胸部X-ray影像判讀

肺實質化病變與肺塌陷

王 耀 東 醫師

中山醫學大學附設醫院
內科部　胸腔內科

Consolidation -Radiology

- An essentially **homogeneous opacity** in the lung characterized by little or no loss of volume, by effacement of pulmonary blood vessels, and sometimes by the presence of an air-bronchogram.

Consolidation -Pathophysiology

- The process by which **air** in the lung is replaced by the products of disease, *rendering the lung solid* (as pneumonia).

  This dense material may consist of:
  - Pus (pneumonia)
  - Fluid (pulmonary edema)
  - Blood (pulmonary hemorrhage)
  - Cells (cancer)

Alveolar pattern

A: Air-bronchogram;
Air-alveologram; Acinus shadow

B: Butterfly distribution

C: Change pattern rapidly

D: Distribution of segmental or lobar

E: Early Coalescence

F: Fluffy margin

G: **Ground glass appearance**

Etiology of Alveolar pattern

Edema	**Cardiac; Non-cardiac**
Hemorrhage	**Pul. hemorrhage**
Exudate	**Infectious; Non-infectious**
Tumor	**Bronchoalveolar cell carcinoma** Lymphoma
Others	**PAP; Eosinophilic lung diseases…**

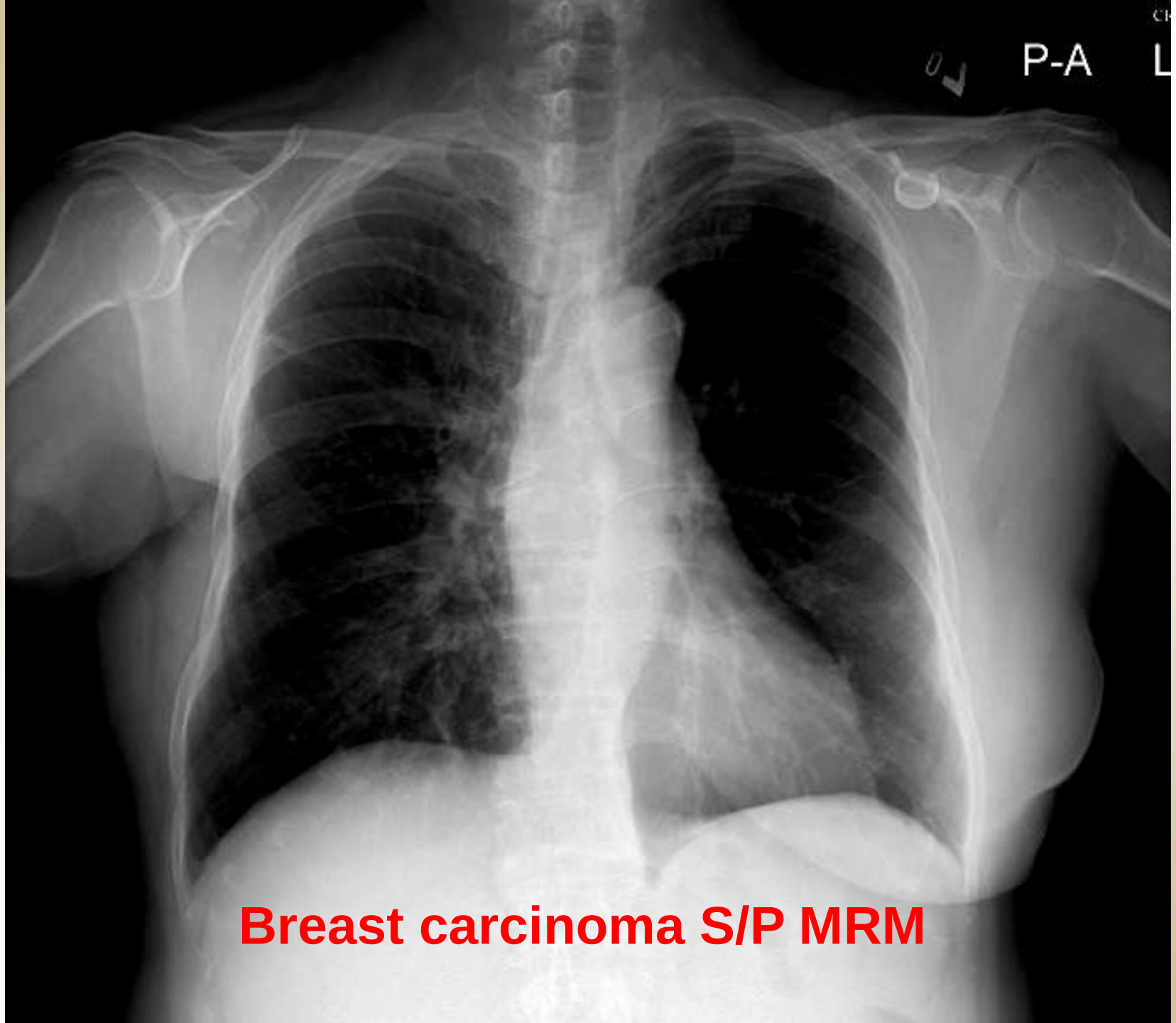
Objectives of Radiography Study

- **Identify the location and extent** of the consolidation
- Correlation of clinical findings
- The findings are consistent with disease process
- To assess the evolution on sequential films
- Identify any complicating features

Identify the Location

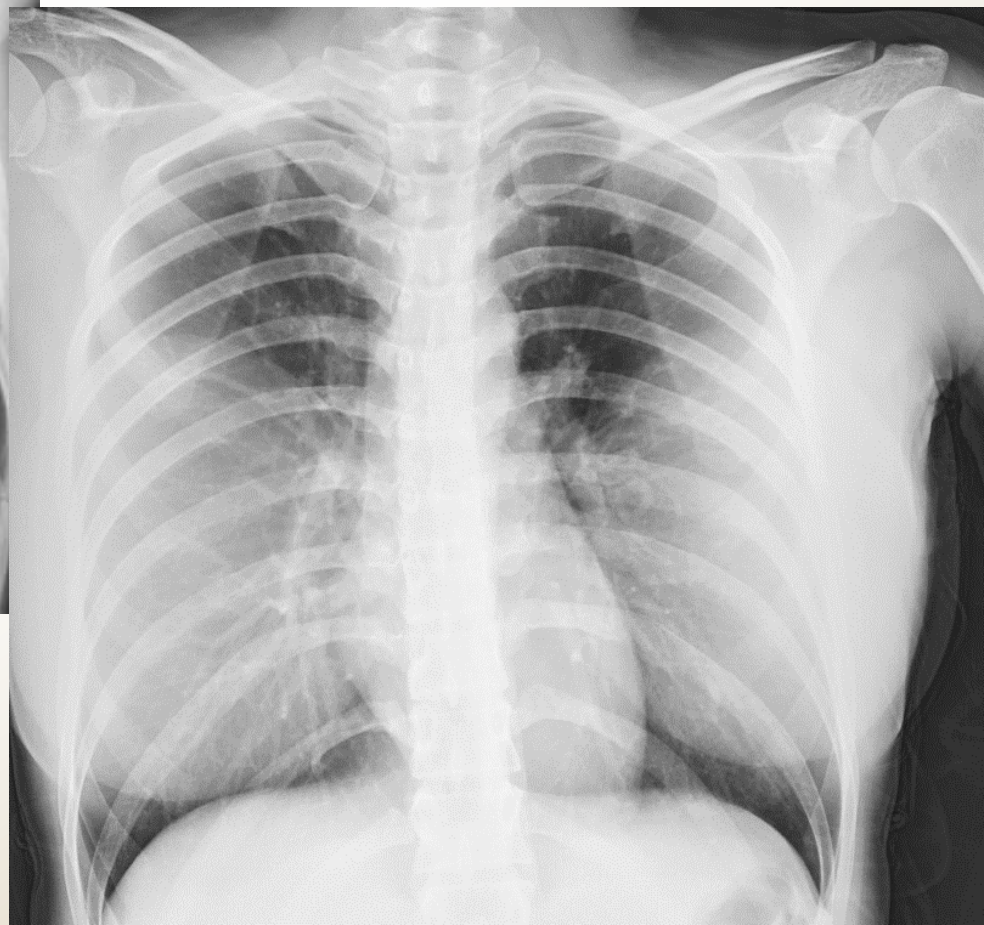
Differential diagnosis of
intra-pulmonary (consolidation) and
extra-pulmonary (e.g. pleural) lesion

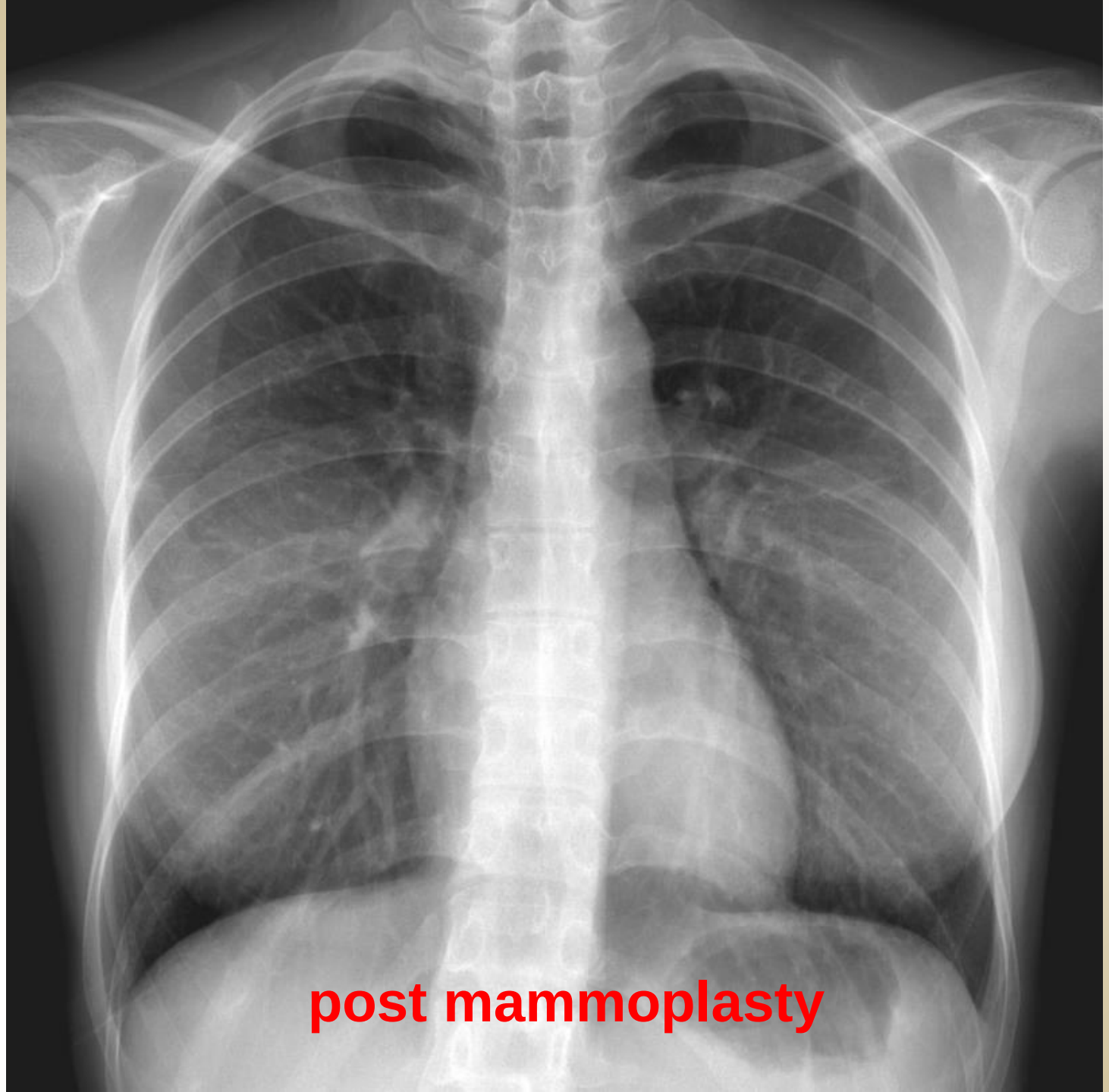
- Radiology anatomy
- Border of lesion (complete or incomplete)
- Shape of the lesion

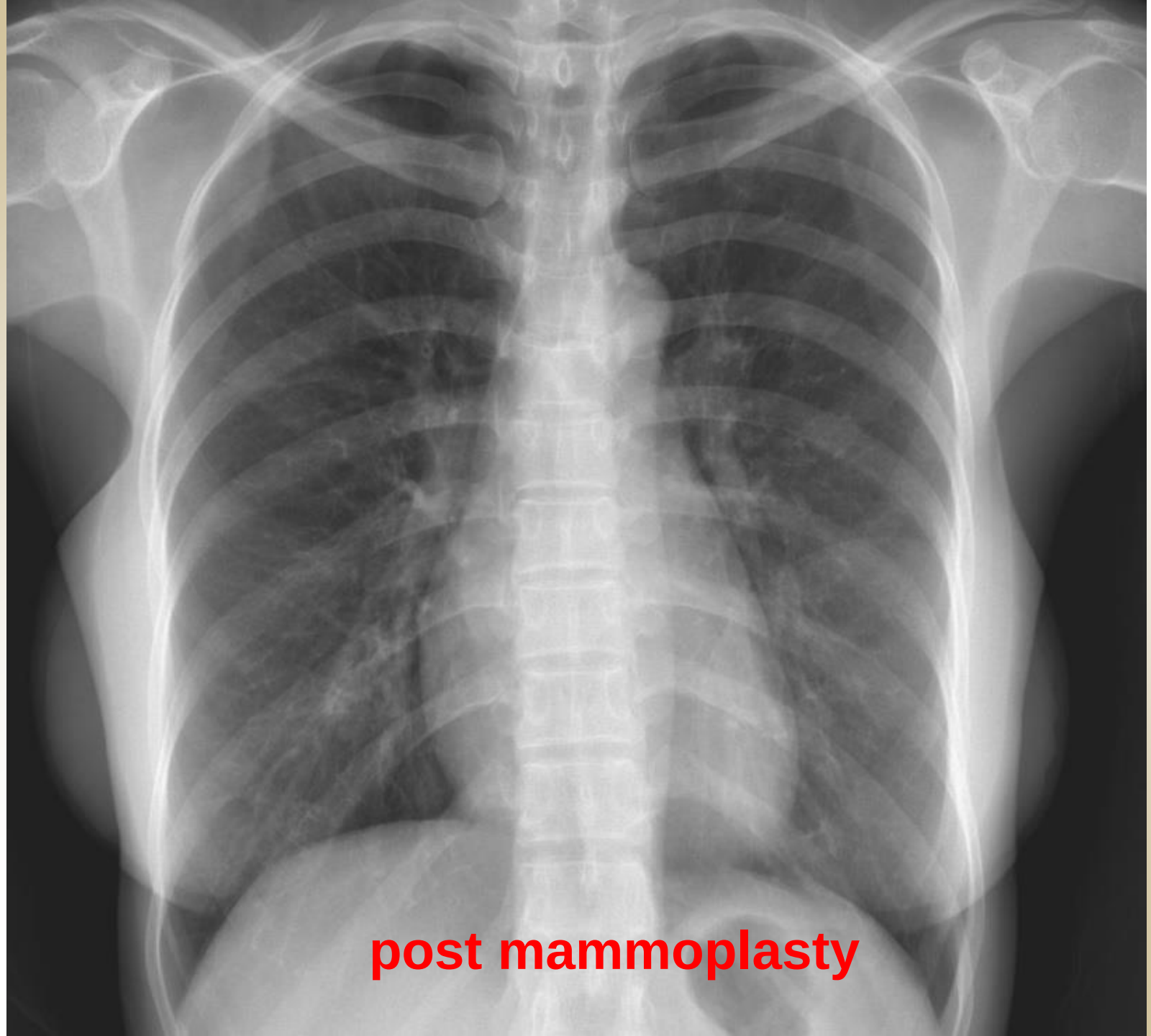


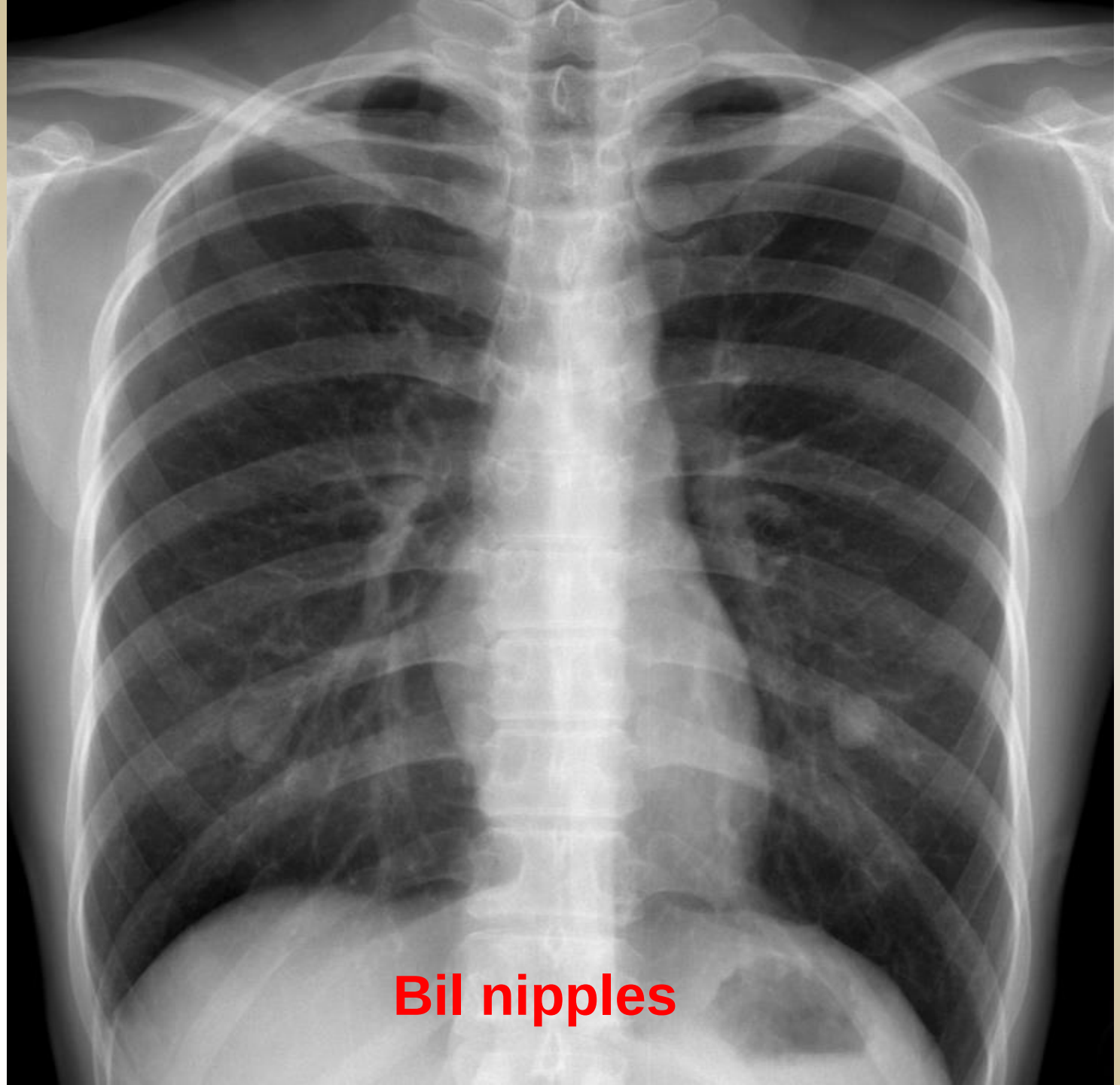
Breast carcinoma S/P MRM

Breast

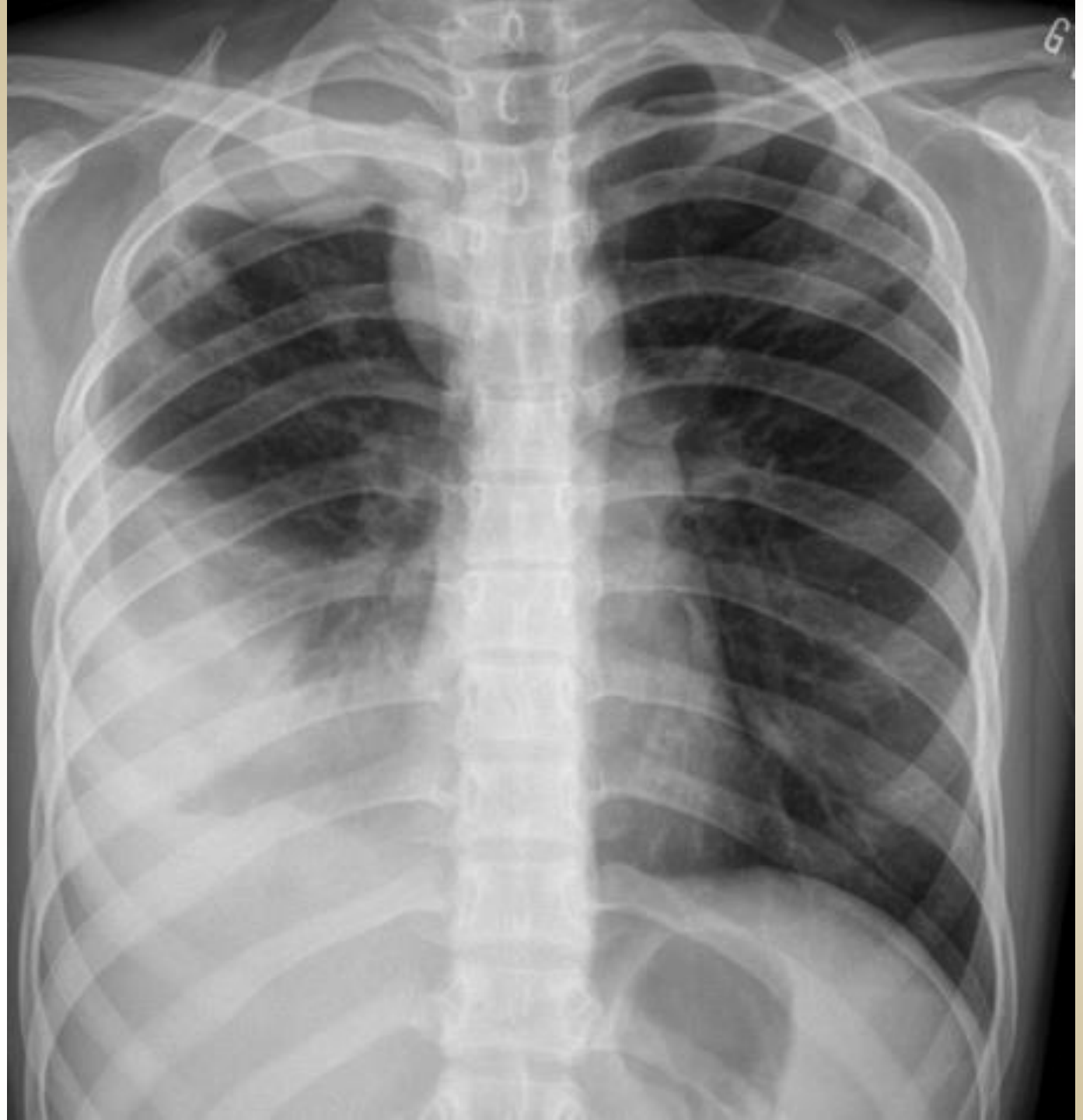



post mammoplasty


post mammoplasty


Bil nipples

Pleural thickening



Identify the Location

Differential diagnosis of intra-pulmonary (consolidation) and extra-pulmonary (e.g. pleural) lesion

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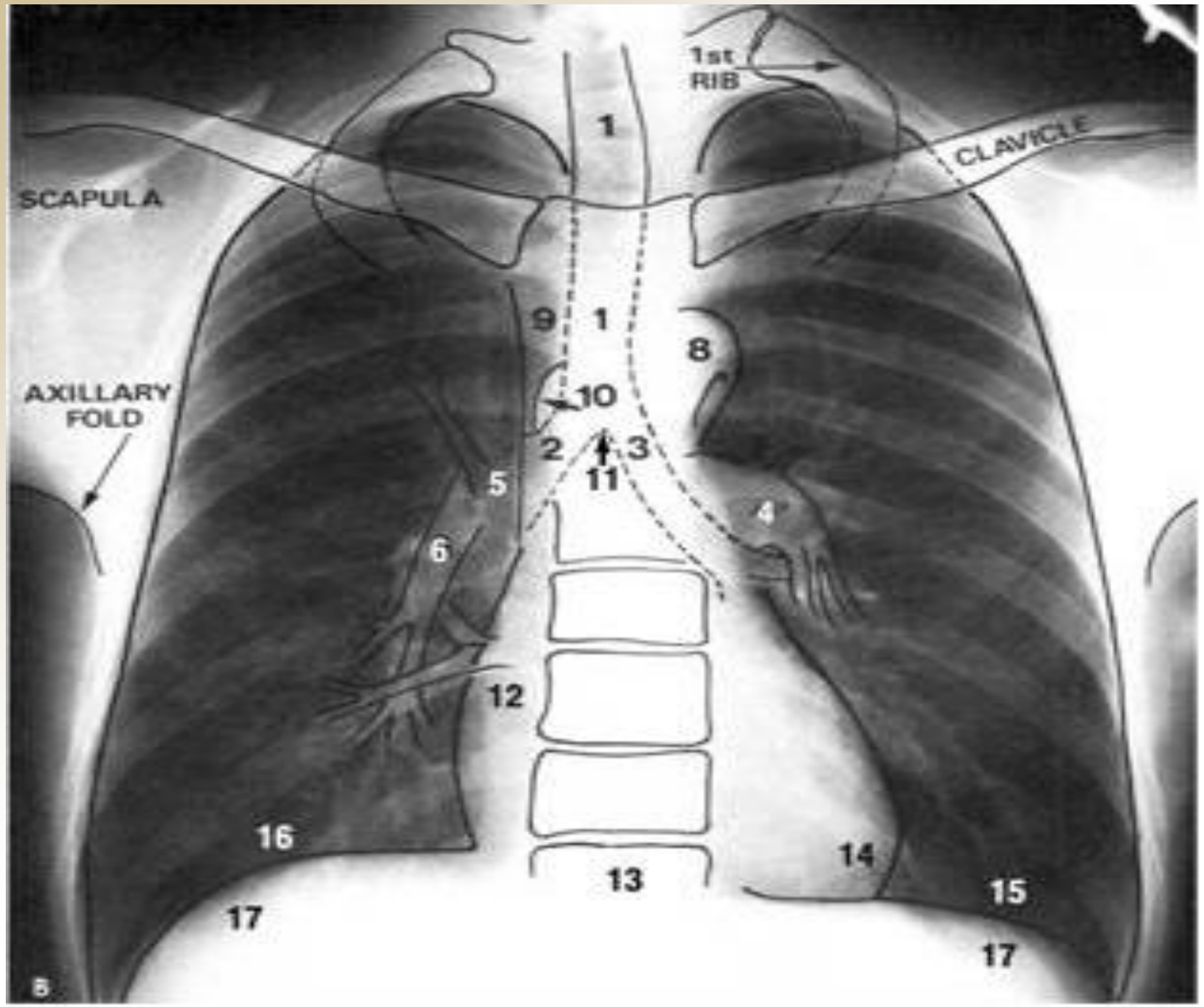
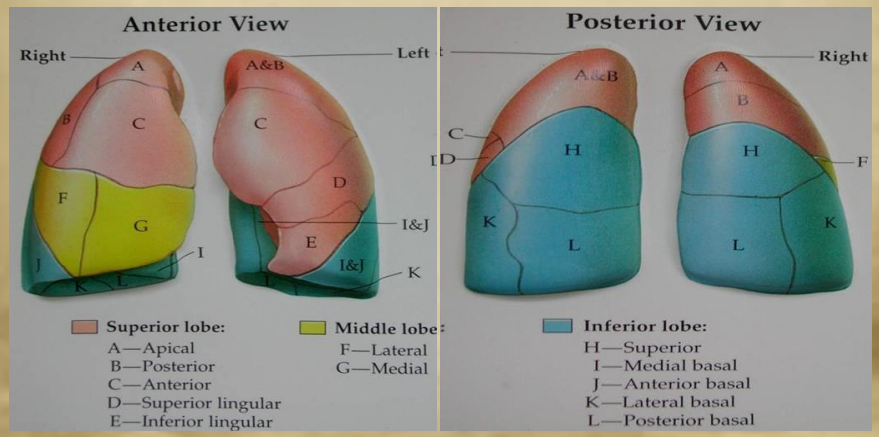

1st RIB
CLAVICLE
SCAPULA
AXILLARY FOLD
1
9
1
8
10
2
3
11
5
4
6
12
16
14
13
15
17
17
8

Identify the Location

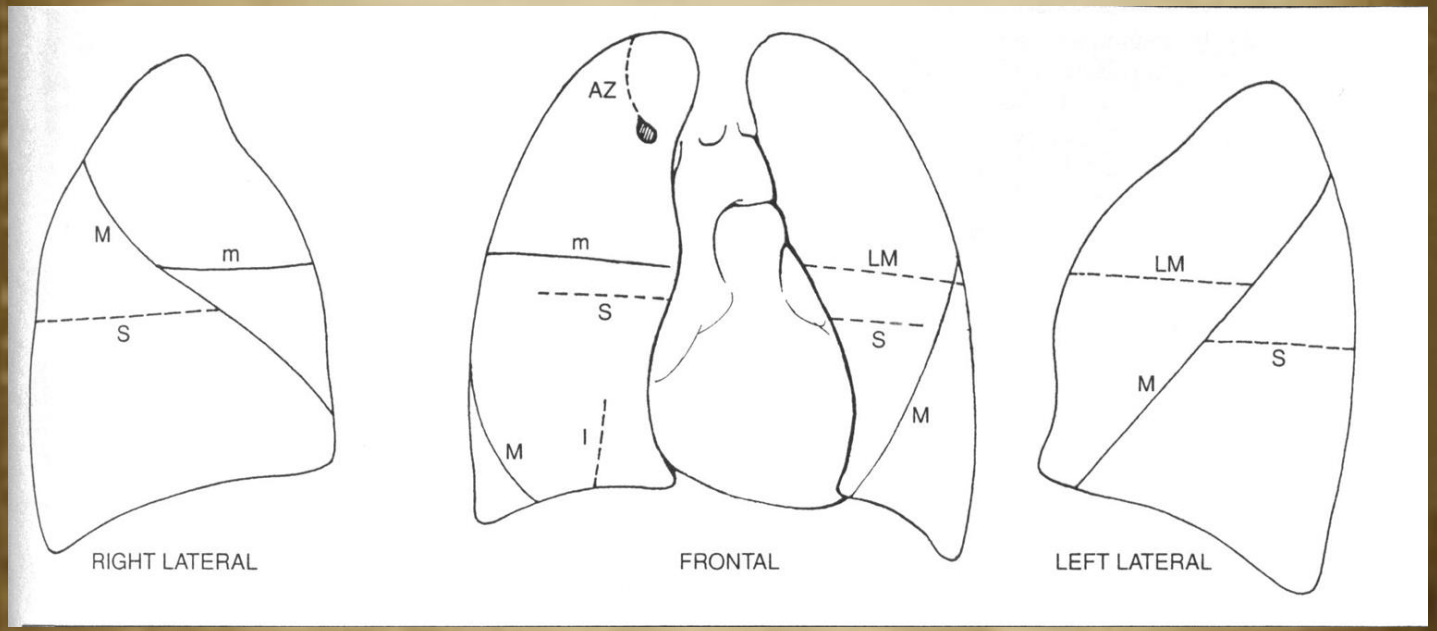
-Radiology Anatomy of Lung

- The septa of the lobe
- The lobar distribution
- The segmental distribution



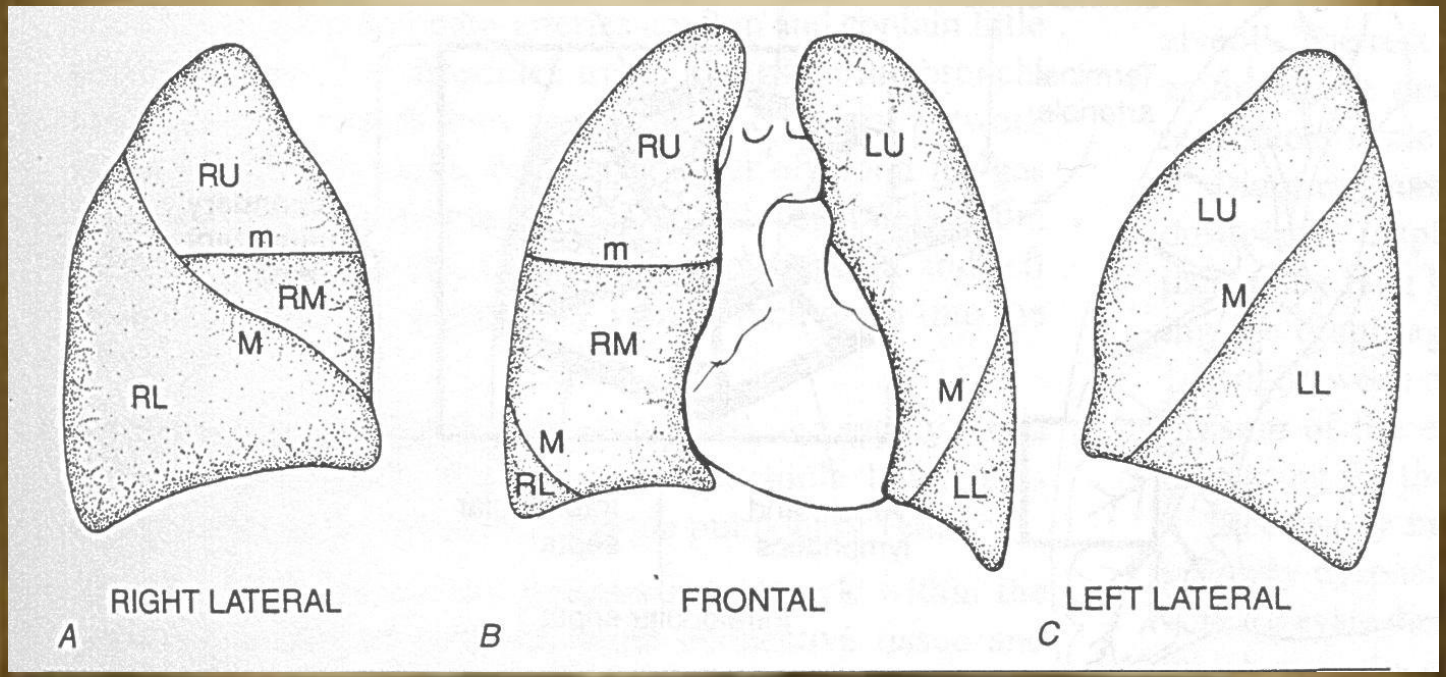
Septa of The Lobes

- Major (oblique) fissure
- Minor (horizon) fissure



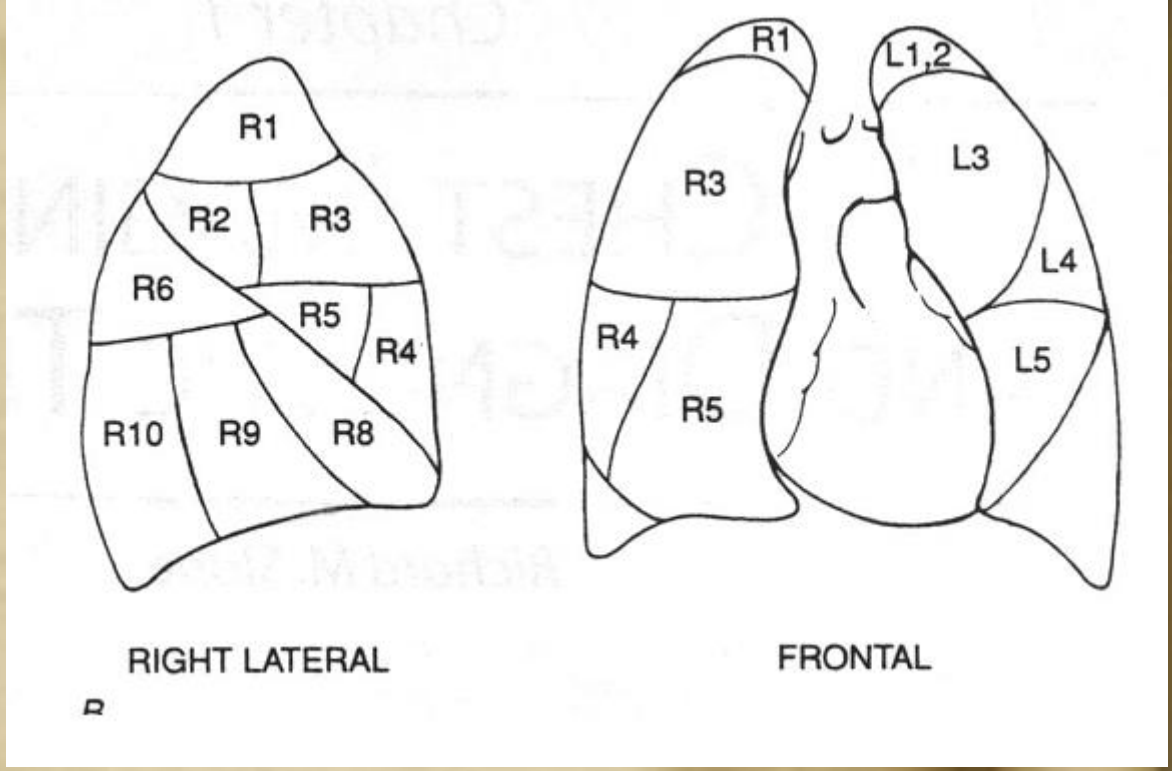
Lobar Distribution

- Right Lung: RUL, RML, RLL
- Left Lung: LUL, LLL



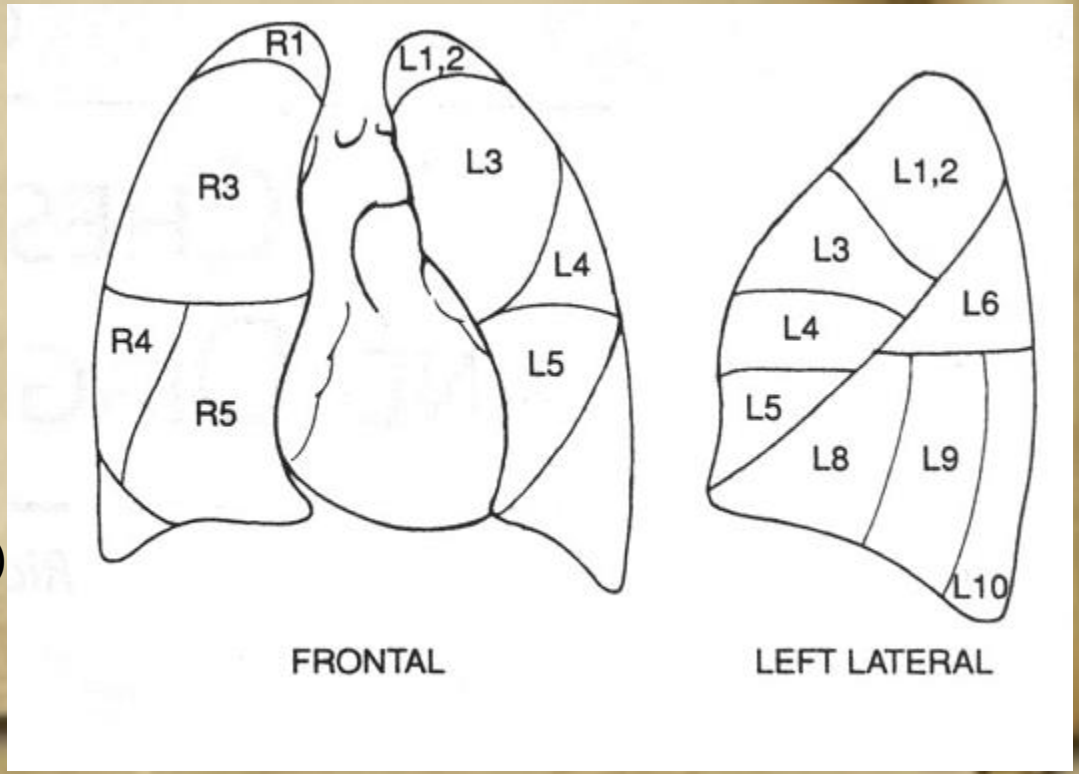
Nomenclature of Right Lung Segments

- Upper lobe
  - Apical (B1)
  - Anterior (B2)
  - Posterior (B3)
- Middle lobe
  - Lateral (B4)
  - Medial (B5)
- Lower lobe
  - Superior (B6)
  - Medial (B7)
  - Anterior (B8)
  - Lateral (B9)
  - Posterior (B10)



Nomenclature of Left Lung Segments

- Upper Lobe
  - Upper division
    - Apicoposterior (B1-2)
    - Anterior (B3)
  - Lower division
    - Superior (B4)
    - Inferior (B5)
- Lower lobe
    - Superior (B6)
    - Anterior (B8)
    - Lateral (B9)
    - Posterior (B10)

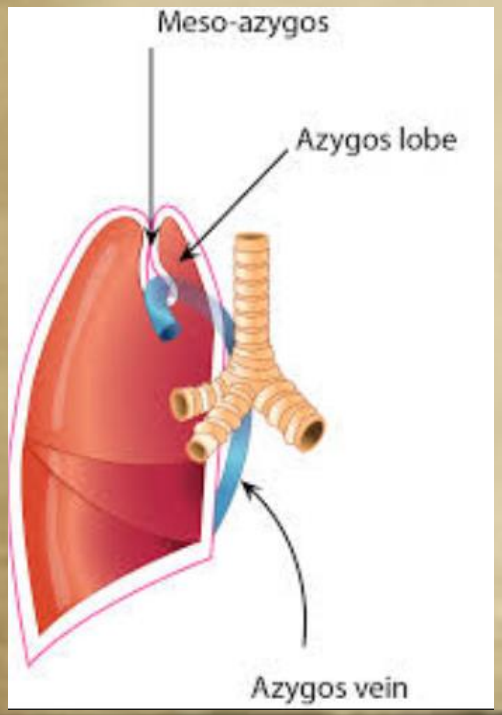


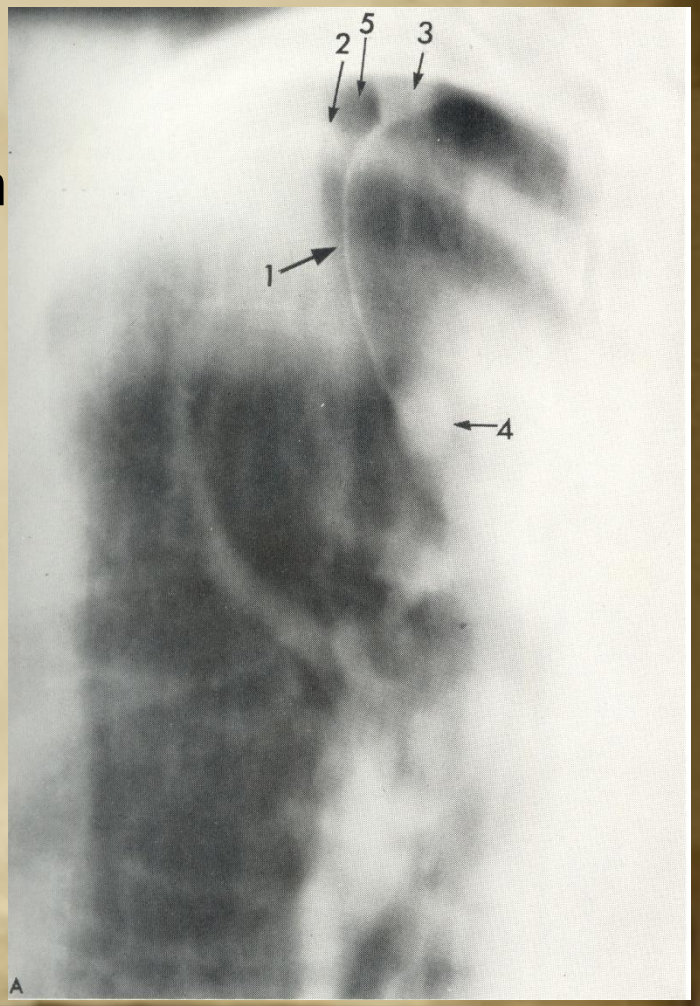
Anomalous Lobes

- Azygos lobe
- Superior accessory lobe
- Inferior accessory lobe

Azygos Lobe

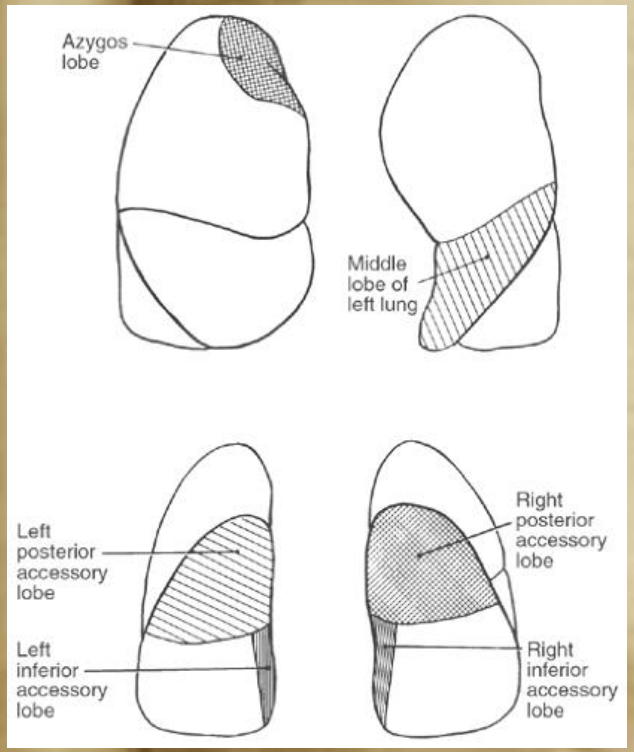
- Azygos fissure
- 1% of anatomic specimen
  0.4% of CXR

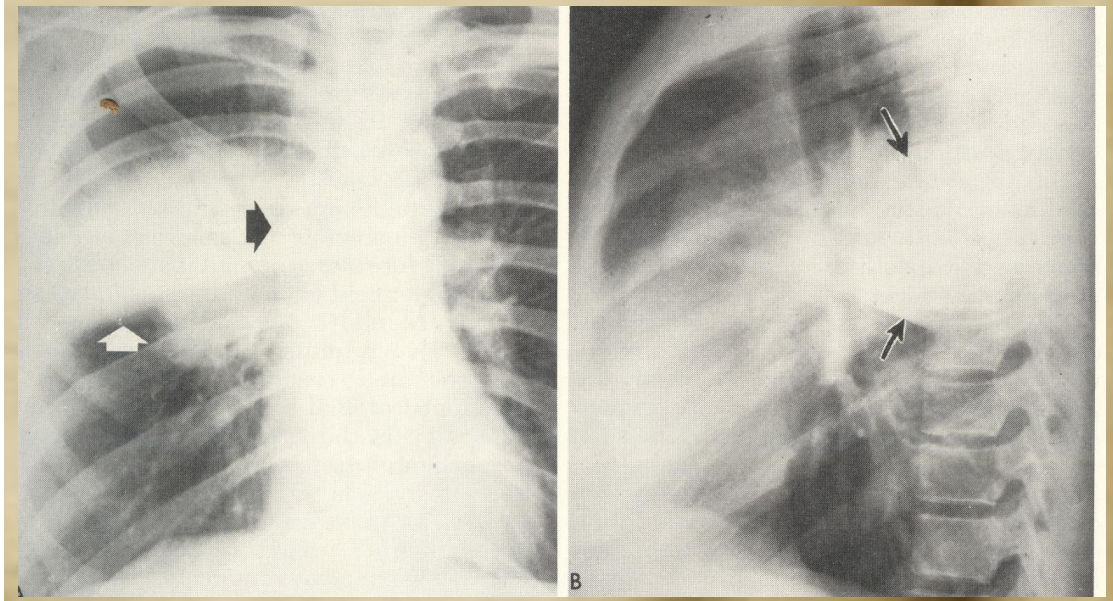




Superior Accessory Lobe

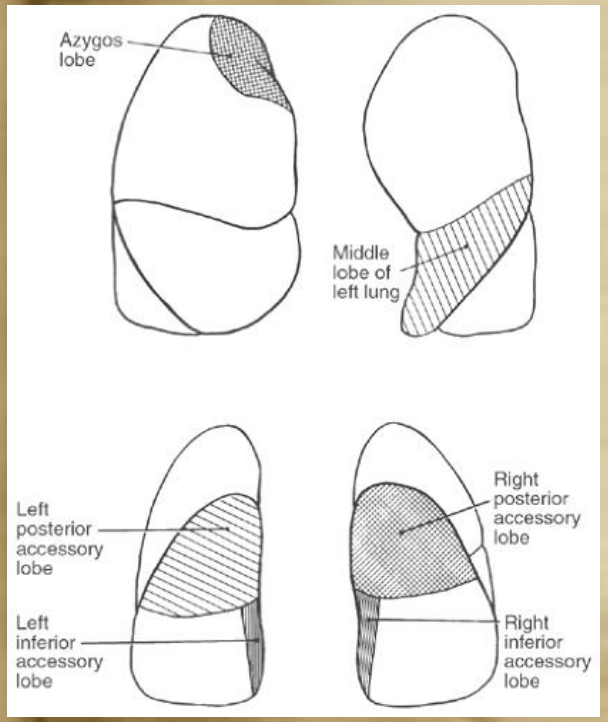
- 5% of anatomic specimen, bilateral
- Separation of superior segment of lower lobe

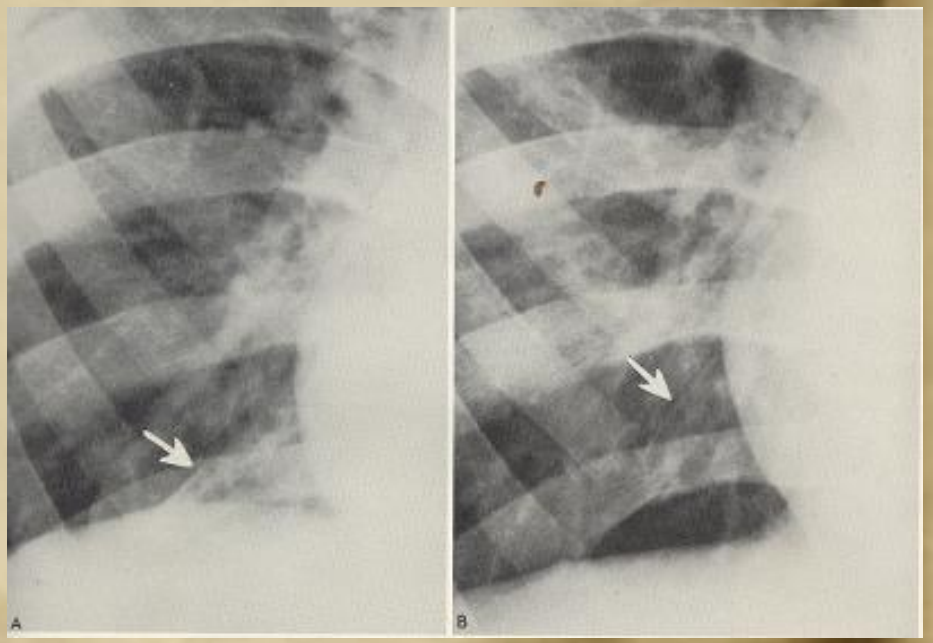




Inferior Accessory Lobe

- Separate the lateral border of medial basal segment from others in lower lobe
- 1/3 of anatomic specimen





Identify the Location

Differential diagnosis of intra-pulmonary (consolidation) and extra-pulmonary (e.g. pleural) lesion

- Radiology anatomy
- Border of lesion (complete or incomplete)
- Shape of the lesion

SILHOUETTE SIGN

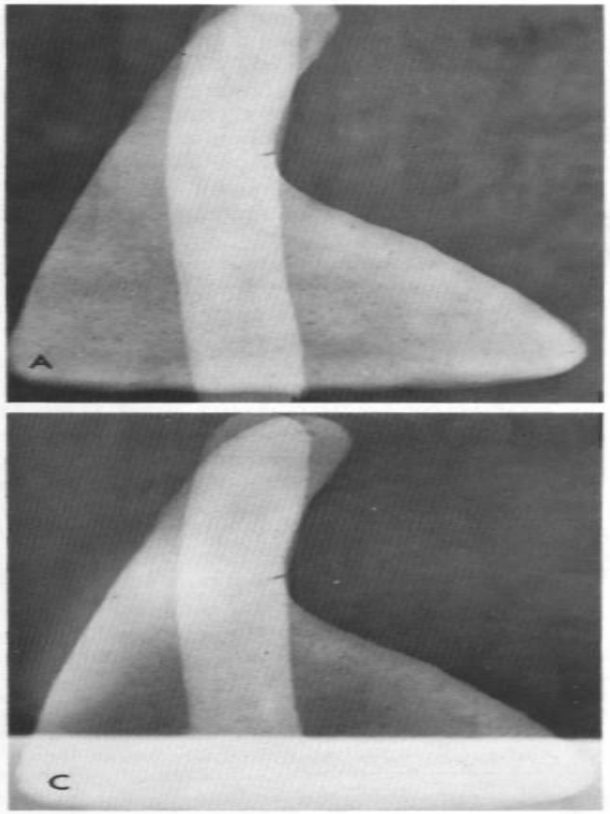
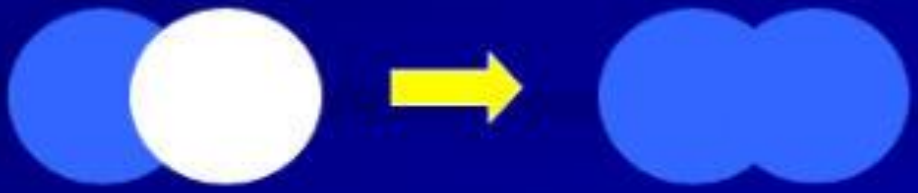


Figure 2–5. SILHOUETTE SIGN ILLUSTRATED BY ROENTGENOGRAMS OF A MODEL (Courtesy of Dr. E. Martinez.)

- Silhouette: 就是<輪廓、側影>的意思
- 在x光片上的兩個連接的影像，如果兩個影像在前後的層面是同一層的，則界限不清楚，稱作Silhouette sign (+)

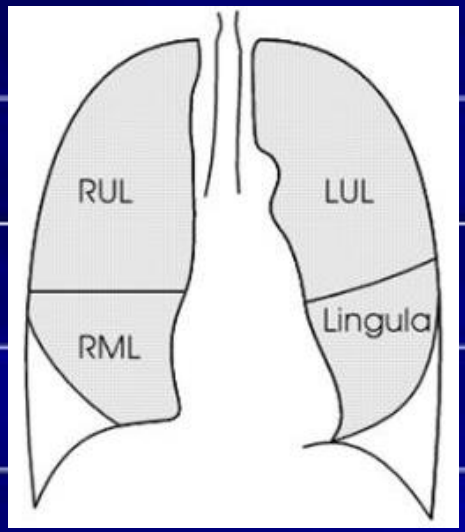
Silhouette Sign

- When an object is in contact with another of different density the adjoining edge is visible e.g. heart border against aerated lung
- When objects of the same density are in contact the adjoining edge is invisible e.g. heart border against consolidated lung



Silhouette Sign

Lobe	Silhouetted structure
Right middle lobe	Right heart border
Left lingula	Left heart border
Right lower lobe	Right hemidiaphragm
Left lower lobe	Left hemidiaphragm
Post apical segment left upper lobe	Aortic knob
Ant segment right upper lobe	Ascending aorta

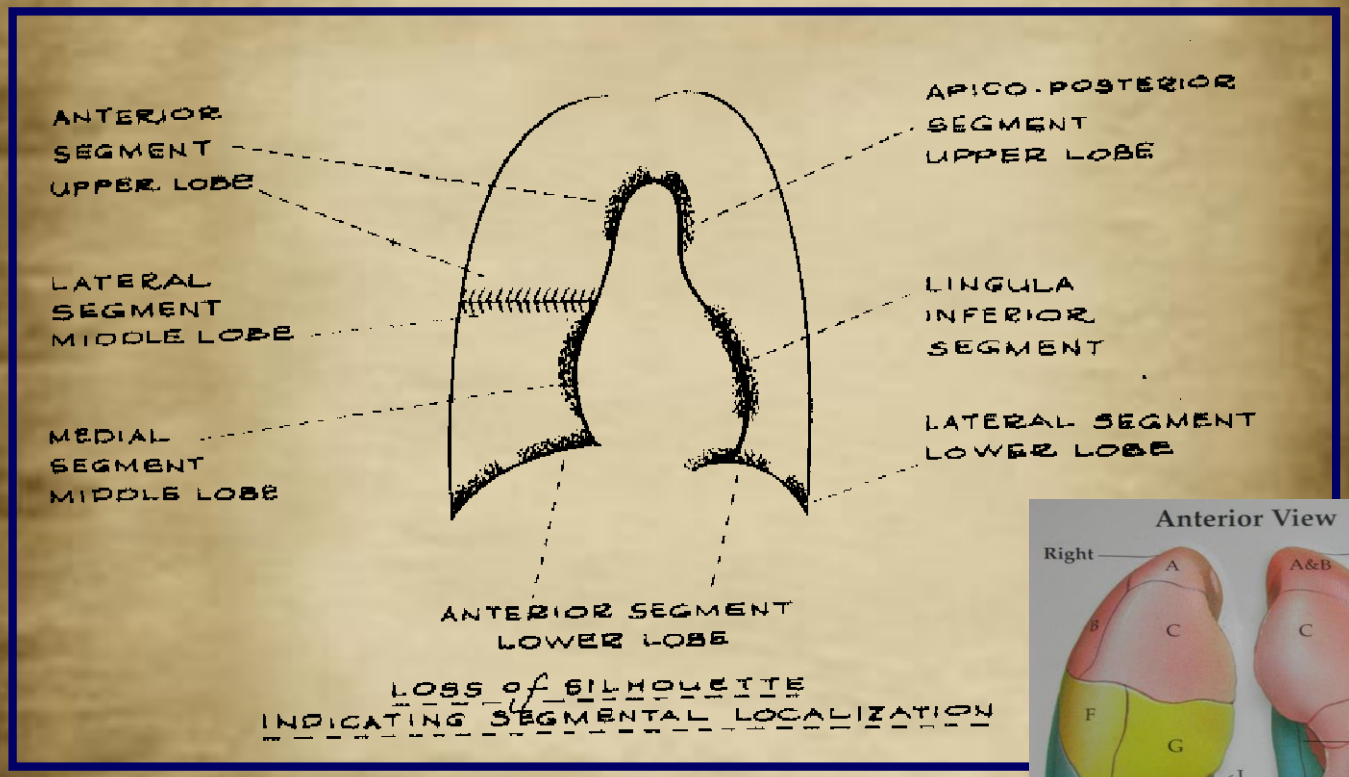


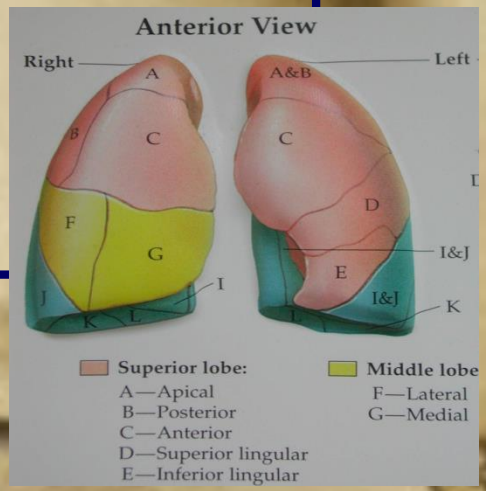
DDx of Consolidation

- **Lung collapse**
- **Lobar consolidation**
  - Infection (pneumonia)
  - Pulmonary infarction
  - Localized edema
  - others
- Lobar enlargement

DDx of Consolidation

-Lung collapse





Silhouette Sign(+)

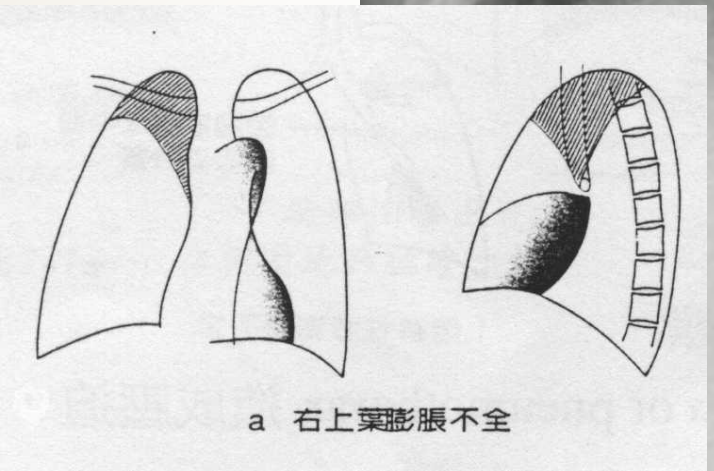
Direct sign of collapse

- 1. Increased redioopacity
- 2. Displacement of fissure
- 3. Bronchovascular crowding

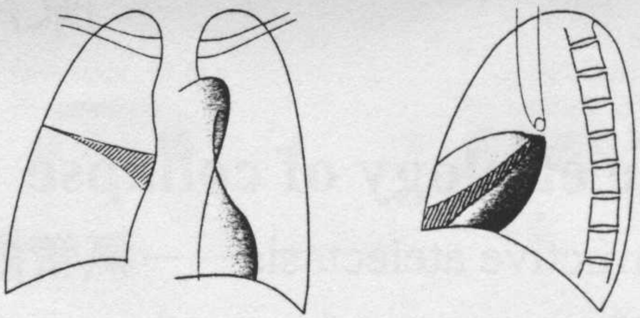
Indirect sign of collapse

- 1. Displacement of hilum
- 2. Elevation of diaphragm
- 3. Shift of mediastinal structure
- 4. Narrowing of intercostal space
- 5. Compensatory emphysema
- 6. Herniation of lung
- 7. Absence of air bronchogram

RUL collapse

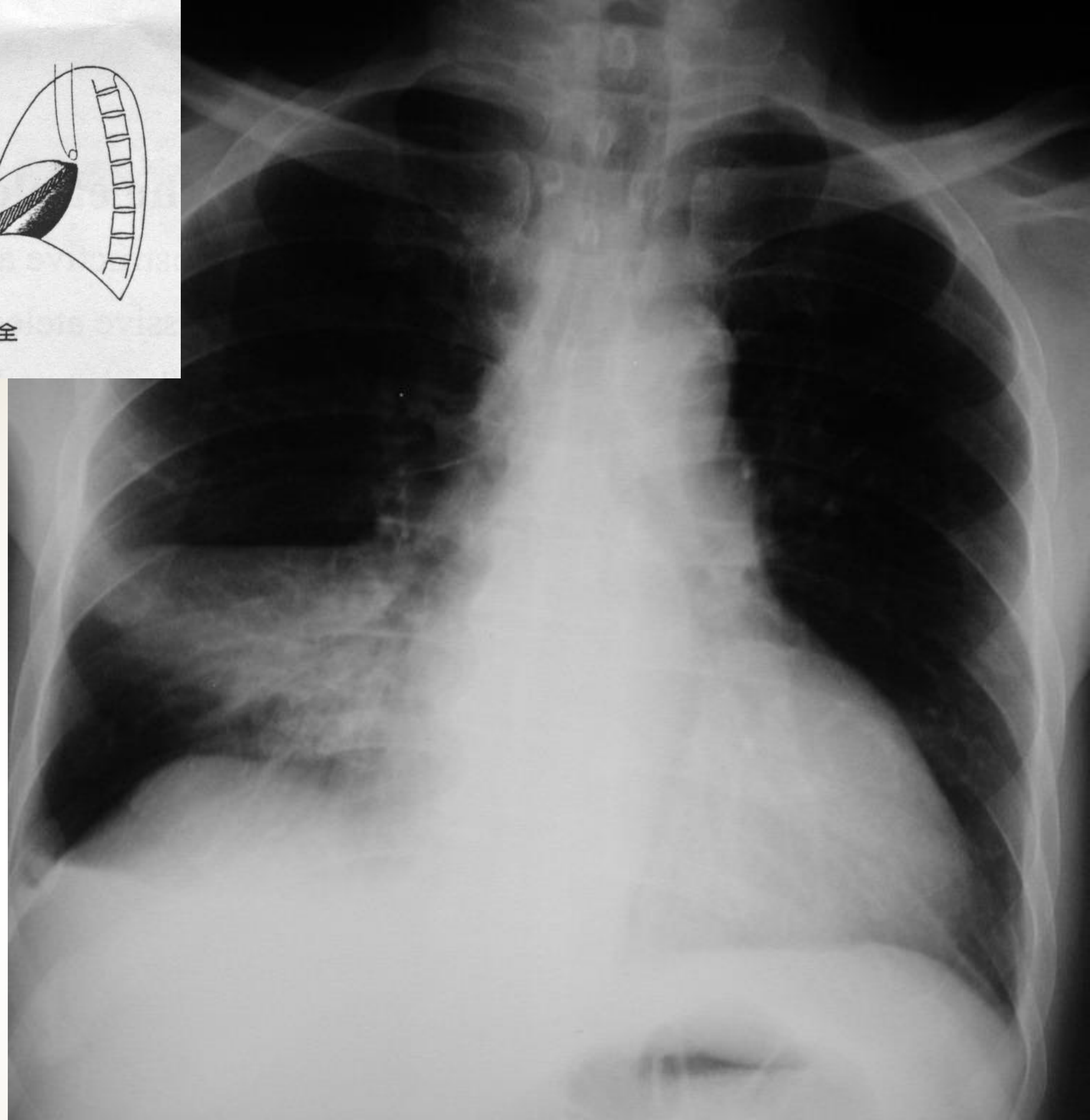


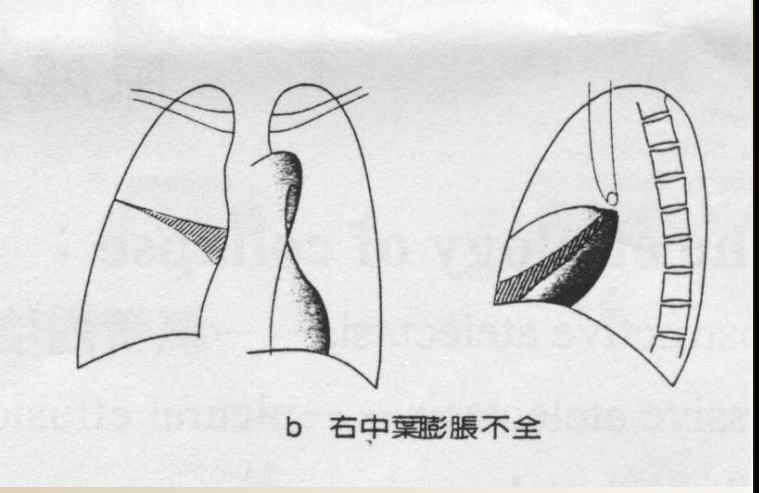
a 右上葉膨脹不全



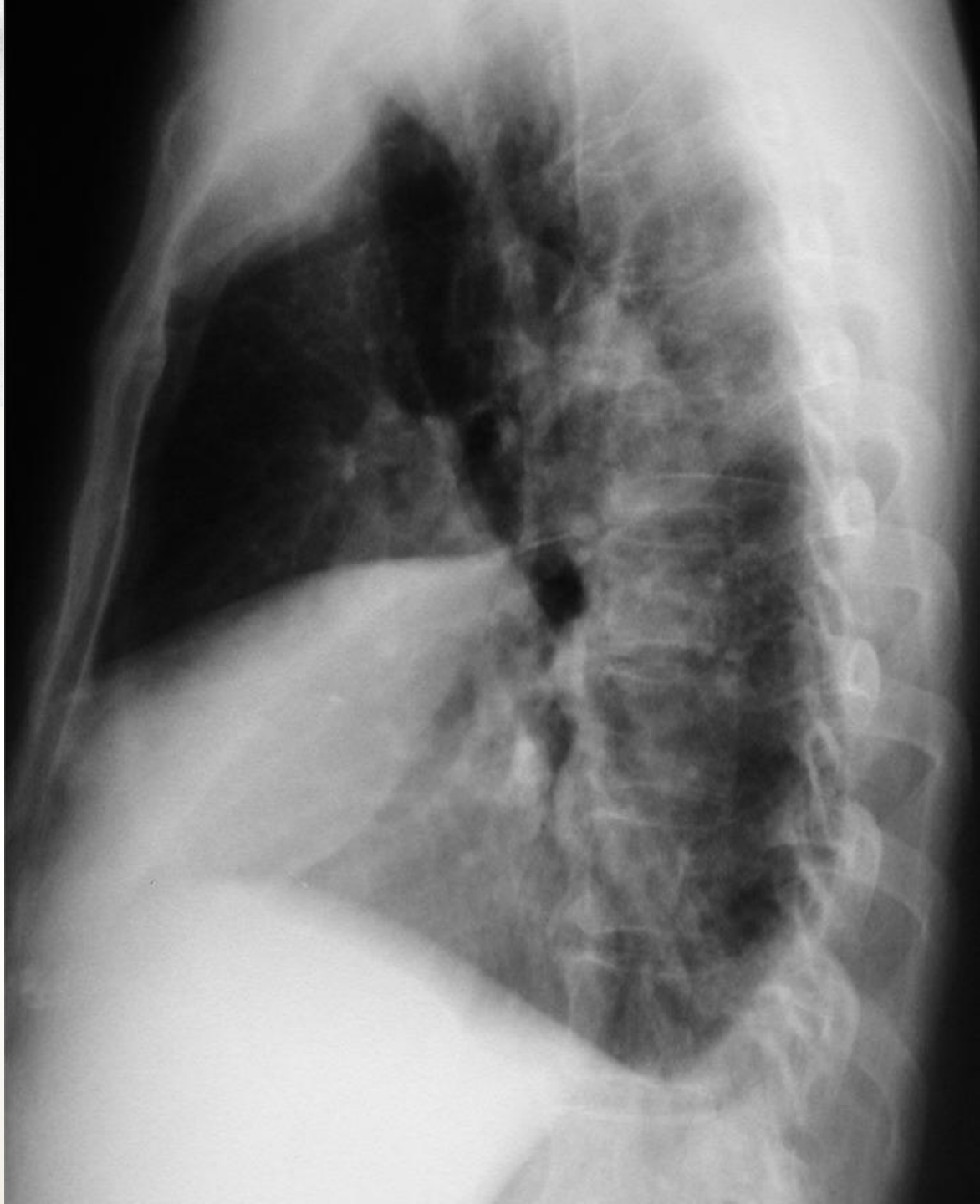
b　右中葉膨脹不全

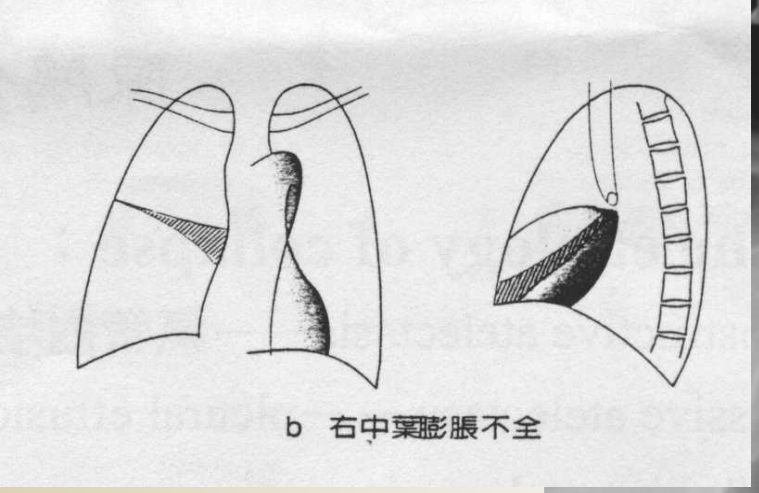
RML collapse



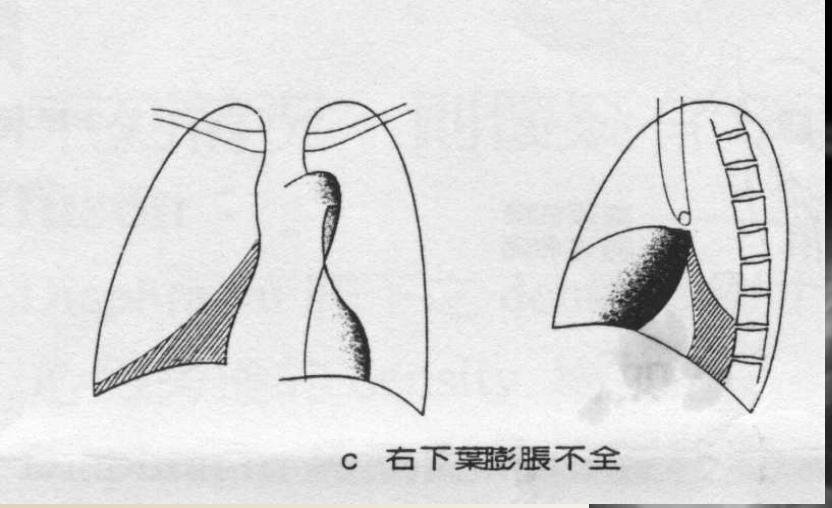


RML collapse

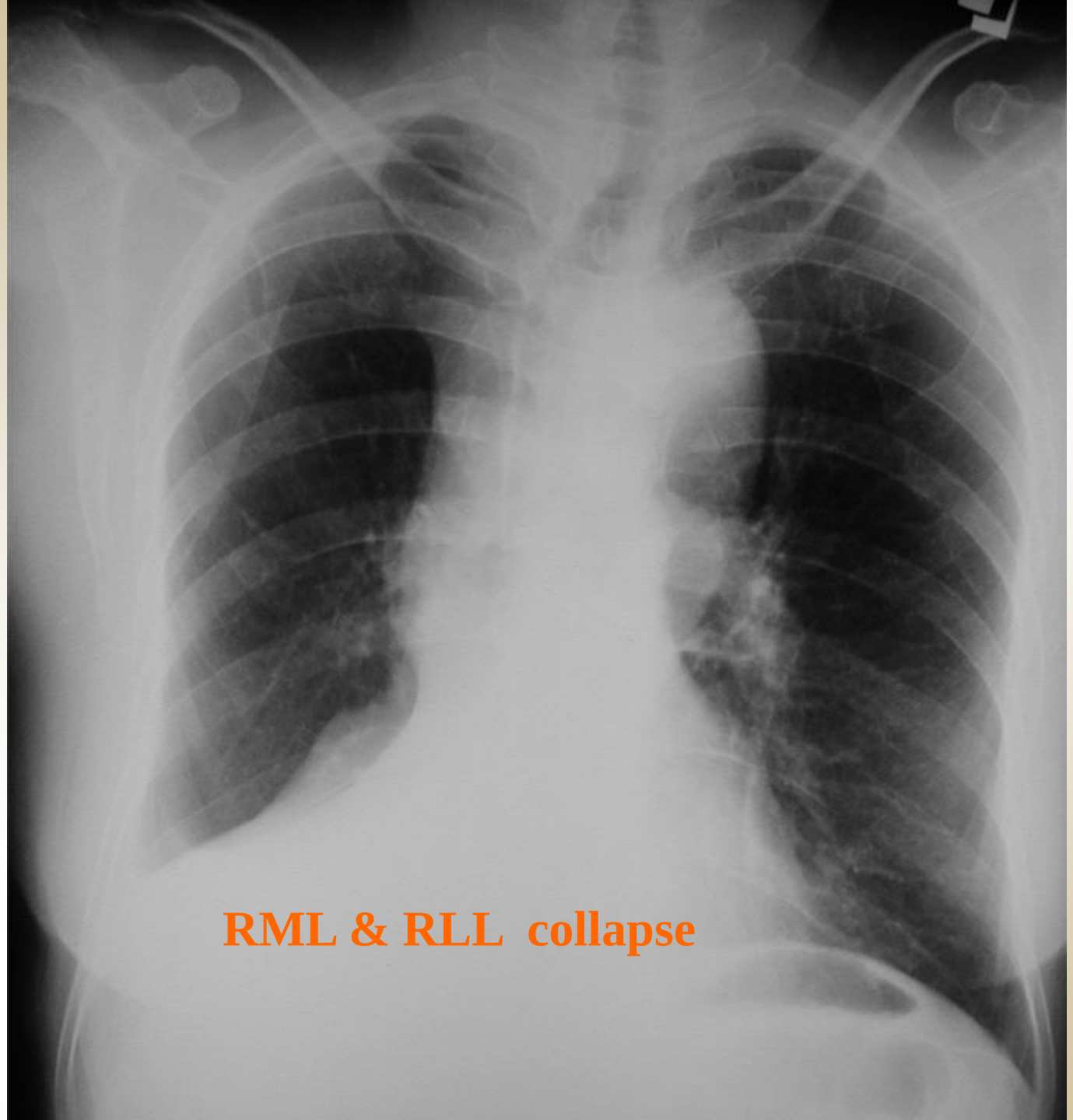




RML collapse

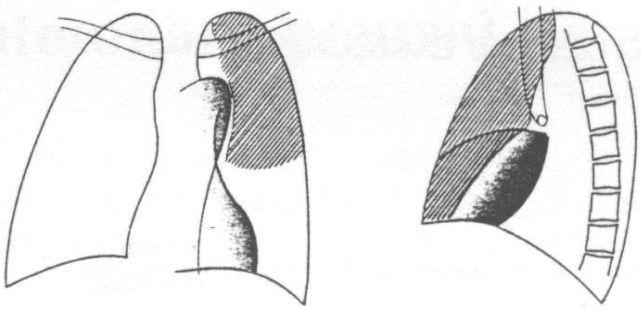


RLL collapse



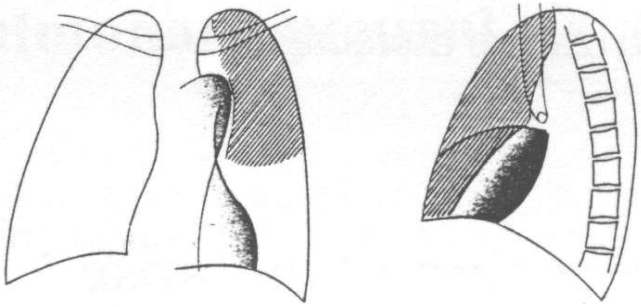
RML & RLL collapse

LUL collapse



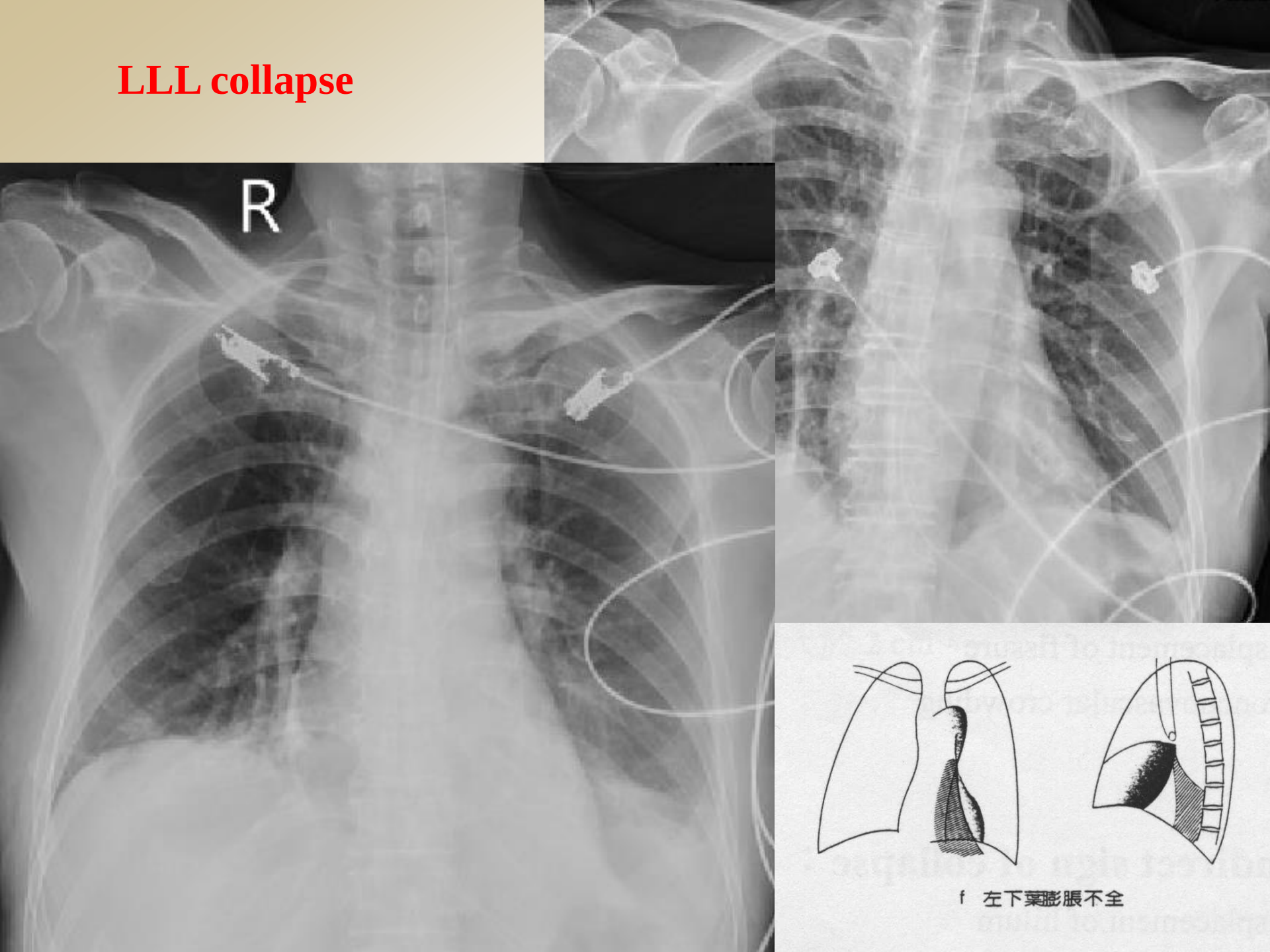
d 左上葉膨脹不全

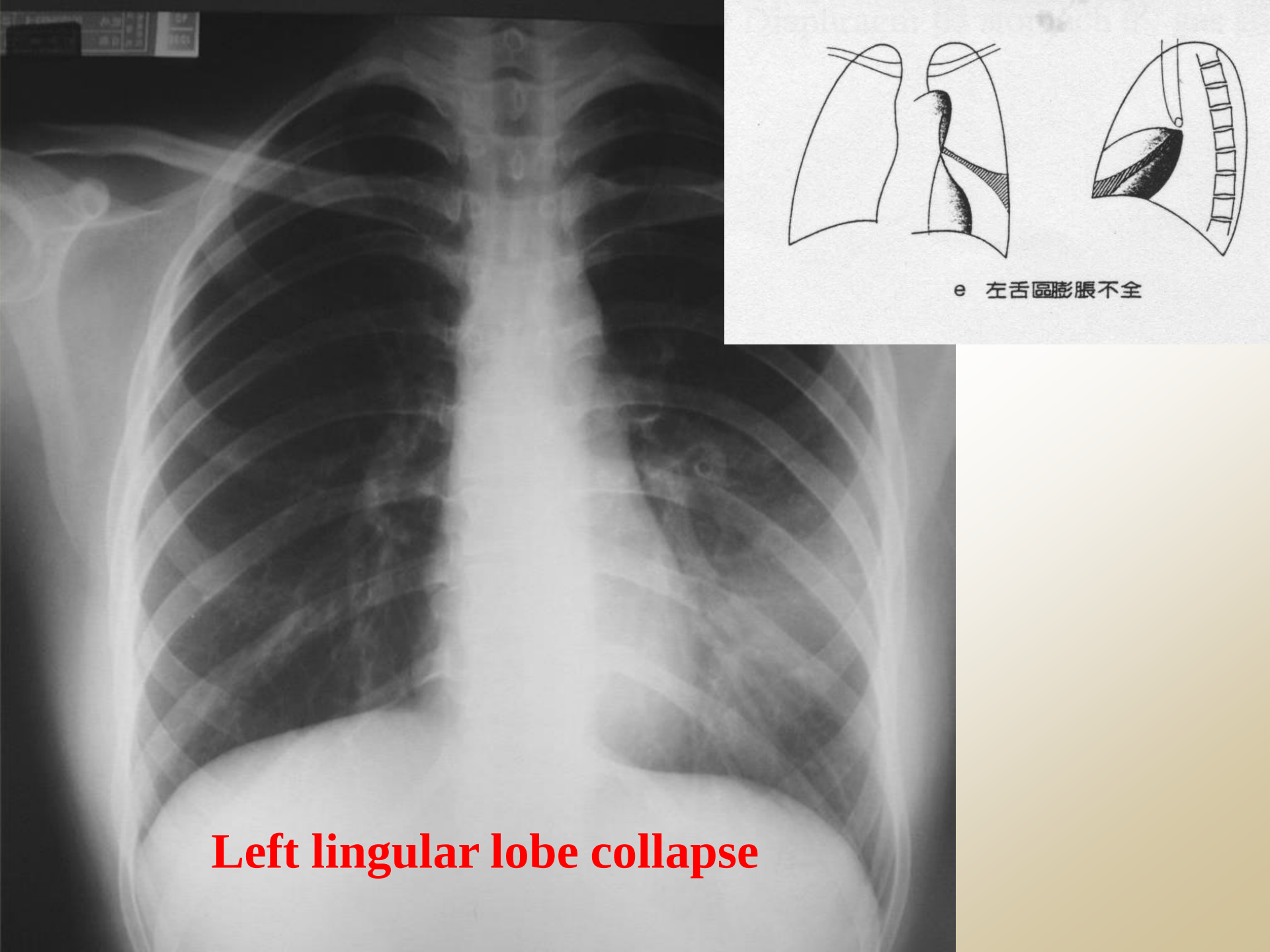
LUL collapse



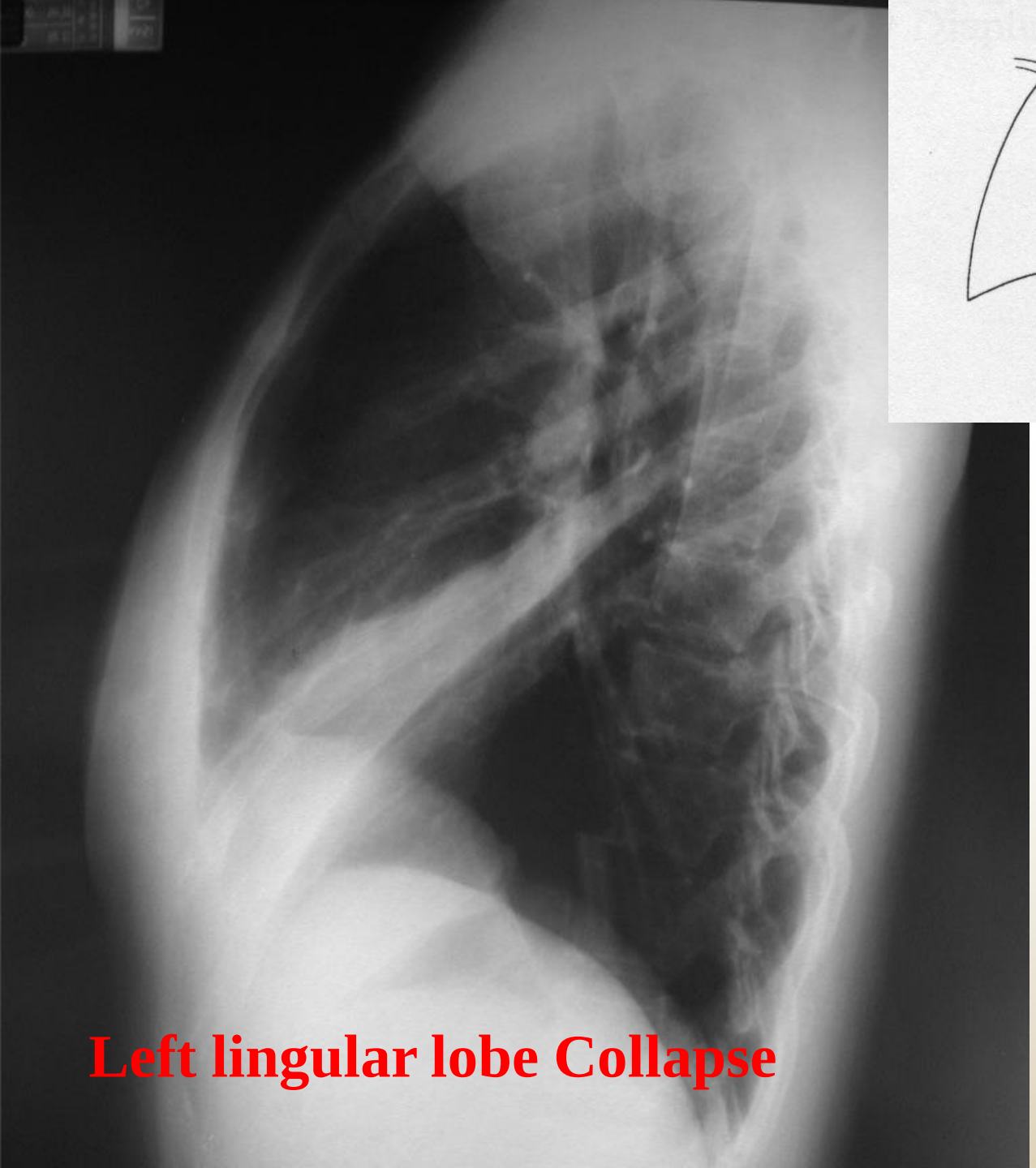
d 左上葉膨脹不全

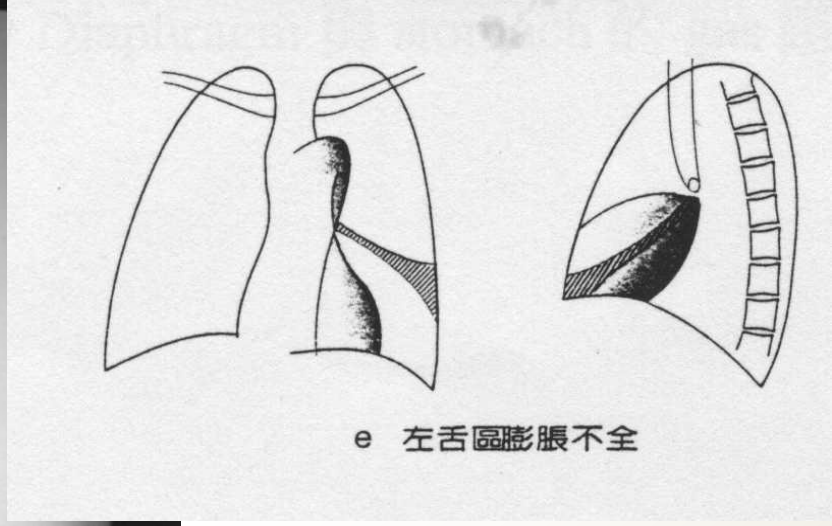
LLL collapse





Left lingular lobe collapse

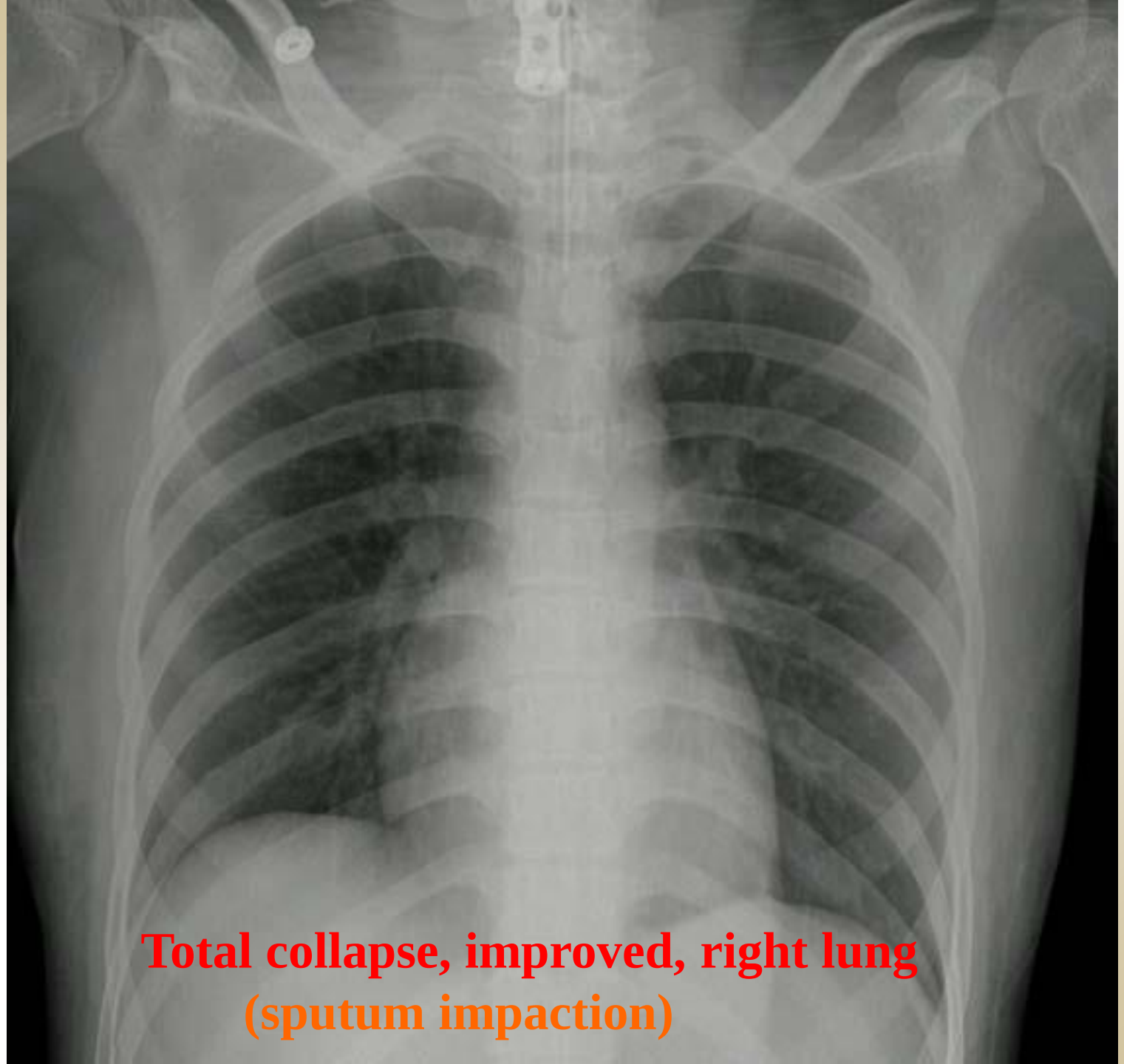




e 左舌區膨脹不全

Left lingular lobe Collapse

Total collapse, right lung



Total collapse, improved, right lung
(sputum impaction)

Identify the Location

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- Radiology anatomy
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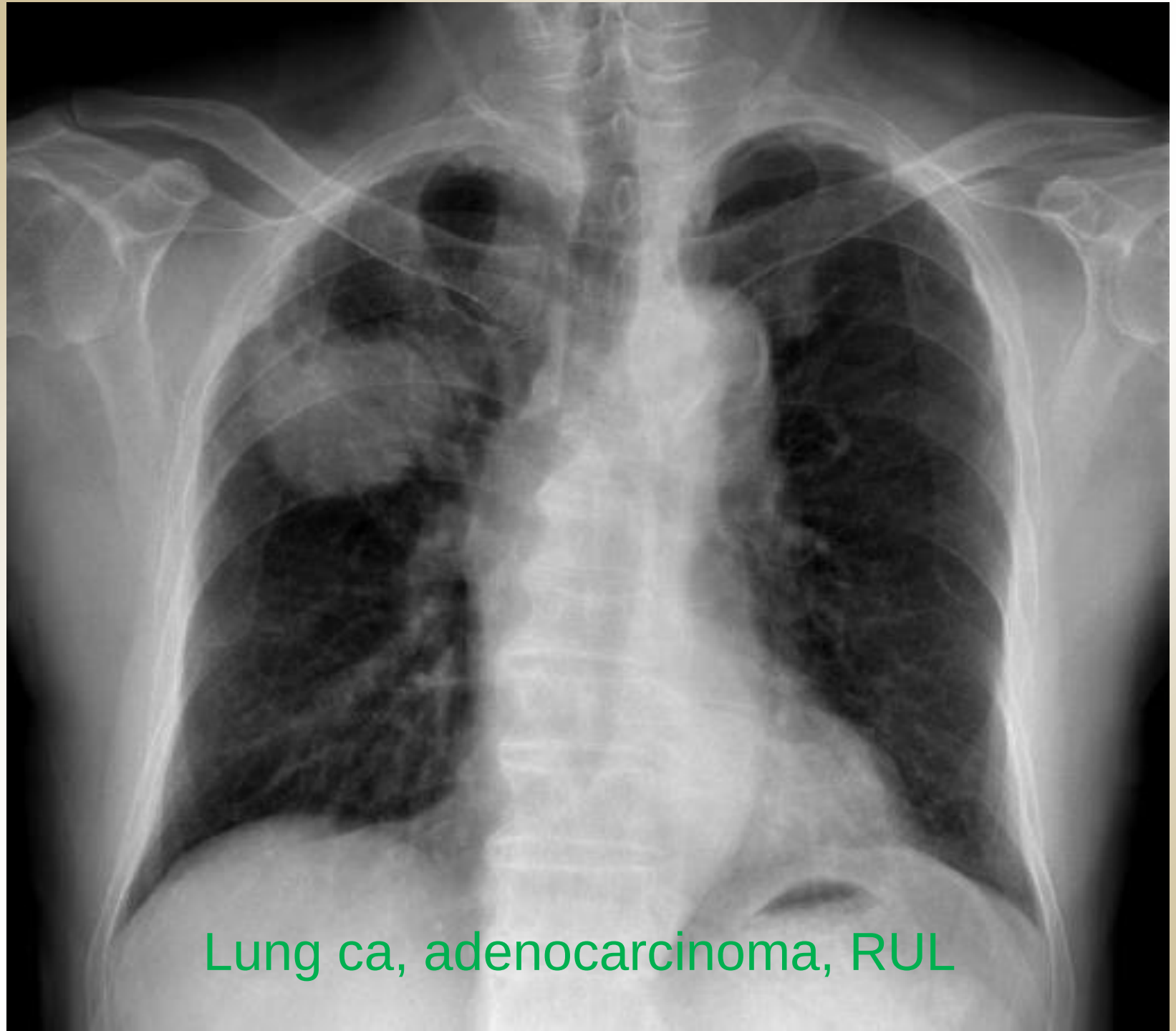
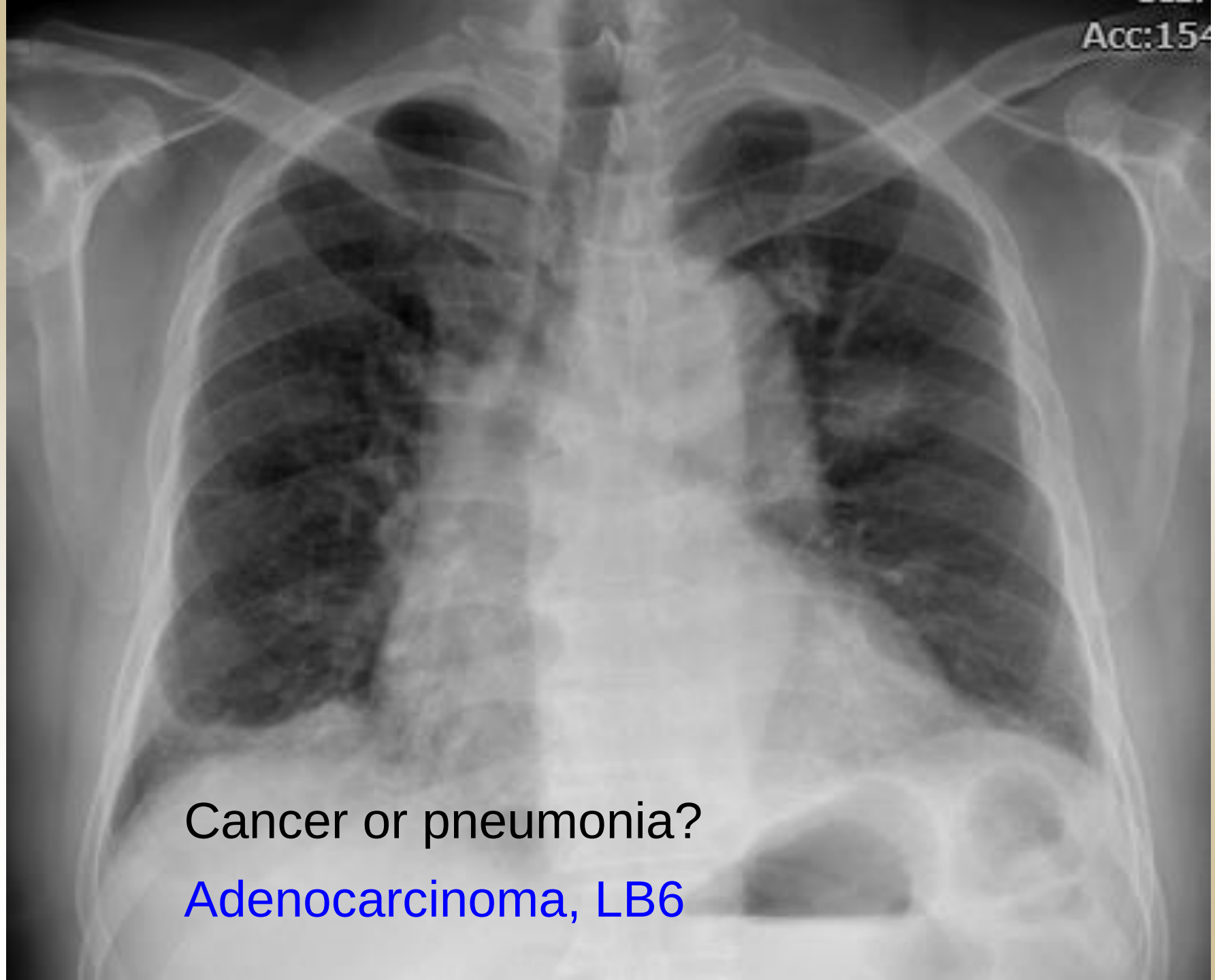
- Shape of the lesion

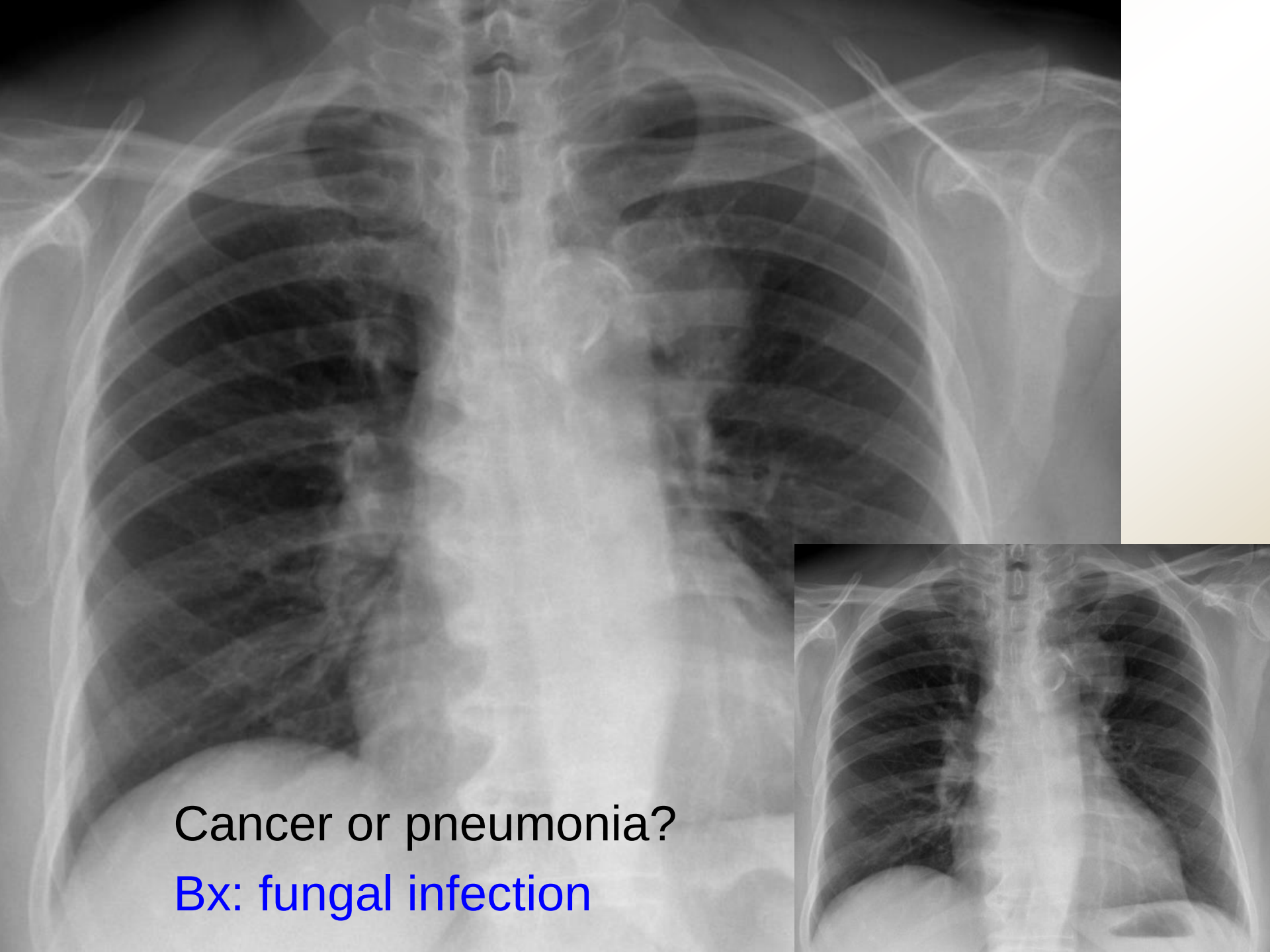


Lung ca, adenocarcinoma, RUL



Cancer or pneumonia?

Adenocarcinoma, LB6



Cancer or pneumonia?

Bx: fungal infection

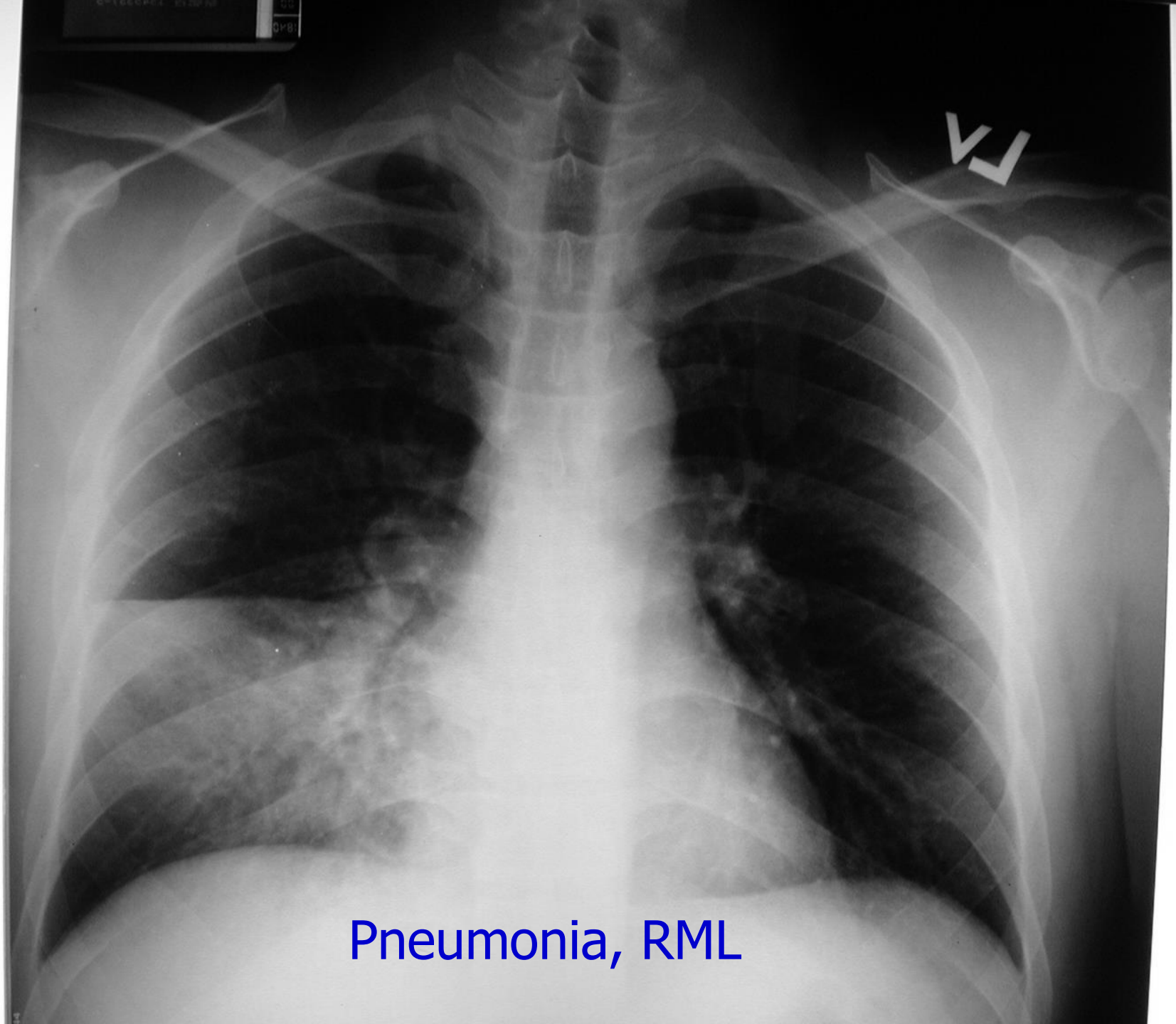
DDx of Consolidation

- Lung collapse
- **Lobar consolidation**
  - Infection (pneumonia)
  - Pulmonary infarction
  - Localized edema
  - others
- Lobar enlargement

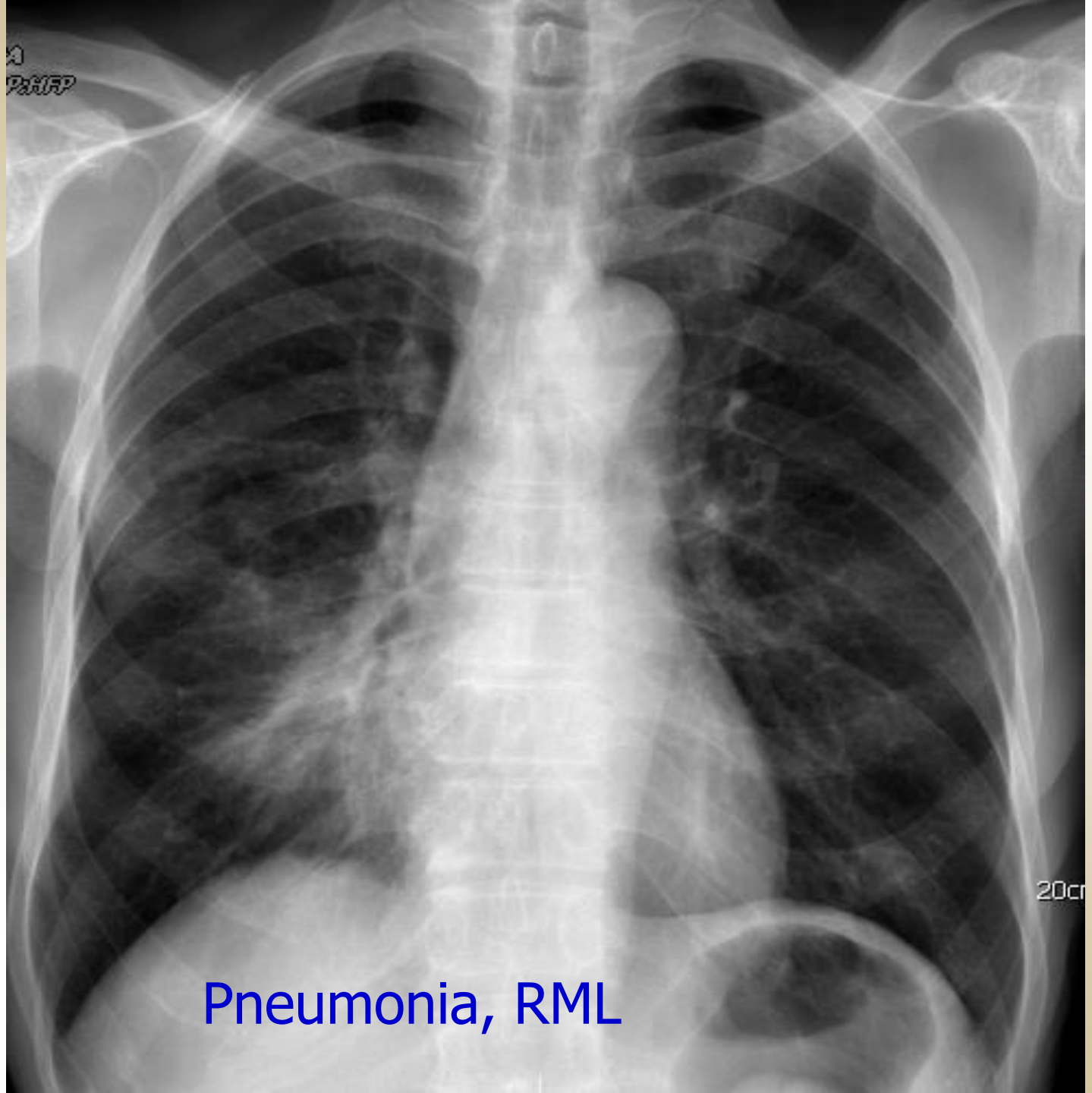
Classification on Pneumonia

- Morphology classification --- Fraser
  - Lobar
  - Lobular
  - Bronchopneumonia
  - Interstitial
- Causatives classification --- Spencer
  - Bacterial
  - Viral

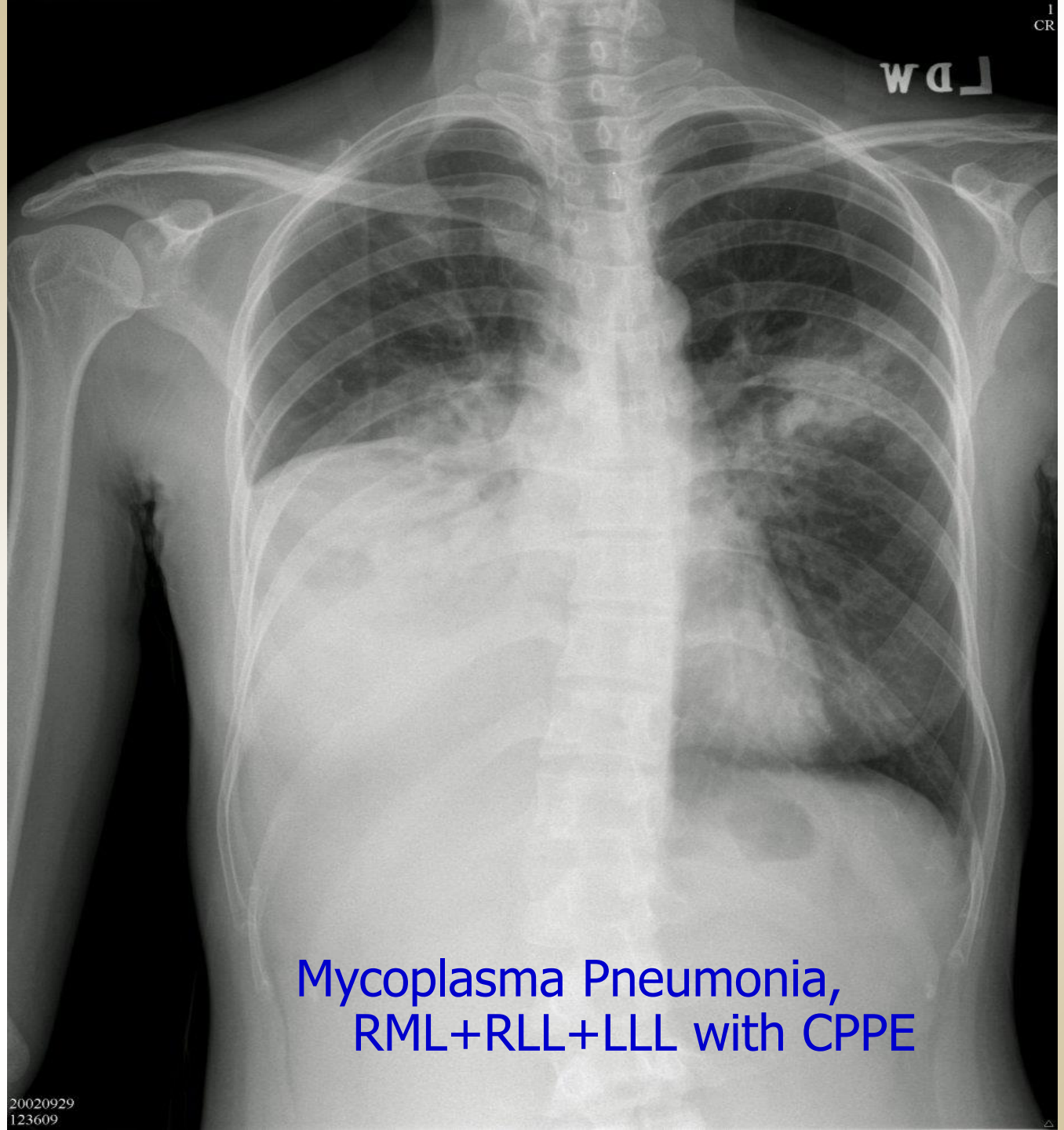
Pneumonia, RLL



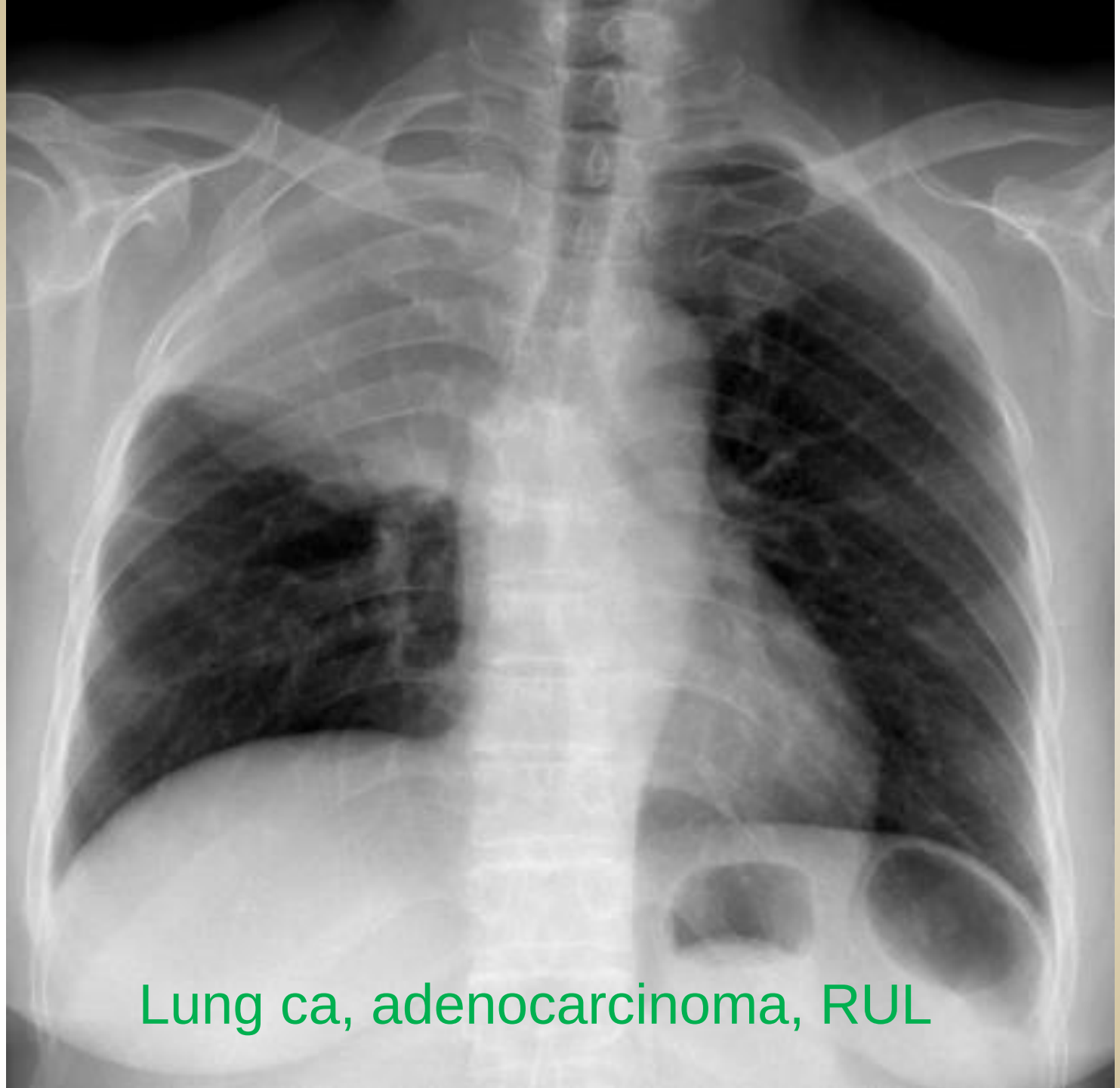
Pneumonia, RML



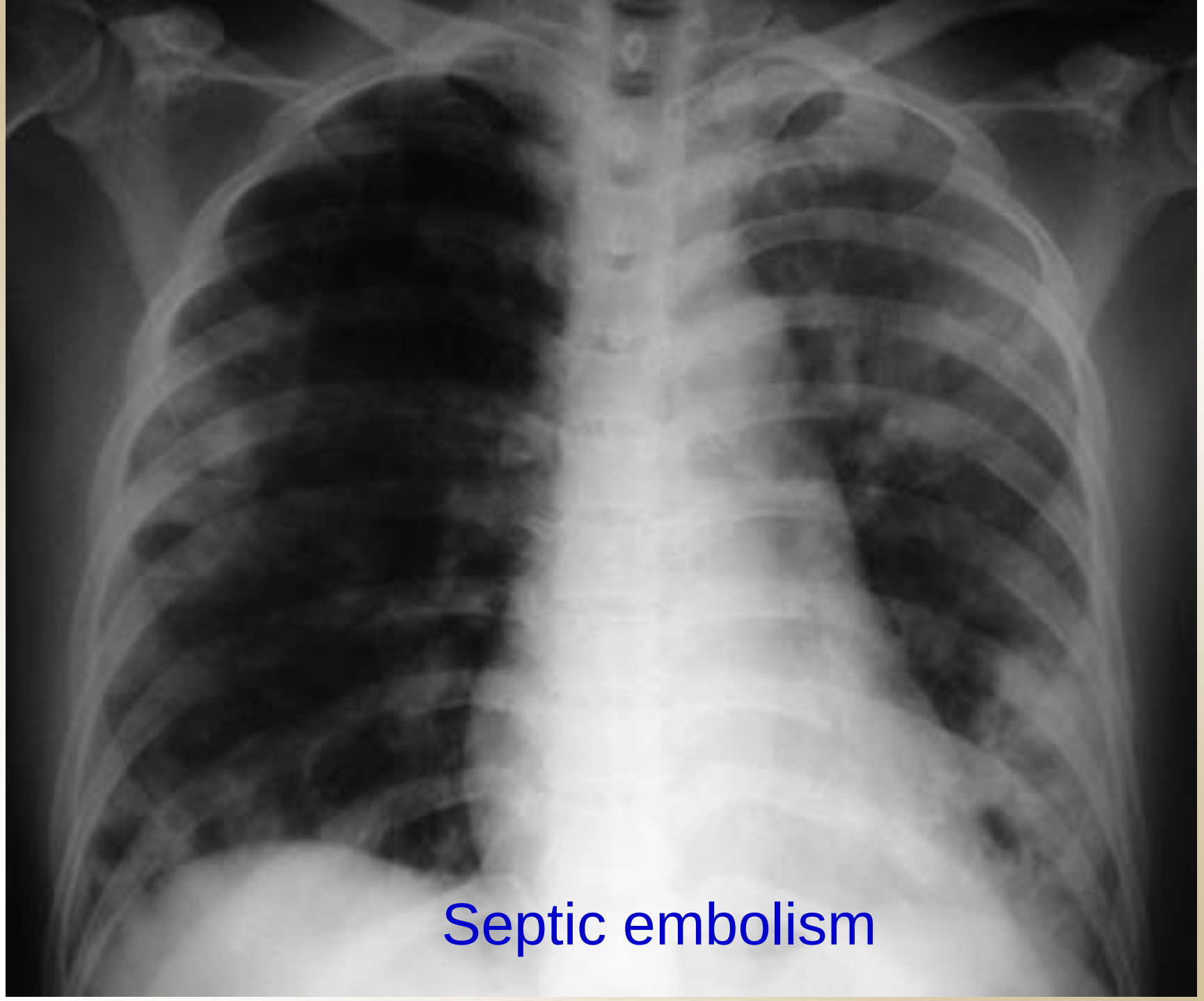
Pneumonia, RML



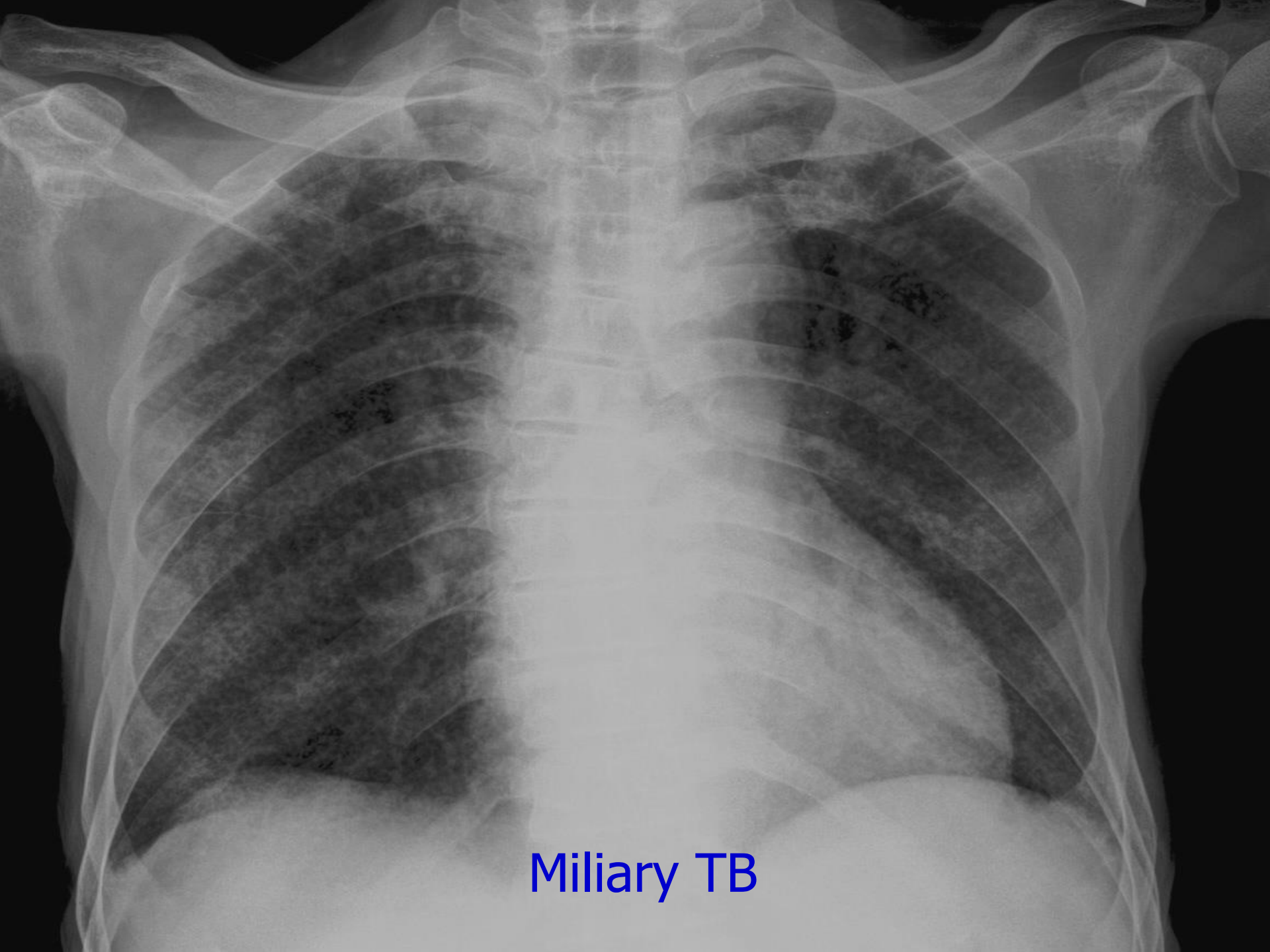
Mycoplasma Pneumonia,
RML+RLL+LLL with CPPE

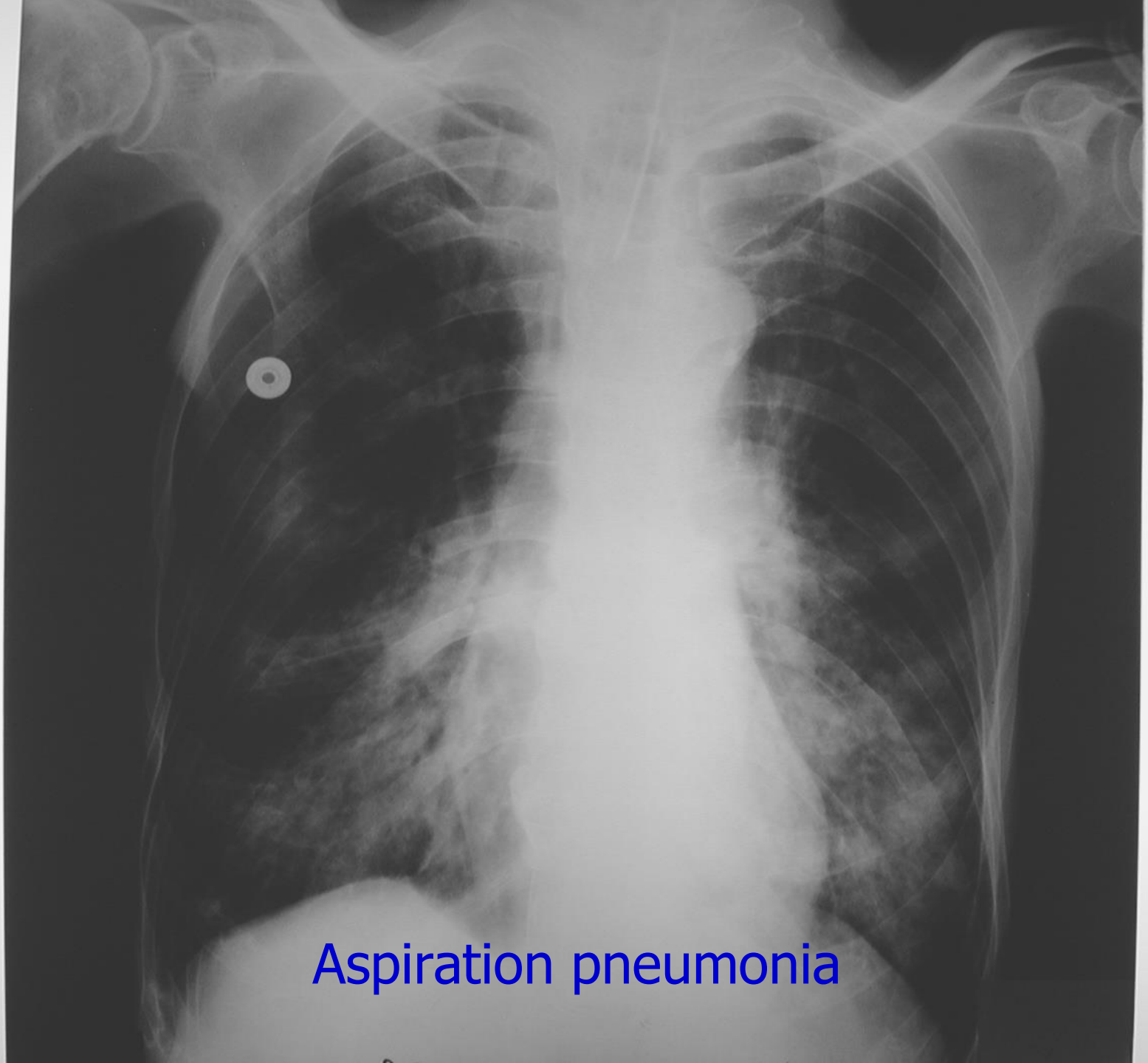


Lung ca, adenocarcinoma, RUL

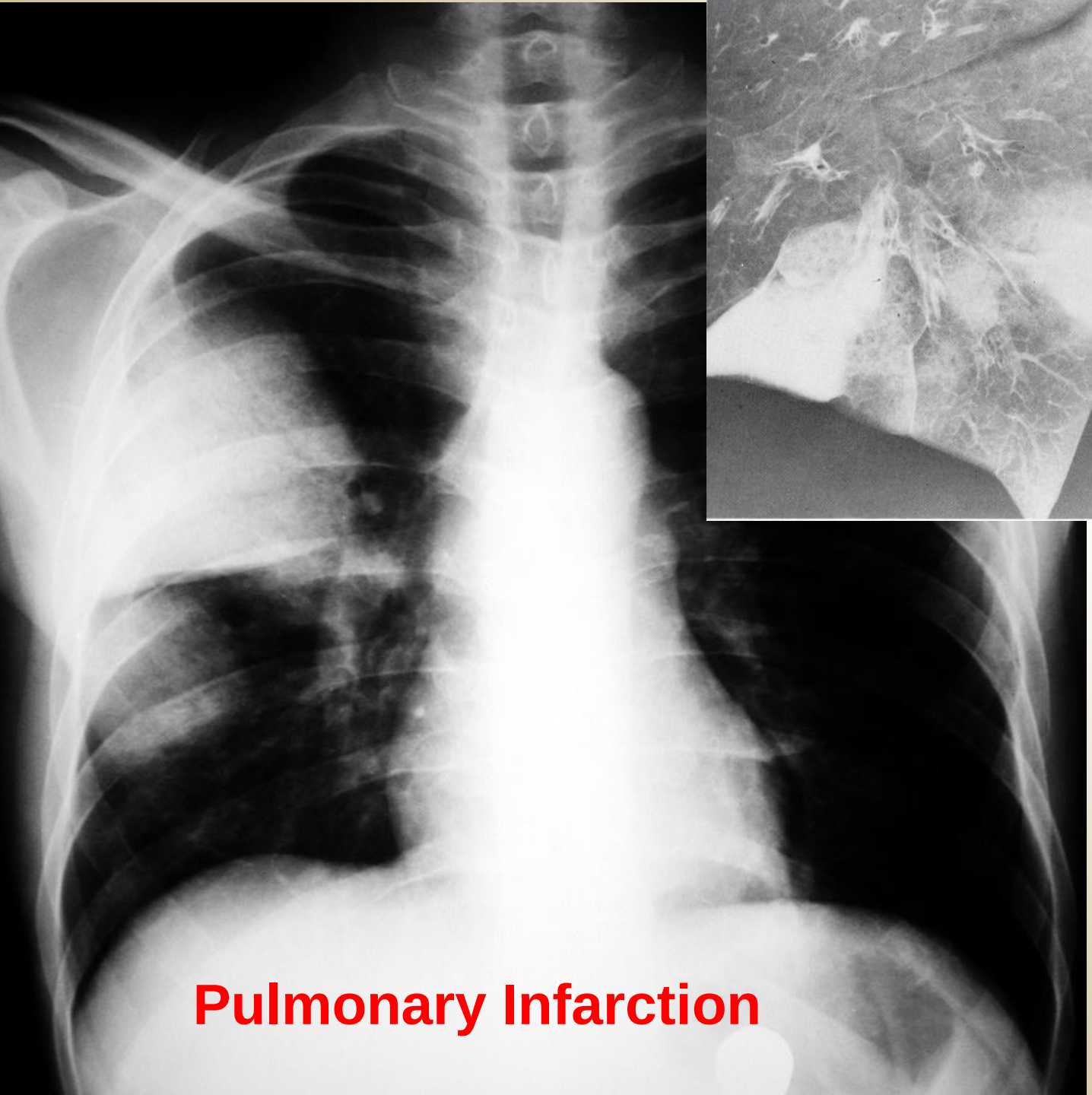


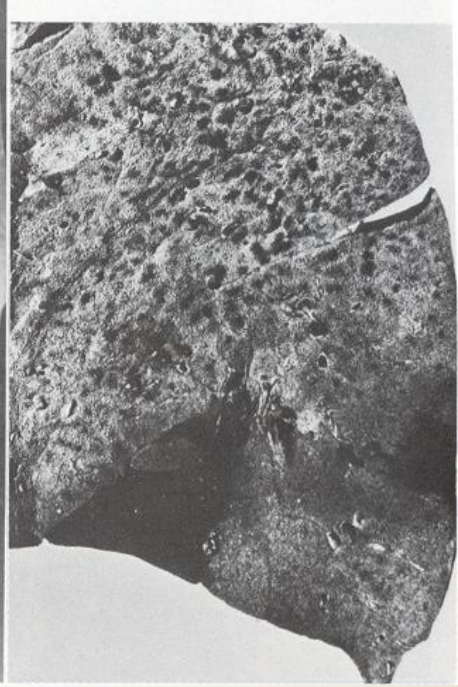
Septic embolism


Miliary TB

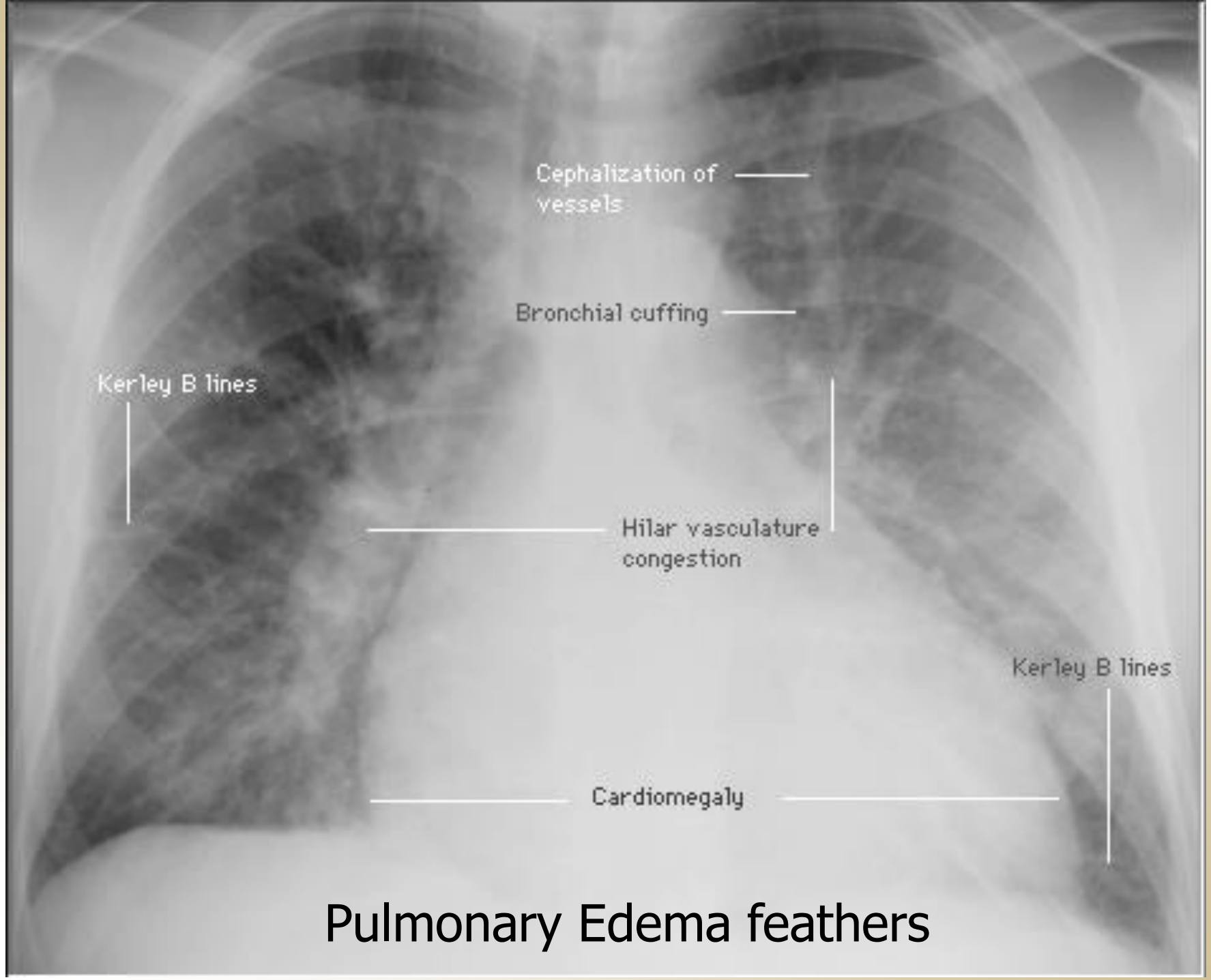


Aspiration pneumonia

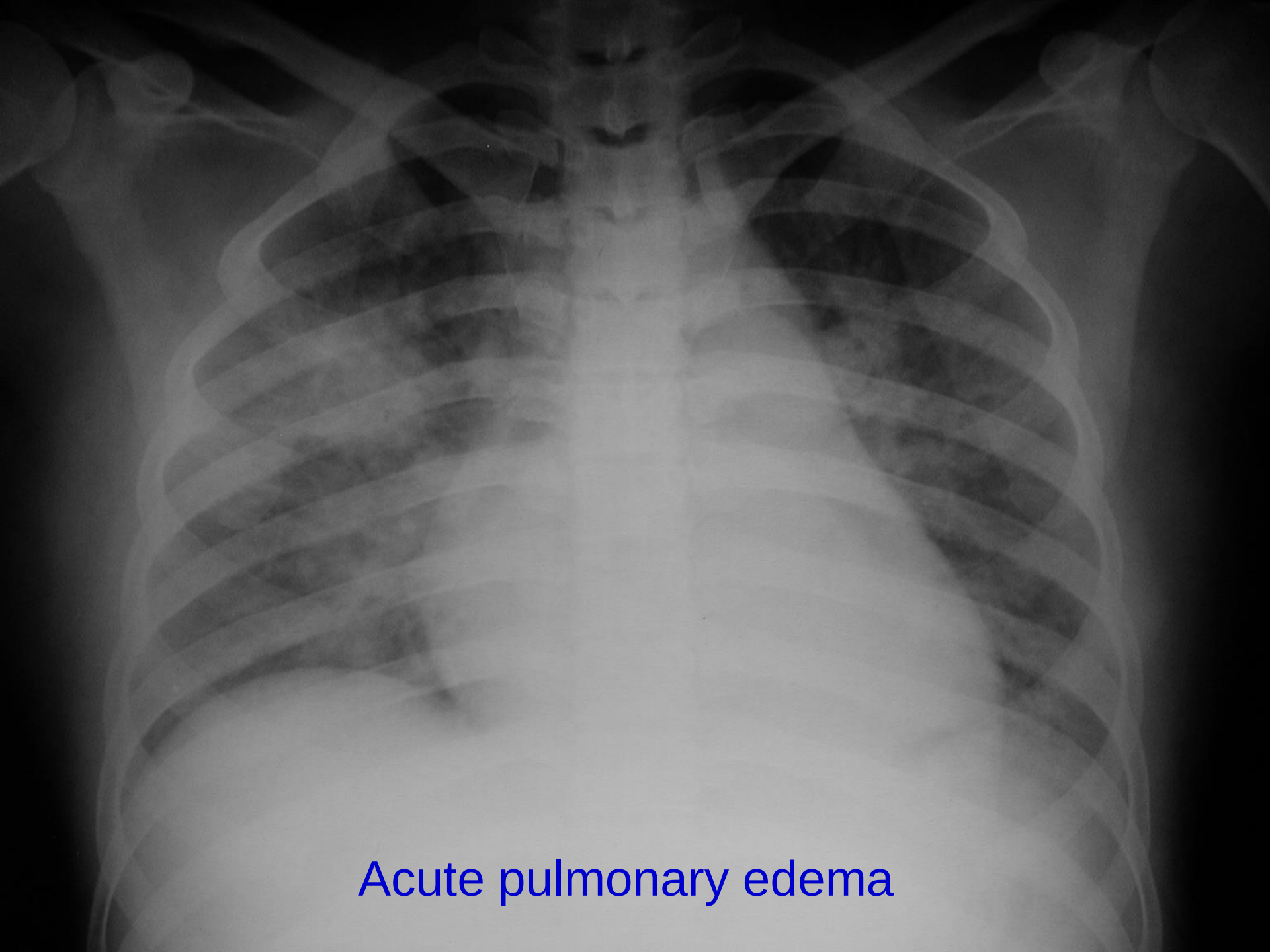




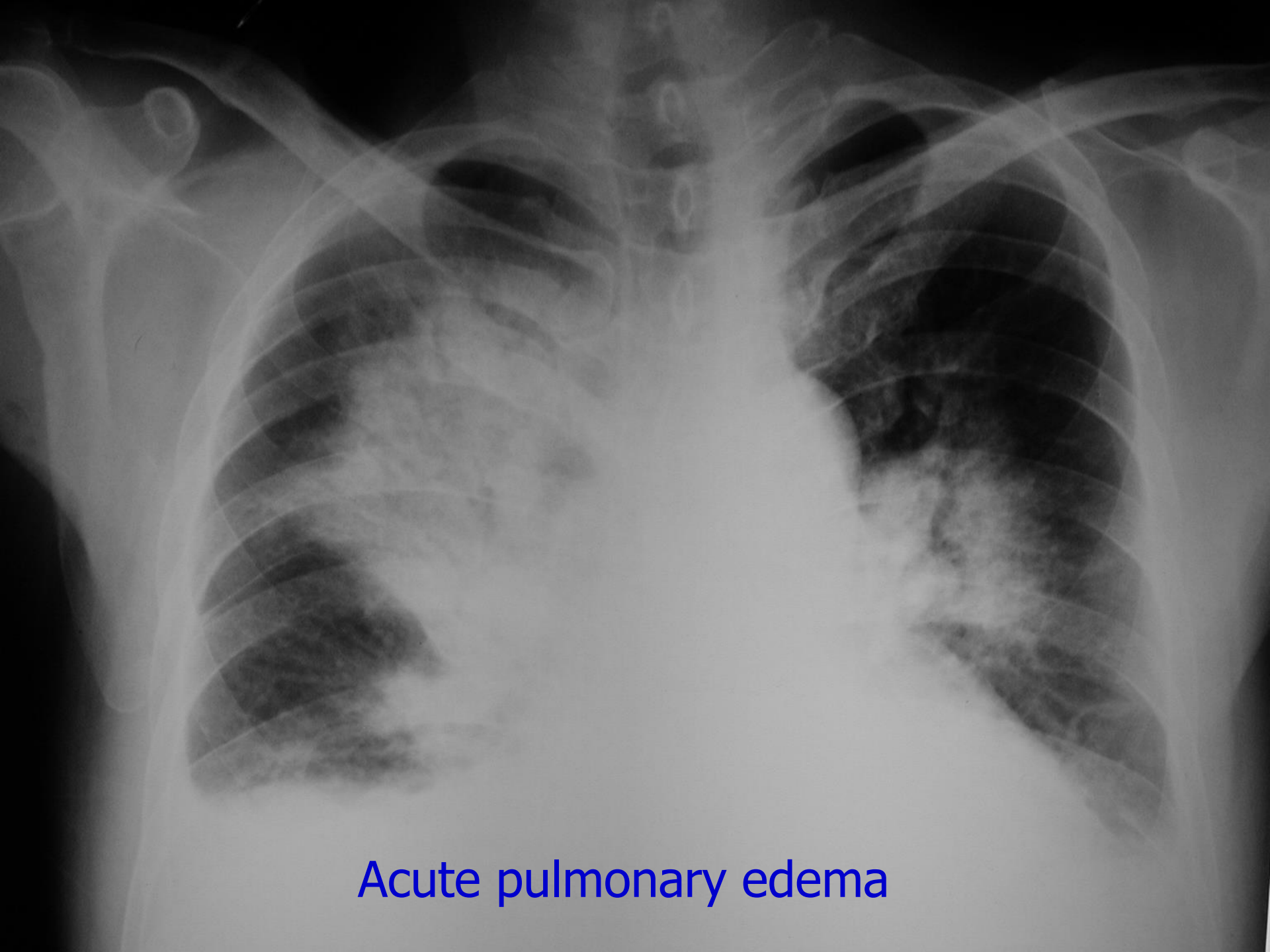
Pulmonary Infarction



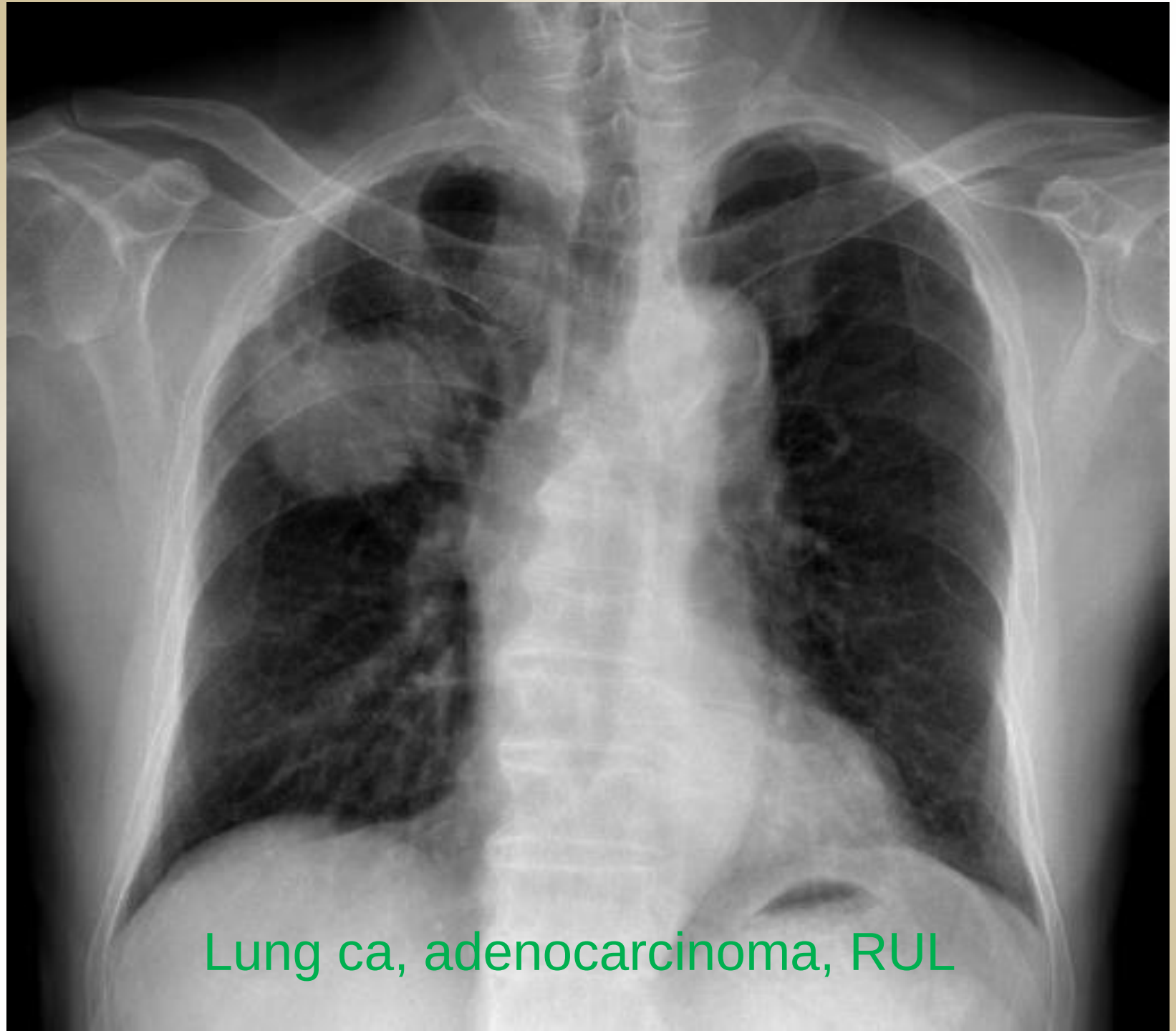
Pulmonary Edema feathers



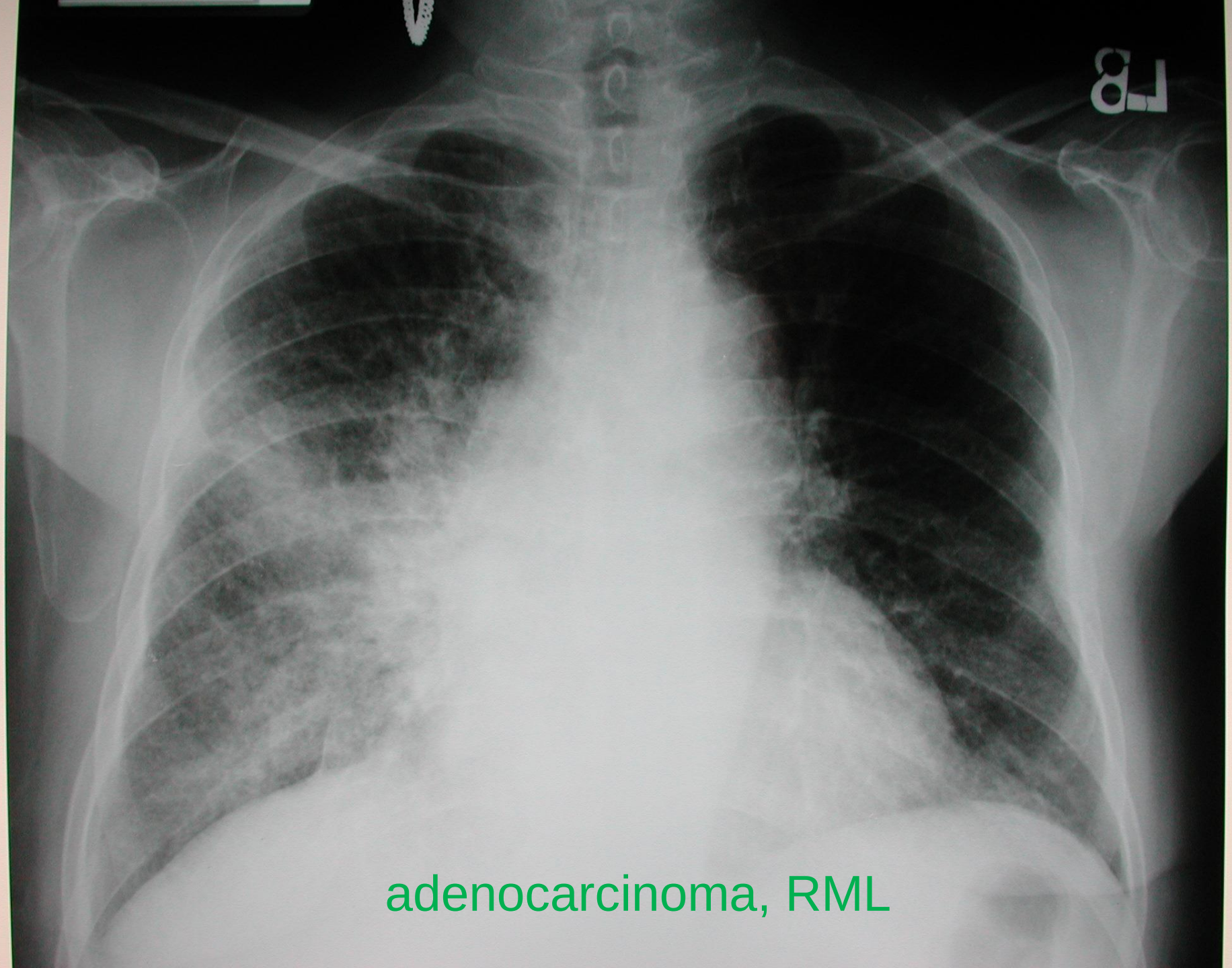
Acute pulmonary edema



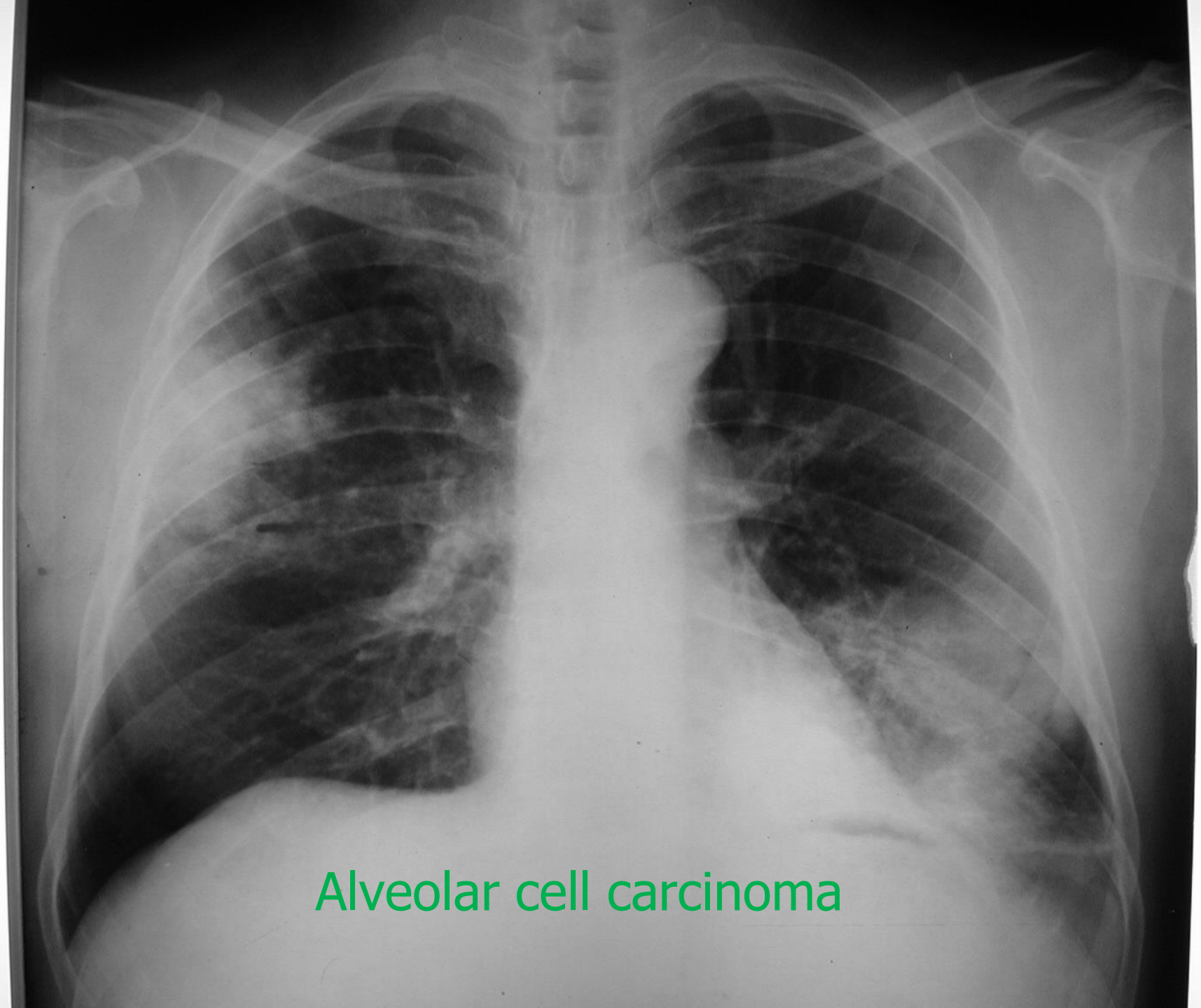
Acute pulmonary edema



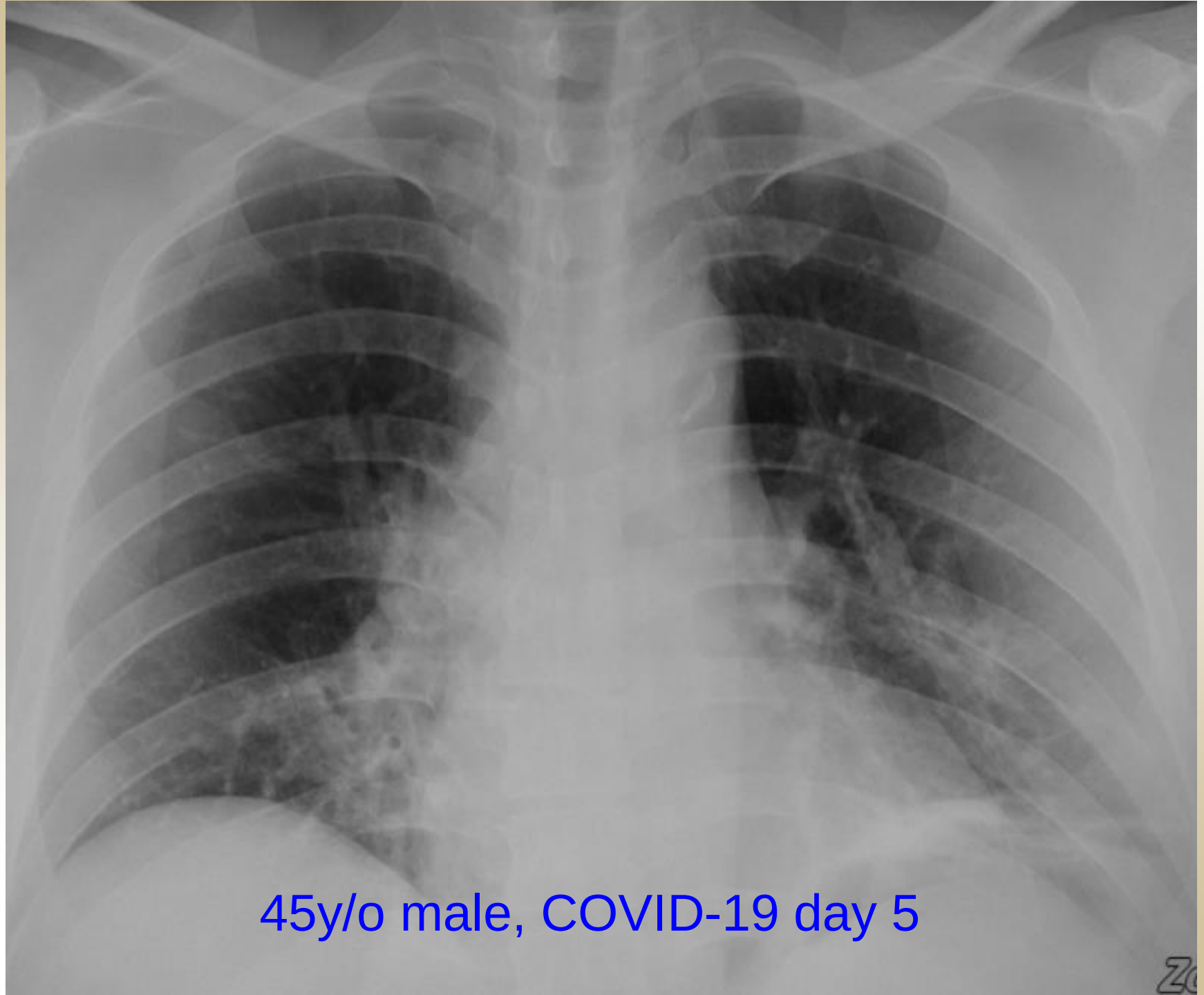
Lung ca, adenocarcinoma, RUL

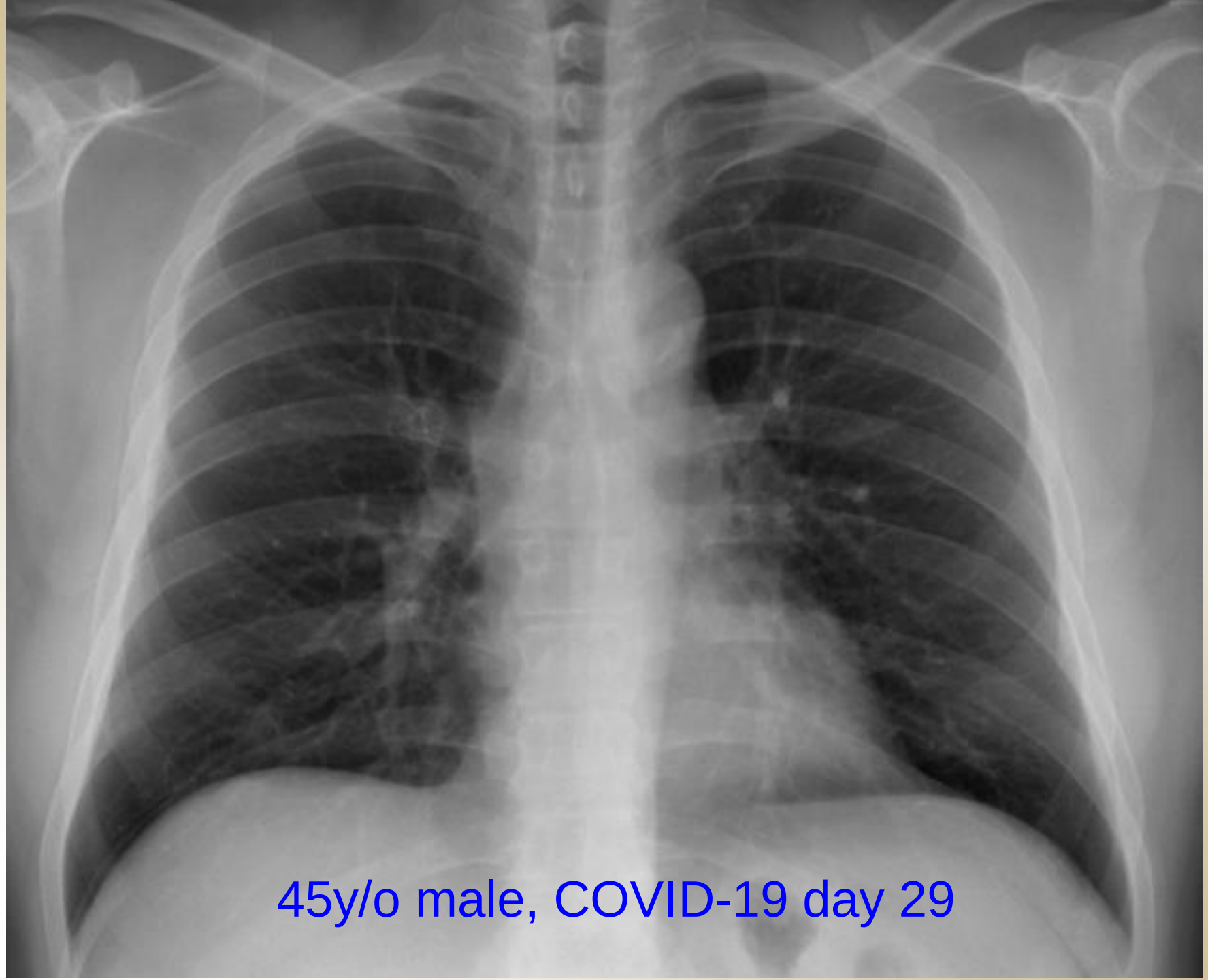


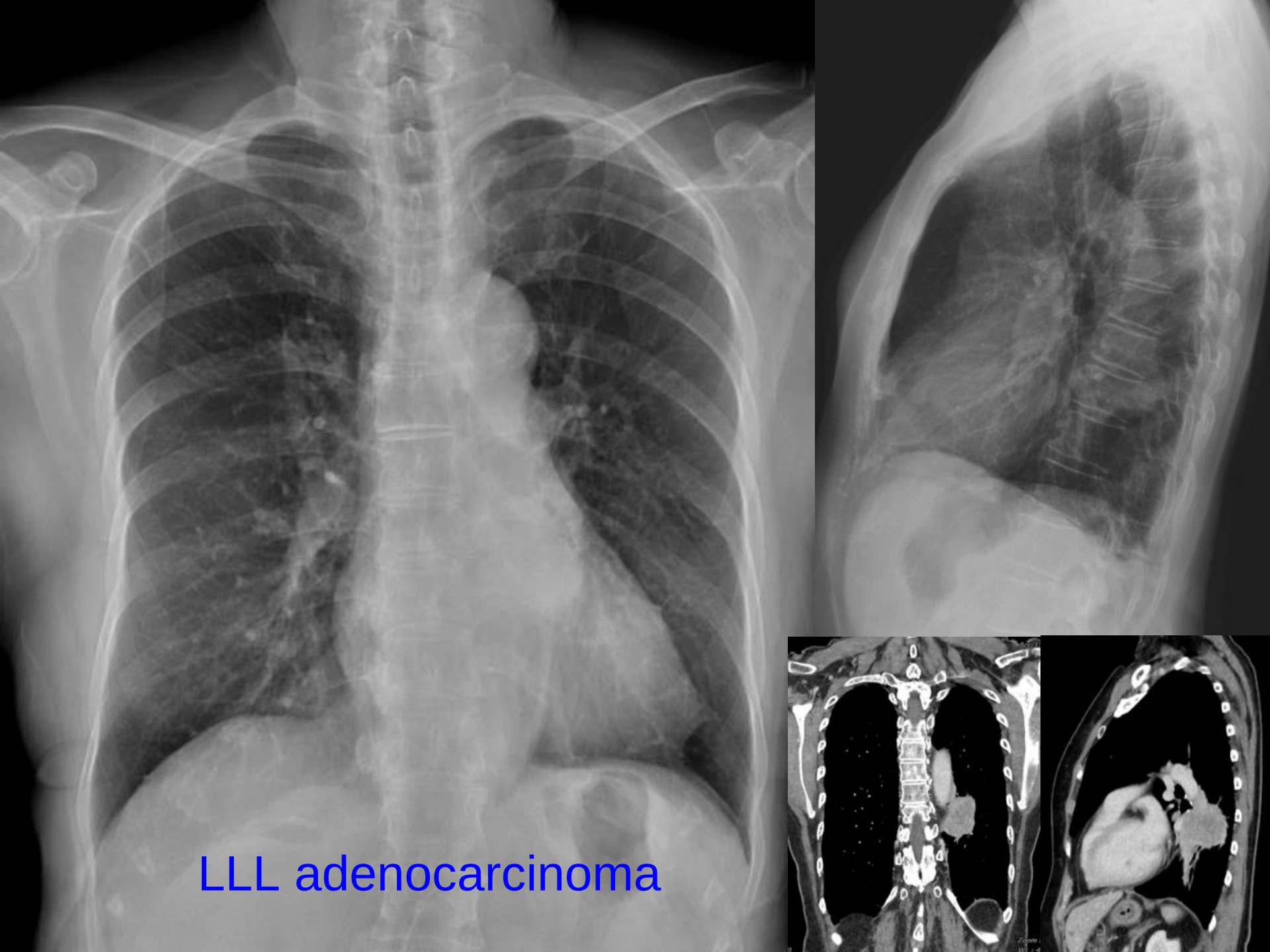
adenocarcinoma, RML



Alveolar cell carcinoma


45y/o male, COVID-19 day 5


45y/o male, COVID-19 day 29


LLL adenocarcinoma

DDx of Consolidation

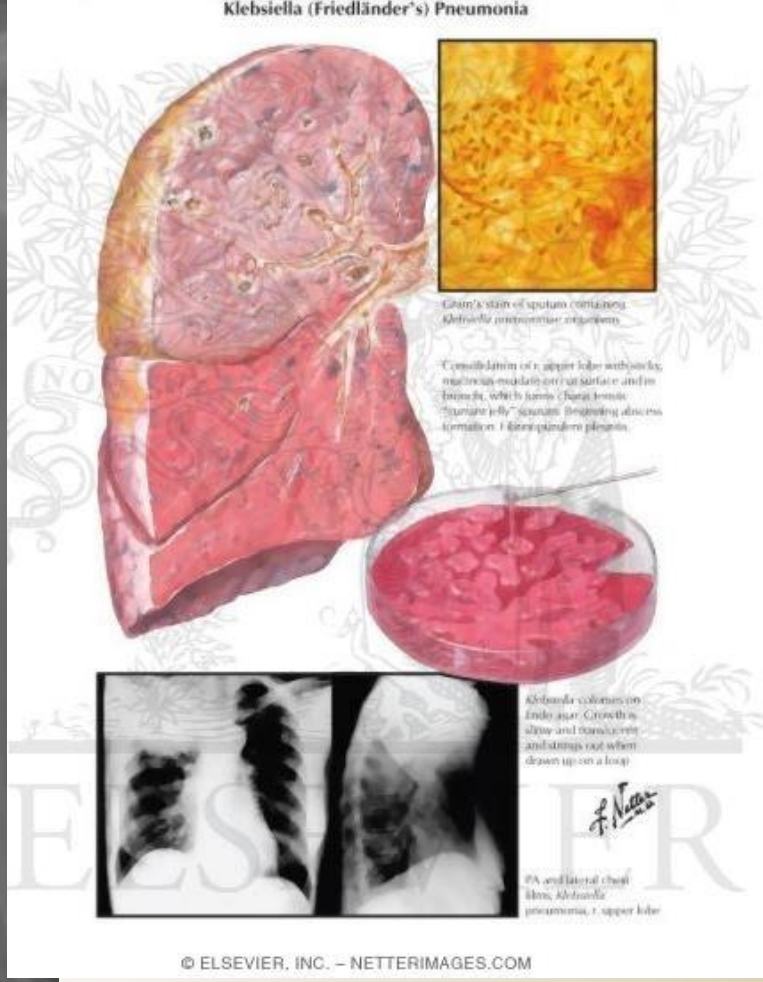
-Lobar Enlargement

- Outward buldging of septa
- D/D with encapsulated interlobar fluid
  - Sharp, biconvex shadow

DDx of Consolidation

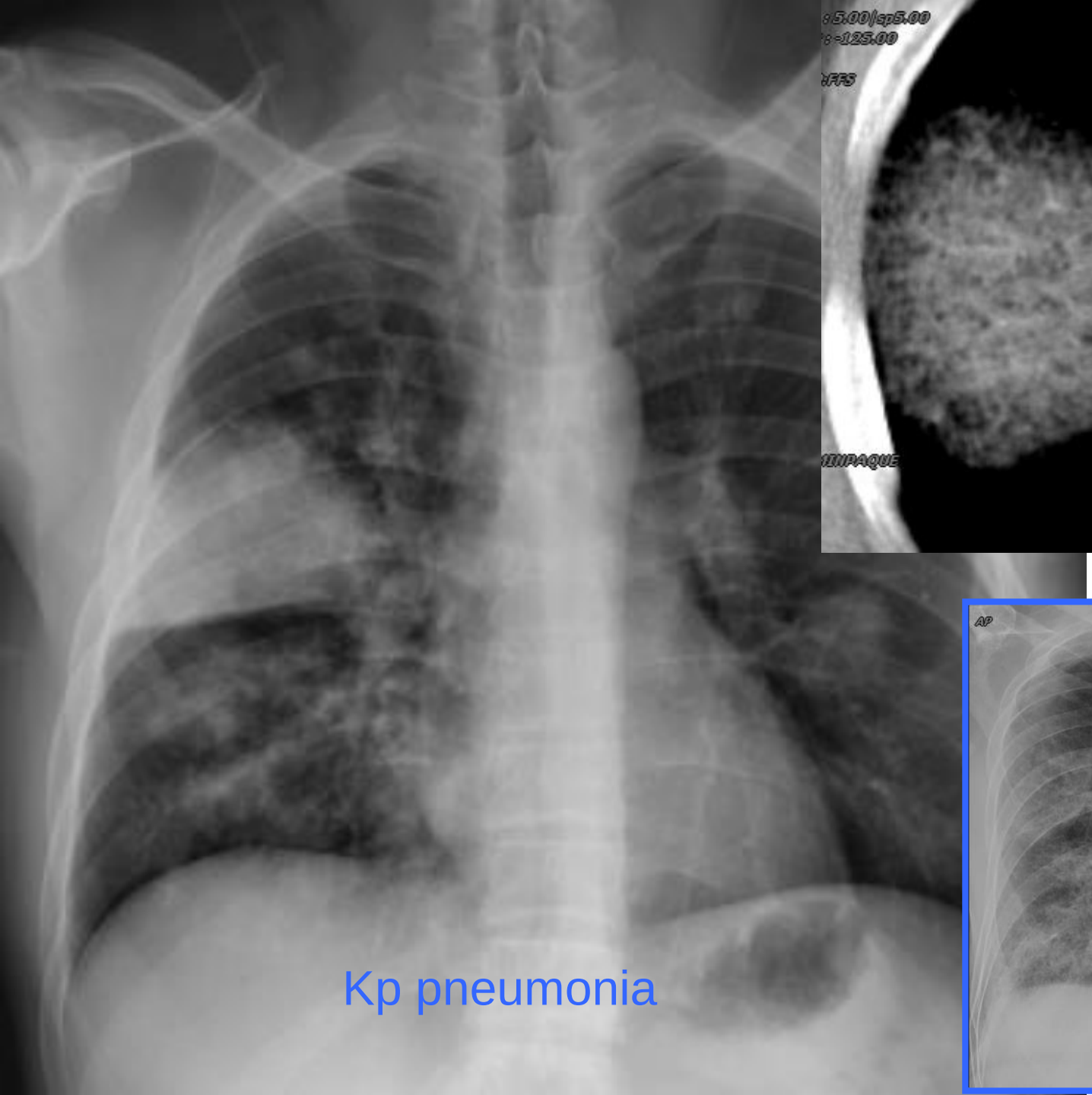
-Lobar Enlargement

- **Klebsiella** pneumonia (Friedlander's pneumonia)
  - Pneumococcal , TB infection
  - Lung absces
  - Not rare in Ca
- **Hyperaeration**
  - Thin wall bullae
  - Obstructive emphysema
  - Congenital lobar emphysema



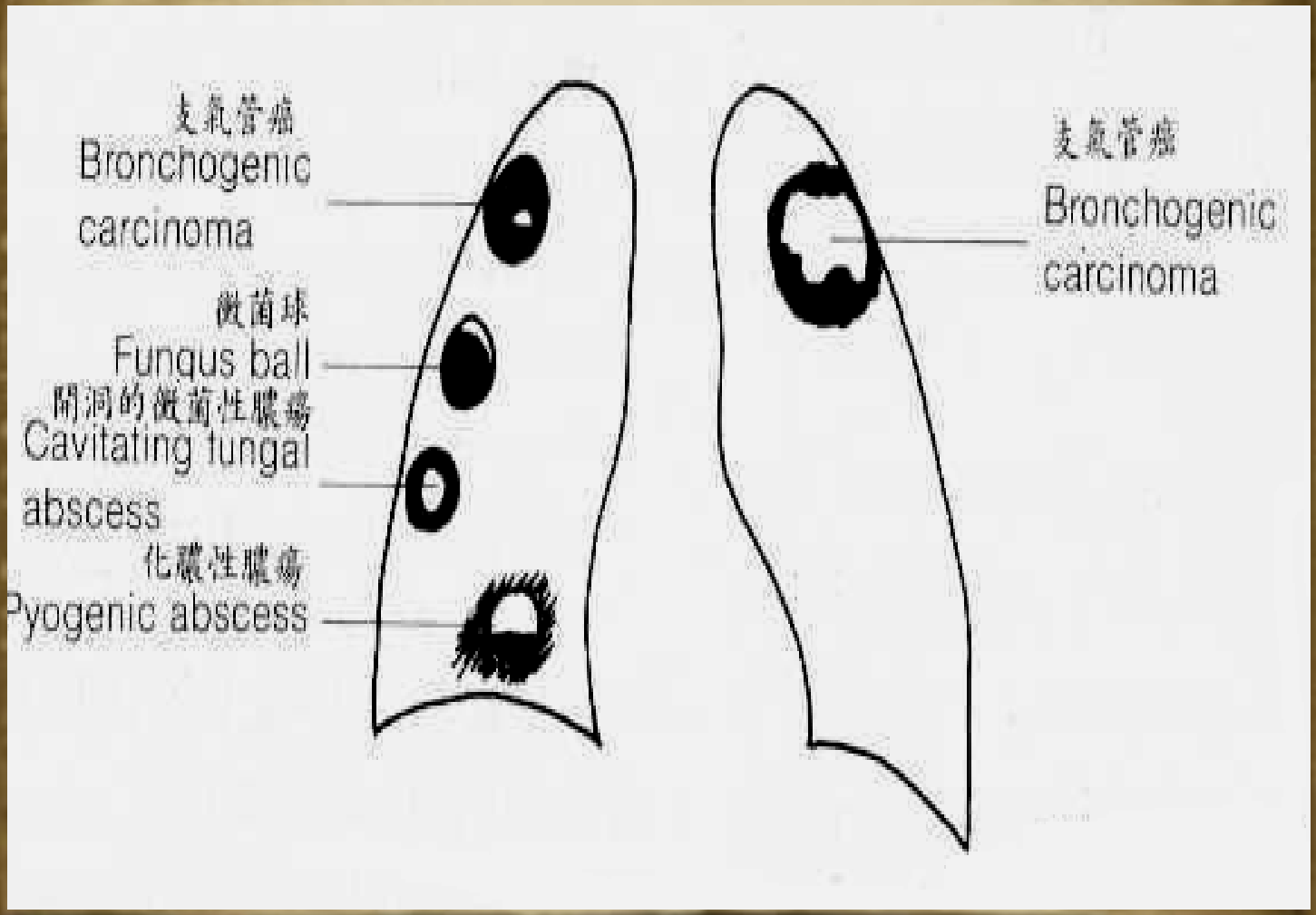
Bulgin fissure sign in Kp pneumonia

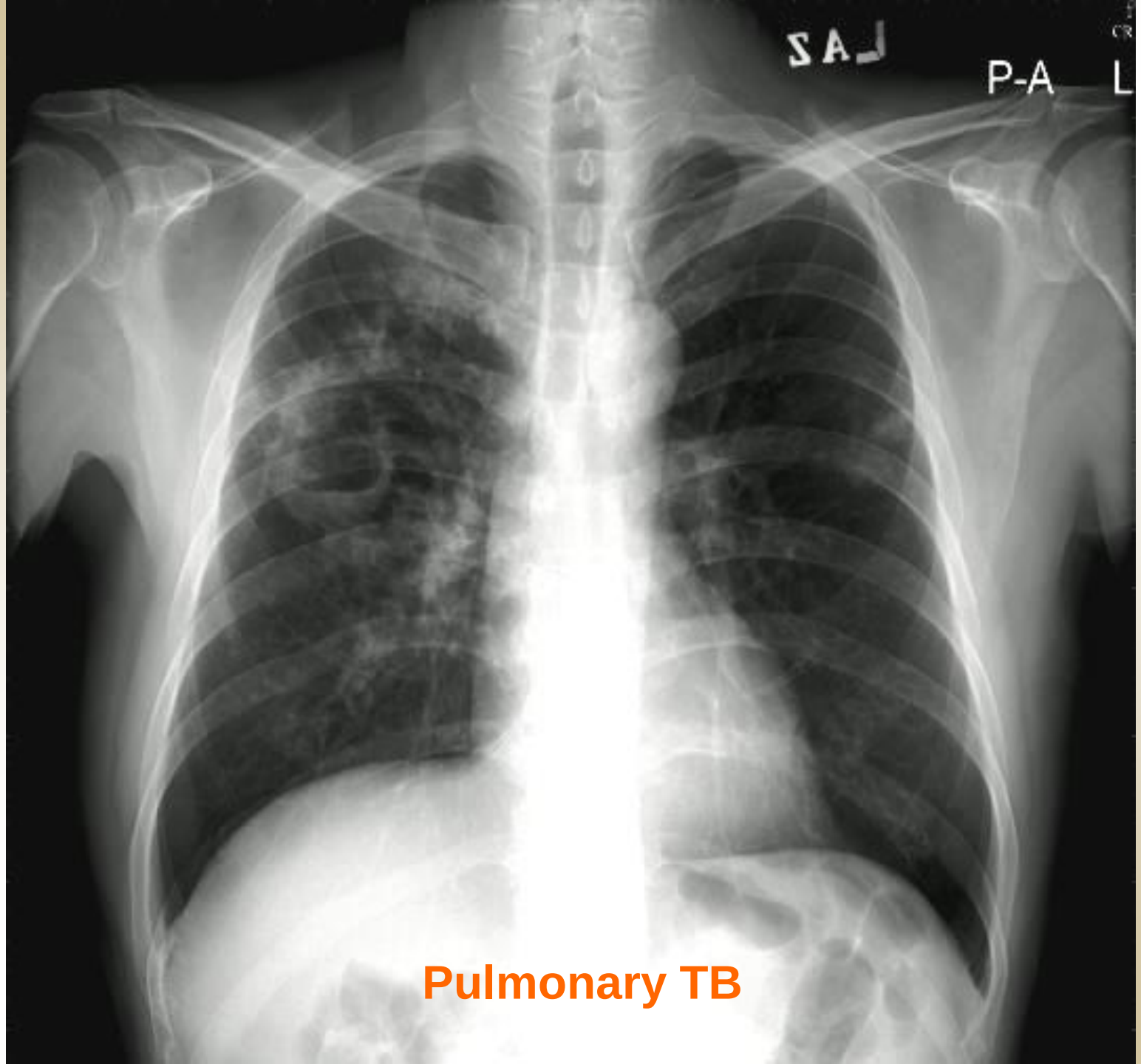
Resuscitation & Intensive Care Med 2018;3:49-51



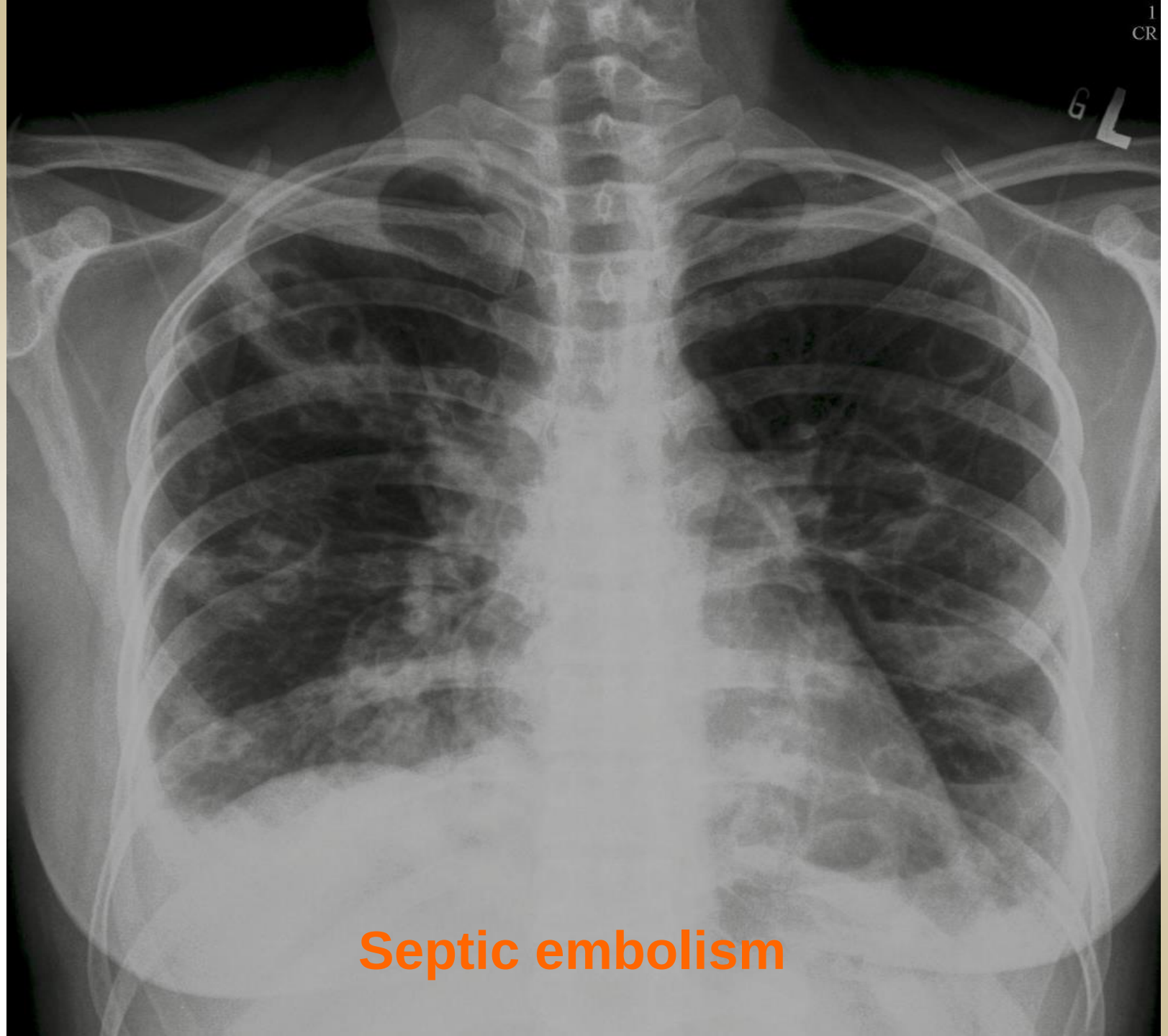
Kp pneumonia

Cavity lesion

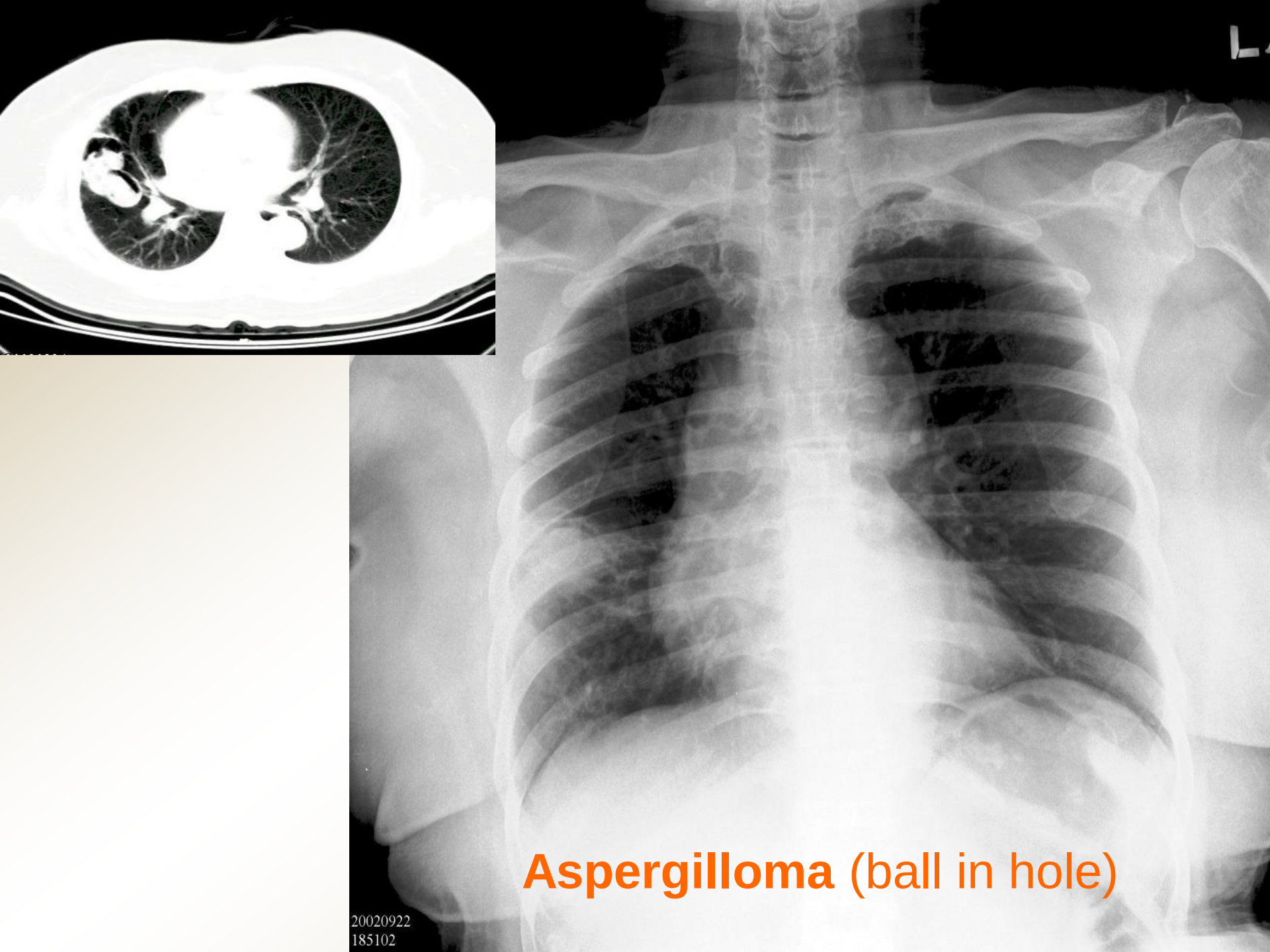




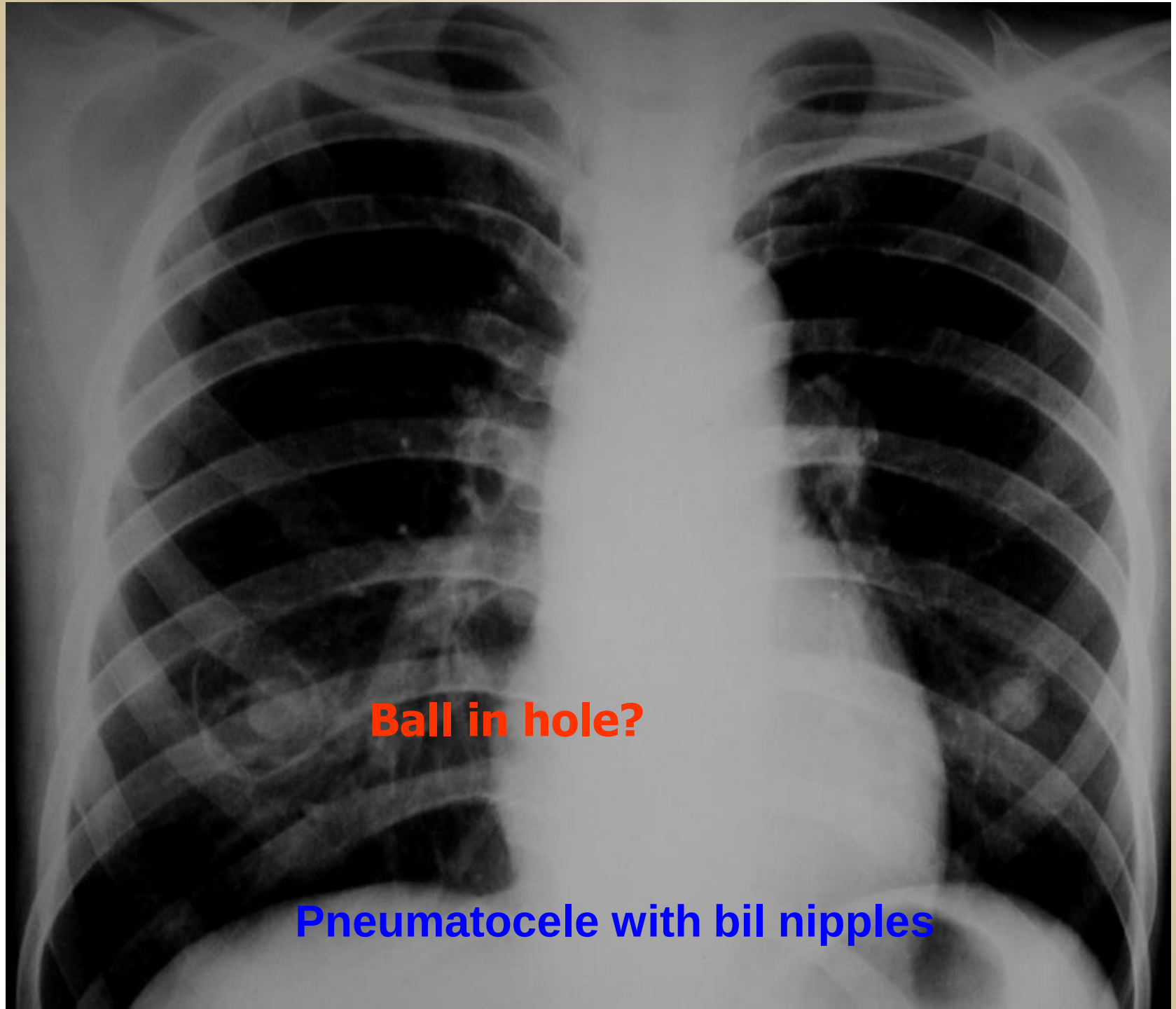
Pulmonary TB



Septic embolism



Aspergilloma (ball in hole)

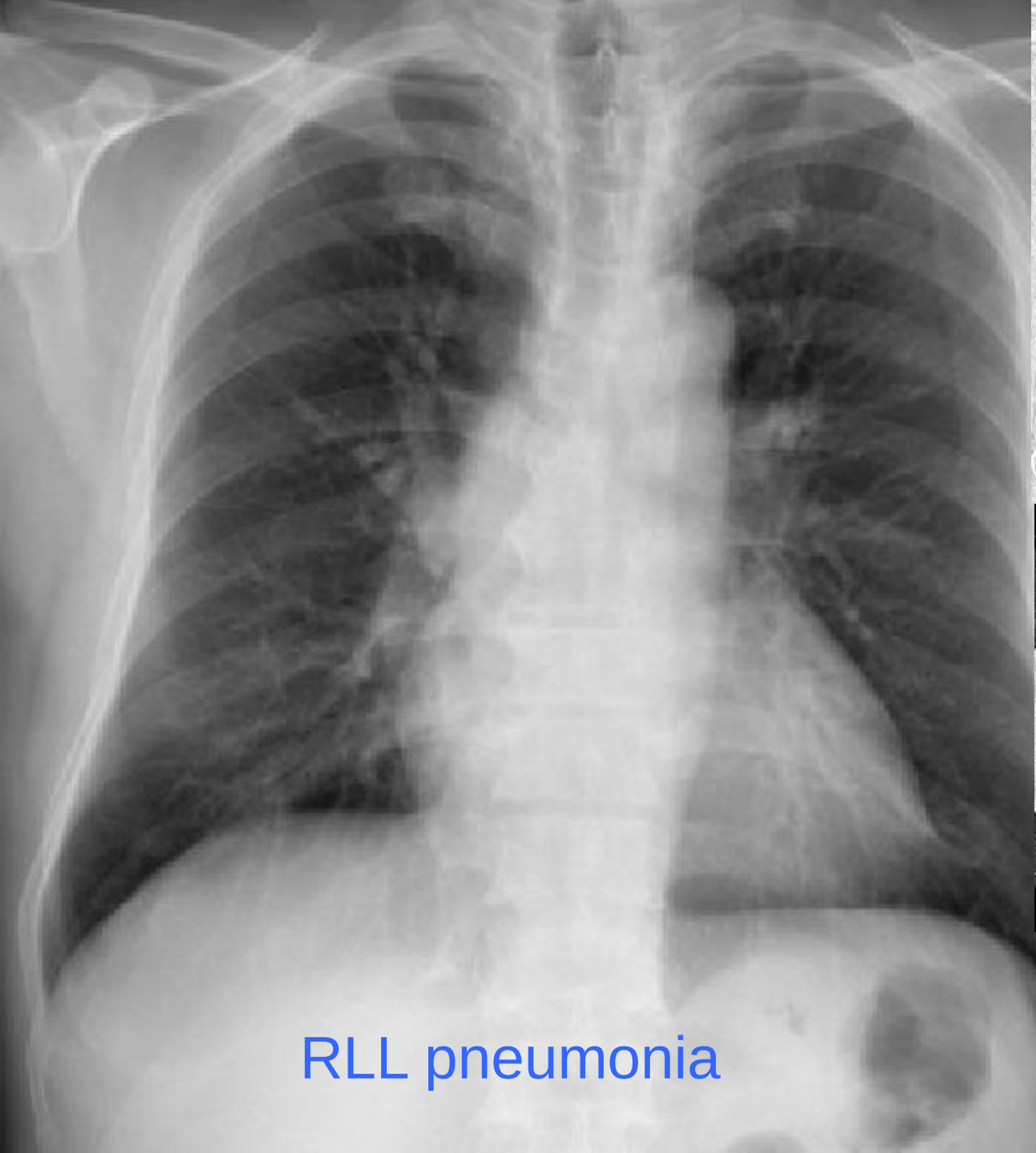

Ball in hole?
Pneumatocele with bil nipples

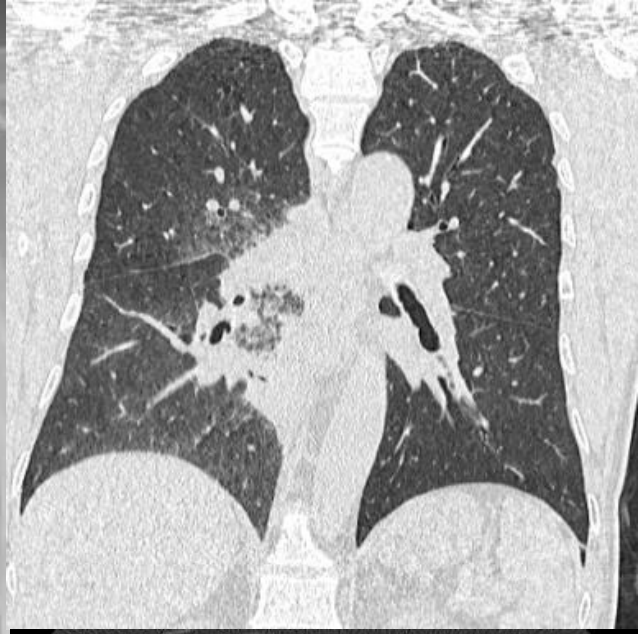
Objectives of Radiography Study

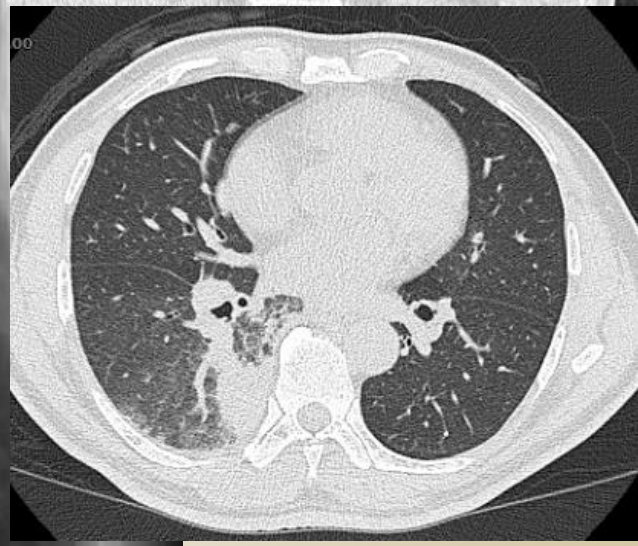
- Identify the location and extent of the consolidation
- **Correlation of clinical findings**
- The findings are consistent with disease process
- To assess the evolution on sequential films
- Identify any complicating features

Clinical Correlation

- **Clinical history**
  - **Acute air space disorder**
    - Pneumonia
    - Pulmonary edema
    - Pulmonary hemorrhage (pulm. thromboembolism)
- **Clinical course**
  - **Acute fever, chillness with purulent sputum**
- Clinical physical signs
- Laboratory findings





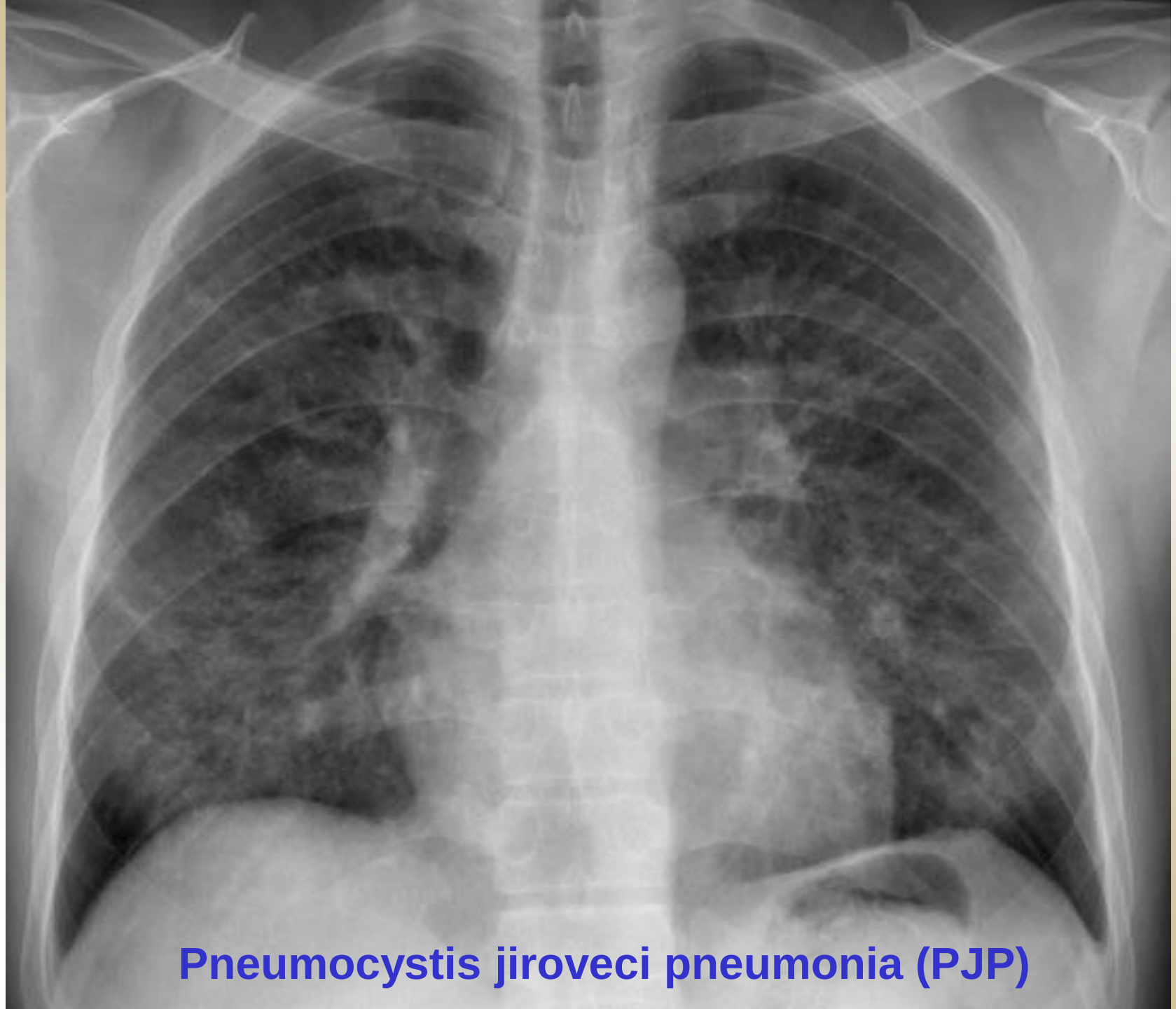


RLL pneumonia

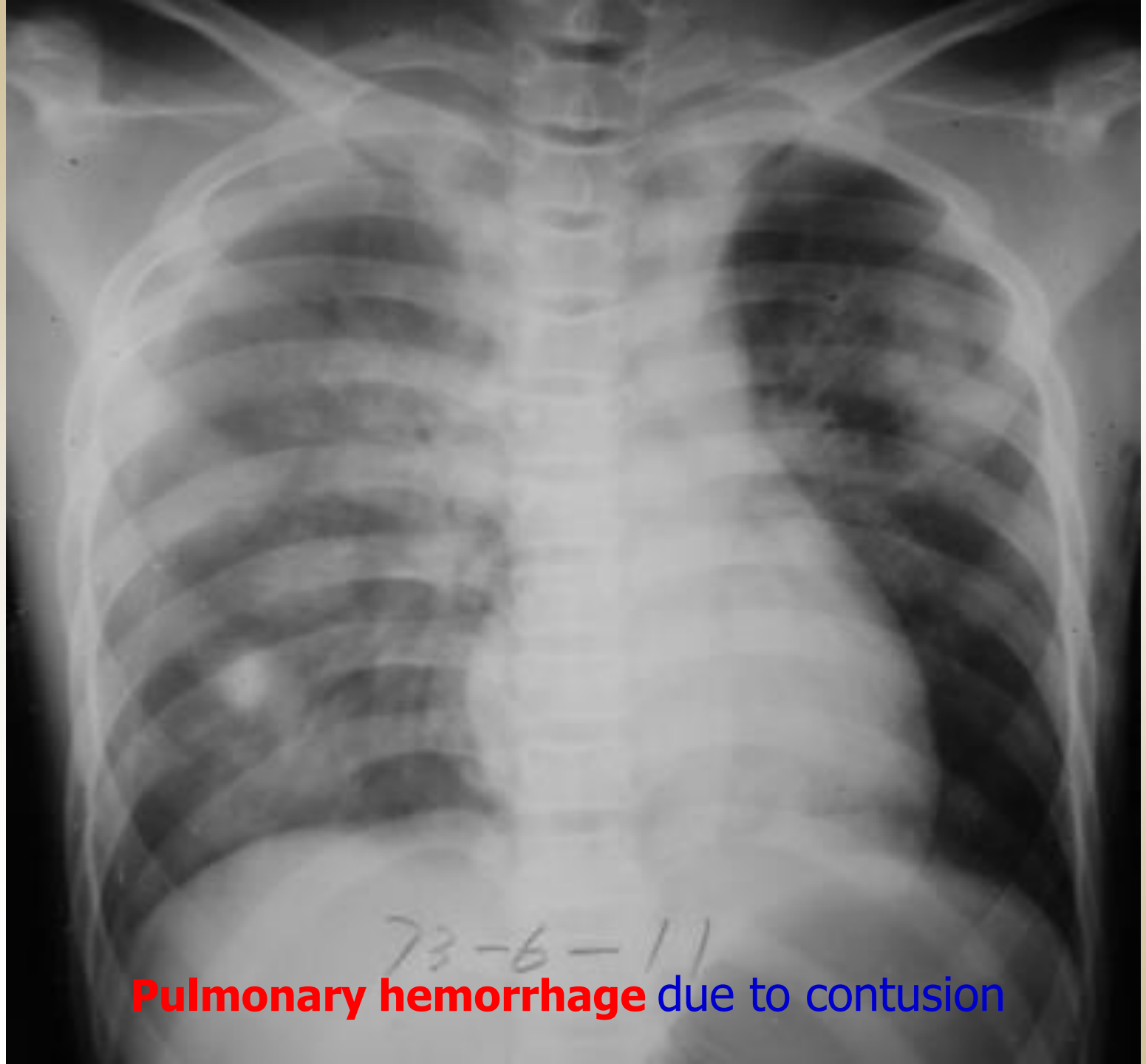
Adenocarcinoma, RUL

Bil lower metastases ?

Bil pneumonia??

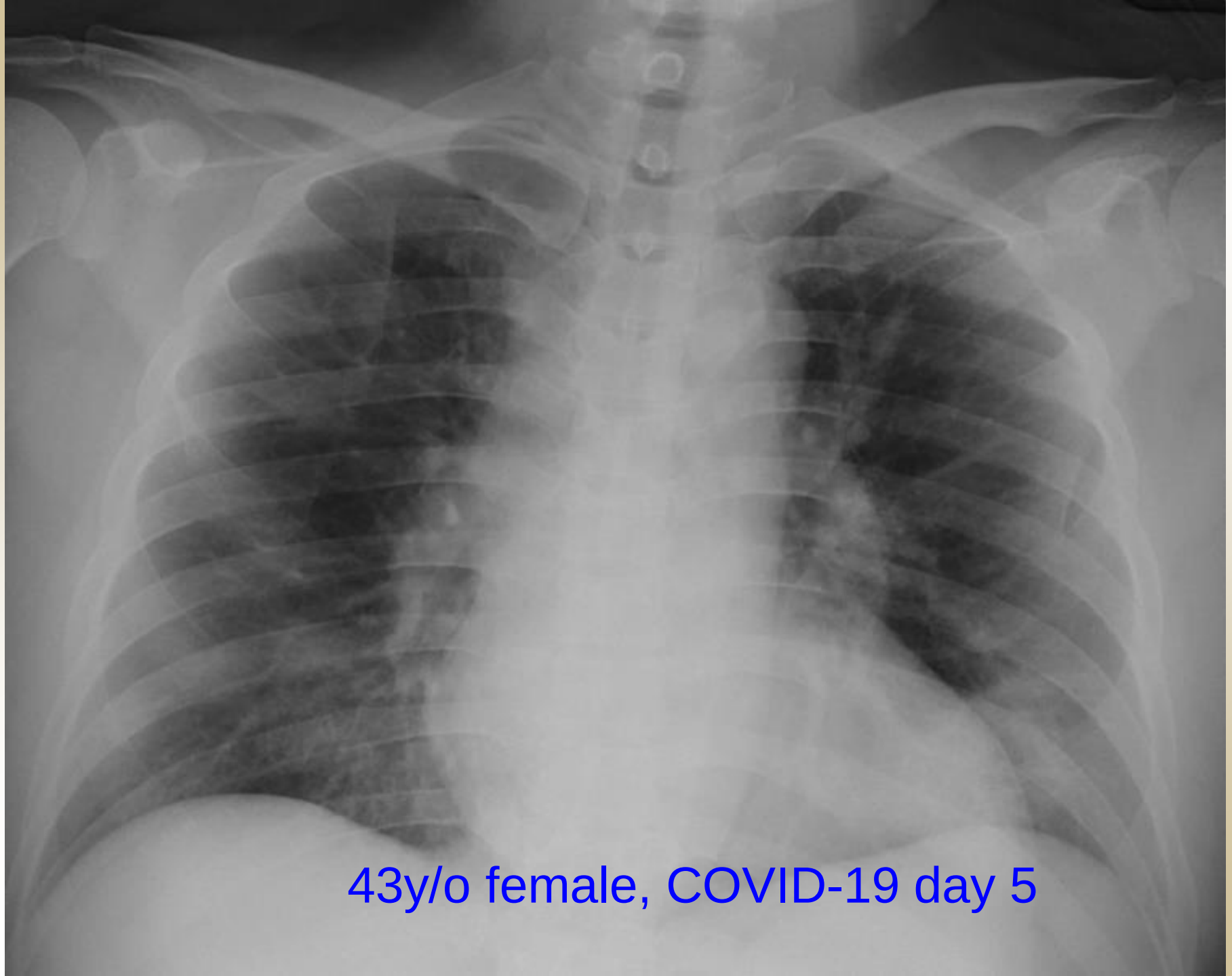


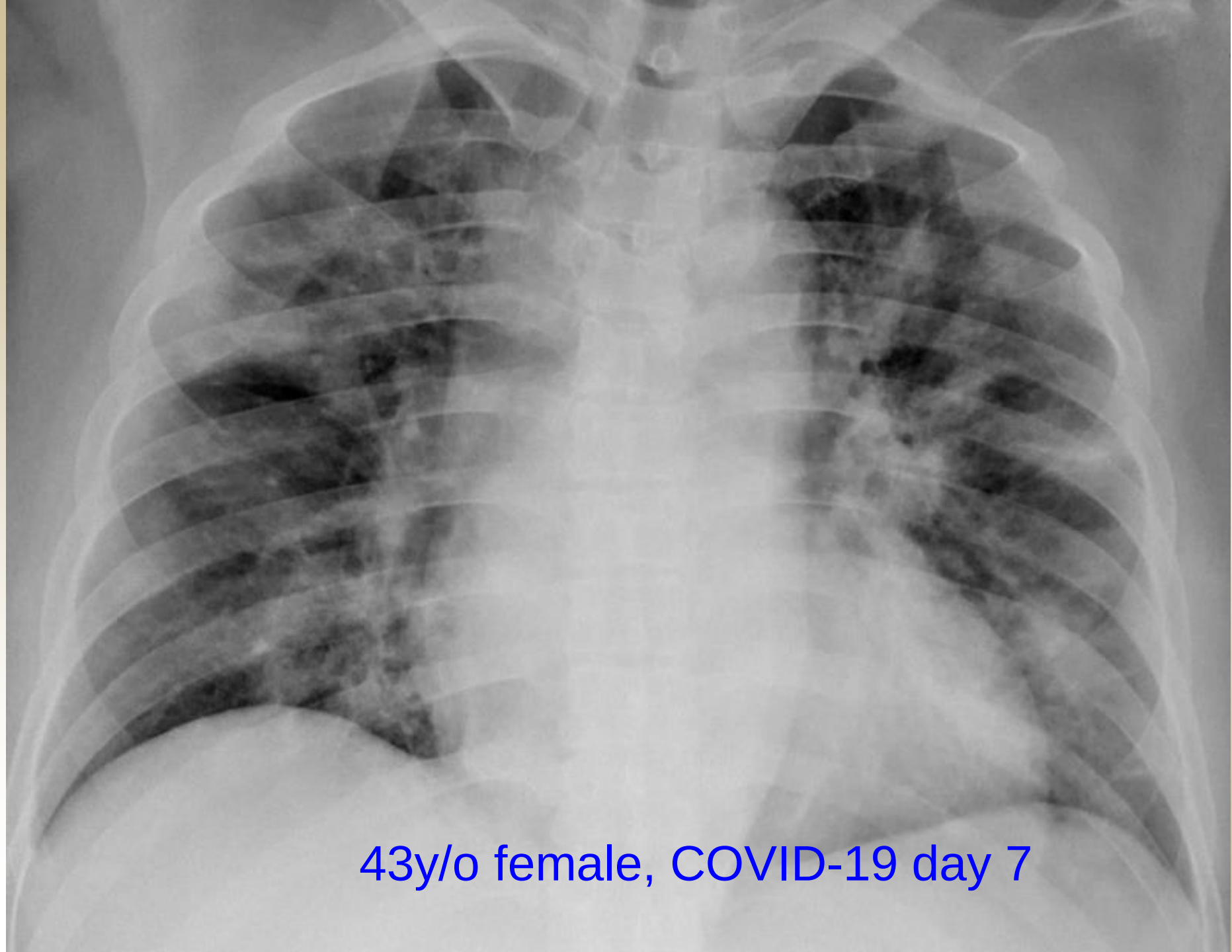
Pneumocystis jiroveci pneumonia (PJP)

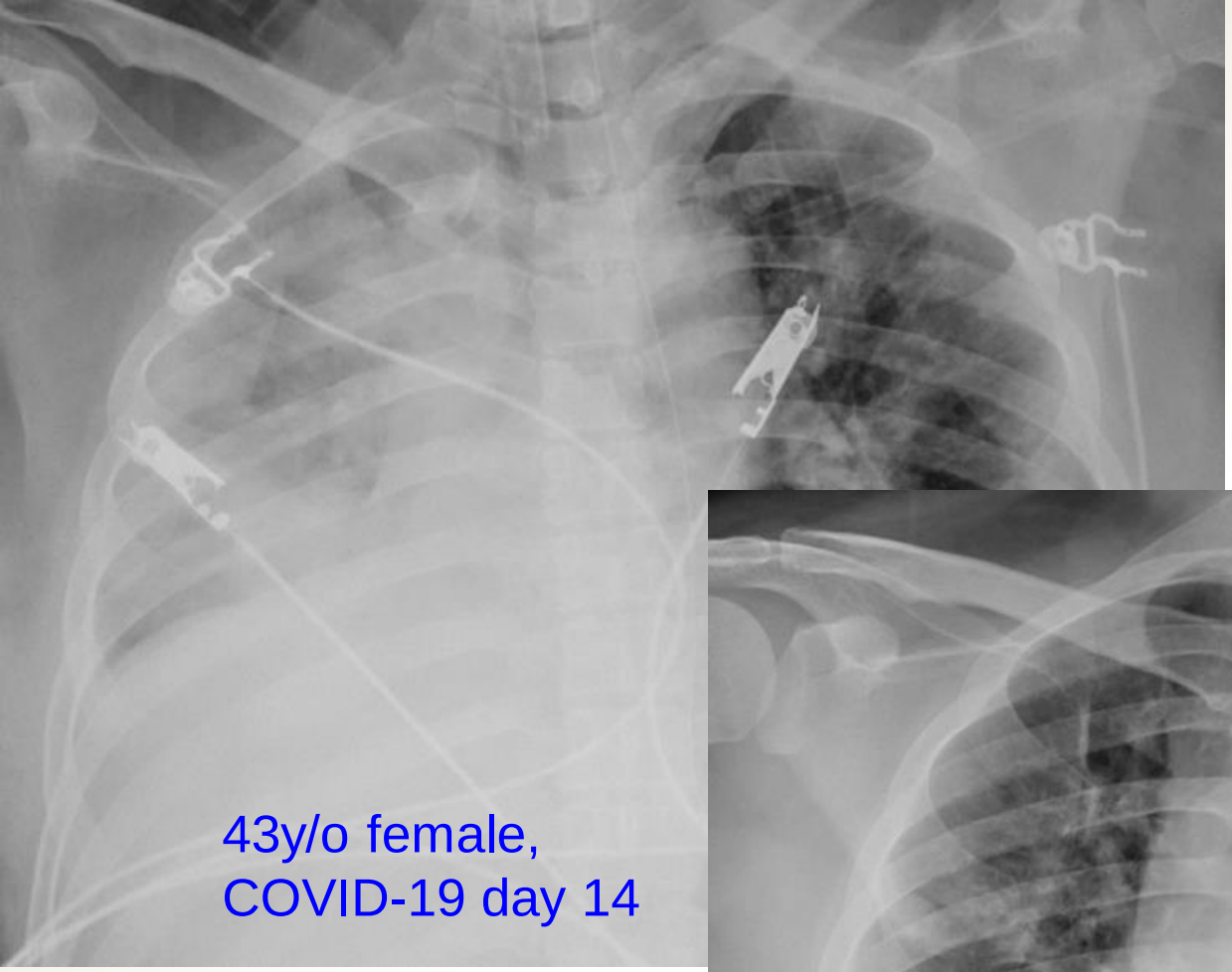


Pulmonary hemorrhage due to contusion

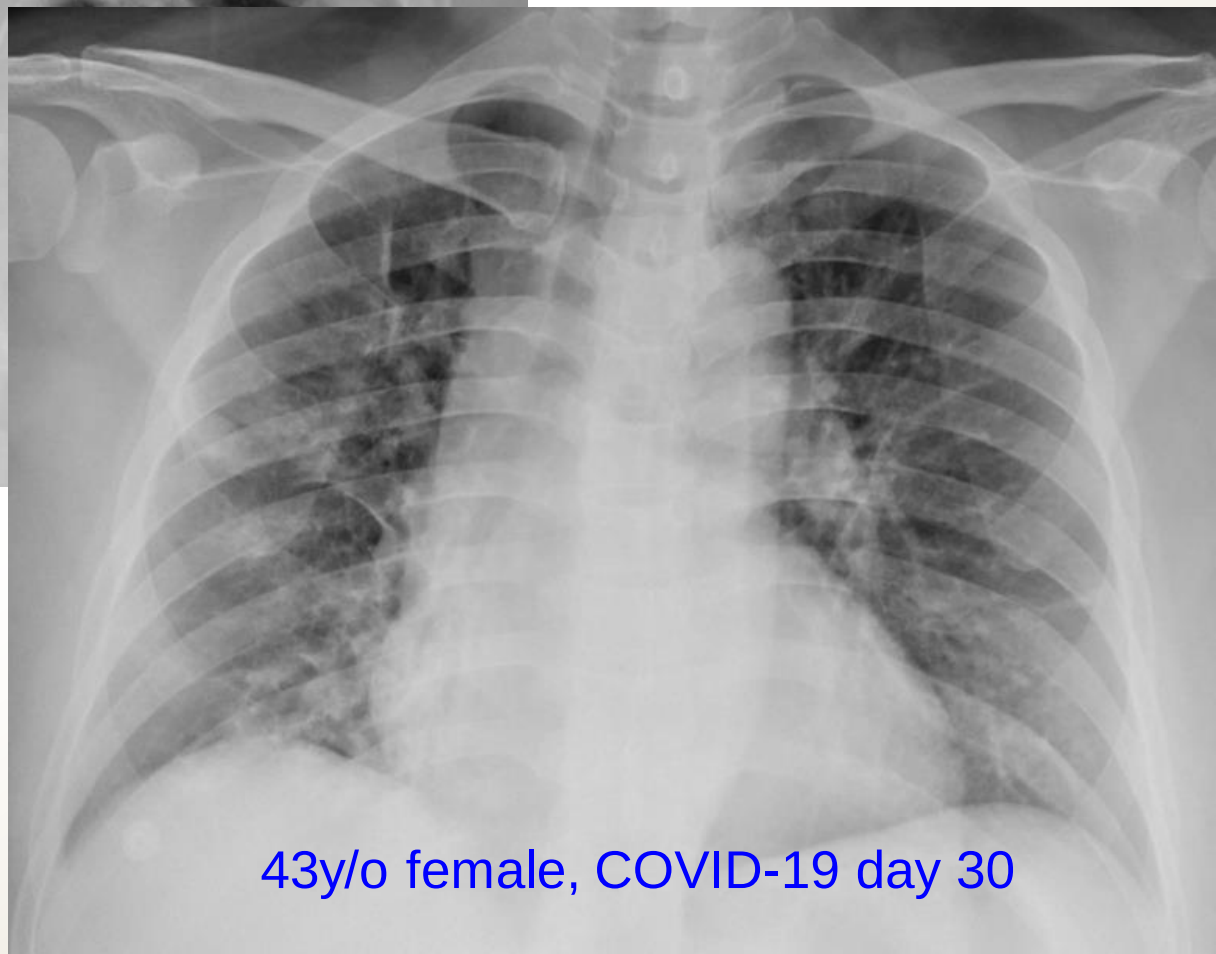
43y/o female, TOCC(+)


43y/o female, COVID-19 day 5


43y/o female, COVID-19 day 7



43y/o female,
COVID-19 day 14



43y/o female, COVID-19 day 30

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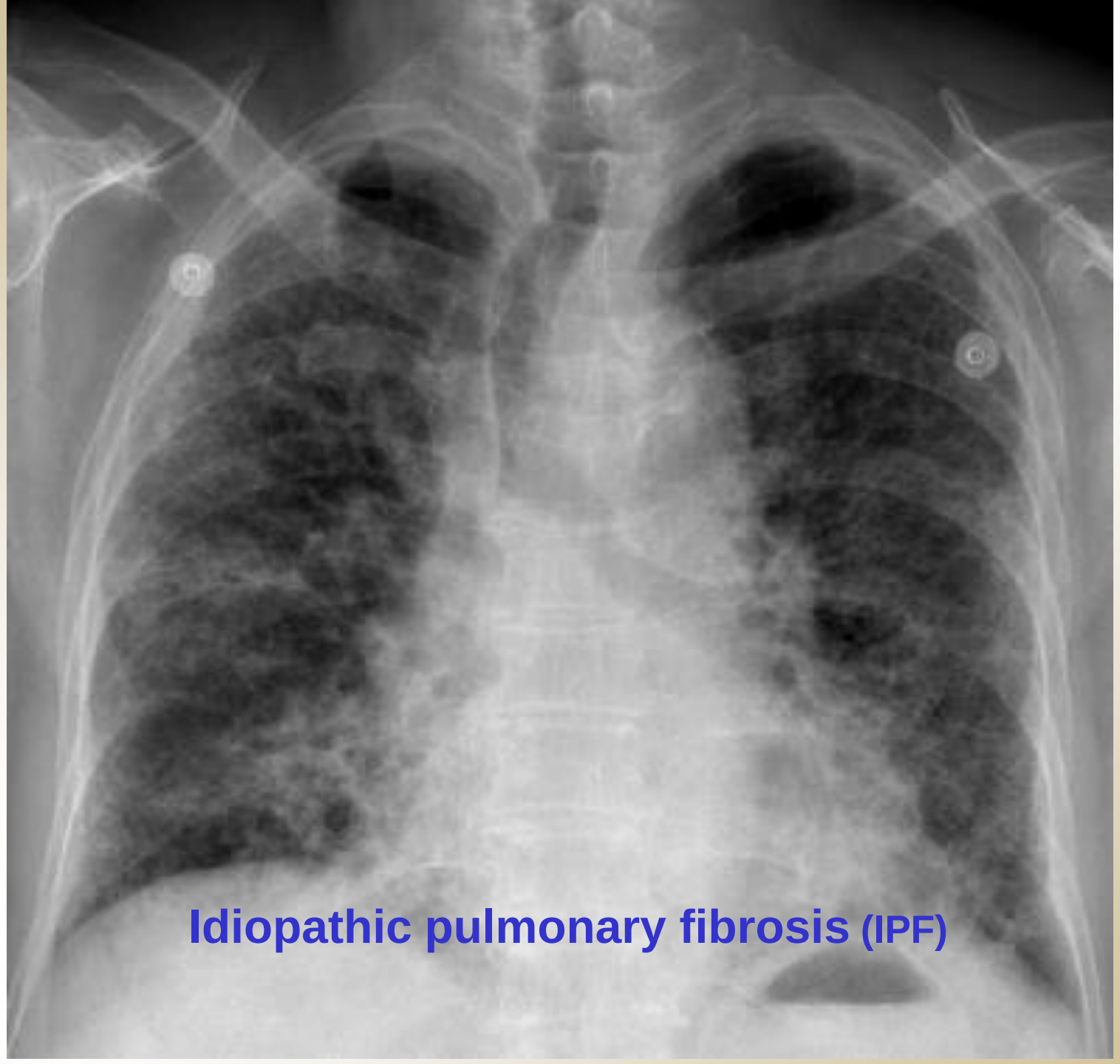
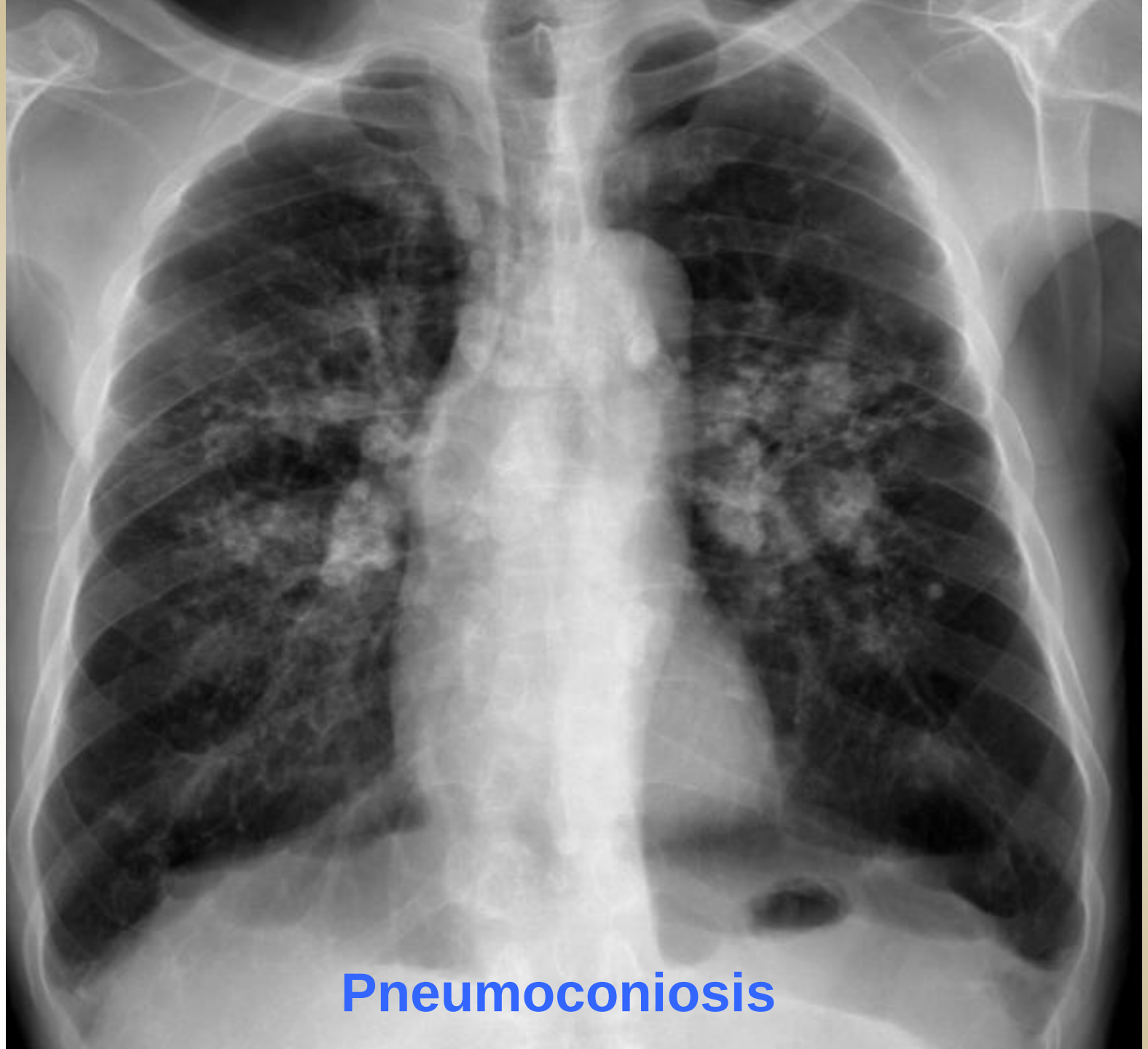
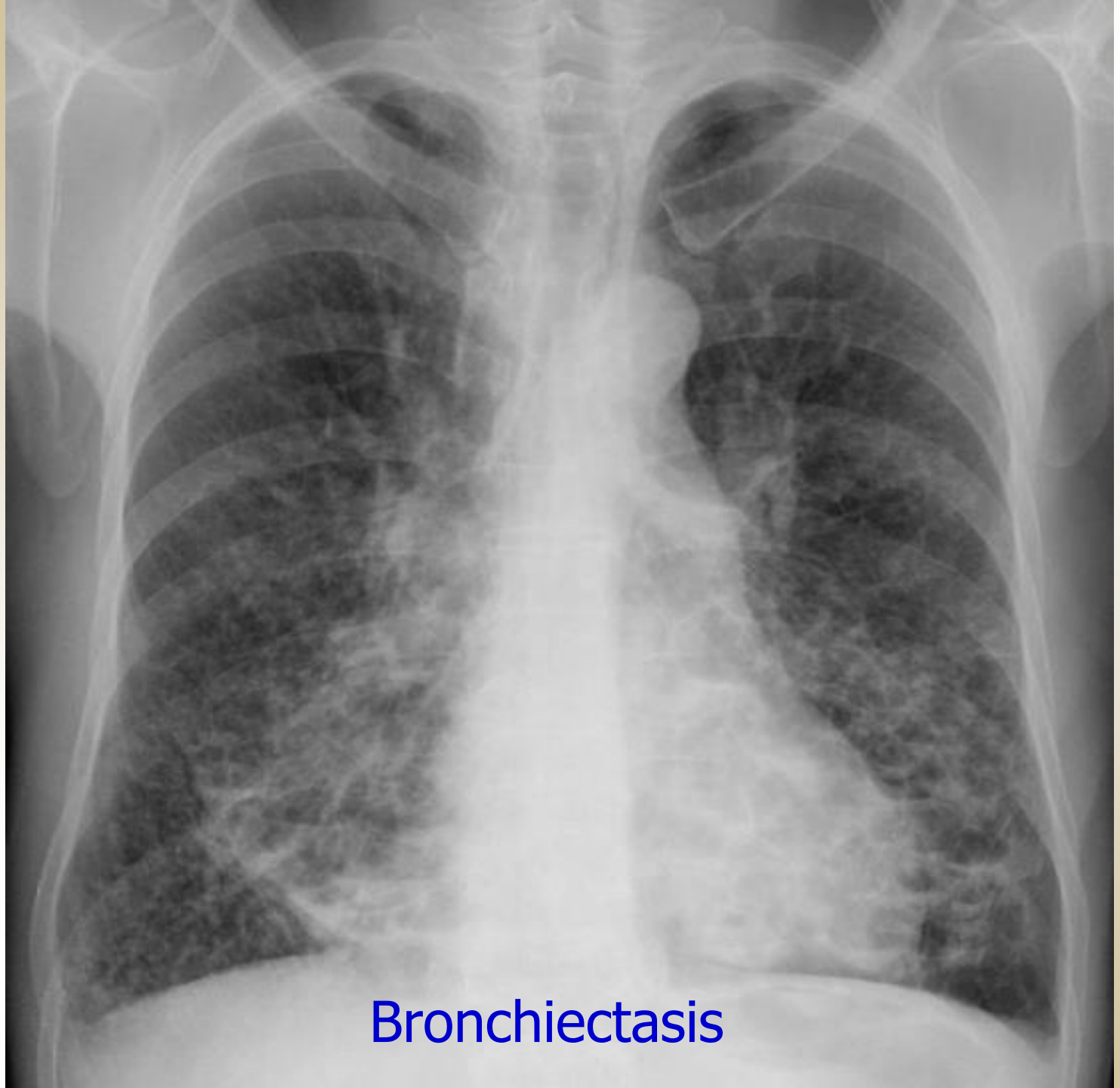


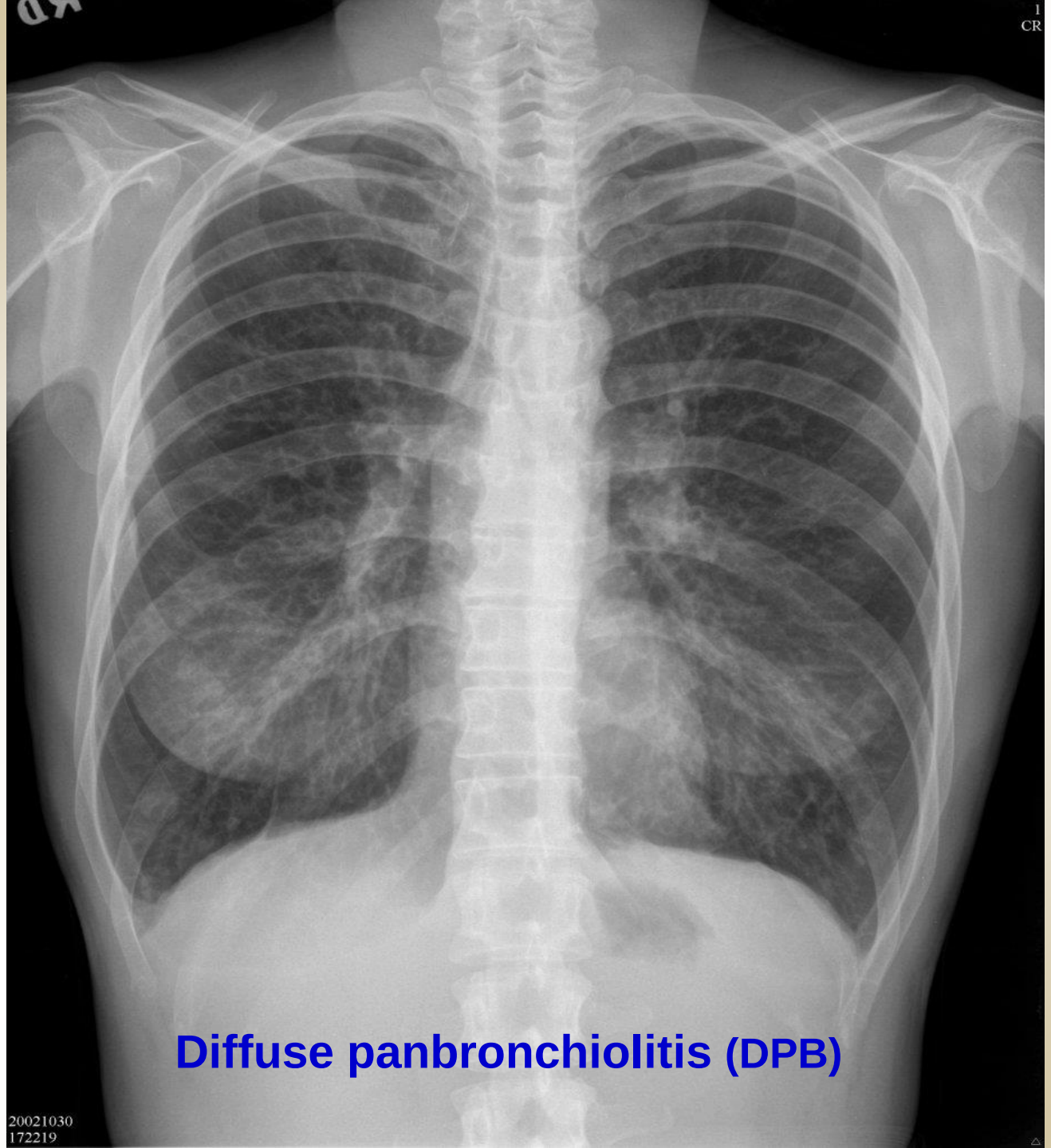
Idiopathic pulmonary fibrosis (IPF)



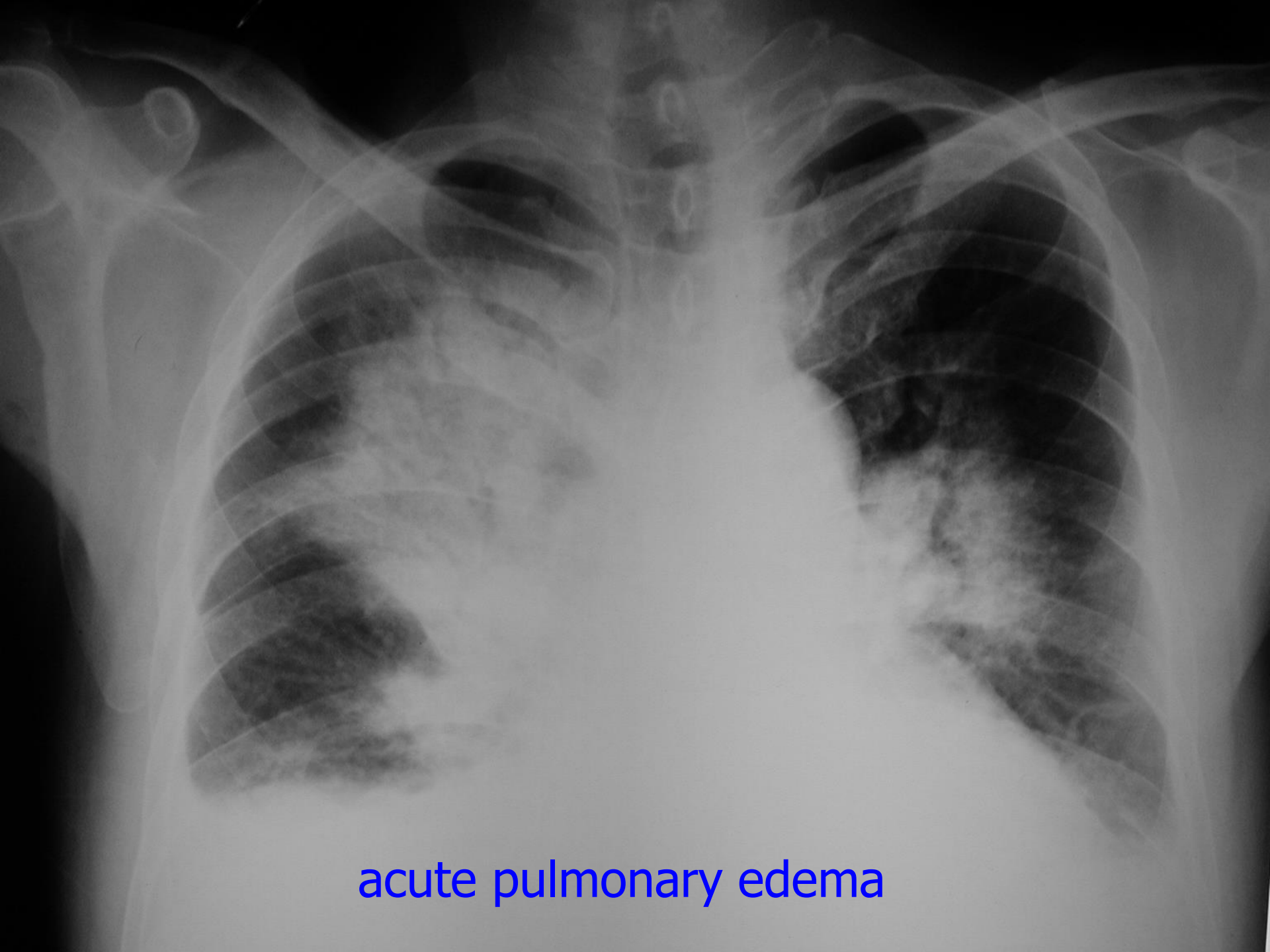
Pneumoconiosis



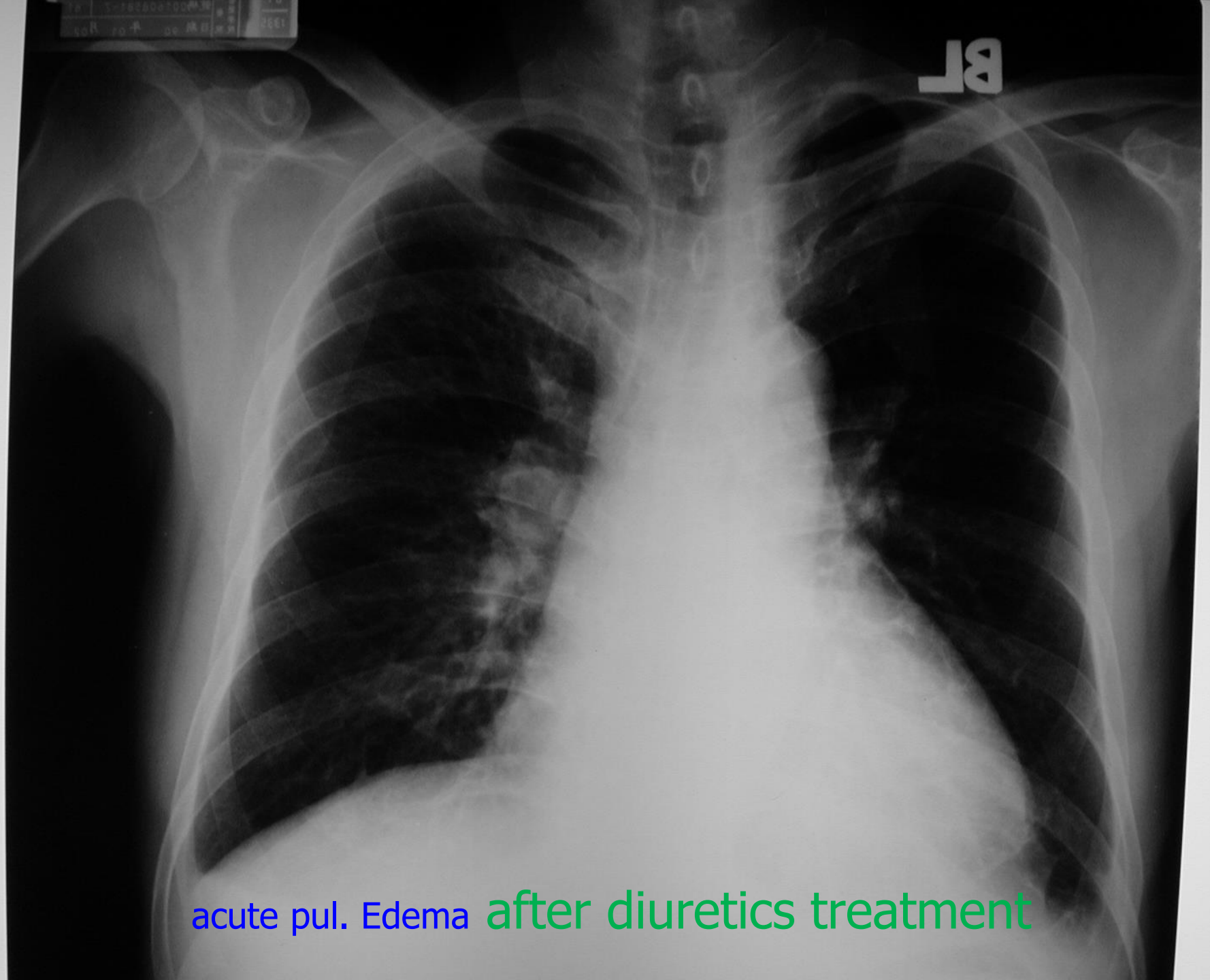
Bronchiectasis

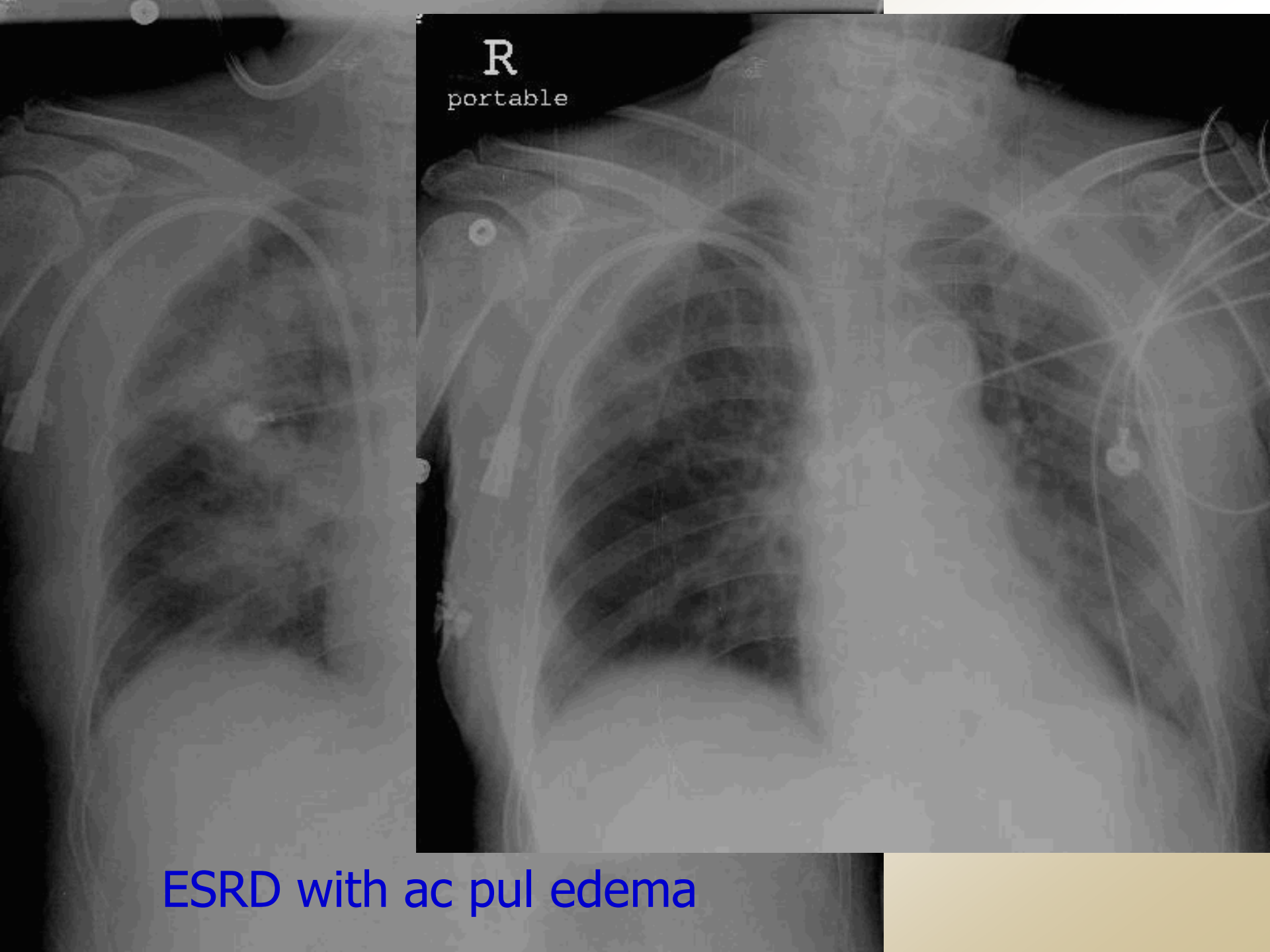


Diffuse panbronchiolitis (DPB)

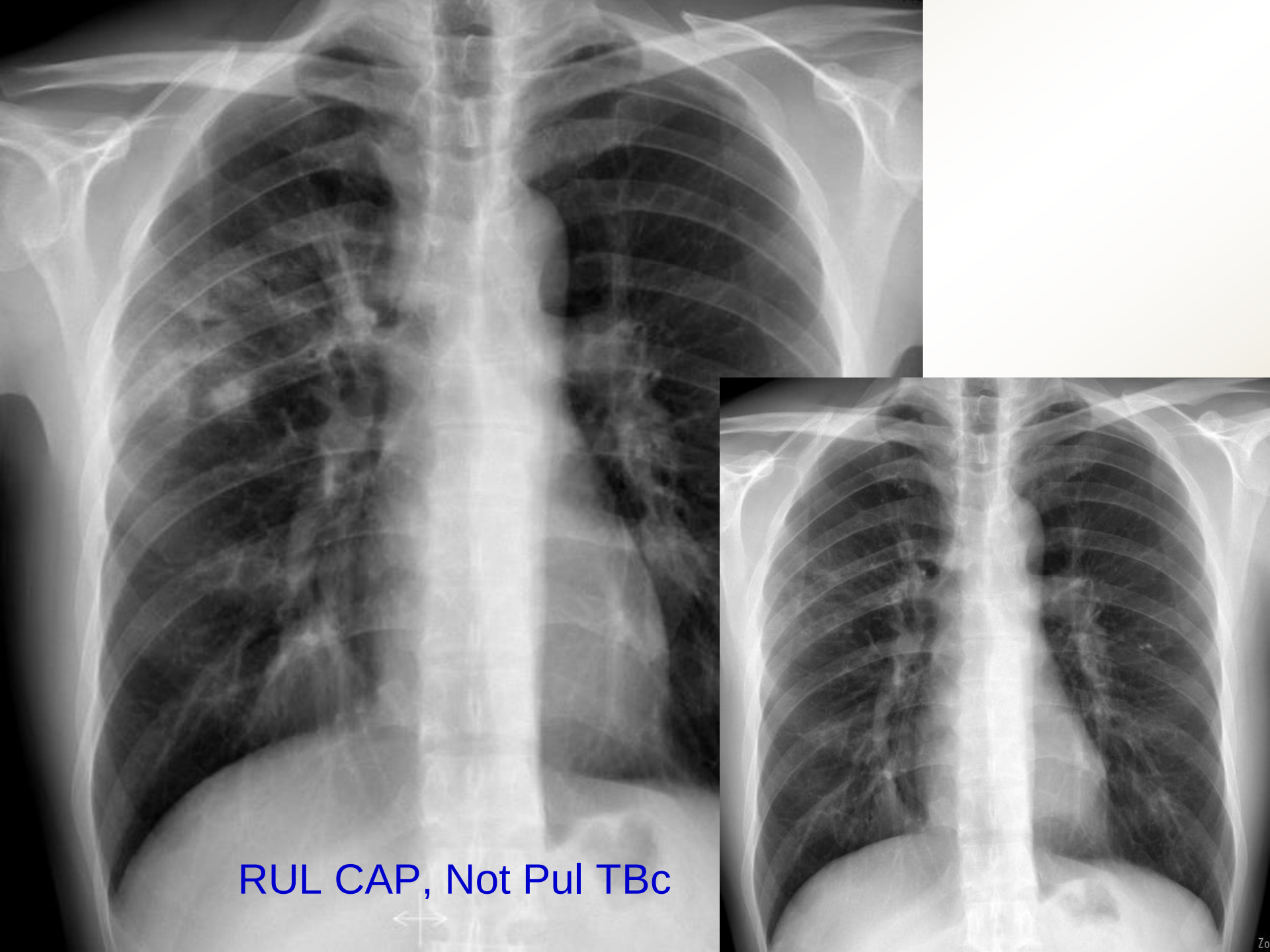


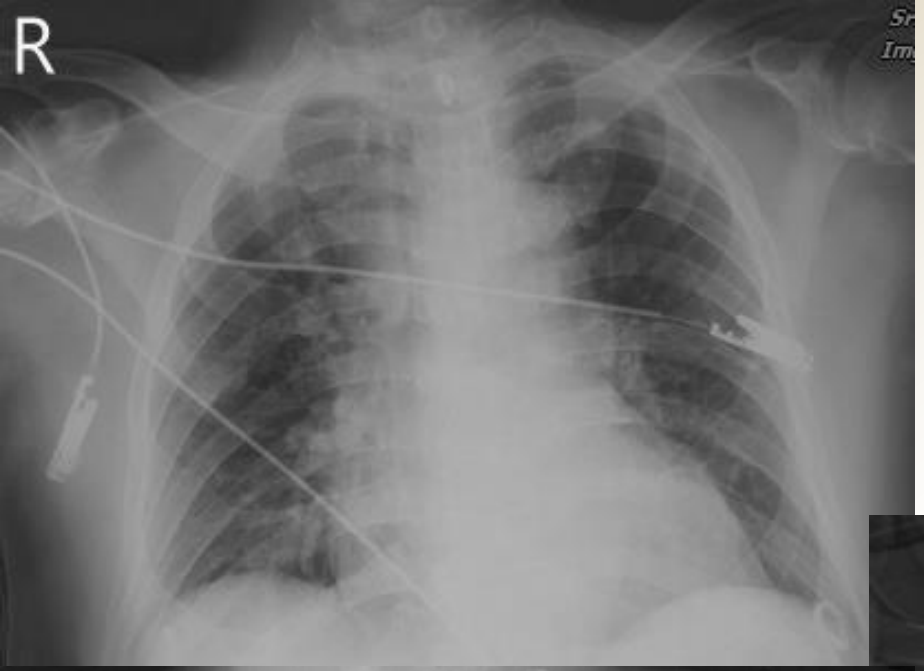
acute pulmonary edema

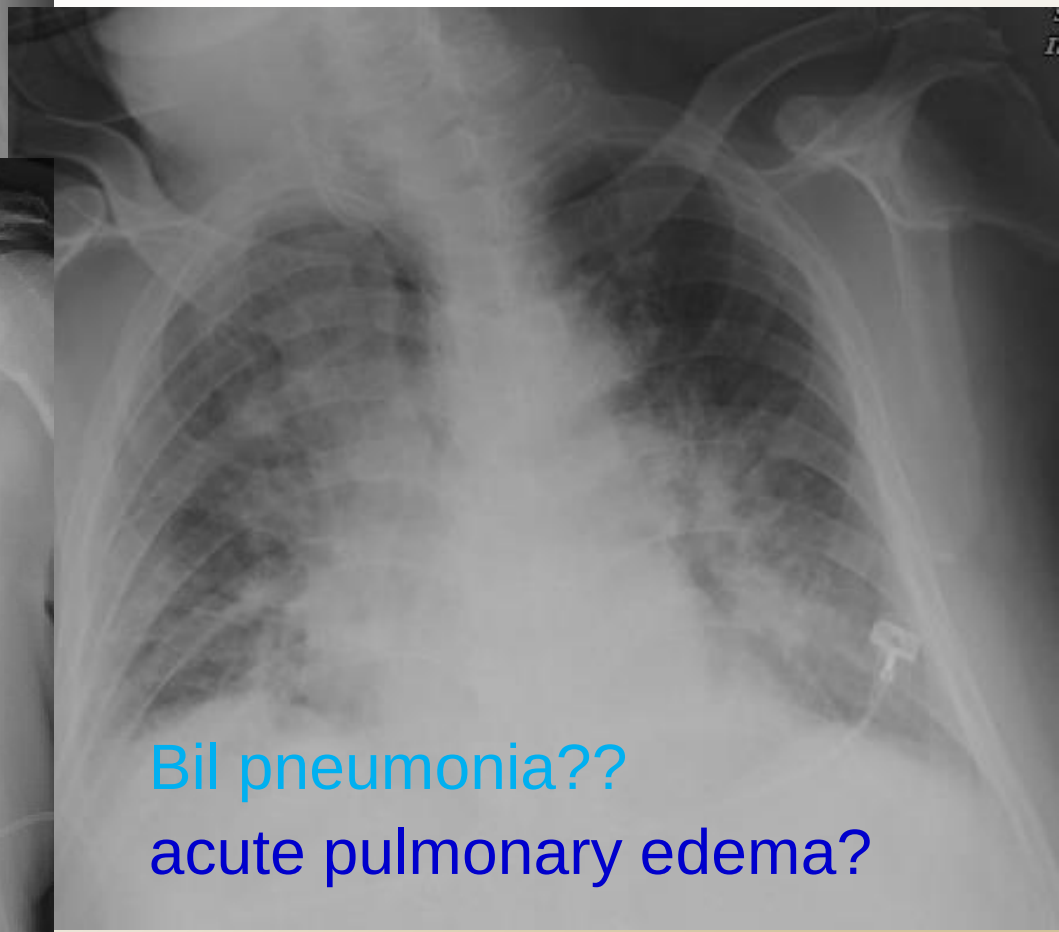

acute pul. Edema after diuretics treatment



ESRD with ac pul edema

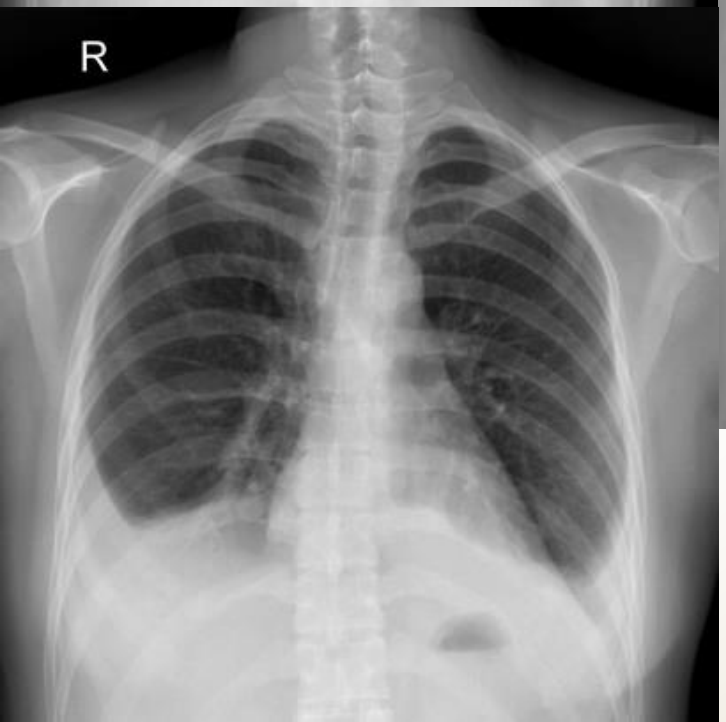

RUL CAP, Not Pul TBc

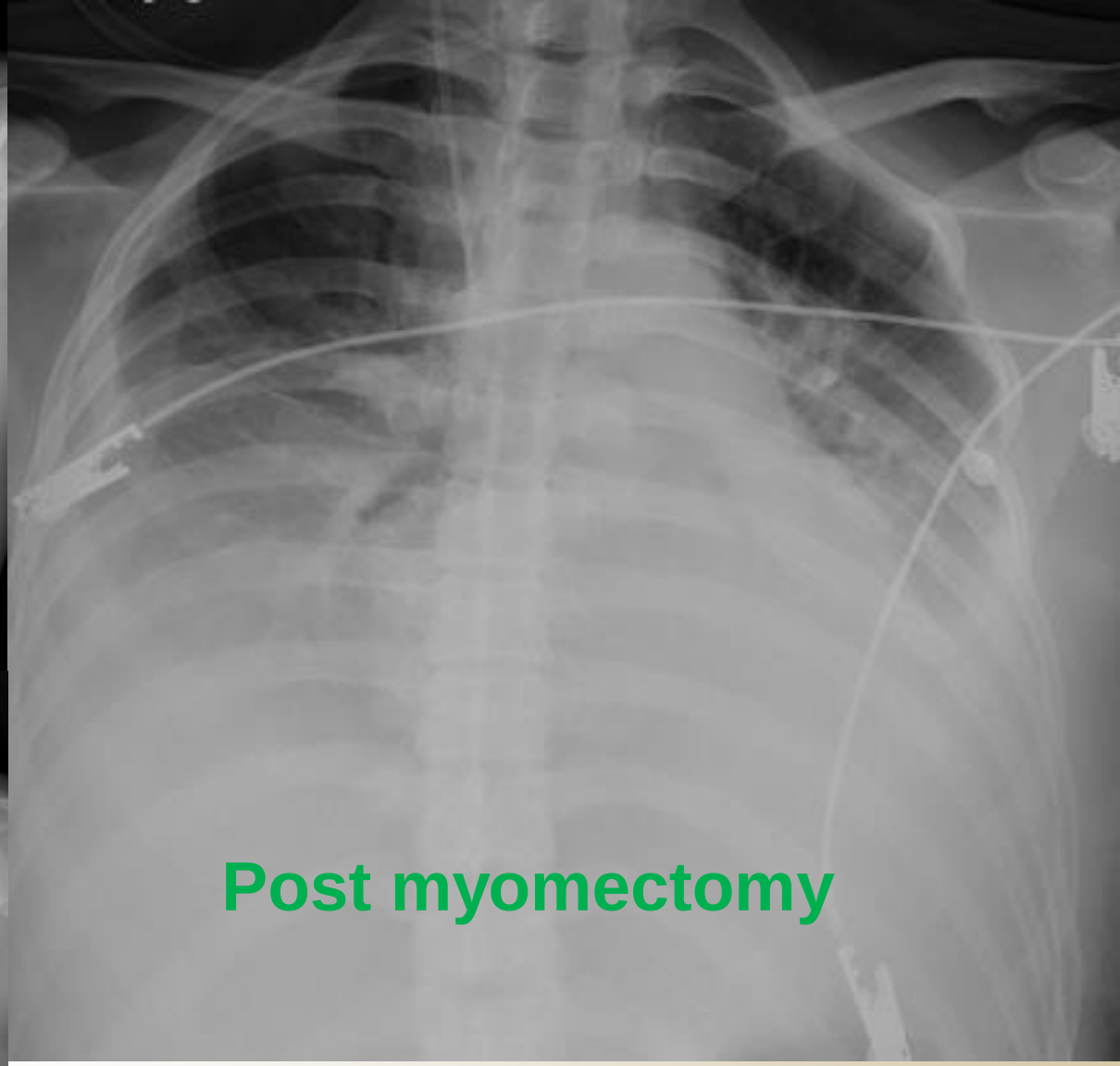




Bil pneumonia??

acute pulmonary edema?





Post myomectomy

Bil pneumonia??

pul edema +PLE?

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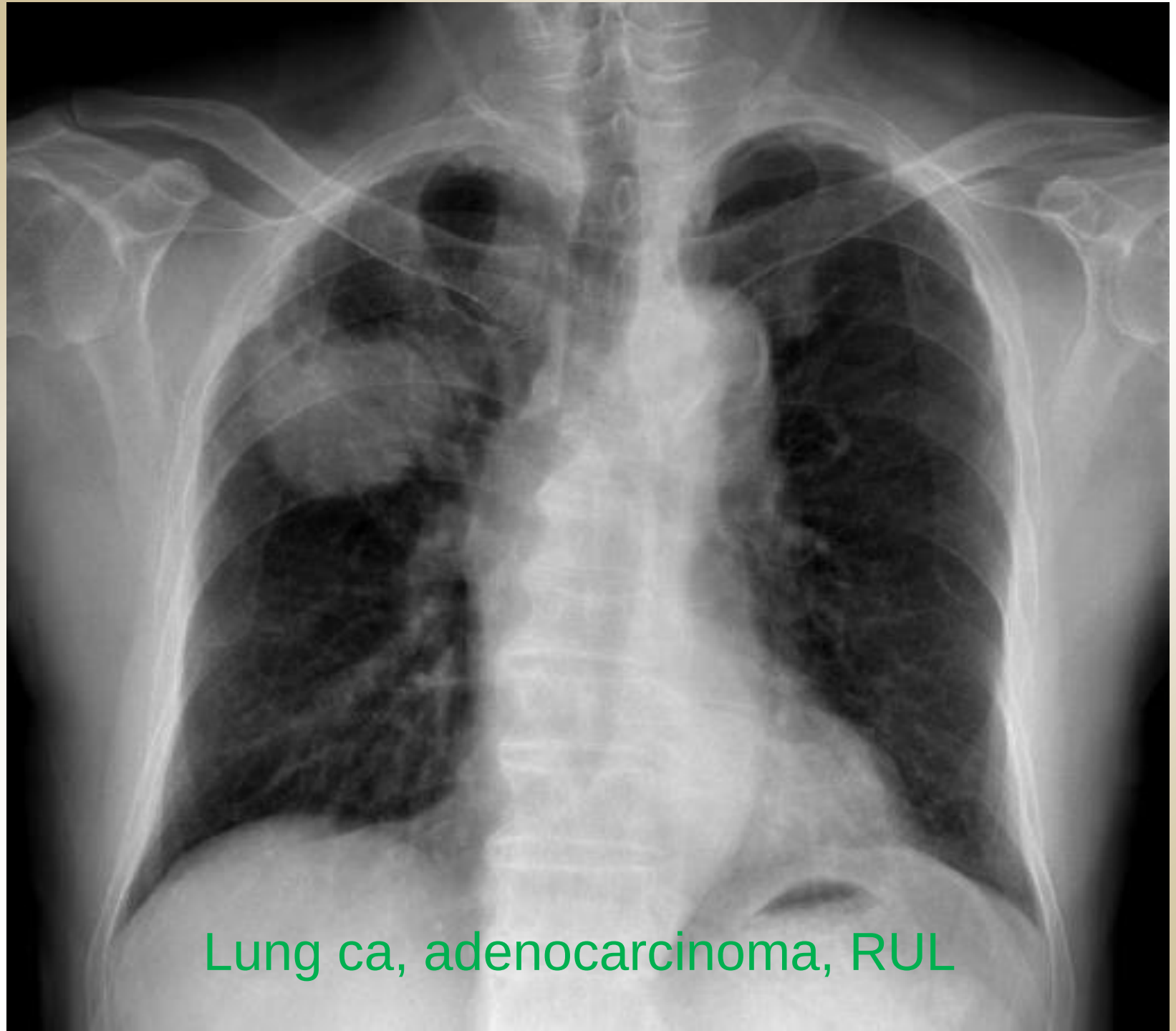
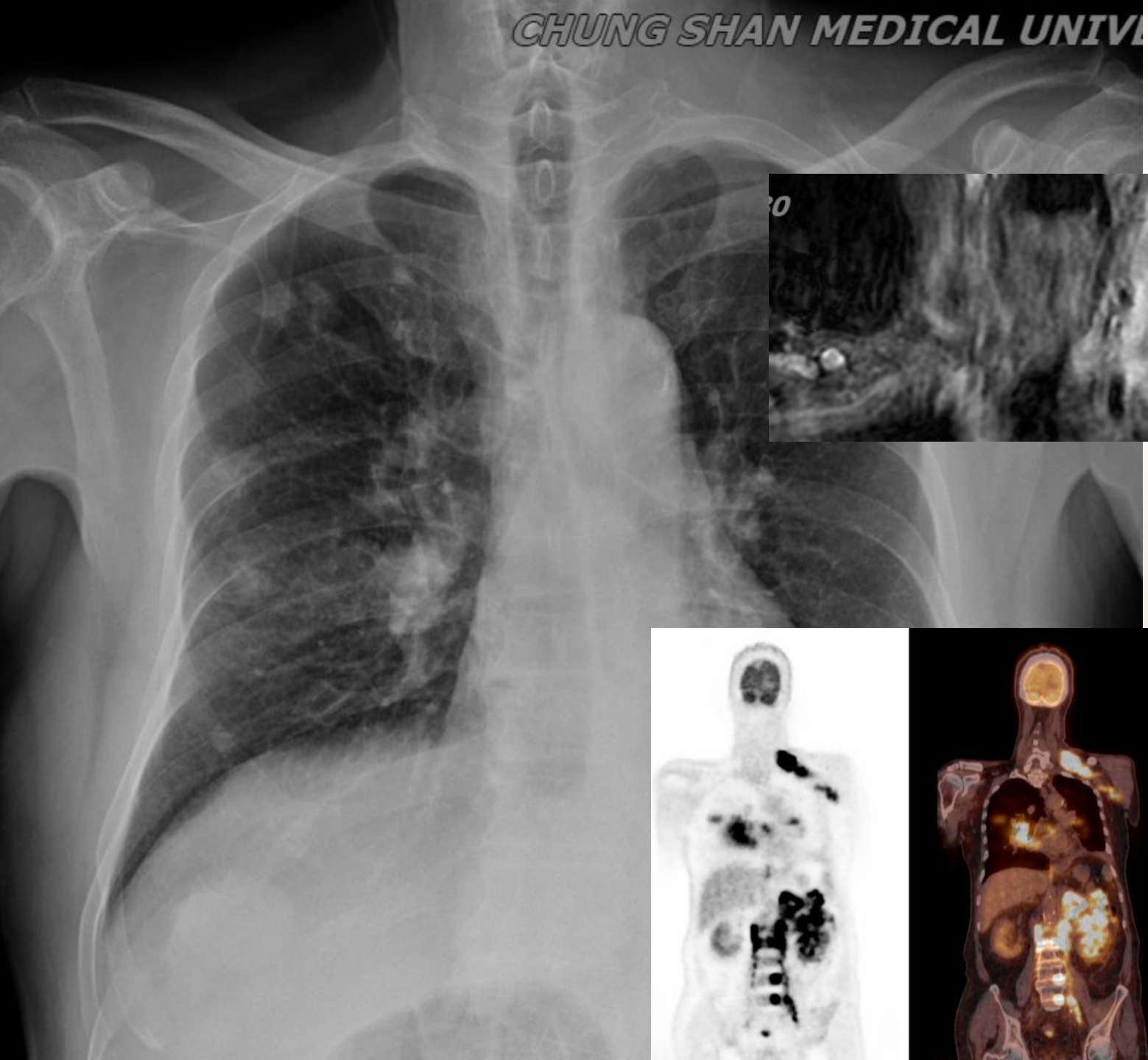
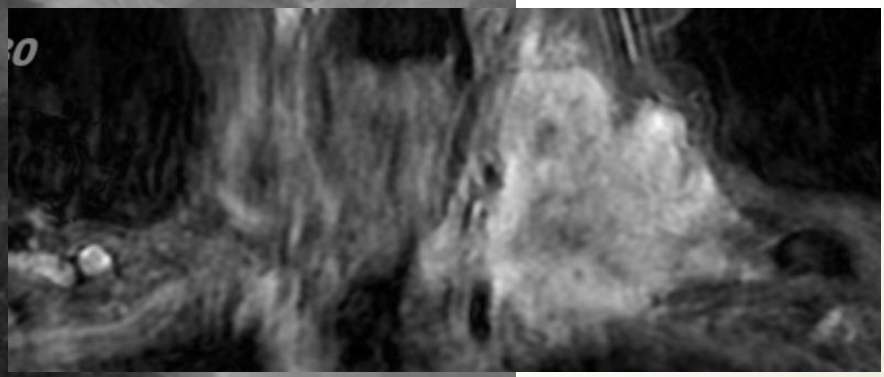
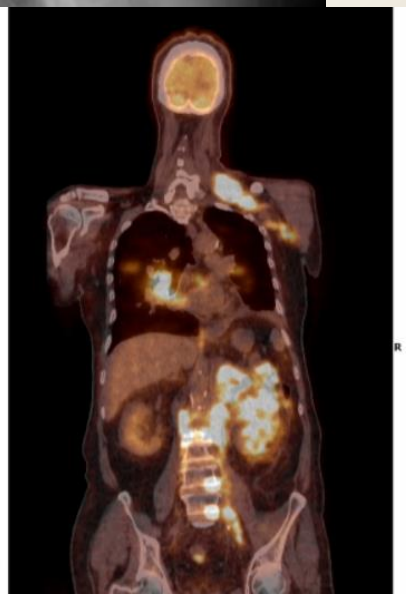
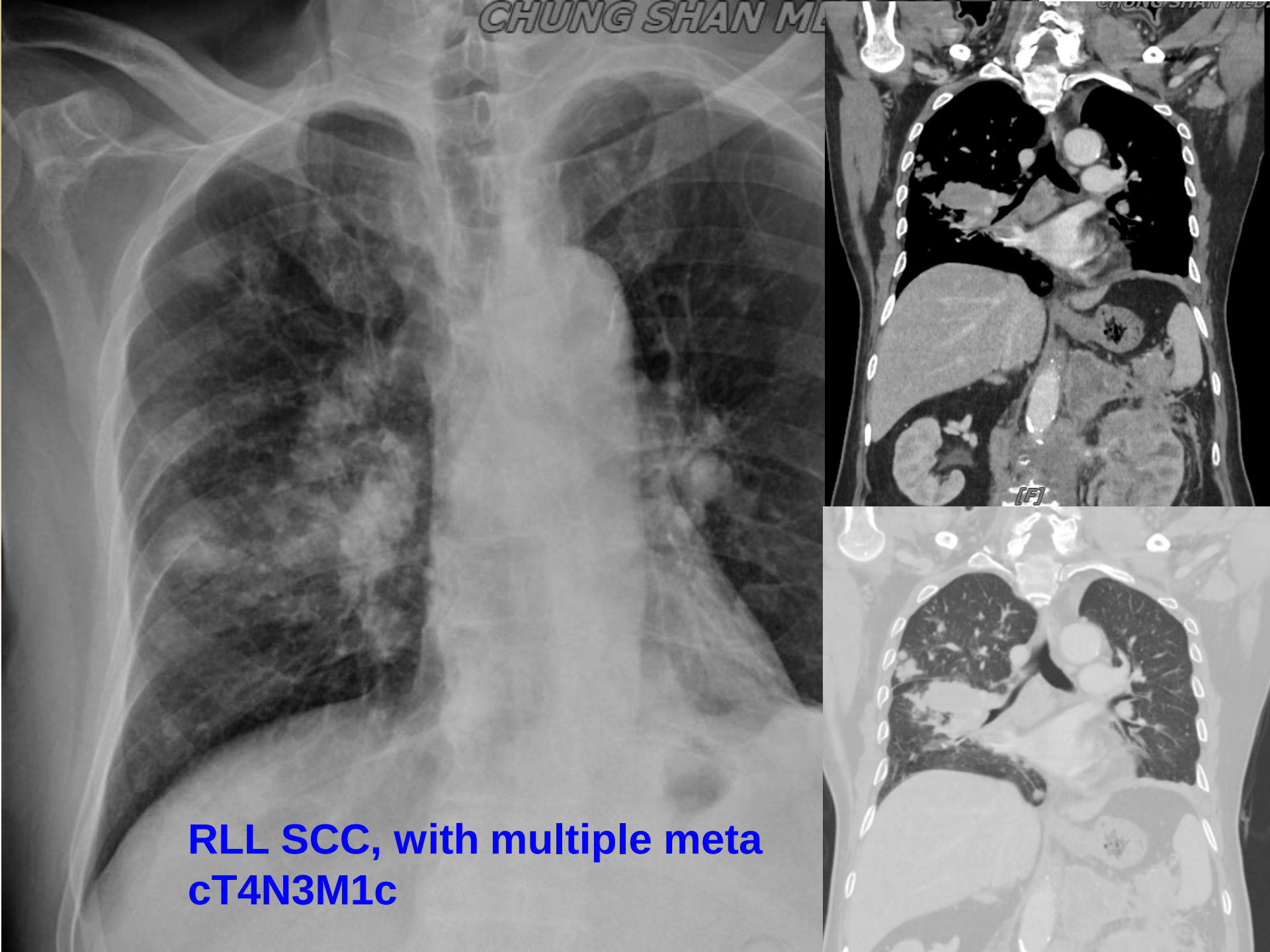


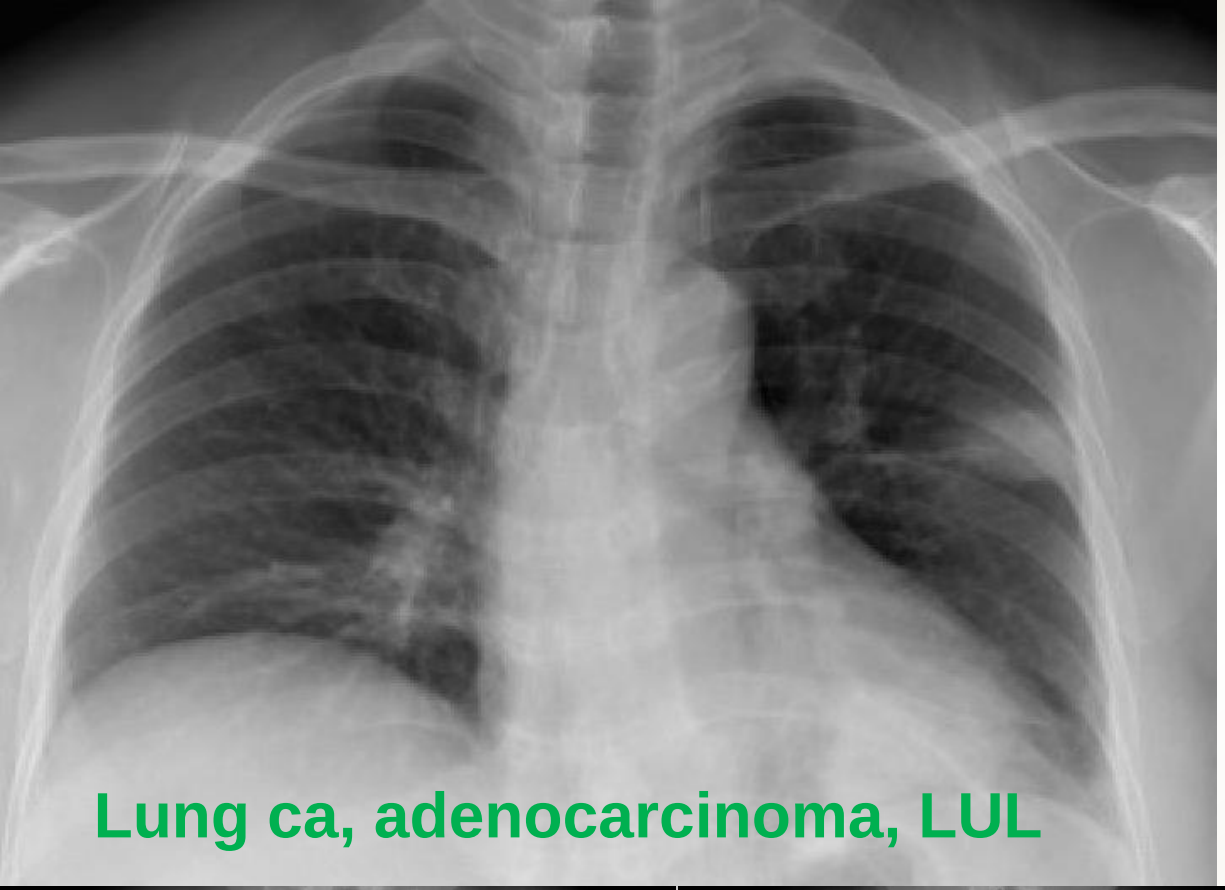
Lung ca, adenocarcinoma, RUL


CHUNG SHAN MEDICAL UNIV

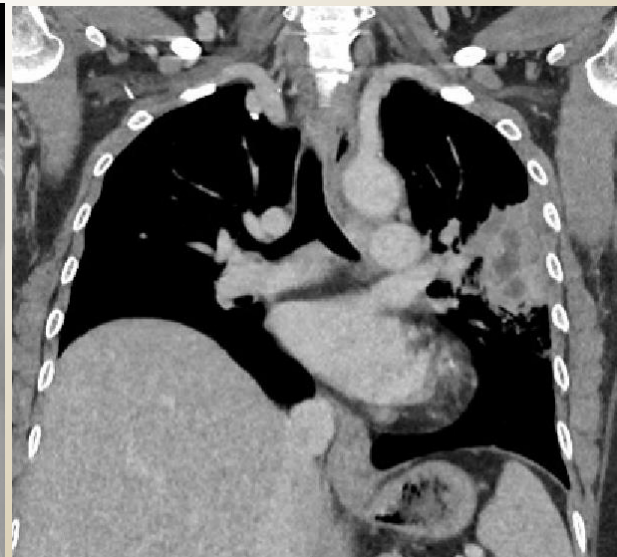


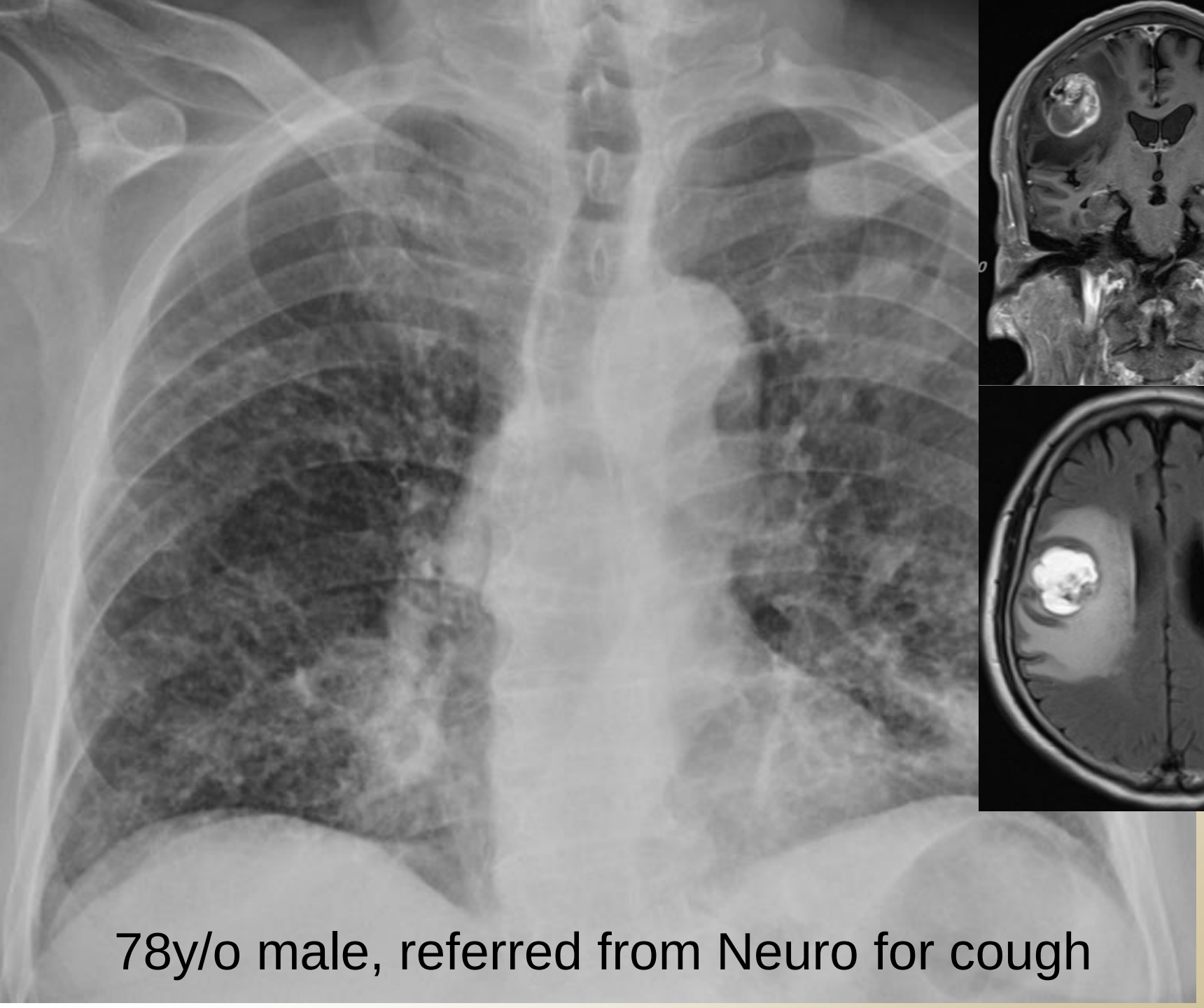


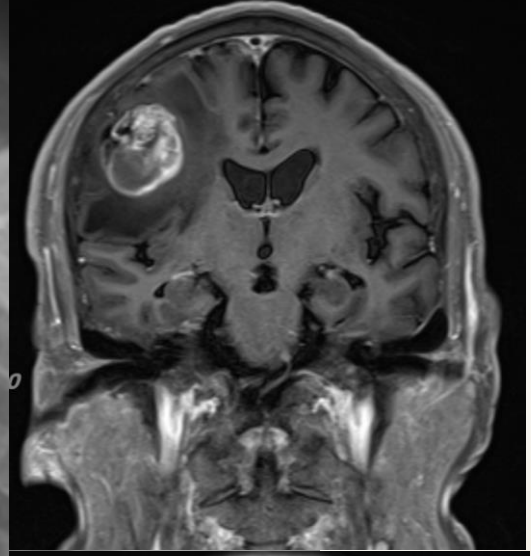

RLL SCC, with multiple meta
cT4N3M1c

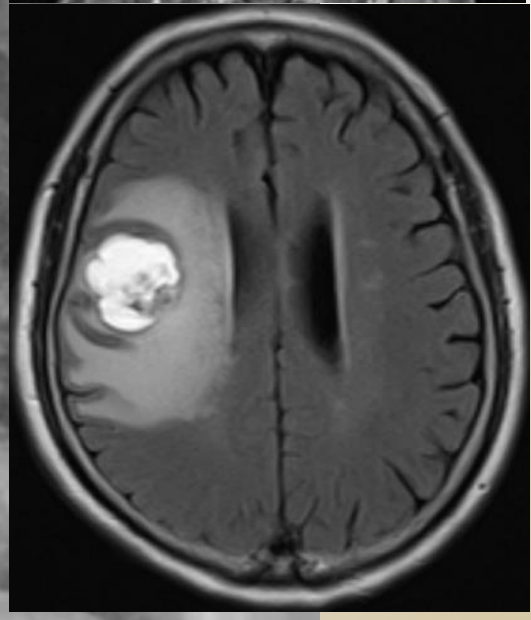


Lung ca, adenocarcinoma, LUL

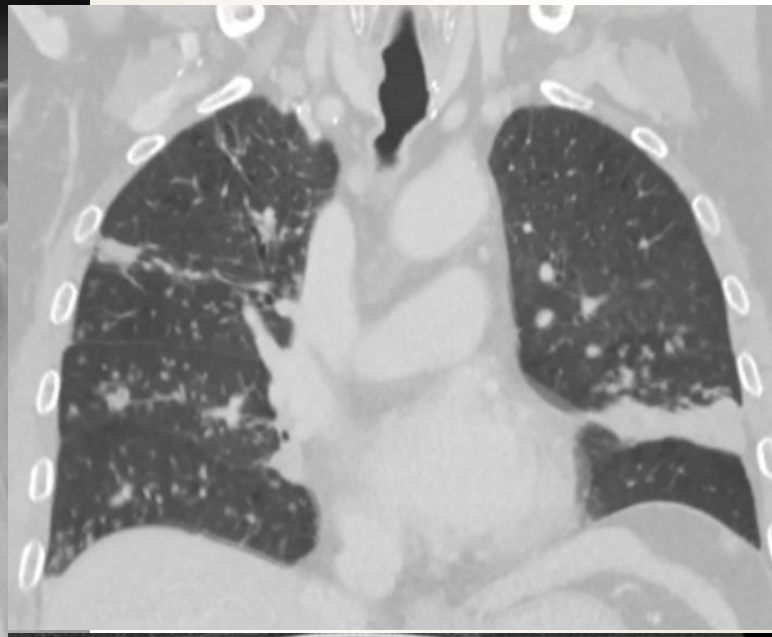






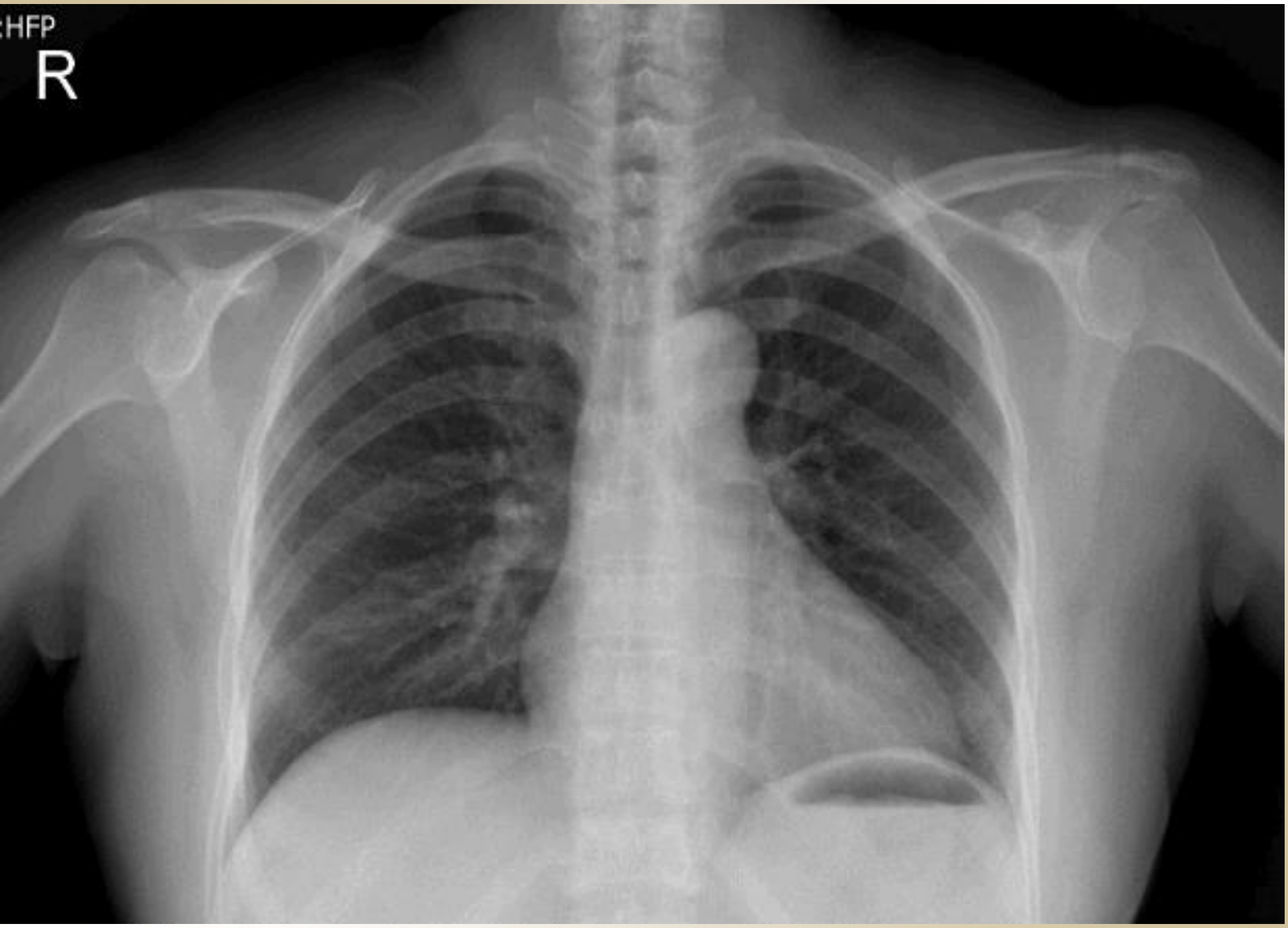


78y/o male, referred from Neuro for cough



Lung adenocarcinoma, cT4N3M1c,
with multiple brain and bone metastases. stage IVB
Pulmonary tuberculosis, active, advanced

Lung adenoca, cT4N3M1c,
s/p TKI and C/T
Pul TB, active, advanced
s/p anti-TB Tx for 4 months


HFP
R


R

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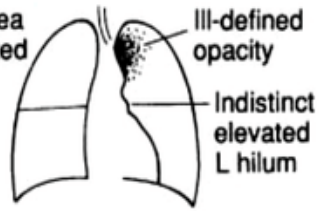
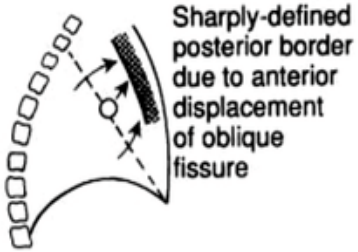
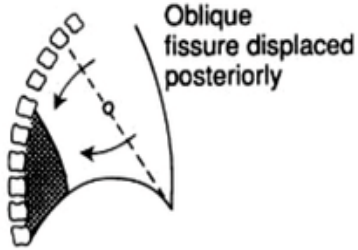
EMNote.org - EMNote

Left upper-lobe collapse



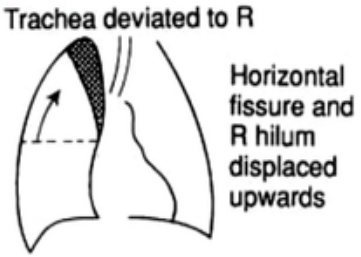


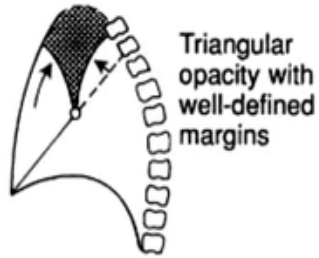
Left lower-lobe collapse



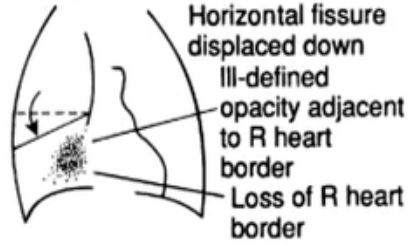
Lingular consolidation

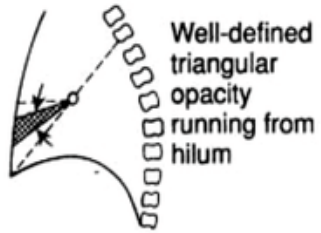
Right upper lobe collapse



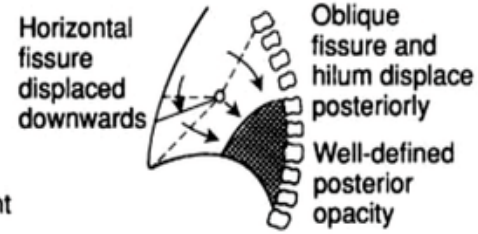


Right middle lobe collapse





Right lower-lobe collapse




Thank you for your attention !!