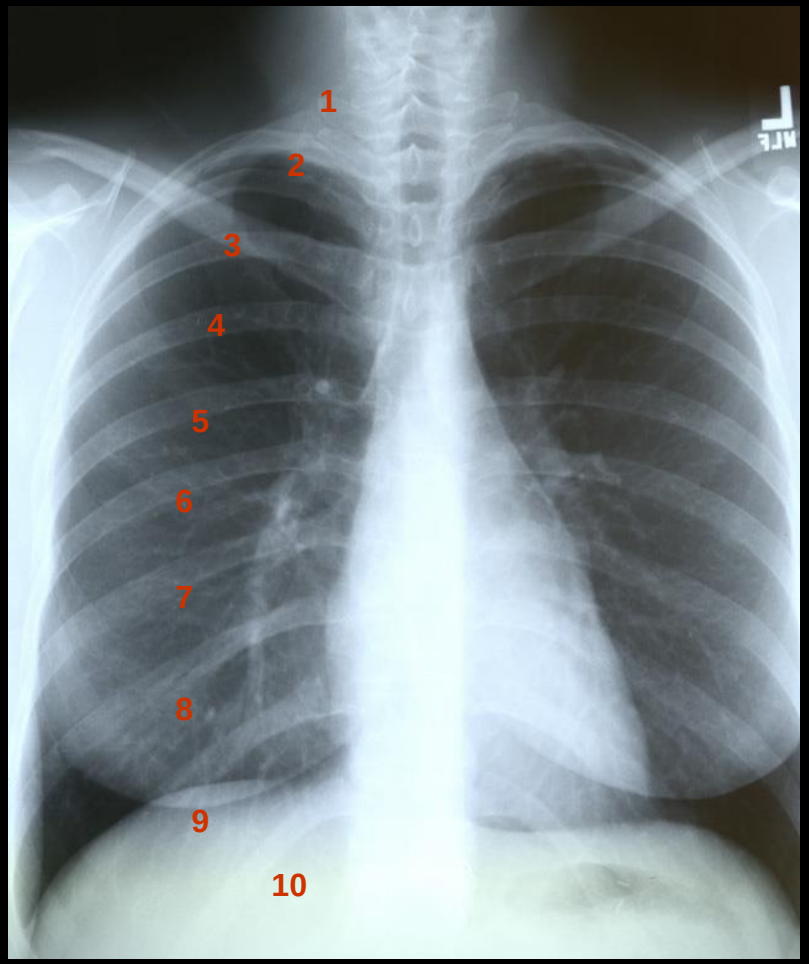


Underpenetrated Film

- Hemidiaphragms are obscured
- Pulmonary markings more prominent than they actually are

Quality Control

- **6**. Inspiration
  - Should be able to count 9-10 posterior ribs
  - Heart shadow should not be hidden by the diaphragm



About 8 posterior ribs are showing

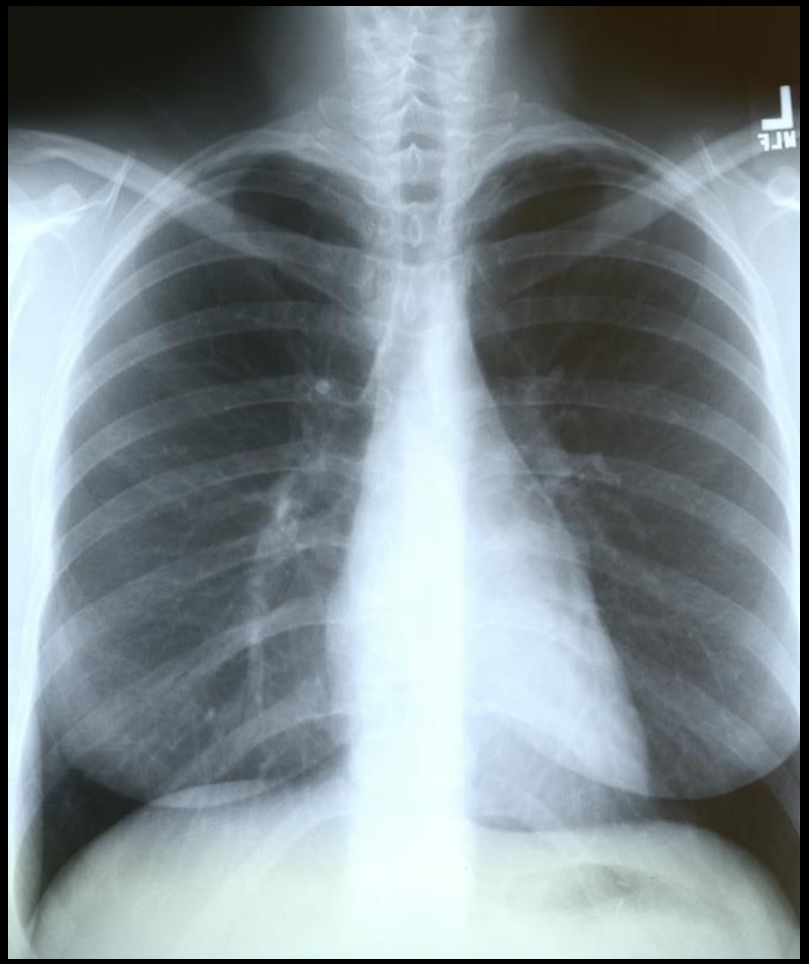
Poor inspiration can crowd lung markings producing pseudo-airspace disease

With better inspiration, the "disease process" at the lung bases has cleared

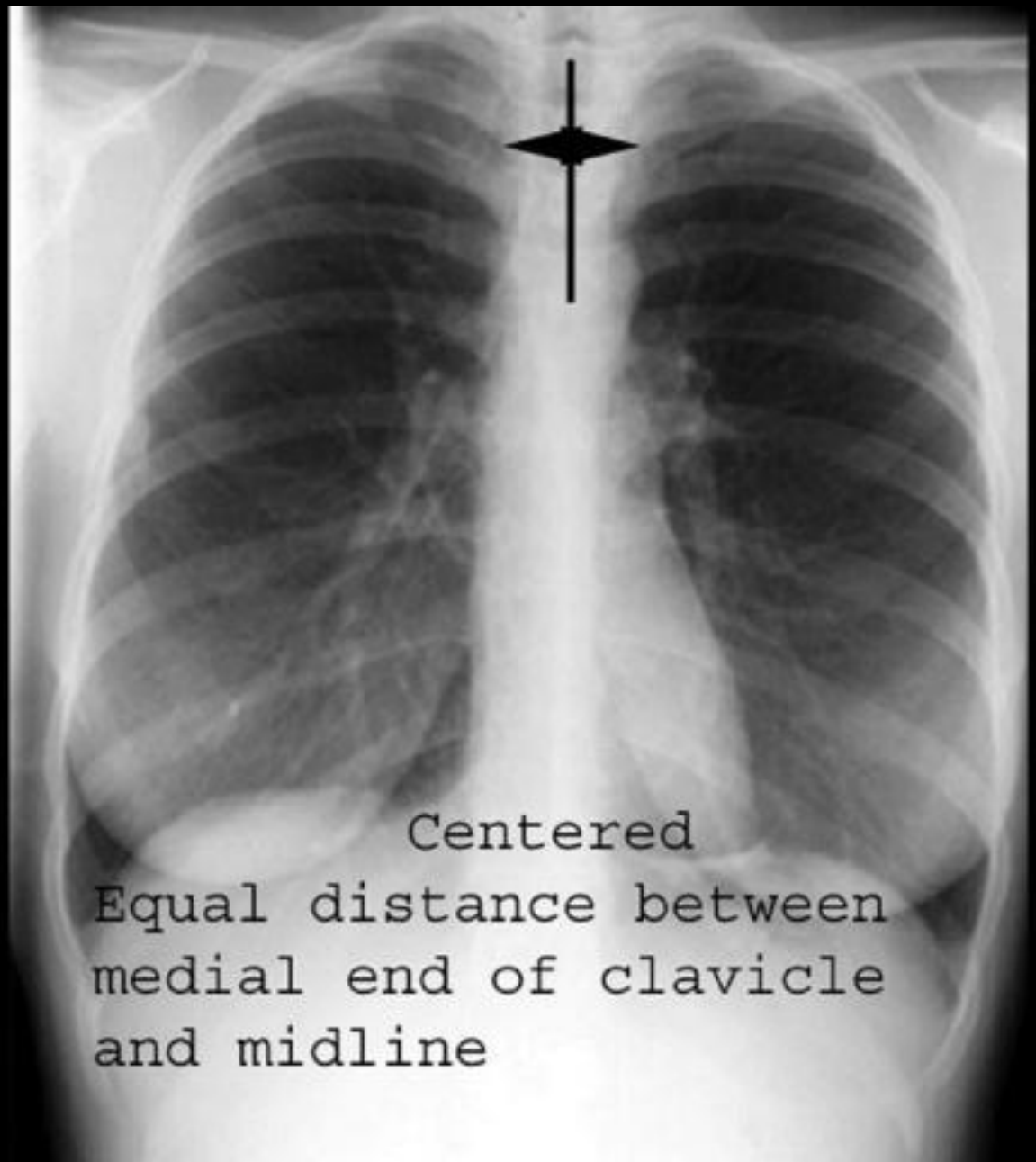
9-10 posterior ribs are showing

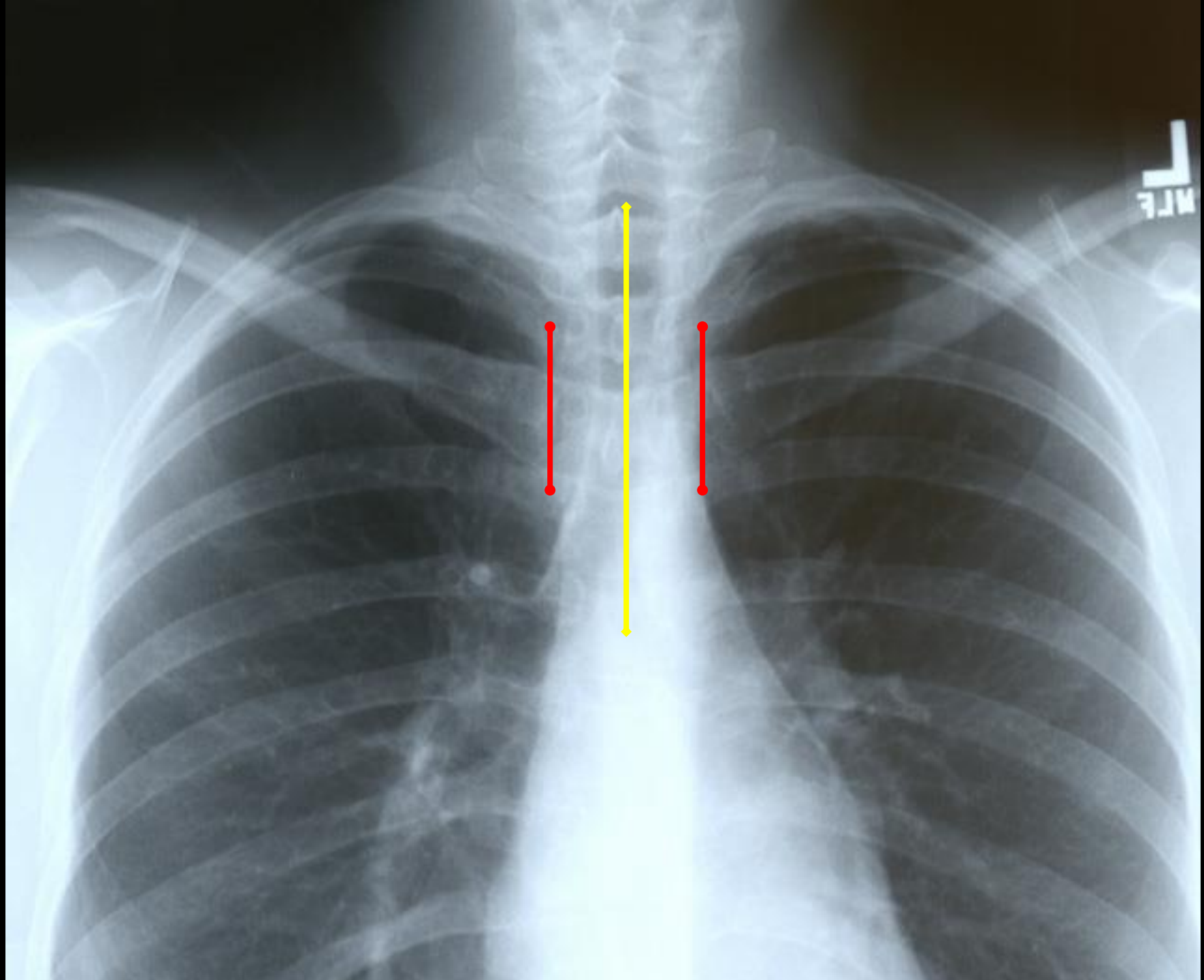
Quality Control

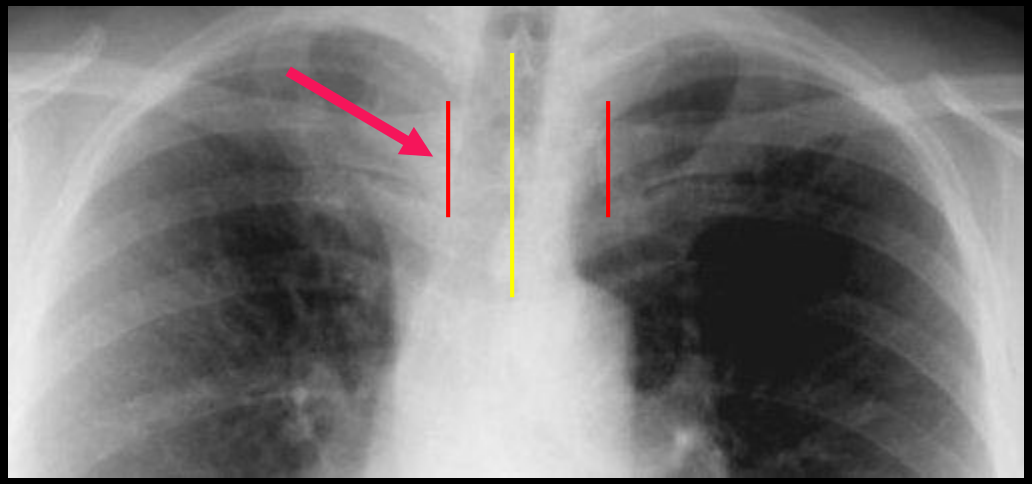
- **7. Rotation**
  - Medial ends of bilateral clavicles are equidistant from the midline or vertebral bodies



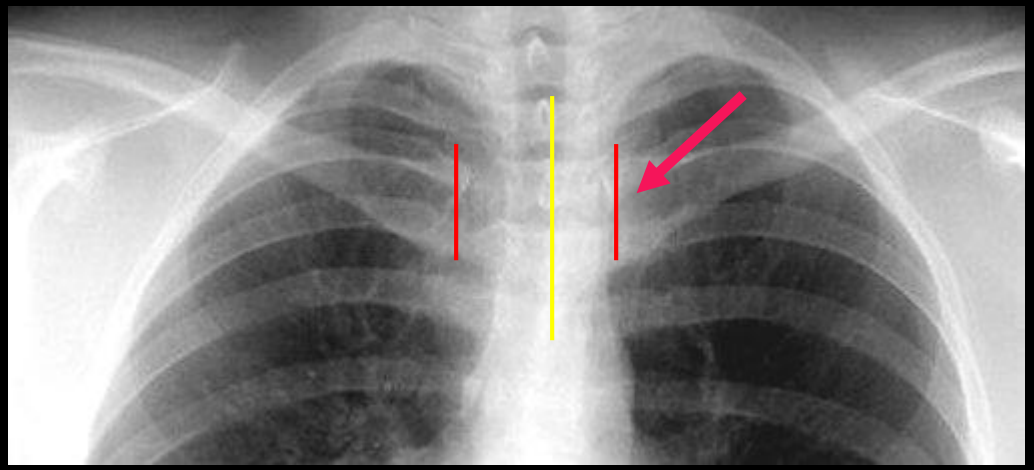
Rotation


Centered
Equal distance between
medial end of clavicle
and midline





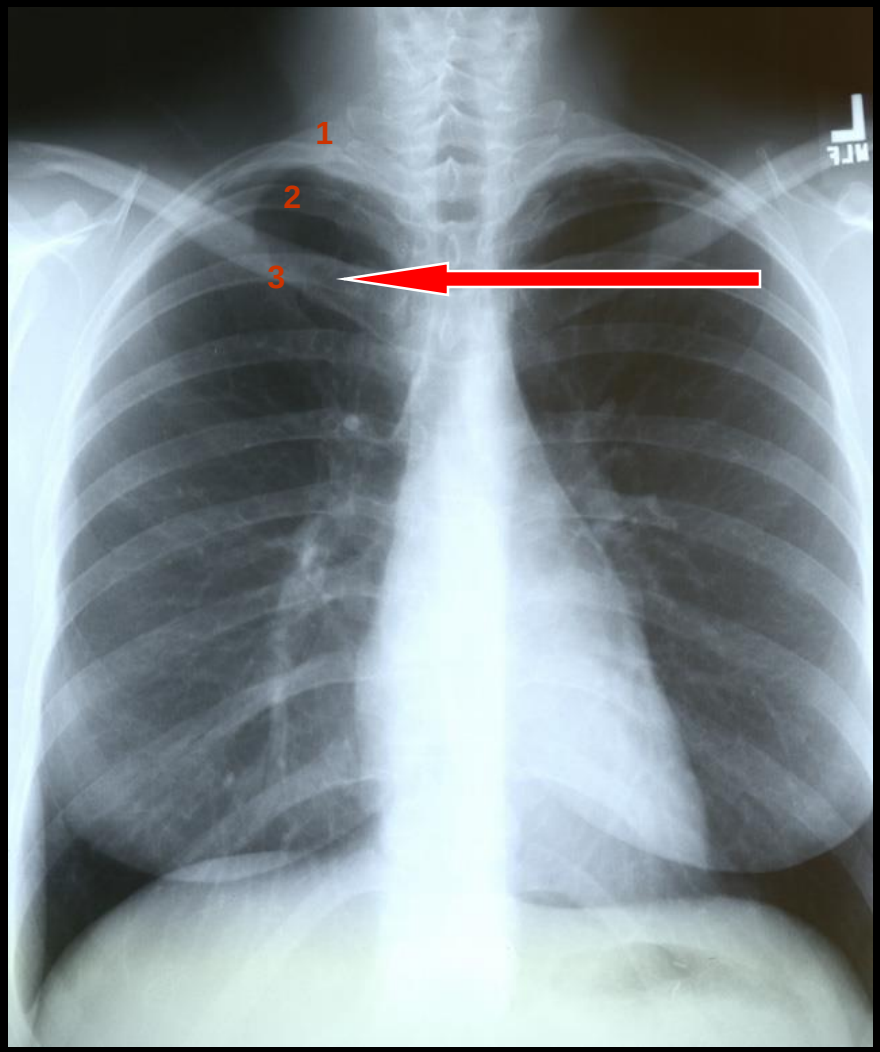
If spinous process appears closer to the right clavicle (red arrow), the patient is rotated toward their own left side



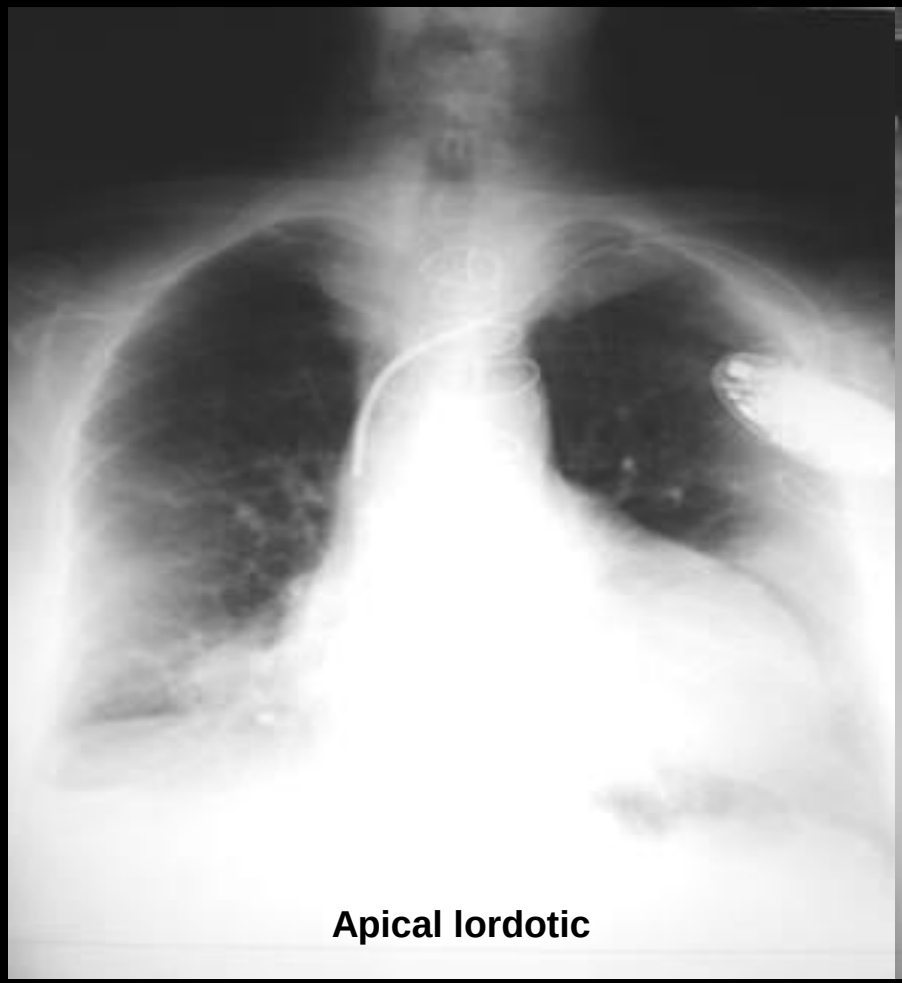
If spinous process appears closer to the left clavicle (red arrow), the patient is rotated toward their own right side

Quality Control

- **8. Angulation**
  - Clavicle should lay over 3rd rib



Pitfall Due to Angulation



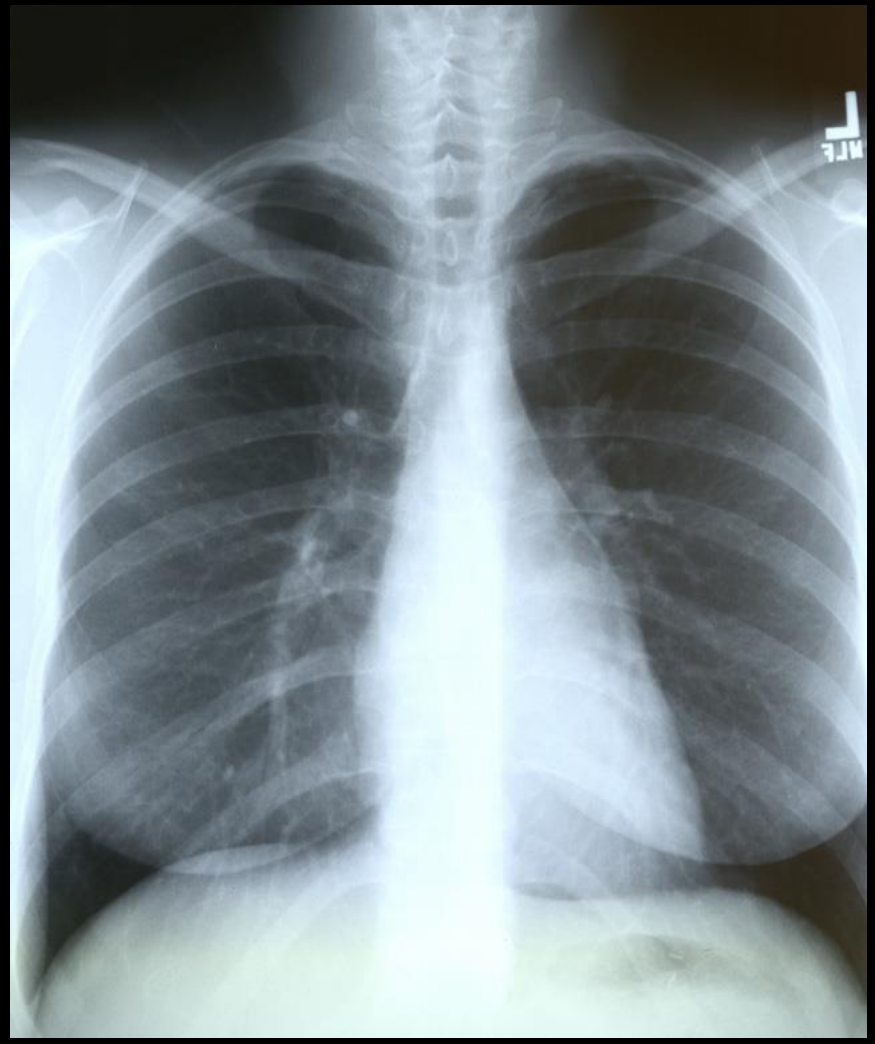
Apical lordotic

Same patient, not lordotic

- A film which is apical lordotic (beam is angled up toward head) will have an unusually shaped heart and the usually sharp border of the left hemidiaphragm will be absent

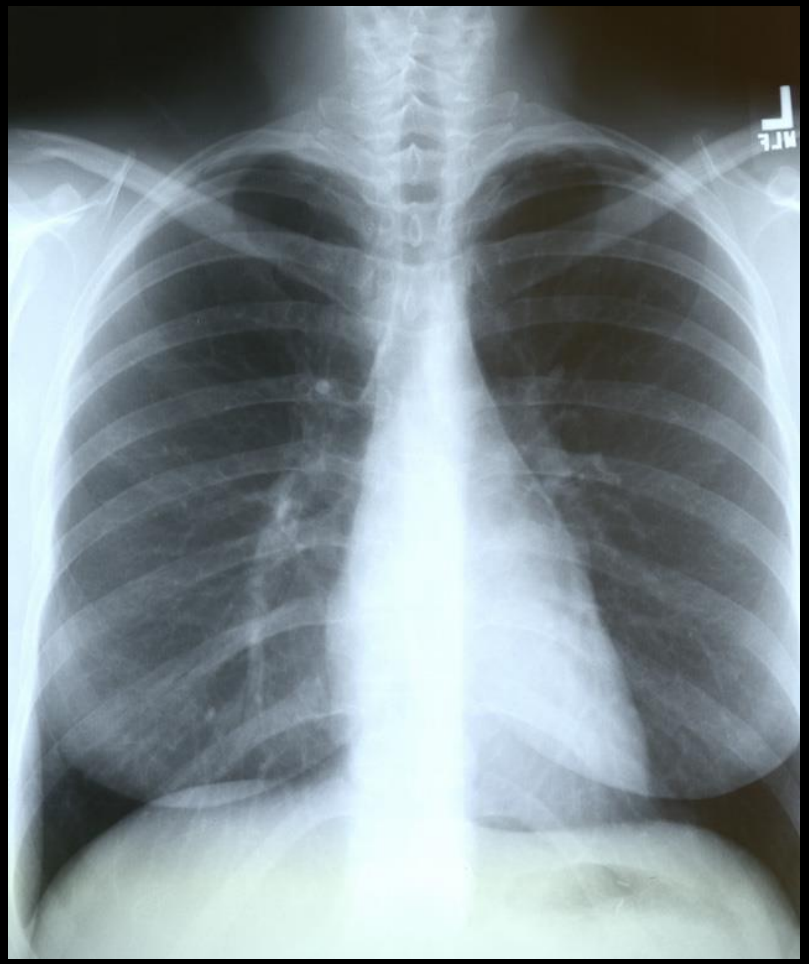
Findings

- **9. Soft tissue and bony structures**
  - Check for
    - Symmetry
    - Deformities
    - Fractures
    - Masses
    - Calcifications
    - Lytic lesions



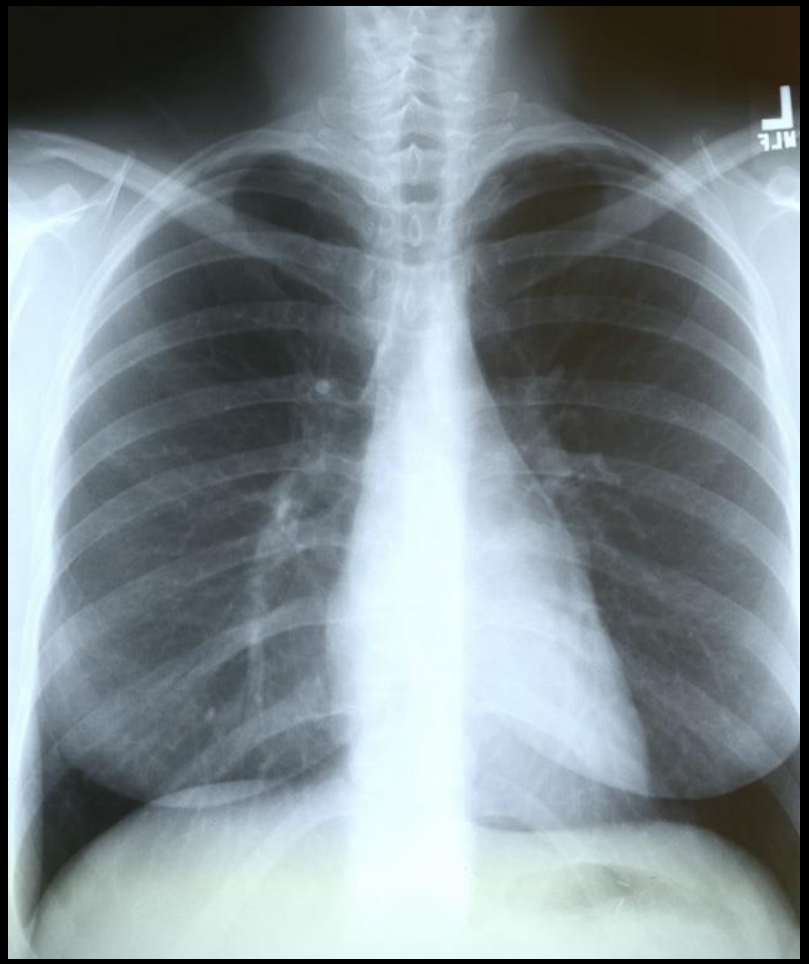
Findings

- **10. Mediastinum**
  - Check for
    - Cardiomegaly
    - Mediastinal and Hilar contours for increase densities or deformities



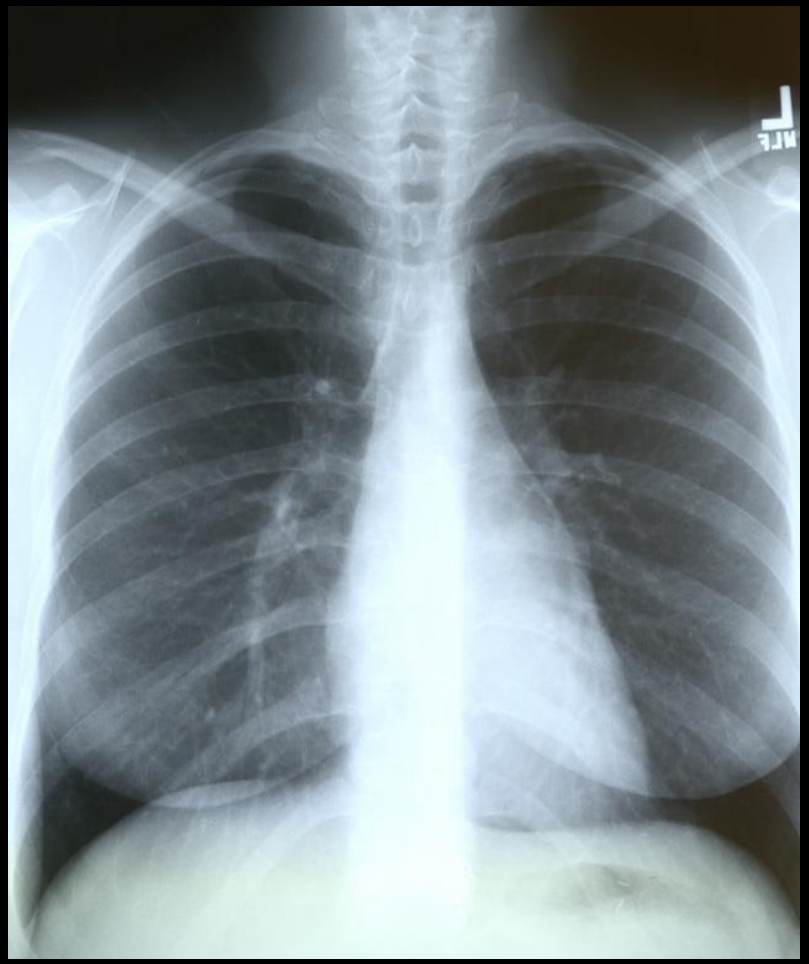
Findings

- **11. Diaphragms**
  - Check sharpness of borders
  - Right is normally higher than left
  - Check for free air, gastric bubble, pleural effusions

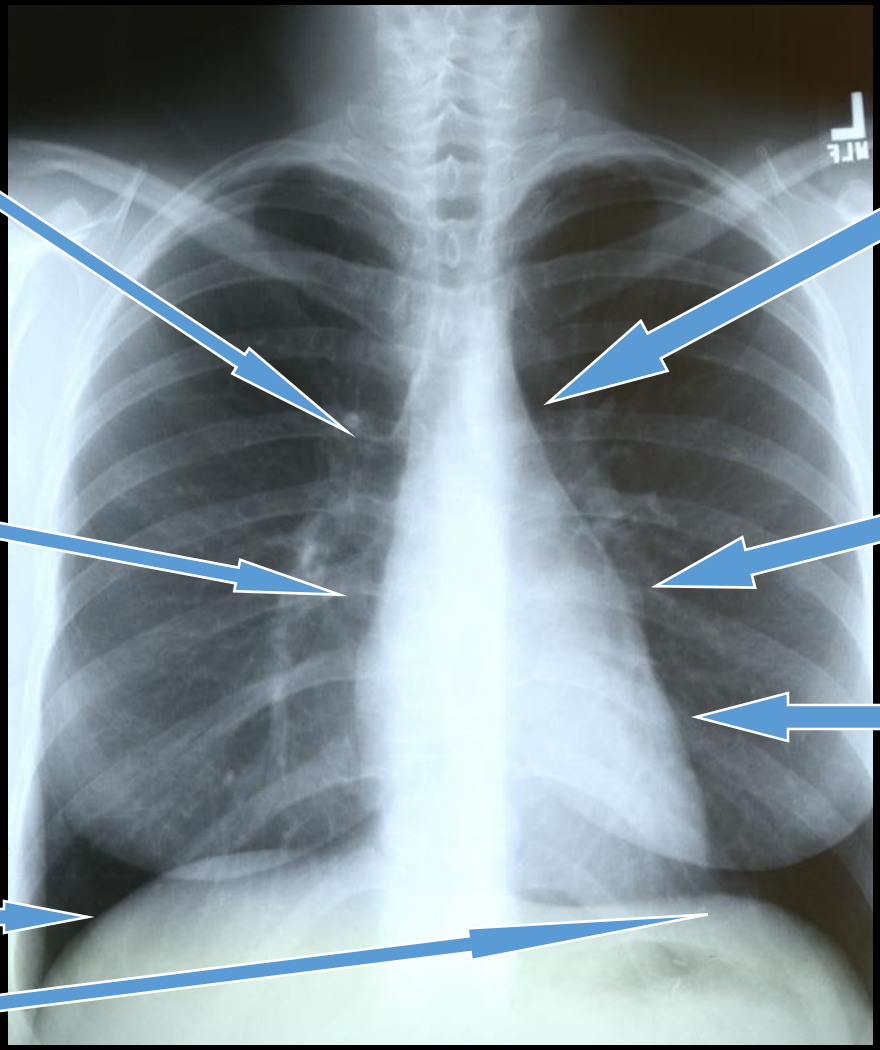


Findings

- **12. The Lung Fields!**
  - To help you determine abnormalities and their location…
    - Use silhouettes of other thoracic structures
    - Use fissures



Lung Fields: Using Structures / Silhouettes



Upper right heart border / ascending aorta (anterior RUL)

Aortic knob (Apical portion of LUL)

Right heart border (medial RML)

Upper left heart border (anterior LUL)

Left heart border (lingula; anterior)

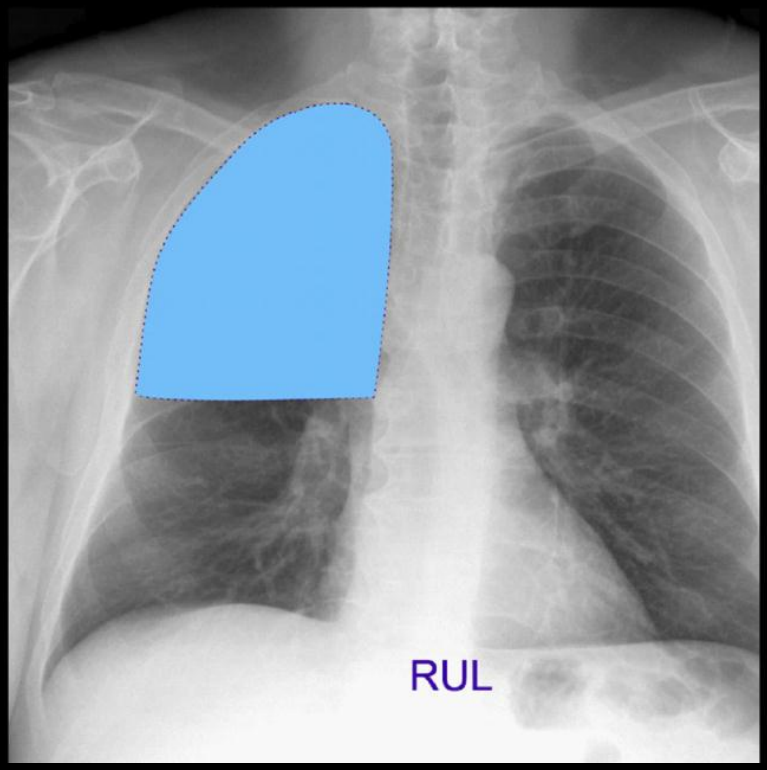
Anterior hemidiaphragms (anterior lower lobes)

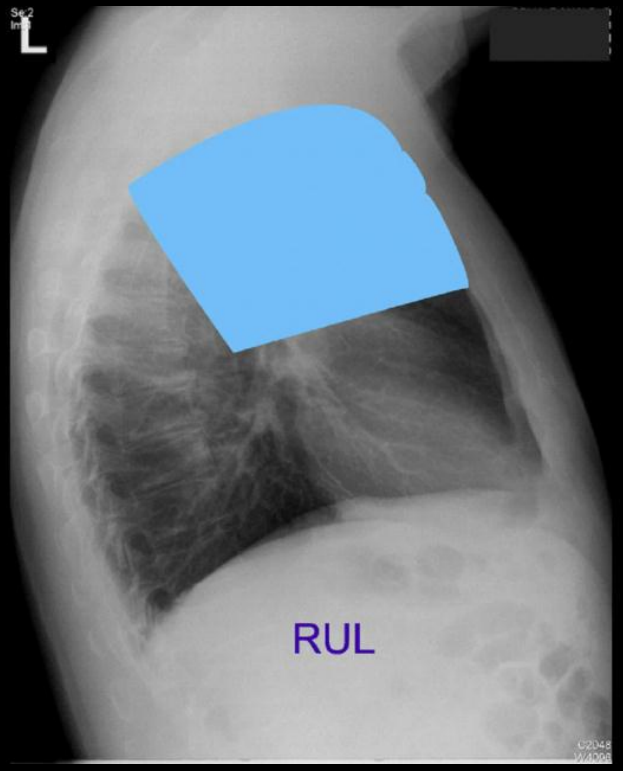
Lung Fields: Fissures

- The fissures can also help you to determine the boundaries of pathology

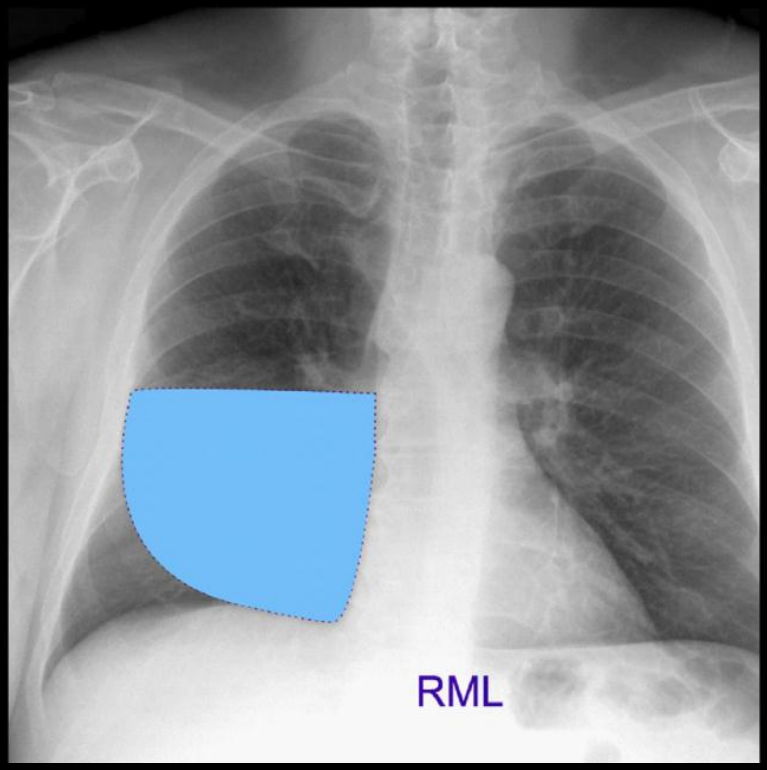
Major Oblique Fissure	Separates the LUL from the LLL
Right Major Fissure	Separates the RUL/RML from the RLL
Right Minor Fissure	Separates the RUL from the RML

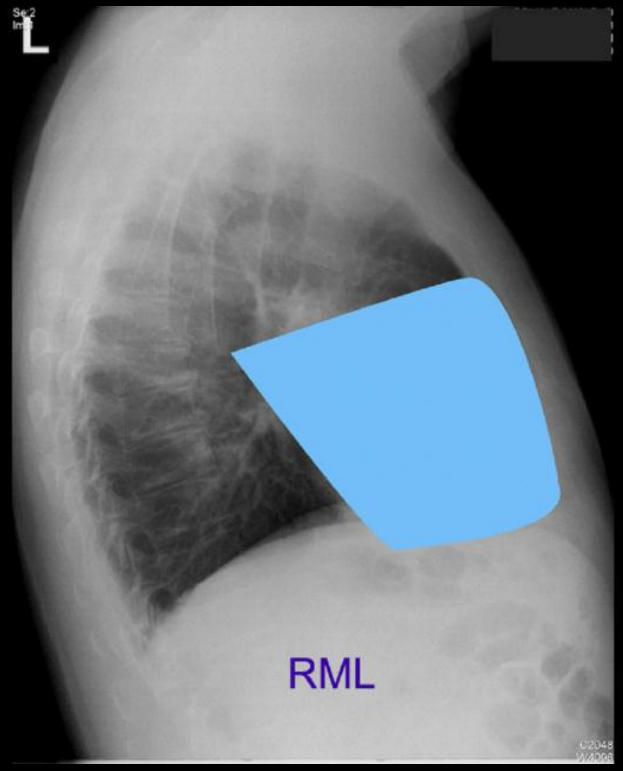
Lobes



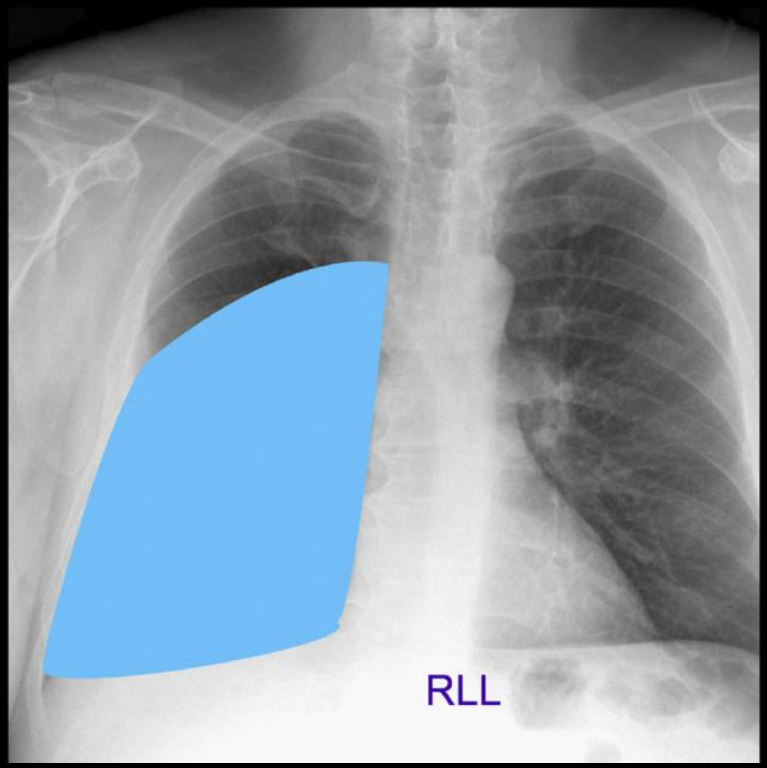


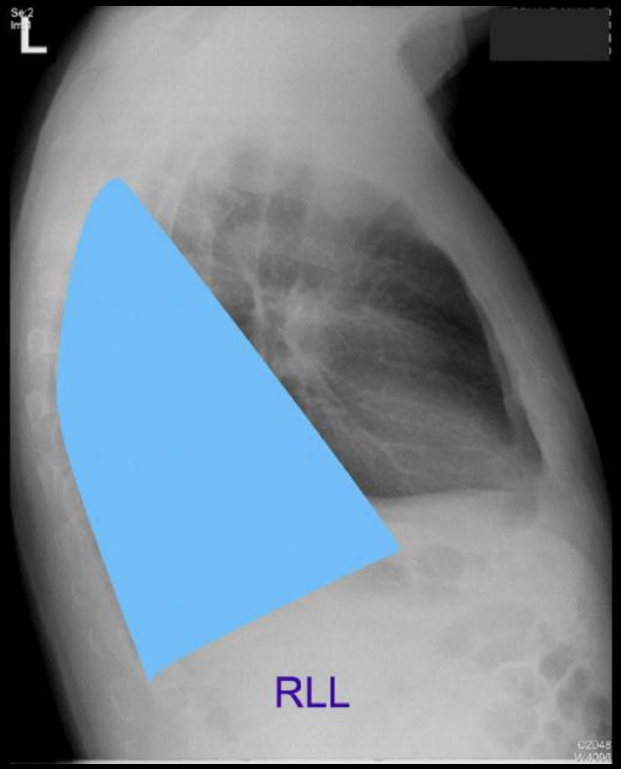
Lobes (continued)



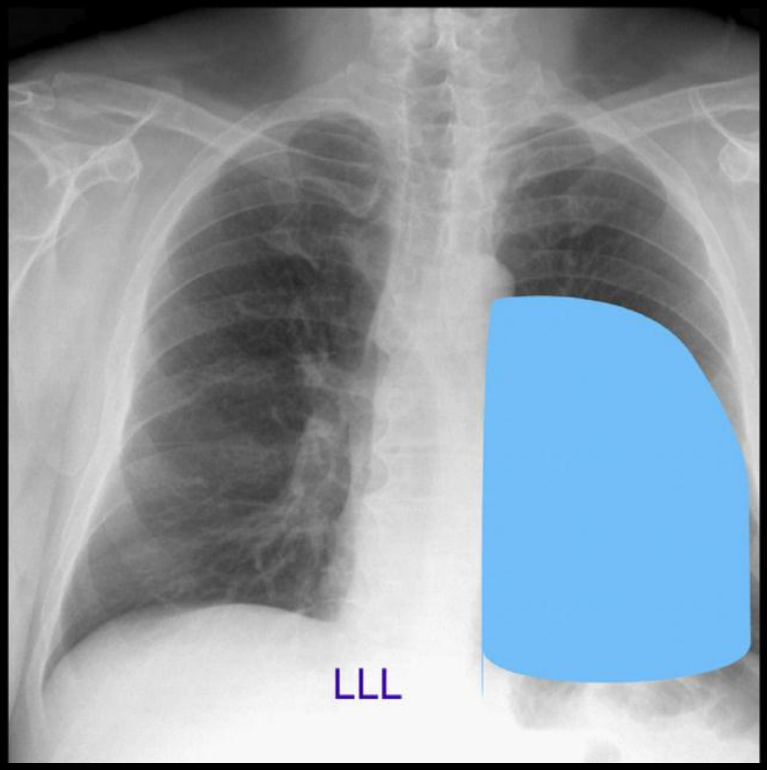


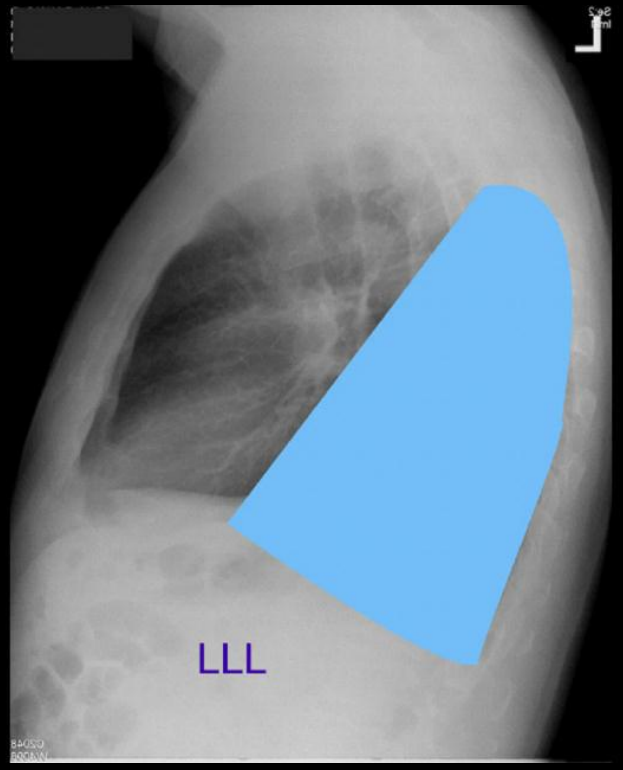
Lobes (continued)



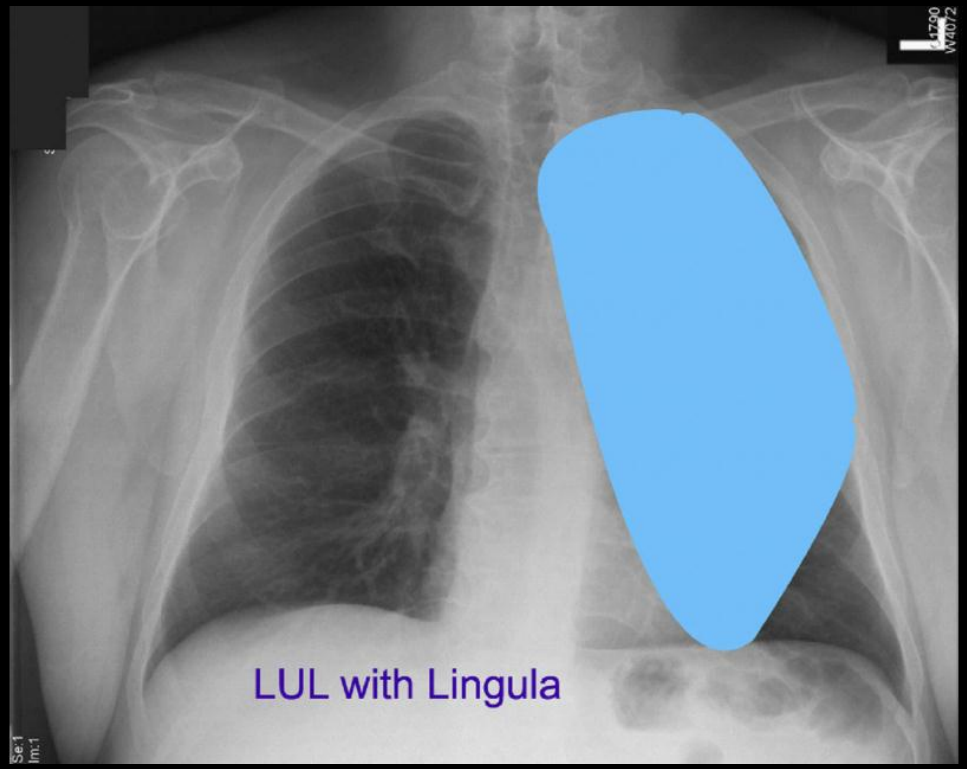


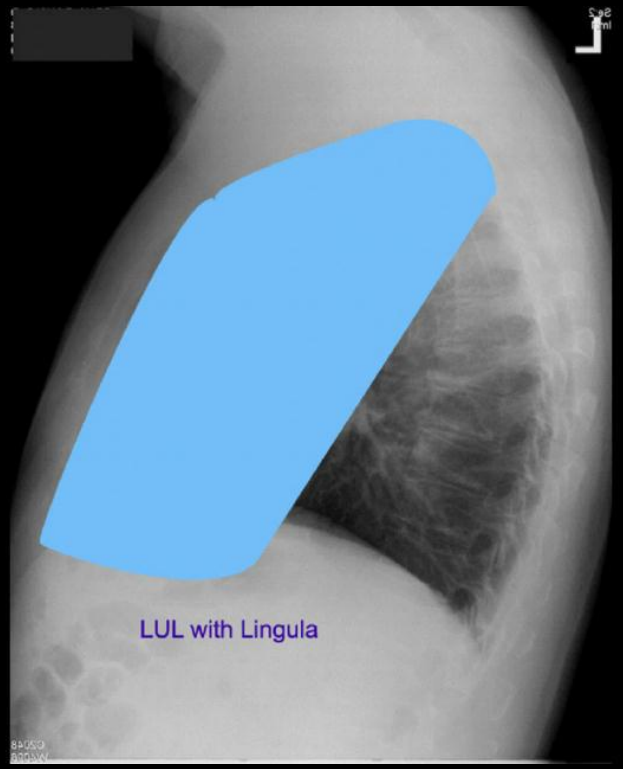
Lobes (continued)



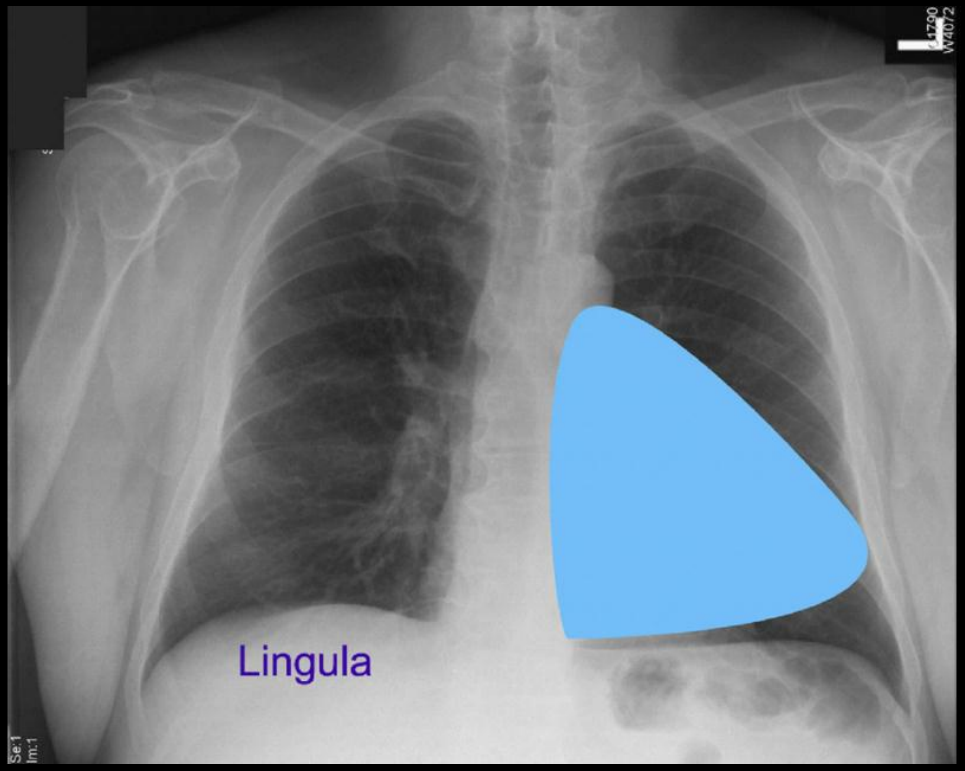


Lobes (continued)

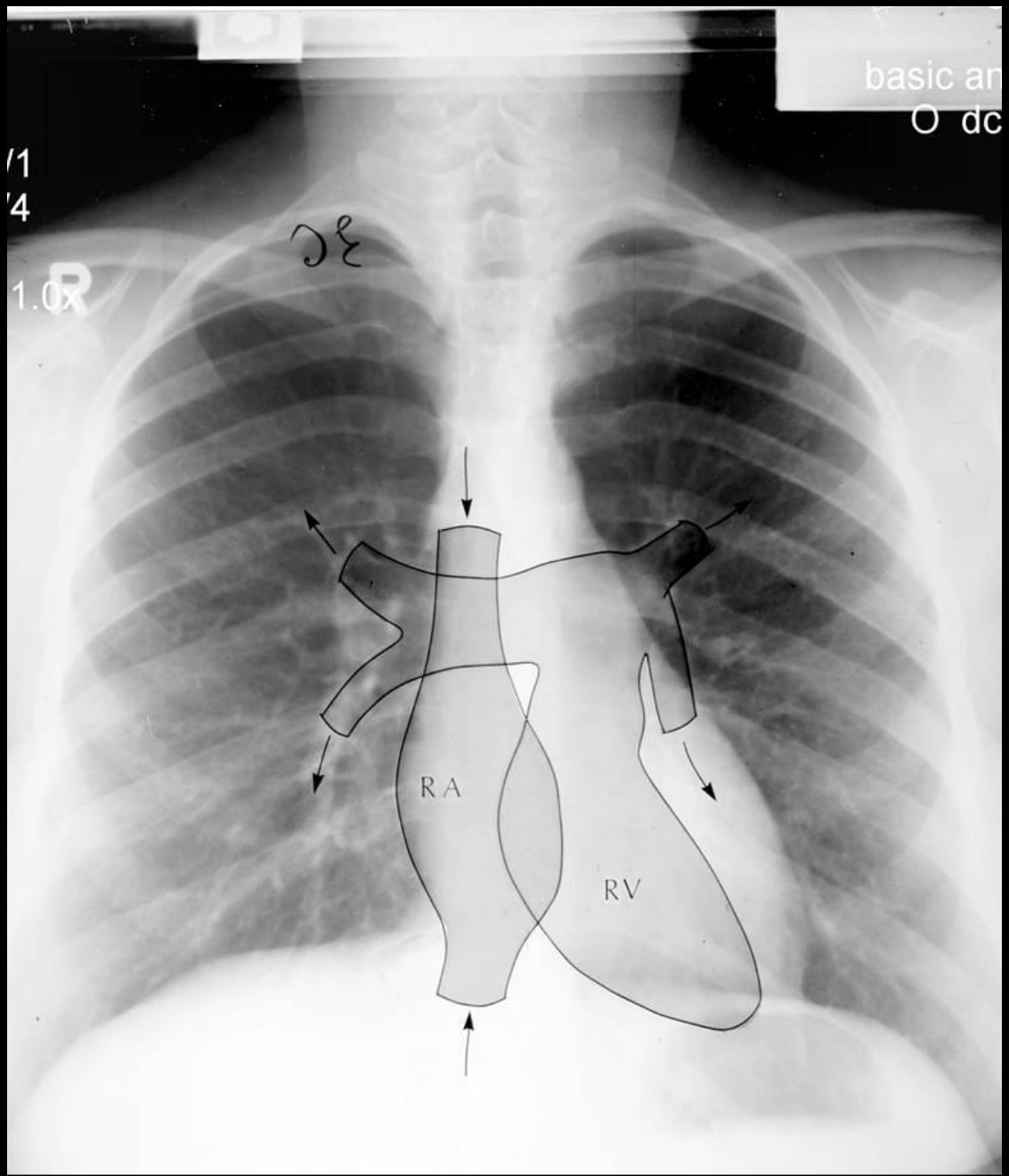




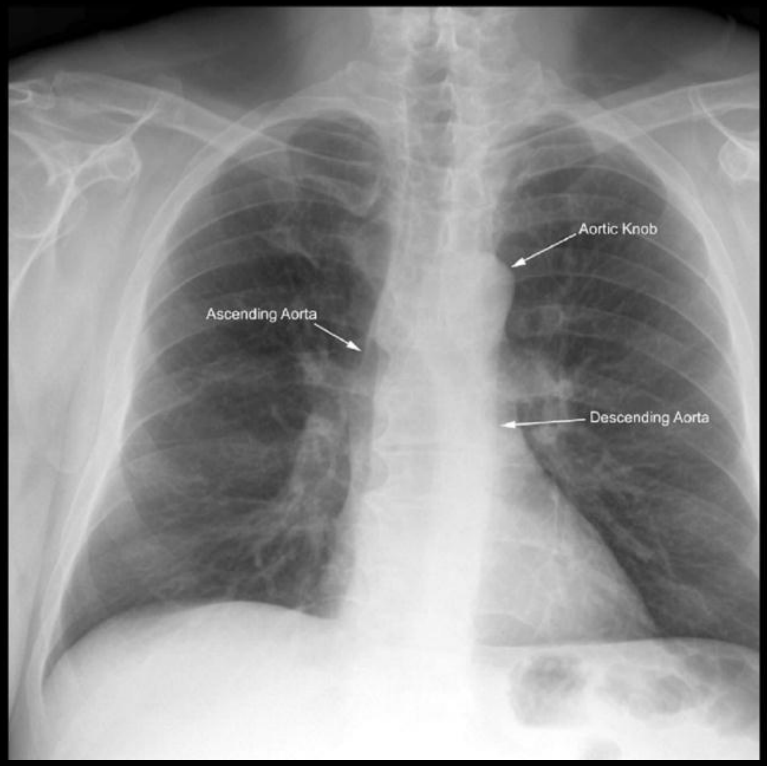
Lobes (continued)

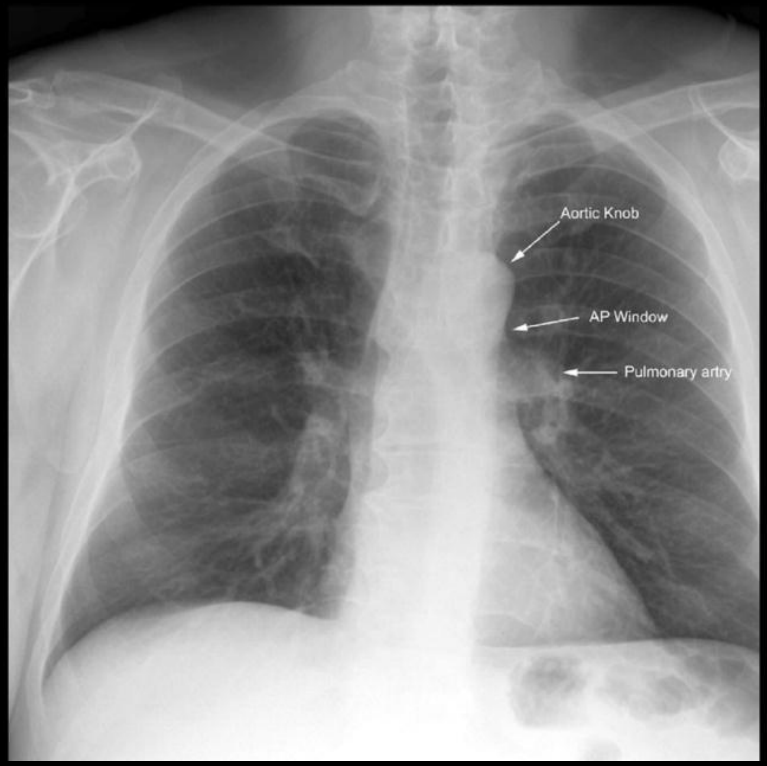


Heart (continued)

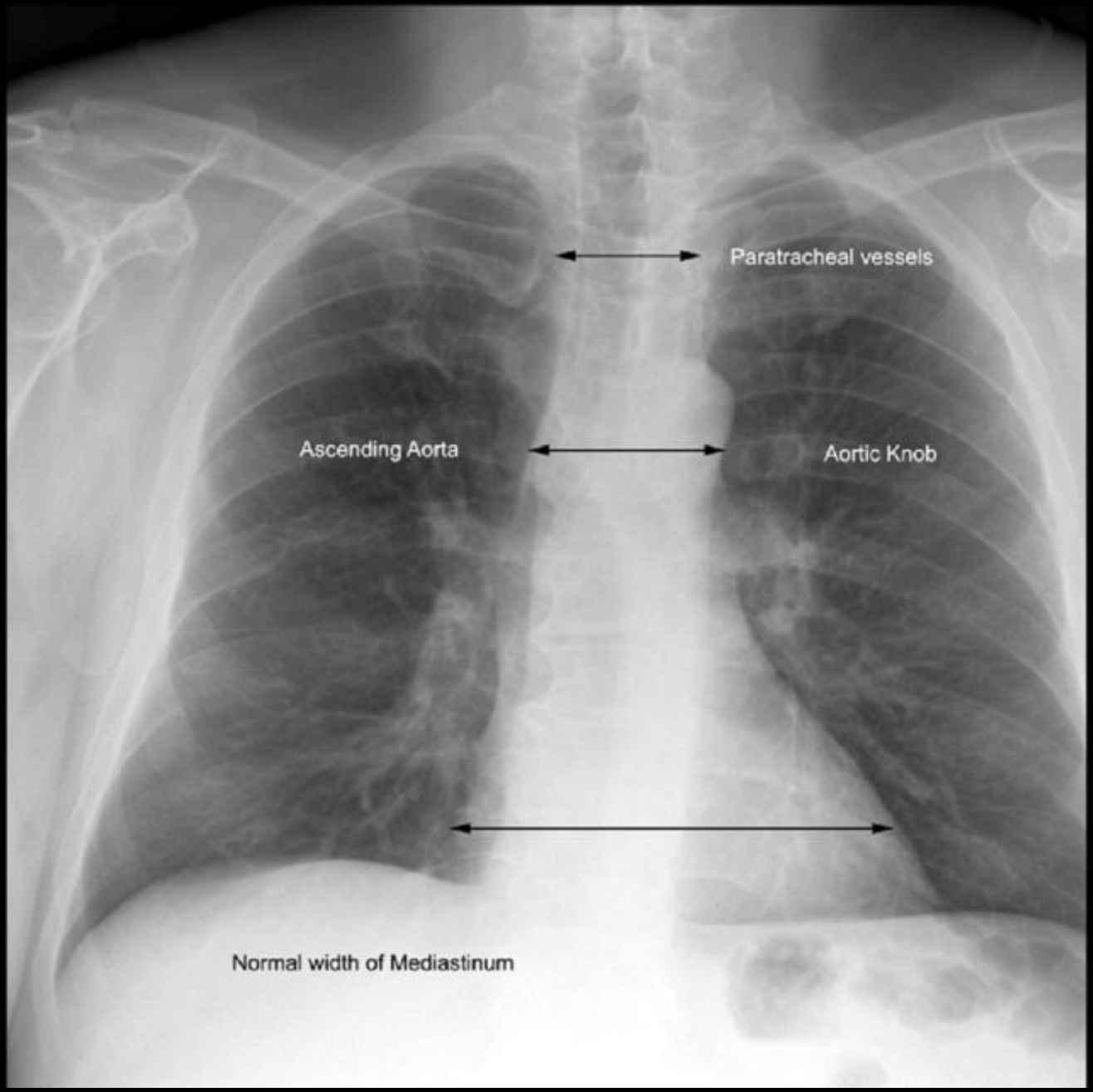


Heart (continued)





Mediastinum



Hilum

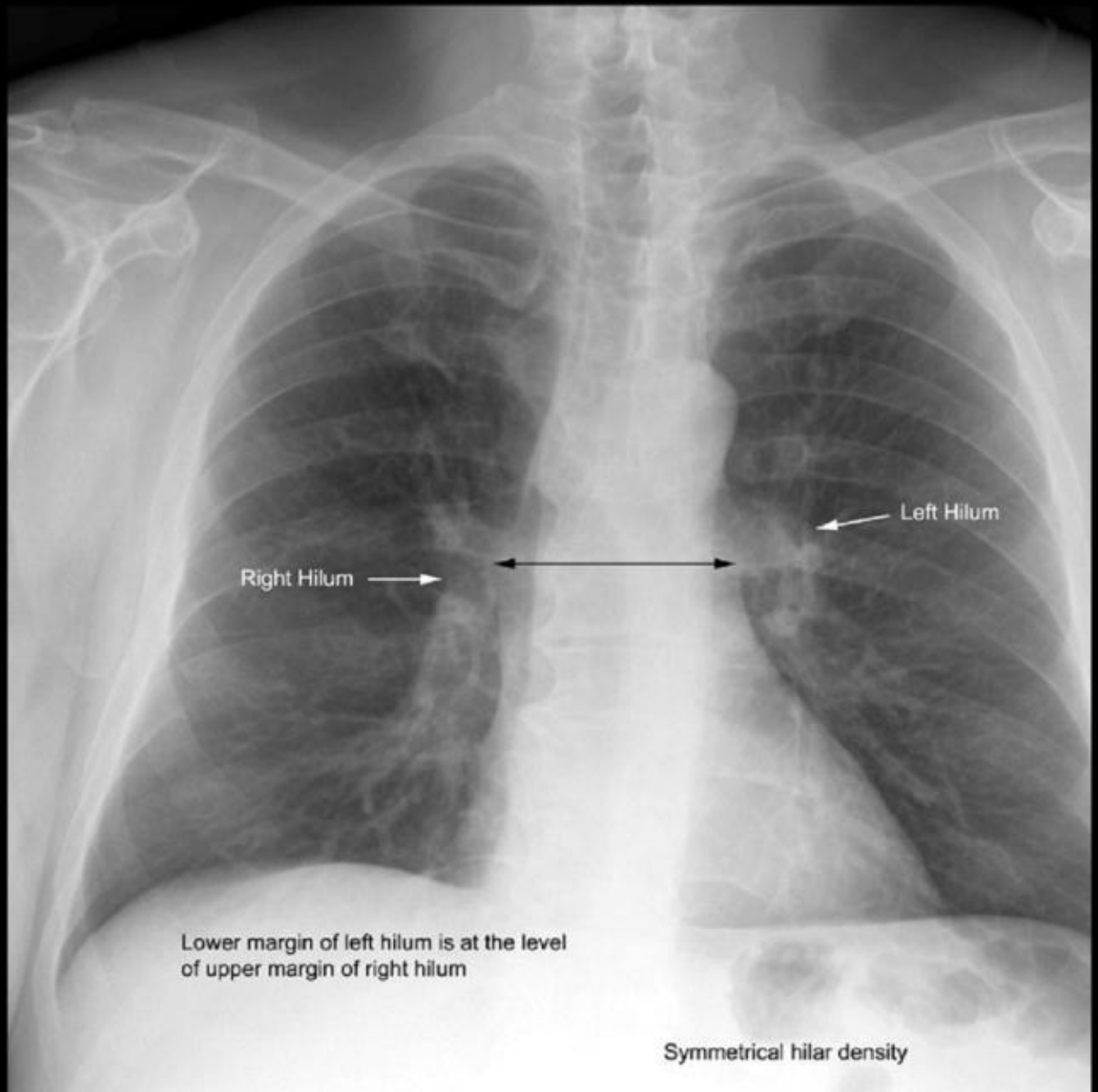
Made of:

1. Pulmonary Art.+Veins
2. The Bronchi

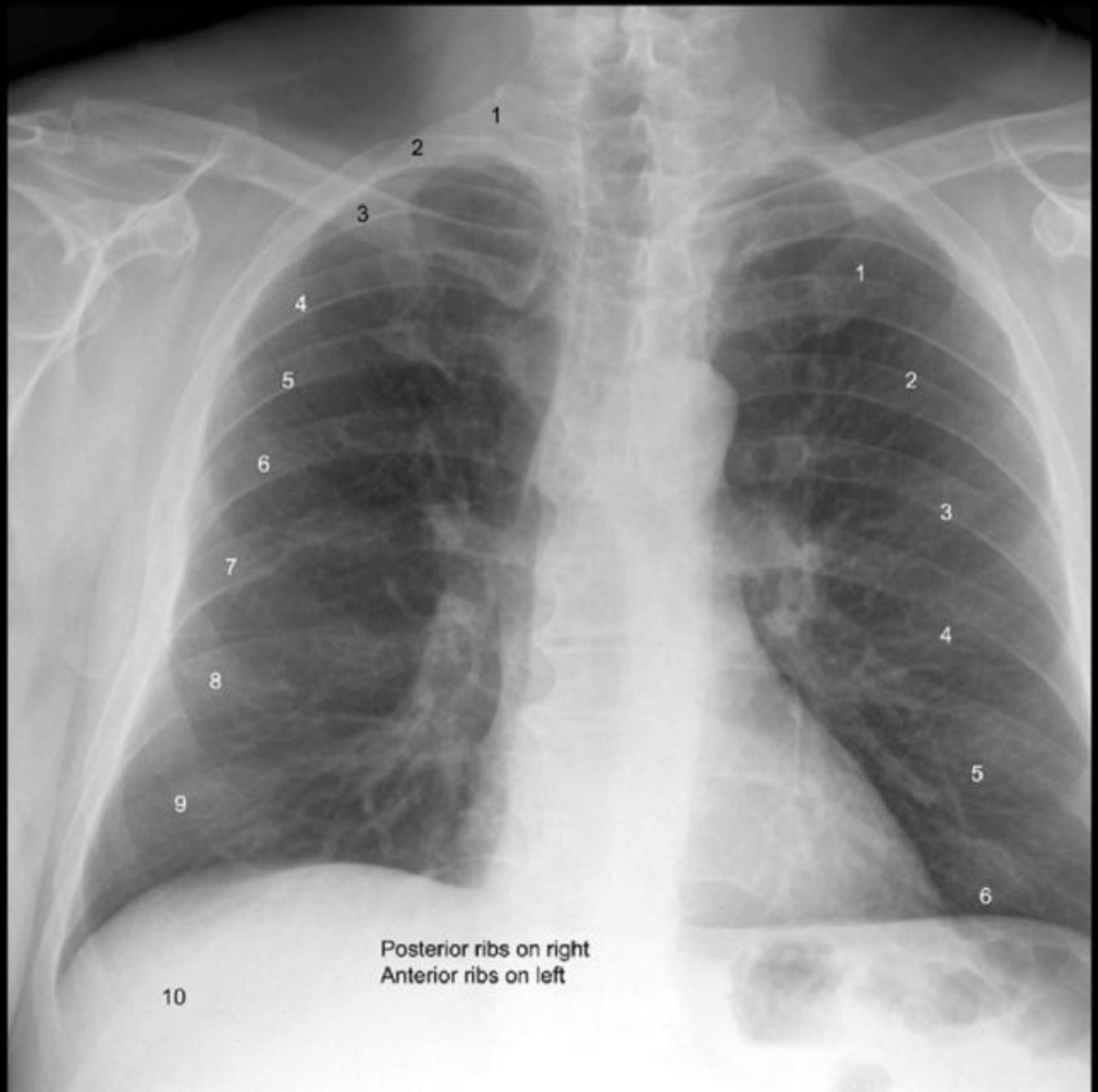
Left Hilum higher (max 1-2,5 cm)

Identical: size, shape, density

Hilum


Left Hilum
Right Hilum
Lower margin of left hilum is at the level
of upper margin of right hilum
Symmetrical hilar density

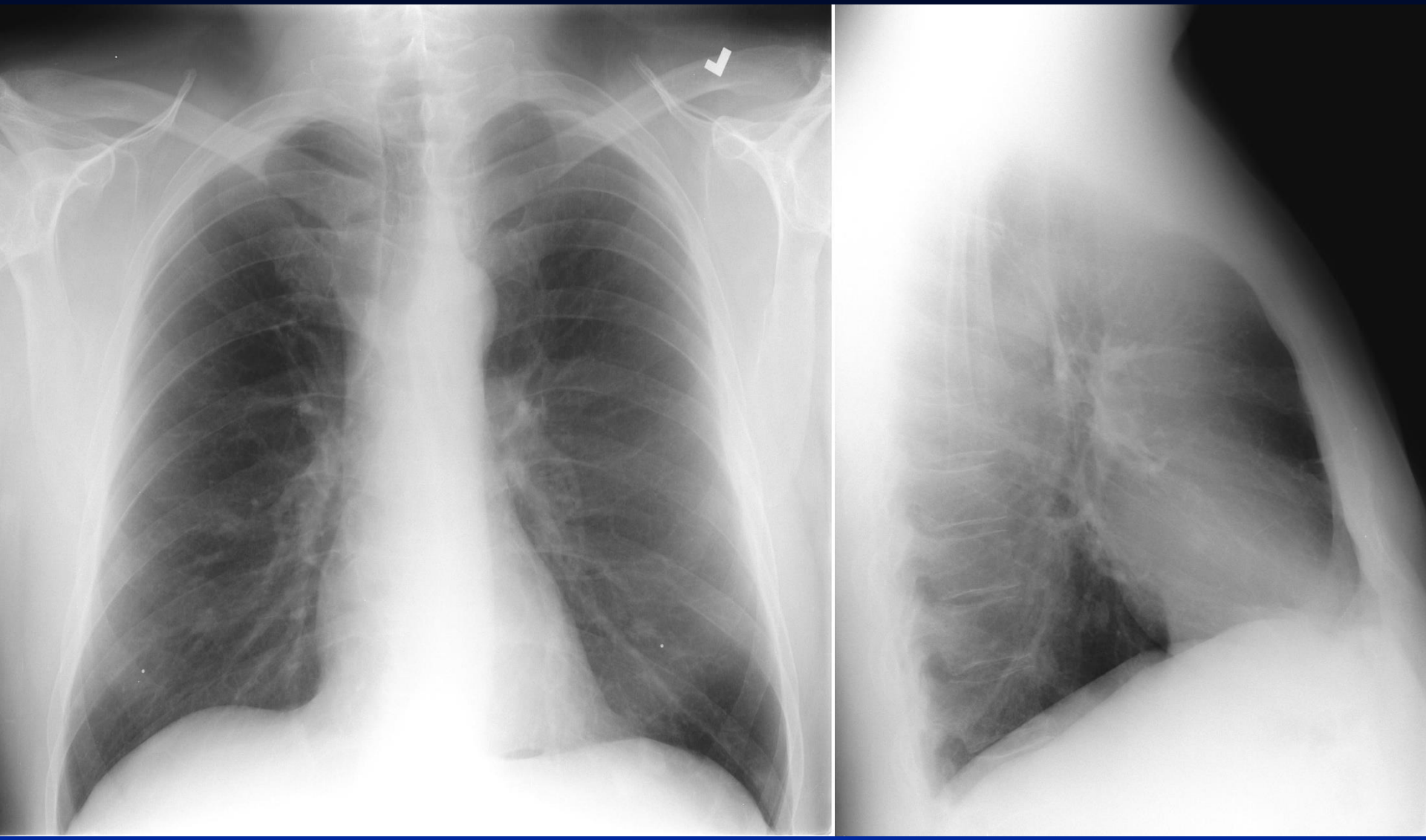
Ribs


1
2
3
4
5
6
7
8
9
10
1
2
3
4
5
6
Posterior ribs on right
Anterior ribs on left

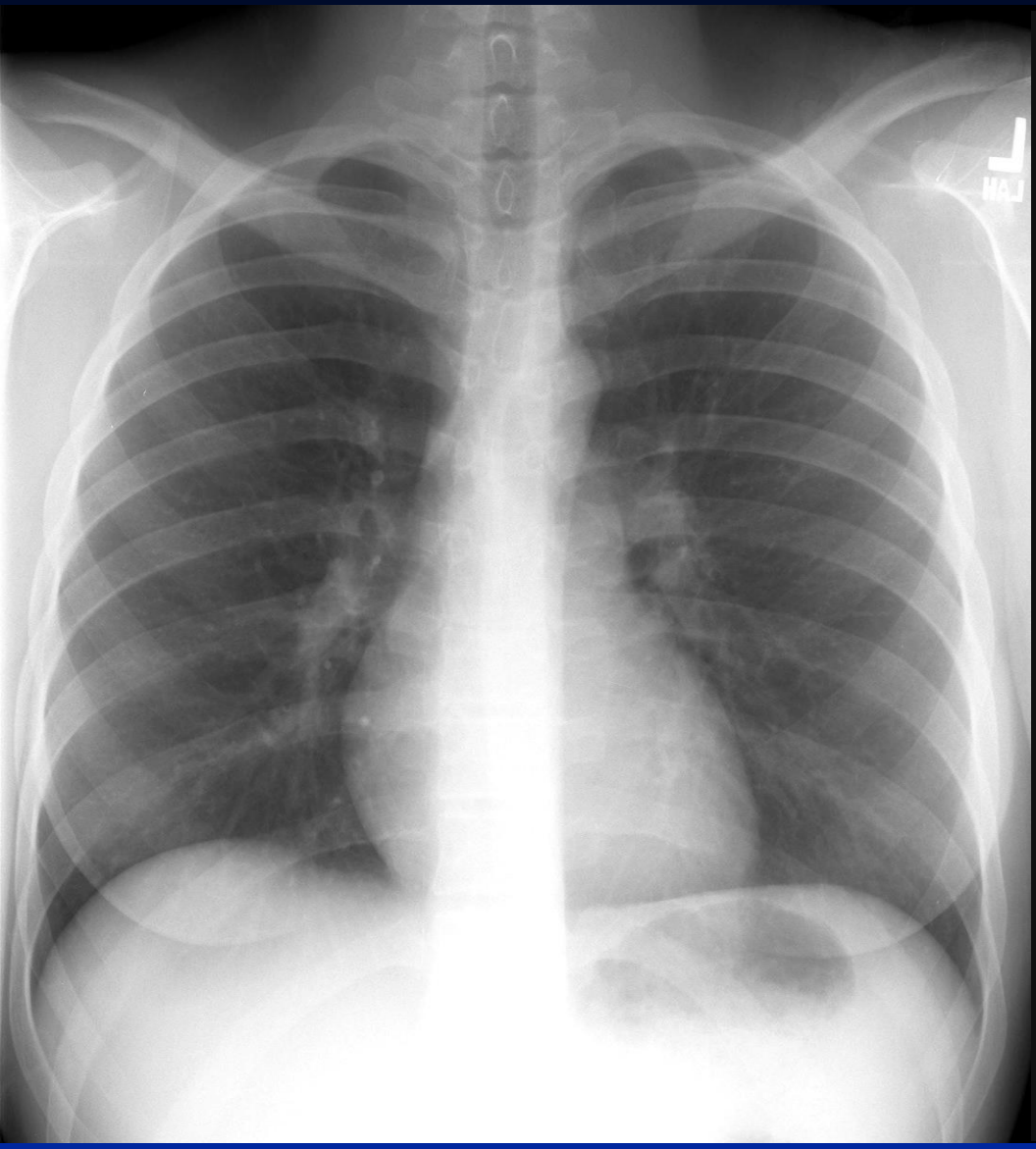
Now for the Cases…

Remember… be systematic!

Normal (62 year old male)



Normal (22 year old female)



Patterns of abnormality

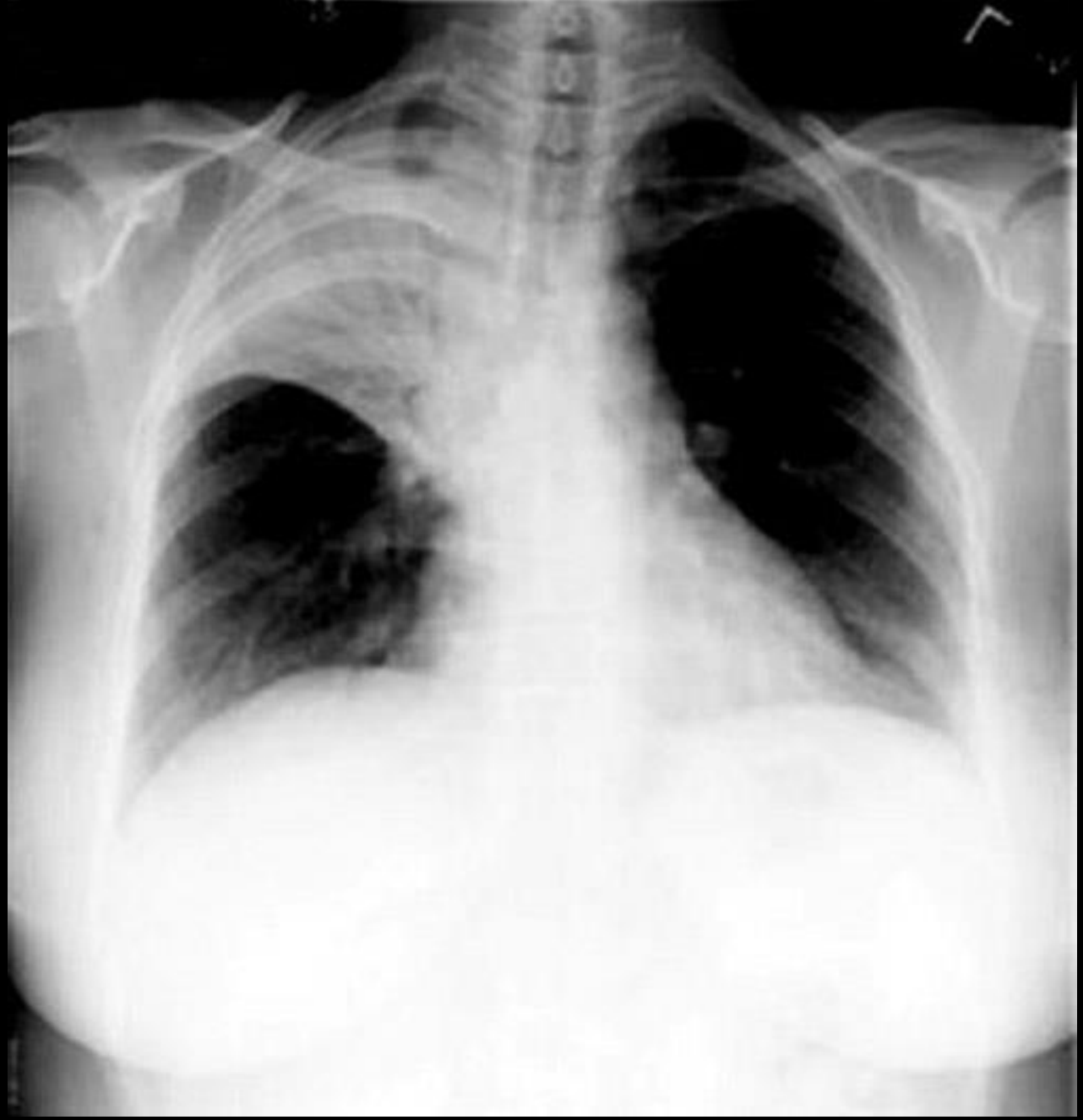
- Clues
  - Is it black where it should be white?
  - Is it white where it should be black?
  - Is the anatomy too big or too small?
  - Is something out of place
  - Summation
- Missing

Patterns of abnormality

- Increased opacity
  - Consolidation/Collapse
  - Effusion
  - Interstitial lung disease
  - Edema
  - Nodules and masses
- Abnormal lucency
  - Emphysema
  - Pneumothorax
  - Pneumomediastinum
  - Air trapping
- Altered anatomy
  - Mediastinal shift
  - Cardiomegaly
  - Altered pulmonary vasculature

Patterns of abnormality

- Predominant pattern
  - Opacity (nodules, lines etc.)
  - Lucency
- Distribution
  - Focal, lobar, basal, peripheral, central, bilateral, unilateral etc.
- Anatomical correlation

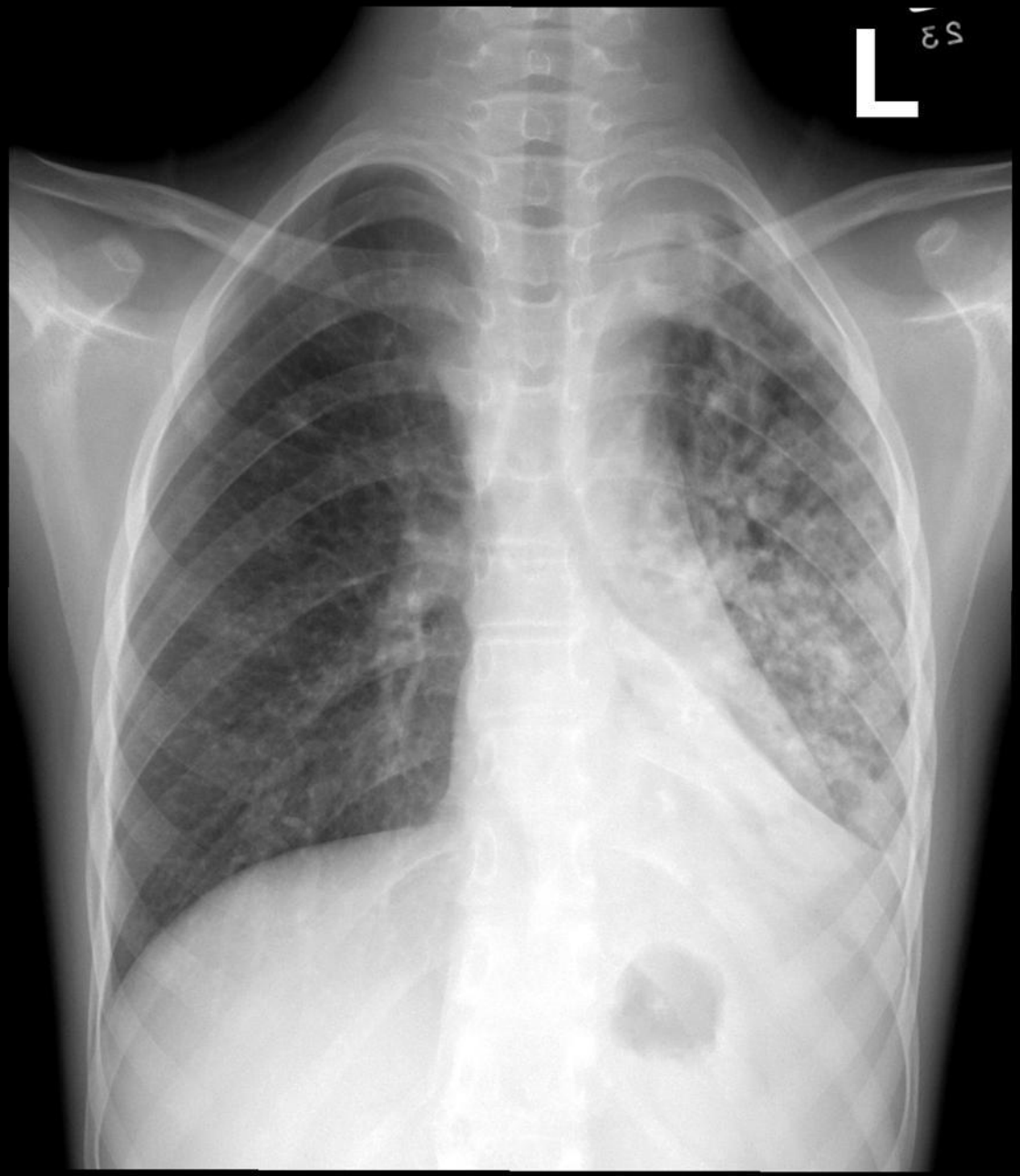


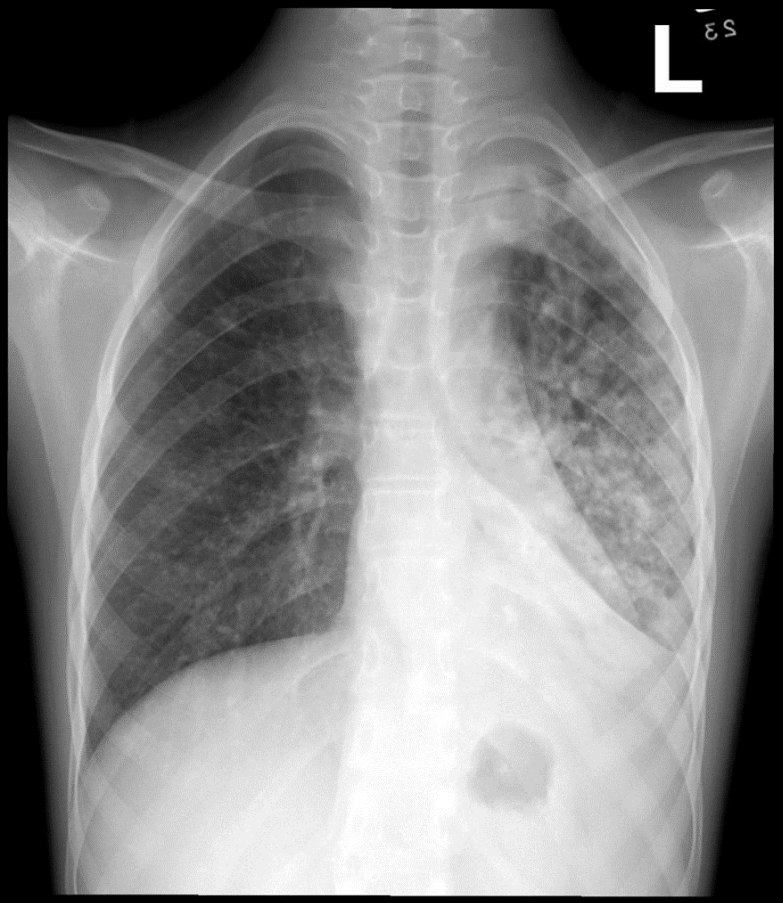
RUL pneumonia

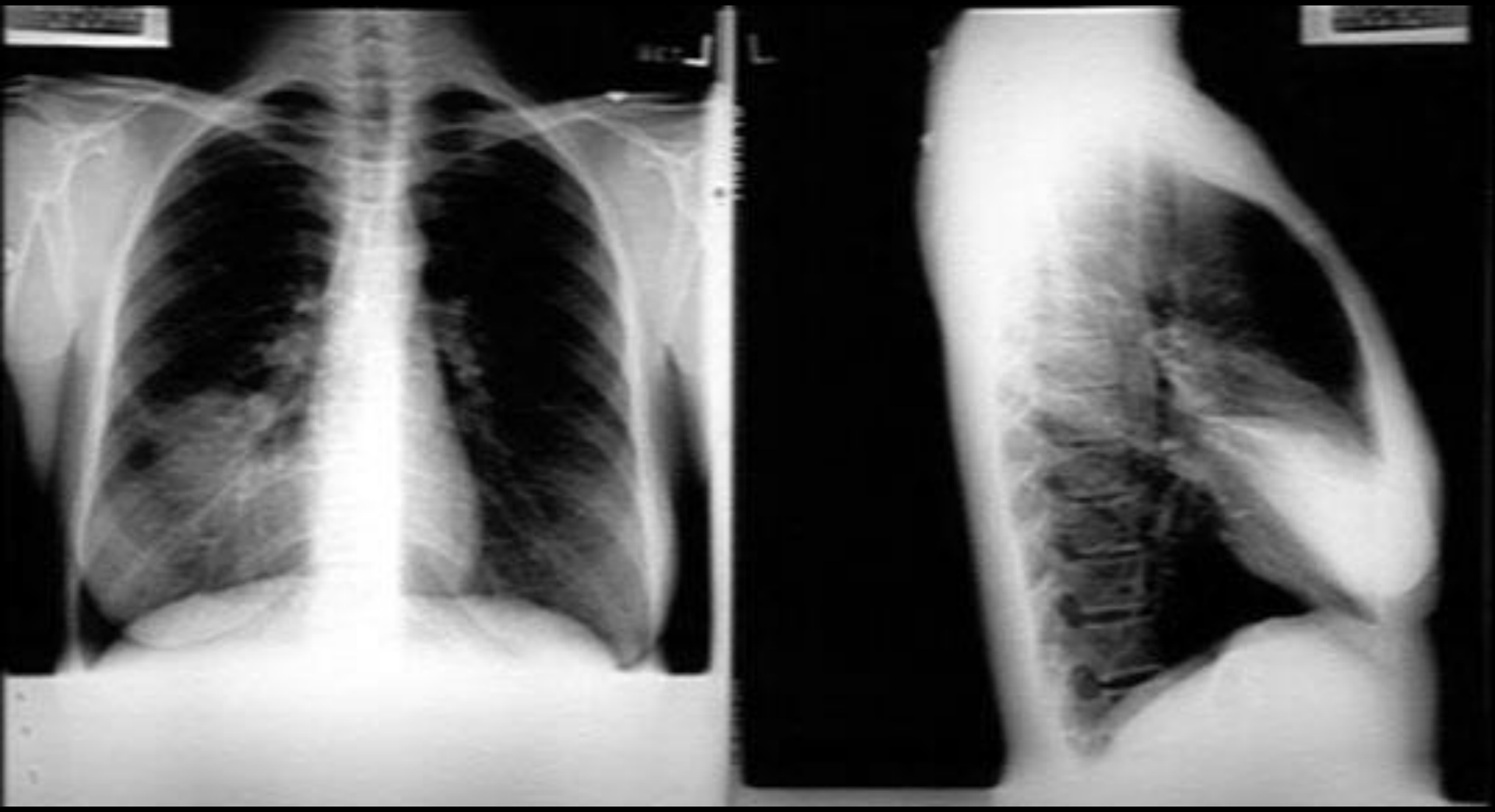

Dct


3
L
C M
AP ERECT
W 16384 : L 16384

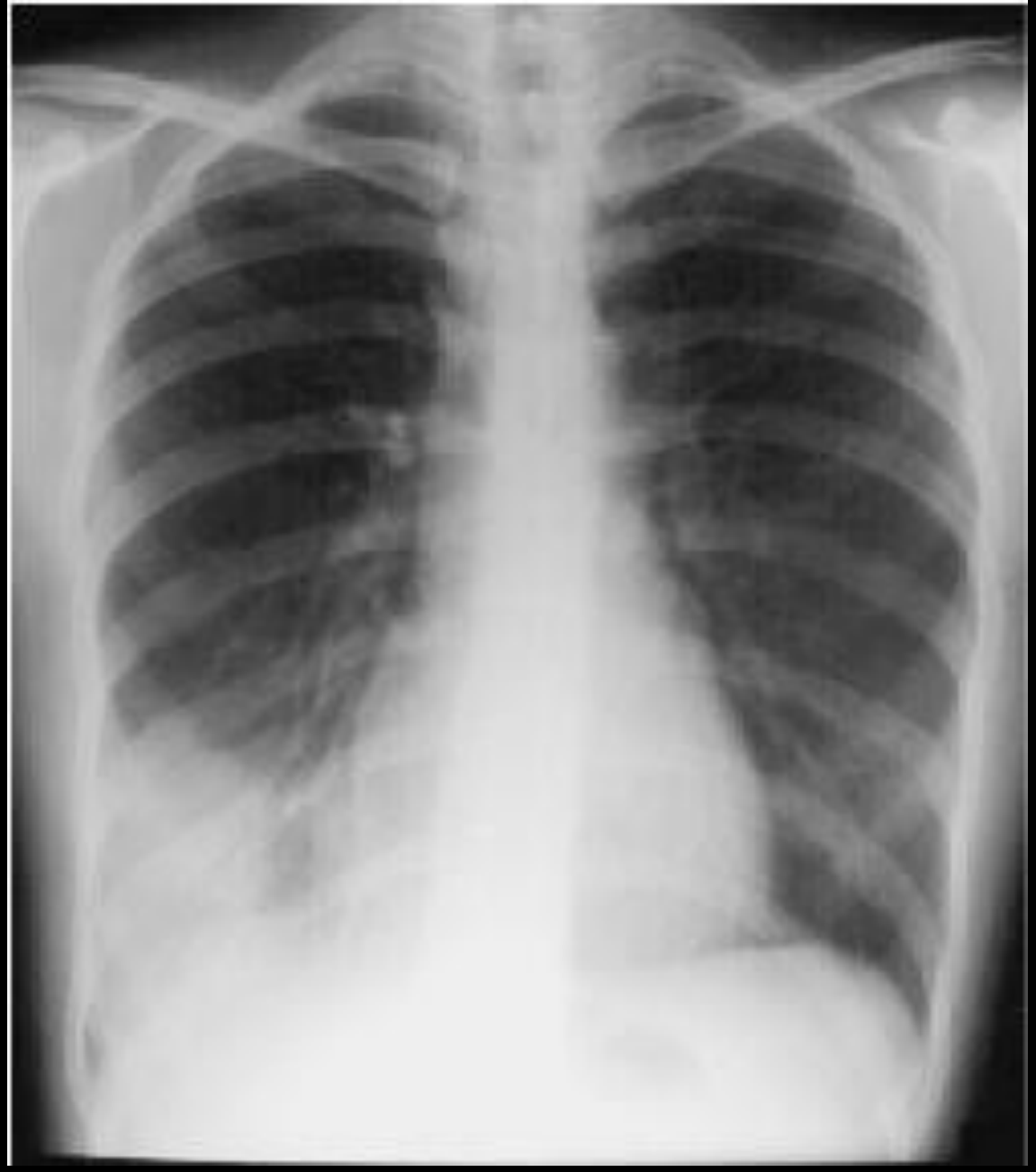

a
b


L

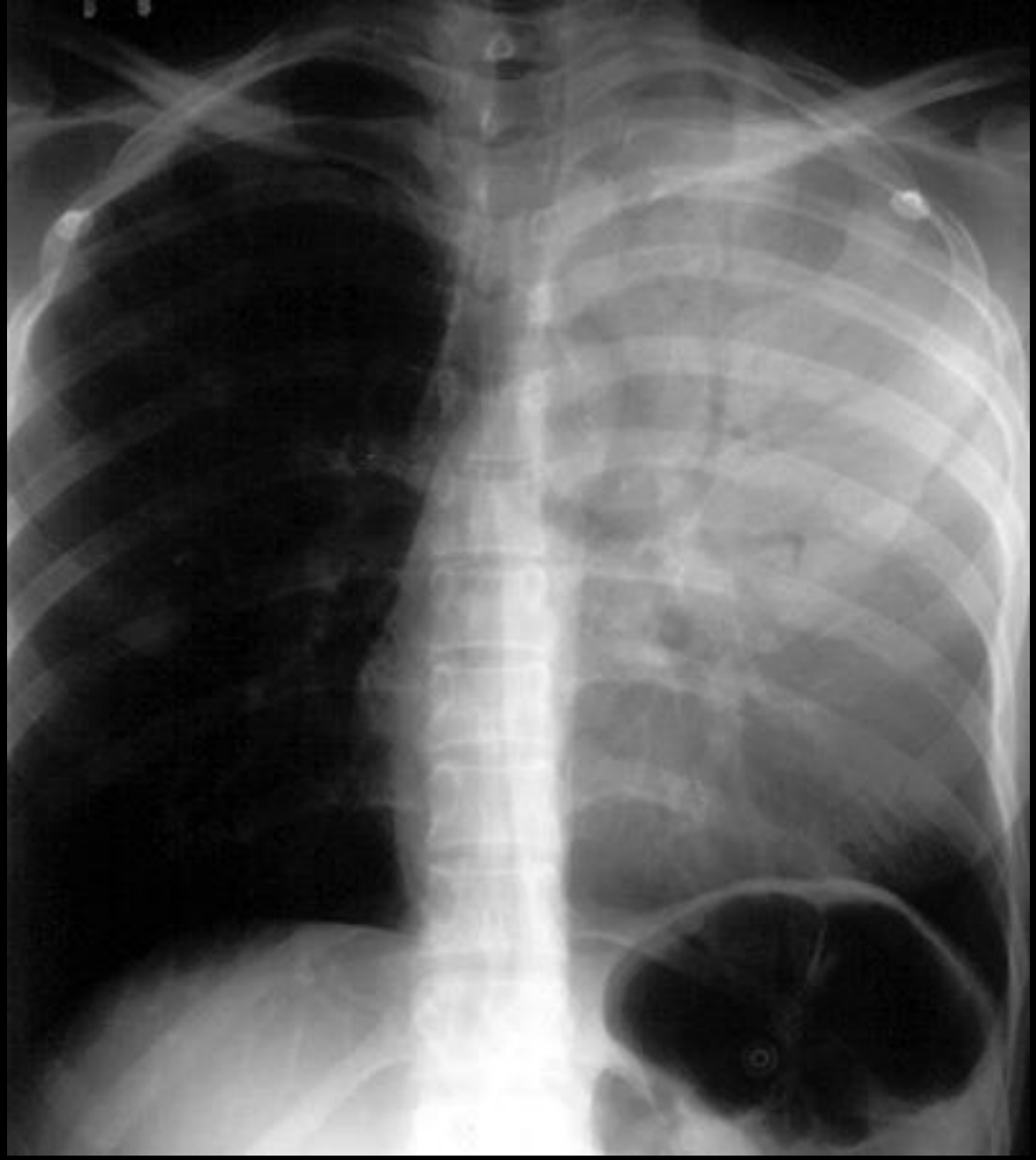

L



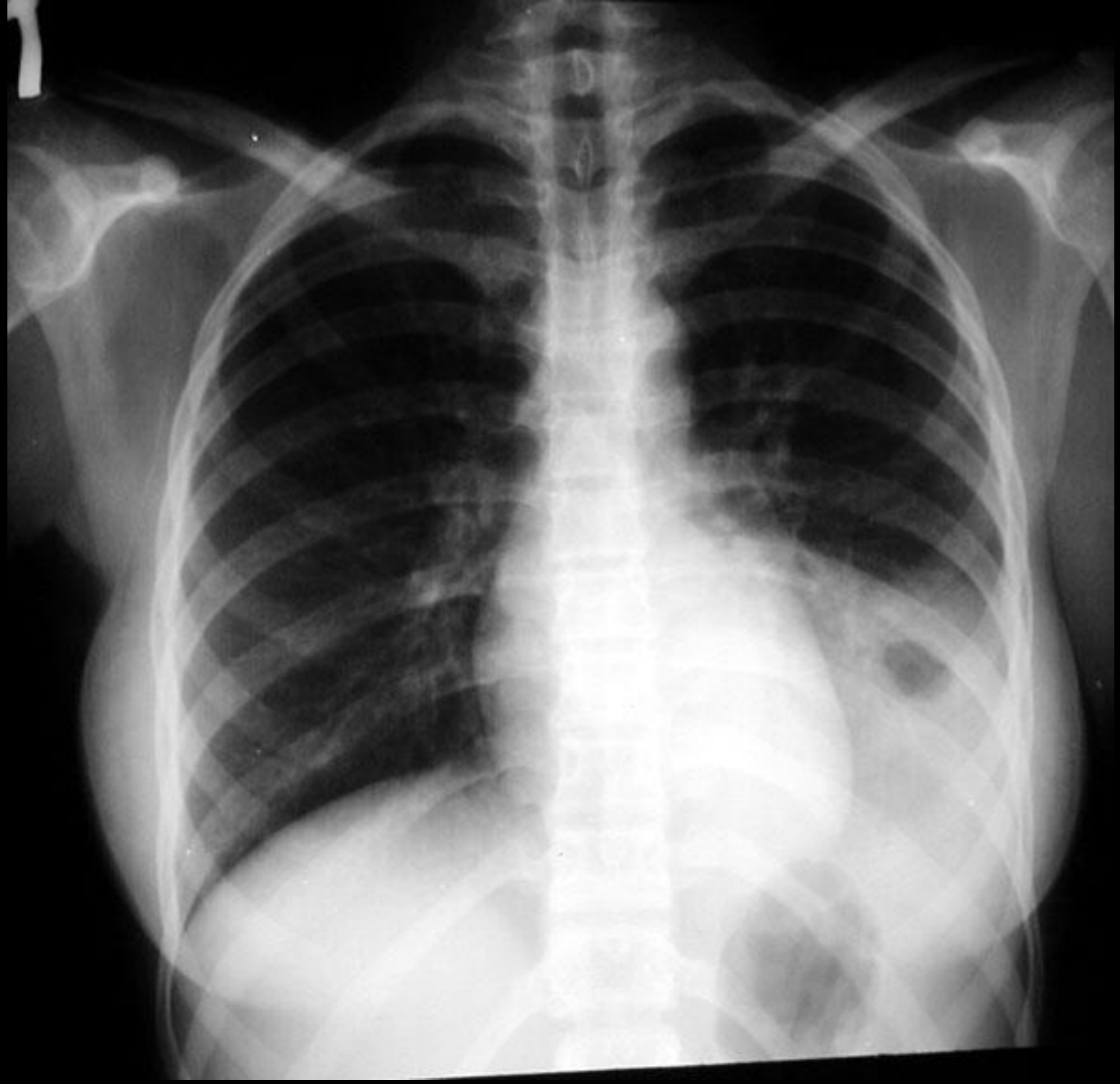
RML pneumonia



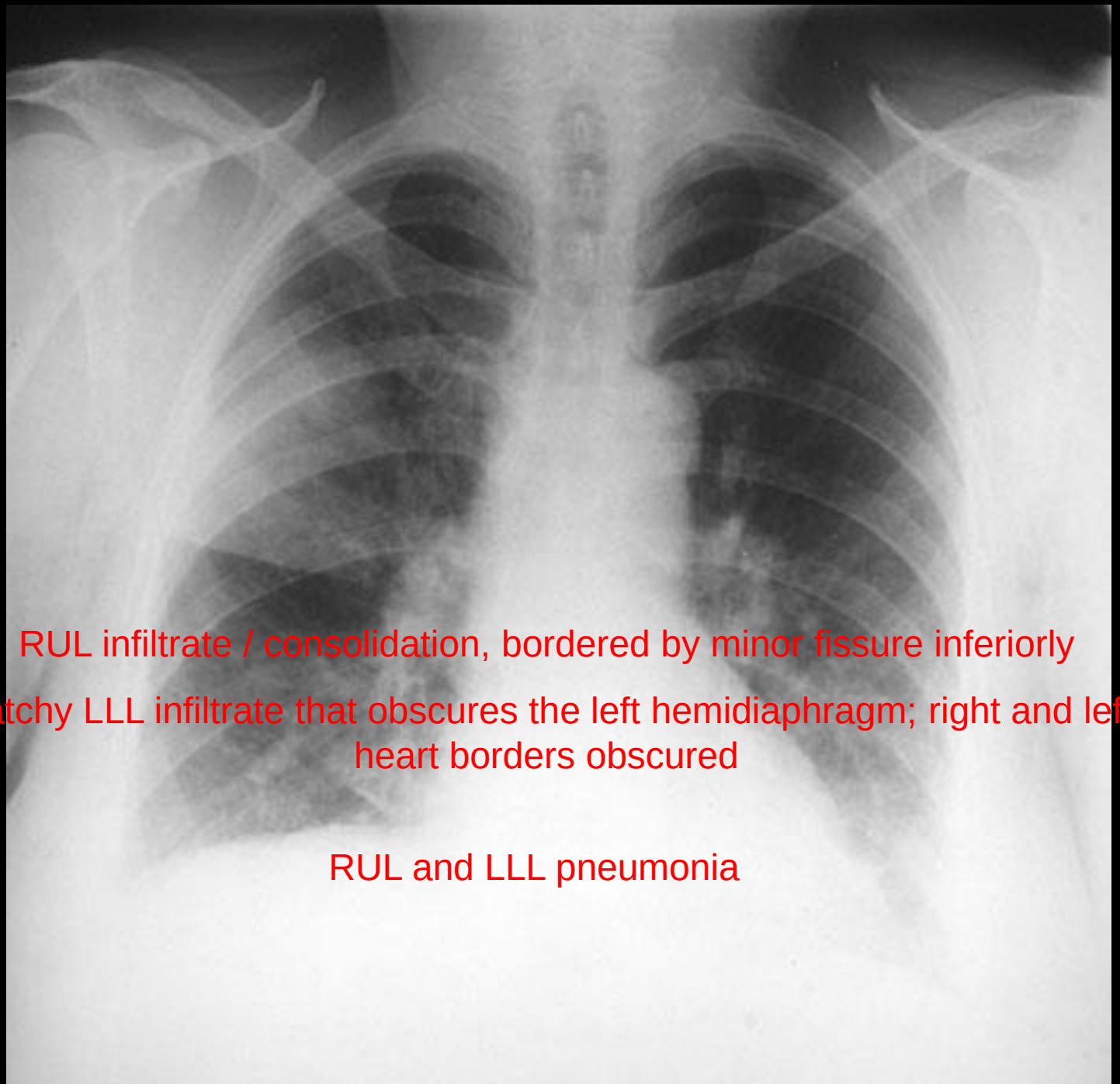
RLL pneumonia



LUL pneumonia



LLL pneumonia



RUL infiltrate / consolidation, bordered by minor fissure inferiorly

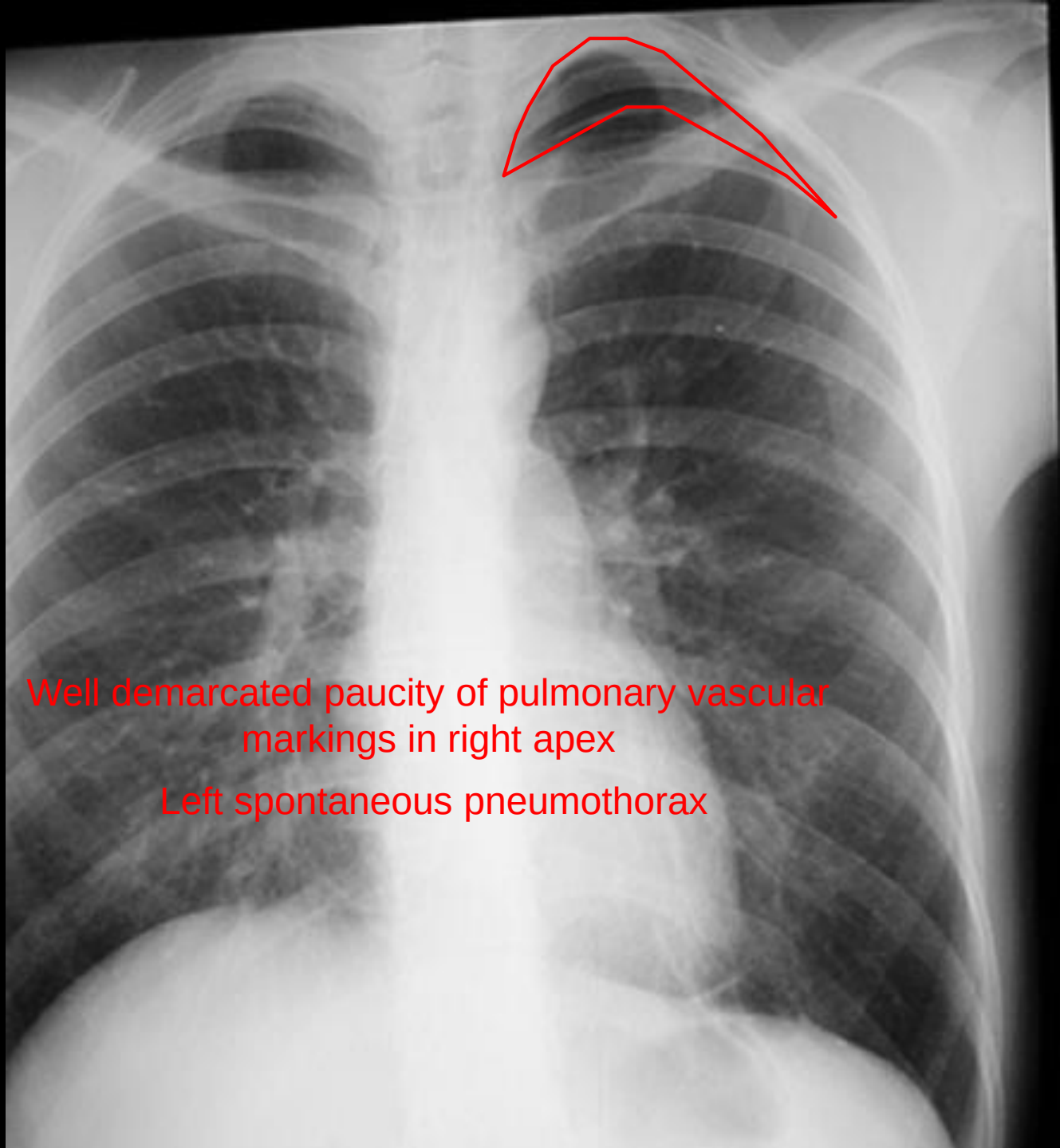
Patchy LLL infiltrate that obscures the left hemidiaphragm; right and left heart borders obscured

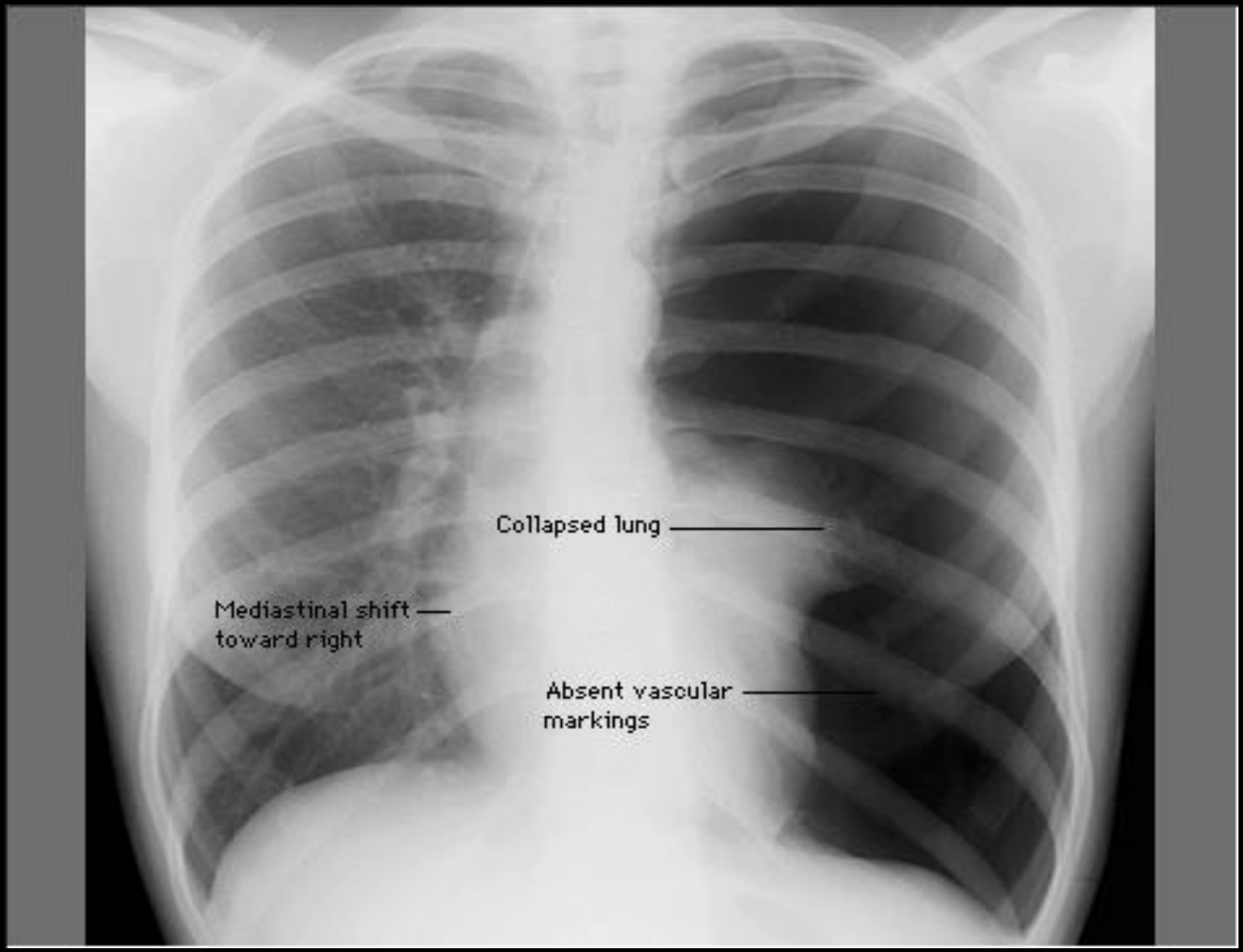
RUL and LLL pneumonia

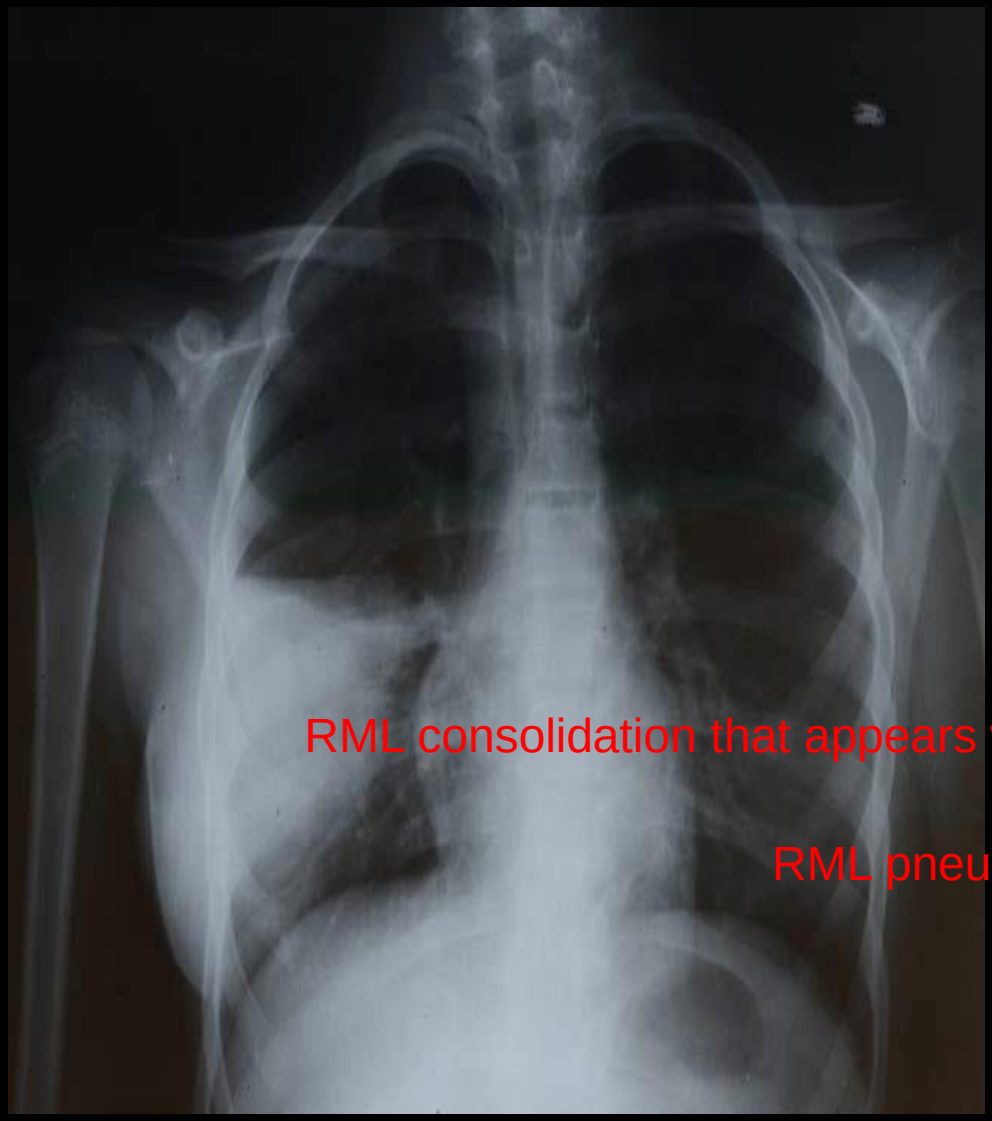
Multiple bilateral cavitary lesions with air-fluid levels c/w pulmonary abscesses

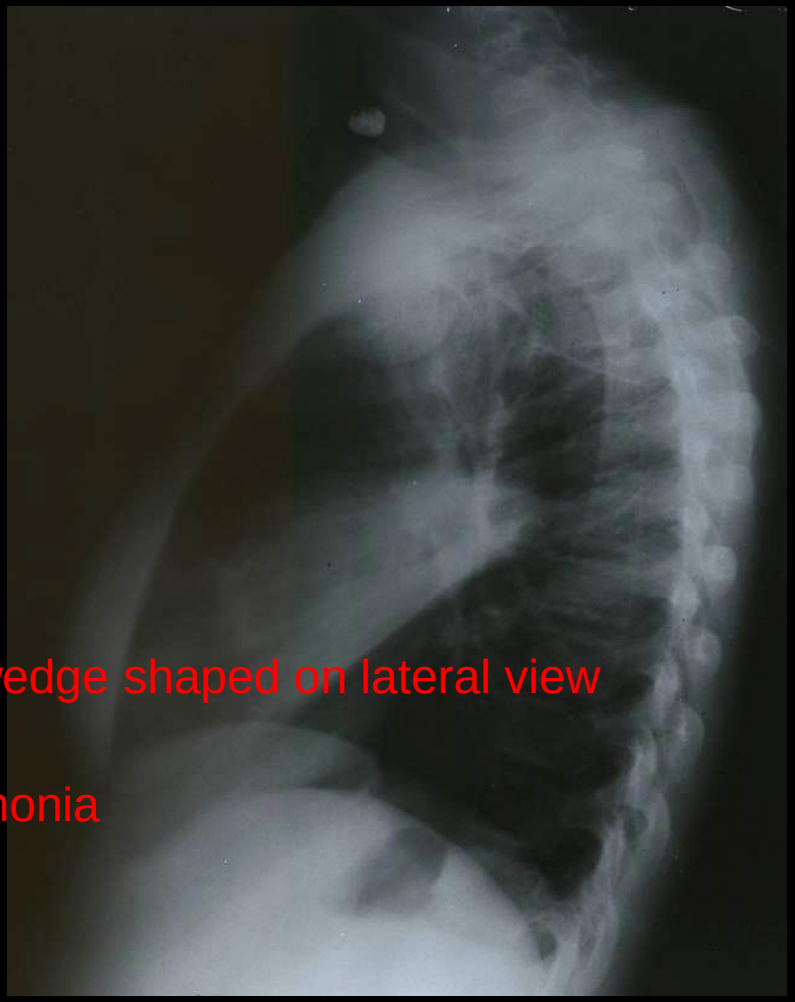
Tuberculosis

28 y/o female with sudden onset SOB while jogging this morning



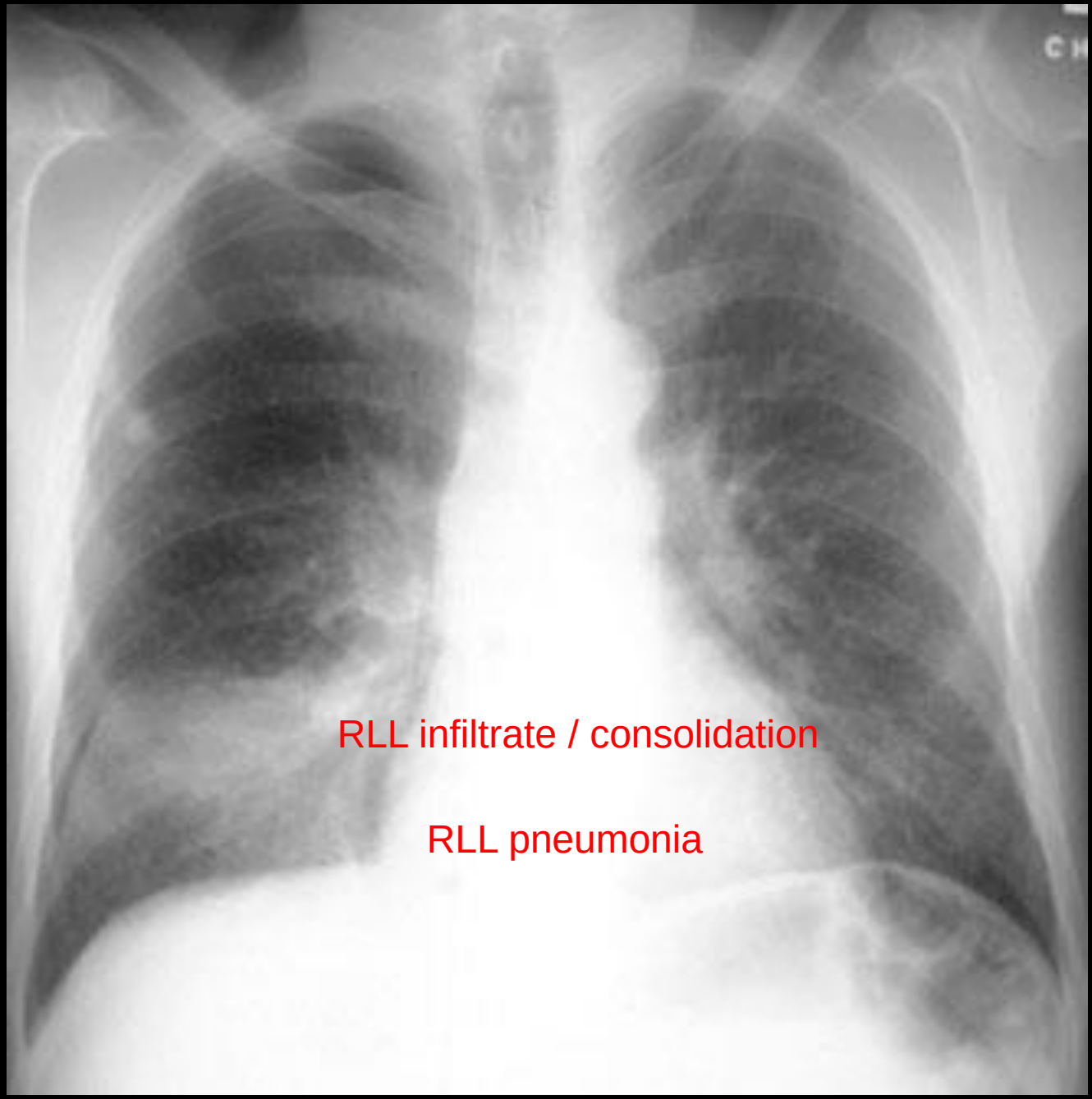

Collapsed lung
Mediastinal shift toward right
Absent vascular markings





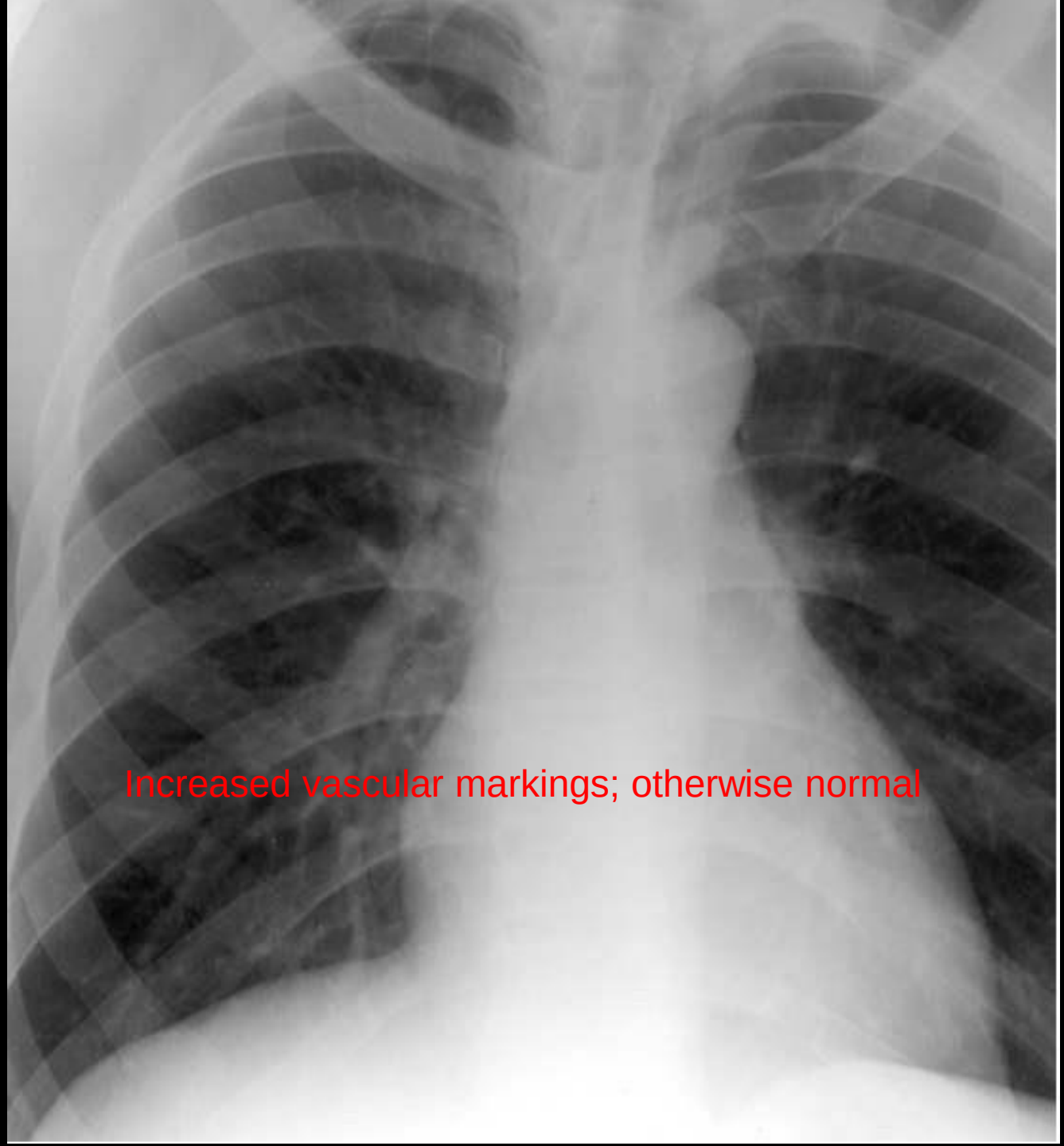
RML consolidation that appears wedge shaped on lateral view

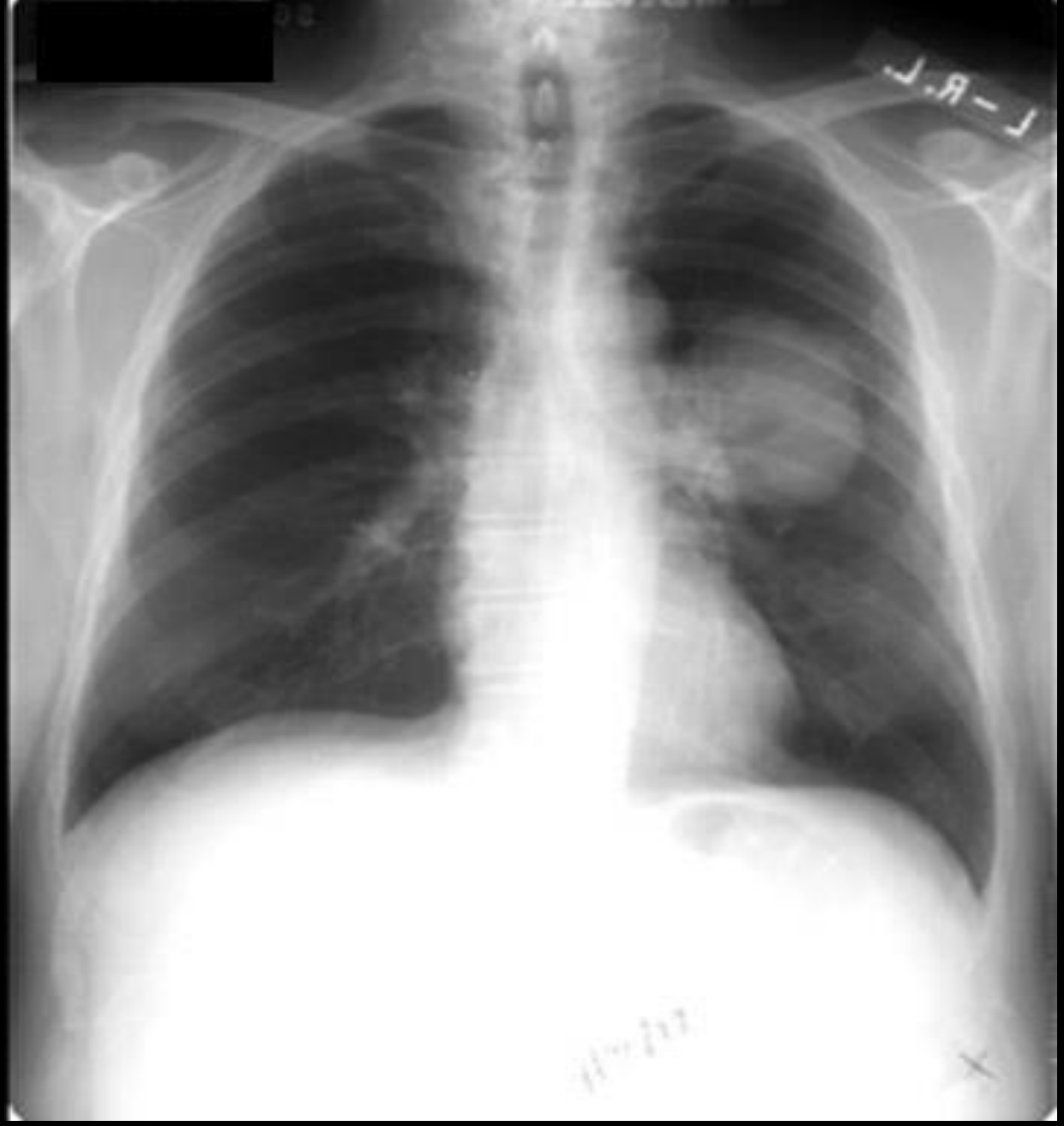
RML pneumonia



RLL infiltrate / consolidation

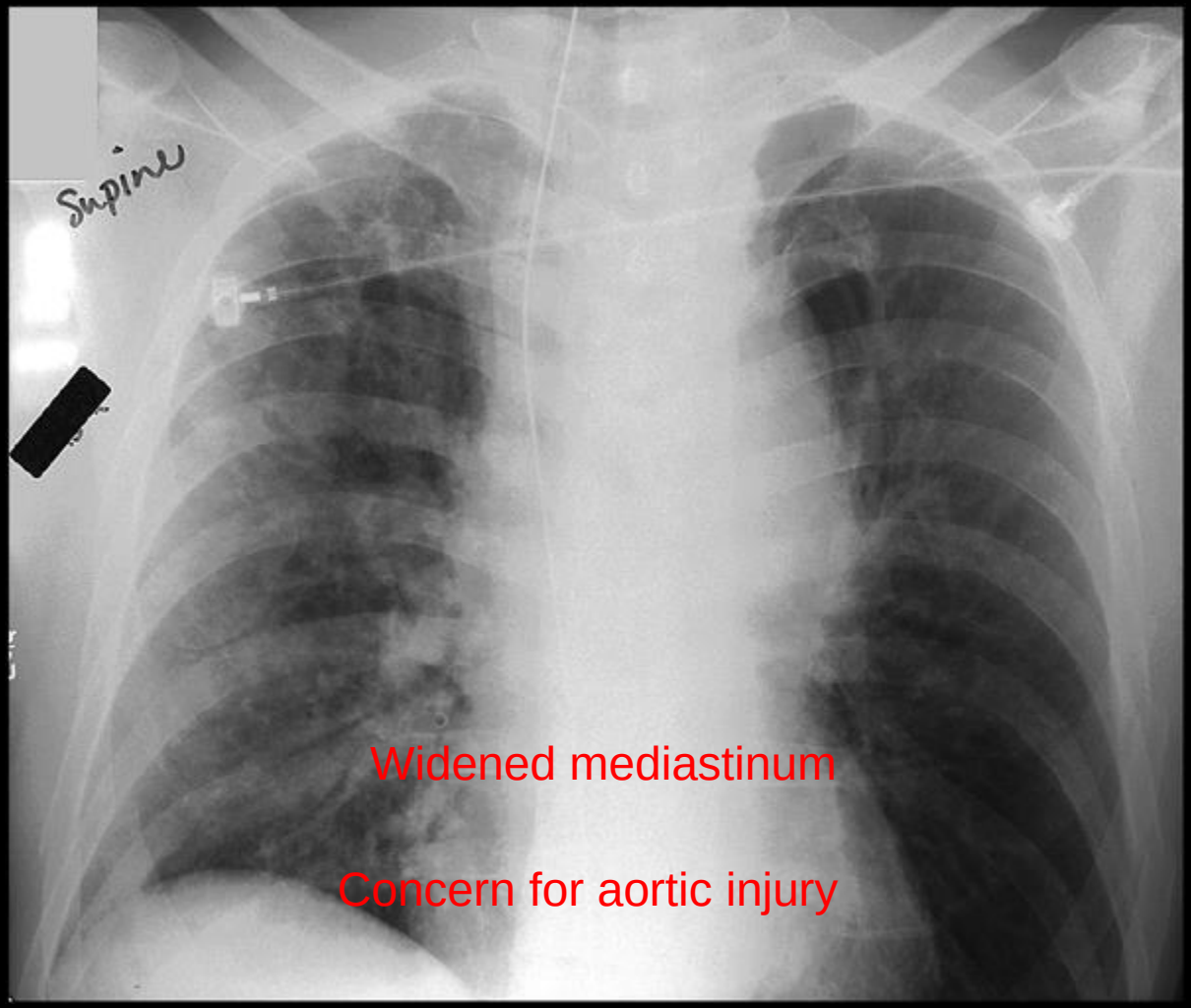
RLL pneumonia

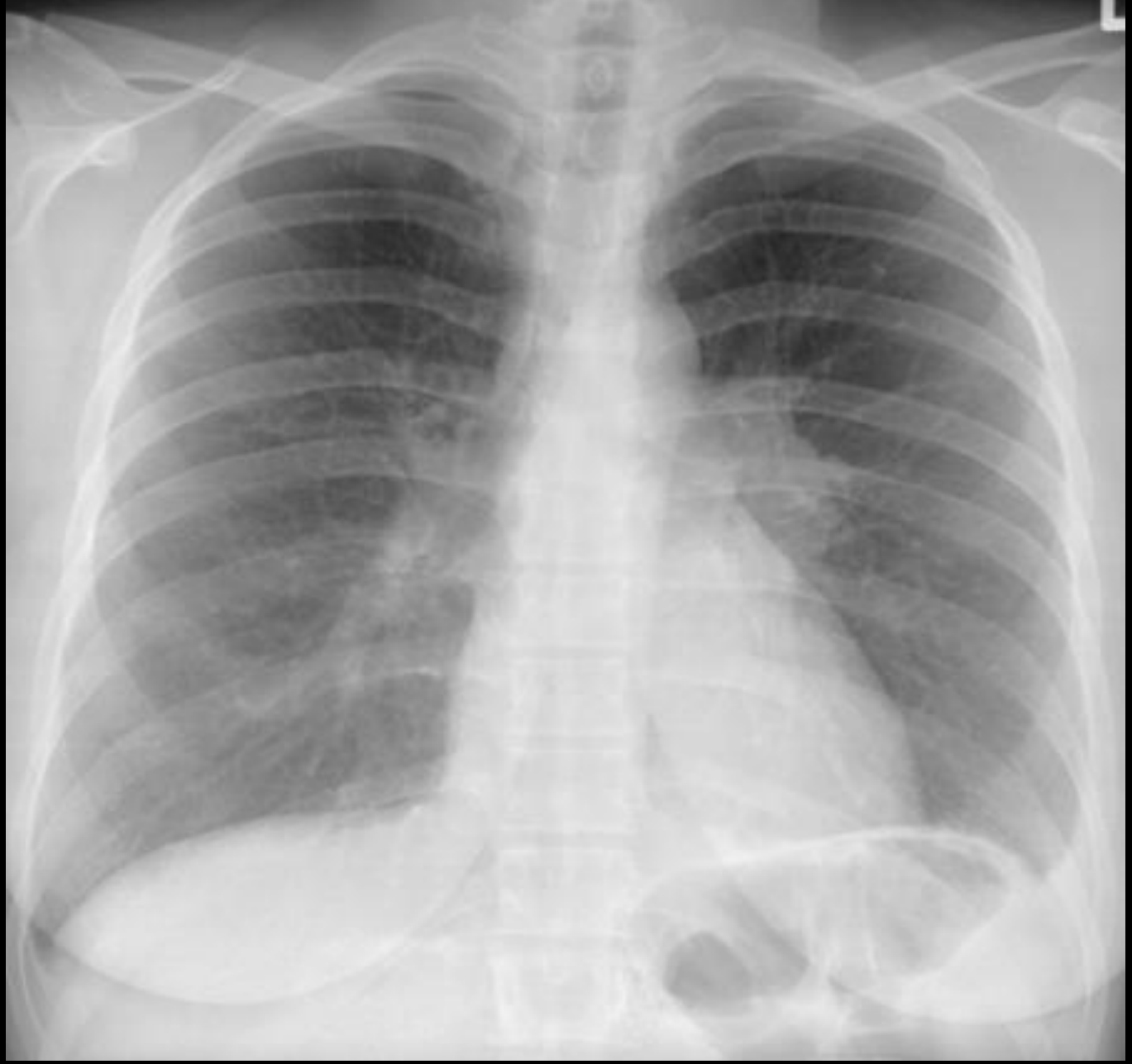

Increased vascular markings; otherwise normal



Hilar m l

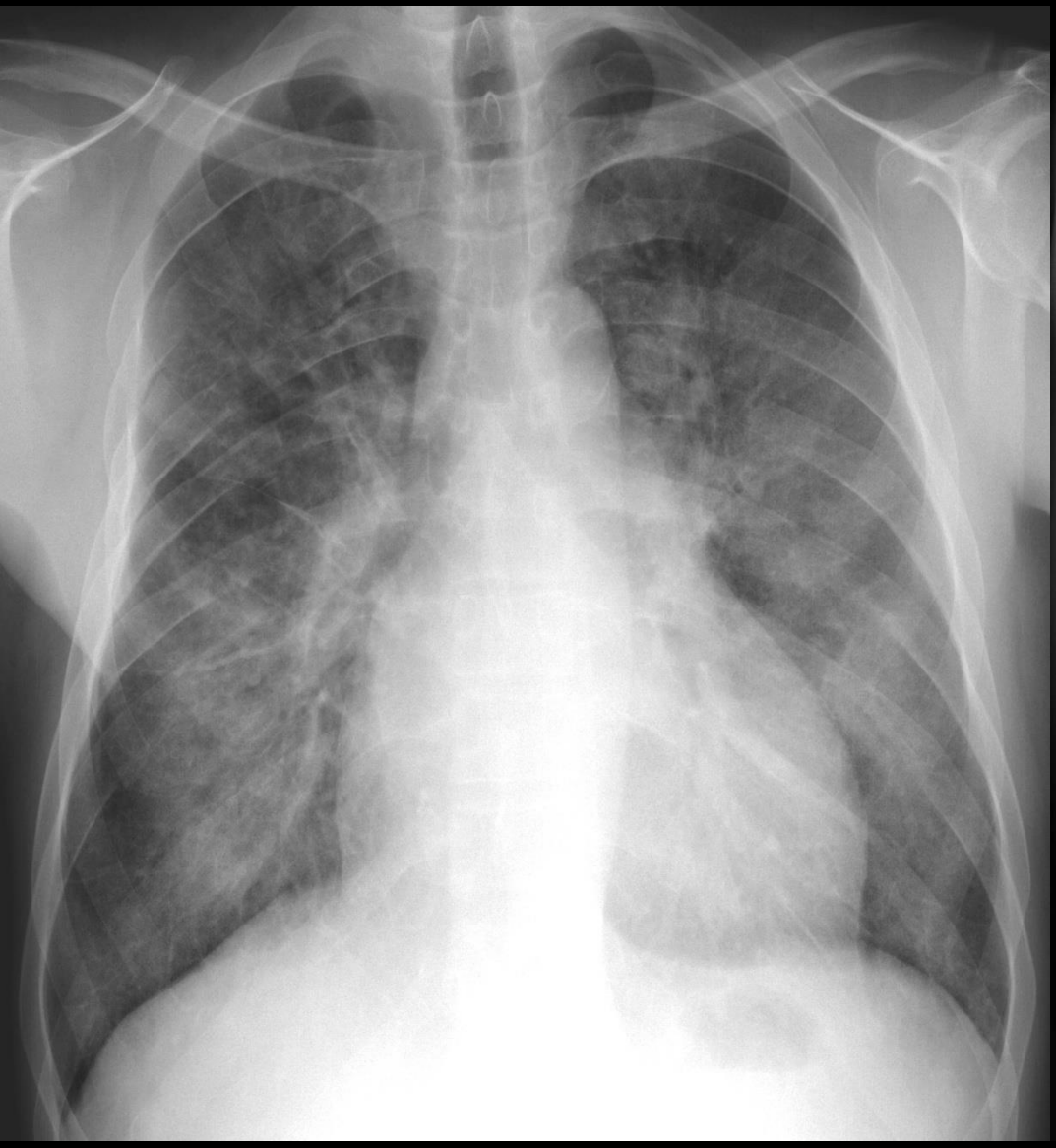
Patient BIBA to ER s/p airplane crash.

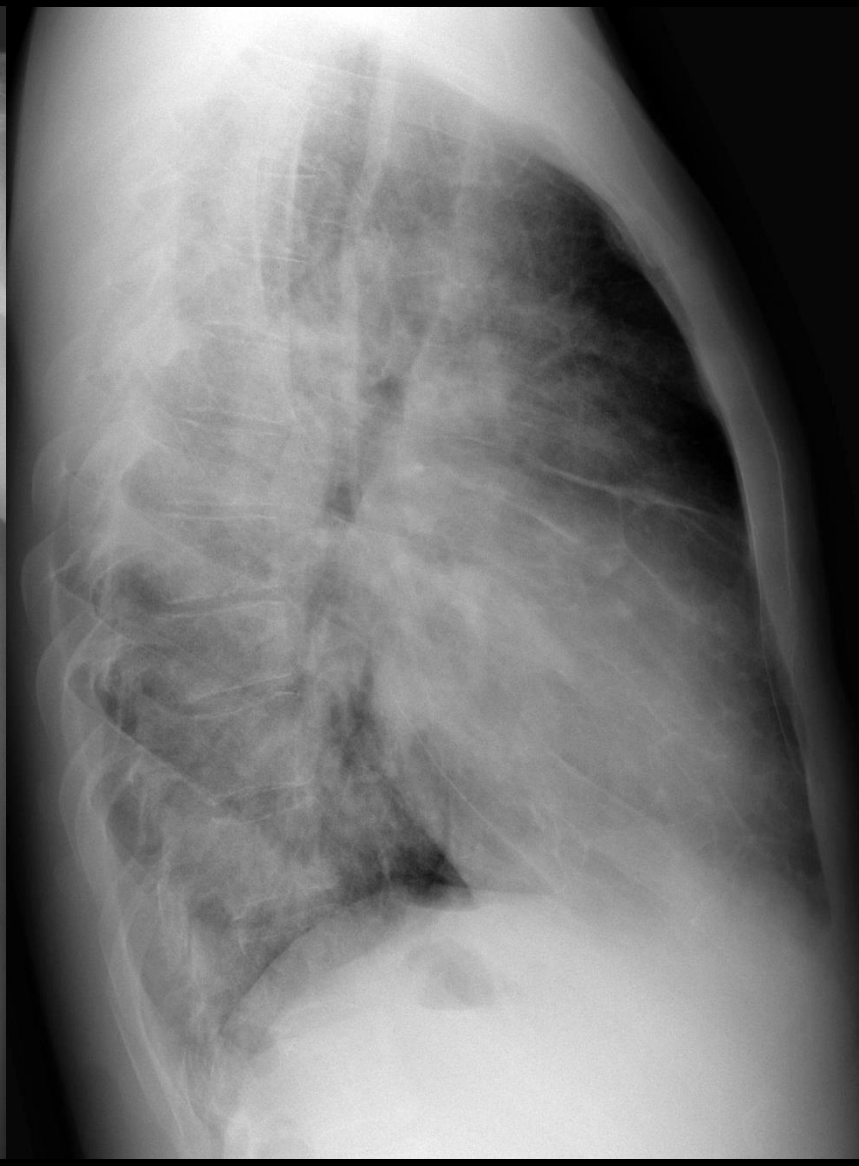


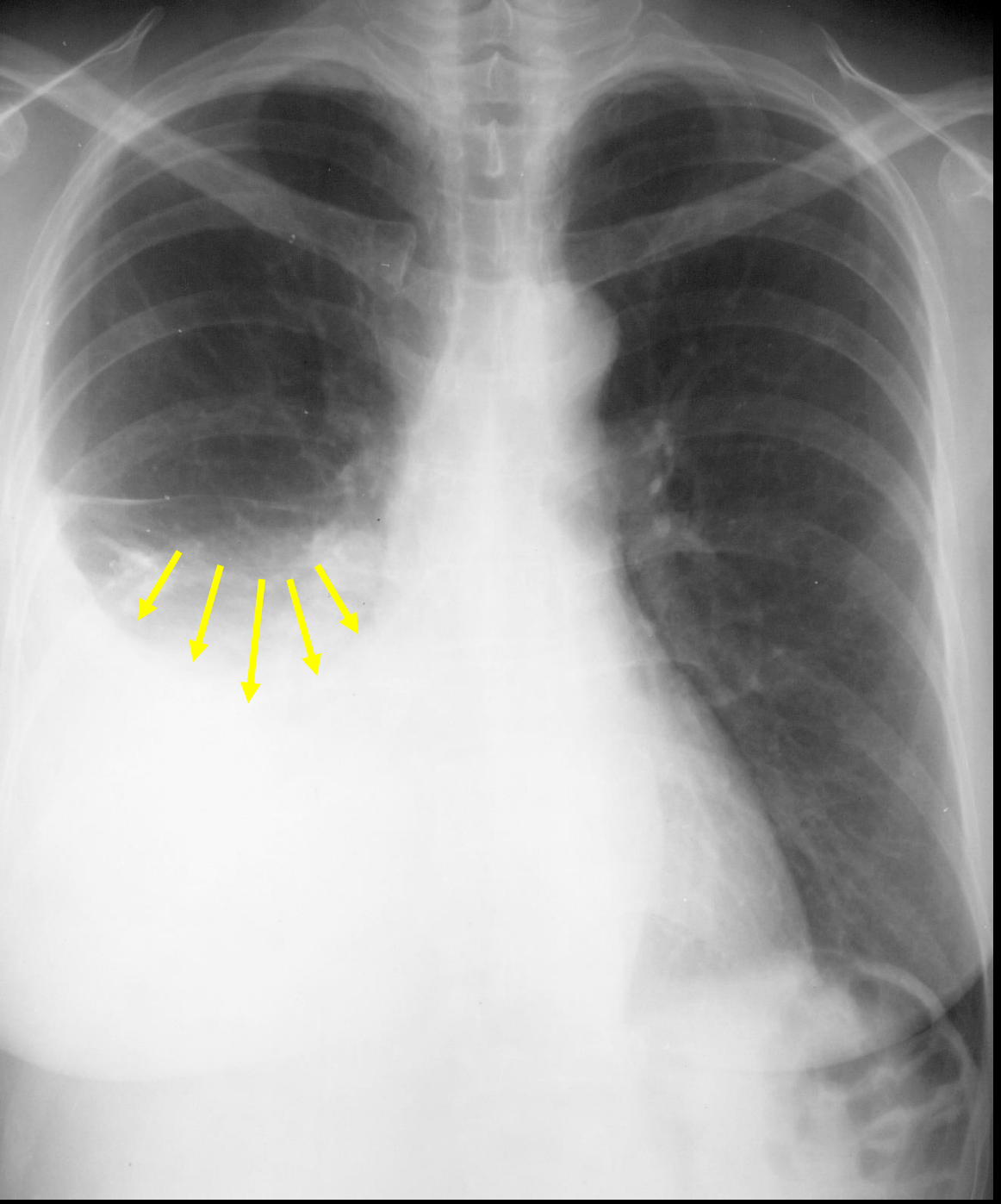


Hilar Lymphadenopathy - BL

Pulmonary Edema



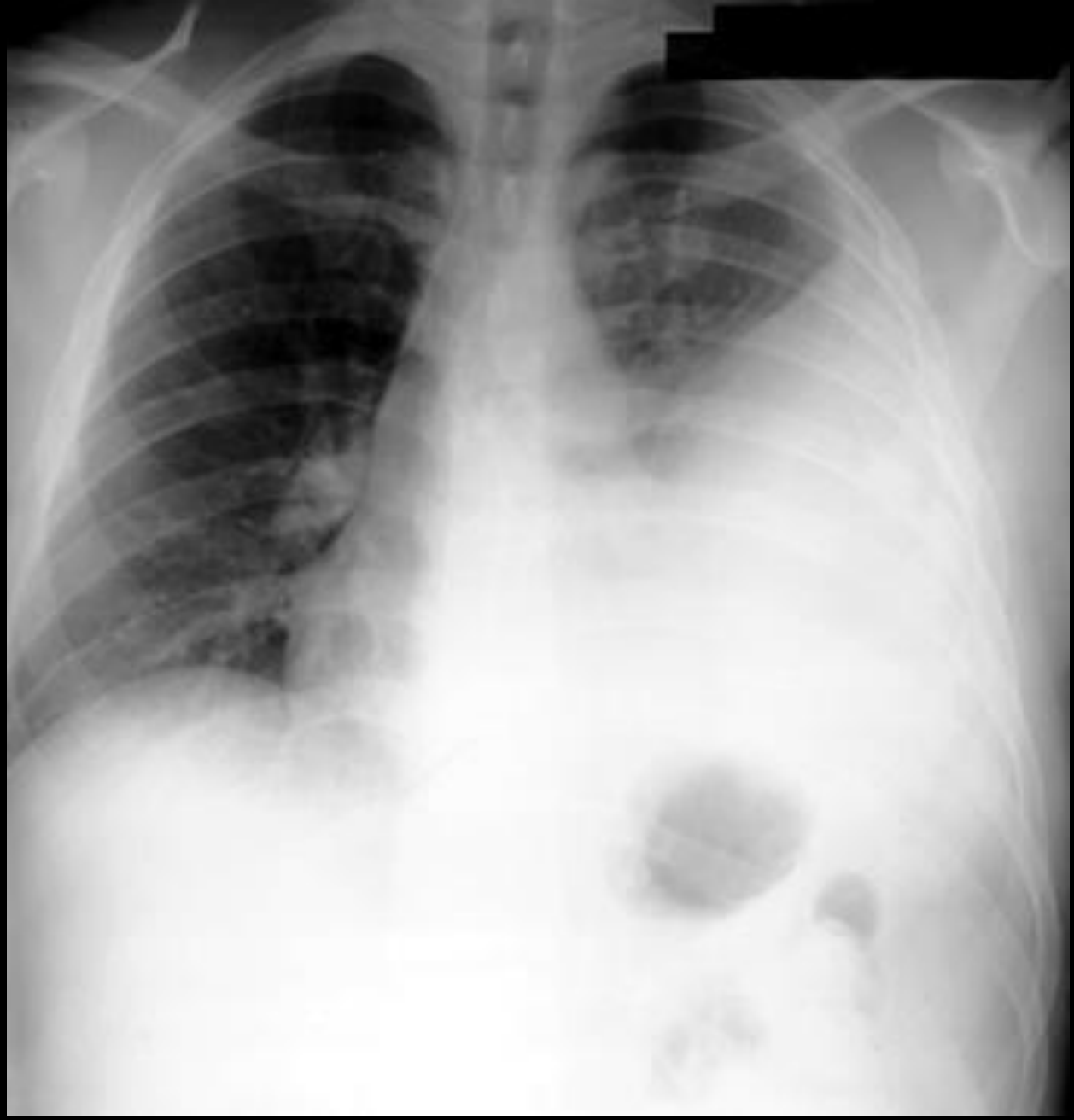




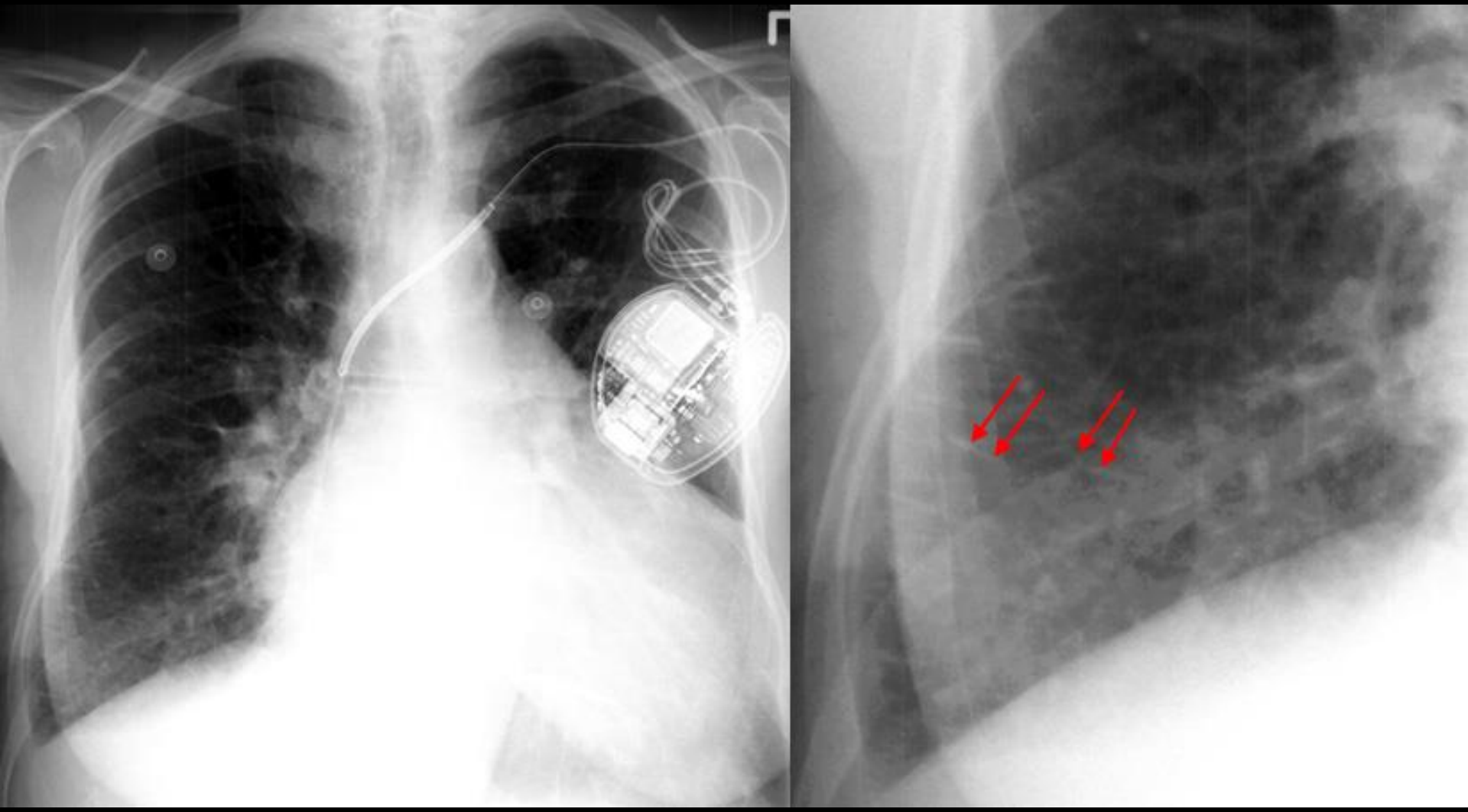
Simple Pleural Effusion

PA CXR

meniscus



Pleural Effusion



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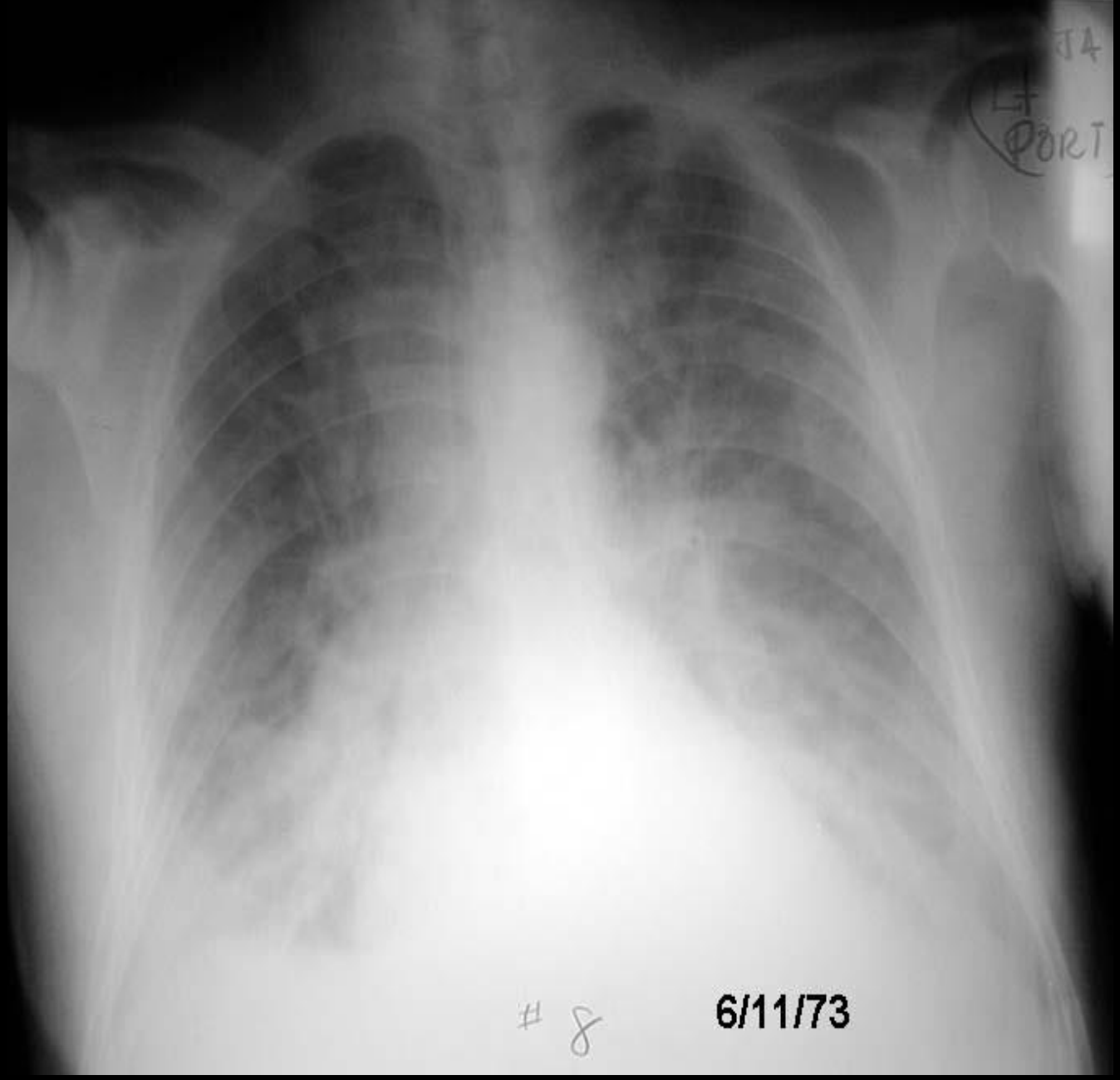
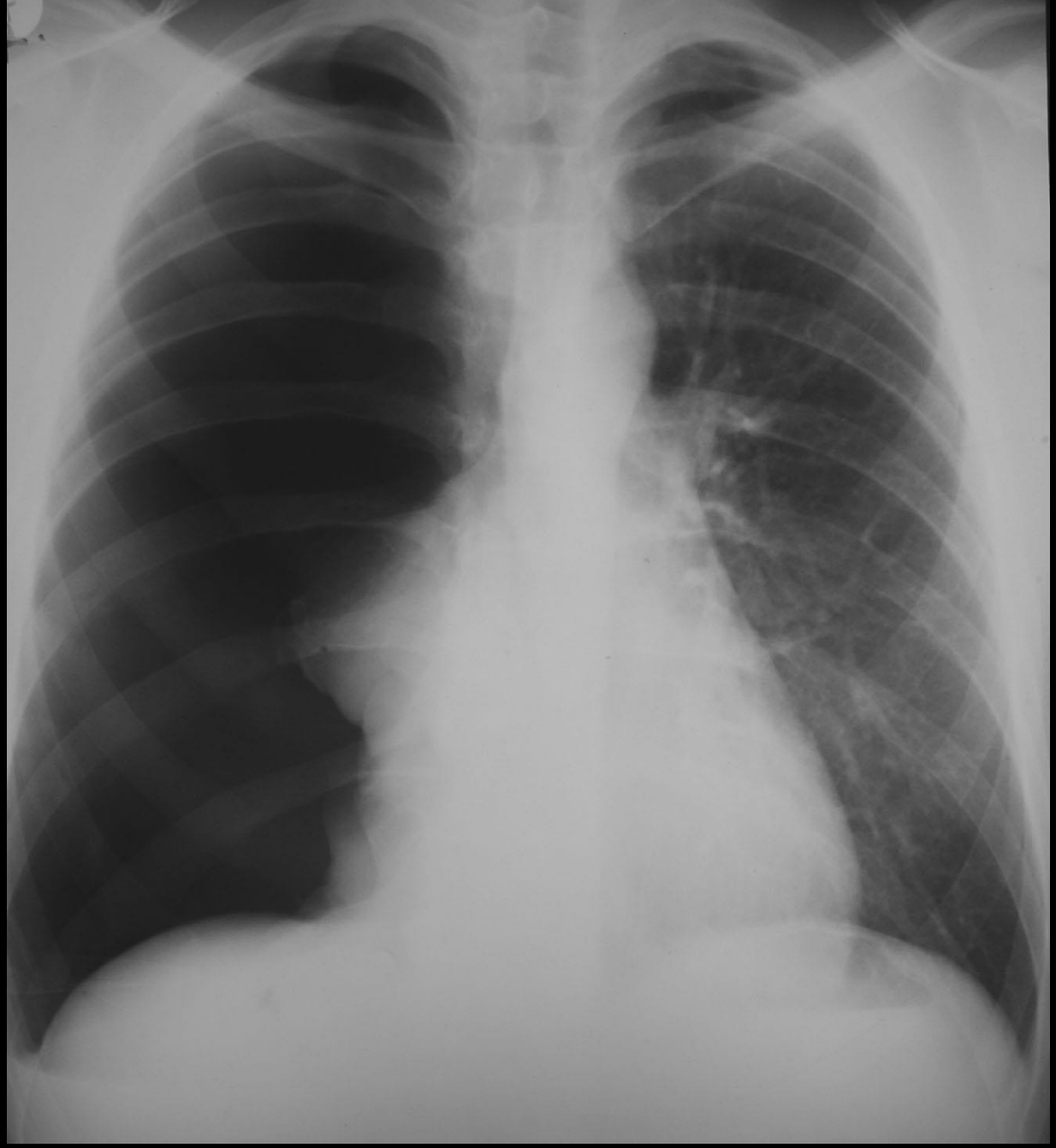
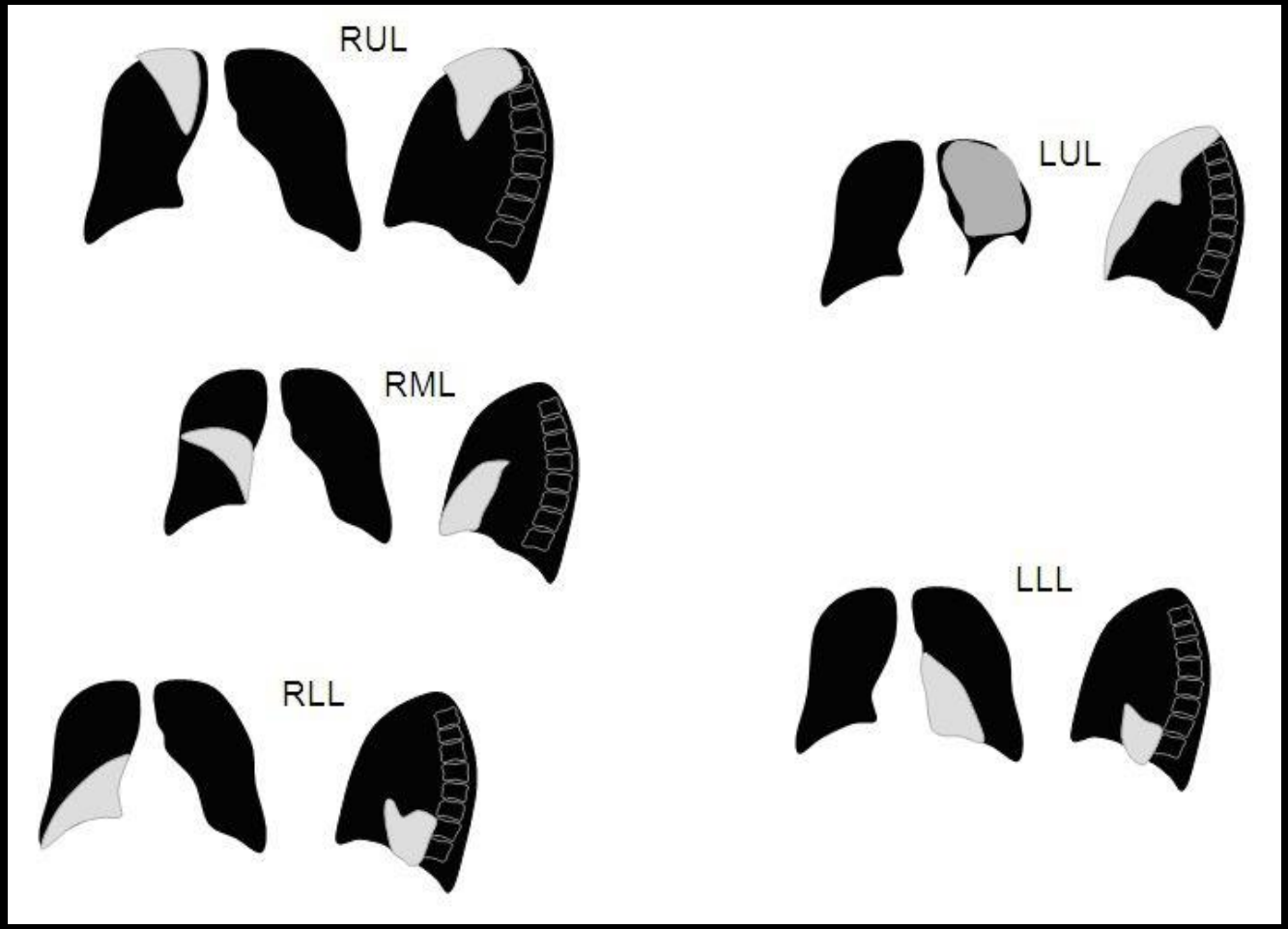


Heart failure

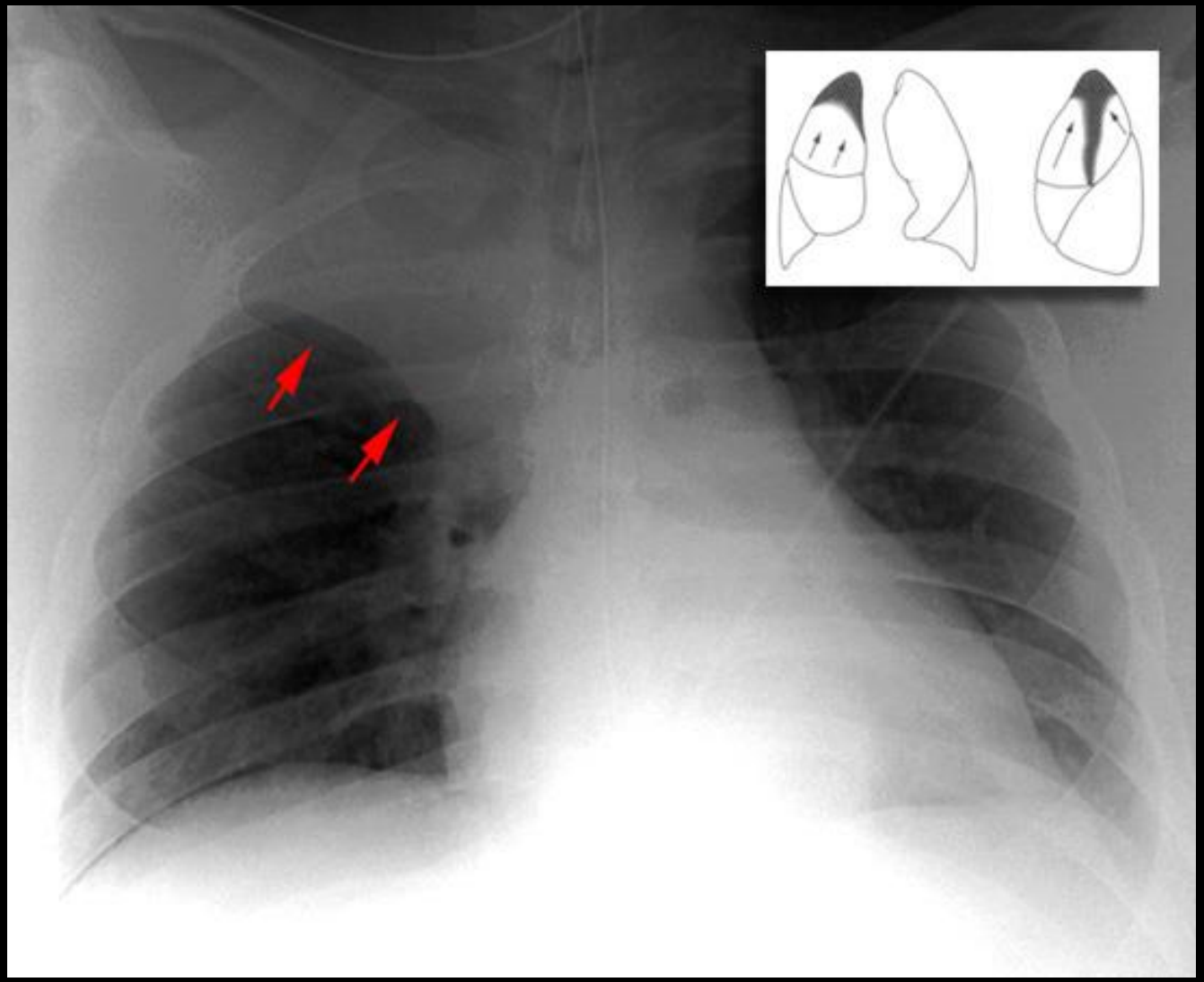


Pneumothorax

Lung collapse- the grey area is collapsed



Right upper lobe collapse

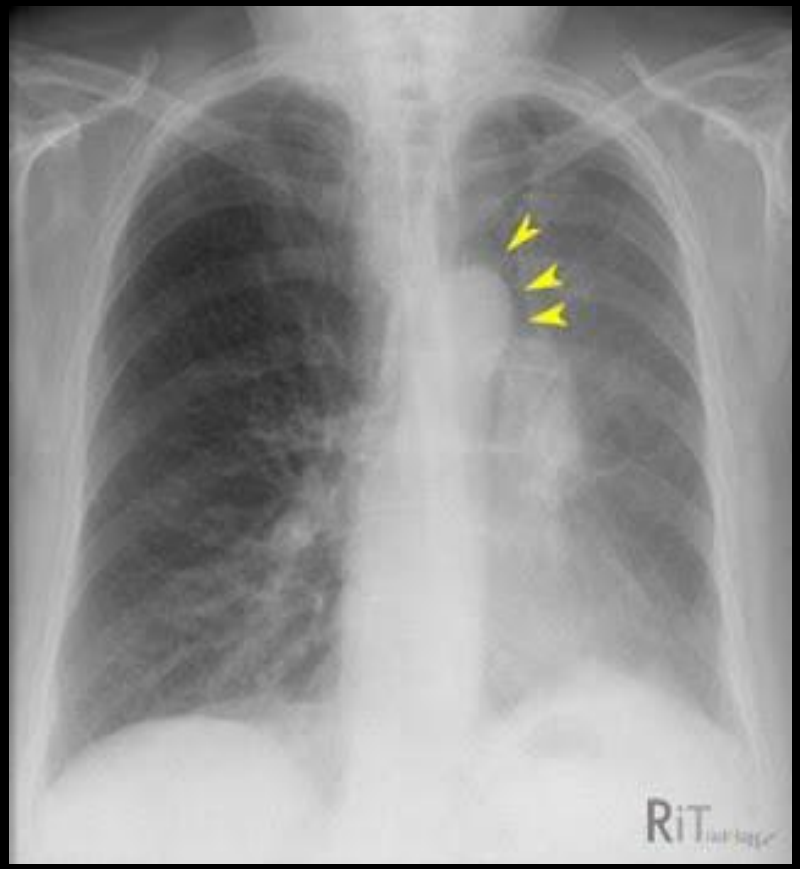


RUL collapse

Middle lobe collapse

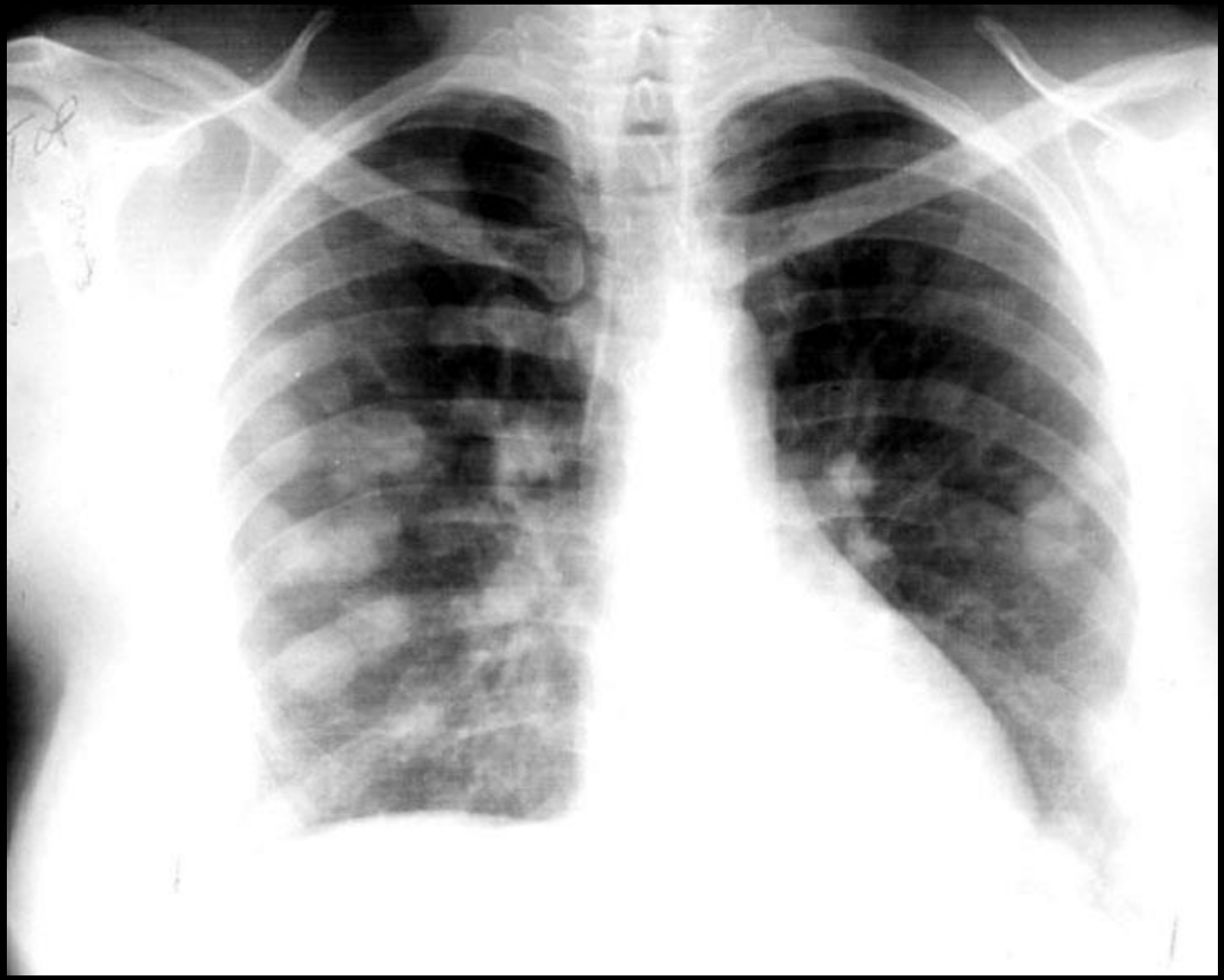
Right lower lobe collapse

LUL COLLAPSE

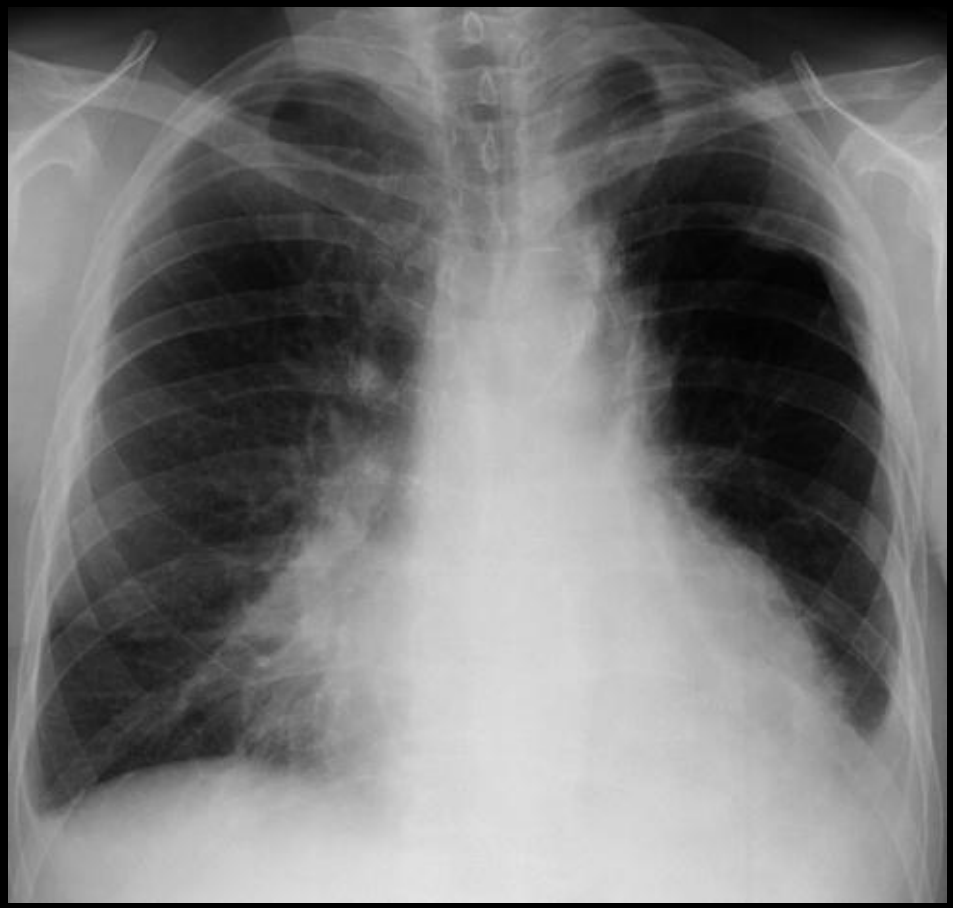


Left lower lobe collpase

Air under the diaphragm

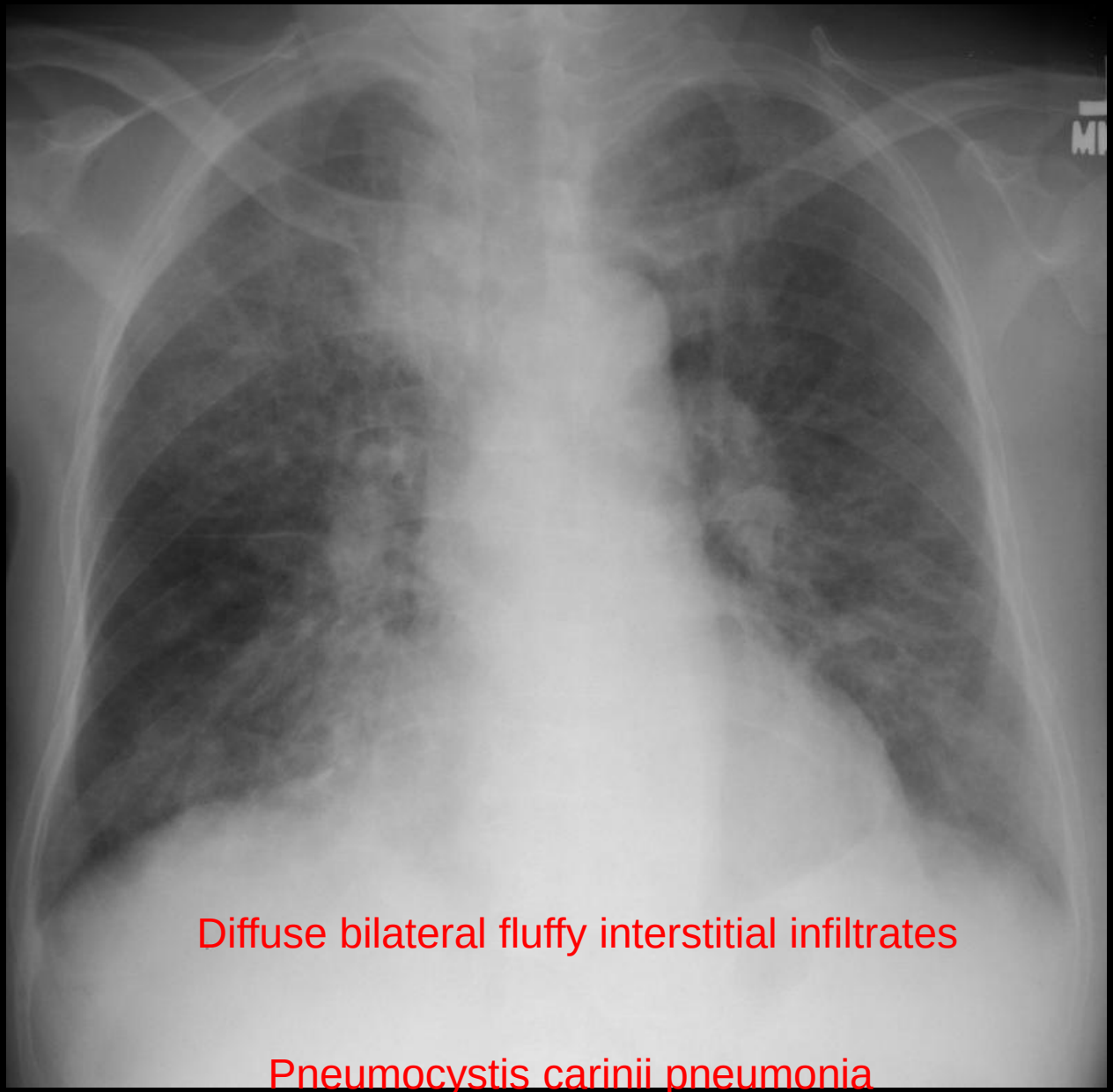


Multiple Masses



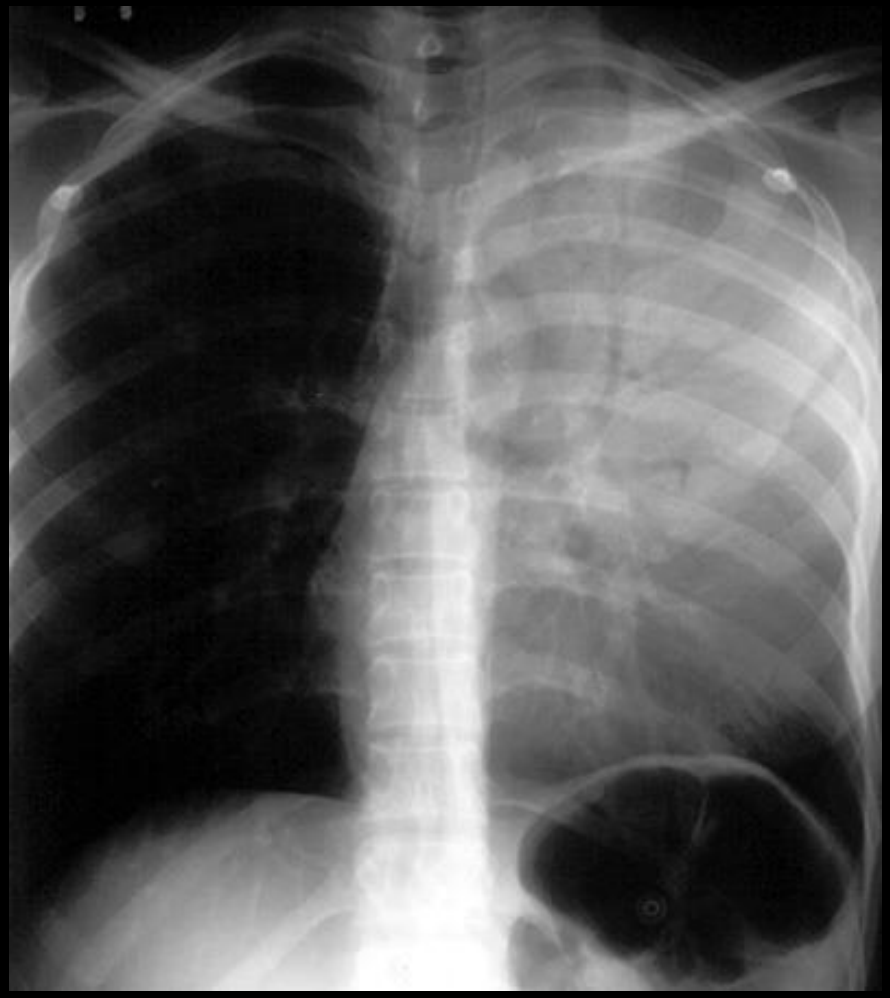
Obscuring of the right and left heart borders; infiltrate at the bases

Bilateral aspiration pneumonia

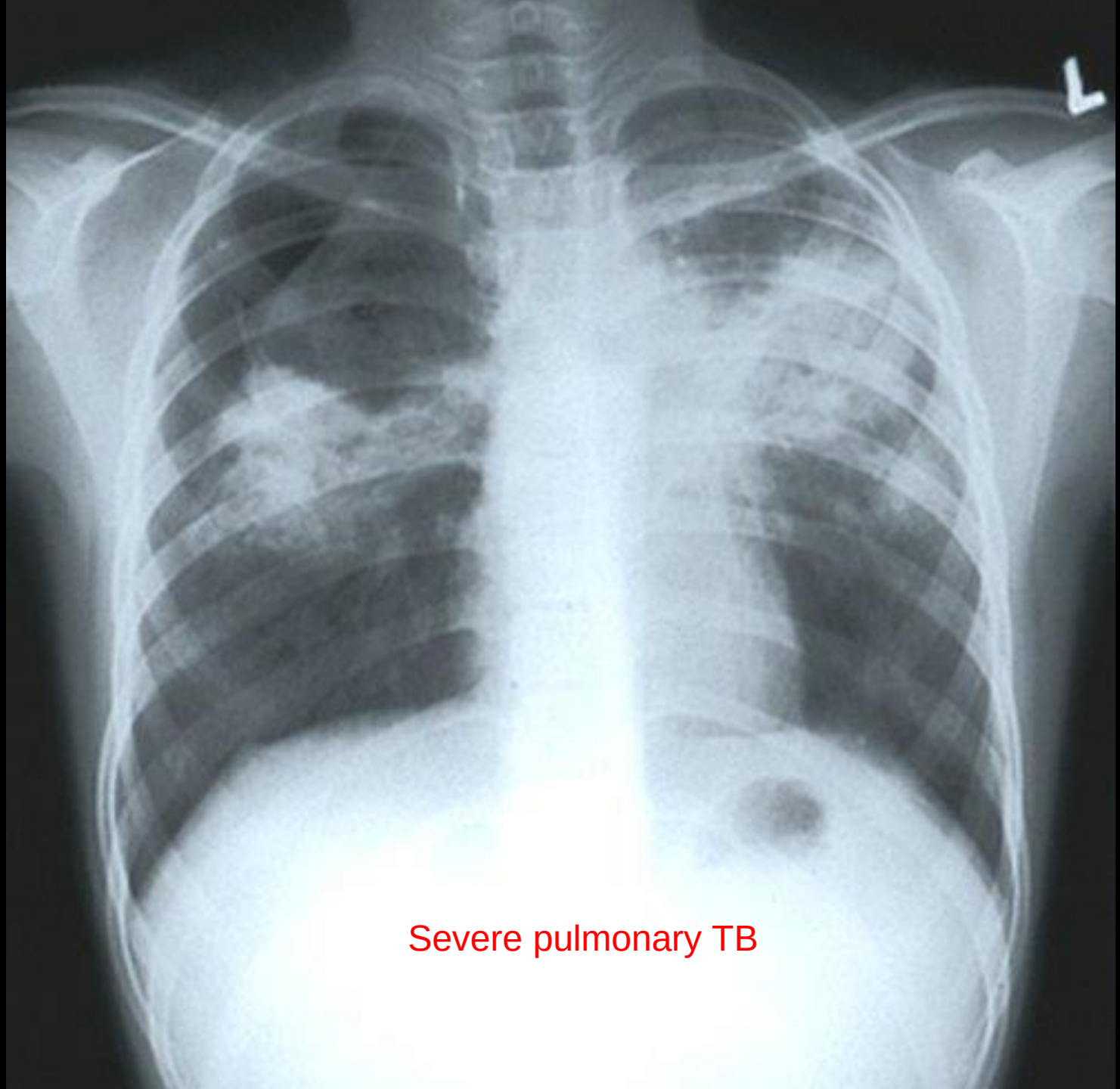


Diffuse bilateral fluffy interstitial infiltrates

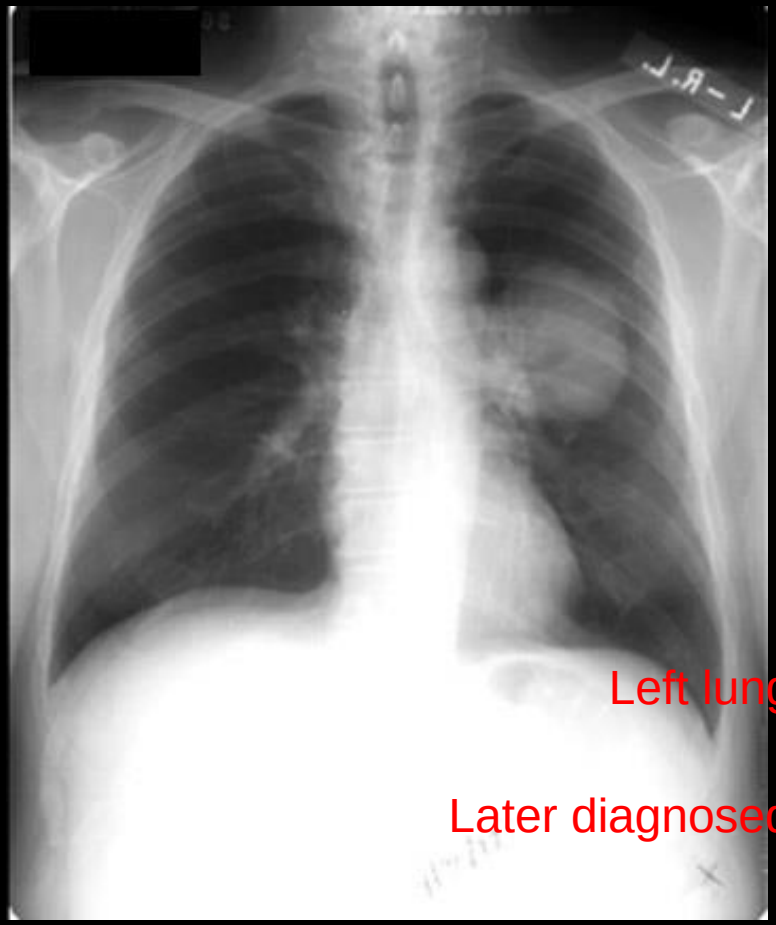
Pneumocystis carinii pneumonia



LUL pneumonia



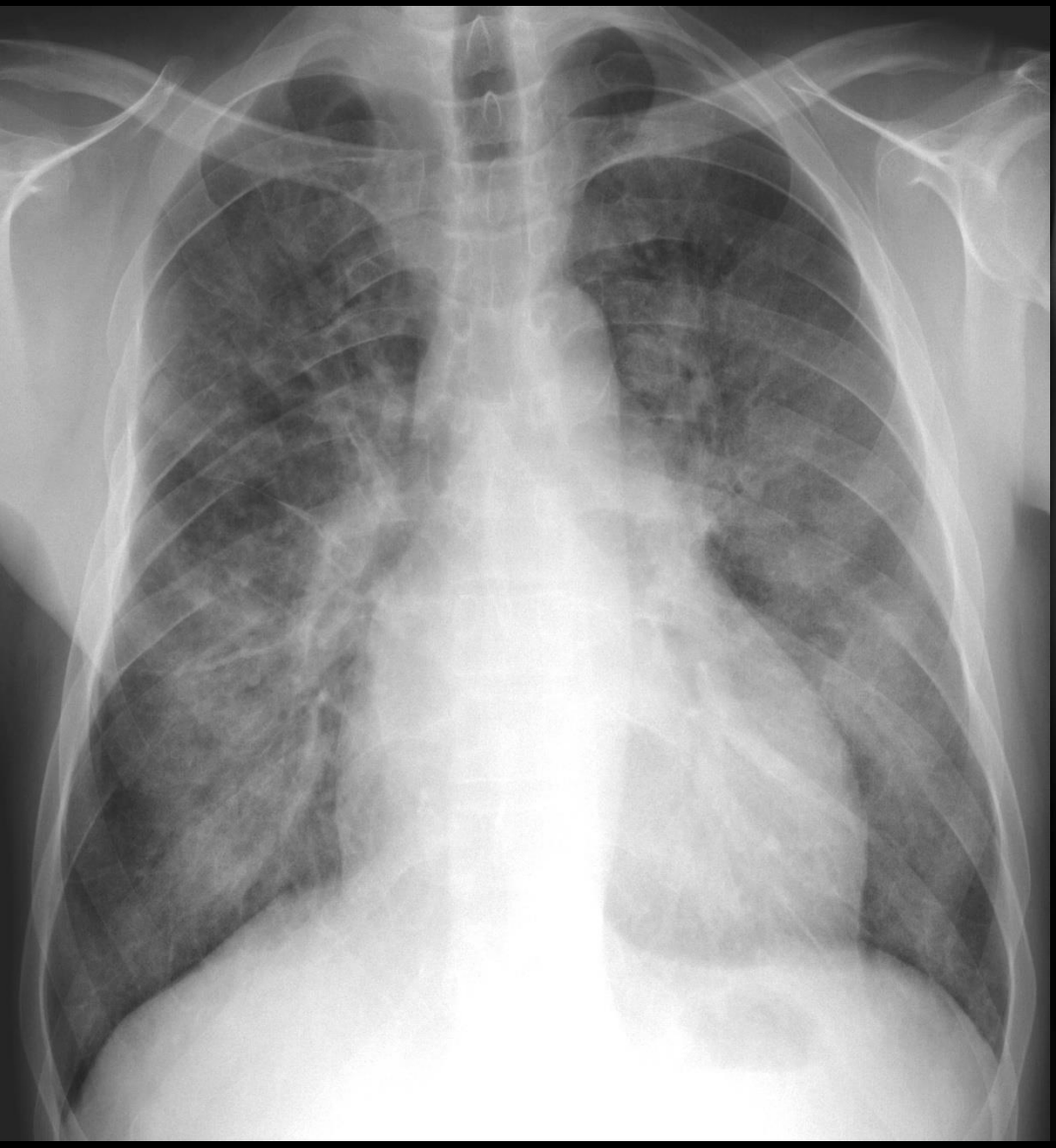
Severe pulmonary TB

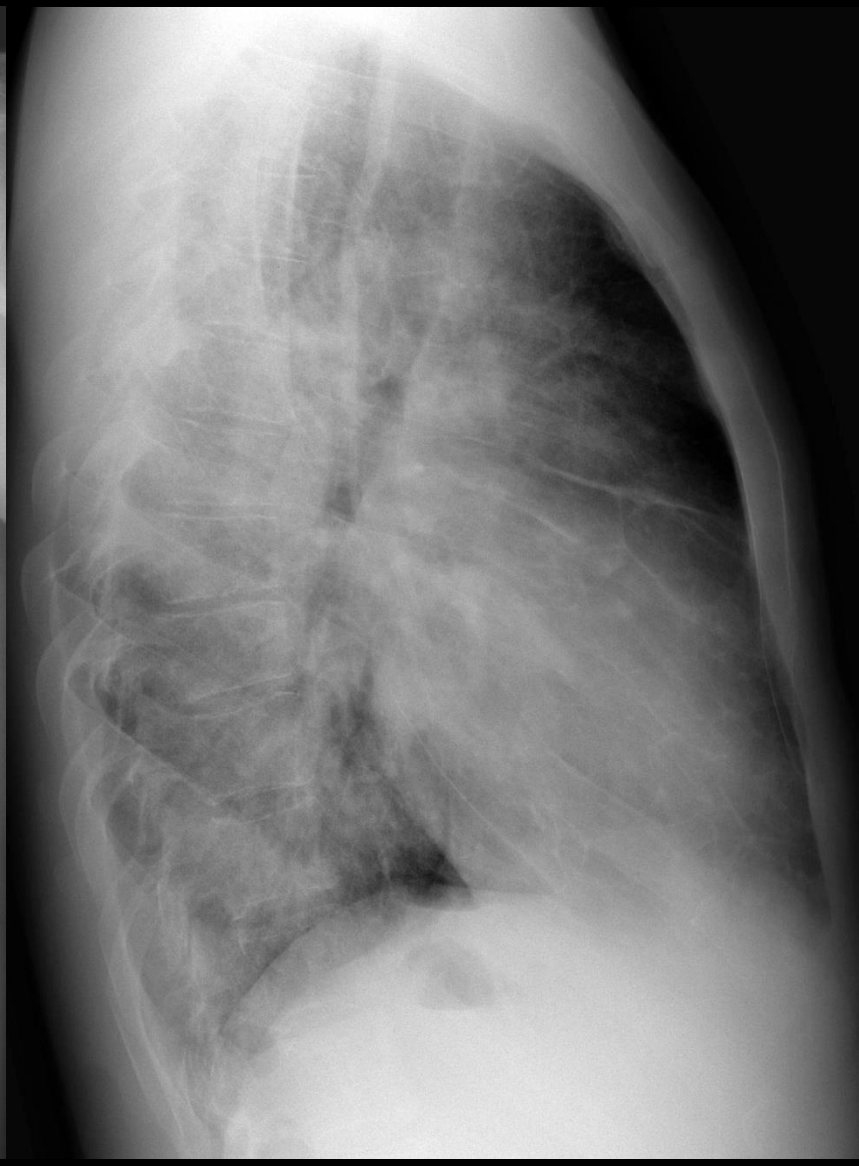


Left lung opacity

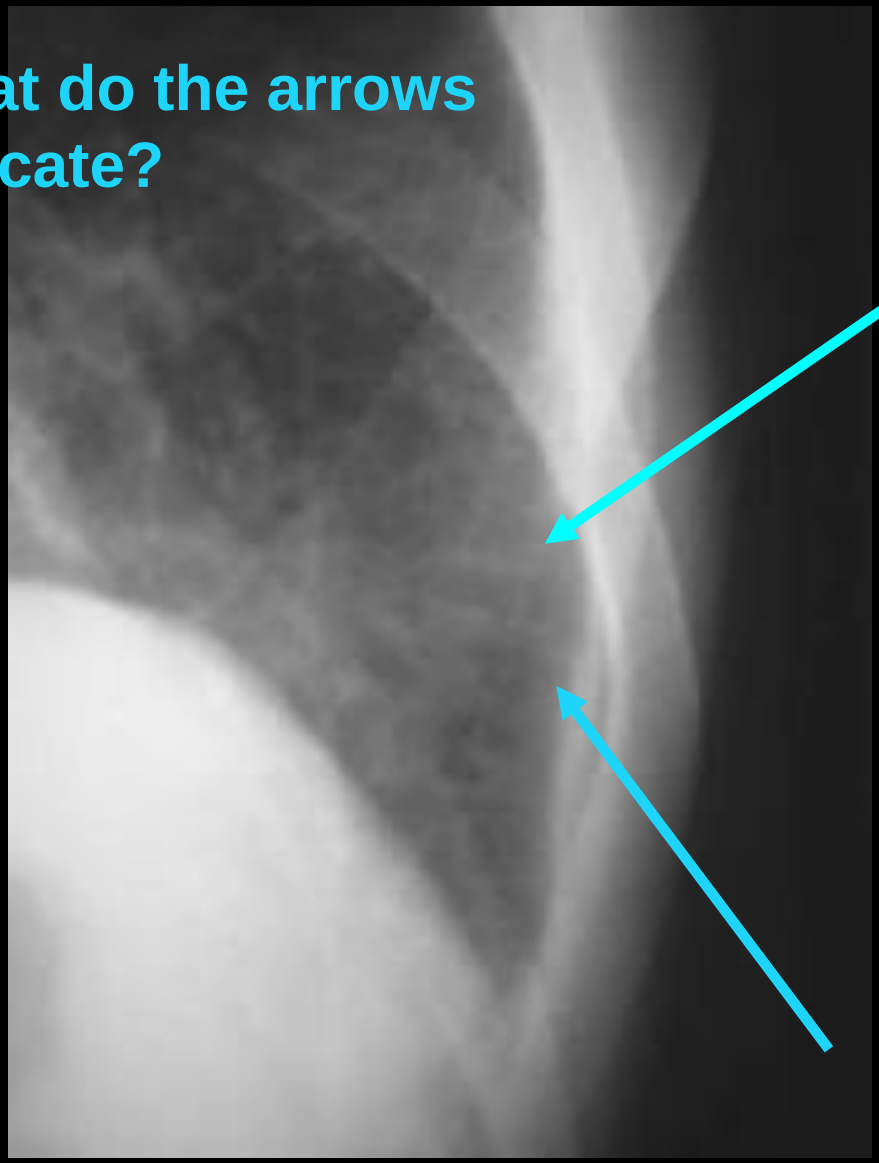
Later diagnosed as lung cancer

Pulmonary Edema





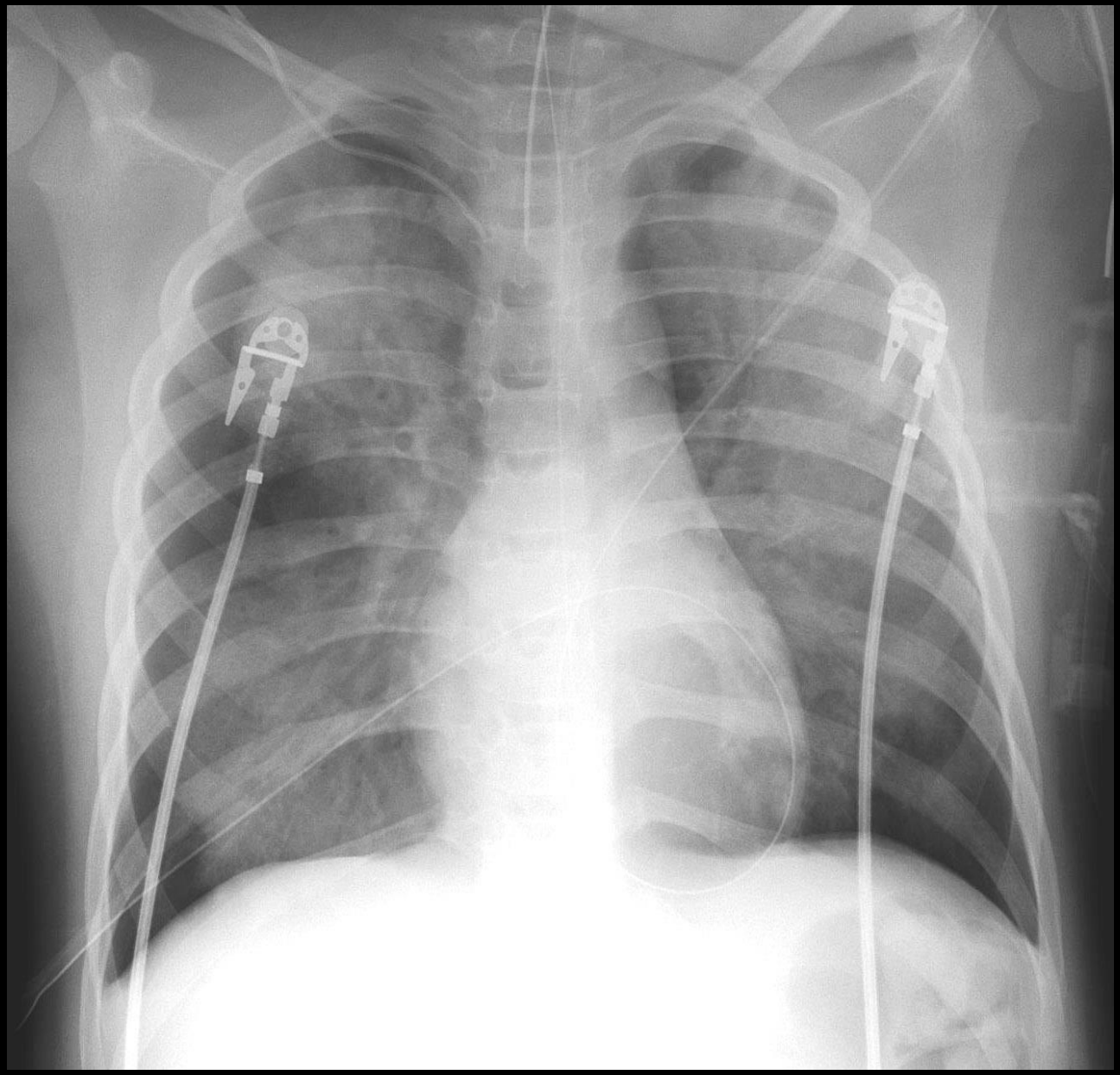
What do the arrows indicate?



Kerley B Lines

Short (1 -2 cm) white lines at the lung bases, perpendicular to the pleural surface representing distended interlobular septa

Pulmonary Edema

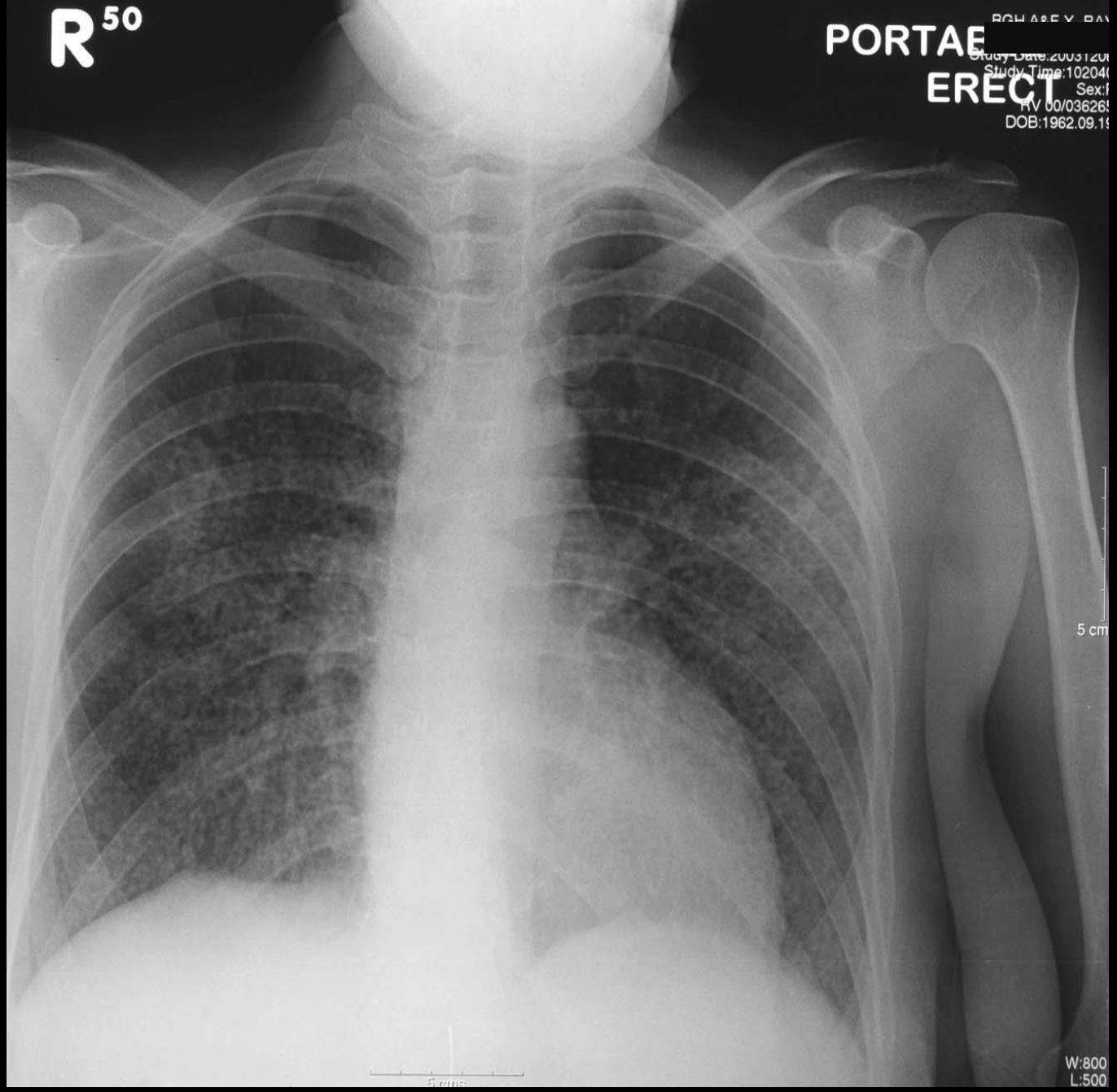


-Perihilar interstitial & airspace opacities

-Bilateral and symmetric

-”Batwing” or “butterfly” configuration

Cavitating lesion



Miliary shadowing

Hiatus hernia

The 12-Step Program

- **1**: Name
- **2**: Date
- **3**: Old films

} **Pre-read**

- **4**: What type of **view(s)**
- **5**: Penetration
- **6**: Inspiration
- **7**: Rotation
- **8**: Angulation

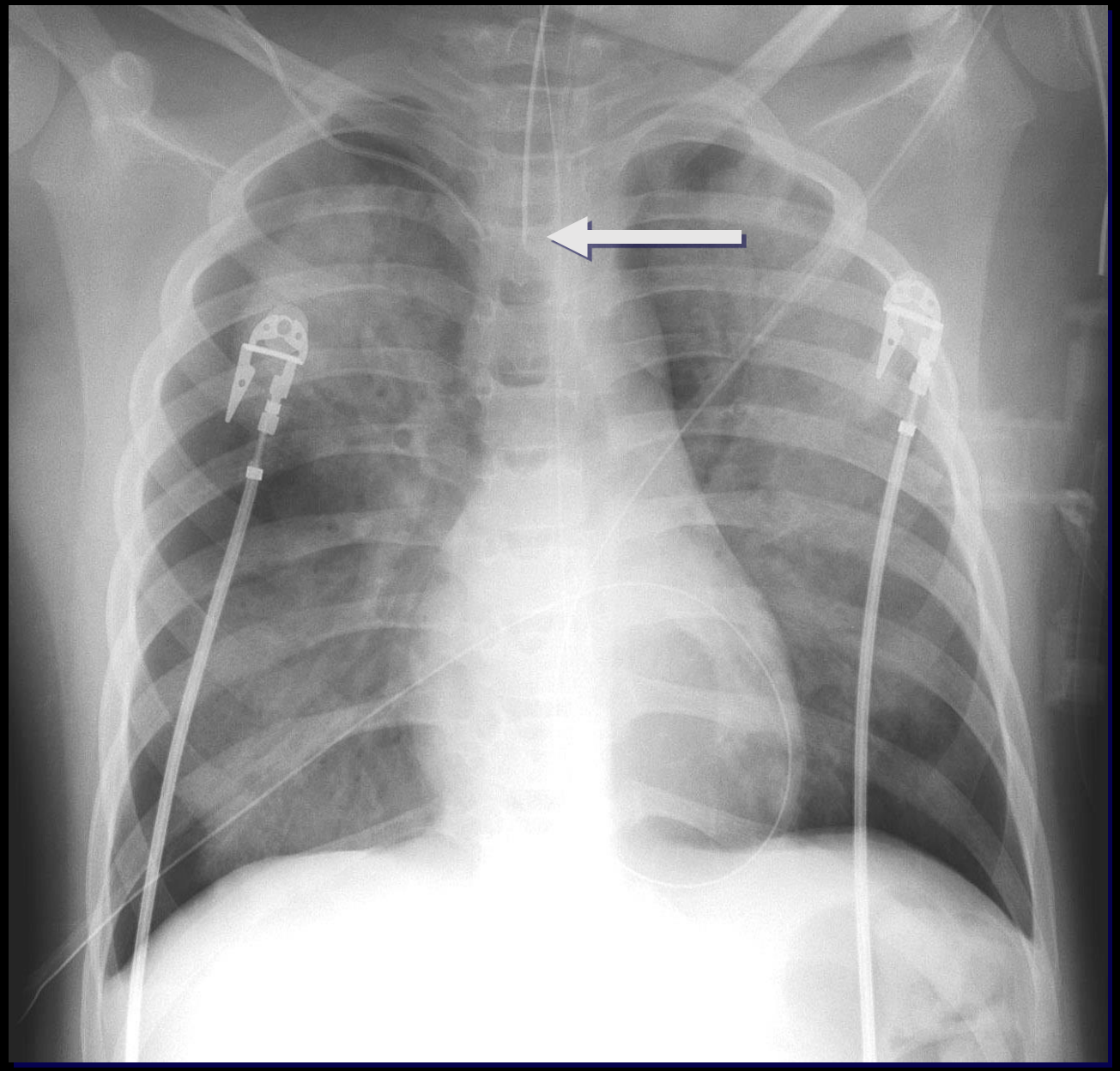
} **Quality Control**

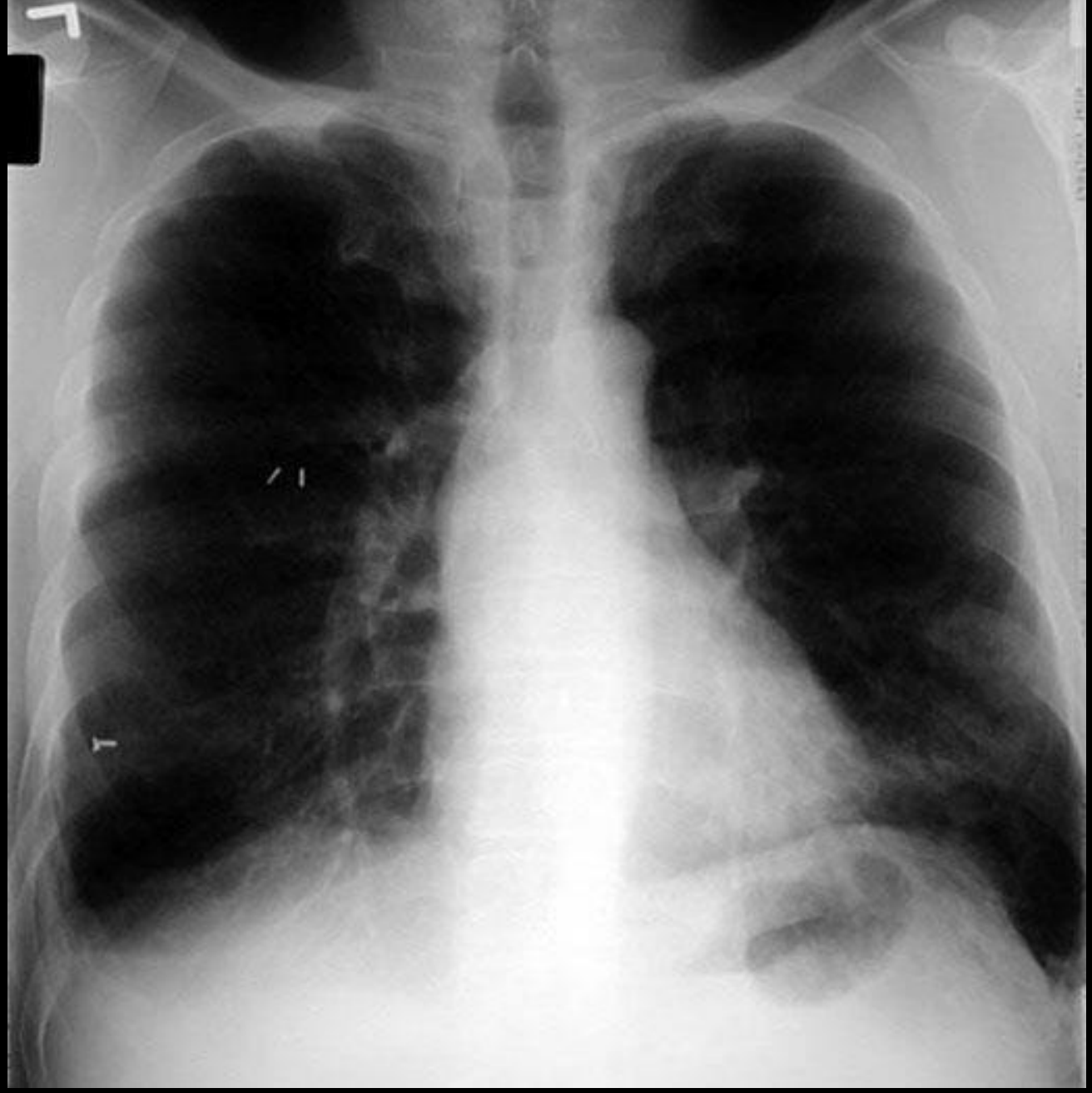
- **9**: Soft tissues / bony structures
- **10**: Mediastinum
- **11**: Diaphragms
- **12**: Lung Fields

} **Findings**

Normal ETT Position

2 - 4 cm above the carina





Dextrocardia

The End

Questions?