



# 胸部X光影像 判讀原則與常用徵象



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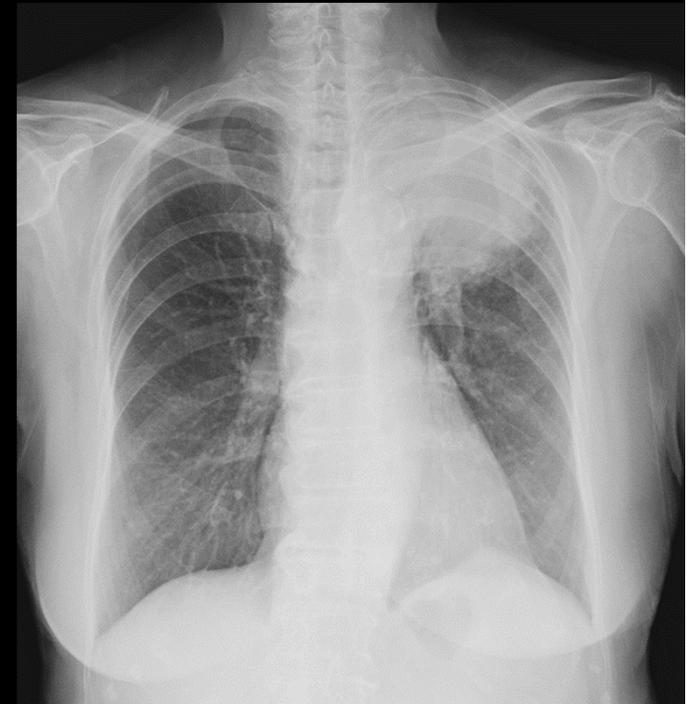
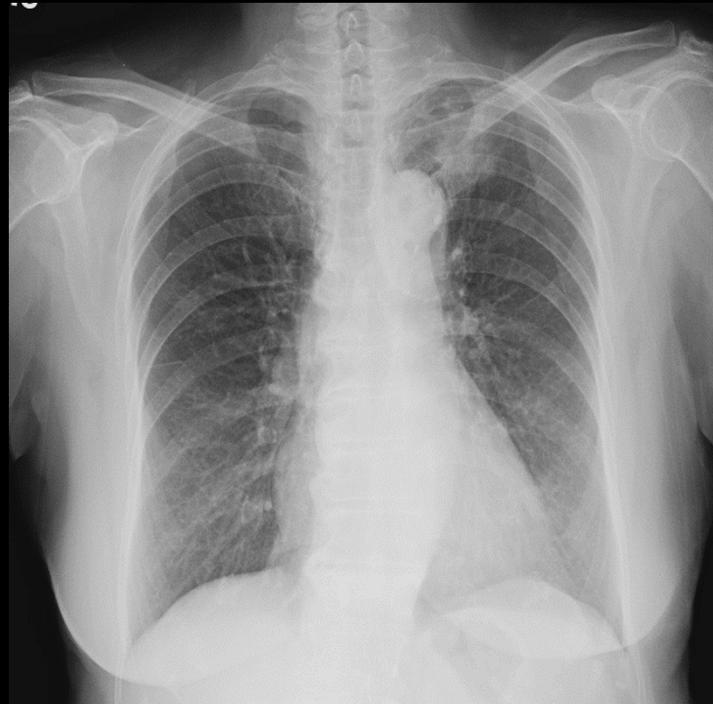
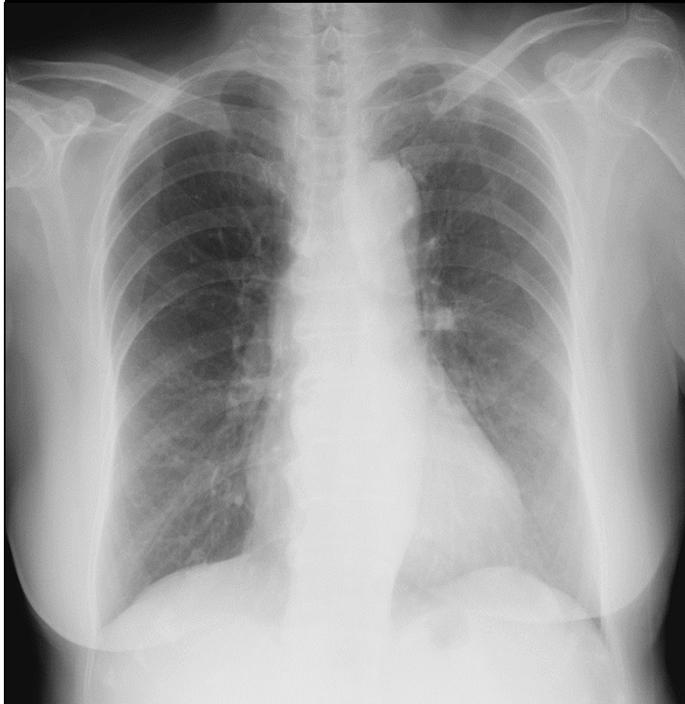
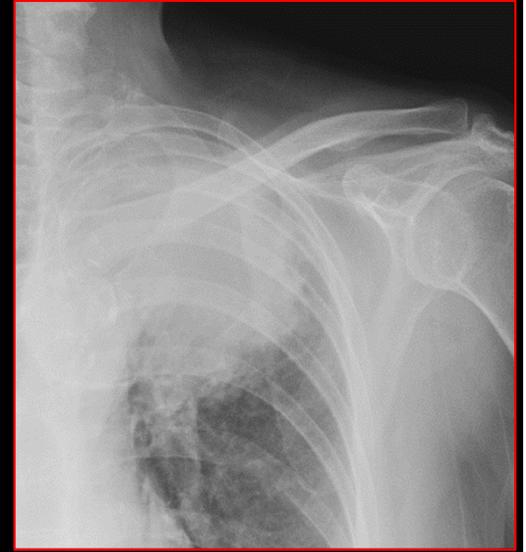
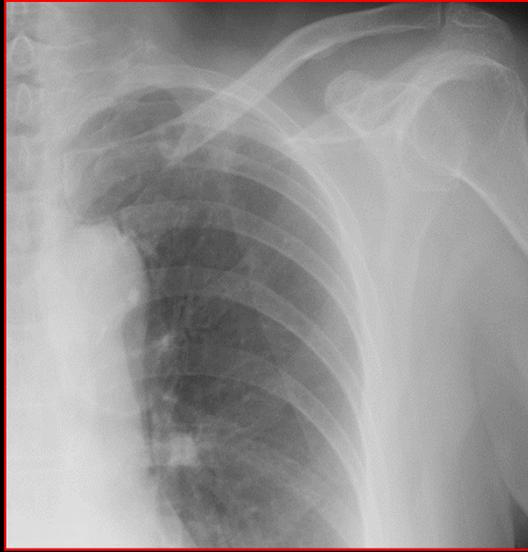
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Slides courtesy of Prof. Chih-Jen Yang,  
Dr. Chih-Hung Cheng, and Dr. Yi-Han Hsiao.

# 做了檢查一定要看...



2013 左上肺結節

2014 左上肺結節

2015 左上肺結節

# Chest image 有那些?

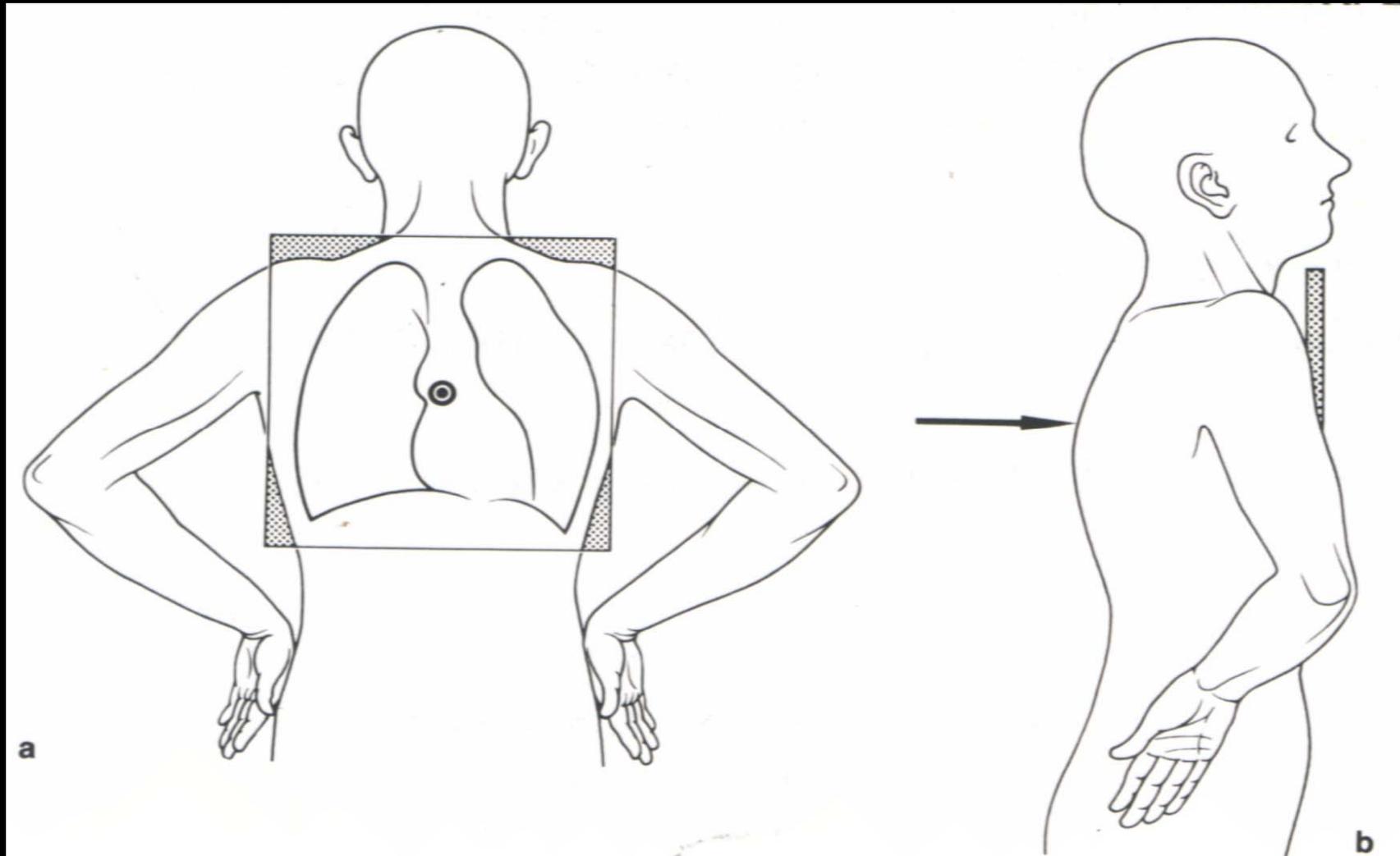
- Chest PA view
- Chest Lateral
- Chest AP view
- Lordotic view
- Decubitus view
- Chest Echo (Ultrasonography)
- Chest CT
- Chest MRI
- Chest PET

# 胸部X光片之判讀要領

- 片子：良好
  - 照相品質
  - 病人姿勢
  - 基本資訊
- 知識：
  - 了解正常解剖學與影像
  - 以patterns & signs作鑑別診斷
  - 熟悉疾病之典型表現，再學習其多樣化表現
- 技巧：
  - 固定的判讀程序，避免遺漏。
  - 利用不同階段的X光片，以病灶的時序變化作鑑別診斷
  - 利用不同的照像技術
  - 參考臨床資料

# Chest PA ~ 標準X光

- most common, adequate lung expansion, standing



## 好的X光片～照的好不好？

- 標示病患基本資料
- 片子夠大
- 姿勢要正
- 吸氣要足
- 脊椎隱約可見
- 心臟後方的肺紋  
(lung marking)  
隱約可見



# Double/multiple exposure

## Motion artifacts



## 開始判讀前的基本資訊

- 確認病人的姓名、病歷號碼、性別、生日及基本資訊
- 確認左或右的字牌
- 做全般性的觀察 (general screening)

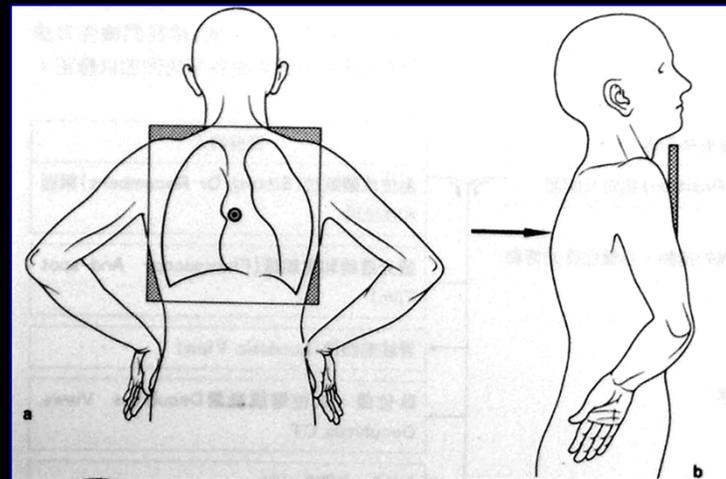


# 好的胸部X光片

看的範圍愈多愈好



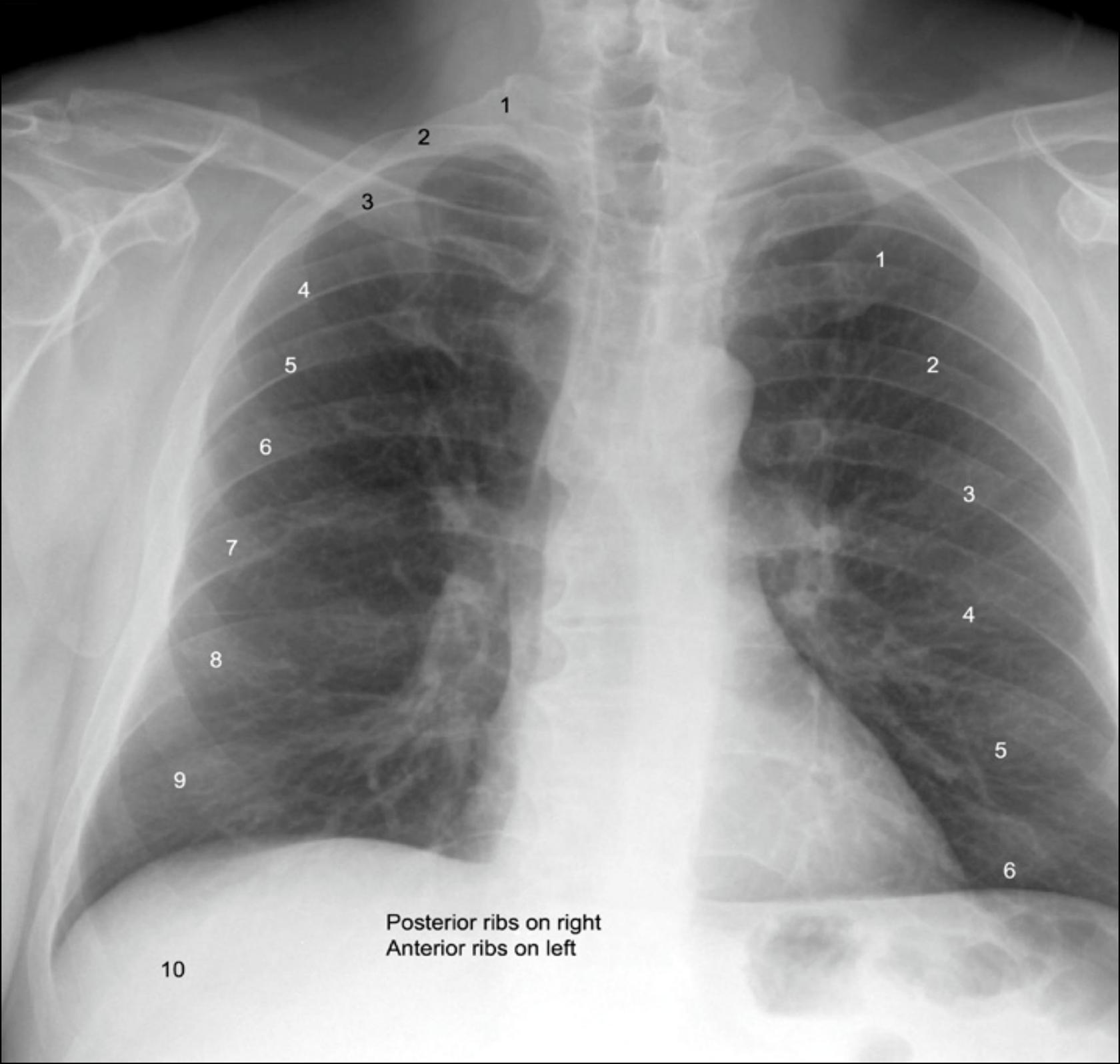
- 常規正面像
  - 立姿
  - 深吸氣
  - 後前像 (PA)
  - 距離 6 英尺
  - 暴露適當



# 照相品質好不好

- **片子夠大**: 應該涵蓋
  - **Neck**: 以免loss trachea 病變
  - **胸廓**: 以免loss soft tissue/ bony lesions
  - **Diaphragm**: sub-diaphragm lesions, 如liver, gastric bubble
  - **Bilateral costophrenic angle**: 以免loss少量effusion
- **吸氣充足**:
  - 正常PA view: diaphragm 中心點與肋骨交會(前6後10)
- **曝光適當**





Posterior ribs on right  
Anterior ribs on left

10

# 如何判斷曝光好不好?

- Trachea與carina  
隱約可見
- 下段vertebra  
清晰可見
- 脊柱間盤隱約可見
- 心臟後與橫膈下方  
的肺紋可識
- 兩側肺紋至外三分  
之一清晰可見



# 曝光良好的CXR



## 曝光太強

過黑，

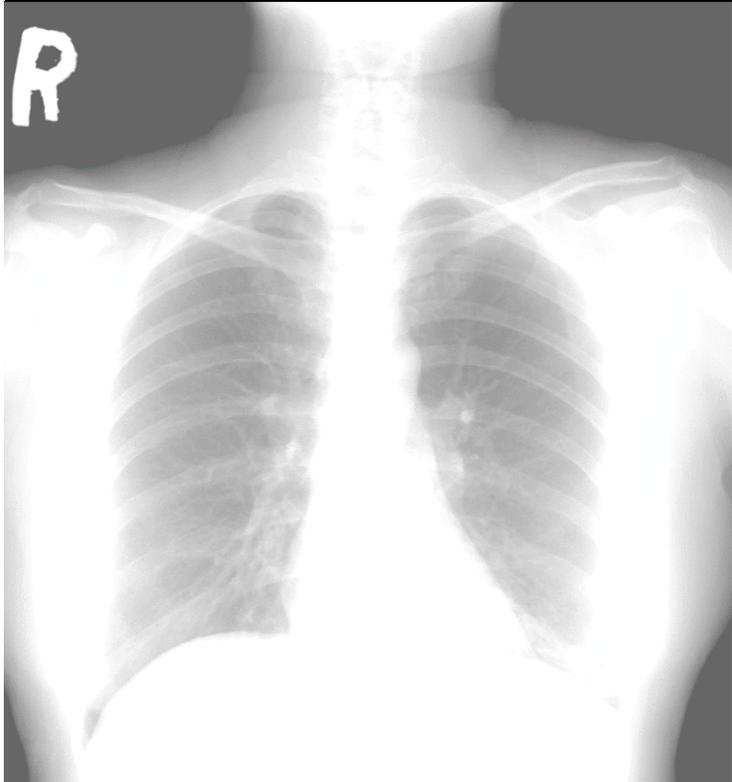
會miss tiny lesions

## 曝光適當

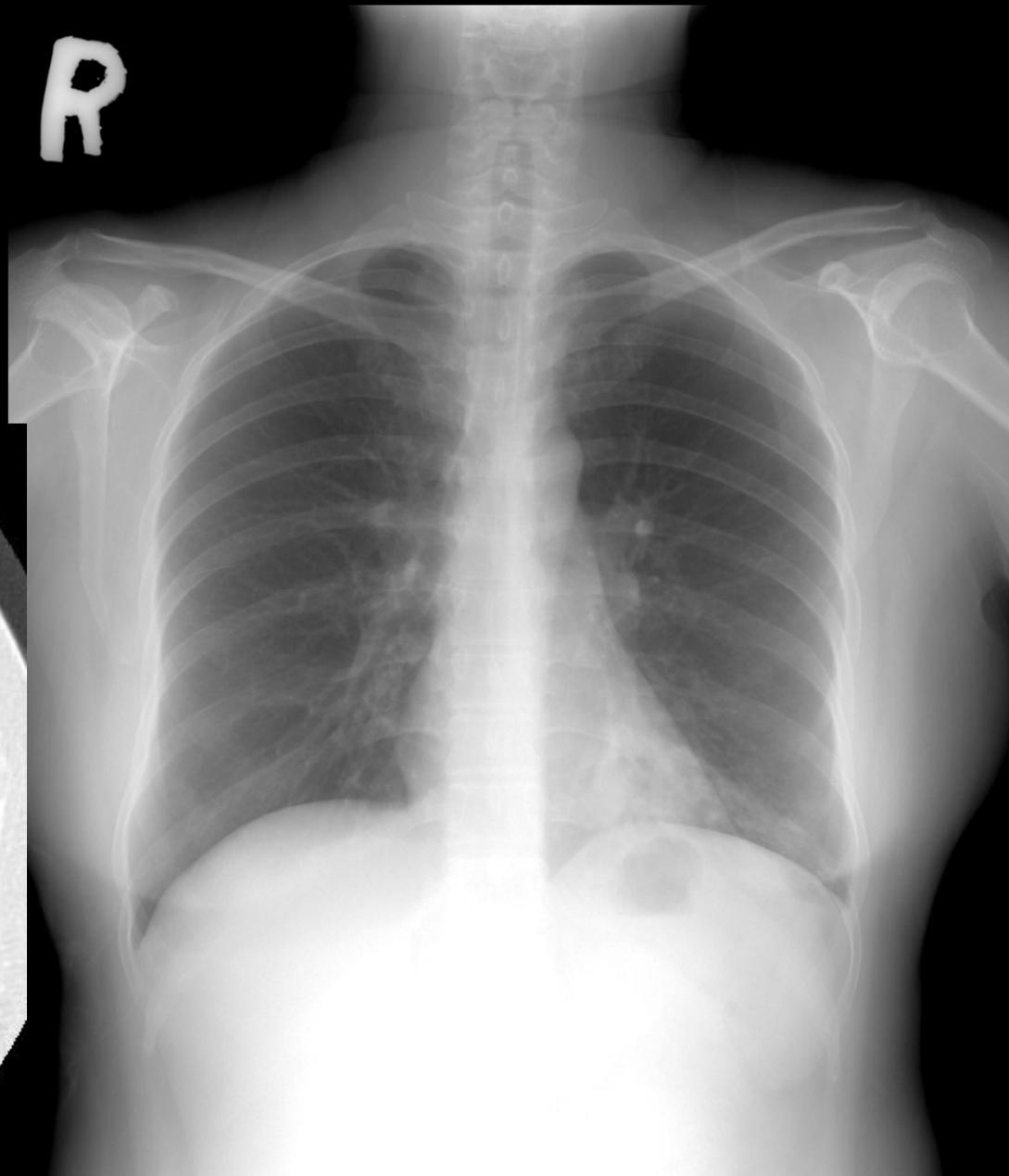
## 曝光太弱

過白，

會miss縱隔腔內、  
心臟後的病變



不好的片子  
→ 調整透光度後...

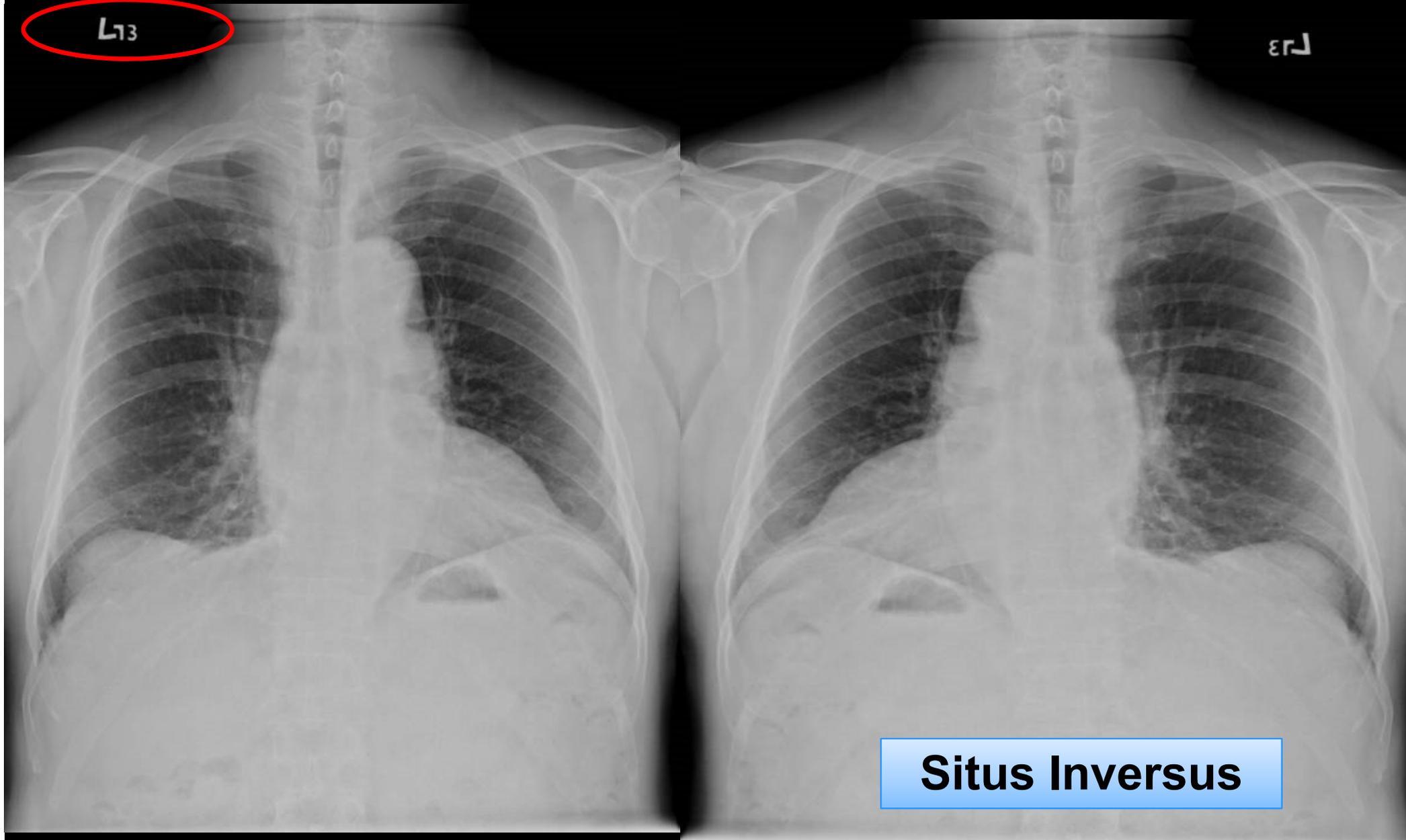


**Bronchiectasis**

L73

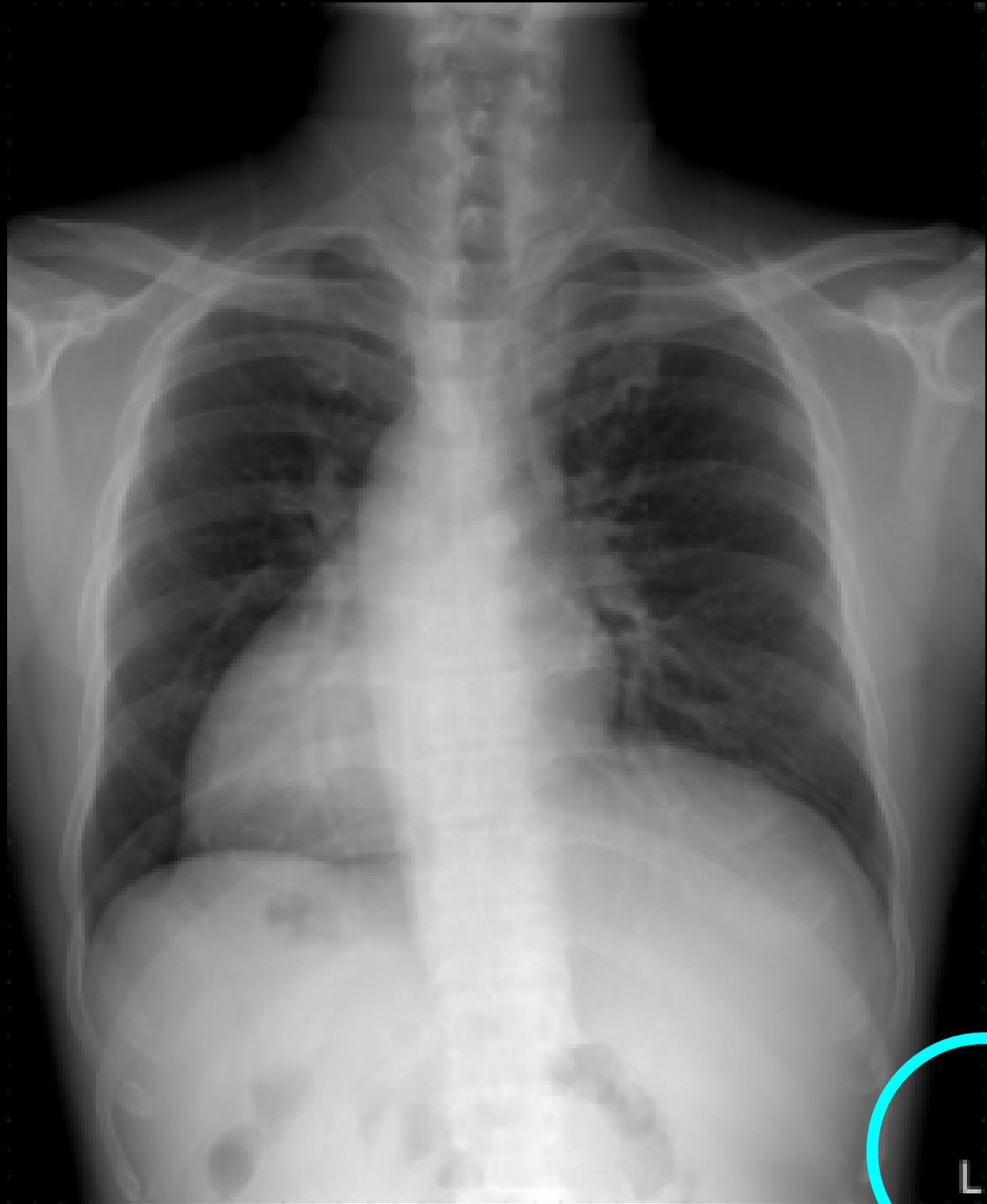
R73

**Situs Inversus**



# Situs Inversus

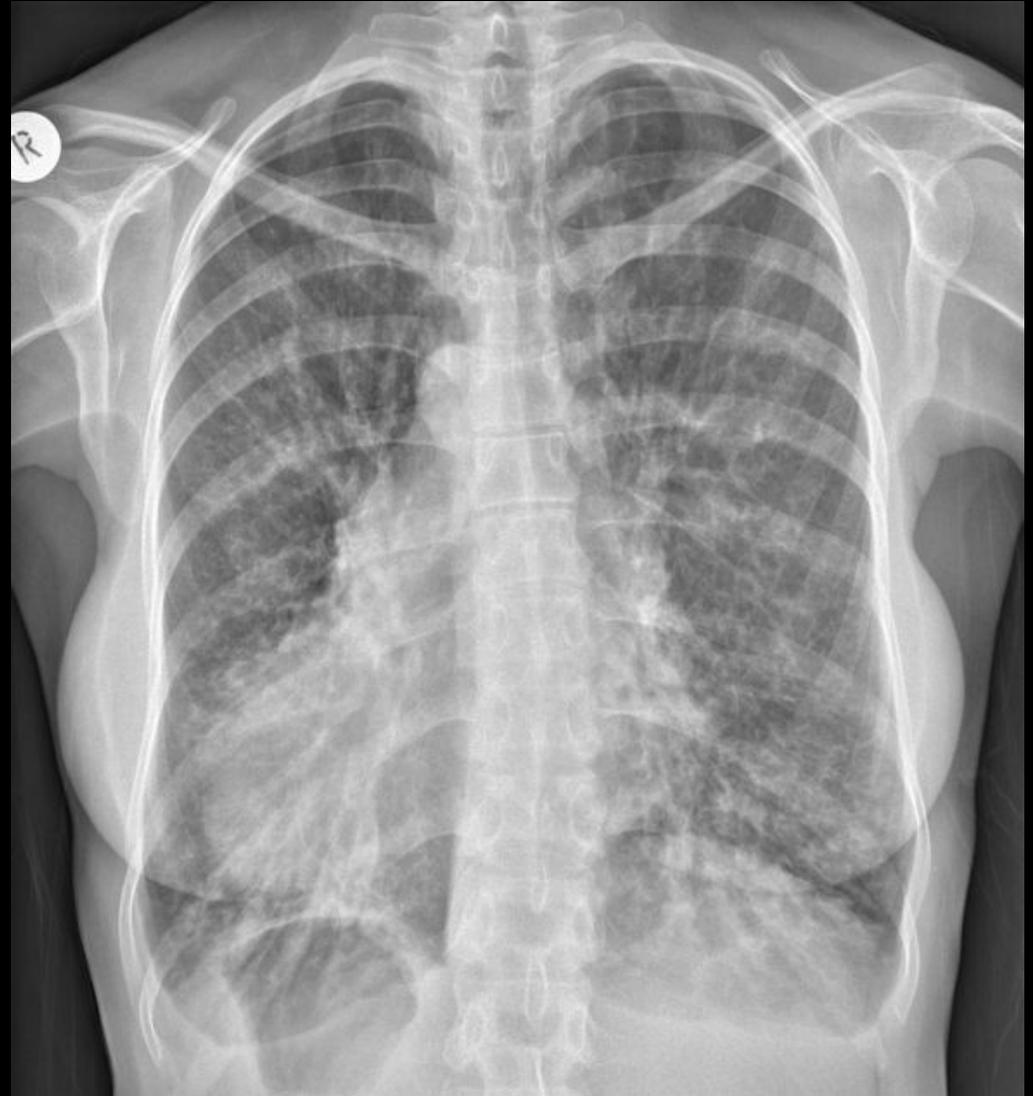
## 內臟反轉



# Kartagener syndrome

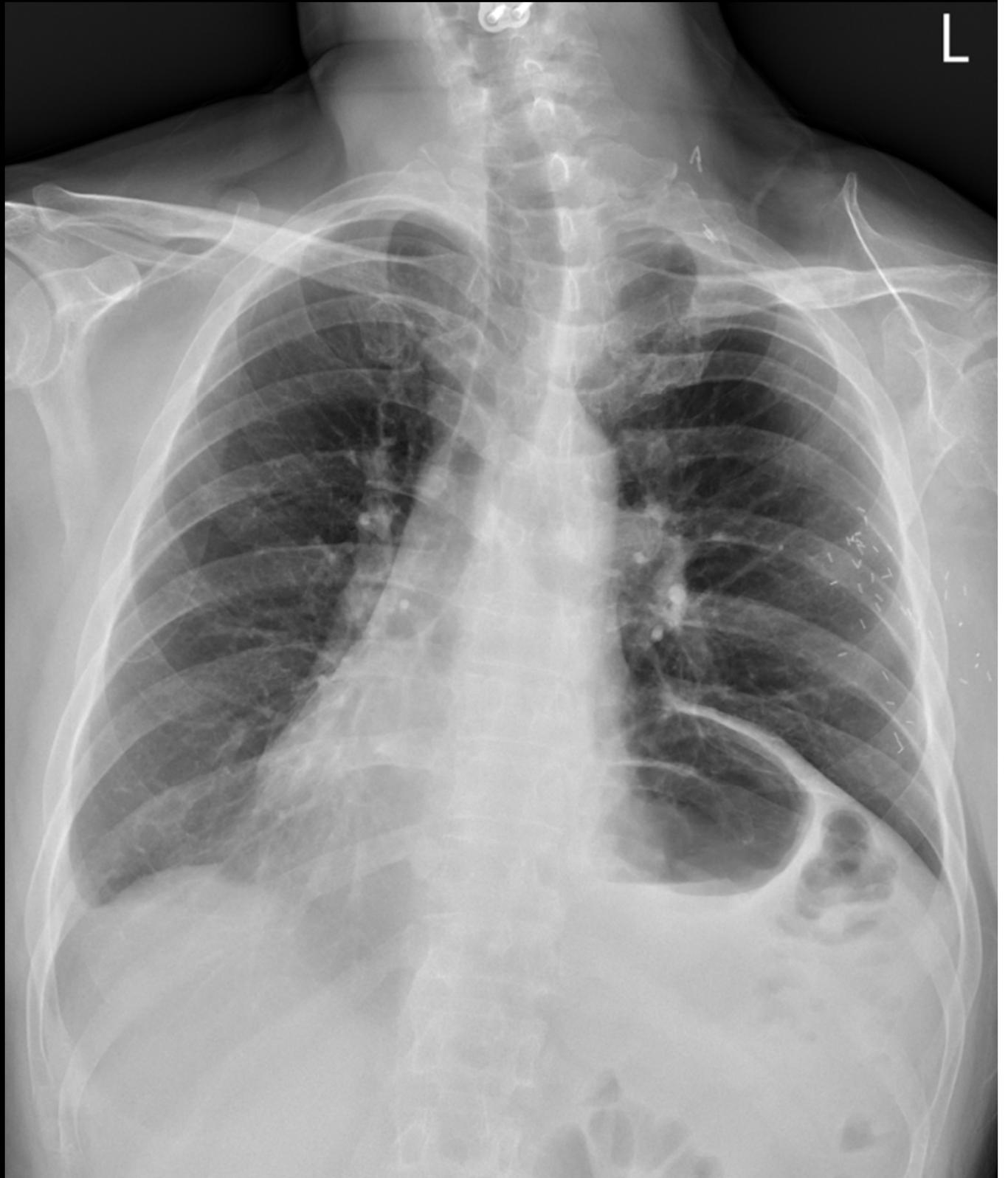
(a subset of primary ciliary dyskinesia)

- Situs inversus (20% of SI)
- Bronchiectasis
- Chronic sinusitis and/or nasal polyposis



**Dextrocardia?**

**Left phrenic nerve palsy  
related to C-spine injury**



# General Screening

## ● 照相的體位(standing or lying)

### ● 觀察重點：

- **Scapular**有沒有打開：看tip of scapula

- **Clavicle**走向：

站著照clavicle比較平，躺著照clavicle會變斜上揚

- **Gastric-bubble**內是否有**air-fluid level**

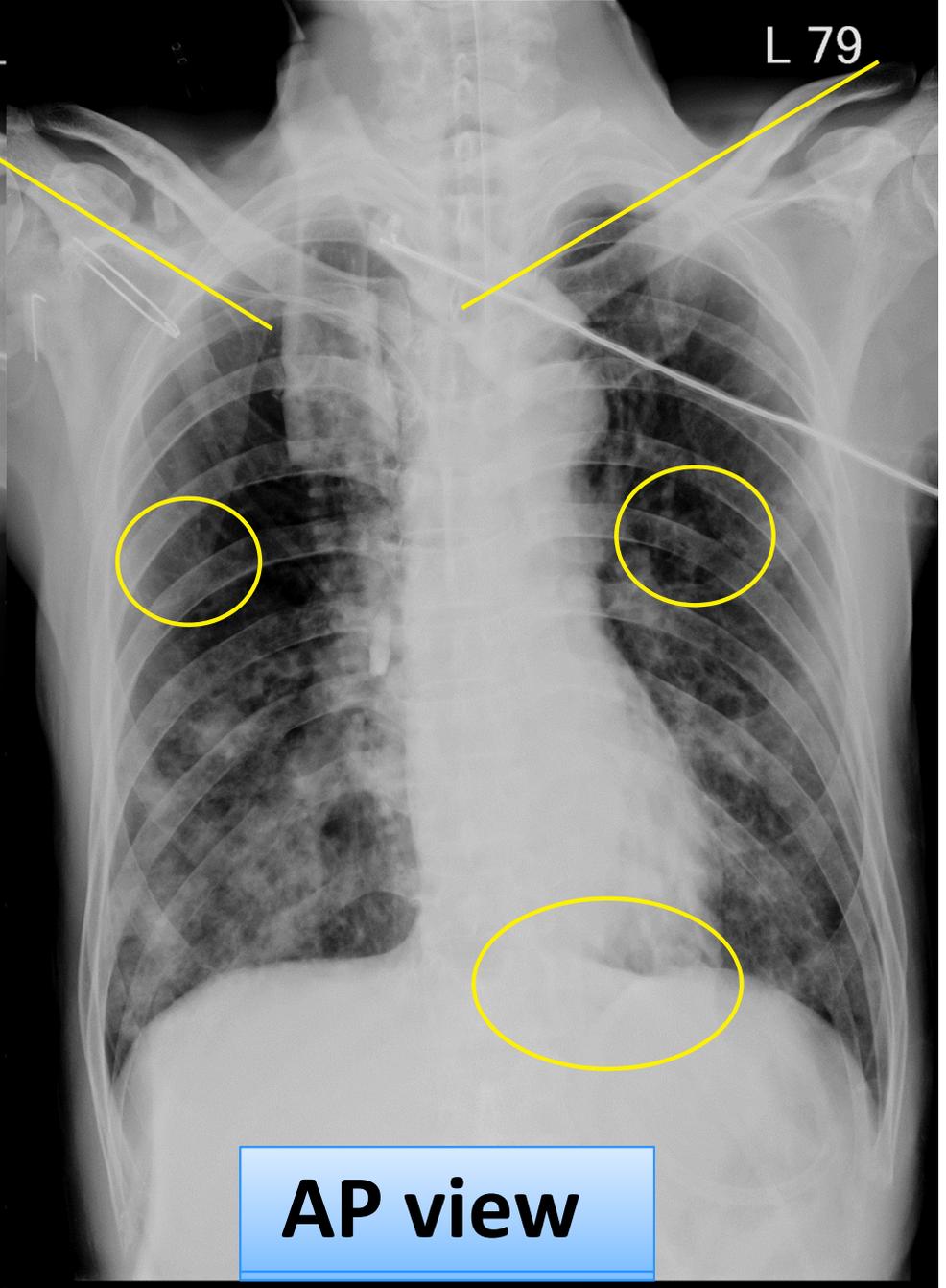
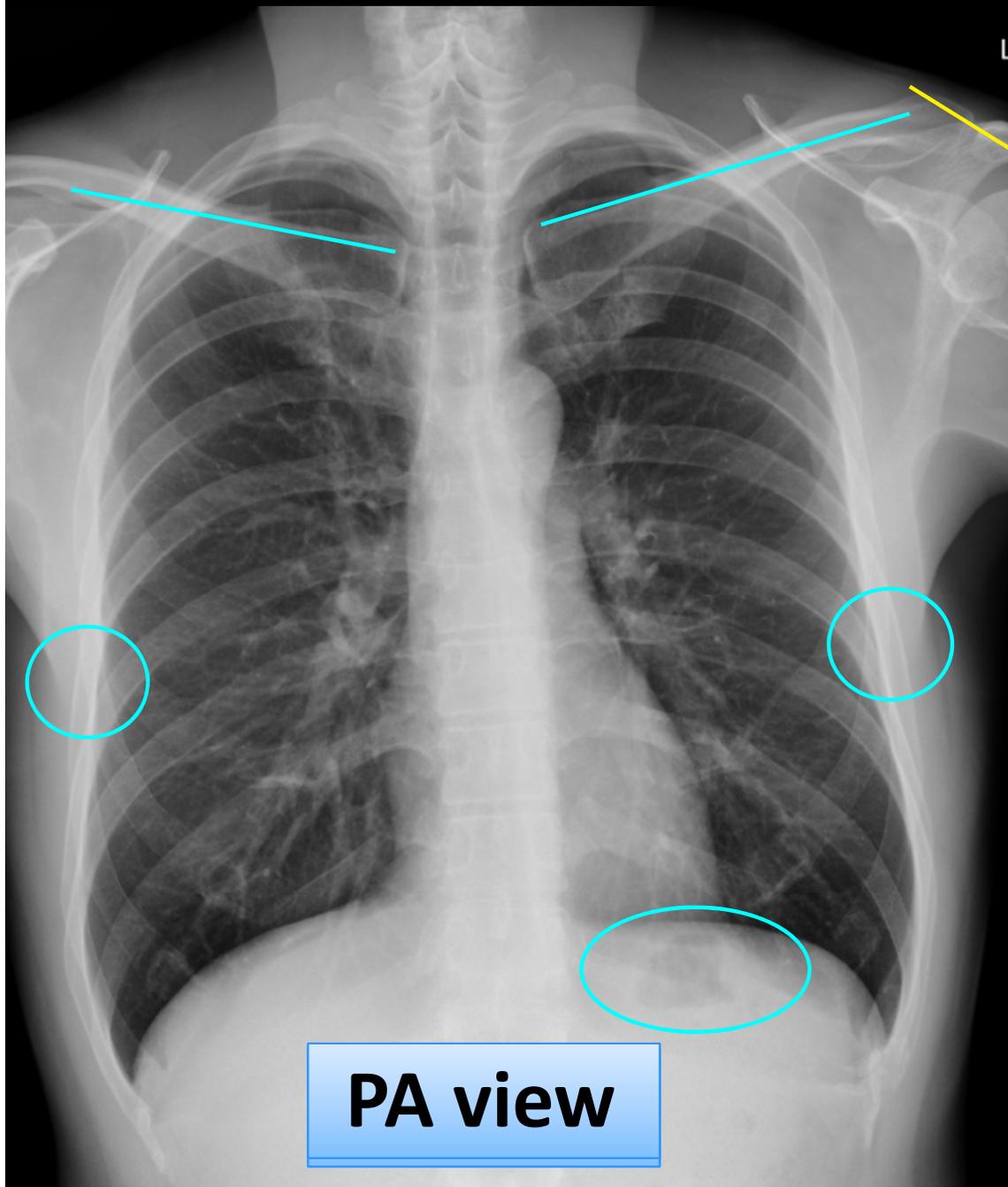
- 通常躺著照相，表示病情較為嚴重。

## ● 年齡

- 30-40 y/o : First rib calcification (第一根肋軟骨鈣化)

- 50-60 y/o : Tortuous aorta

- 70 y/o : Aortic arch (knob) calcification



# AP view 與 PA view 判讀之差異

- **透亮度(lucency) :**  
AP view 肺尖與肺底之透亮度較為接近
- **肺野(lung field) :**  
AP view 因平躺(supine)，因重力(gravity)的關係
  - a. 上肺野之肺血管紋(lung markings)較站立時明顯
  - b. 肺血管紋的分布也不限於內2/3
- **肺容積(lung volume) :**
  - a. 肺容積減少    b. 橫膈上升    c. 肋間距縮短
- **心臟及橫膈的影像(shadows) :**
  - a. 心臟大小：較大    b. 橫膈高低：不明顯

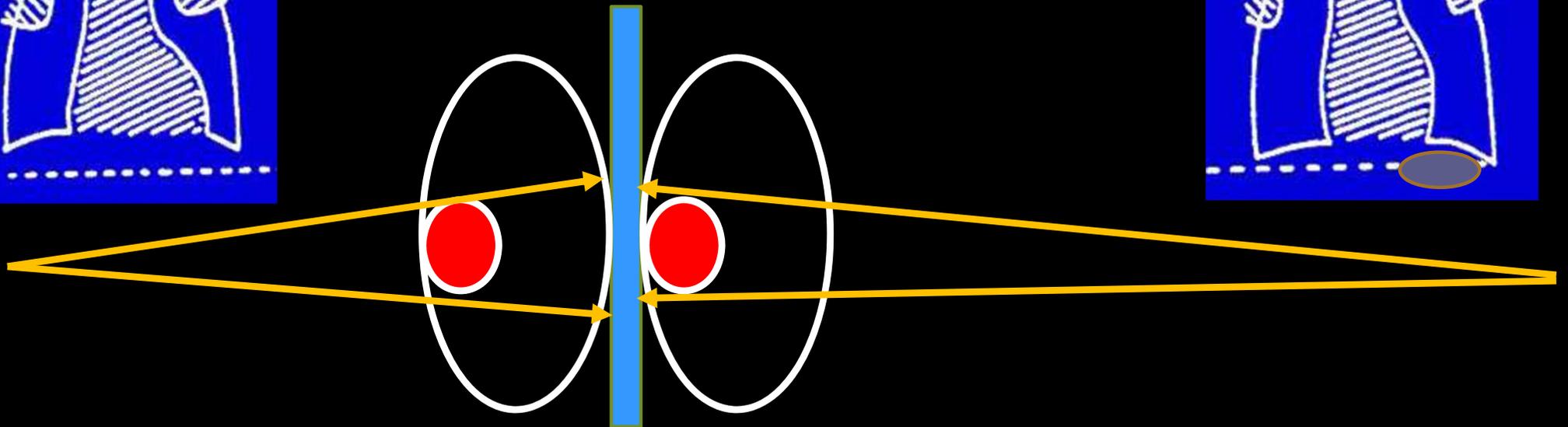
# Chest AP : 重症單位之CXR

- CXR是ICU單位最常用且最基礎之影像檢查
- CXR是用Portable (Bedside) X ray 機器
- 一般站立CXR是Chest PA(即由後往前照,底片在前), 在6呎處照
- Portable CXR 是Chest AP(由前往後照,底片在後), 小於6呎照
- 方便、即時, 但品質、影像條件差

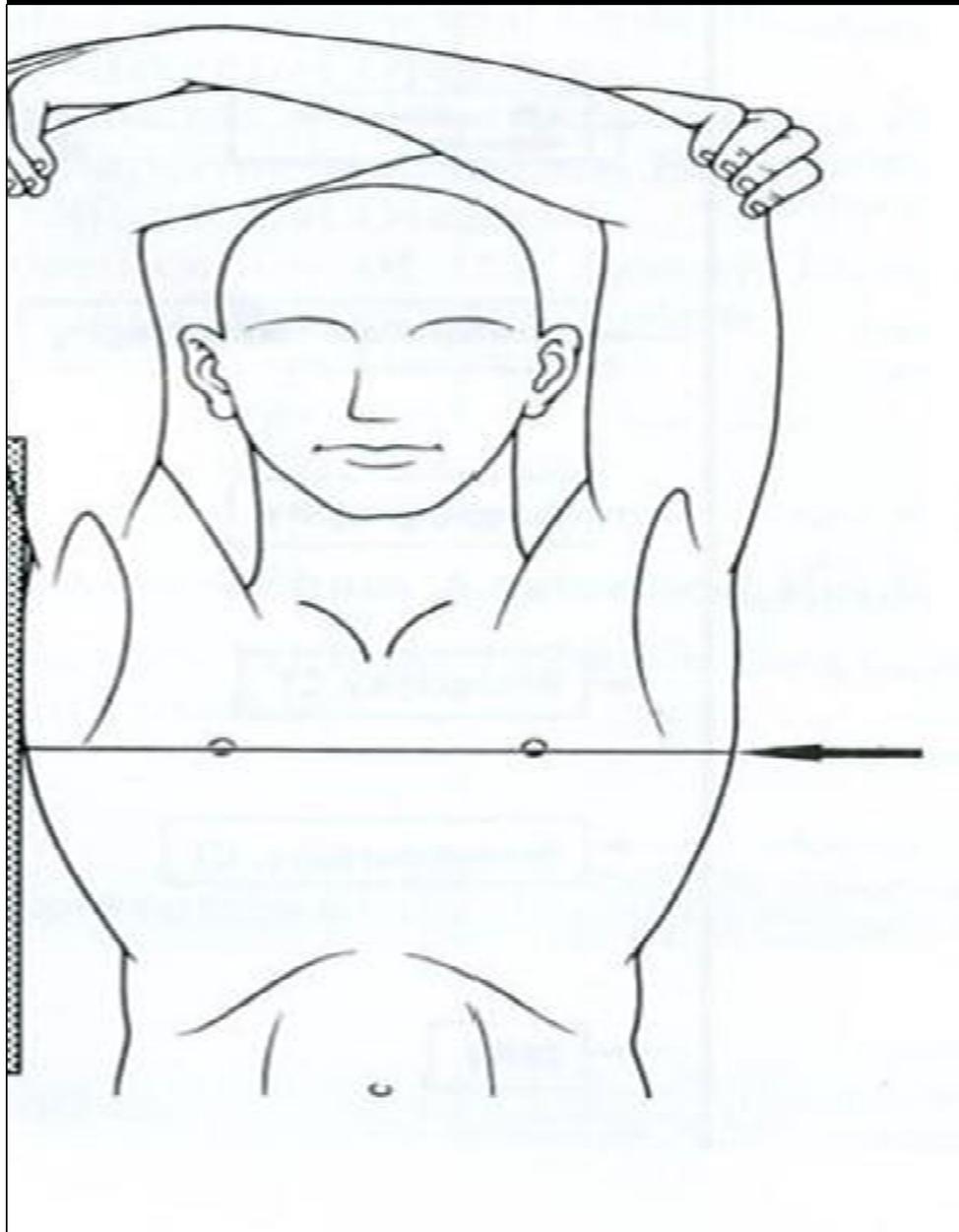
AP



PA view (站)



# Lateral view



Left lateral



Right lateral

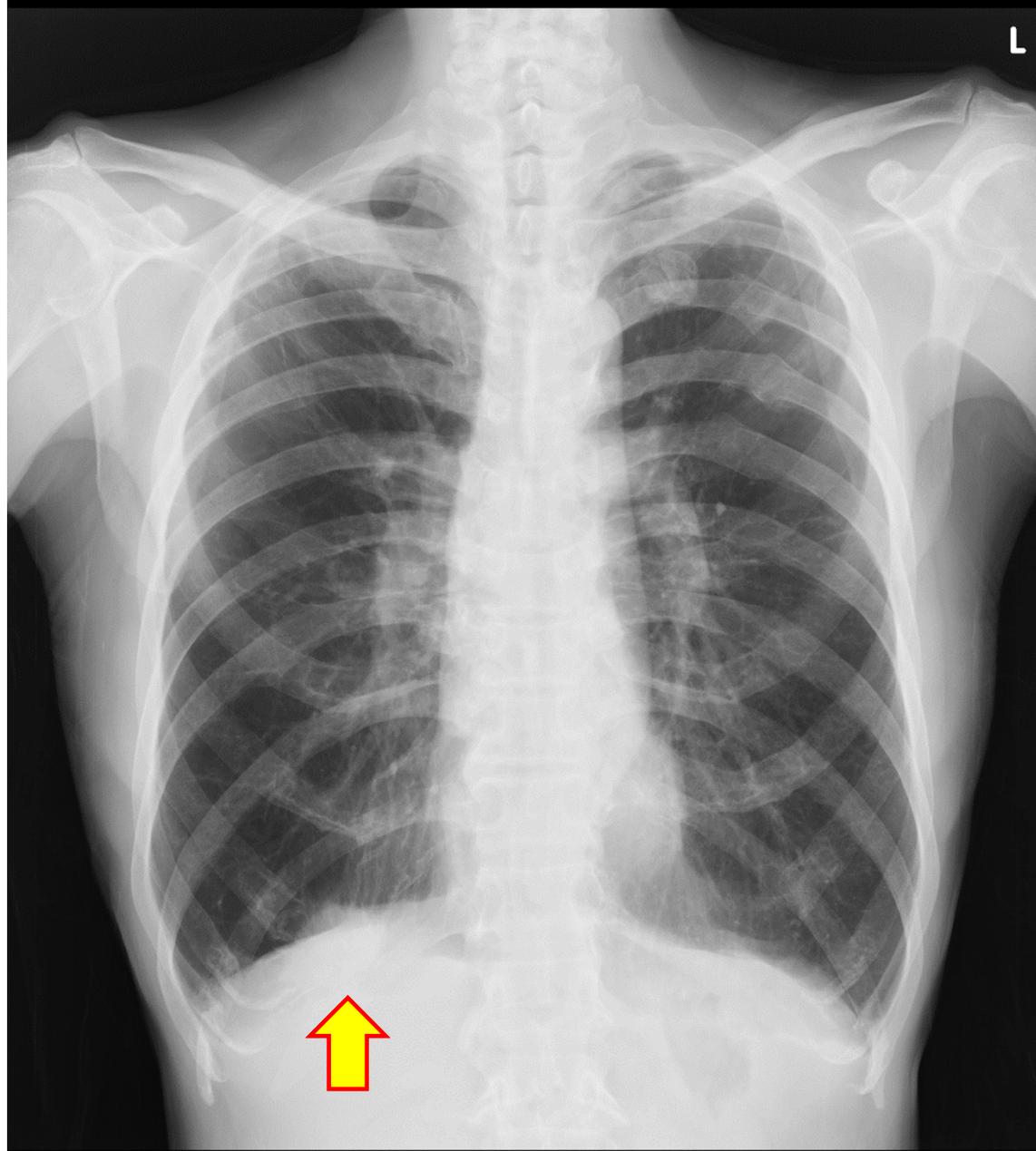
目標貼近底片！

# Lateral view

- 側面照可印證及確定CXR PA之病灶範圍、位置
- 有些病灶在CXR PA看不見
- 注意點：
  - **Retrocardial and retrosternal hyperlucency**
  - 沿Spine往下應越來越黑
  - **Costovertebral angle**
  - **Diaphragm**
  - **Major fissure**
  - **Hilum**
  - **Trachea**



# 側面照有時也會有幫助

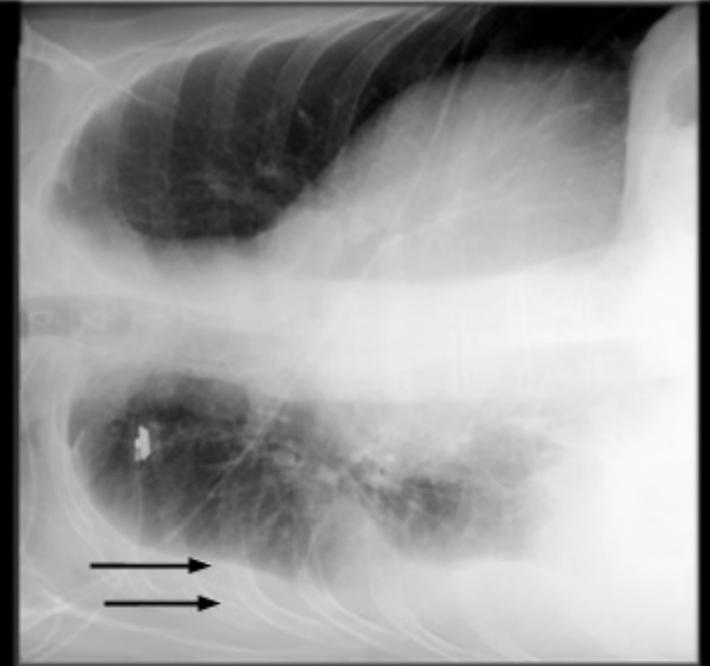


# Decubitus view

- 偵測肋膜積水
  - 現今多已超音波取代
- 偵測肺內膿瘍  
(air-fluid level)



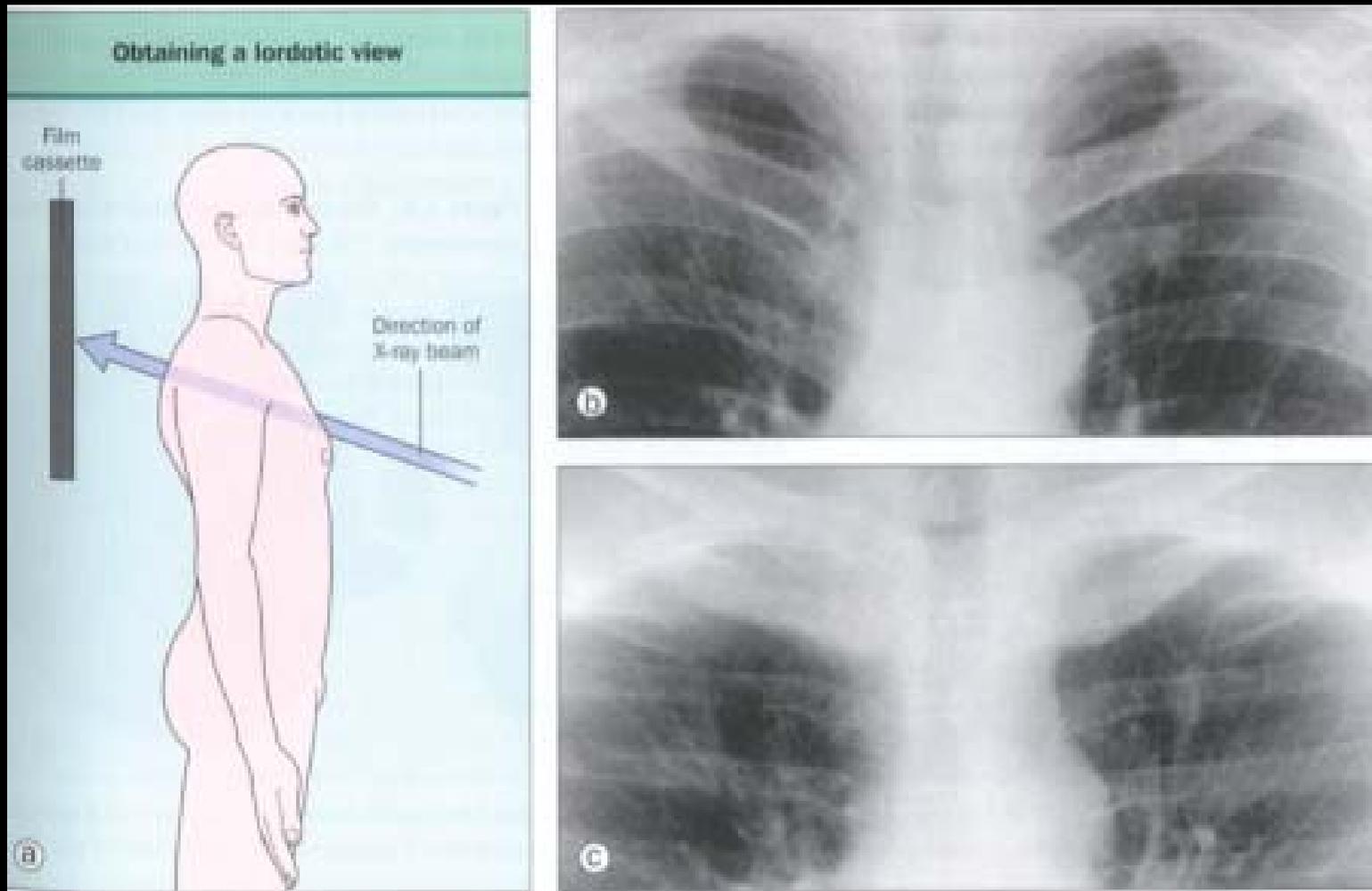
high hemidiaphragm  
suggests effusion



decubitus view  
confirms layering  
effusion

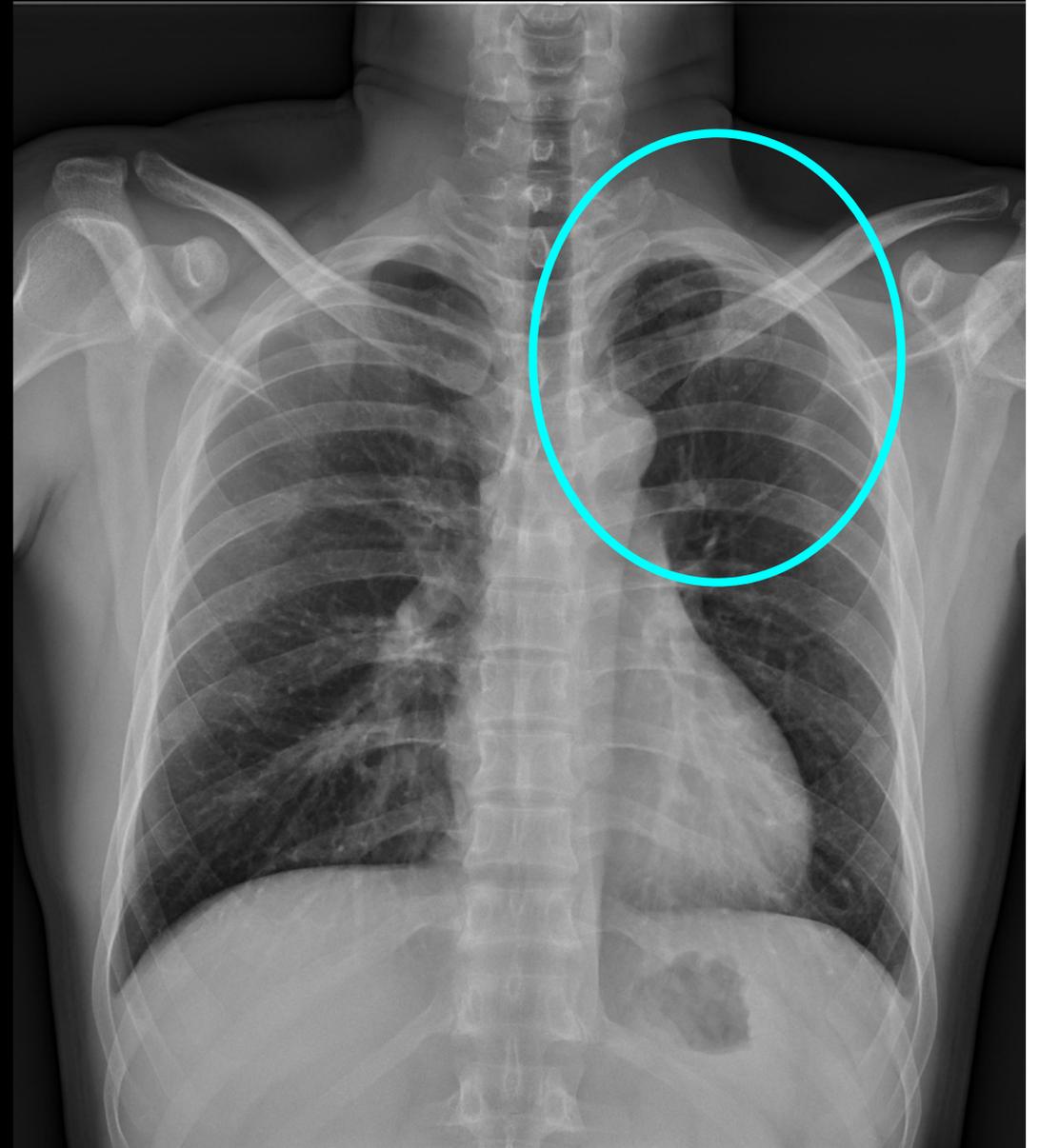
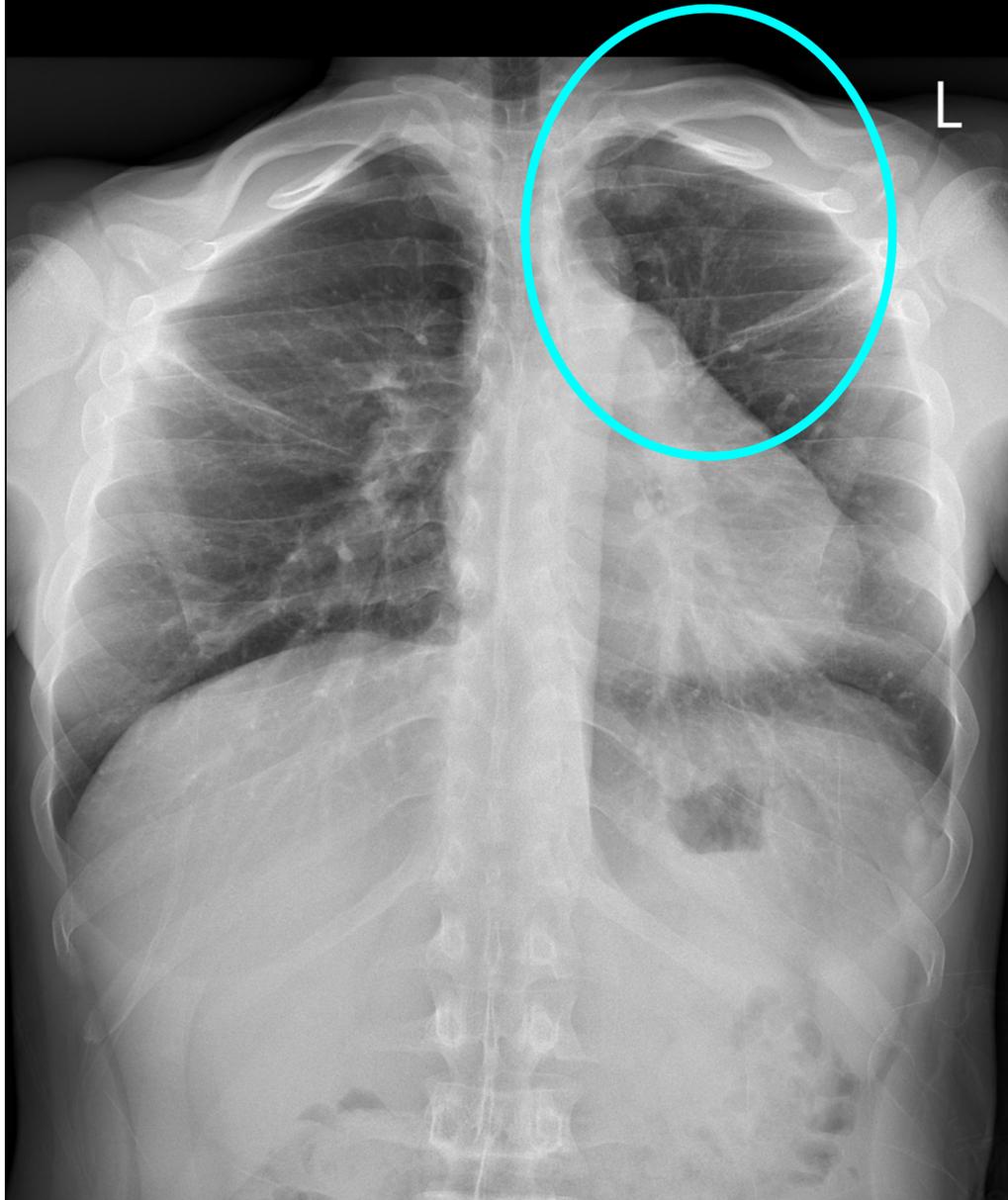
# Lordotic view

## for apical lesion or RML lesion

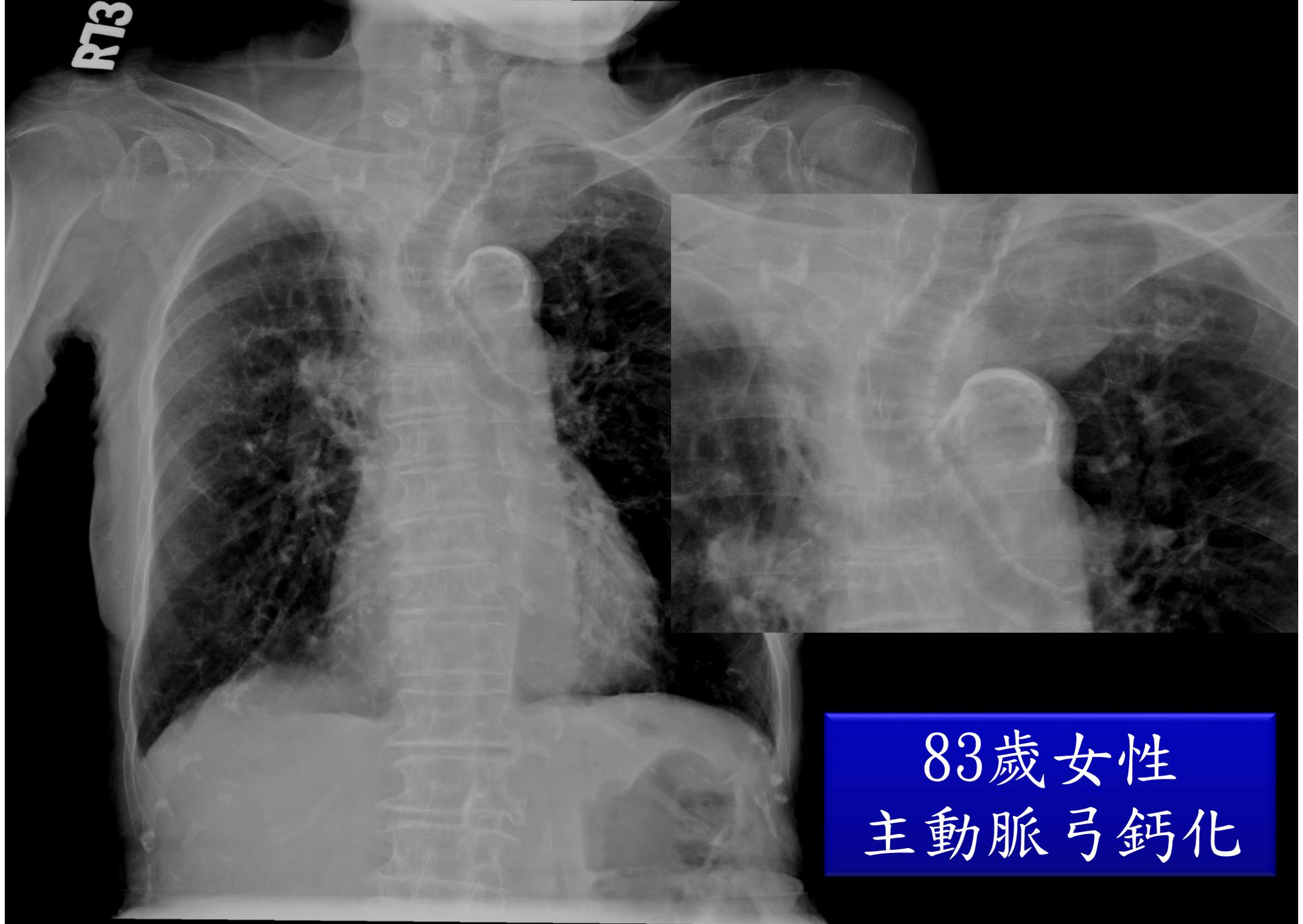


- 彎曲身體上半部(約30度)使背後的肩部靠近片匣
- 用來確認肺尖、RML/Lingular lobe等被肋骨遮蓋住的病灶

# Lordotic view



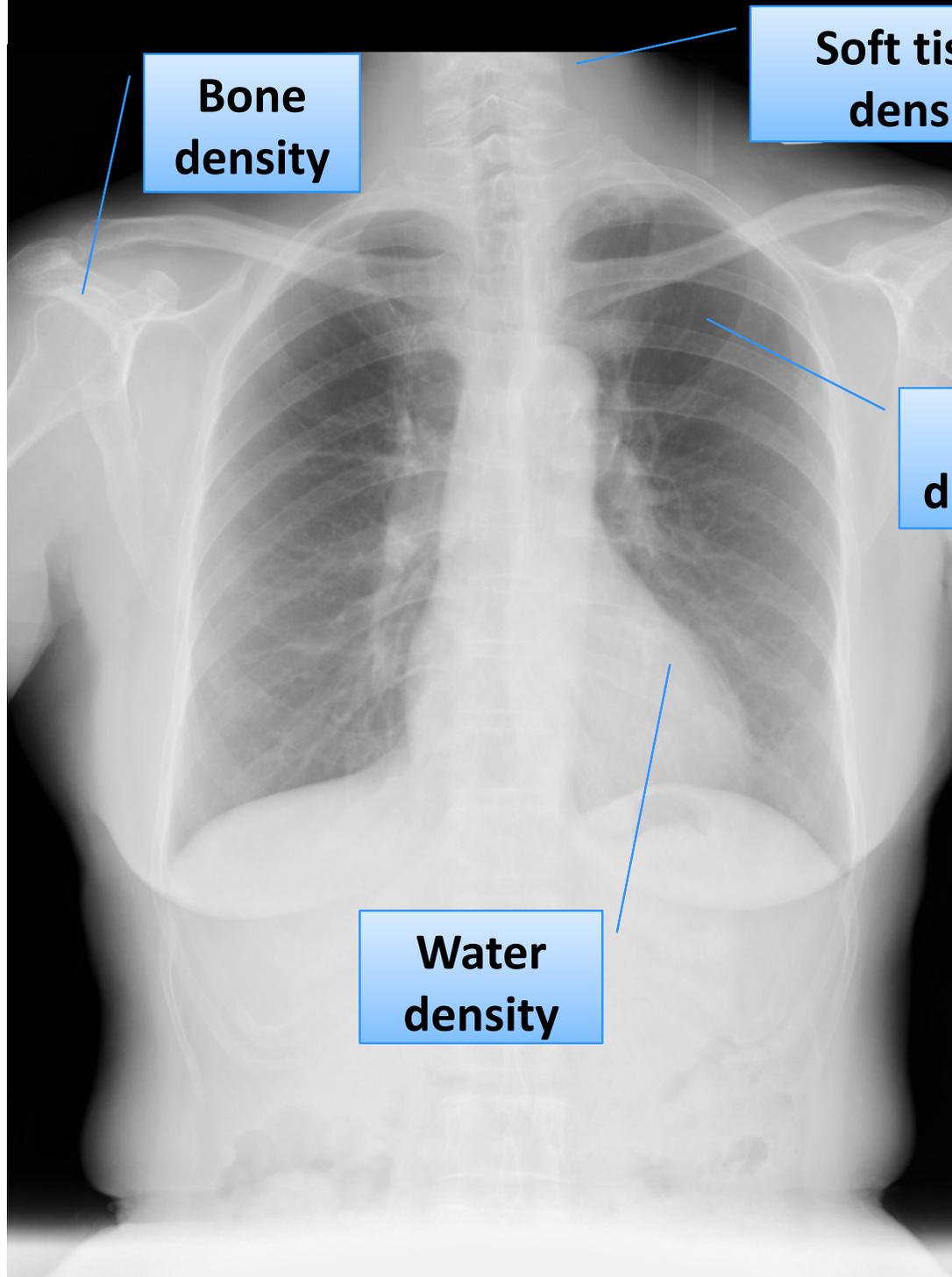
R73



83歲女性  
主動脈弓鈣化

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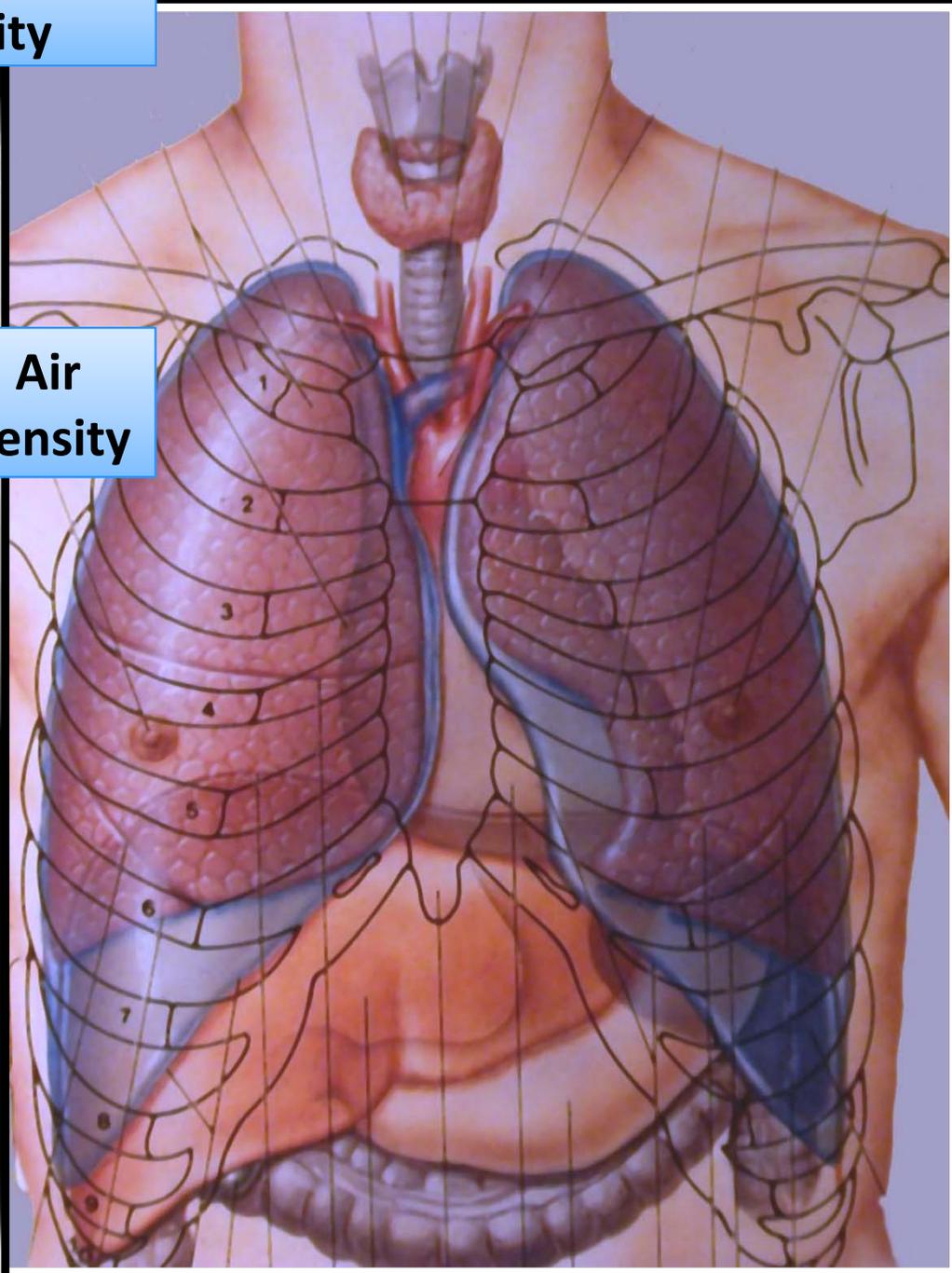


**Bone density**

**Soft tissue density**

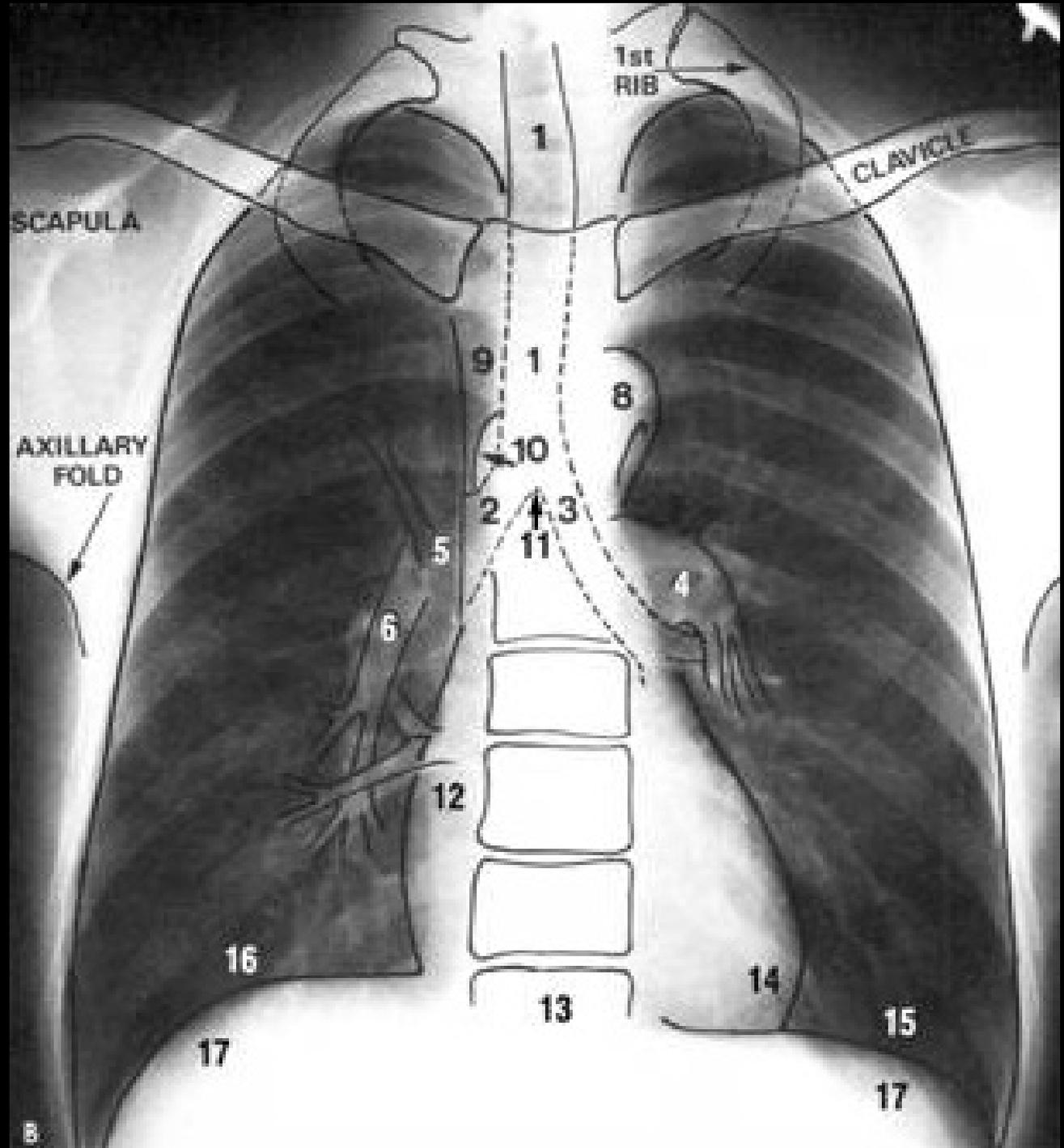
**Water density**

**Air density**



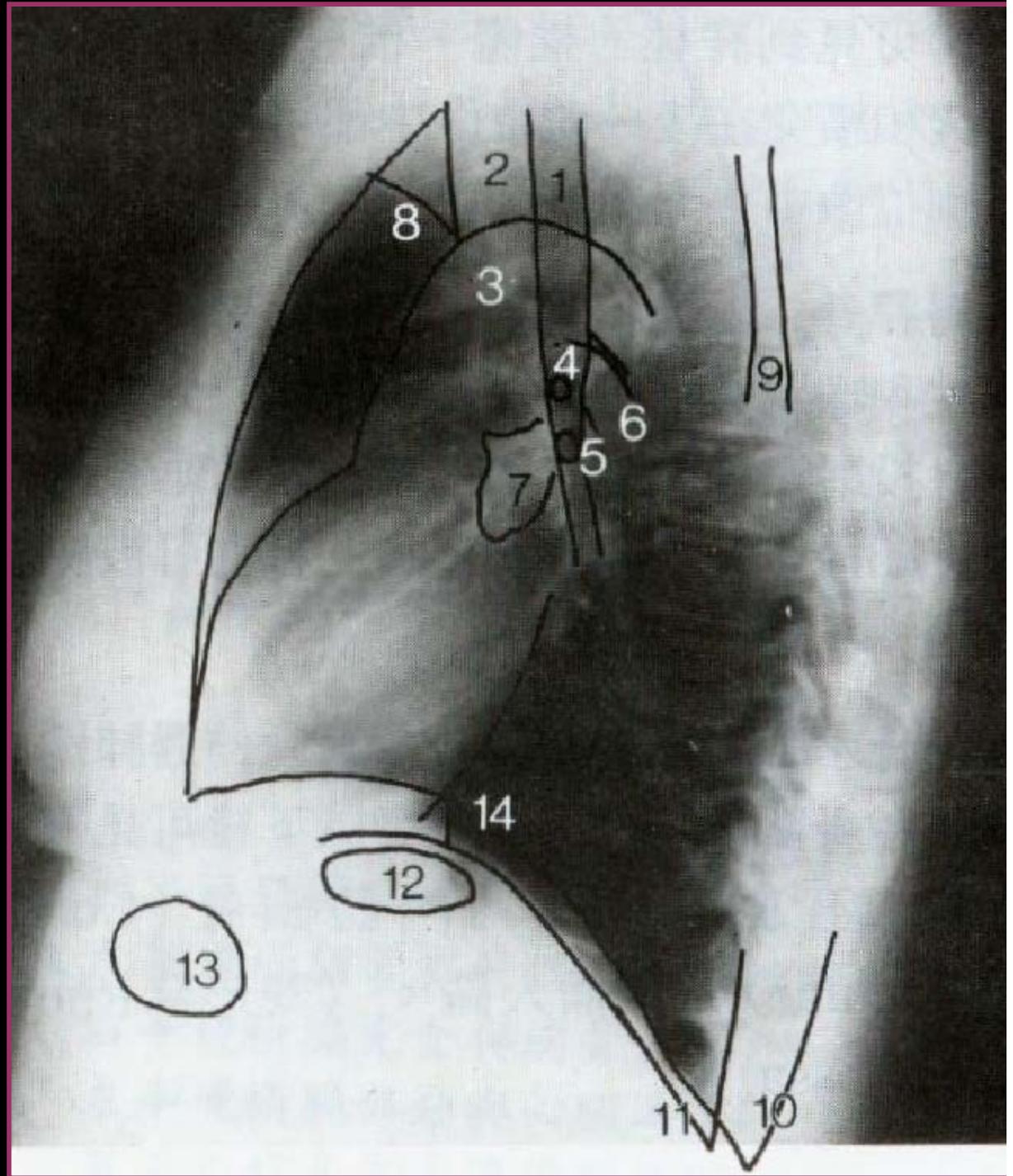
# Normal Chest X-Ray PA view

1. Trachea
2. Right Mainstem
3. Left Mainstem
4. Left Pulmonary Artery
5. Right upper lobe pulmonary vein
6. Right Interlobar artery
7. Not labeled
8. Aortic knob
9. Superior vena cava
10. Ascending aorta
11. Carina
12. Right atrium
13. Right ventricle
14. Left ventricle
15. Left Hemidiaphragm
16. Right Hemidiaphragm
17. Costophrenic angles



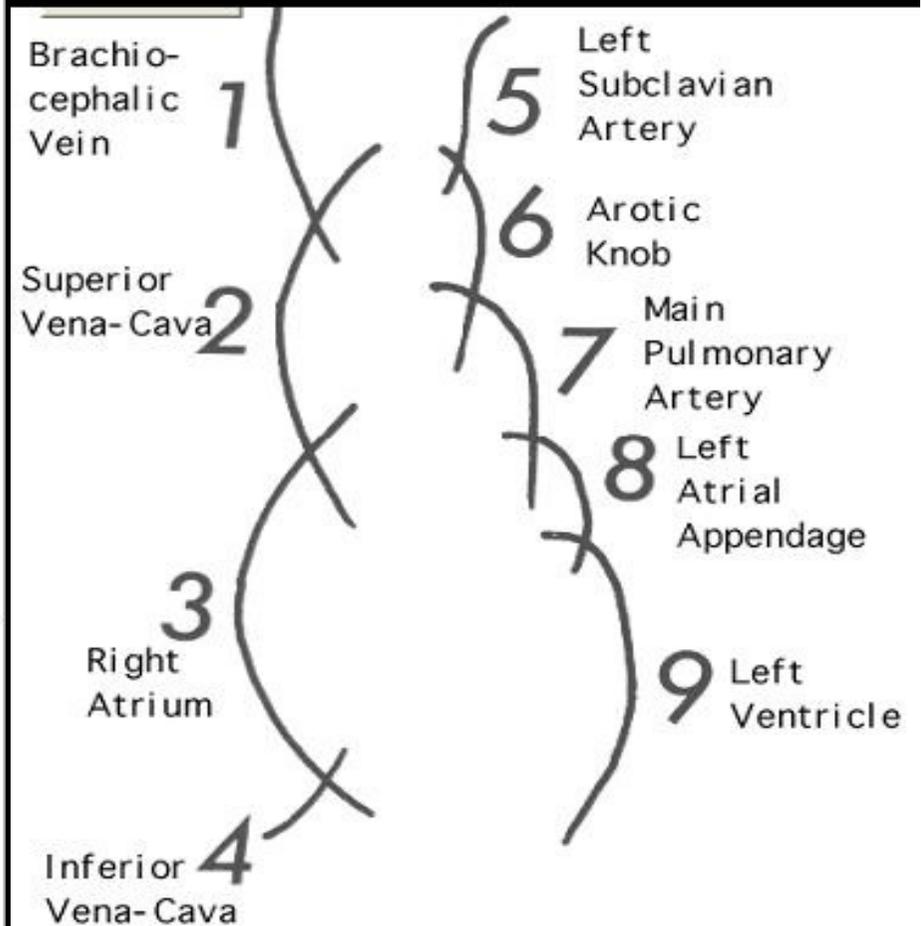
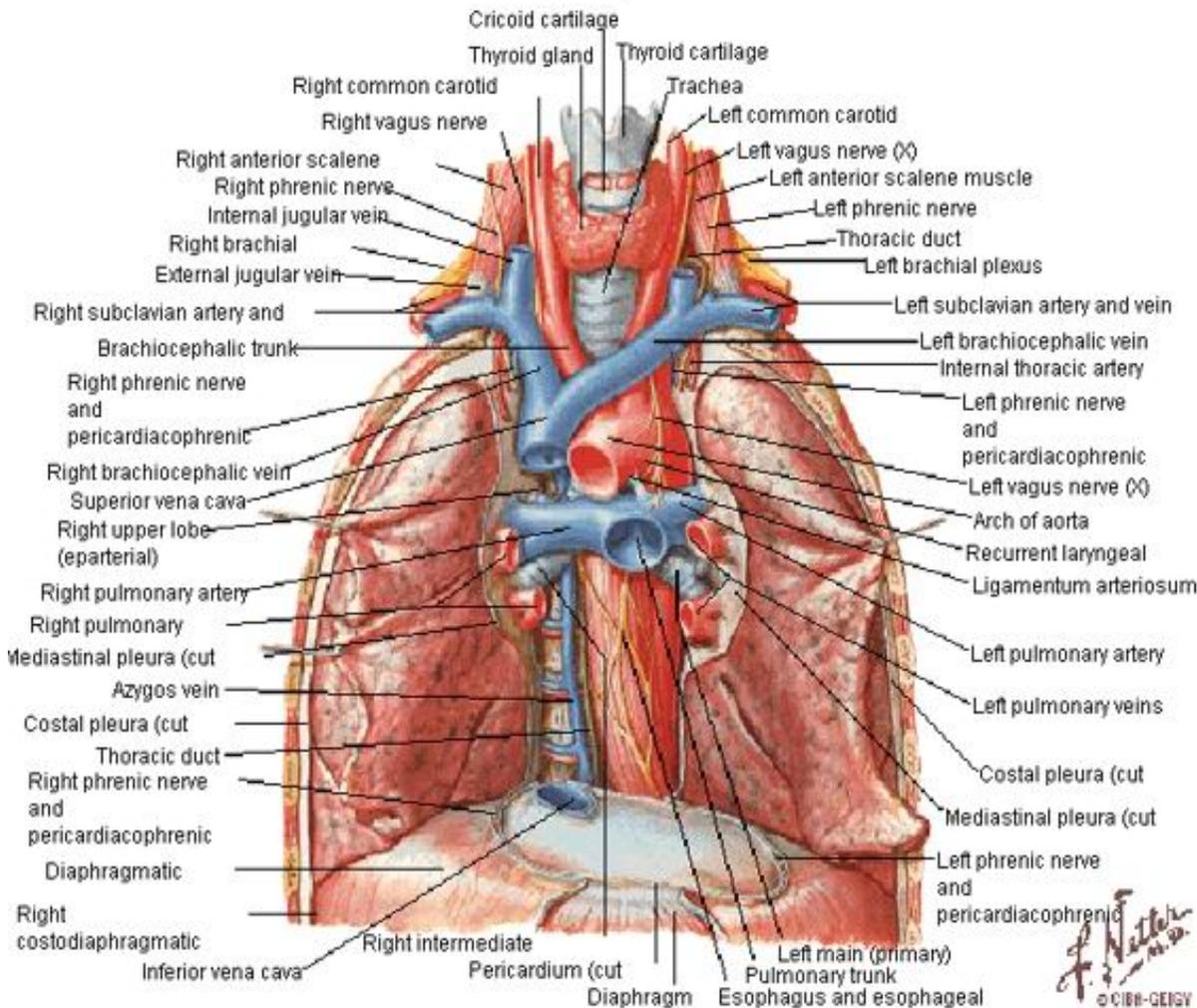
# Normal Chest X-Ray Lateral view

1. Trachea
2. Pretracheal Vascular Bundle
3. Aortic Arch
4. RUL bronchus
5. LUL bronchus
6. Left PA
7. Right PA
8. Axilla
9. Scapula
10. Right side
11. Left side
12. Gastric Bubble
13. Transverse Colon
14. IVC



# Cardiovascular shadow

## Main Bronchi With Pulmonary Arteries and Veins in Situ



# Silhouette sign ~ lesion detection

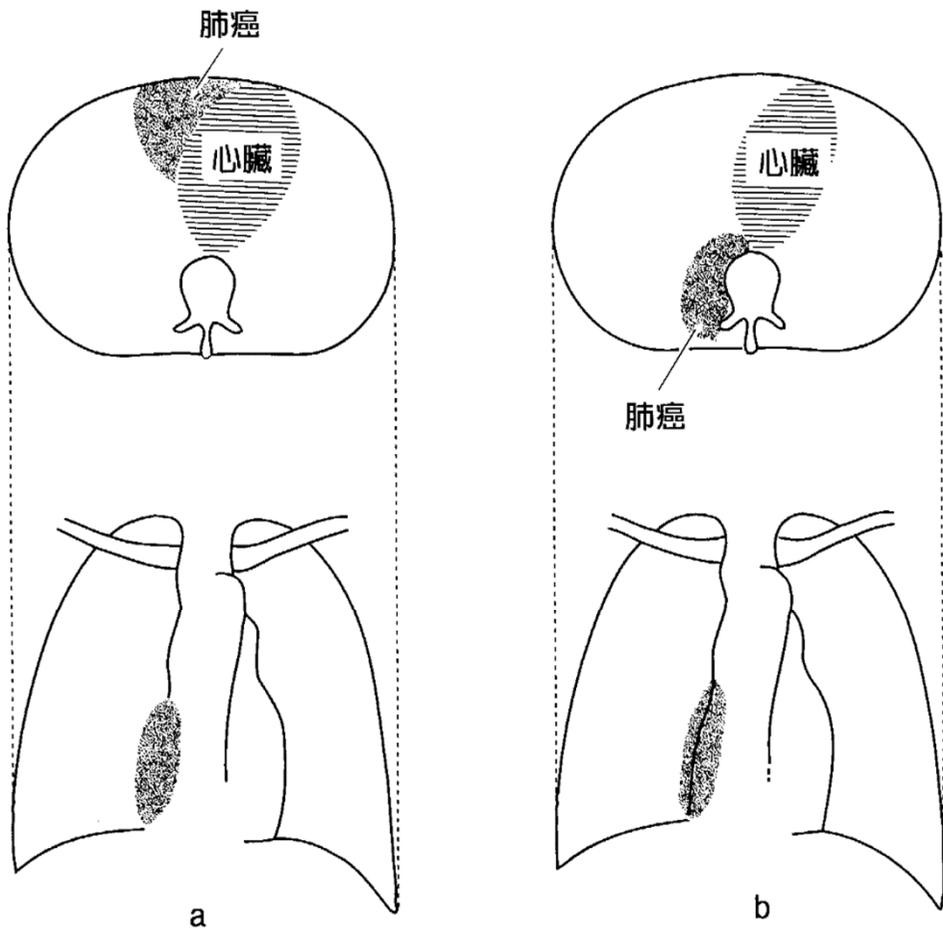


圖2 輪廓徵兆 (silhouette sign) 的病例

- a 肺癌與心臟相接時，就無法看到心右緣的輪廓 = 因肺癌使心右緣呈輪廓徵兆陽性。
- b 肺癌和心臟不相接時，仍看得到心右緣的輪廓 = 因肺癌使心右緣呈輪廓徵兆陰性。

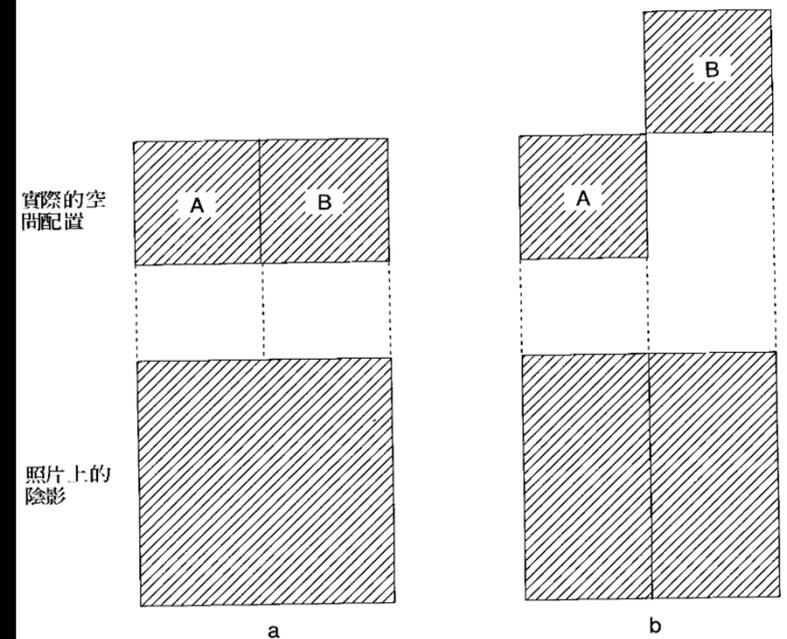


圖1 輪廓徵兆 (silhouette sign) 的原理

- a 相同密度的物質A和物質B完全相接的時候，看不出兩者的邊界。→ 輪廓徵兆陽性
- b 物質A和物質B不完全相接的時候，就看得出其兩者的邊界。→ 輪廓徵兆陰性

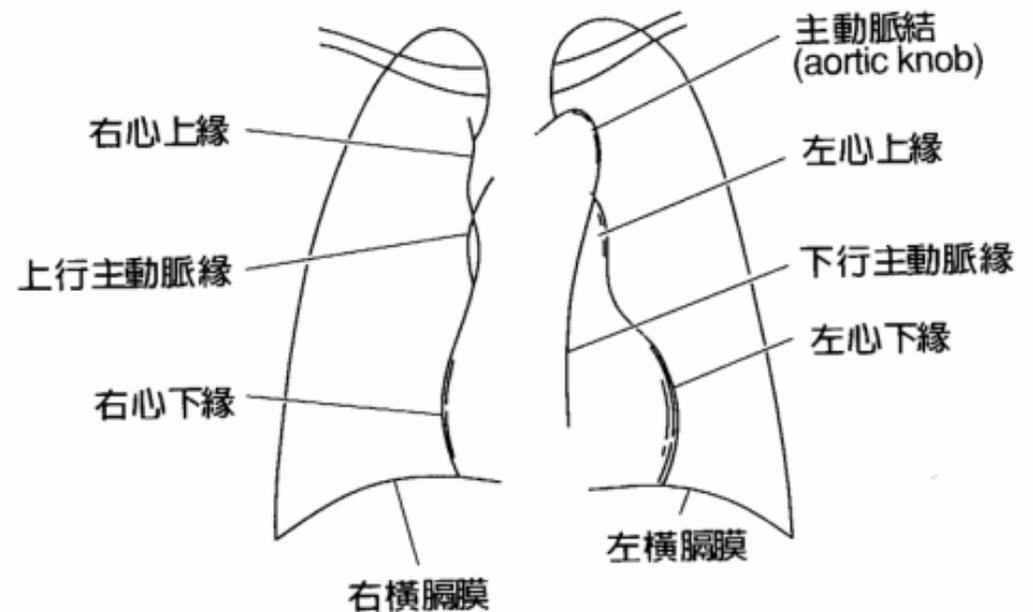


圖1 輪廓徵兆應注意的解剖學構造

# 判讀胸部X光片

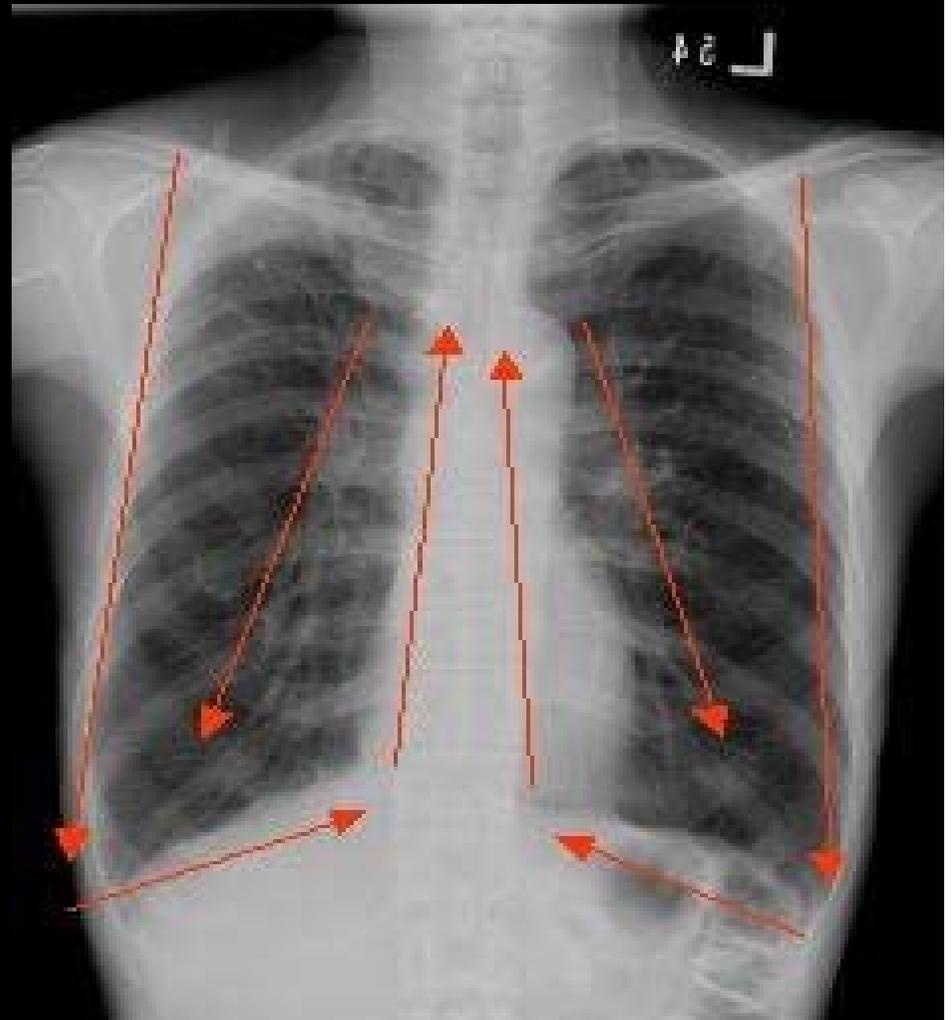
- 以系統性分析方式判讀胸部X光片  
常認定是理想的胸部X光片，可依下列系統性分析方式，分段觀察，進行判讀，以求詳盡
  - (1) 胸廓軟組織
  - (2) 骨架、骨骼
  - (3) 橫膈
  - (4) 縱膈及心臟
  - (5) 肺門
  - (6) 肺紋及肺野

# 系統性的判讀

每個人可以建立自己的讀片順序

## Felson: There Are Many Lung Lesions

1. T(thorax): 胸廓及其外軟組織
2. A(abdomen): 橫膈及腹部器官
3. M(mediastinum): 縱膈，含大氣道和肺門
4. L(單側肺區): 肺裂、肺紋及支氣管分支
5. L(兩側肺區左右比較)



# 胸廓：Bone ( Frontal View )

- **General appearance**
  - Scoliosis, kyphosis, kyphoscoliosis
- **Osteoblastic change**
  - Prostate ca.
  - Breast ca.
- **Osteolytic change**
  - Metastasis, multiple myeloma
  - Osteoporosis

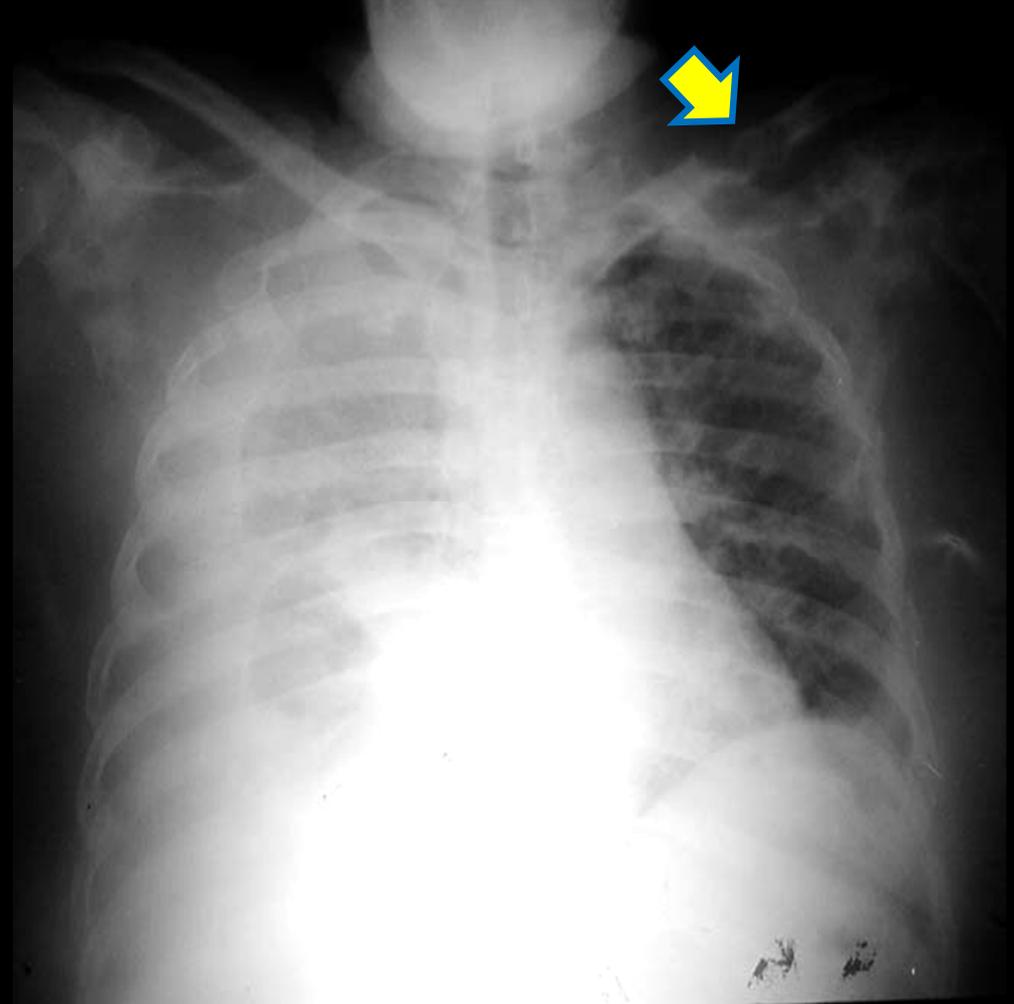
# Different bony densities on CXR

Osteoblastic



Prostate ca with bone mets

Osteoclastic



Multiple myeloma

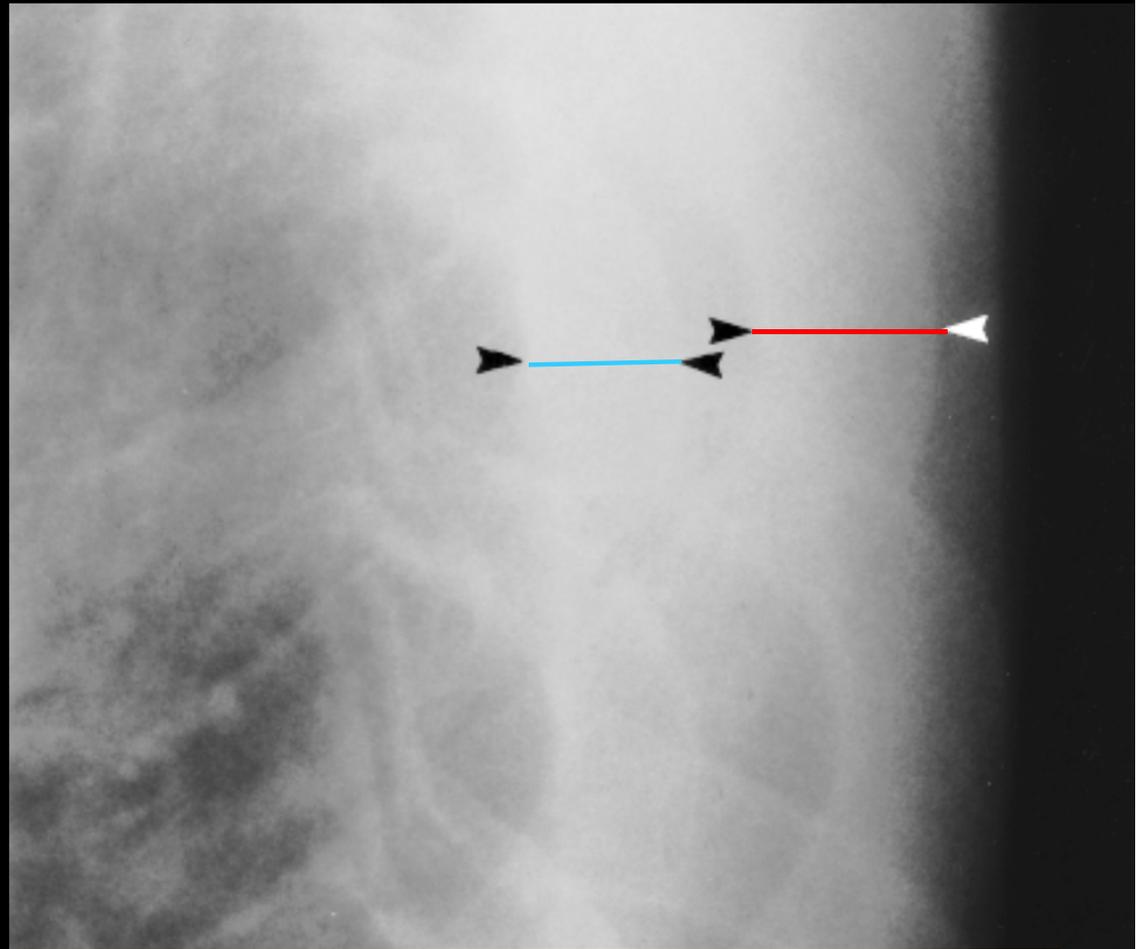
# 胸廓：Bone ( Frontal View )

## ● Ribs

- 在lateral view中區別左右側的rib：
  - **Big rib sign**
  - **Vertical displacement sign**
- Extra – **Cervical rib**
- Upper margin – Metastasis
- Lower margin – Notching: Coarctation of aorta
- Expansion – healing of fracture, tumor, fibrous dysplasia
- Diffuse enlargement – **Extramedullary hematopoiesis**
- **Fork rib, fracture, ...**

# Big Rib Sign

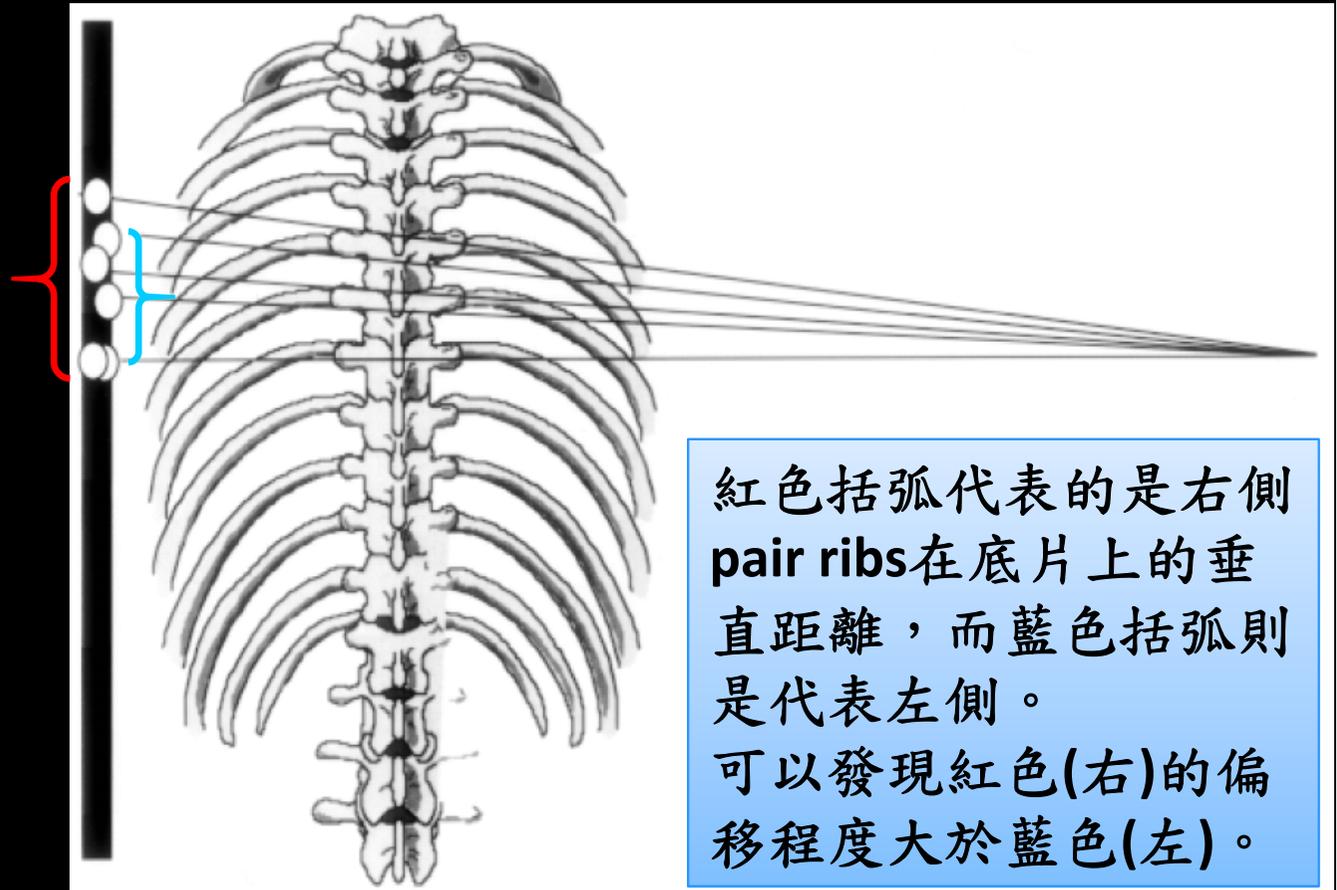
- 原理：**遠離底片**那一側的rib cage因為放大的效果，看起來會比靠近底片側的來得**粗**一些。
- 在well-positioned **left lateral** chest radiograph中，**右邊的rib**看起來會比左邊看起來**粗**
- The big rib sign is very useful but is not perfect because the magnification **difference** between the right and left ribs is **only 10%**.
- Not applicable when the posterior ribs are superimposed



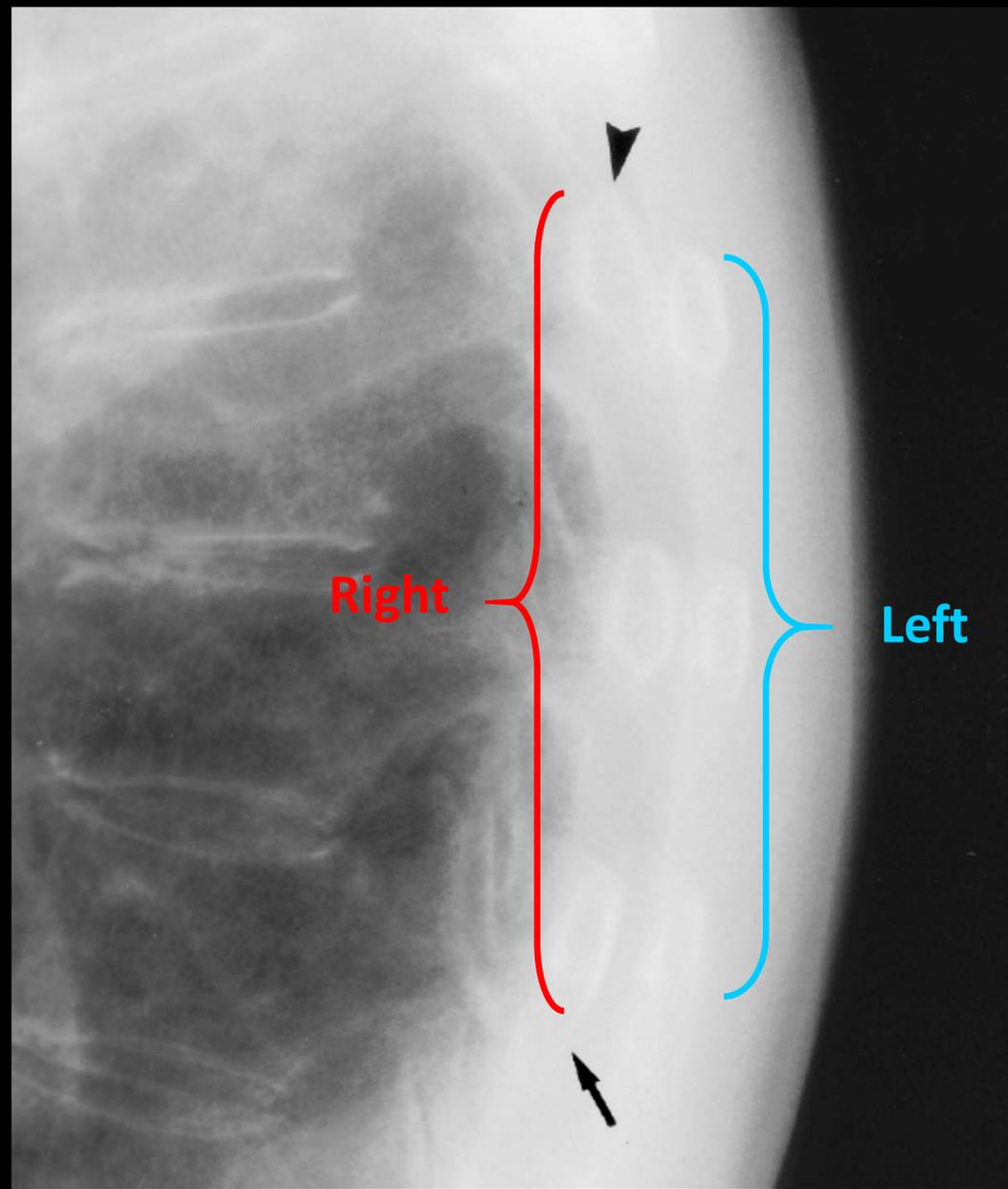
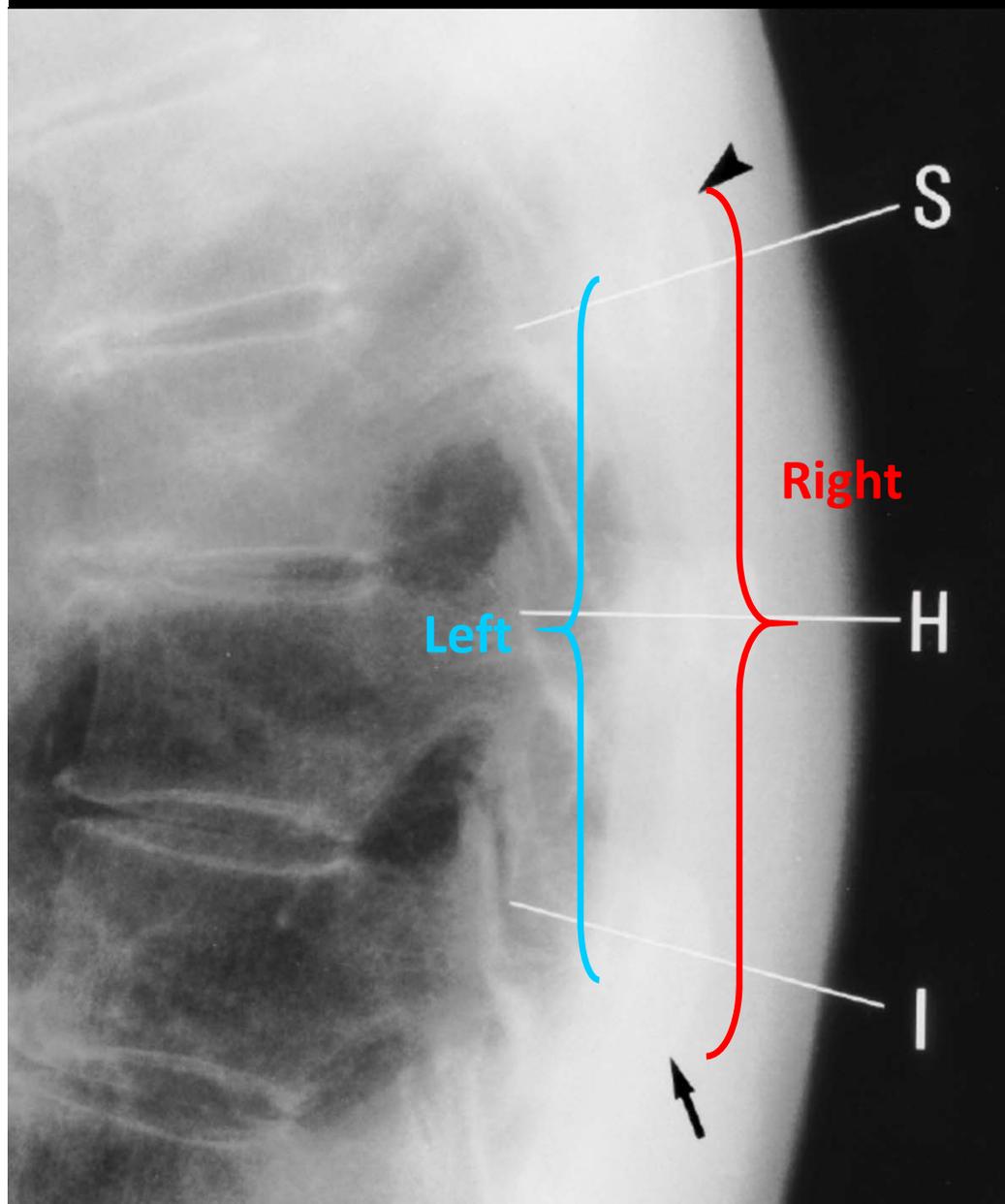
在left lateral view中，紅色線段的rib比藍色線段的rib粗，所以是遠離底片的那一側。

# Vertical Displacement Sign

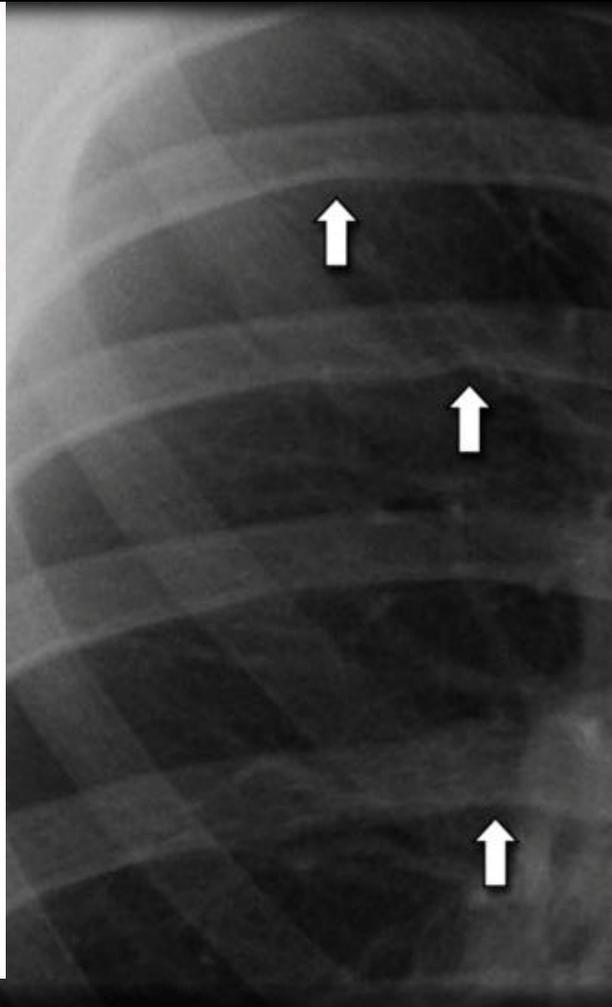
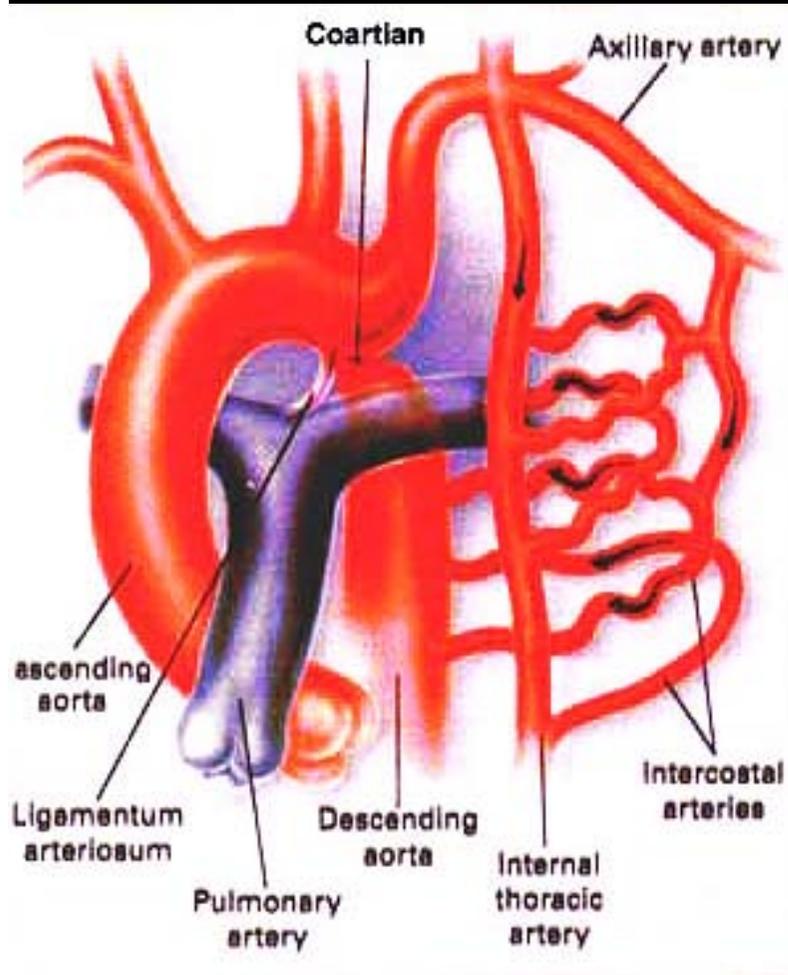
- 原理：based on vertical divergence of the x-ray beam rather than on the magnification of the ribs.
- 以 **L't lateral view** 為例，X-ray beam 投射至底片時，**右側** rib cage 在垂直距離上被**放大偏移**的程度會大於左側 rib。
- 用 paired ribs 在垂直距離上偏移的程度可以區分出左右側的 rib
- 即使左右兩側 rib 重疊還是可以區別得出來 – better than big rib sign



# Vertical Displacement Sign

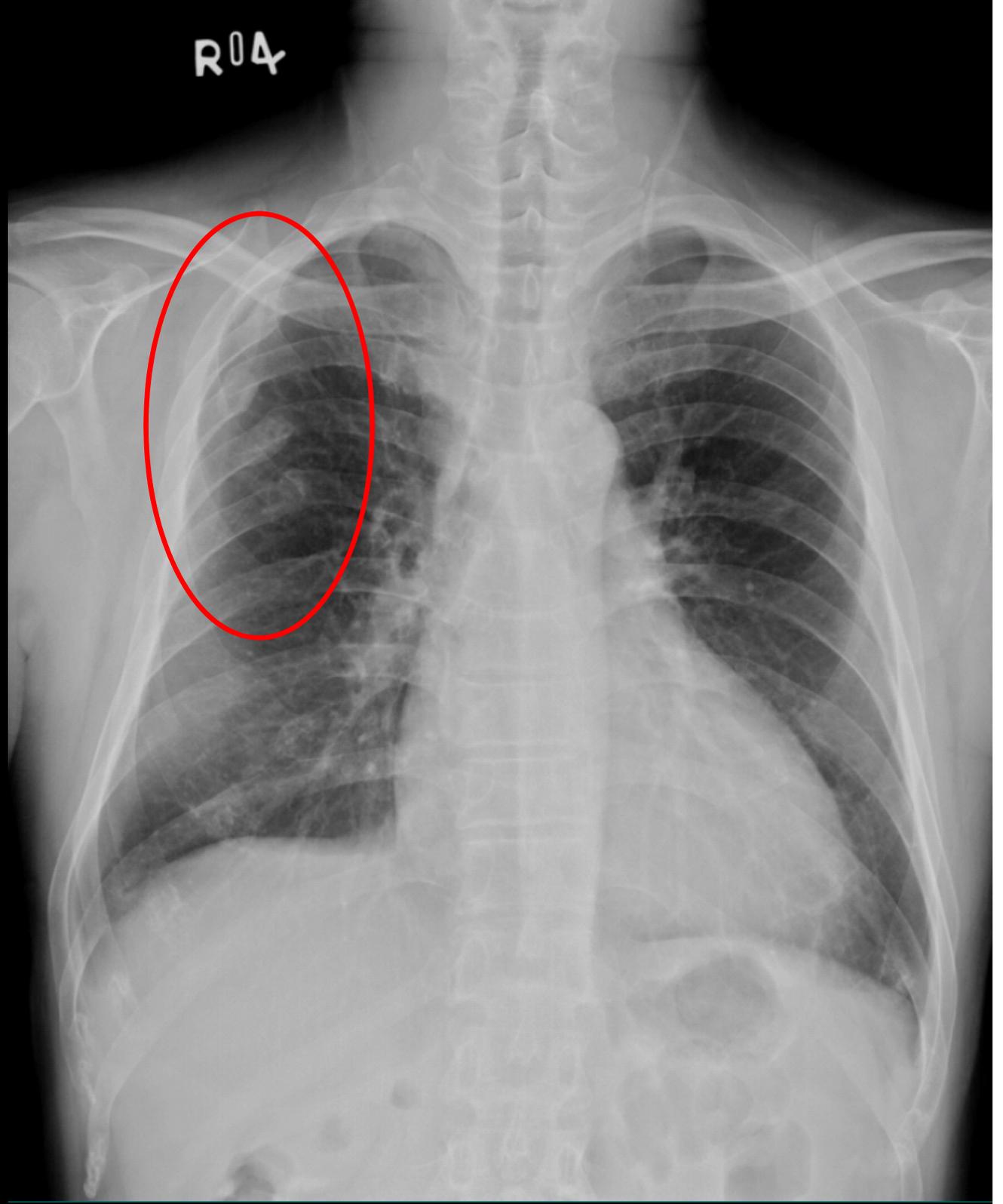


# Rib notching: coarctation of aorta

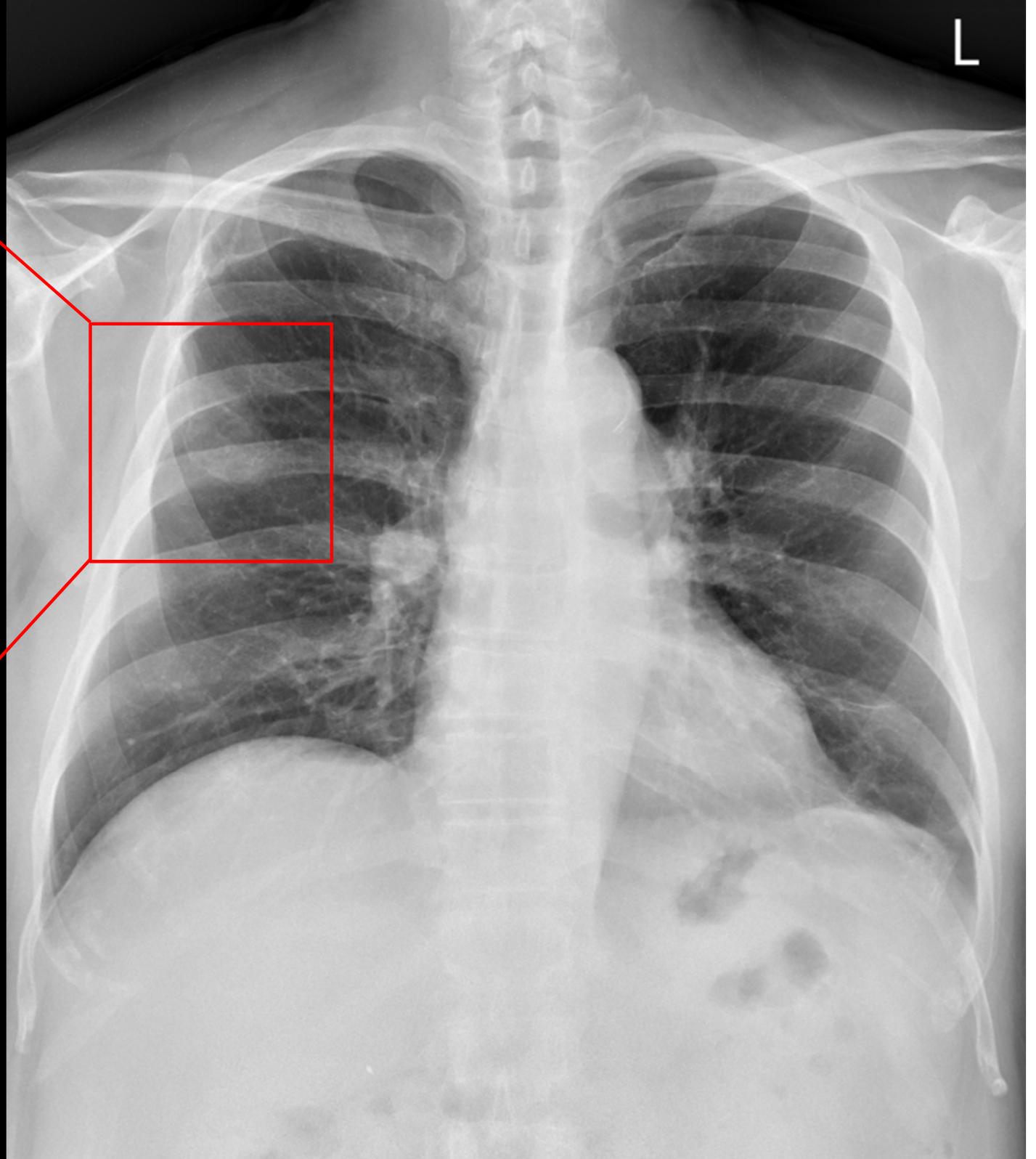
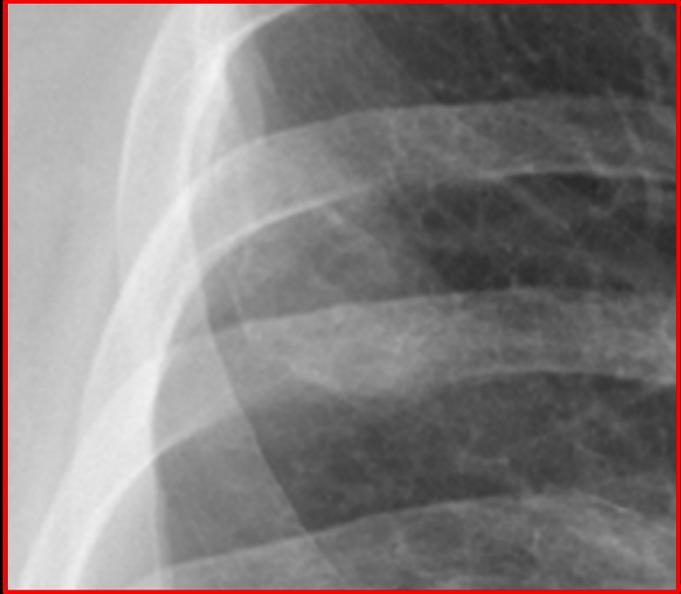


Inferior rib notching in a patient with coarctation of the aorta

# Rib Fracture, healing



# Fibrous dysplasia



# 胸廓：Bone ( Frontal View )

- **Sternum**

- Pectus excavatum (Funnel chest)
- Pectus carinatum (Pigeon chest)

- **Spine**: the lower, the more radiolucent of density

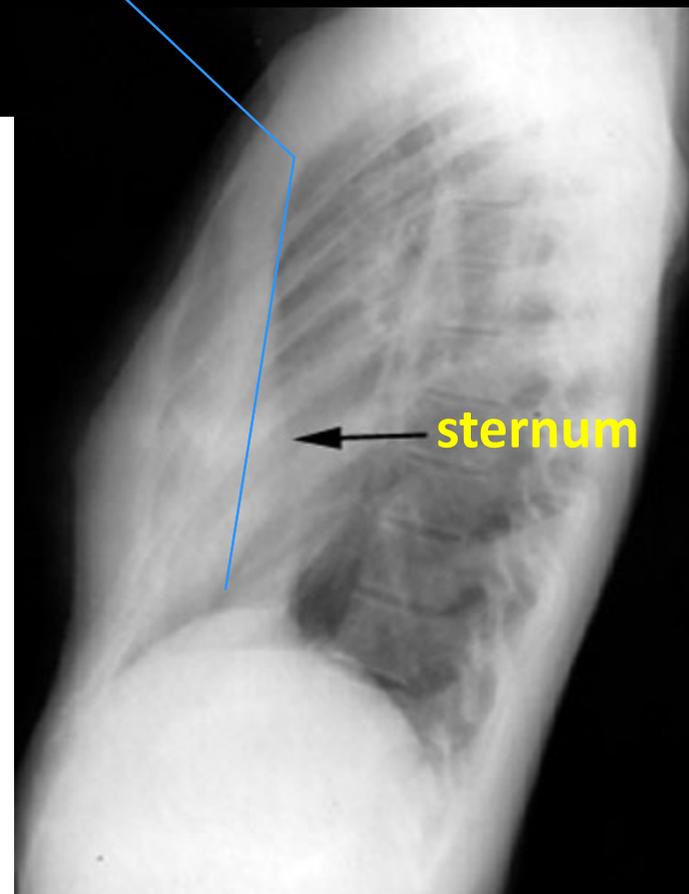
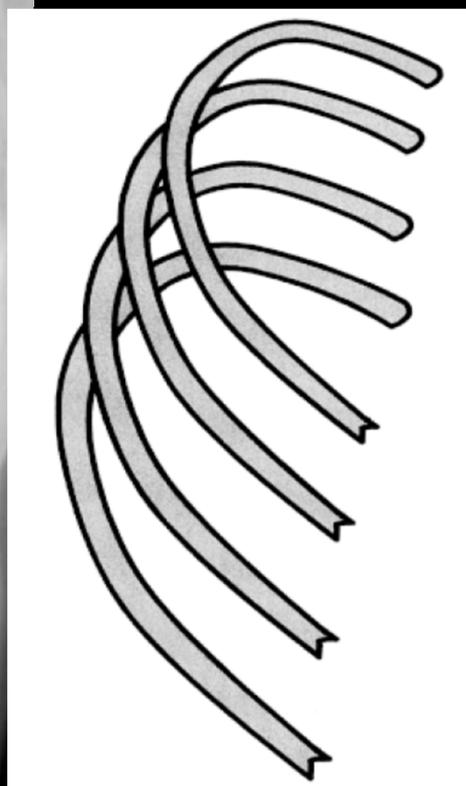
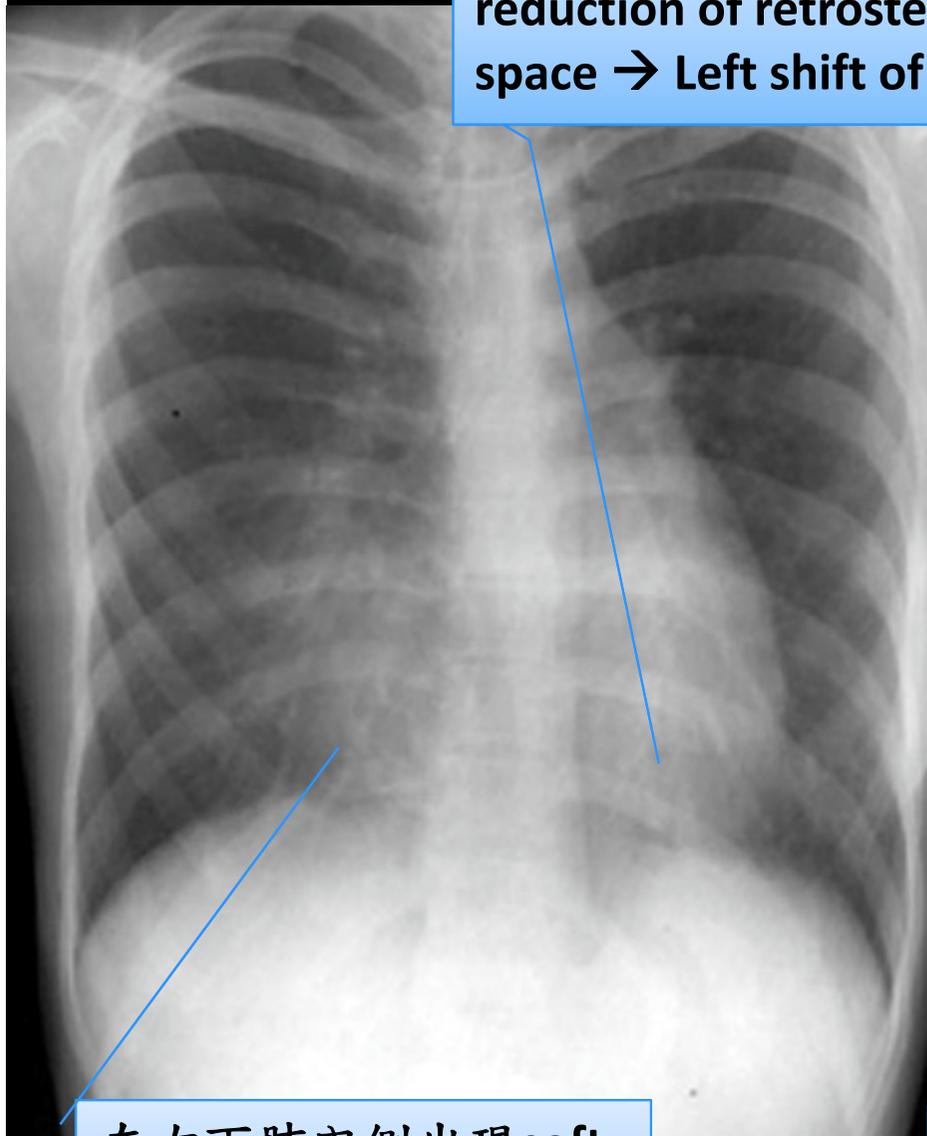
- Compression fracture/osteoporosis
- **Bamboo spine**
- TB spine
- Metastasis (osteoblastic, osteolytic)

# Pectus Excavatum (漏斗胸)



凹陷的sternum和rib造成  
reduction of retrosternal  
space → Left shift of heart

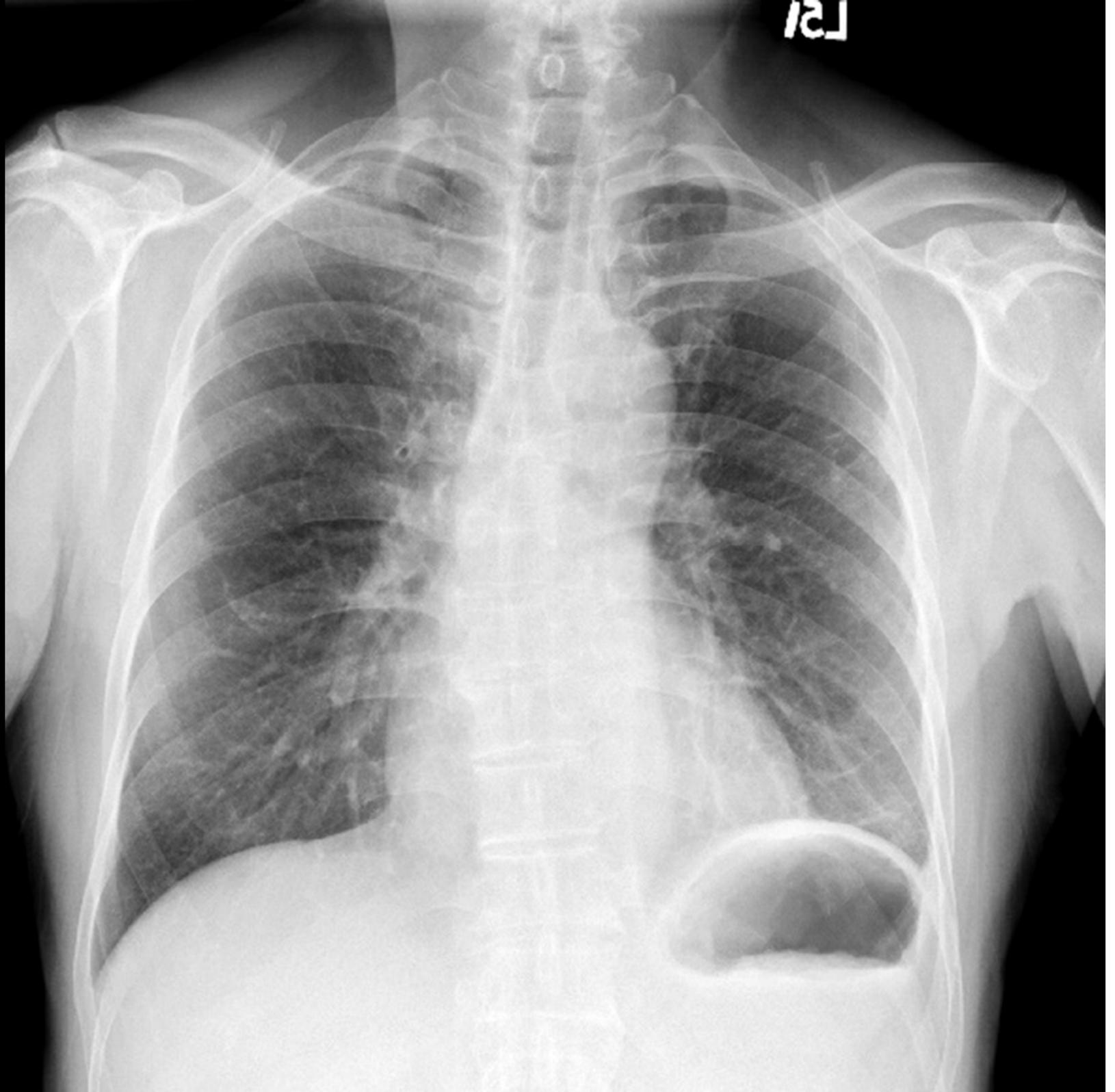
每一根rib在lateral  
view都突出在  
sternum的前面



在右下肺內側出現soft-  
tissue density，使得右  
邊heart border不清楚

1. 肋骨前緣：downward angulation(像數字"7")，  
which run almost parallel to each other.
2. 肋骨後緣：sometimes angle slightly upward.

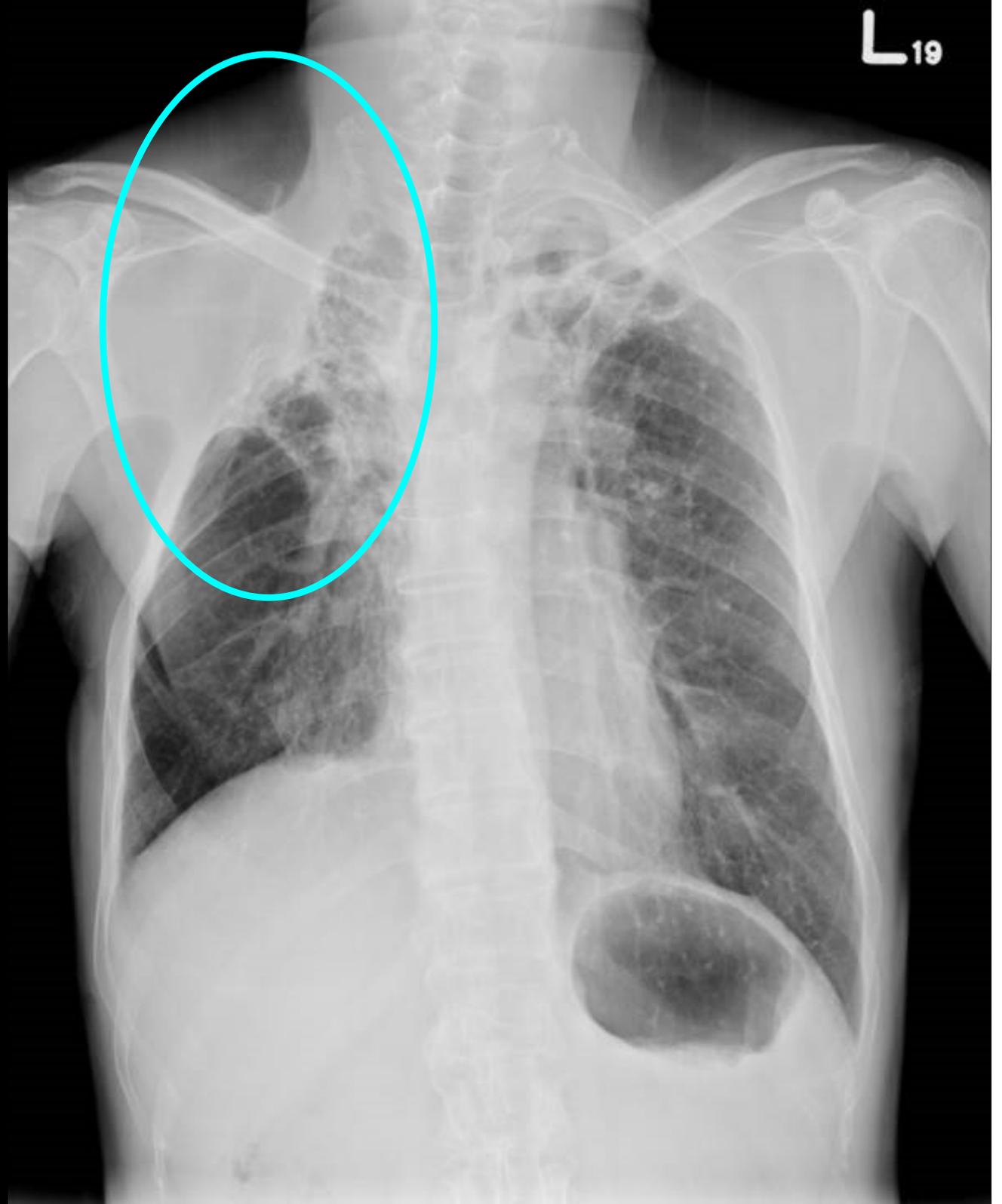
# Scoliosis



**AS with  
bamboo  
spine**



# Thoracoplasty



# 胸廓：Soft Tissue ( Frontal View )

- Breast shadow
- Subcutaneous emphysema
- Subcutaneous abscess/cellulitis
- Neck mass/**soft tissue mass**
- Gastric bubble
  - Upper border  $> 2\text{cm}$  -- Subpulmonic effusion
  - Intra-gastric mass -- Gastric ca.
  - Extra-gastric mass -- Spleen or kidney
  - Absence -- Hiatal hernia, achalasia

# Mammoplasty



# 軟組織密度變化：Subcutaneous emphysema

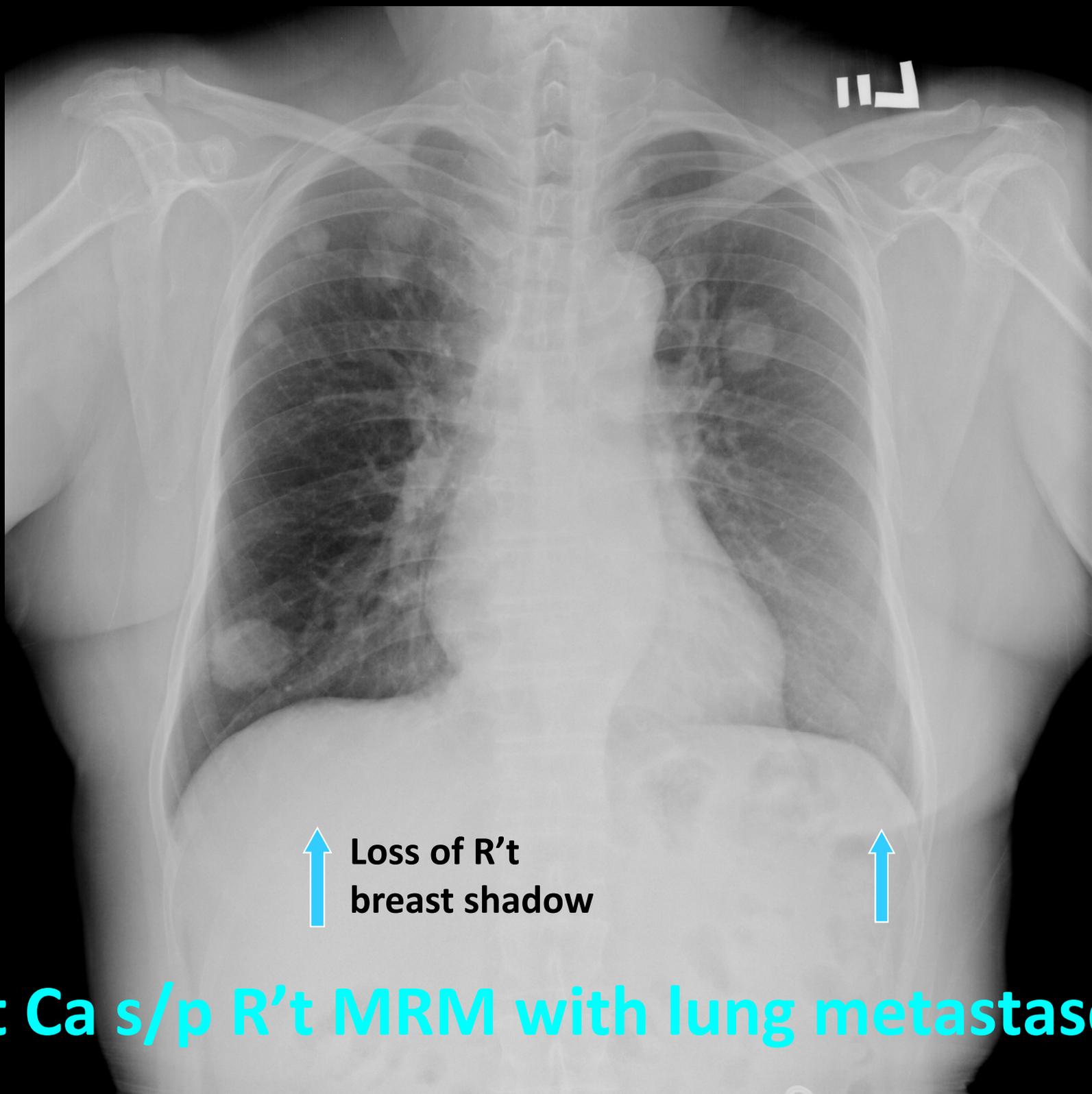


胸廓之軟組織：  
**Neurofibromatosis  
with lung  
involvement**



# Abnormal hemithorax density

- 太白太黑都要注意
- 兩側相互比較
- 單側hemithorax density異常
  - lesion site是太白處or太黑處
- **Increased opacity (太白)**
  - Abnormal shadows
- **Increased radiolucency (太黑): 由外而內D/D**
  - 胸廓外：mastectomy, Poland's syndrome(少了大胸肌)
  - 肋膜：pneumothorax
  - Decreased vessel: pulmonary embolism(a), Pul. a. agenesis(a), Scimitar syndrome(v)
  - Air collection: endobronchial obstruction, Swyer-James syndrome emphysema, localized bullae



↑ Loss of R't  
breast shadow

**Breast Ca s/p R't MRM with lung metastases**

# Unilateral hyperlucent hemithorax



The NEW ENGLAND  
JOURNAL of MEDICINE

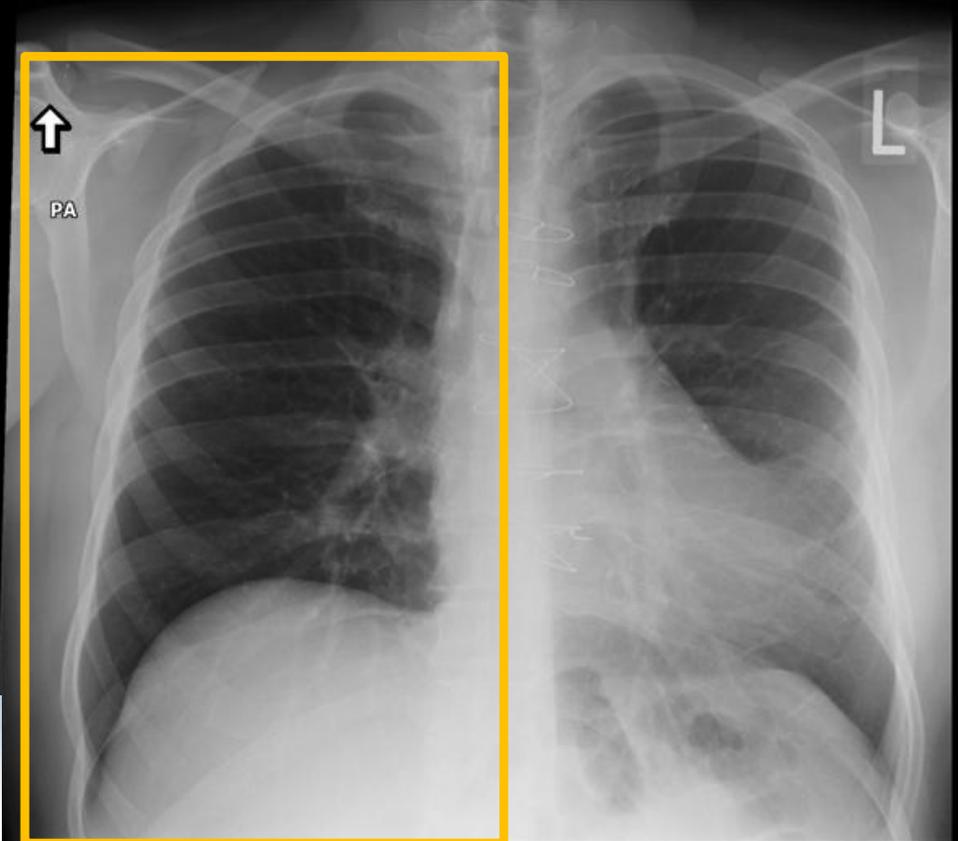
HOME ARTICLES & MULTIMEDIA ISSUES SPECIALTIES & TOPICS

Image Challenge

Share:



Syndactyly



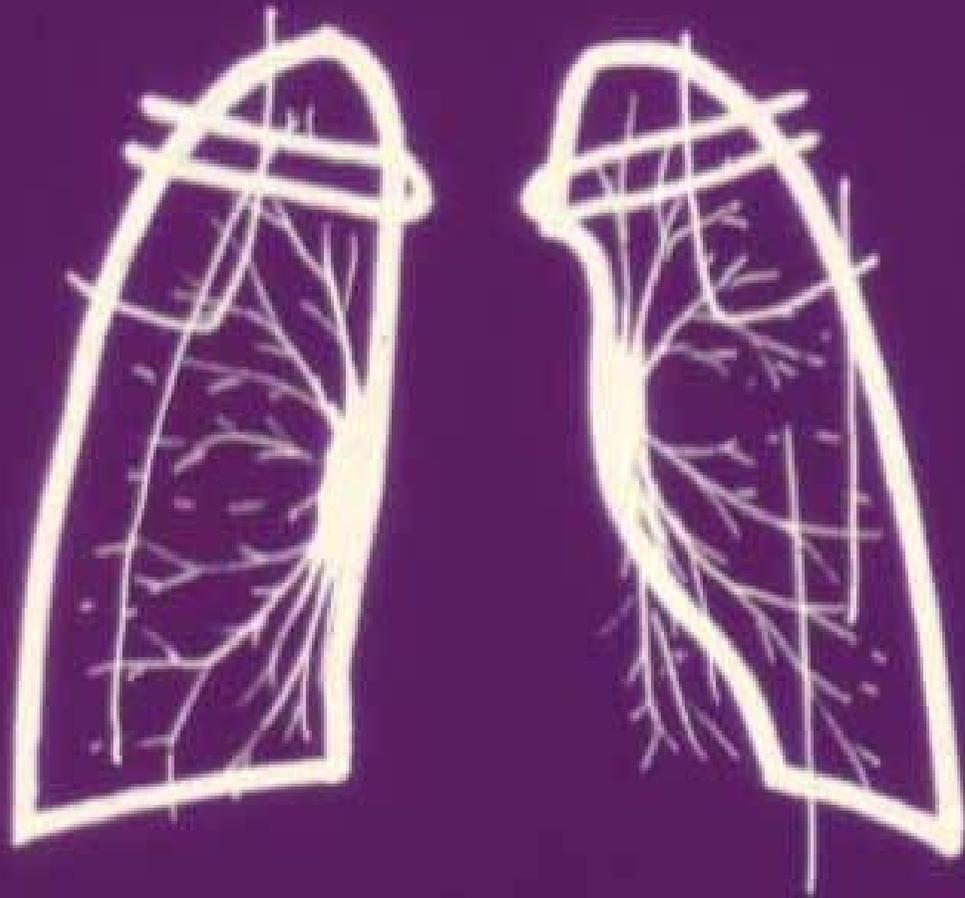
**Poland syndrome**

(absent pectoralis major muscle and brachydactyly of hand)

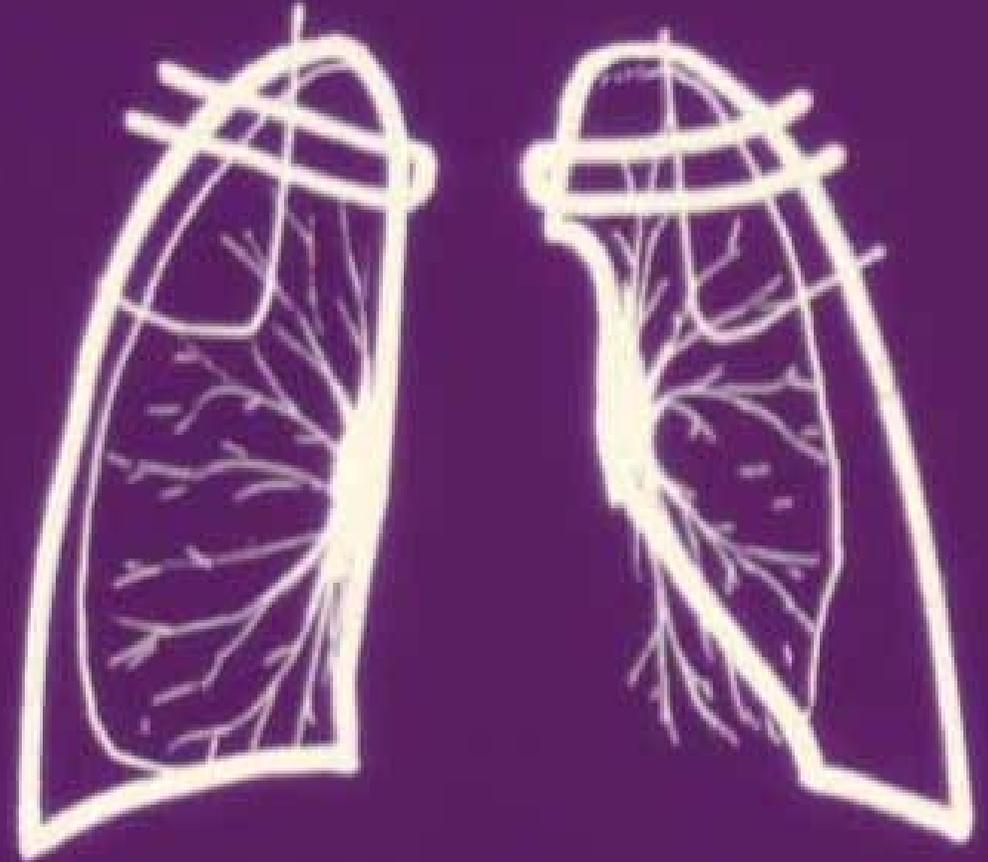
# Pleura

- Pleural thickening / pleural fibrosis / fibrothorax / pleural plaque / pleural calcification
- **Pneumothorax**
- Pleural mass
- Pleural effusion
- Costophrenic (C-P) angle blunting
  - Pleural thickening
  - Pleural effusion

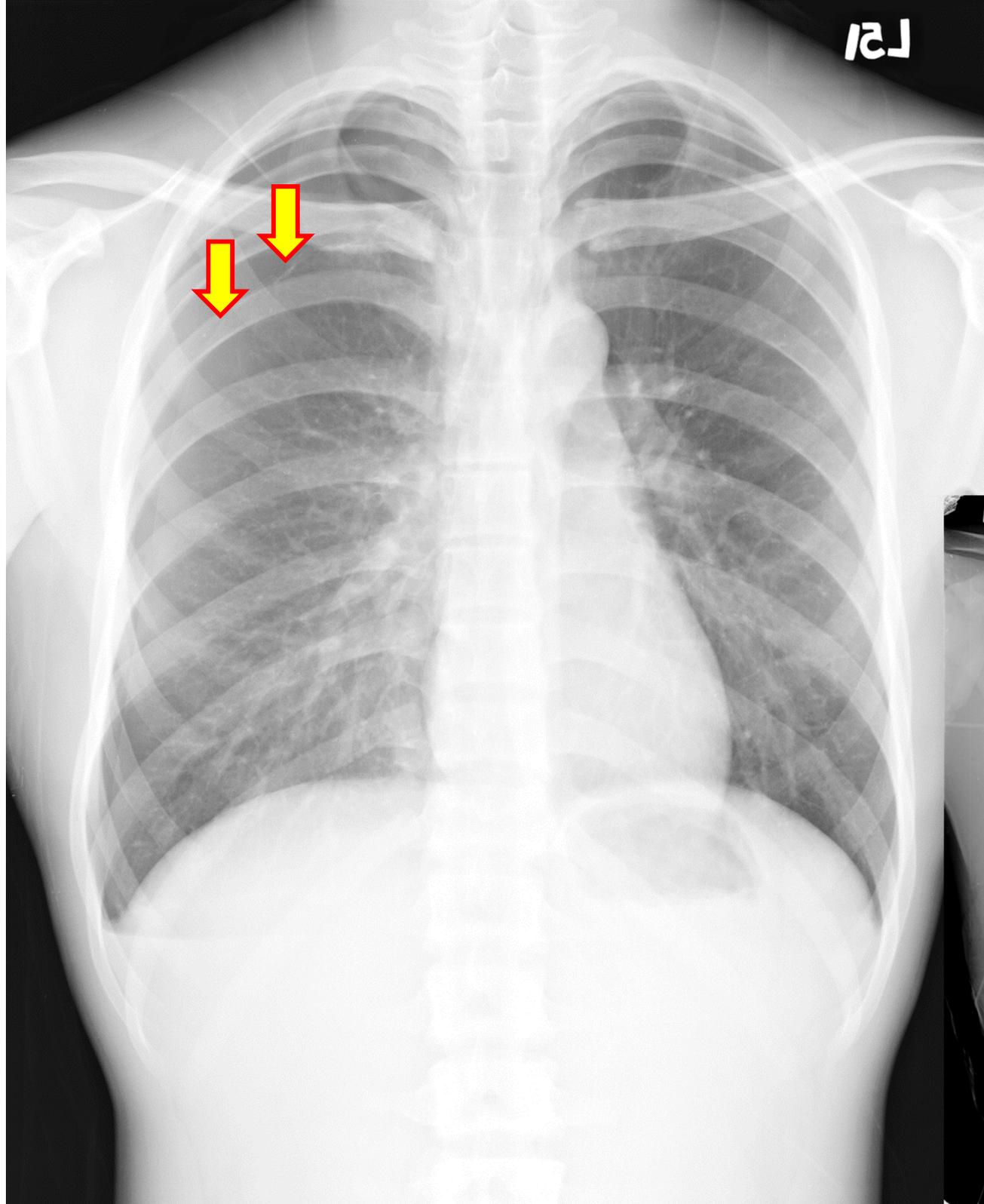
# Skin fold vs. Pneumothorax



Skin folds

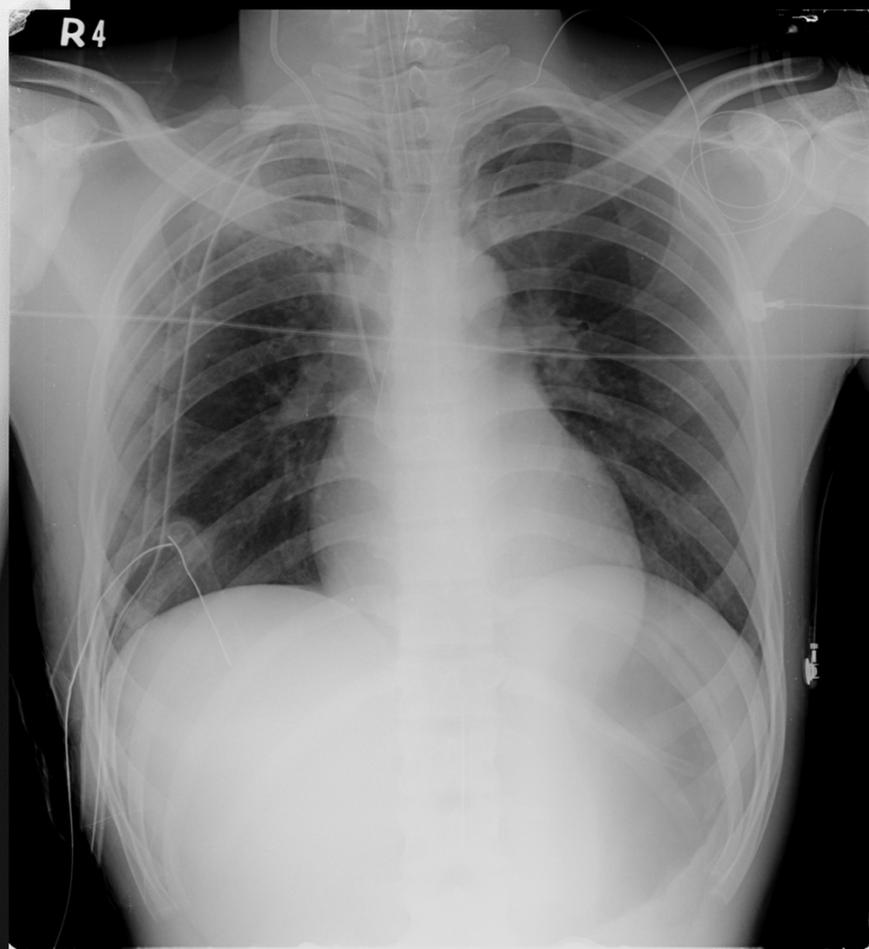


Pneumothorax



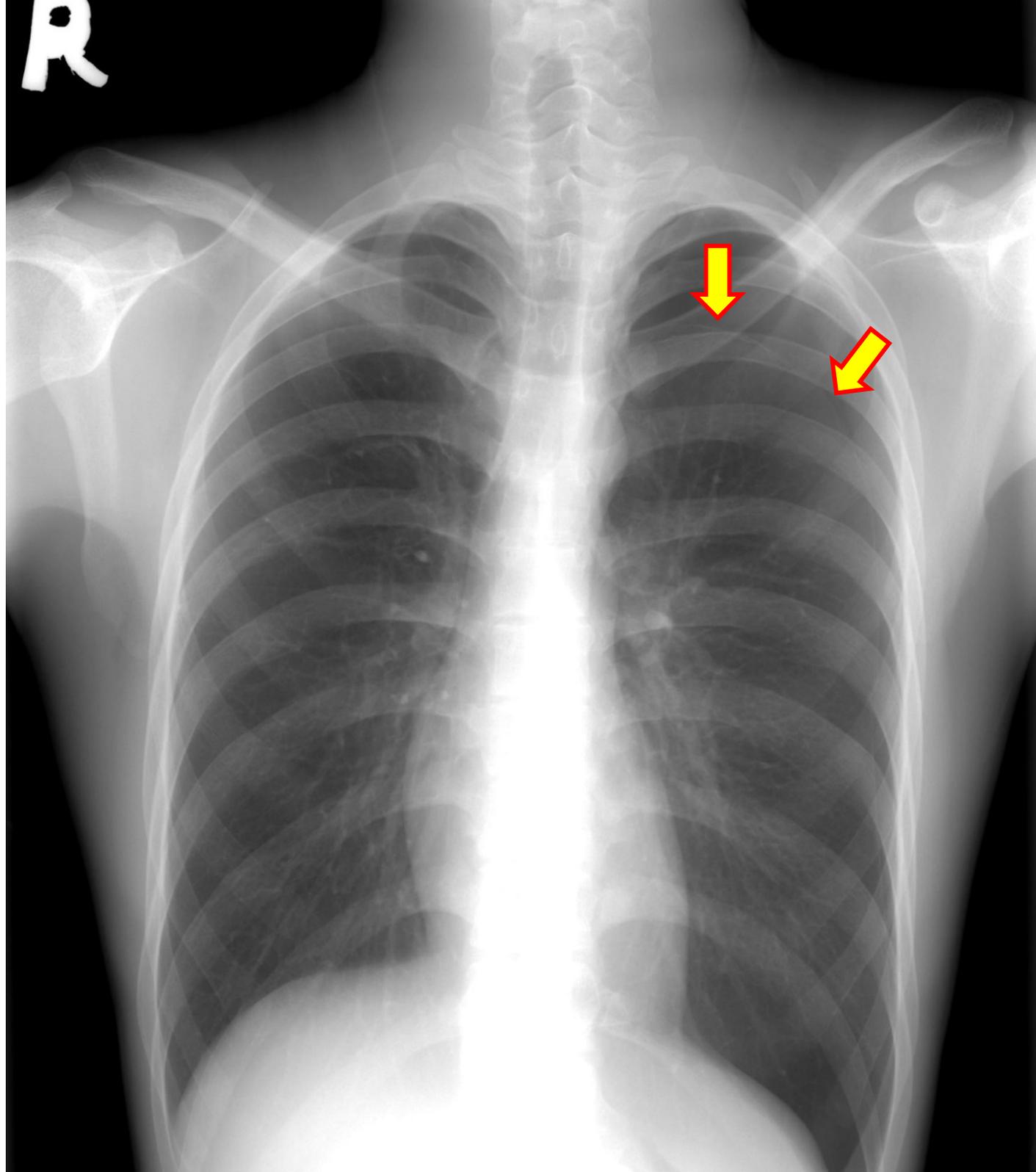
Rt

**R't**  
**pneumothorax**



R4

R

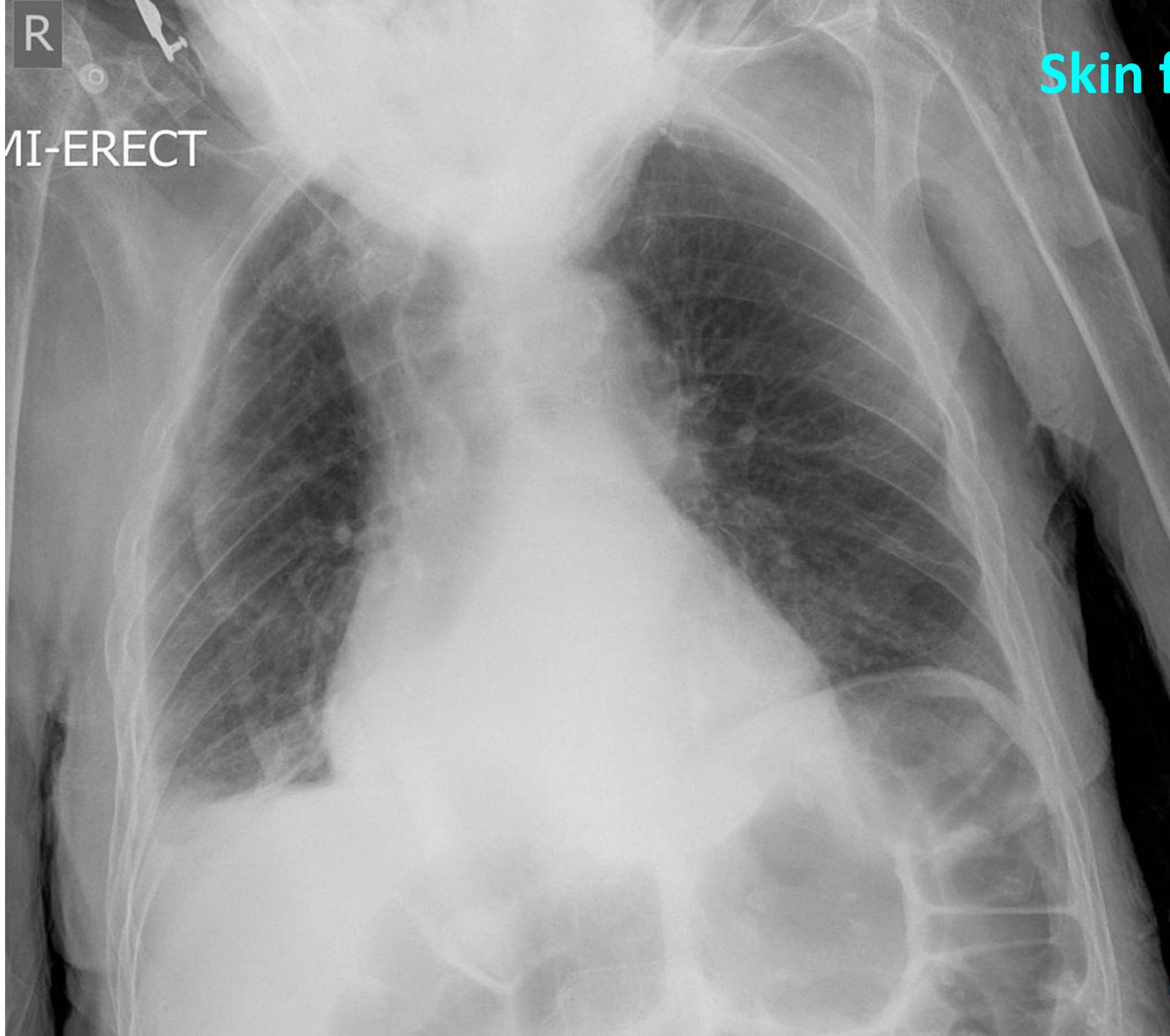


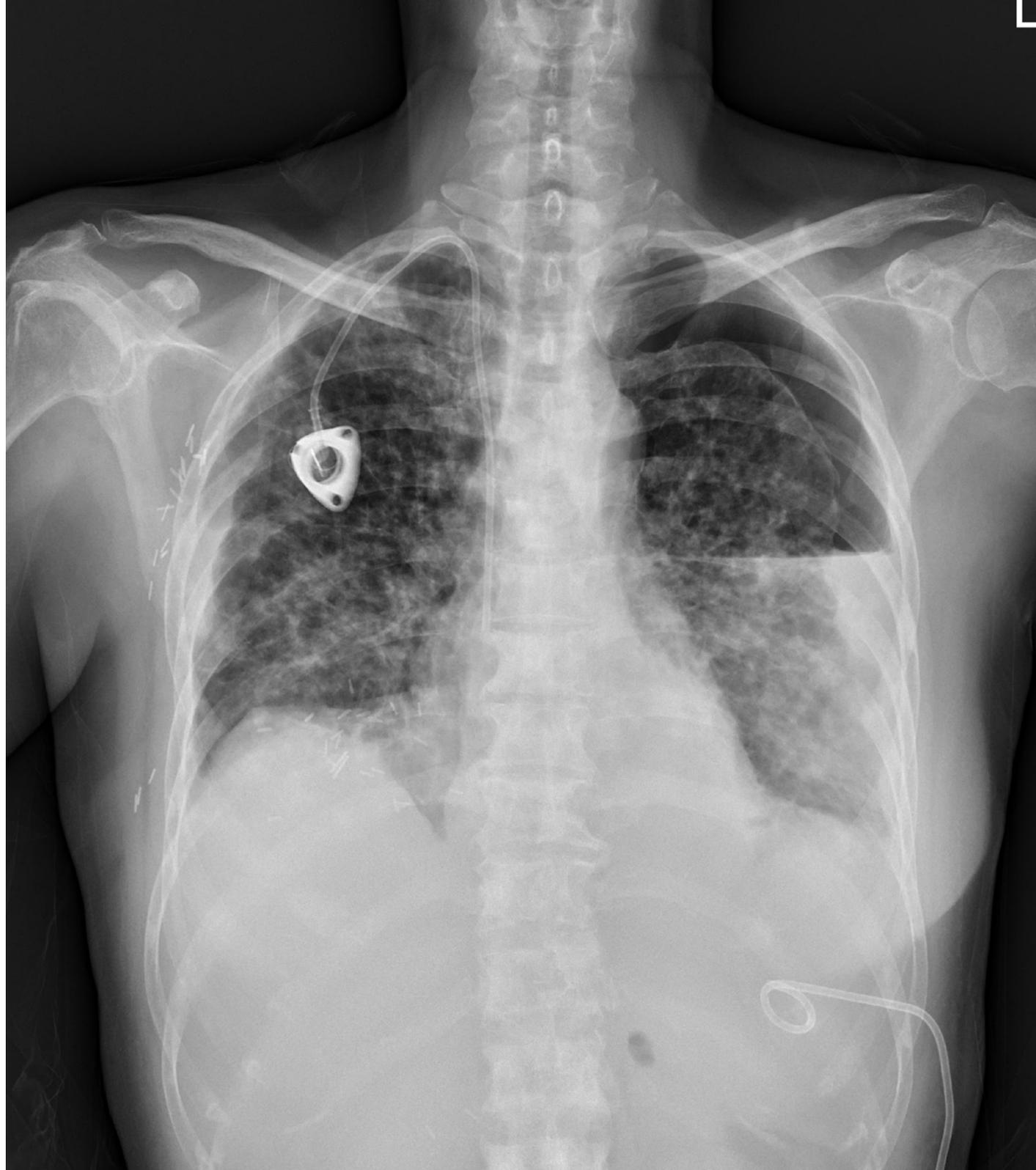
**Pneumothorax  
related to  
acupuncture**

R

Skin fold

MI-ERECT





**Hydro-  
pneumothorax**



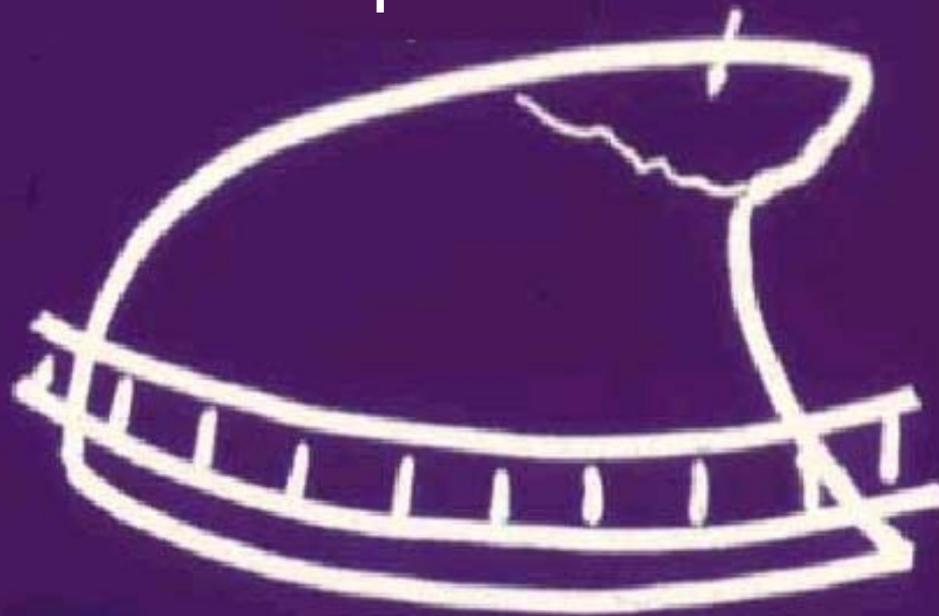
Standing



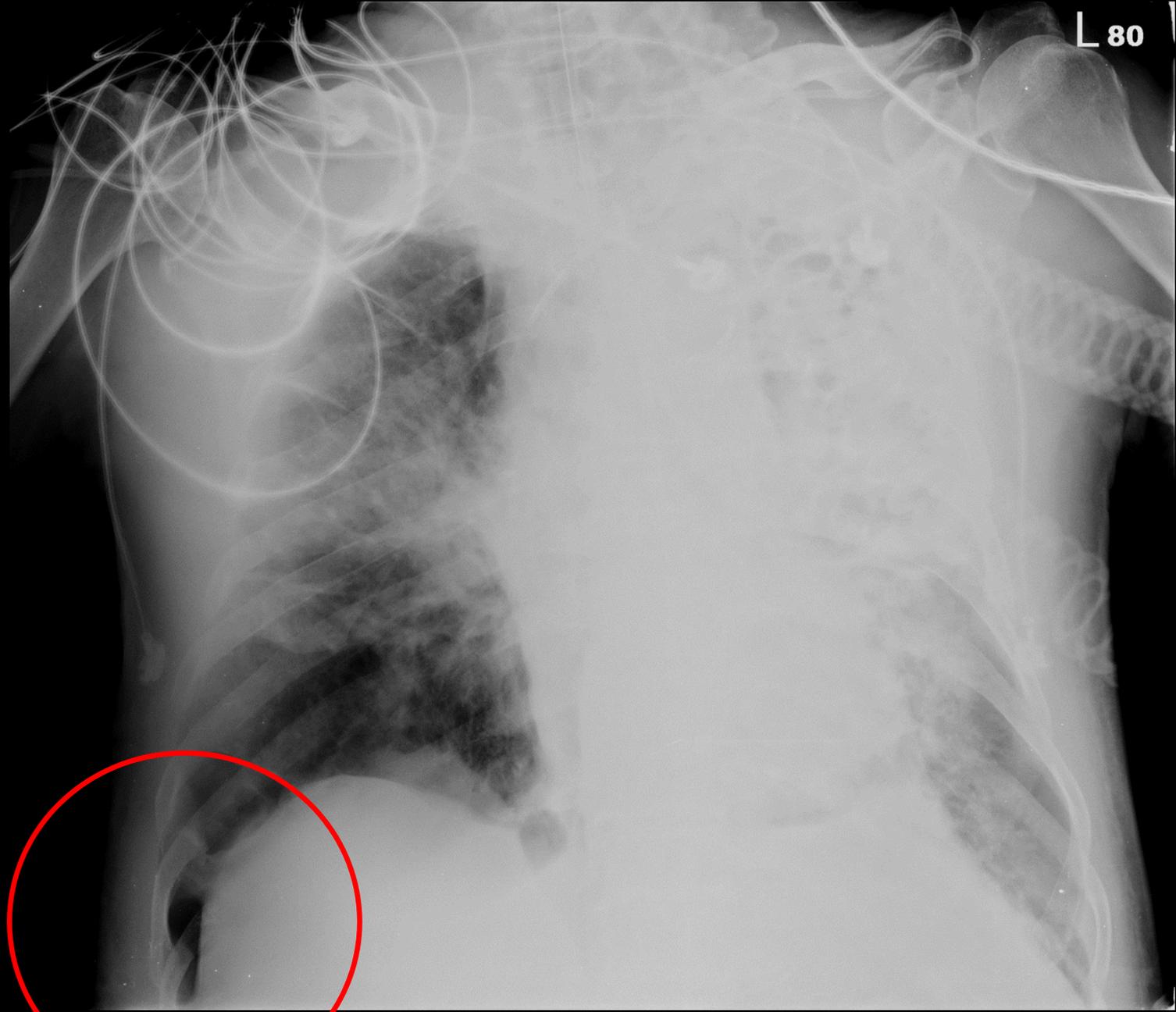
supine

air

Pneumothorax



# Pneumothorax- deep sulcus sign



# Meniscus sign (弦月徵候) pleural effusion

- 肋膜腔積液時，由於毛細現象，積液沿著兩層肋膜間向上延伸，因而形成半月狀之空氣—水介面，稱為弦月徵候。



# Empyema



# 橫膈、橫膈下影像

- **位置**：前高後低, **右高左低** (91%), 內高外低
  - 右橫膈: 10~11 post. rib; 左橫膈: 略低0.5-1 vertebral body(約1-2cm)
  - 最高點在內1/3 – 1/2處
    - if peak lateral shifting, or elevated → subpulmonary effusion
  - 左側橫膈高於右側橫膈：異常
    - 肺部因素：L't lung volume reduction
    - 橫膈因素：diaphragmatic hernia, subpulmonic effusion
    - 腹腔內因素：lesion把L't diaphragm往上頂
- **胃氣**：
  - **距左橫膈 < 1cm** (81%); > 2cm要懷疑subpulmonic effusion
  - 胃內有沒有東西 (gastric Ca)
  - Gastric air不見：hiatal hernia, achalasia, 躺著照
- **Liver**：
  - Liver abscess: air-fluid level within liver density
  - 利用腸氣(colon gas)可判斷肝脾大小
- **Subphrenic gas**：PPU, subphrenic abscess, interposed colon



駝峰狀

Normal



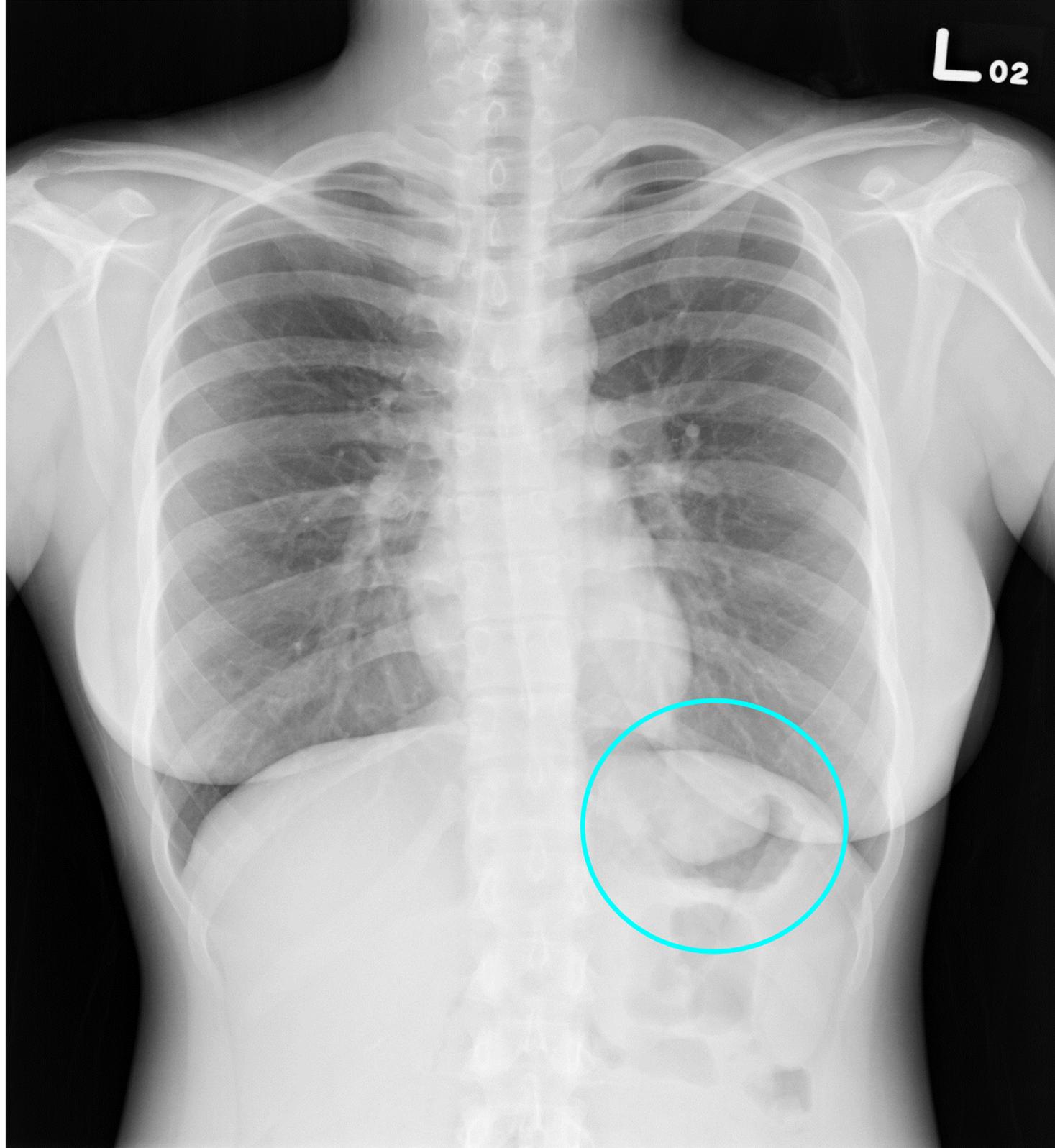
扁平狀

COPD

# Emphysema

- Hyperinflation
- Flat diaphragm
- Vertical heart

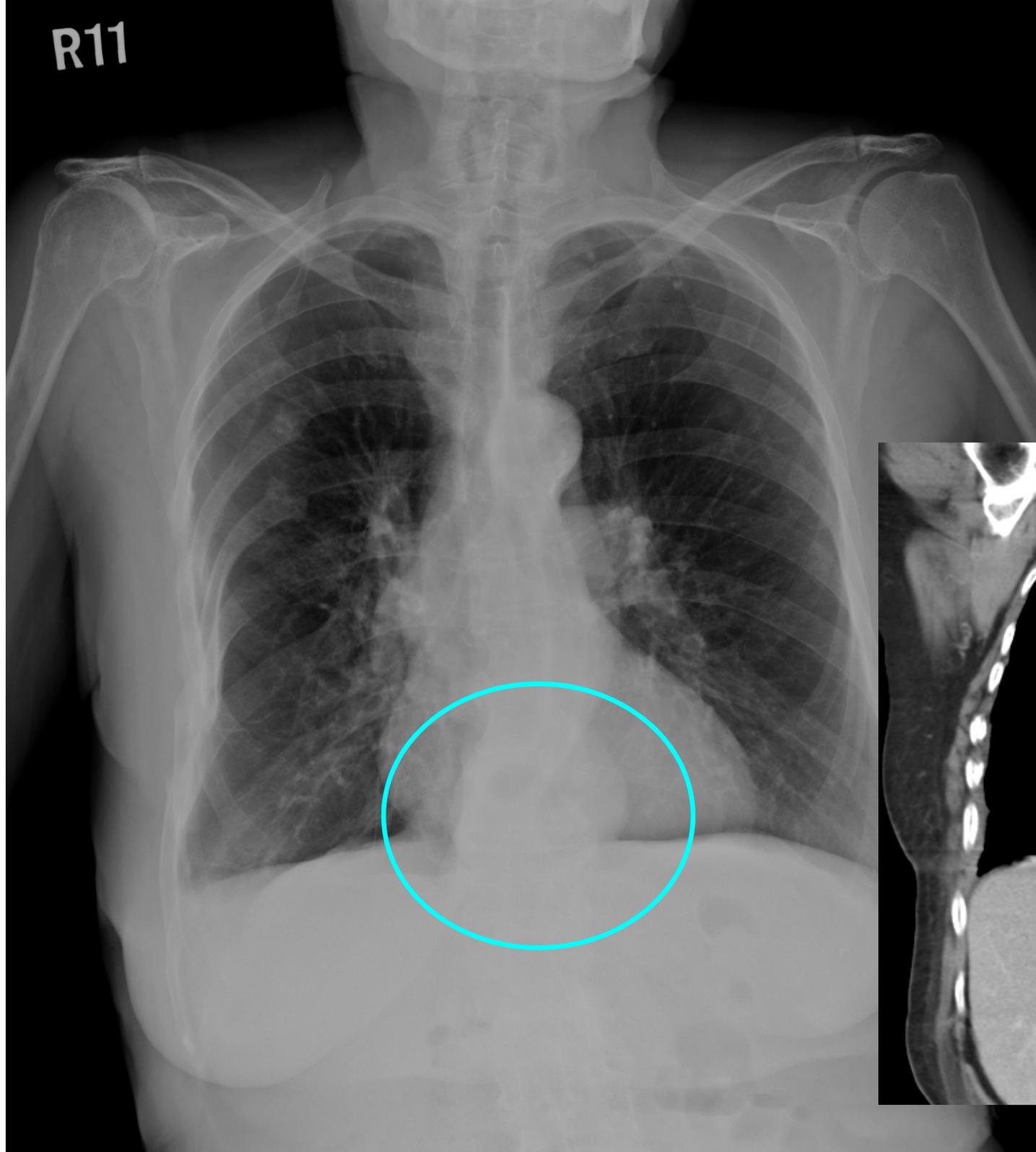




**Gastric CA**

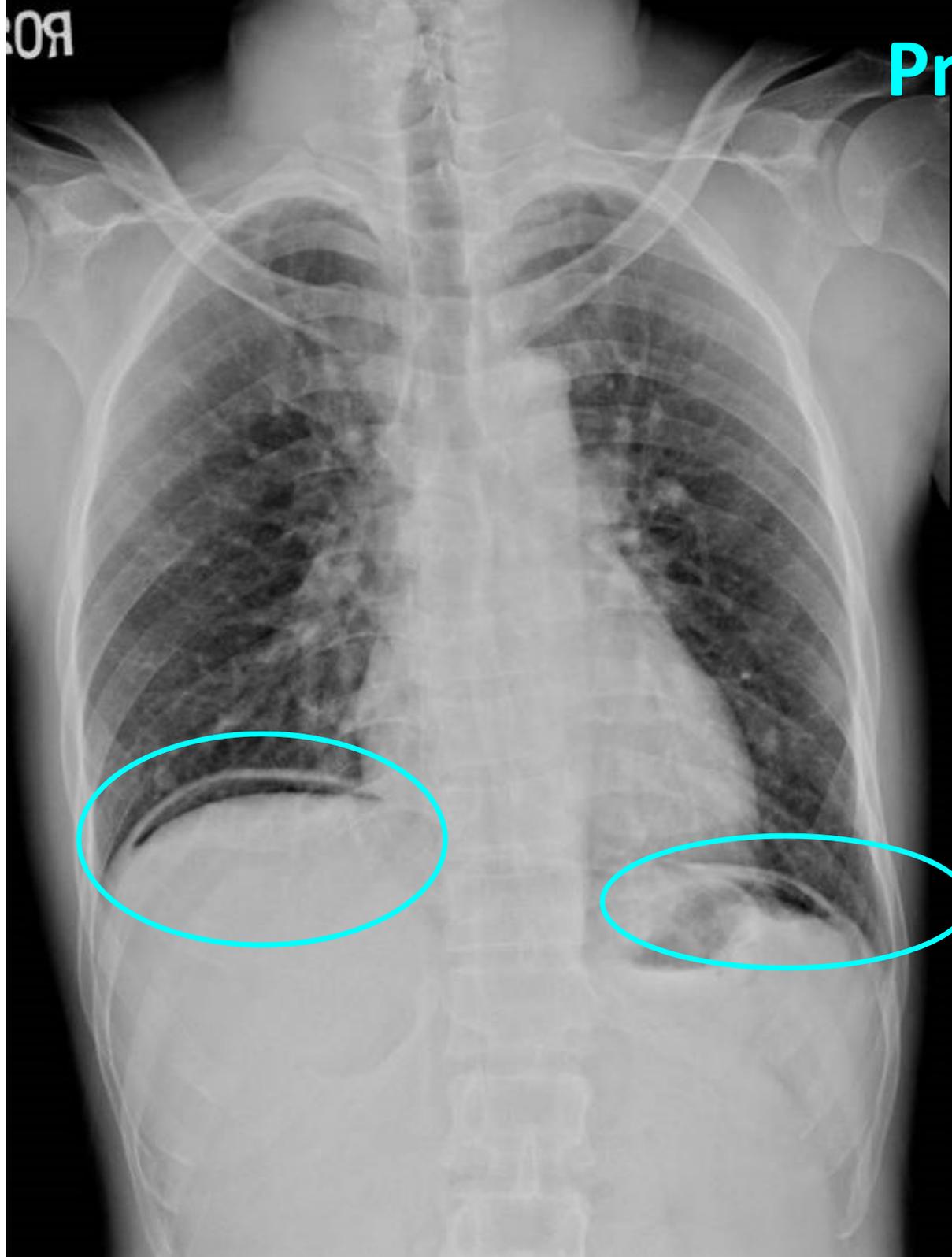
R11

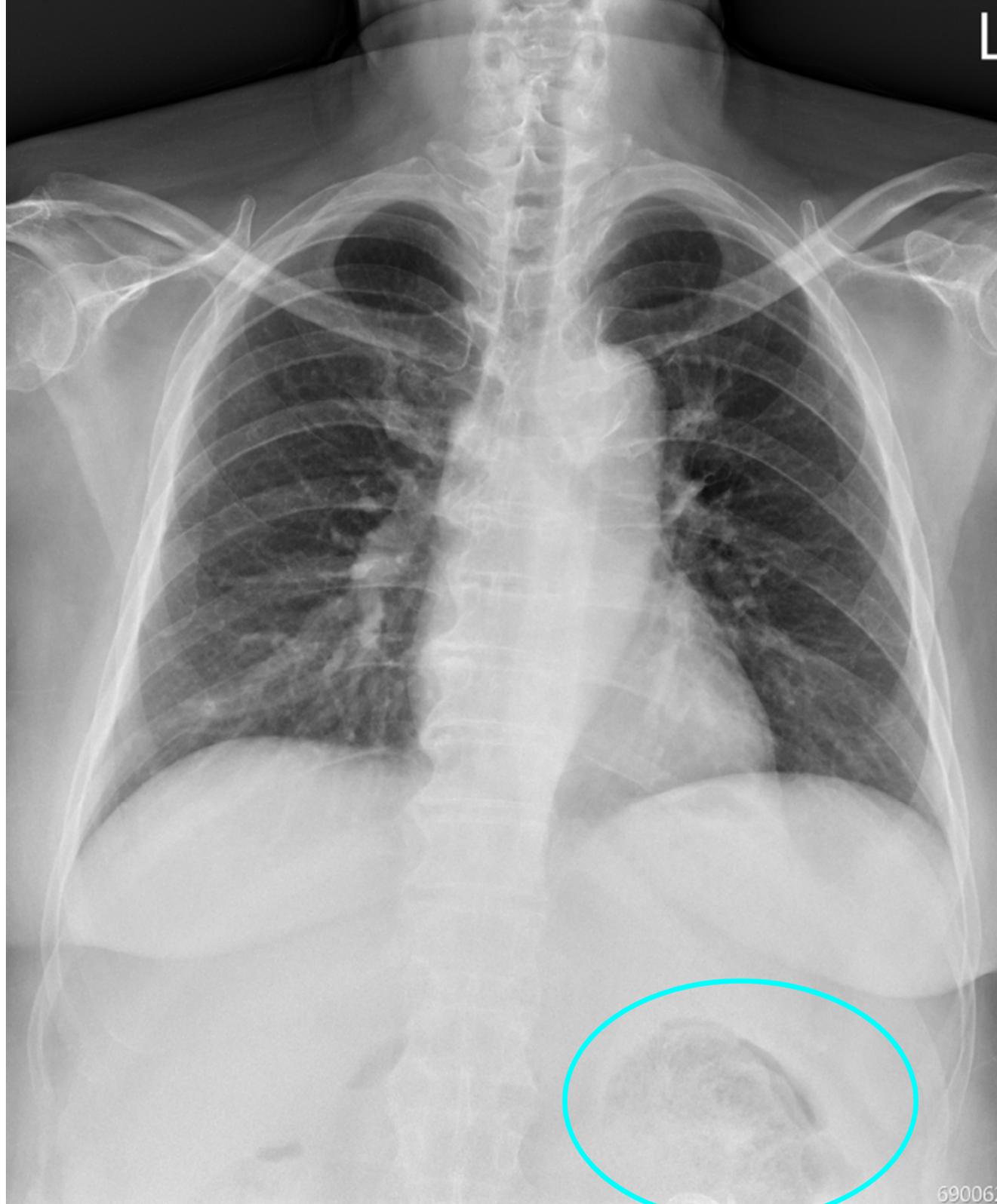
Hiatal hernia



ROA

# Pneumoperitoneum

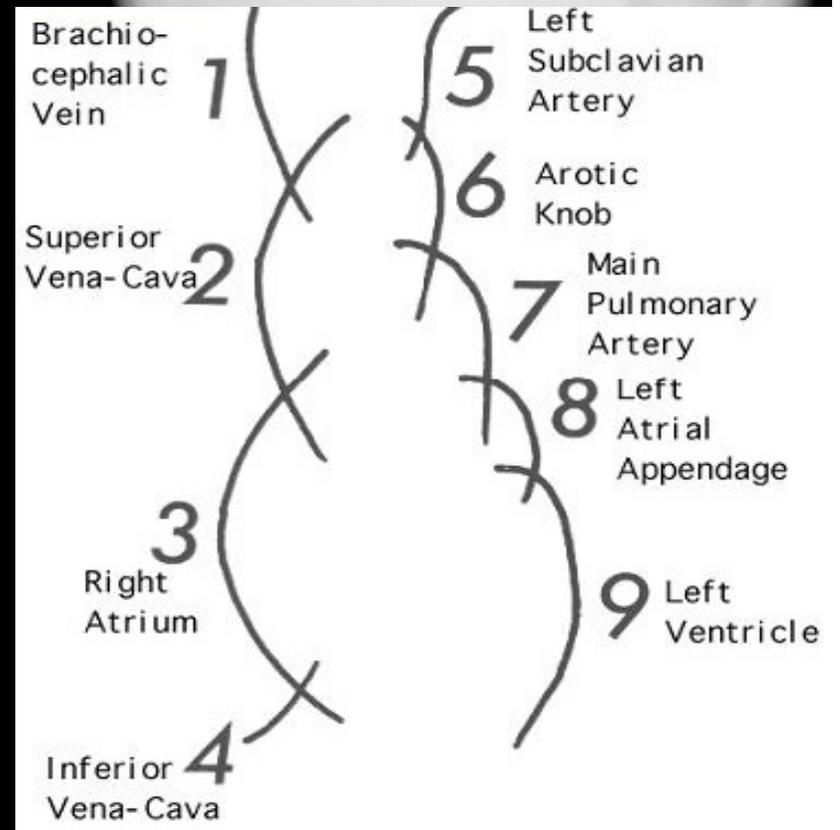
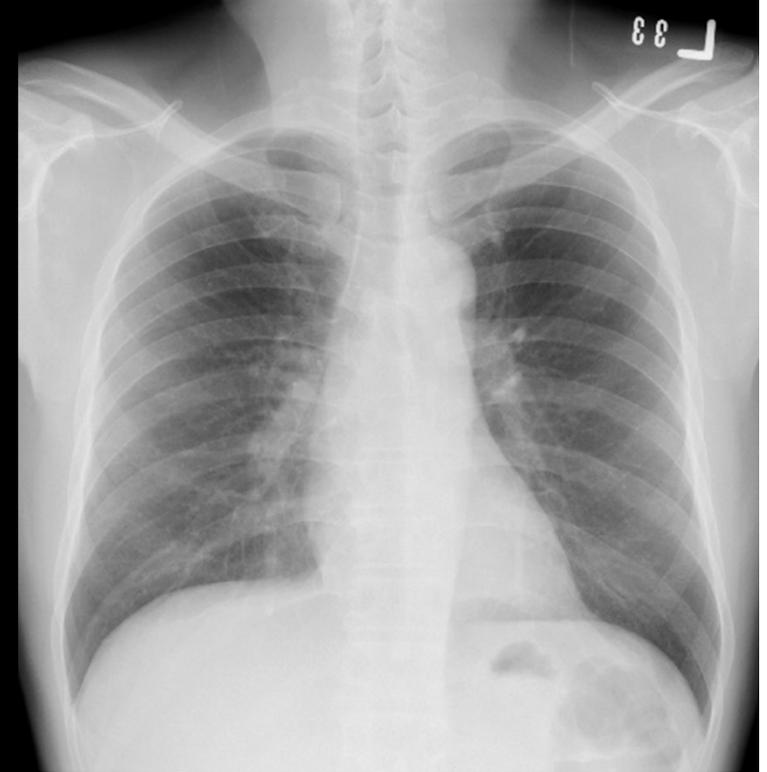




L  
**Emphysematopus  
pyelonephritis**

# Mediastinum 縱膈

- 心臟
  - Heart shadow
  - Cardiothoracic Index
- 大血管
  - Aorta
  - Pulmonary arteries
- 大氣道
  - Endotracheal/endobronchial
  - Subcarinal angle  $75^{\circ}$
- 食道
- 肺門



# Mediastinum 縱膈

懷疑縱膈病灶-務必看側位照

上、前、中、後縱膈

心臟

大血管

**Aorta**

**Pulmonary arteries**

大氣道

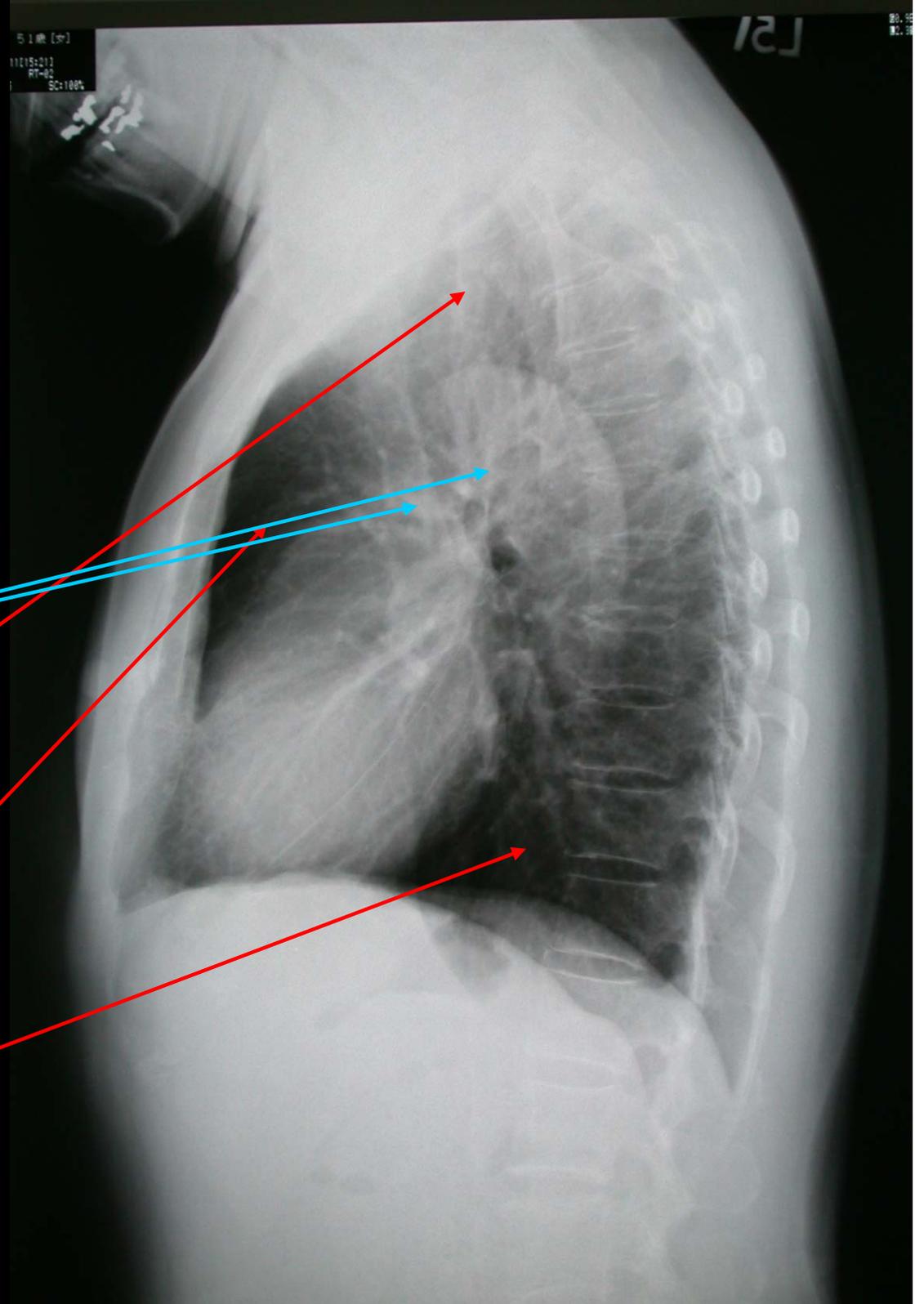
**Posterior tracheal stripe**

食道

肺門

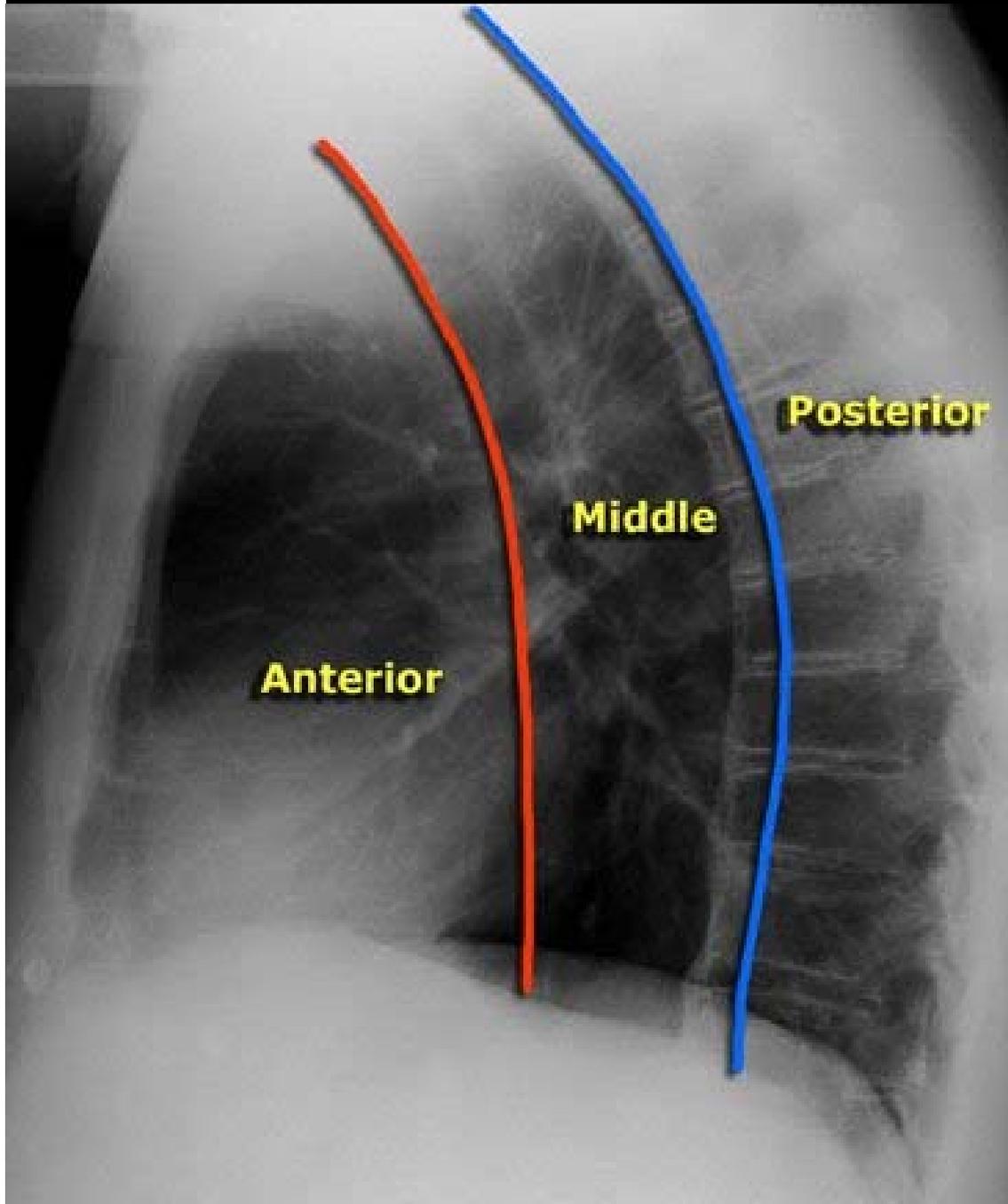
Retrosternal triangle

Retrocardiac triangle



# 縱膈

## 前中後縱膈



### Anatomy Landmarks

Anterior  
Middle  
Posterior

} mediastinum

- 氣管前緣-心臟後緣
- 椎體前緣向後1 cm

# Mediastinum

- Shift
- Widening
  - Aortic aneurysm
  - Lipomatosis
  - Mediastinitis (air-fluid level)
- Soft tissue density
  - Mass, neoplasm
- Air or air-fluid level
  - Pneumomediastinum
  - 食道病變 : esophagus reconstruction, esophageal cancer, achalasia
  - Hernia

# Cervicothoracic sign

- Used to determine location of mediastinal lesion in the **upper chest**
- Based on principle that an intrathoracic lesion in direct contact with soft tissues of the neck will not be outlined by air
- Uppermost border of the **anterior mediastinum** ends at level of clavicles
- **Middle and posterior mediastinum** extends above the clavicles
- Mediastinal mass projected superior the level of clavicles must be located either within **middle or posterior mediastinum**
- More cephalad the mass extends the most posterior the location



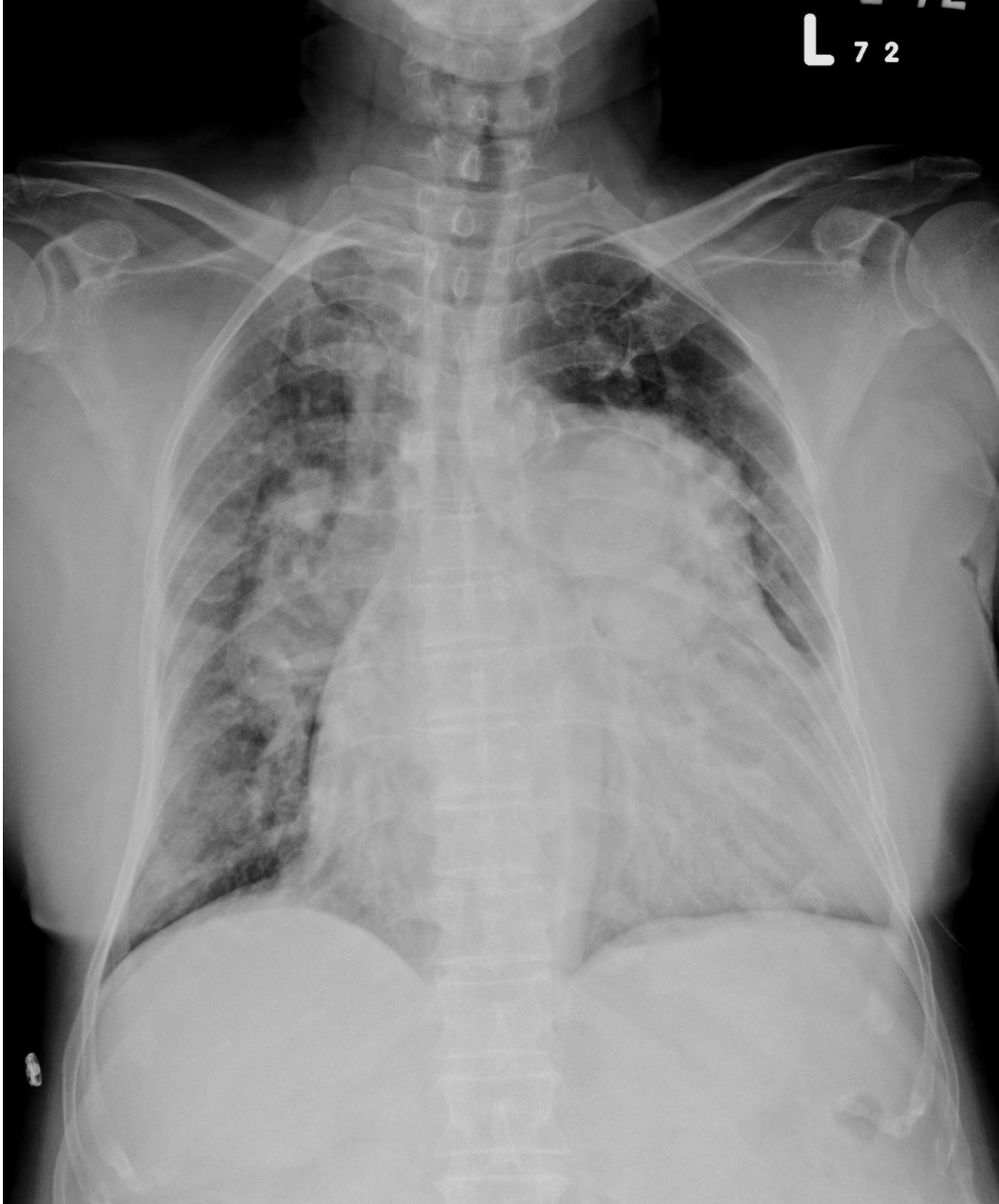
**Trachea  
deviation**

**Thyroid goiter**



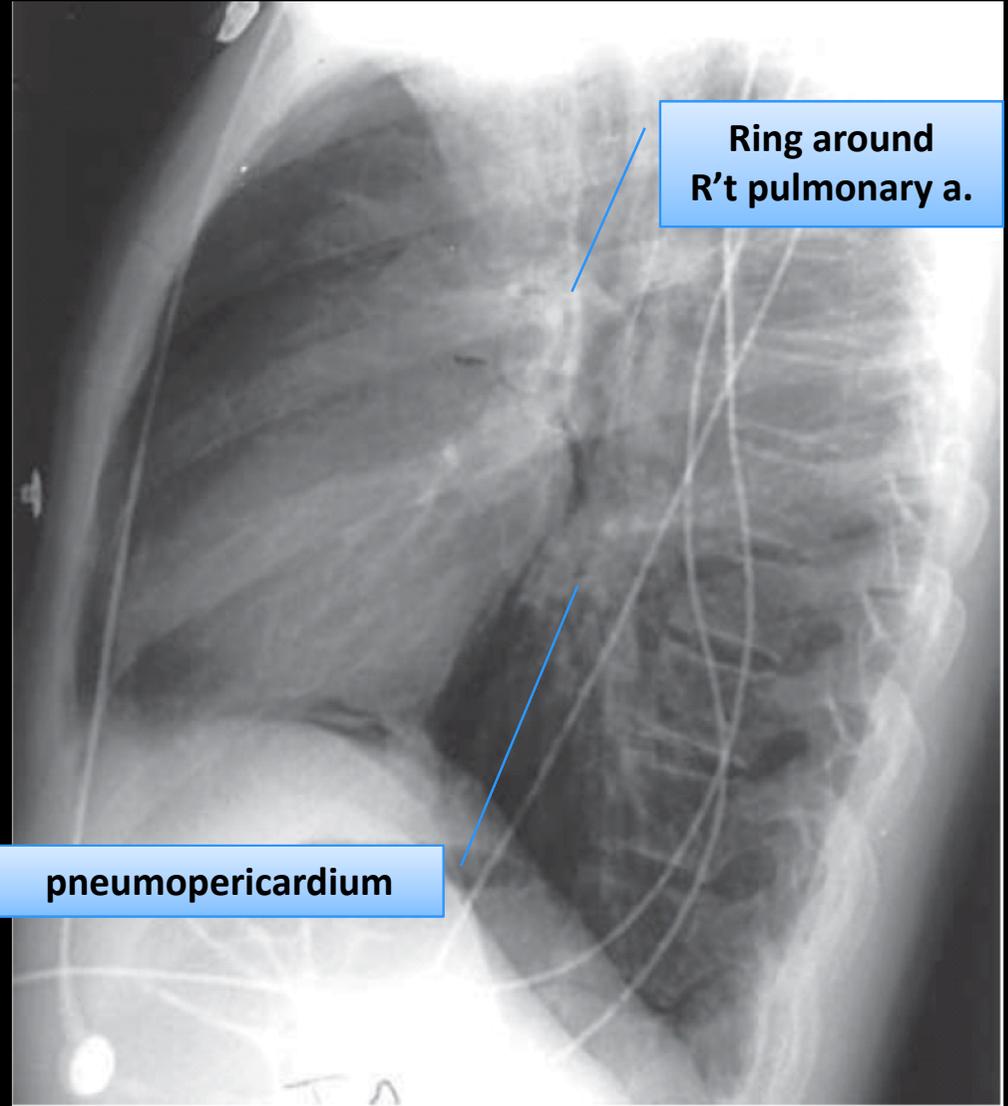
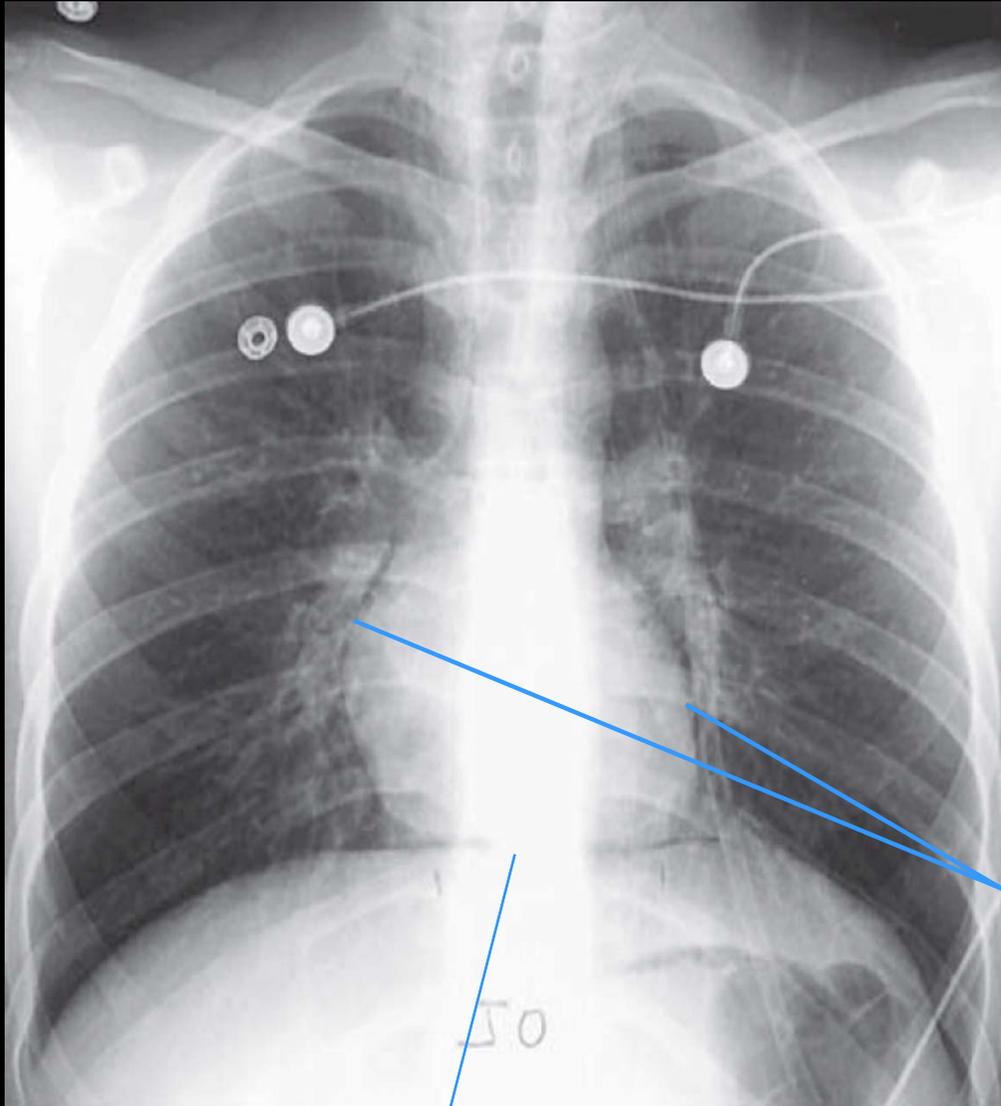
L 7 2

# Aortic Aneurysm



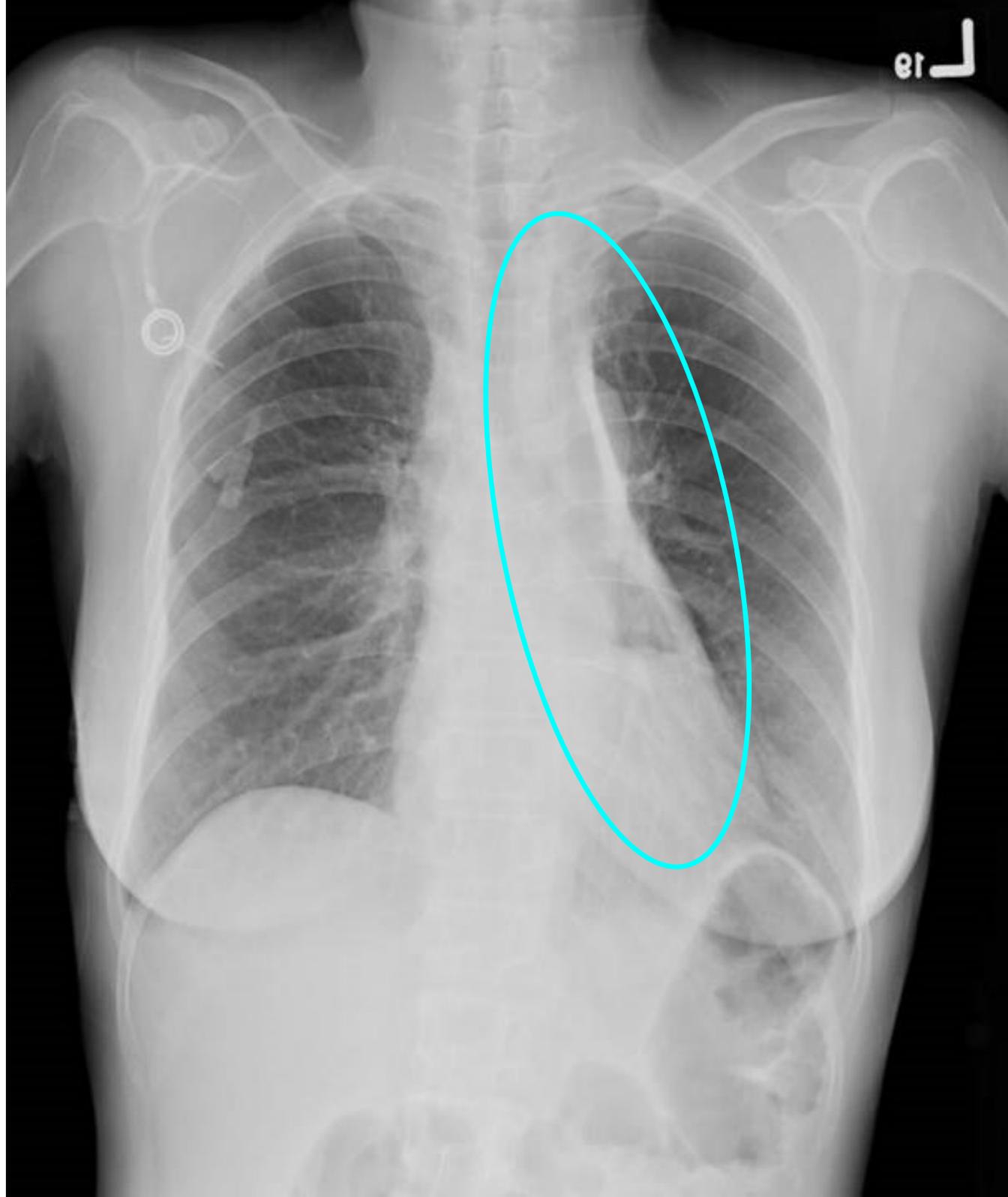
# Continuous diaphragm sign

## Ring around the artery sign



**Continuous diaphragm sign**

→ air trapped posterior to the pericardium



# Esophageal Reconstruction

# Heart

- **Size change:** Cardiothoracic (C-T) ratio
- **Signs:**
  - **Water bag:** Pericardial effusion
  - **Boot-shaped:** Tetralogy of Fallot (TOF)
  - Straight Lt heart border (**Flat-waist sign**) : LLL atelectasis
  - Double density of right heart border (**Double contour sign**): LAE
- **Pericardiac mass:** 心臟、橫膈、肺、其他縱膈腫塊
  - L: LV aneurysm
  - R: Morgagni hernia
  - R / L: Epicardial fat pad, pericardial cyst, diaphragmatic hernia, lung mass
- **Pericardial calcification:** constrictive pericarditis
- **Retrocardiac density:** 死角

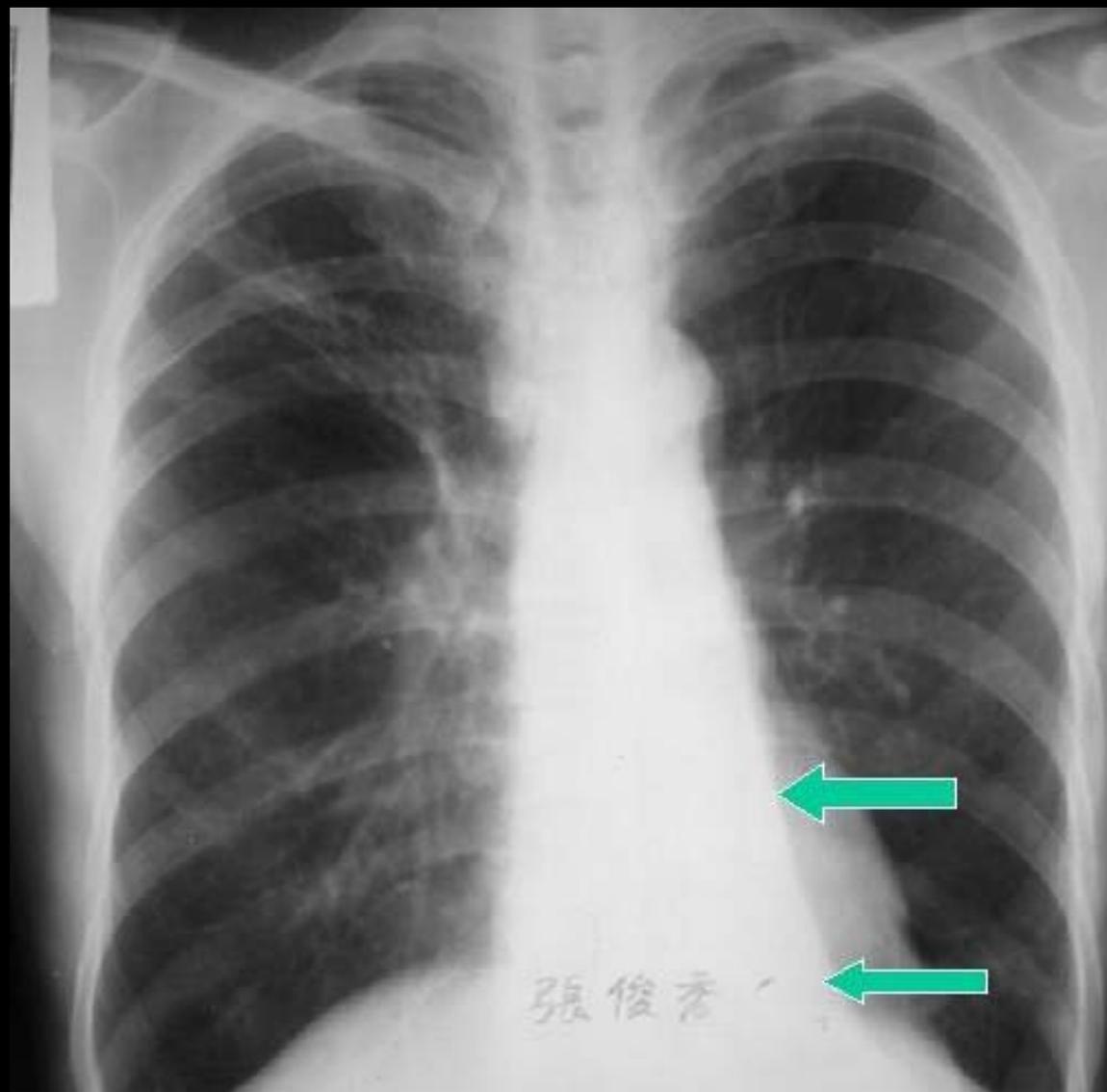
# Pericardial Effusion



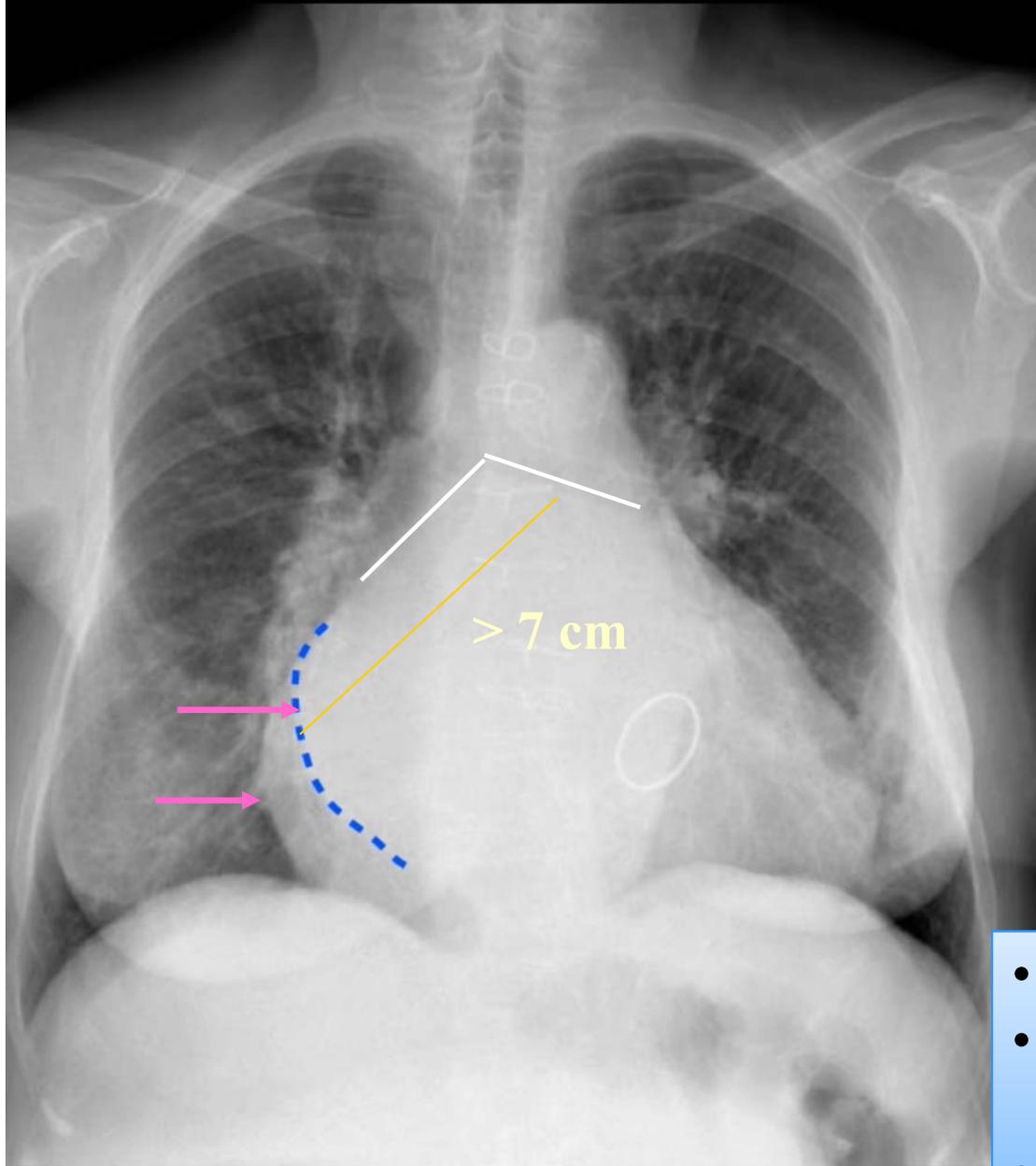
- Enlarged "cardiac" density
- Water bottle appearance
- Pulmonary olegemia
- Precardiac fat line in lateral view below

# Flat waist sign (LLL collapse)

- 平腰徵
- 正常左邊的心臟邊緣成凹陷狀，而當 **severe LLL collapse** 時，除了 mediastinal shift 之外，心臟還會作輕微的 **right anterior oblique rotation**，以致於左側心臟的 normal concavity 消失，因而呈平坦狀。



# LA enlargement (LAE)

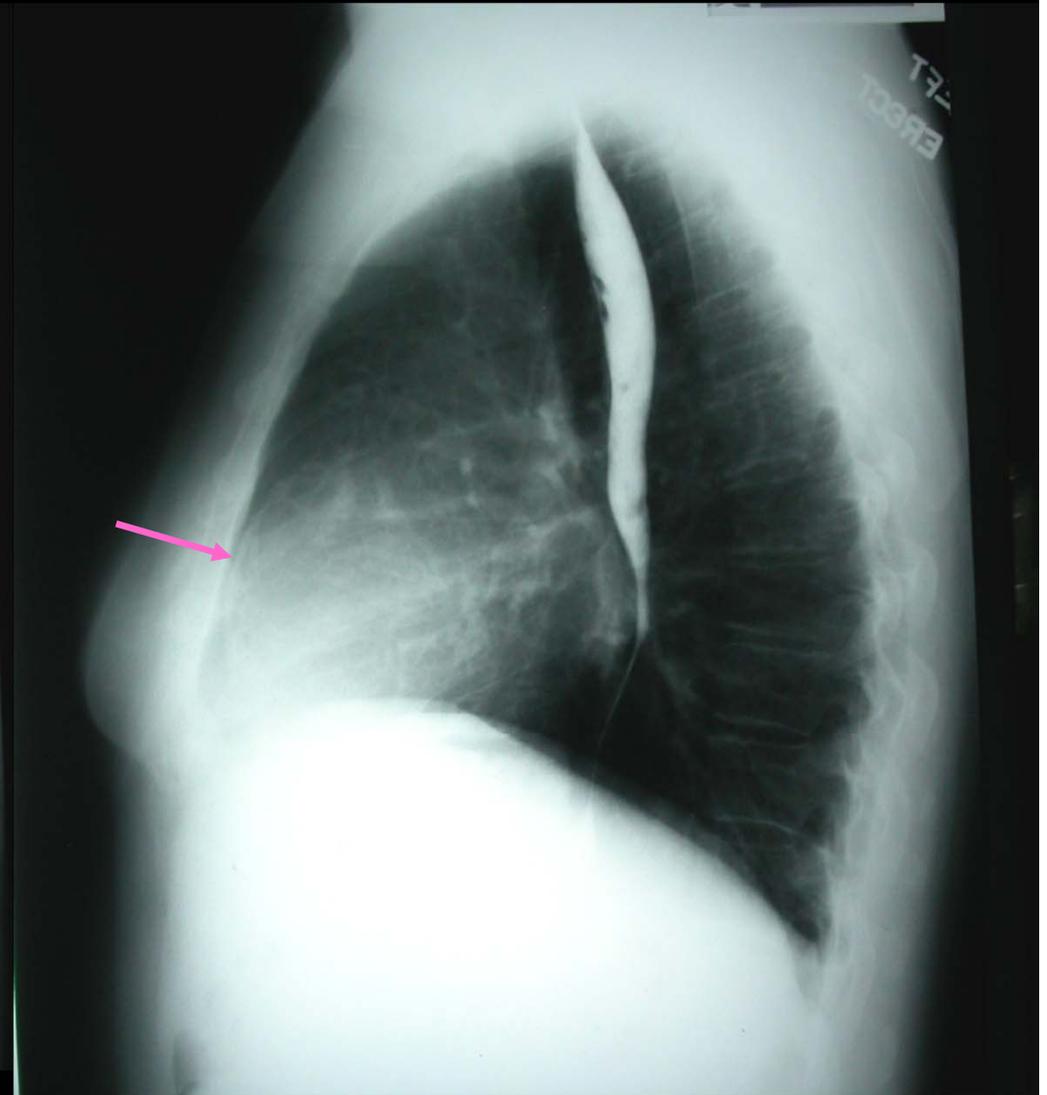
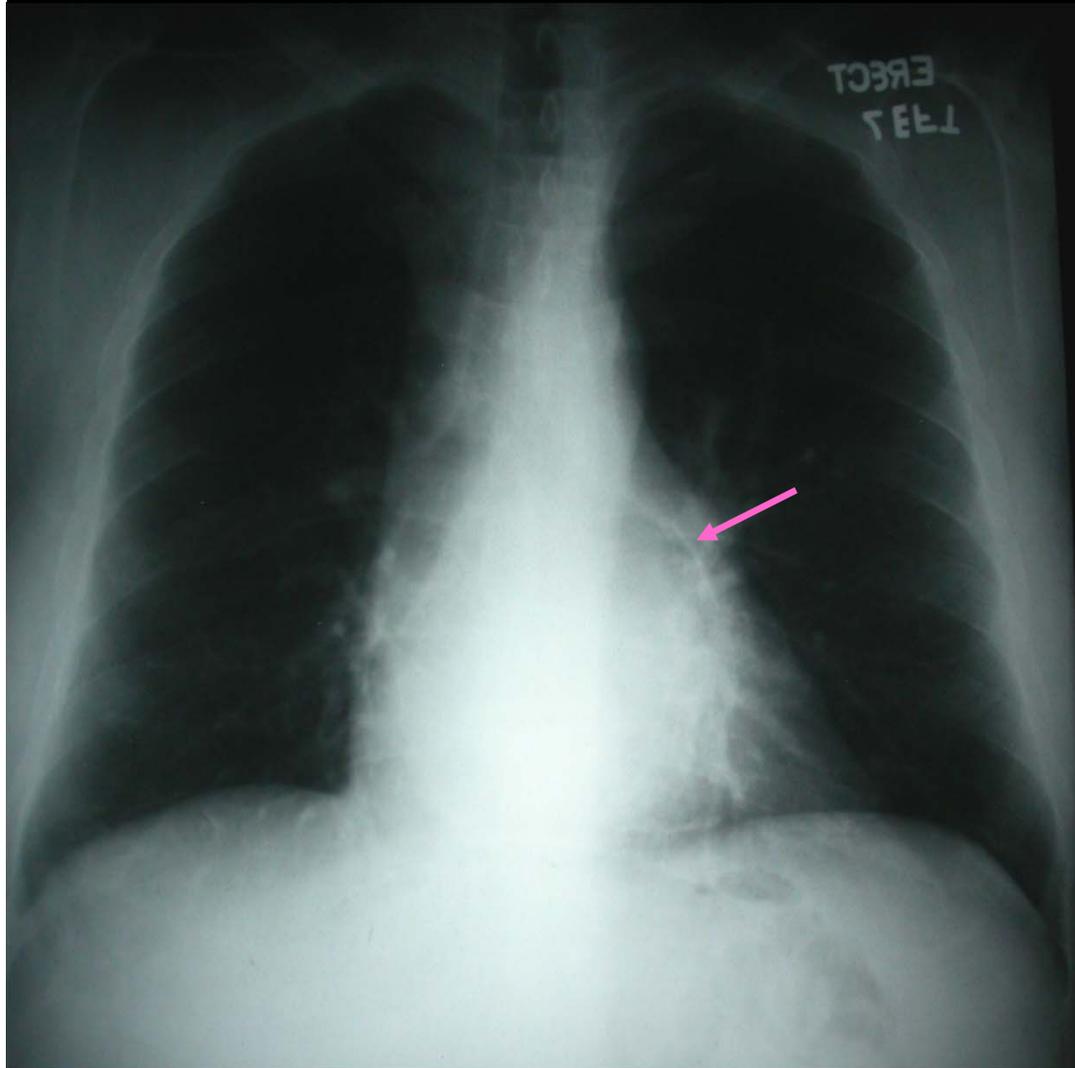


- Double contour of R't heart border
- Distance between midpoint of double contour-LMB  $> 7 \text{ cm}$
- Subcarina Angle  $> 75^\circ$



# Pericardial calcification

50% of p't in constrictive pericarditis

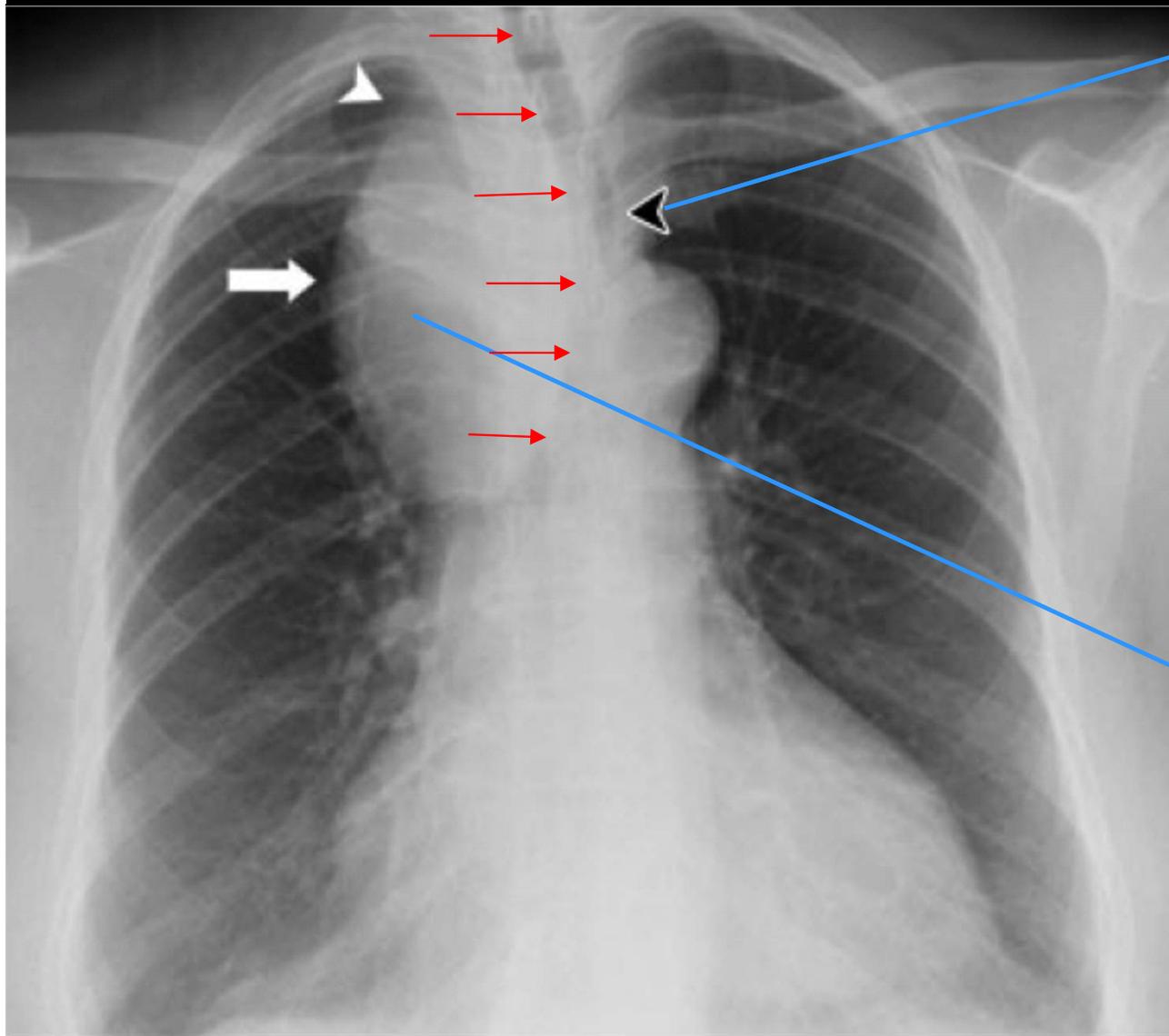


# Airway

- **Diameter change:** (Normal < 2-2.5cm)
  - Stenosis
  - Dilate: tracheomalacia
- **Deviation:**
  - Pathological change
  - Aortic notch compression
- **Tumor:**
  - Tracheal tumor; hamartoma; carcinoid tumor; cylindroma
- **Carina:** adult T5-T6 level
  - **Right main bronchus:** 1-2 cm
  - **left main bronchus:** 4-5 cm
  - **Carina angle:** (正常約 $75^{\circ}$  ( $35-87.5^{\circ}$ ); Rt :  $30^{\circ}$  , Lt:  $45^{\circ}$ )
    - $< 60^{\circ}$  : lower lobe volume reduction
    - $> 90^{\circ}$  : upper lobe volume reduction (atelectasis), left atrium enlargement, pericardial effusion, subcarinal LAP



**LUL volume  
reduction**  
– Left deviation  
of trachea



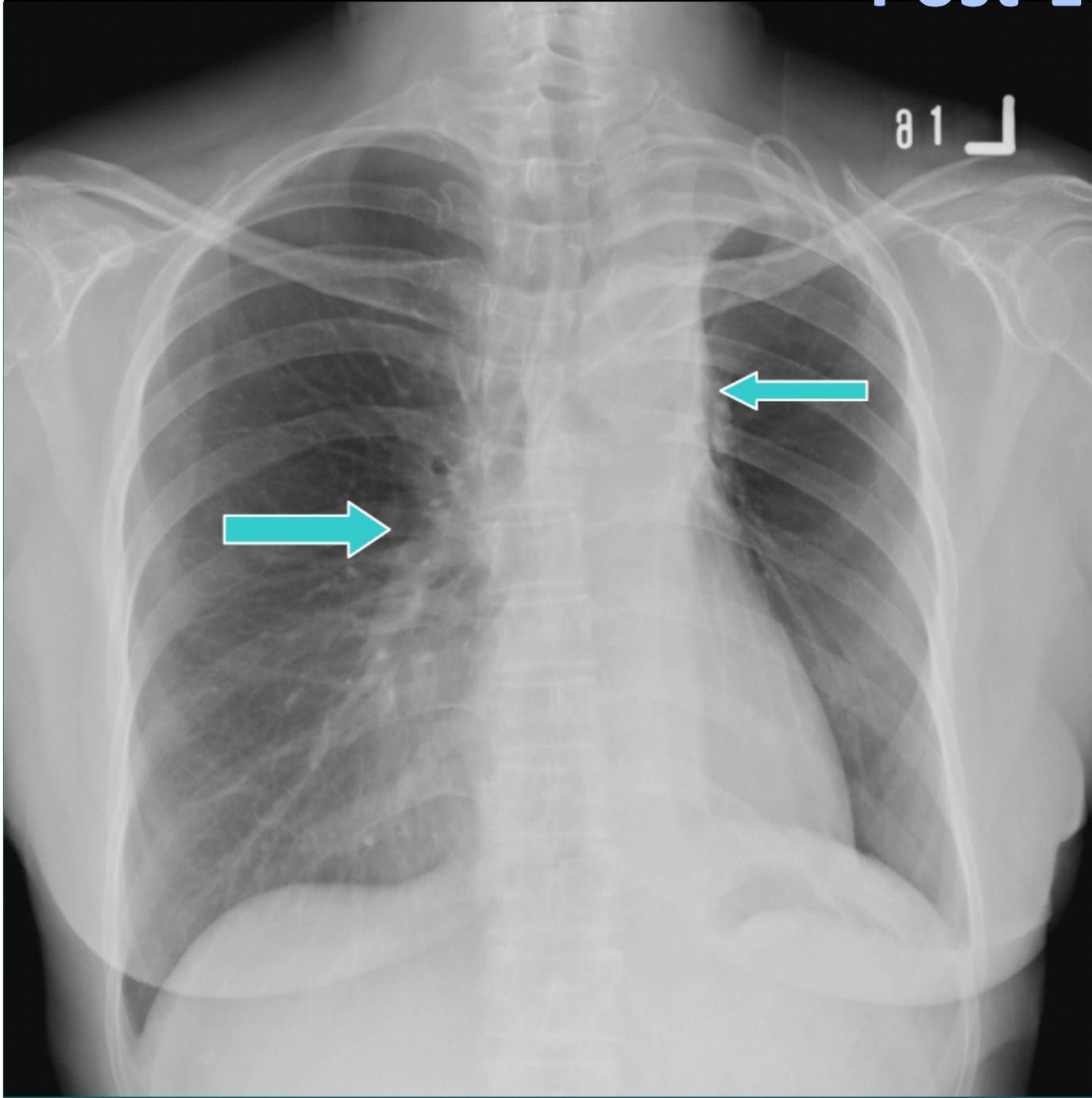
**Deviation of the trachea to the left**

**Intrathoracic Goiter**

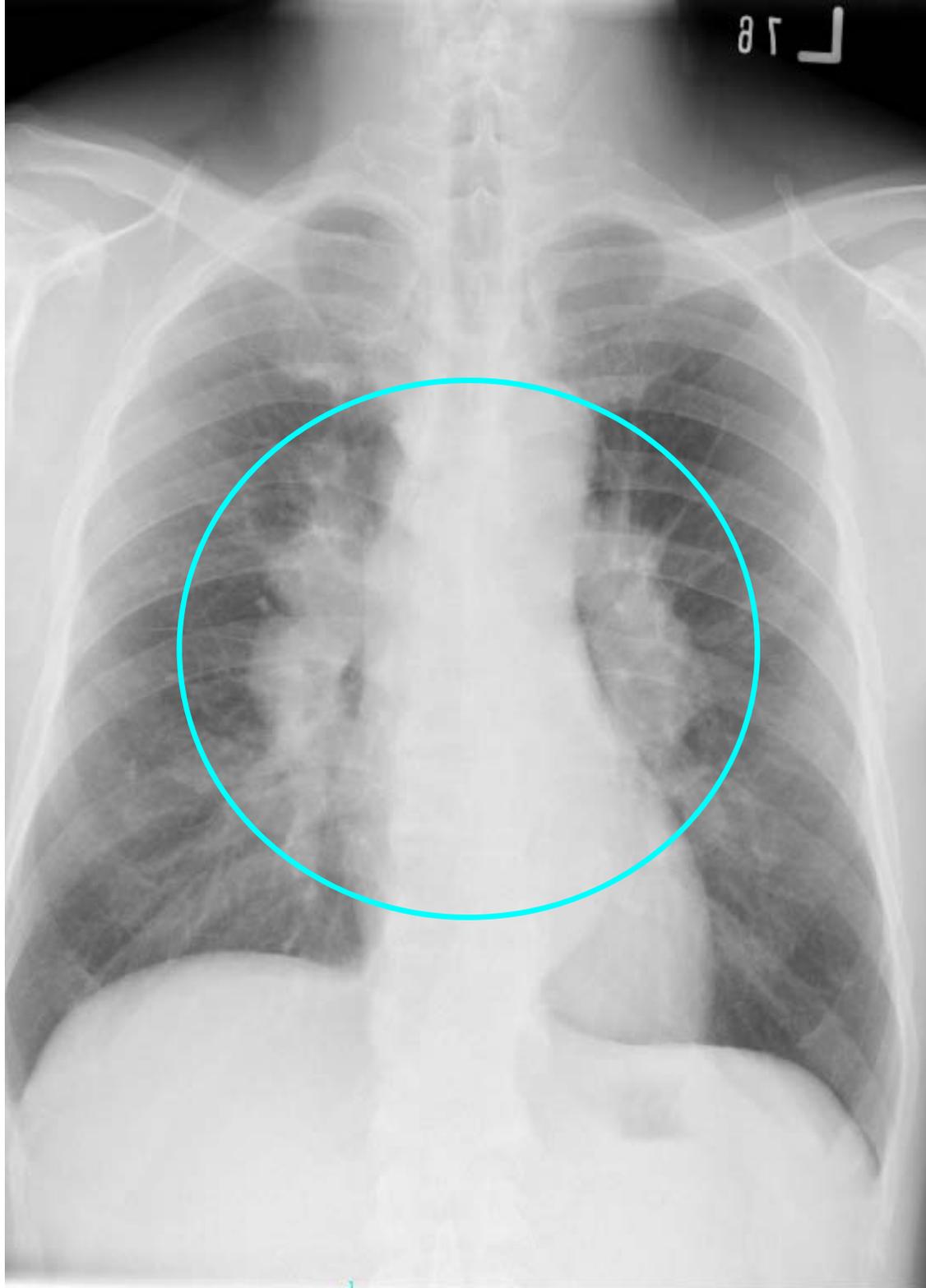
# Hilum

- 觀察重點：
  - 大小、位置、形狀、濃度(density)
- 位置：
  - 正常：左高於右 (97%, 0.75-3cm, 左右等高(3%))
  - 異常：右高於左 (一旦右側高或左側低代表有問題!!)
  - 右側肺門：R't superior pulmonary vein 和 inferior limb of R't pulmonary artery 的交點
  - 左側肺門：upper margin of L't pulmonary artery trunk and LMB 的中點
- Hilum enlargement
  - Hilar lesion
    - Vessel engorgement
    - Hilar LAP
  - Superimposed mass (lung, mediastinum)

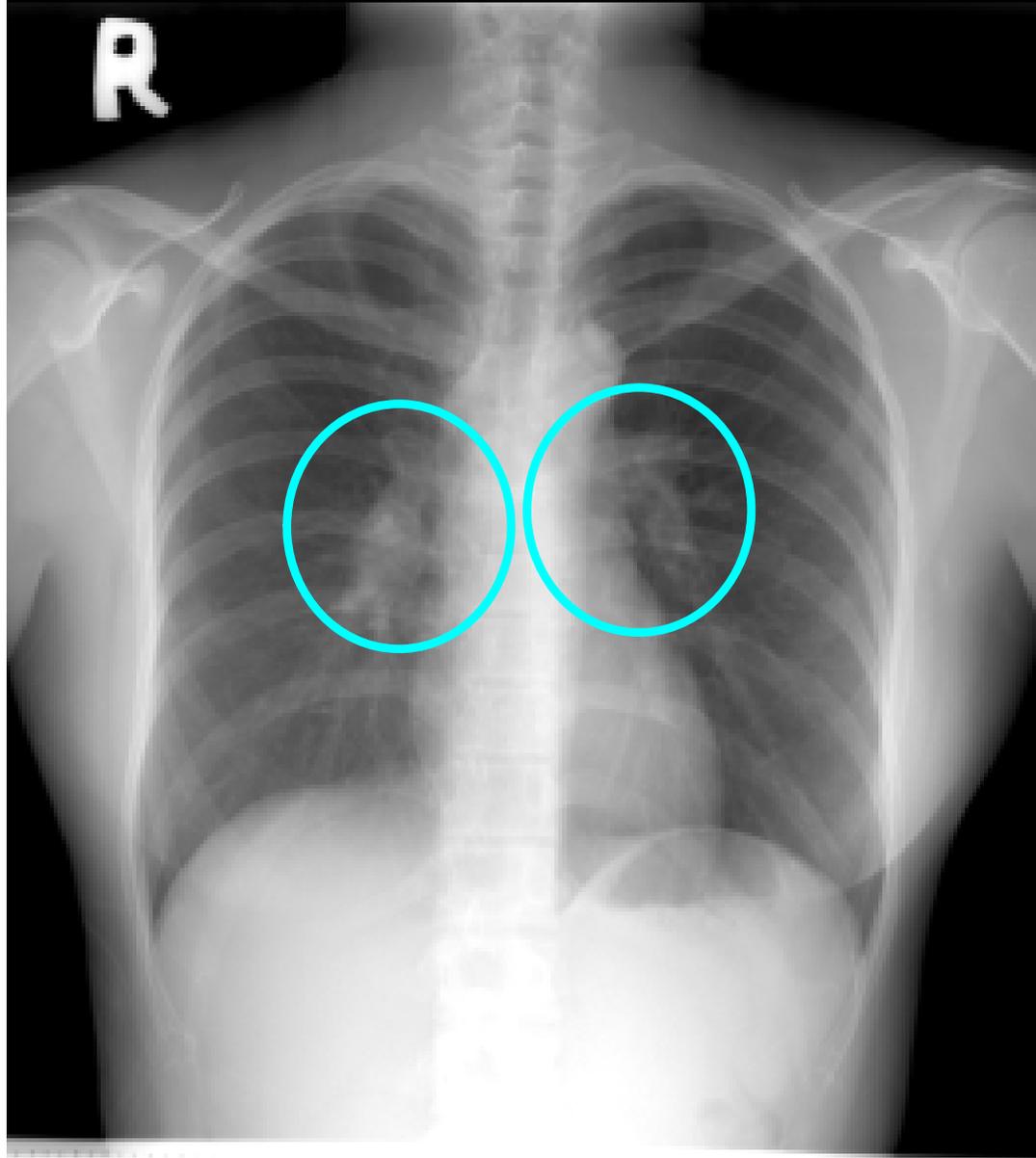
# Elevation of Left hilum Post-LUL lobectomy



# Sarcoidosis

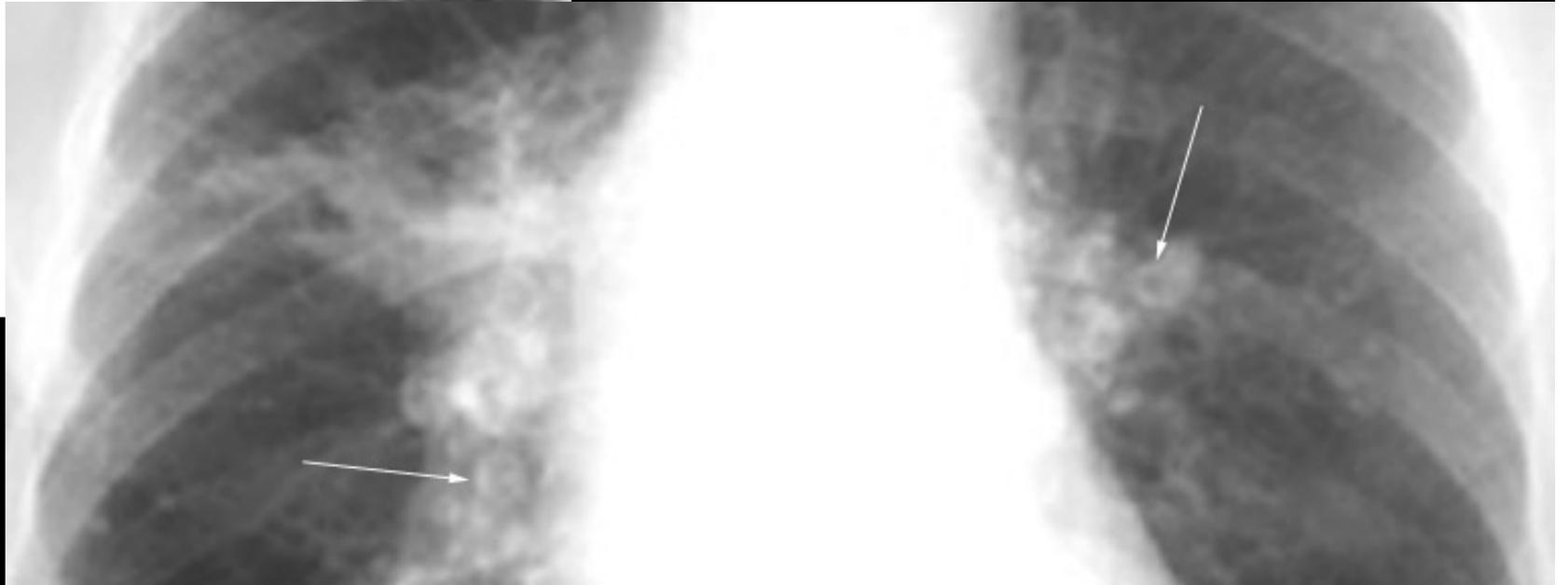


# Lung cancer (adenocarcinoma)





**Silicosis**  
Egg Shell  
Calcification of  
hilar LAP

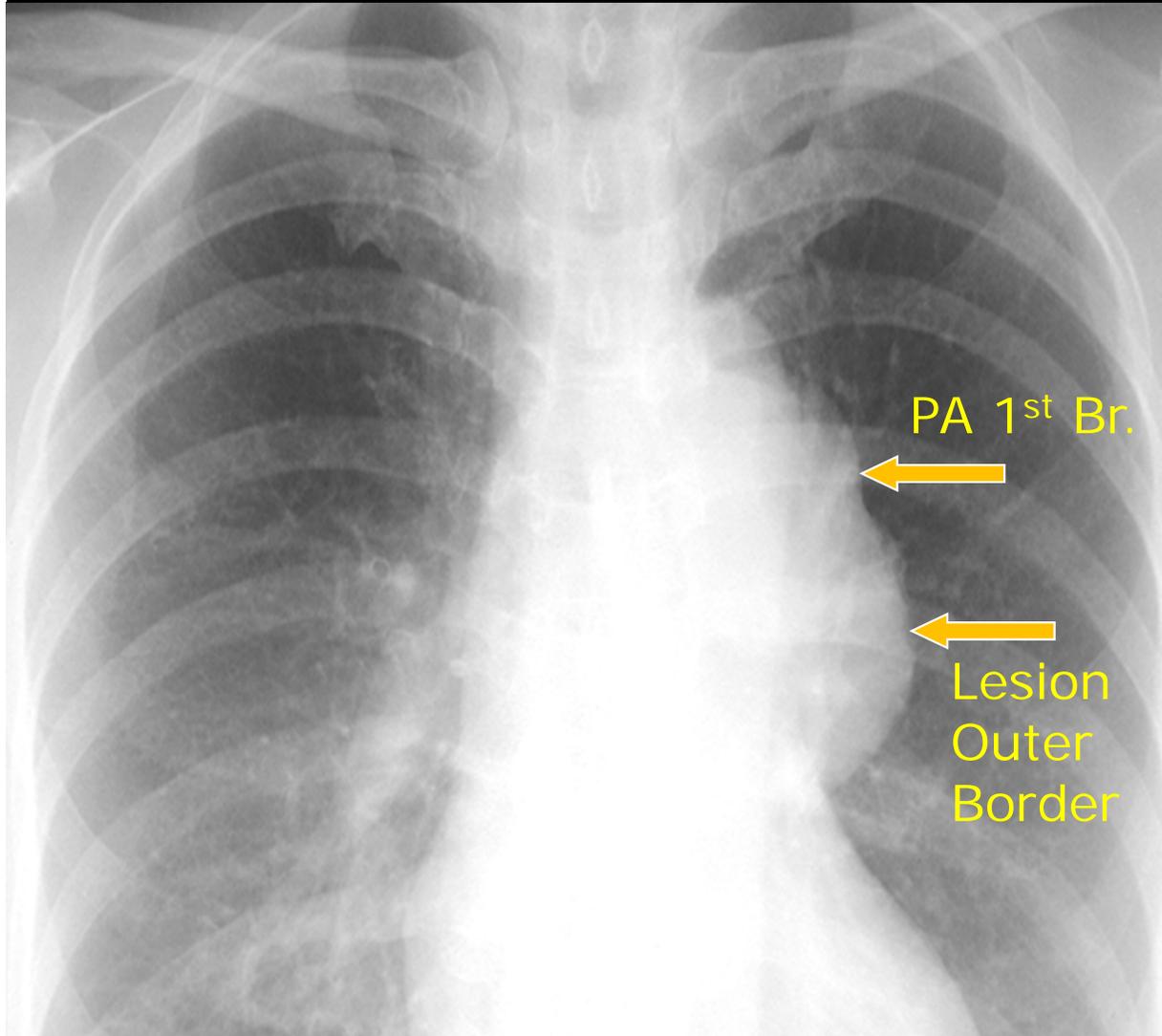


# Hilum Overlay Sign

- 用來區分肺門附近的病灶是 mediastinal mass 或 cardiomegaly
  - 觀念：98% 正常人 **pulmonary artery** 的第一個分支點 (最內側的分支)，位在 **心臟邊緣或稍外側**，即使在 cardiomegaly or pericardial effusion 亦是如此。只有 2% 的正常人，此分支點位於心臟邊緣內側且距心臟邊緣 1cm 以上。
  - 應用：  
若 pulmonary artery 的第一個分叉點在 **lesion 外緣的內側且大於 1cm 以上** → favor **mediastinal mass**

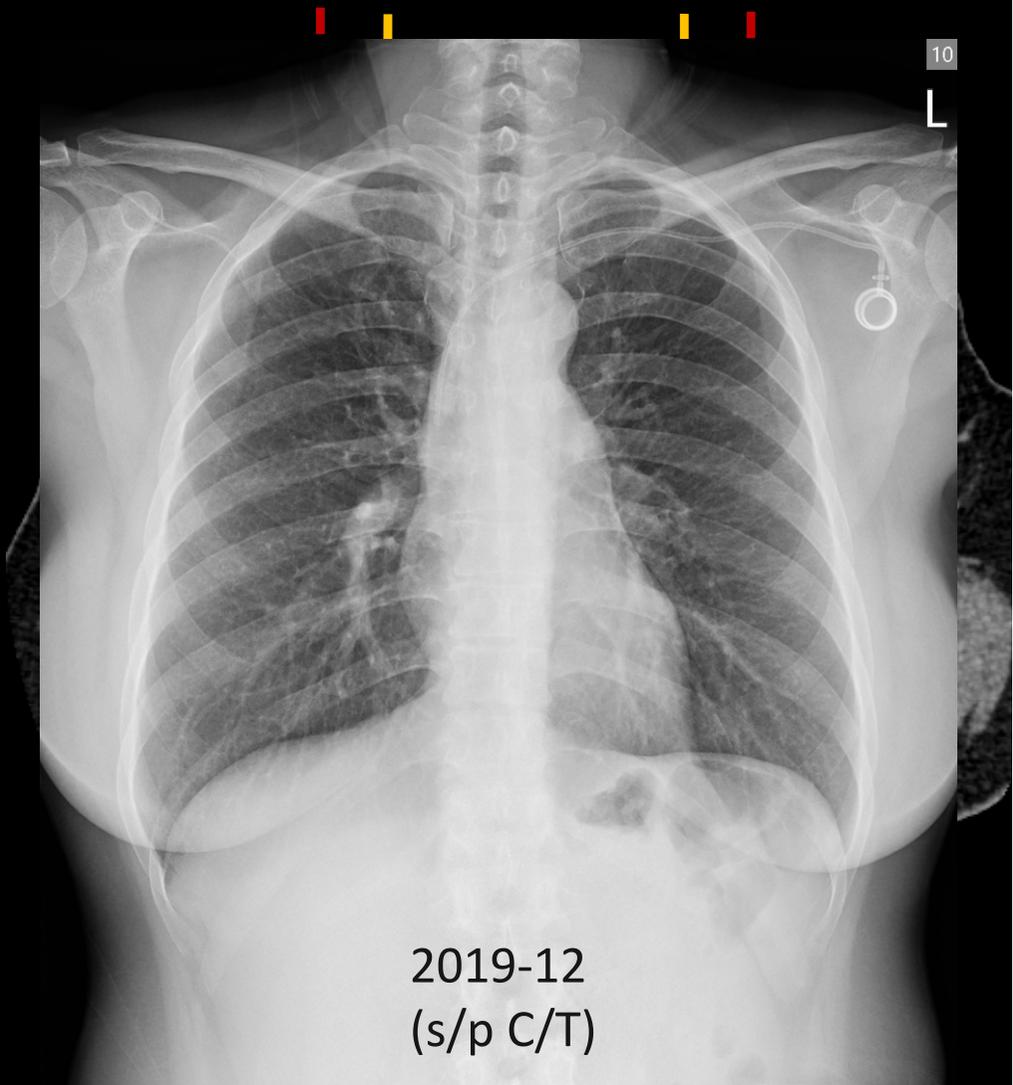
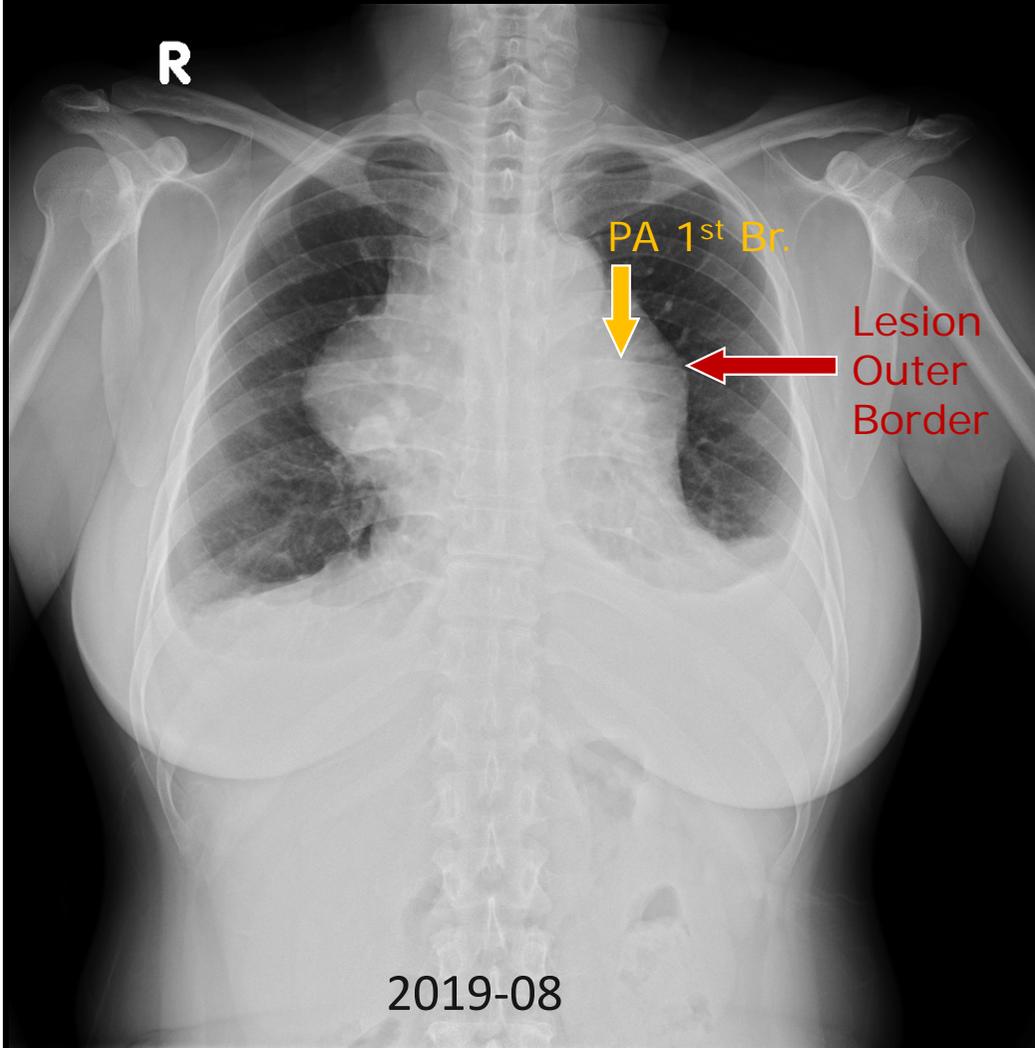
# Hilum Overlay Sign

Dx: thymoma



# Hilum Overlay Sign

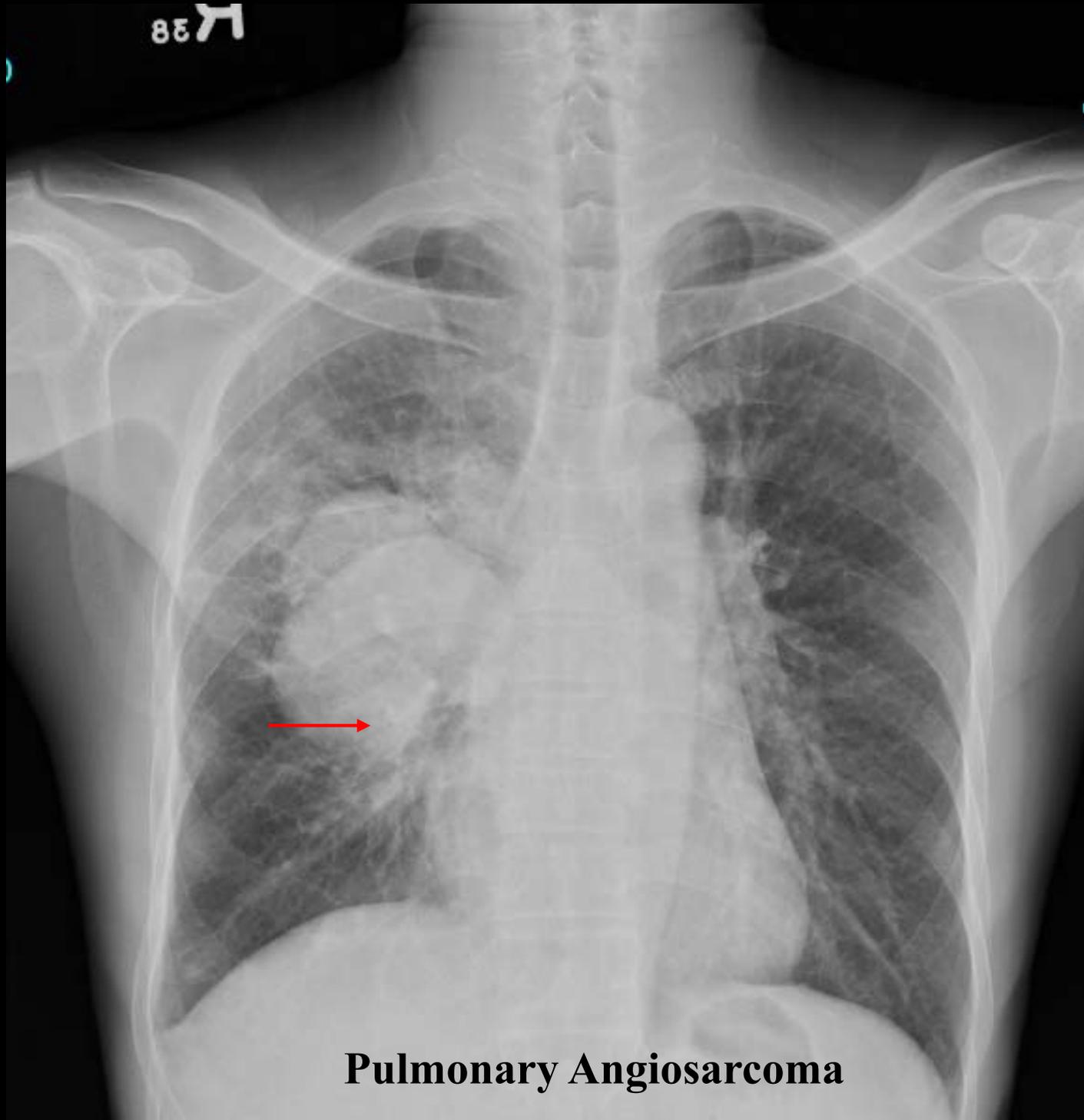
Dx: large B cell lymphoma



# Hilum Convergence Sign (Vascular Shadow in Mediastinum)

- 用來區分肺門腫大  
是否因pulmonary artery變大而造成
- 假如血管進入肺門1cm內即消失，  
則代表肺門腫大是因engorged pulmonary  
artery造成(ex. pulmonary hypertension)
- 若血管進入肺門仍未消失，  
則代表肺門處的腫瘤所造成。

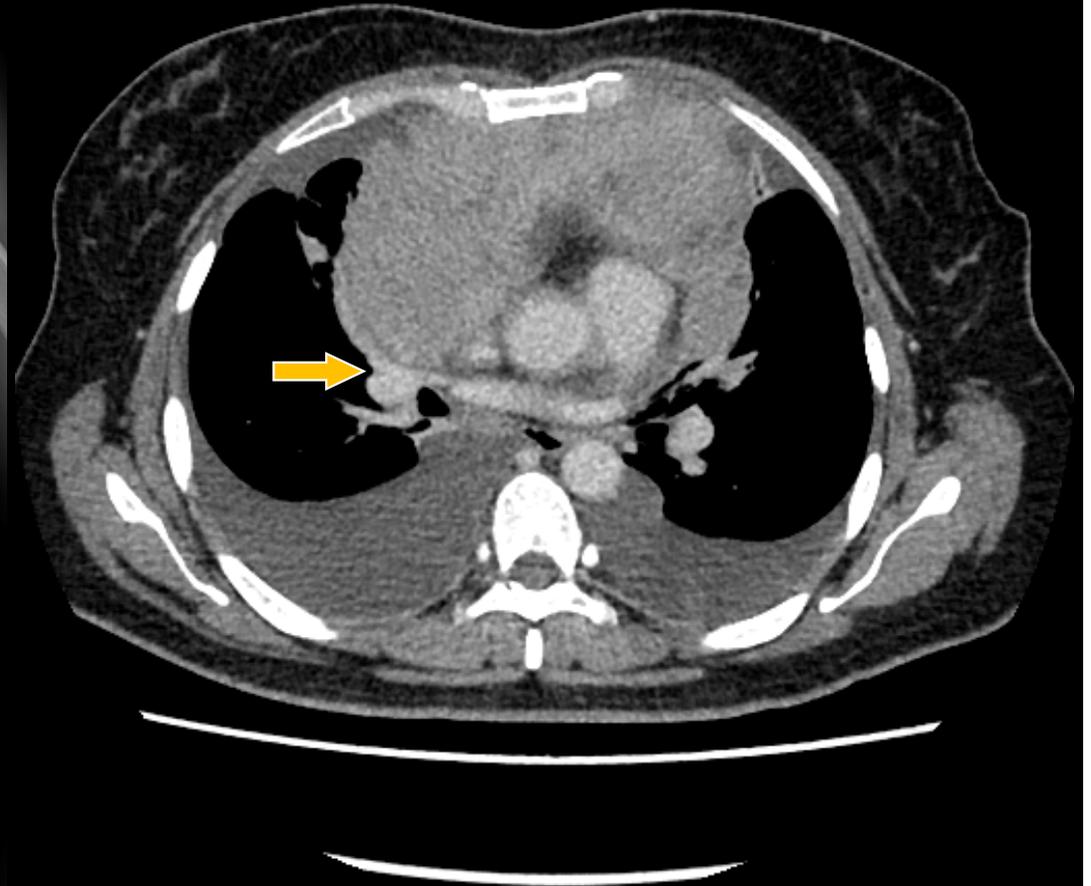
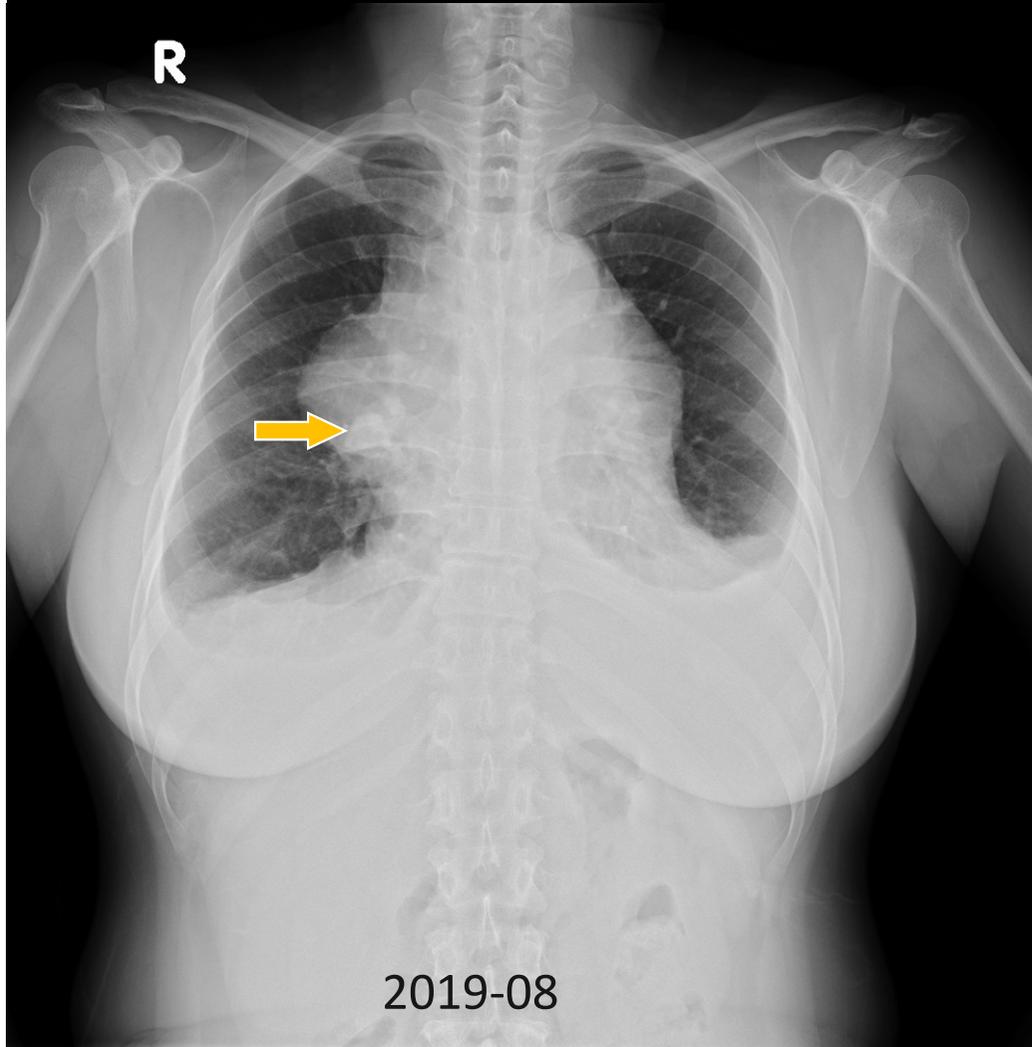
# Hilum Convergence Sign



**Pulmonary Angiosarcoma**

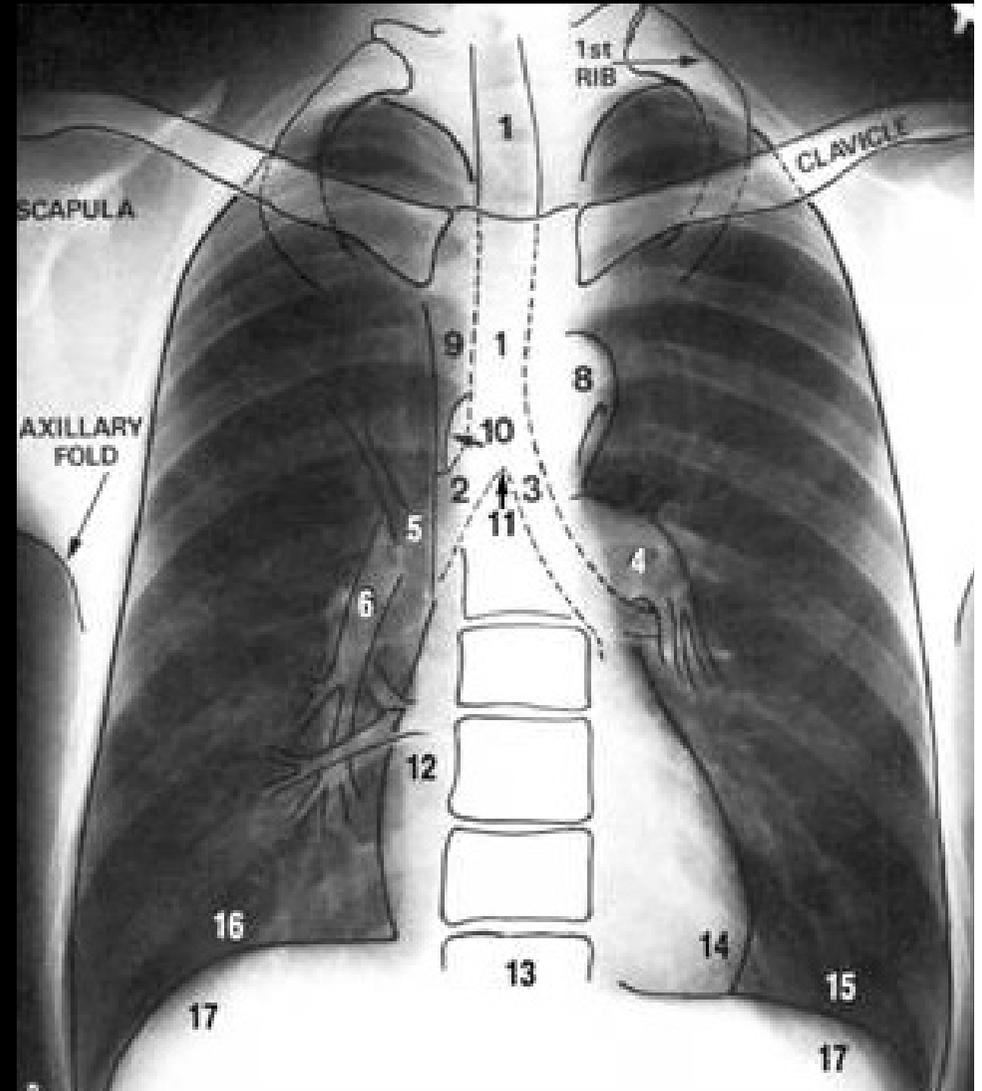
# Hilum Convergence Sign

Dx: large B cell lymphoma



# Lung Fields

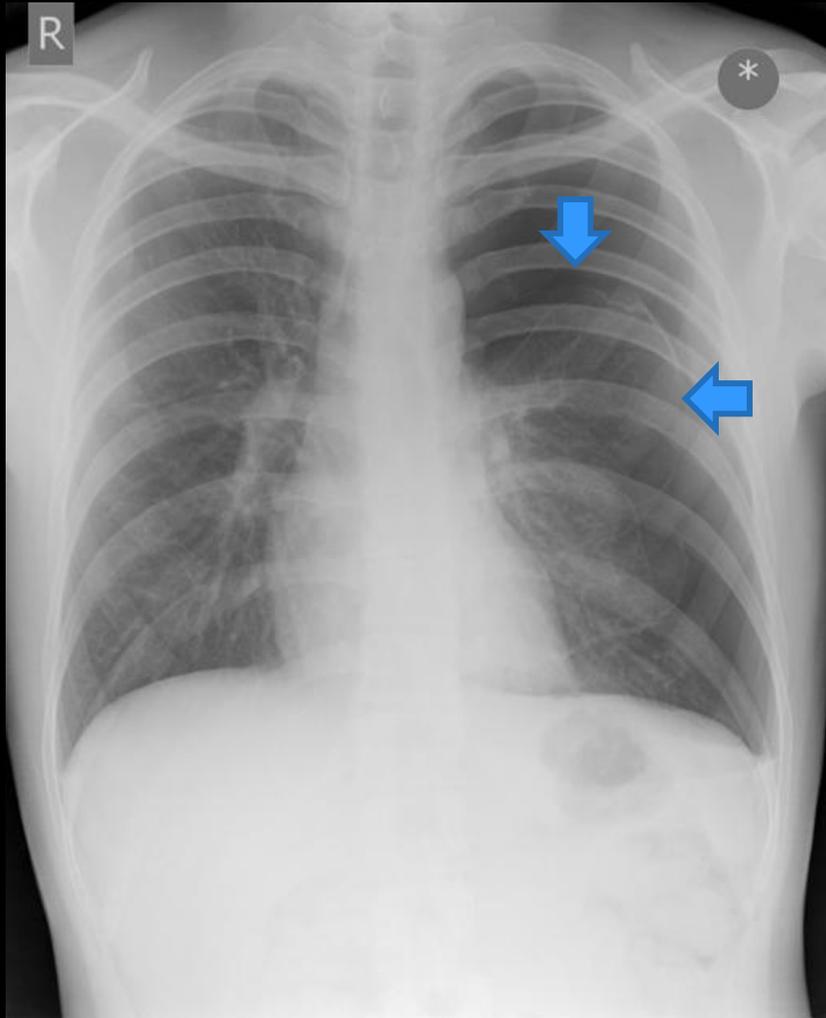
- **Upper lung field :**  
Pulmonary artery and  
Pulmonary vein  
平行同角度, 不相交
- **Lower lung field :**  
Pulmonary artery 向下直走,  
Pulmonary vein 平行回流.
- 95%pt, within 2/3
- **Minor fissure :**  
82% over 4th-5th ant. ICS



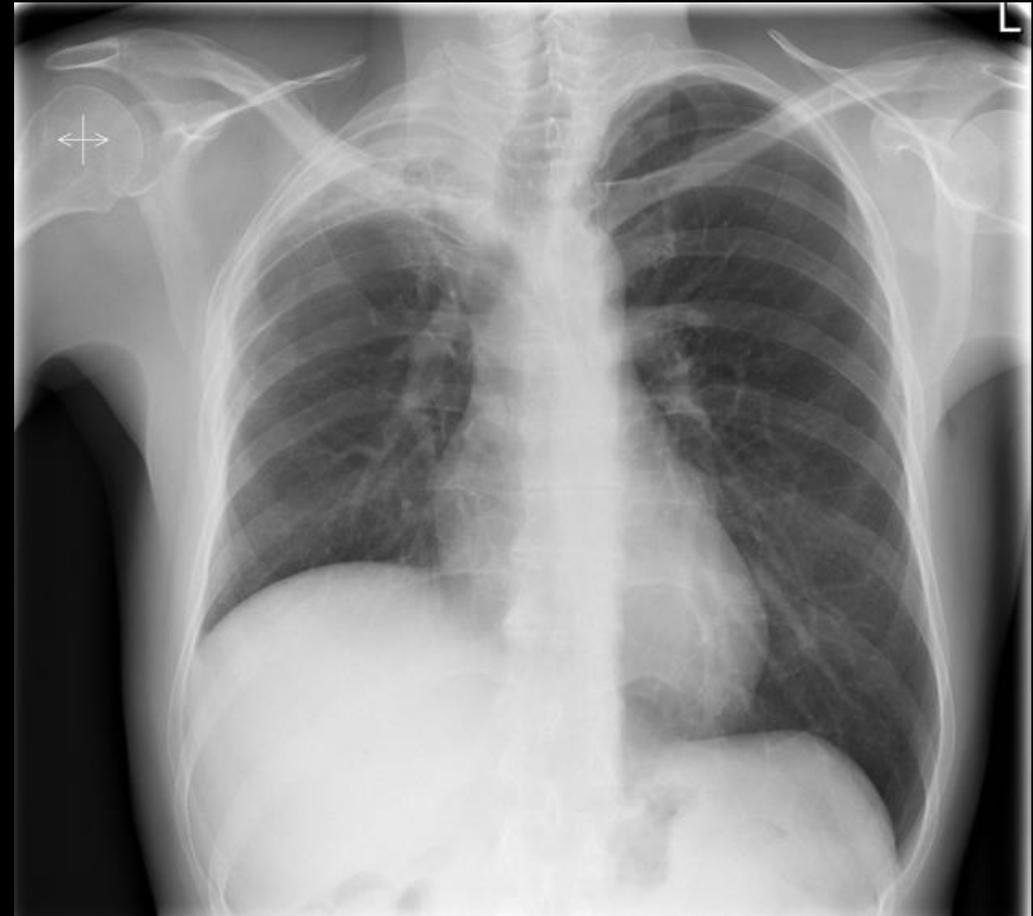
# Lung Fields

- 太白太黑都要注意
- 兩側相互比較
- 單側hemithorax density異常
  - lesion site是太白處or太黑處
- **Increased opacity (太白)**
  - Abnormal shadows
- **Increased radiolucency (太黑):** 由外而內D/D
  - 胸廓外：mastectomy, Poland's syndrome(少了大胸肌)
  - 肋膜：pneumothorax
  - **Decreased vessel:** pulmonary embolism(a), Pul. a. agenesis(a), Scimitar syndrome(v)
  - **Air collection:** endobronchial obstruction, emphysema, localized bullae, Swyer-James syndrome

# Unilateral hyperlucent hemithorax



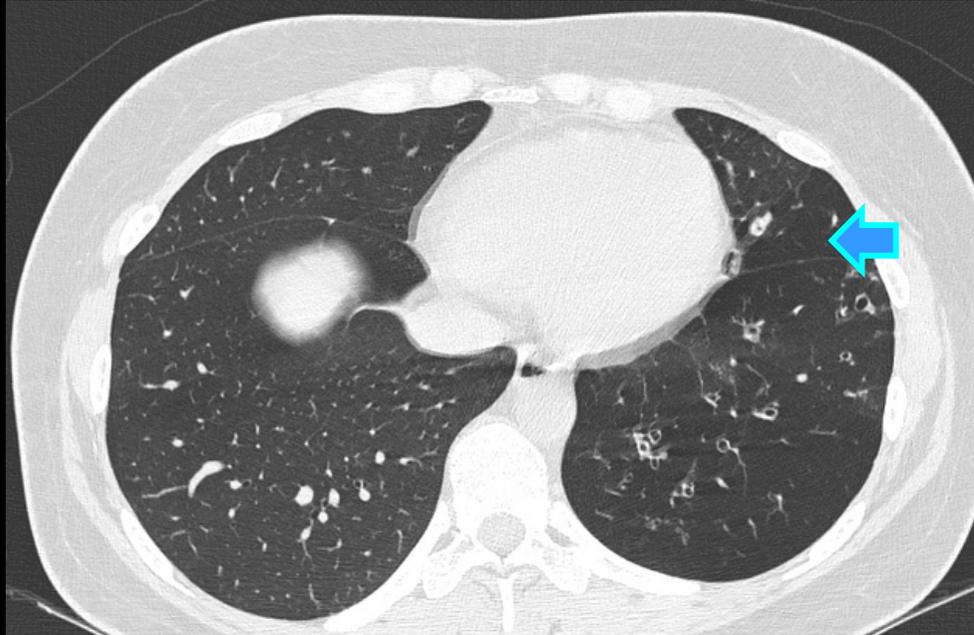
Left pneumothorax



Compensatory hyperinflation

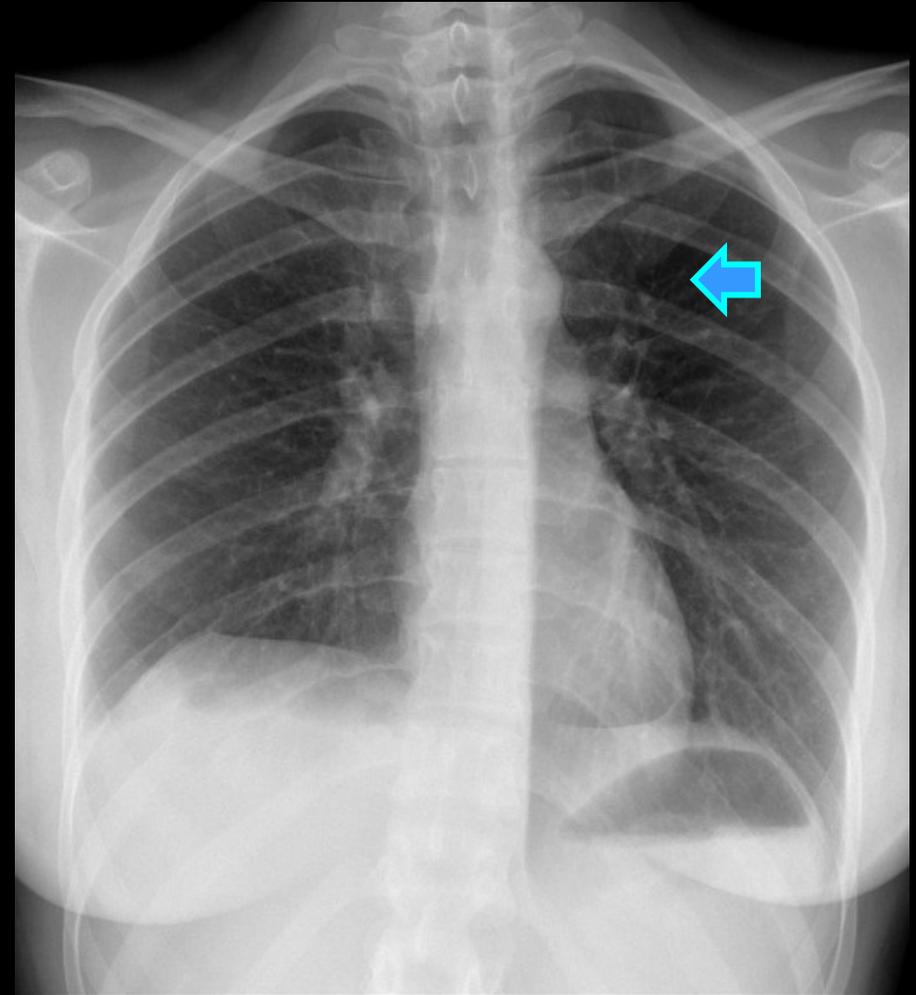
# Unilateral hyperlucent hemithorax

Hx of viral RTI in early childhood



hyperlucent with diminished vascularity

**Swyer-James syndrome**



**Pulmonary embolism  
(Westermark sign)**

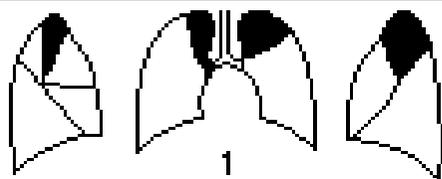
# Location of pneumonia

- 哪一個肺葉？有兩種看法：
  1. 以minor fissure來看
  2. 以Silhouette sign來看

# Location of pneumonia

- 哪一個肺葉？有兩種看法：
  1. 以 **minor fissure** 來看
  2. 以 Silhouette sign 來看

# LUNG – SEGMENTAL ANATOMY



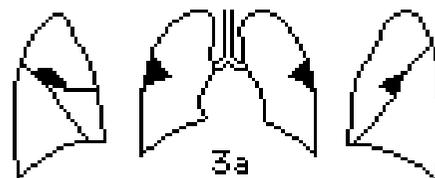
1  
Right apical segment of upper lobe  
Left apical-posterior segment of upper lobe



2  
Right posterior segment of upper lobe  
Left apical-posterior segment of upper lobe



3  
Right and left anterior  
segment of upper lobe



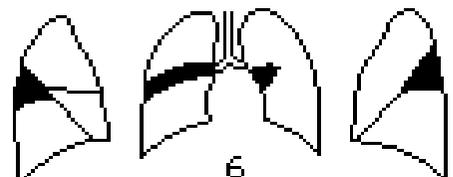
3a  
Right and left  
axillary subsegment



4  
Right lateral segment of the middle lobe  
Left superior lingular segment



5  
Right medial segment of the middle lobe  
Left inferior lingular segment



6  
Right and left superior  
segment of the lower lobe



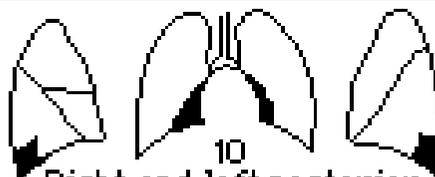
7  
Right medial  
segment of the lower lobe



8  
Right and left anterior  
basal segment of the lower lobe



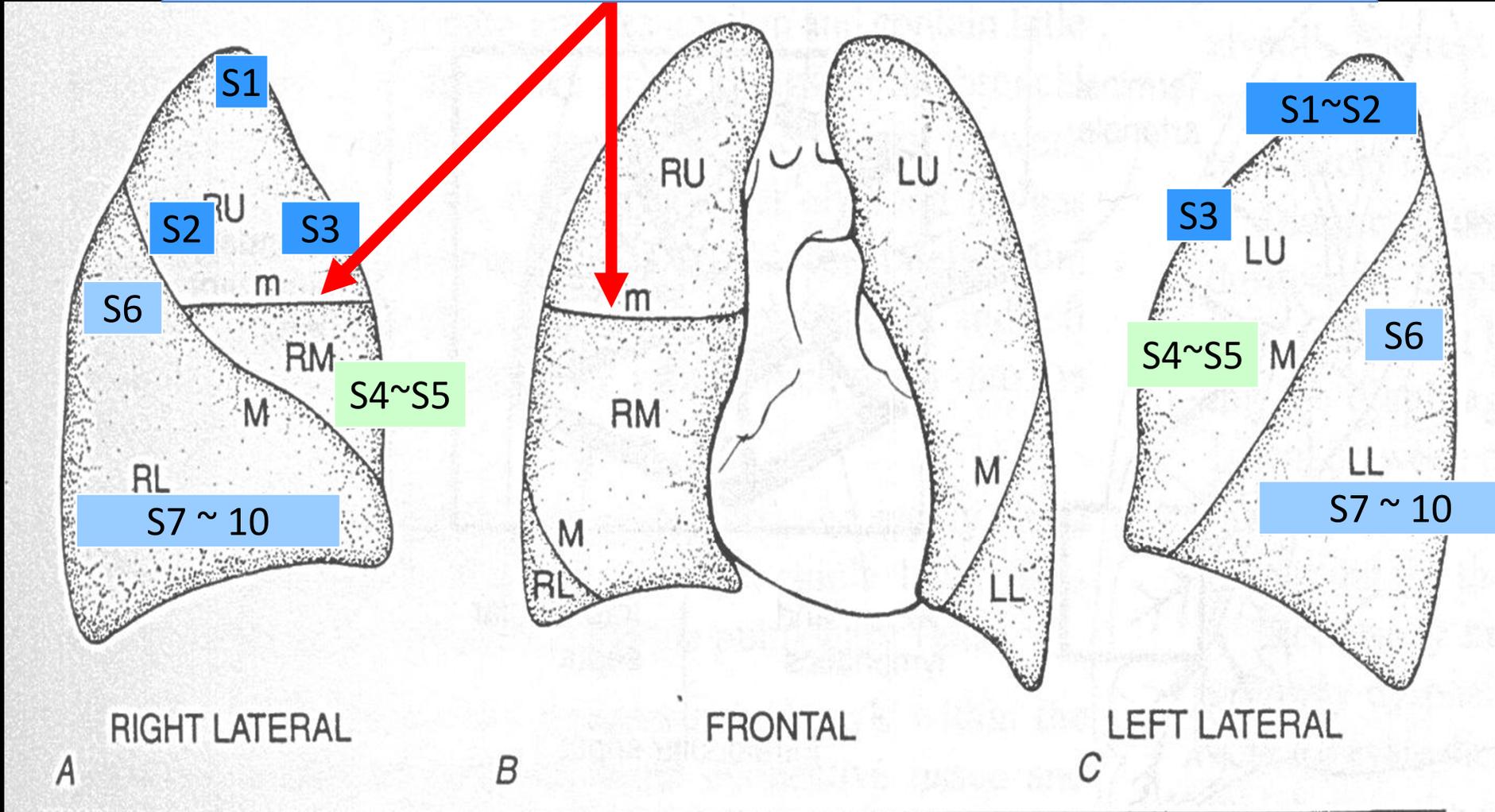
9  
Right and left lateral basal  
segment of the lower lobe



10  
Right and left posterior  
basal segment of the lower lobe

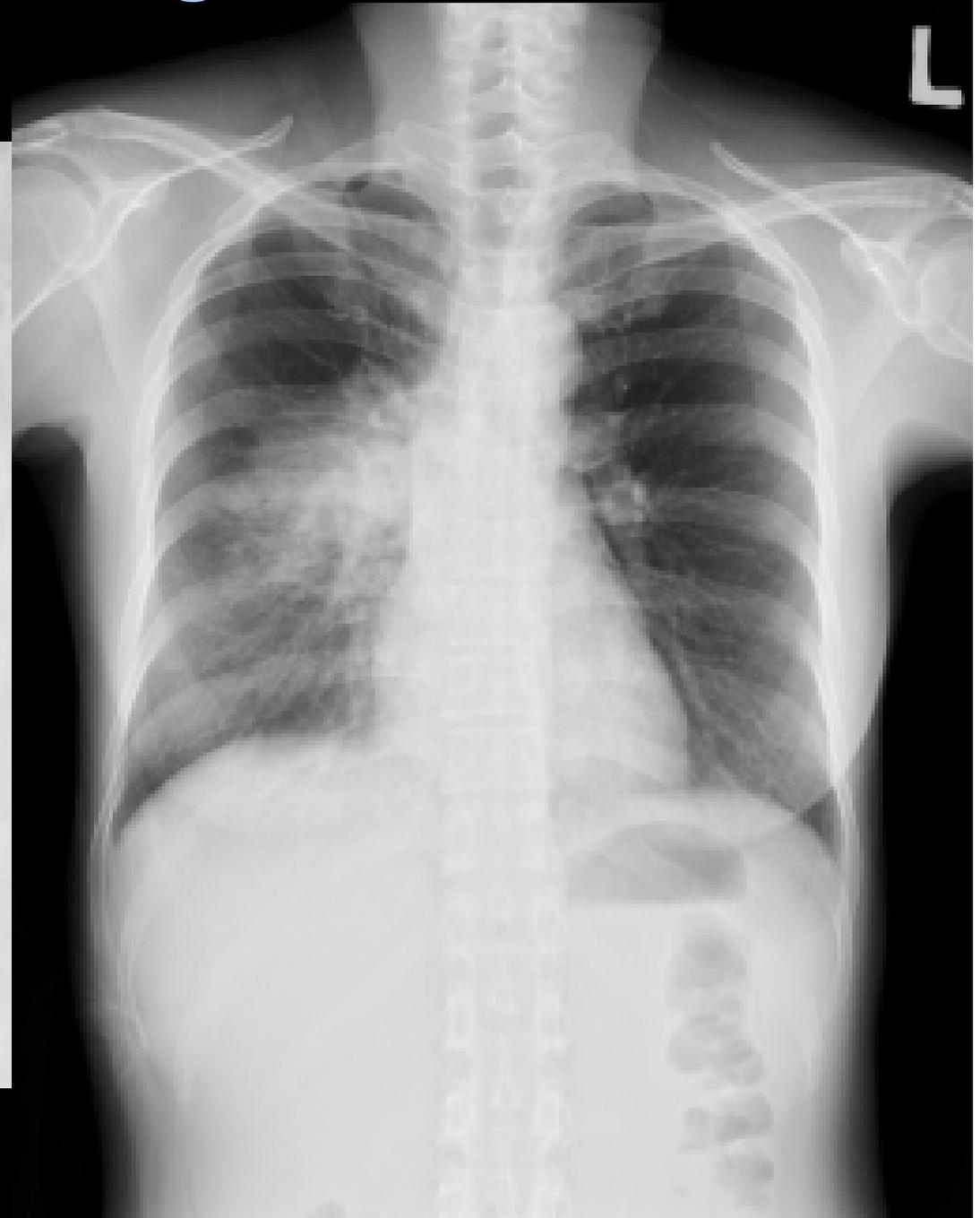
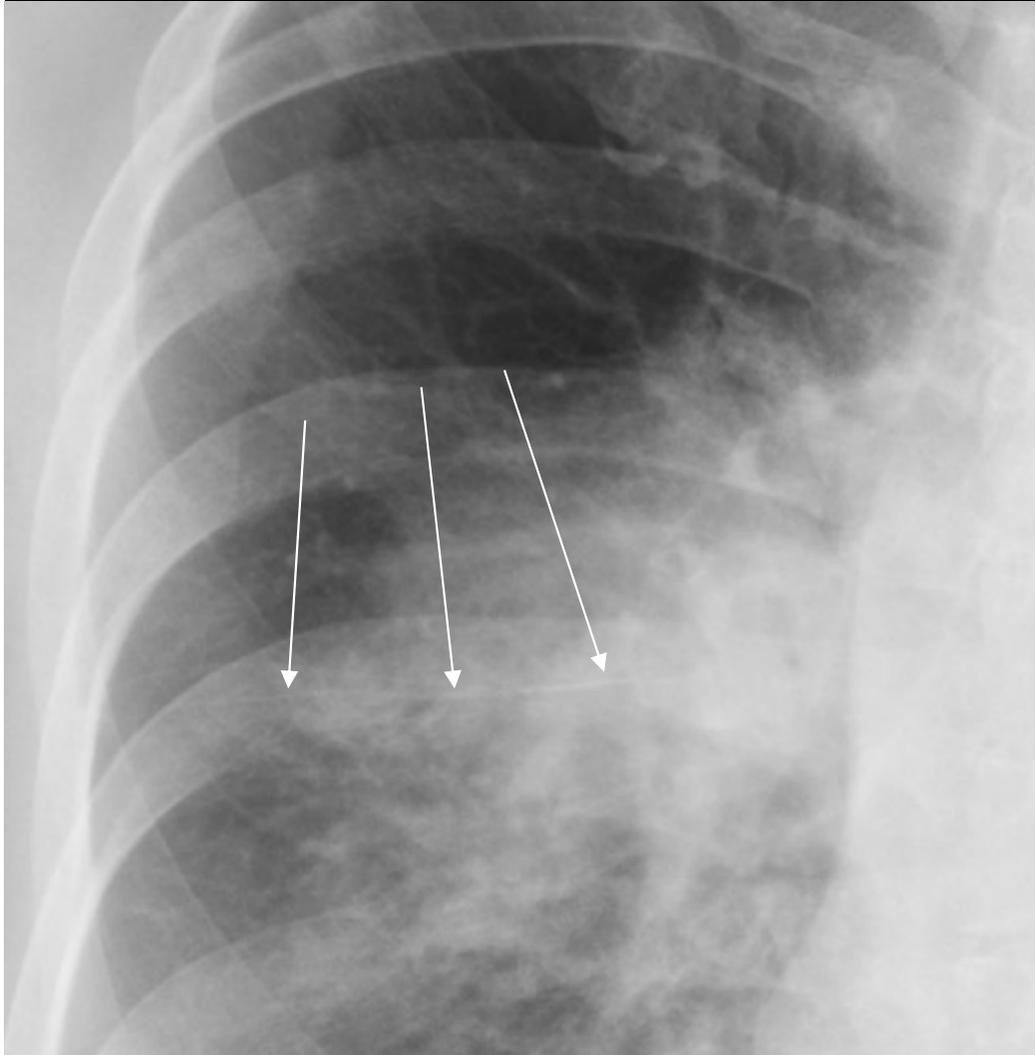
# Anatomy of lobes

**Minor fissure :**  
82% over 4th-5th anterior intercostal space

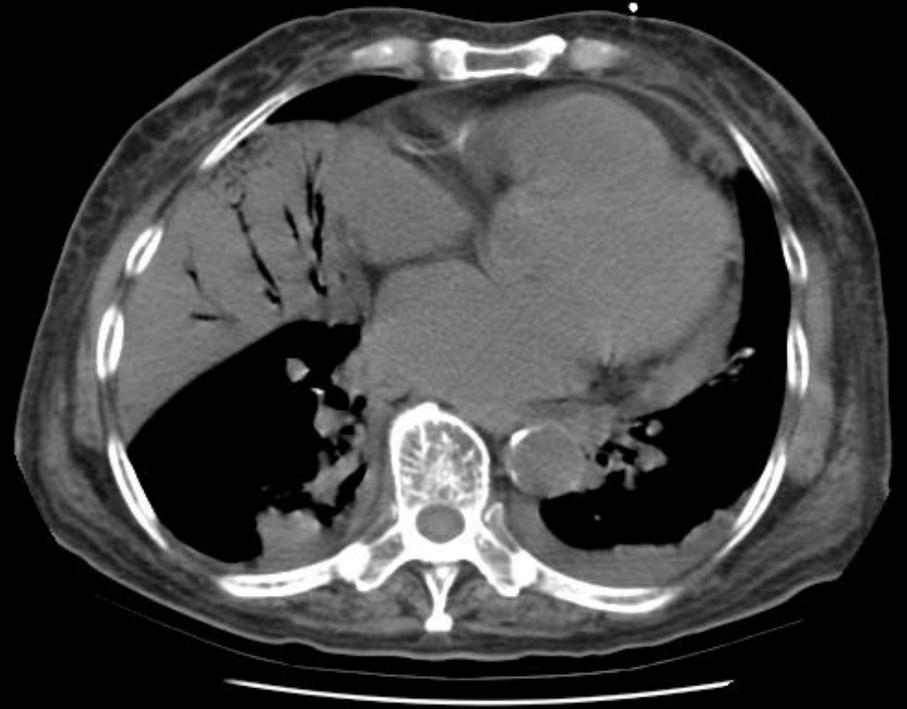


除非太厲害，肺炎一般是不會跨越肺裂~

**Right B6 –  
superior segment of right lower lobe**



# RML pneumonia

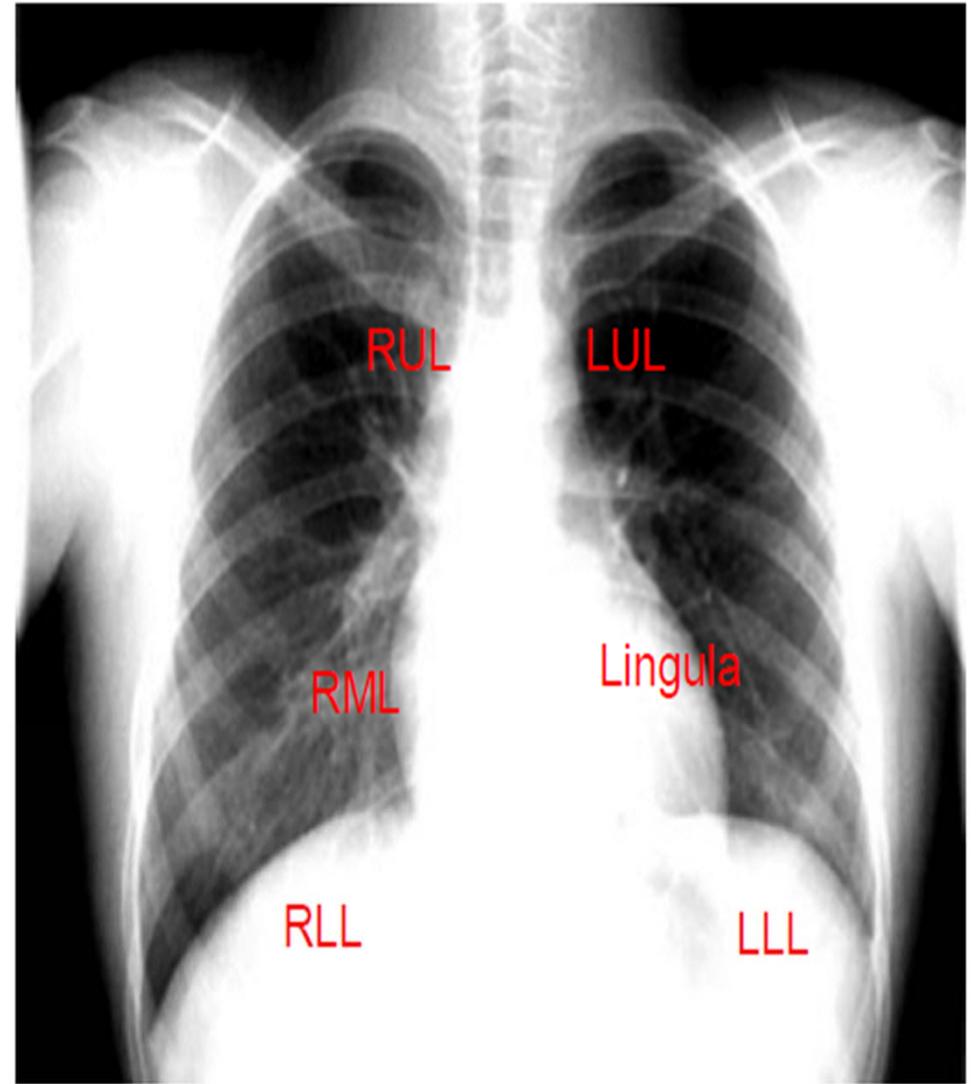


# Location of pneumonia

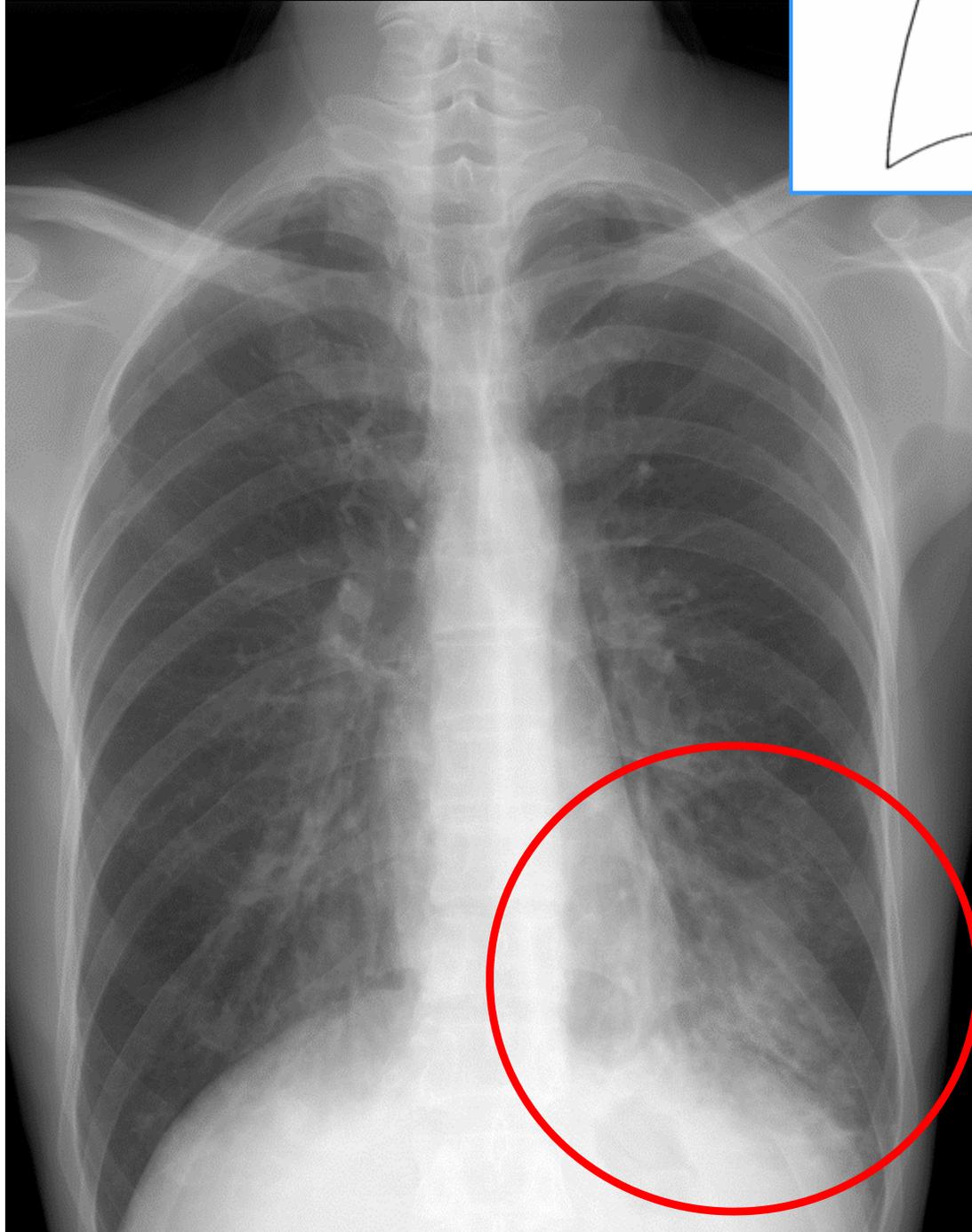
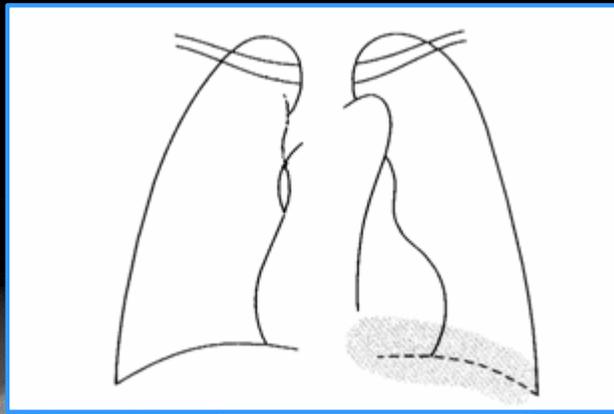
- 哪一個肺葉？有兩種看法：
  1. 以minor fissure來看
  2. 以Silhouette sign來看

# Silhouette sign (輪廓徵候)

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



# LLL pneumonia



# RML pneumonia

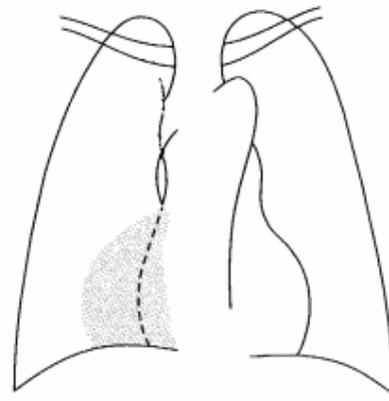
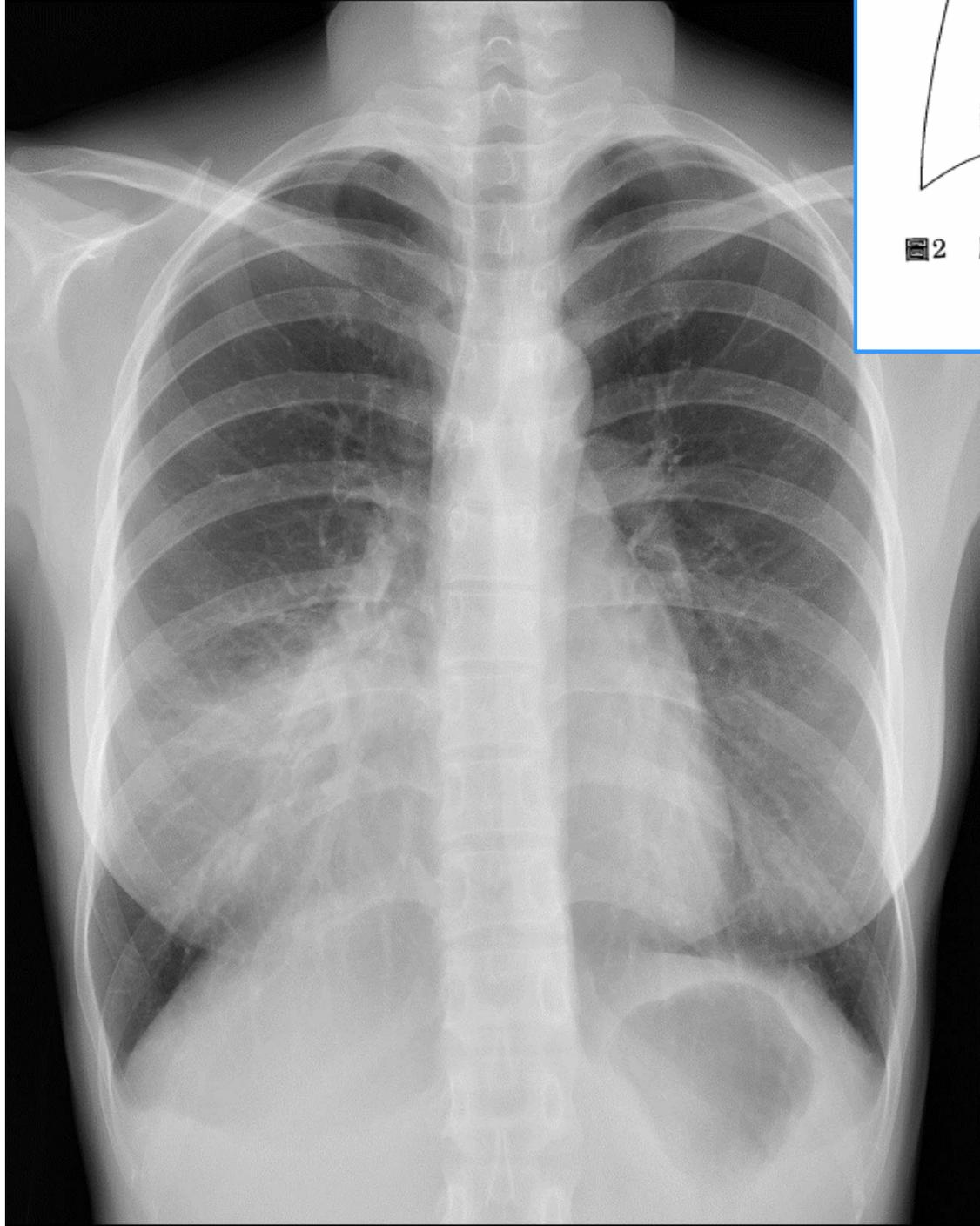
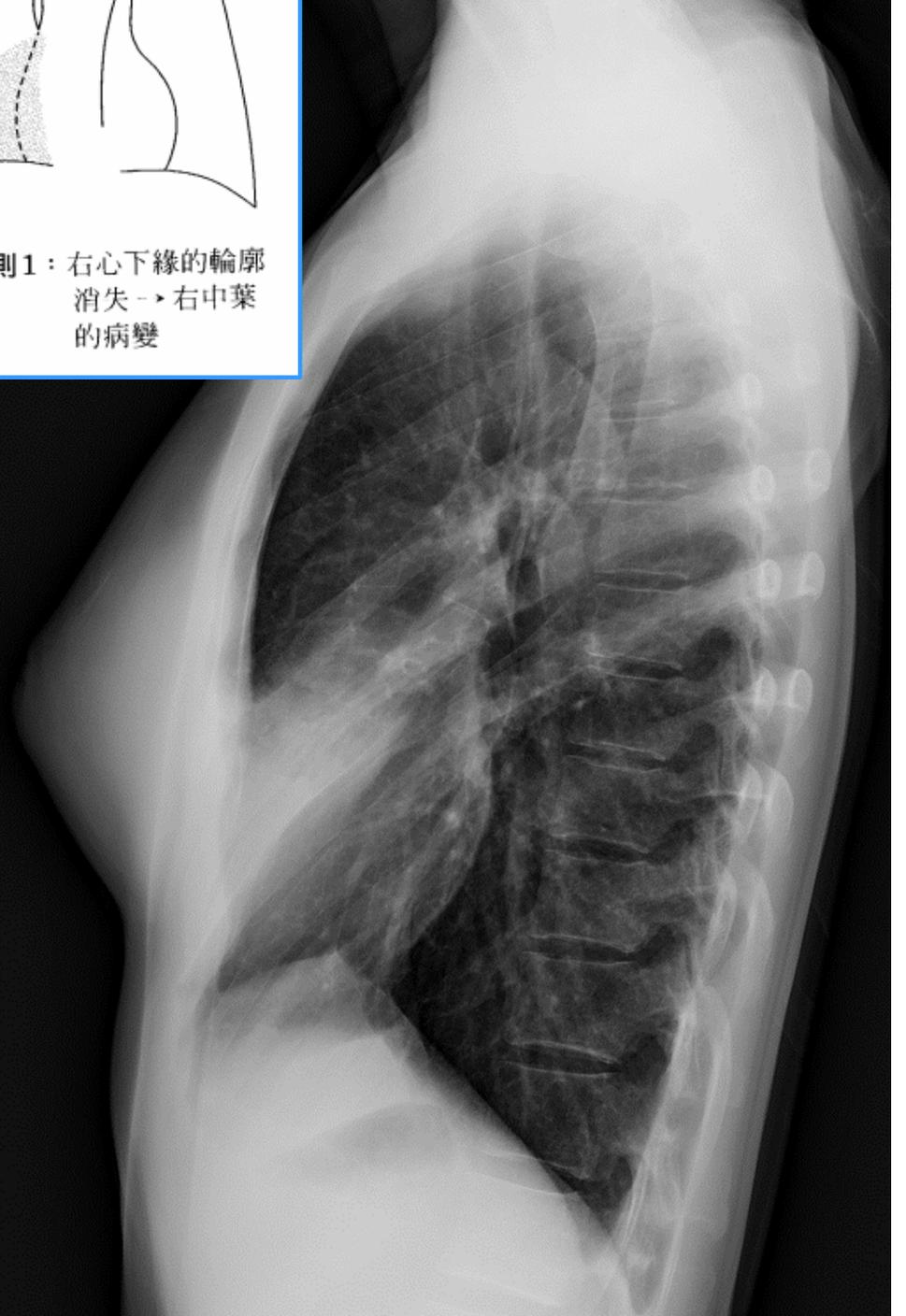


圖2 原則1：右心下緣的輪廓消失→右中葉的病變



# Lingual lobe pneumonia

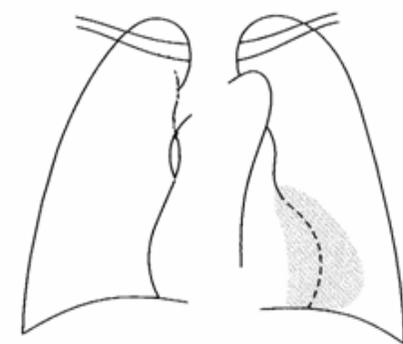
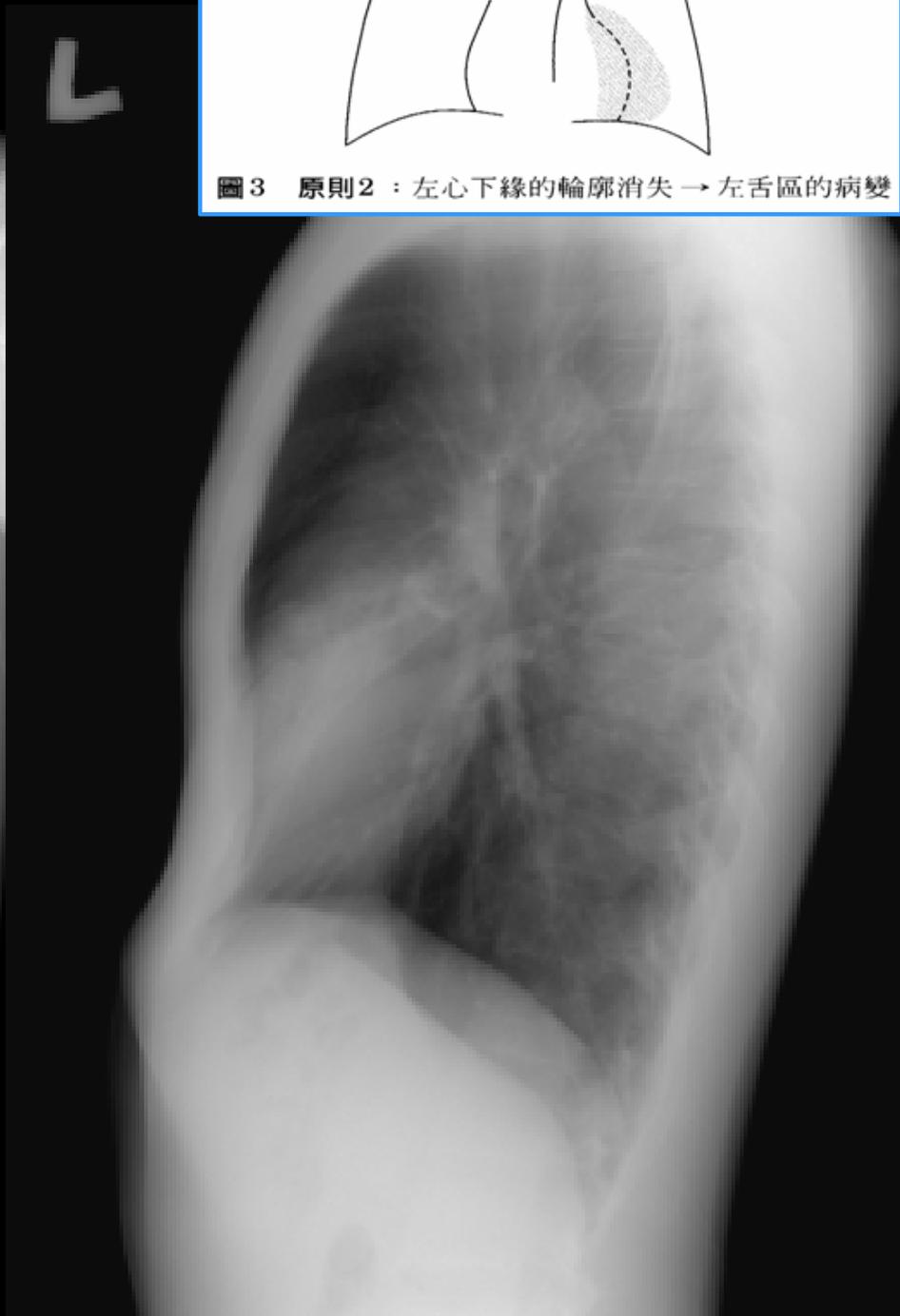
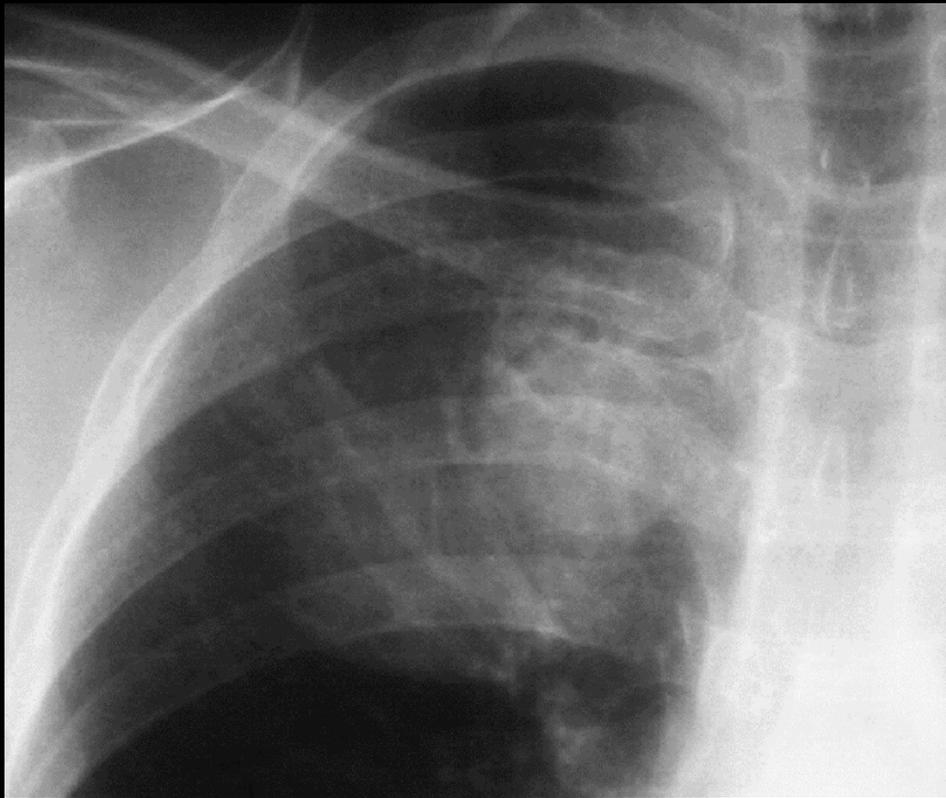


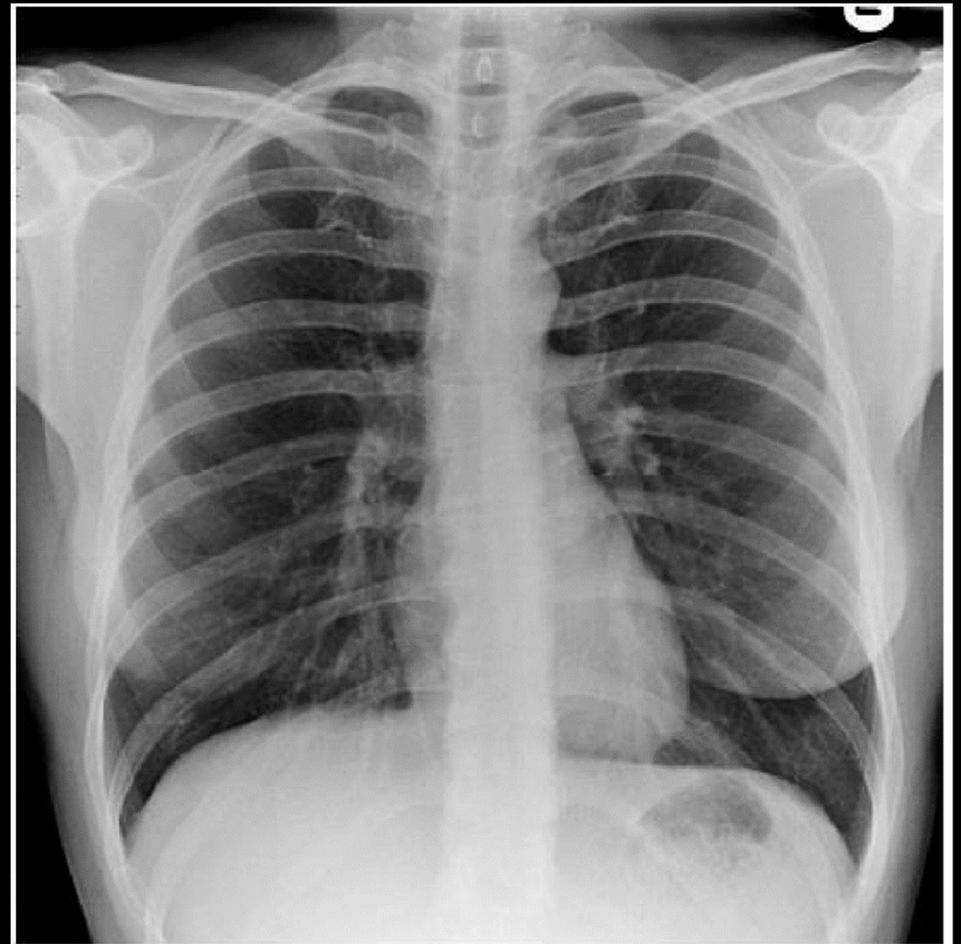
圖3 原則2：左心下緣的輪廓消失 → 左舌區的病變

# Incomplete border sign (不完全邊緣徵候)

- 當一個結節狀病灶其邊緣不完整時可能代表是肺外病變。



Loculated pleural effusion



Breast

# Extrapleural sign (肋膜外病灶徵候)

- 指肋膜外的病灶往肺內突入，  
但因其外圍有兩層肋膜包被，故有下列三個特徵：
  - (1) 病灶外緣界限清晰
  - (2) 影像的基底部較寬，  
與胸廓或橫隔或縱膈  
之交角為鈍角。
  - (3) convex border 朝向肺



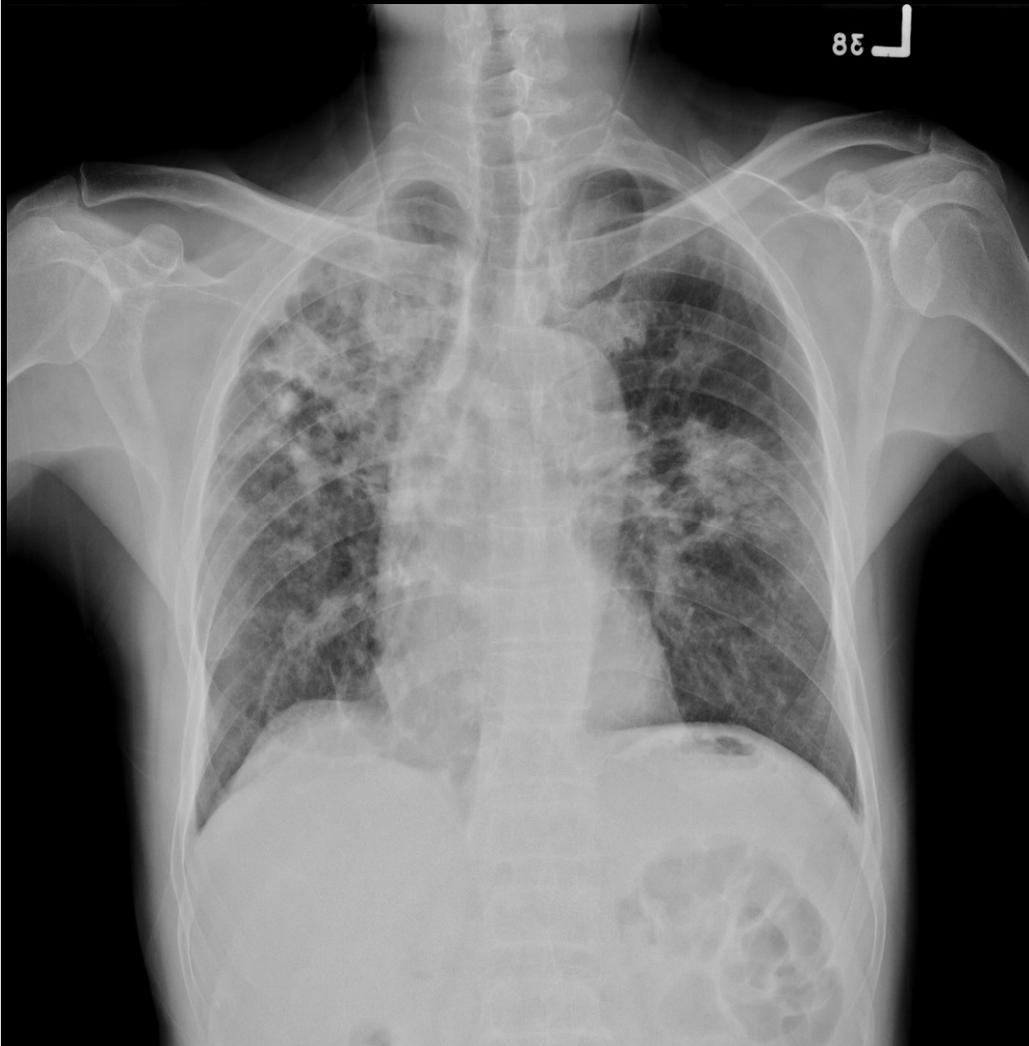
# Common patterns in lung diseases

- **Part A - Pulmonary opacities**
  - Air space shadow
  - Atelectasis
  - Nodular / mass pattern
  - Line shadows and band shadows
  - Ring shadow, cysts and bullae
  - Wide spread nodular, reticular and honeycomb shadowing
- **Part B – Increased transradiancy of the lung**

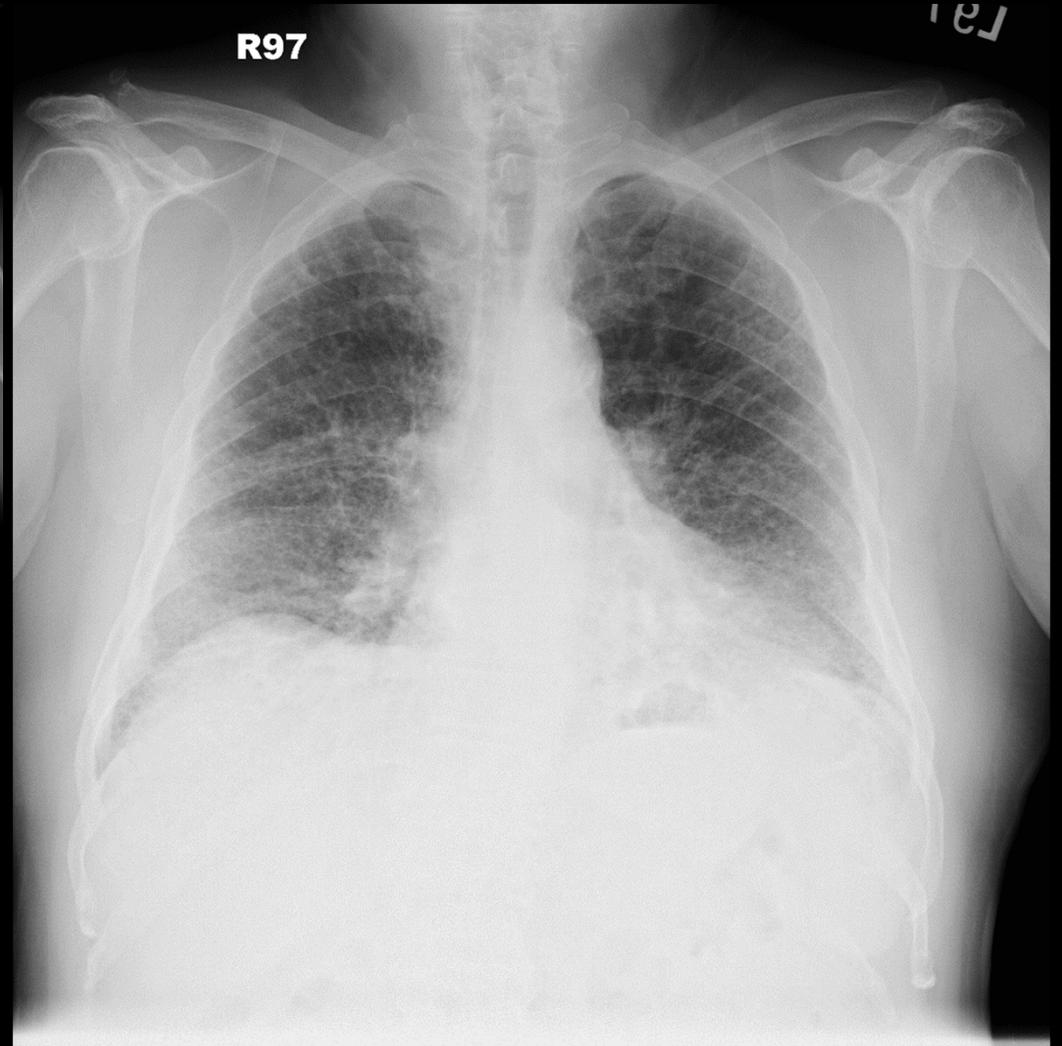
# Patterns

Alveolar pattern

Interstitial pattern



Pulmonary TB



IPF

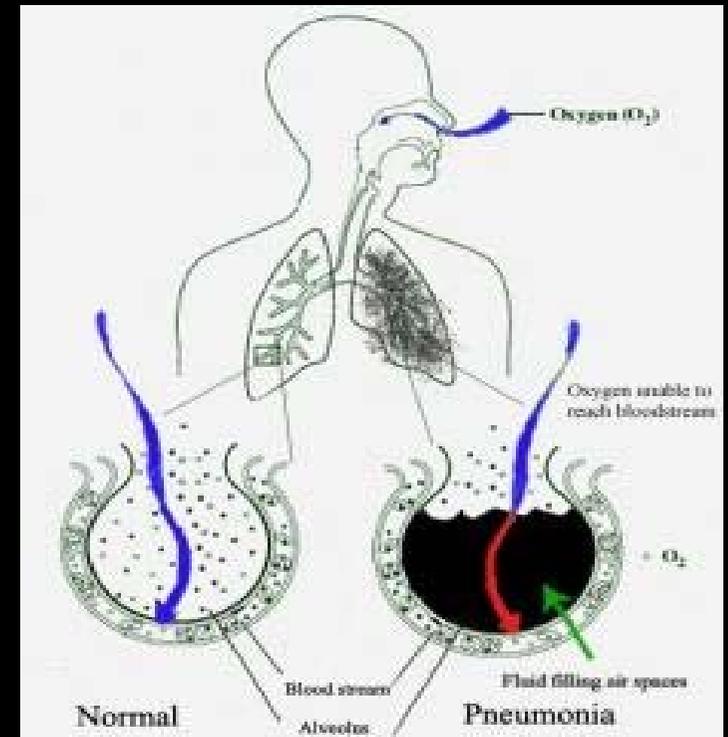
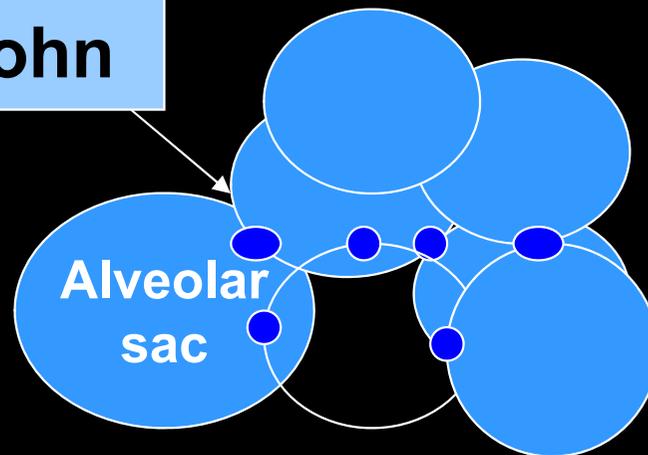
# Air-space filling

- Terms used for describing one or more discrete, ill-defined pulmonary densities.
- The features of air-space filling on CXR are one or more shadows with ill-defined margins except where the shadow abuts the pleura.
- When multiple, the shadow typically coalesce.

# How to describe a lung opacity ?

- **Consolidation** – cathotic (廣泛、一整片實質化)
- **Infiltrate** - any pulmonary shadow
- **Air-space filling = air-space shadow**
  - Replacement of air in the distant airways and alveoli by fluid or other materials.

## Pores of Kohn



- **Ground glass** : homogenous veiling opacity

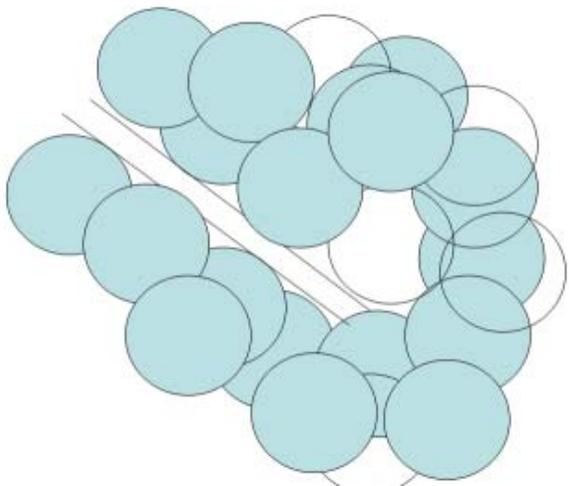
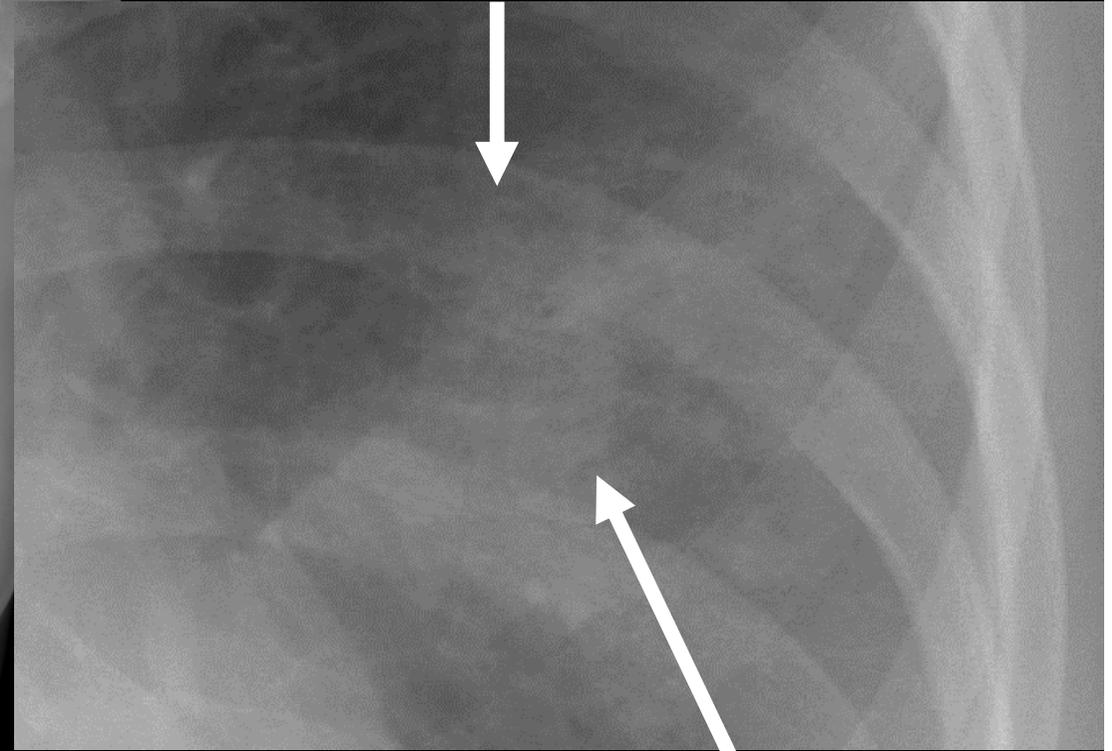
# Air bronchogram sign



# LLL Pneumonia ~ Air space shadow



Air alveogram



Air bronchogram

L

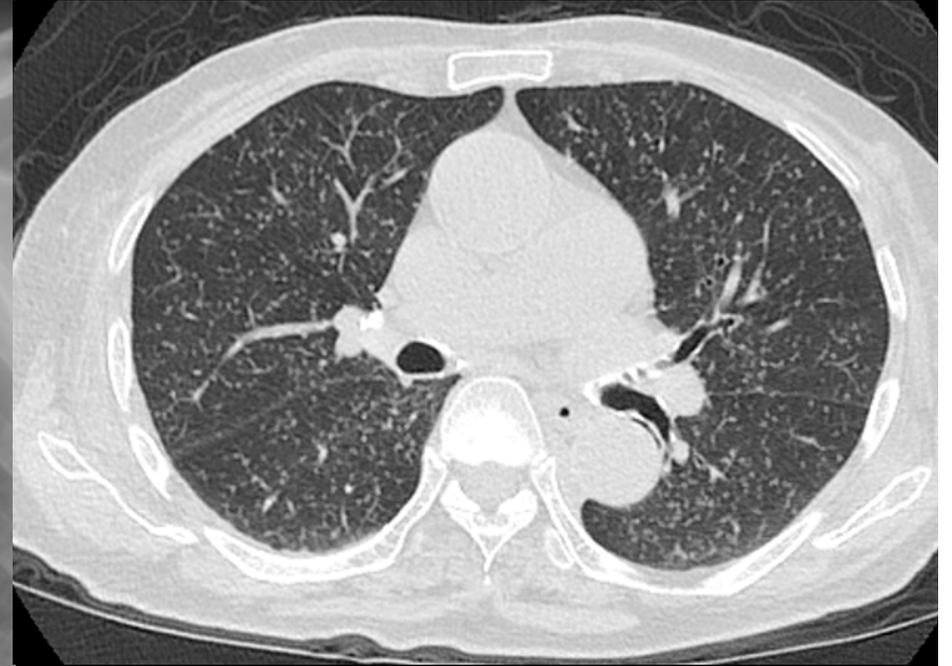
# 不會好的肺炎？

肺泡細胞癌 bronchioloalveolar carcinoma (BAC)



# Multiple tiny nodules

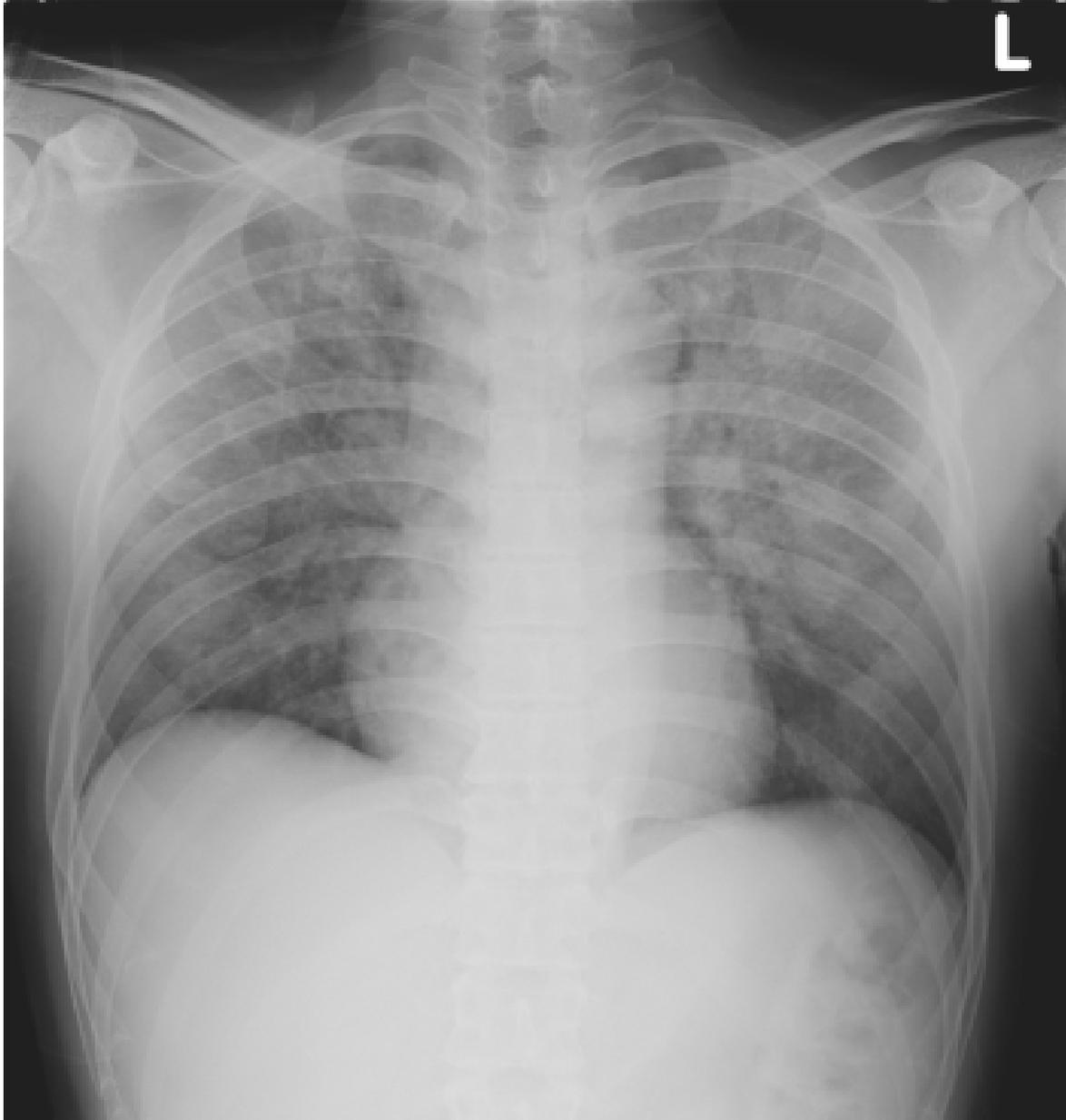
## Miliary TB



瀰漫散在性之  
約2mm獨立小結節，  
多合併全身症狀  
如發燒、意識不清等

# Pneumocystic pneumonia (PCP) in AIDS

Ground glass opacity



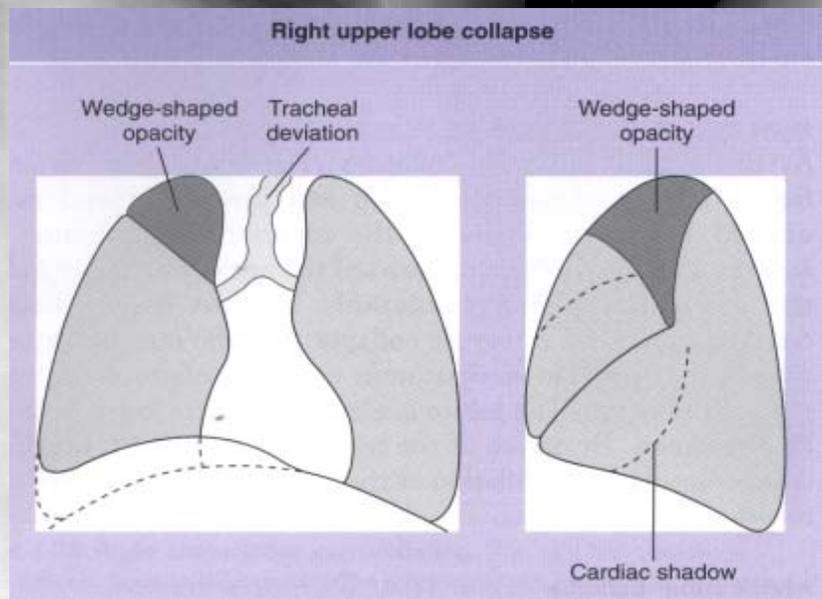
Oral candidiasis



Chest CT



# RUL collapse - Golden S sign Adenocarcinoma



# Reticular pattern

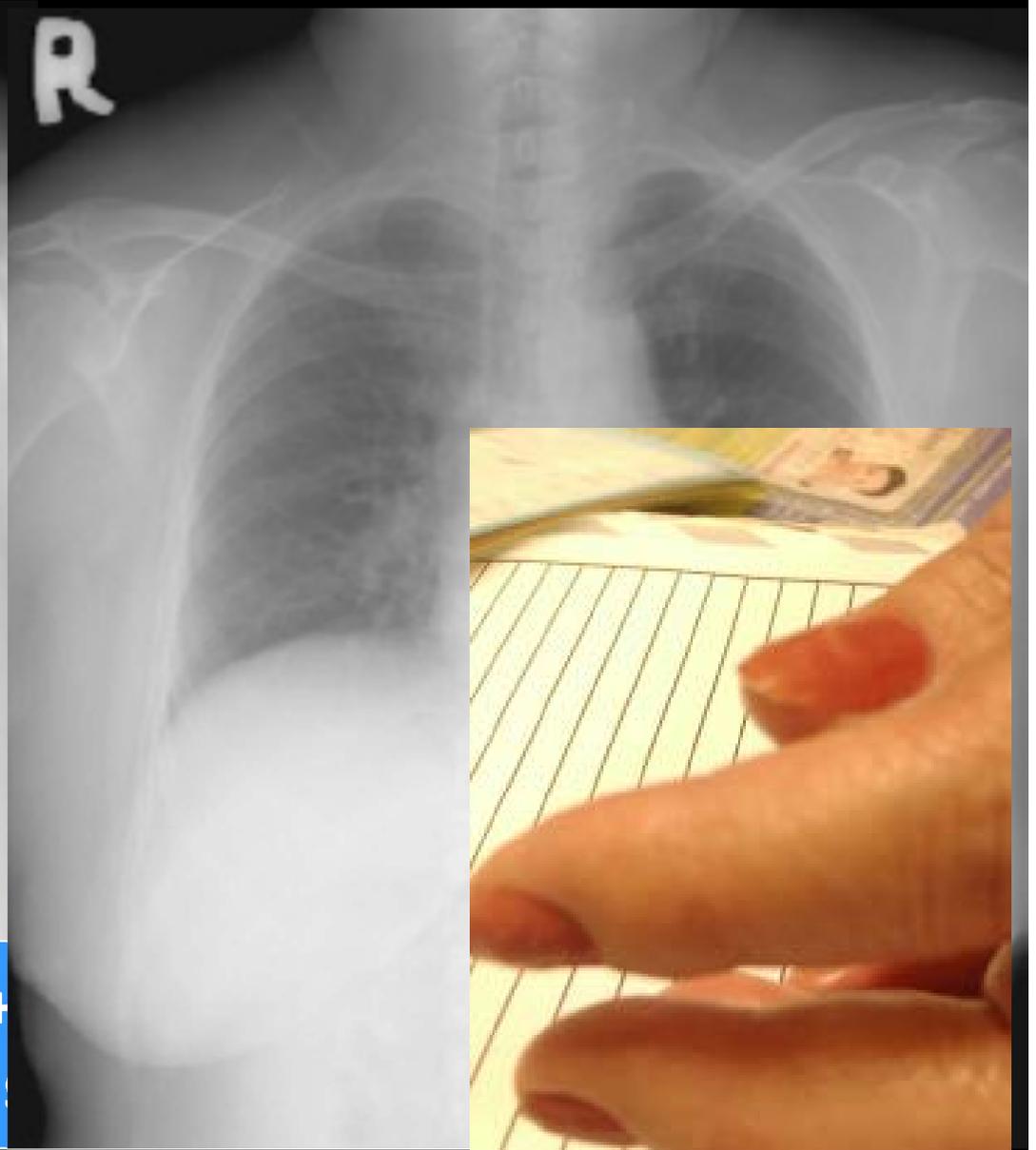
## Interstitial lung disease



Pneumoconiosis  
with pulmonary fibrosis

# Reticular pattern

## Interstitial lung disease (Interstitial pneumonitis)



Mechanic's hand + ILD +  
~ Antisynthetase

# Reticular pattern

Interstitial lung disease related to sicca syndrome



Tx with steroid  
4<sup>th</sup> day

Tx with steroid  
10<sup>th</sup> day

# 盲點：常見的判讀陷阱(四大死角)

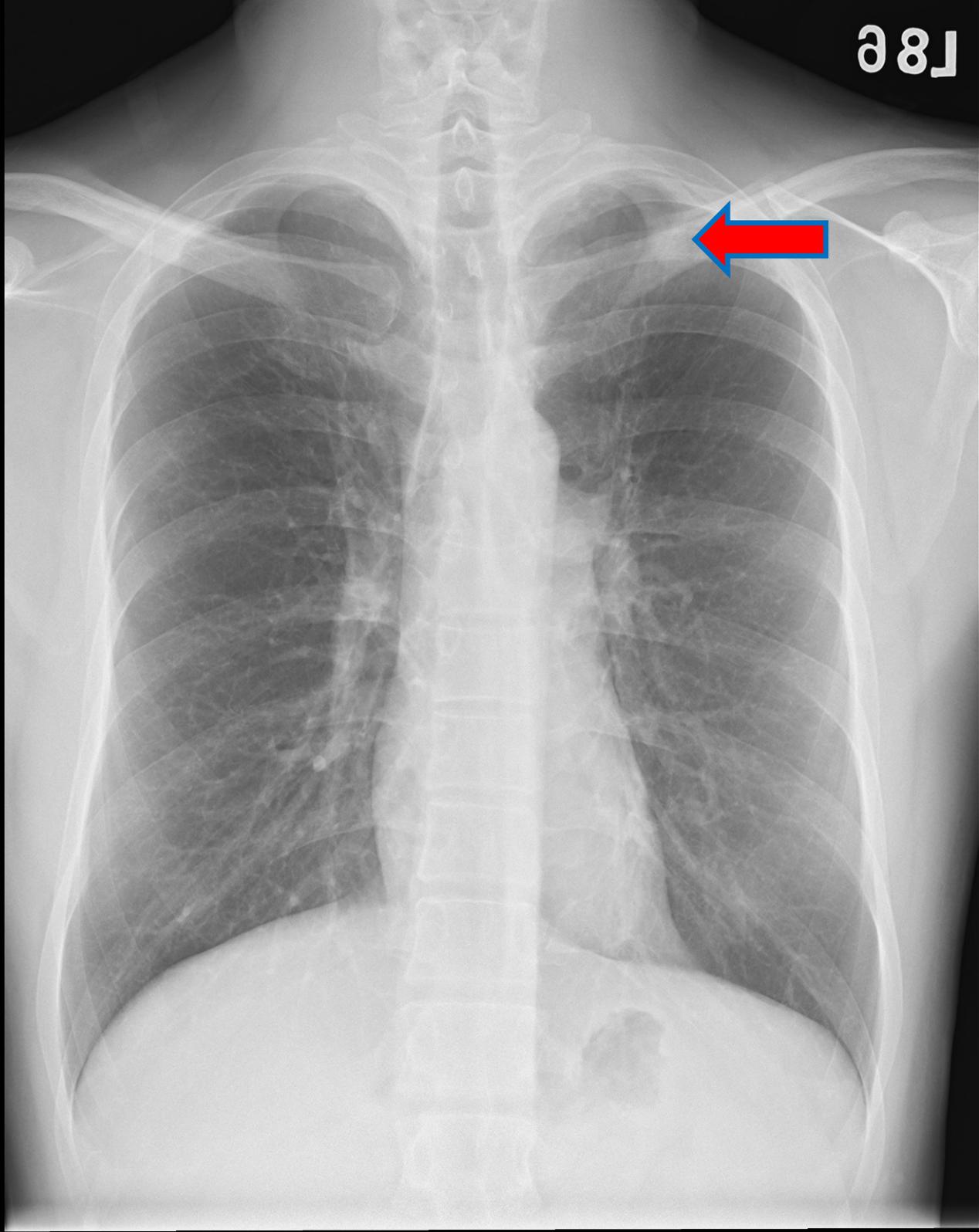
- Bilateral Apex (bone overlapping)
- Large Airway
- Retrocardiac region
- Bilateral lung bases  
(especially sub-diaphragm)

# 盲點：常見的判讀陷阱(四大死角)

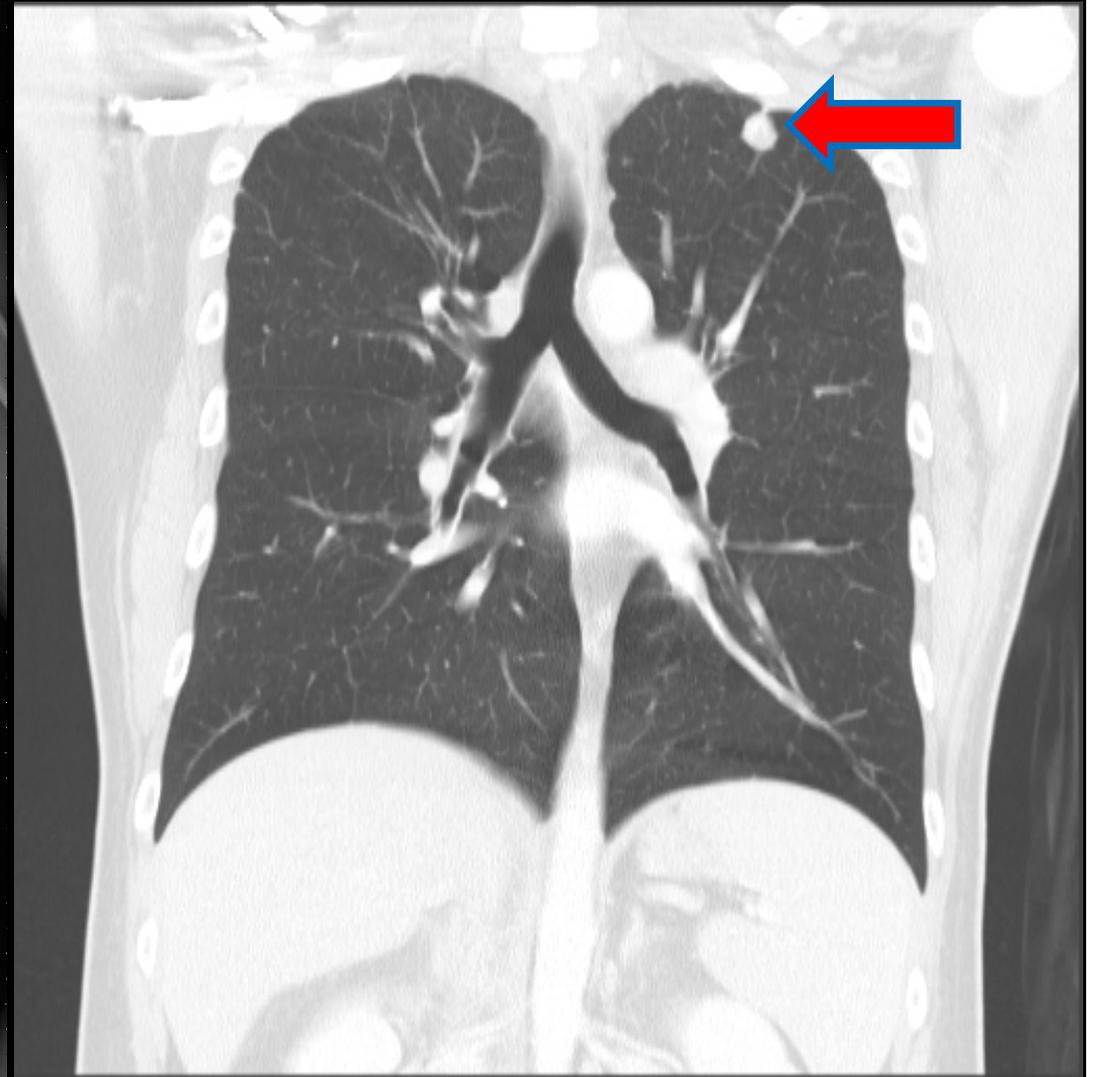
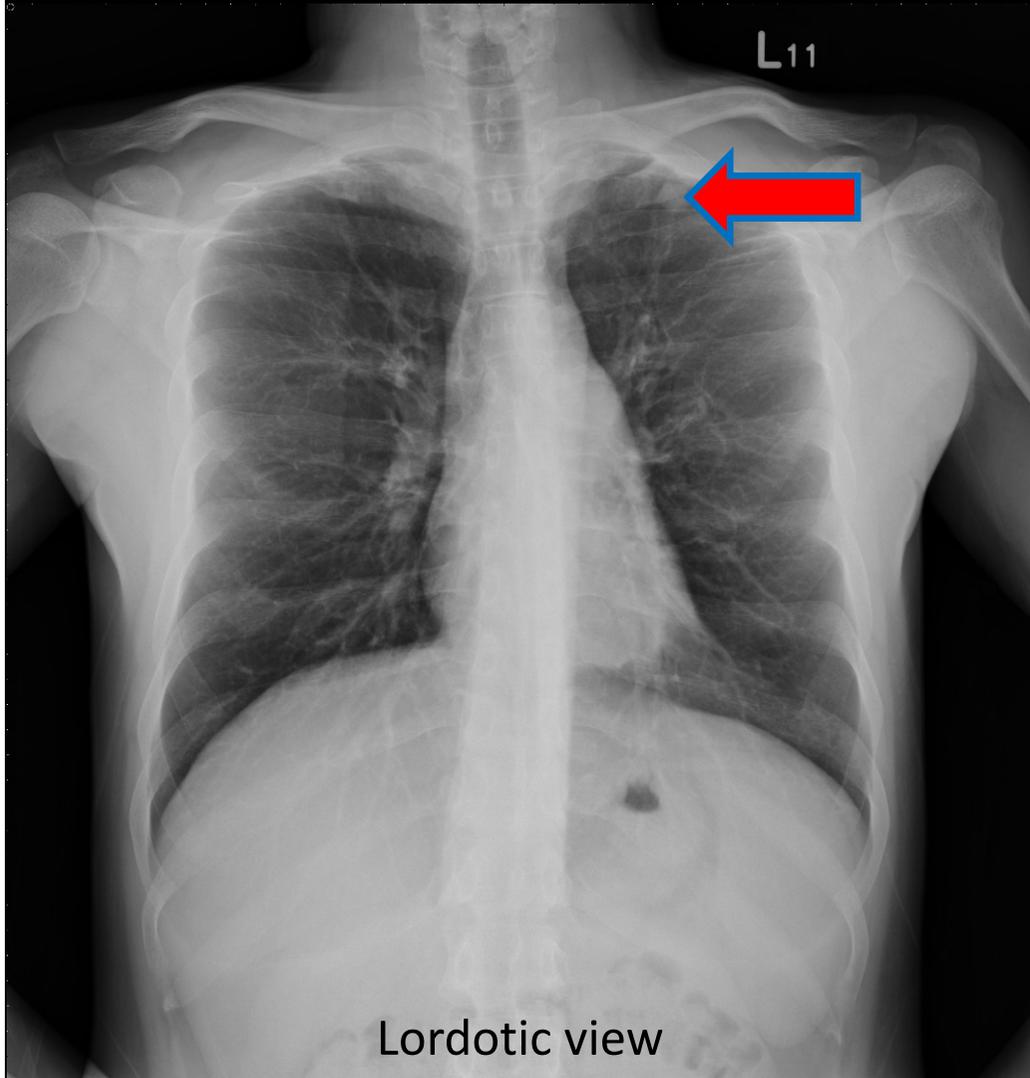
- **Bilateral Apex (bone overlapping)**
- Large Airway
- Retrocardiac region
- Bilateral lung bases  
(especially sub-diaphragm)

# 體檢X光異常

39 y/o male,  
Incidentally  
finding of **a lung  
nodule** during  
physical checkup

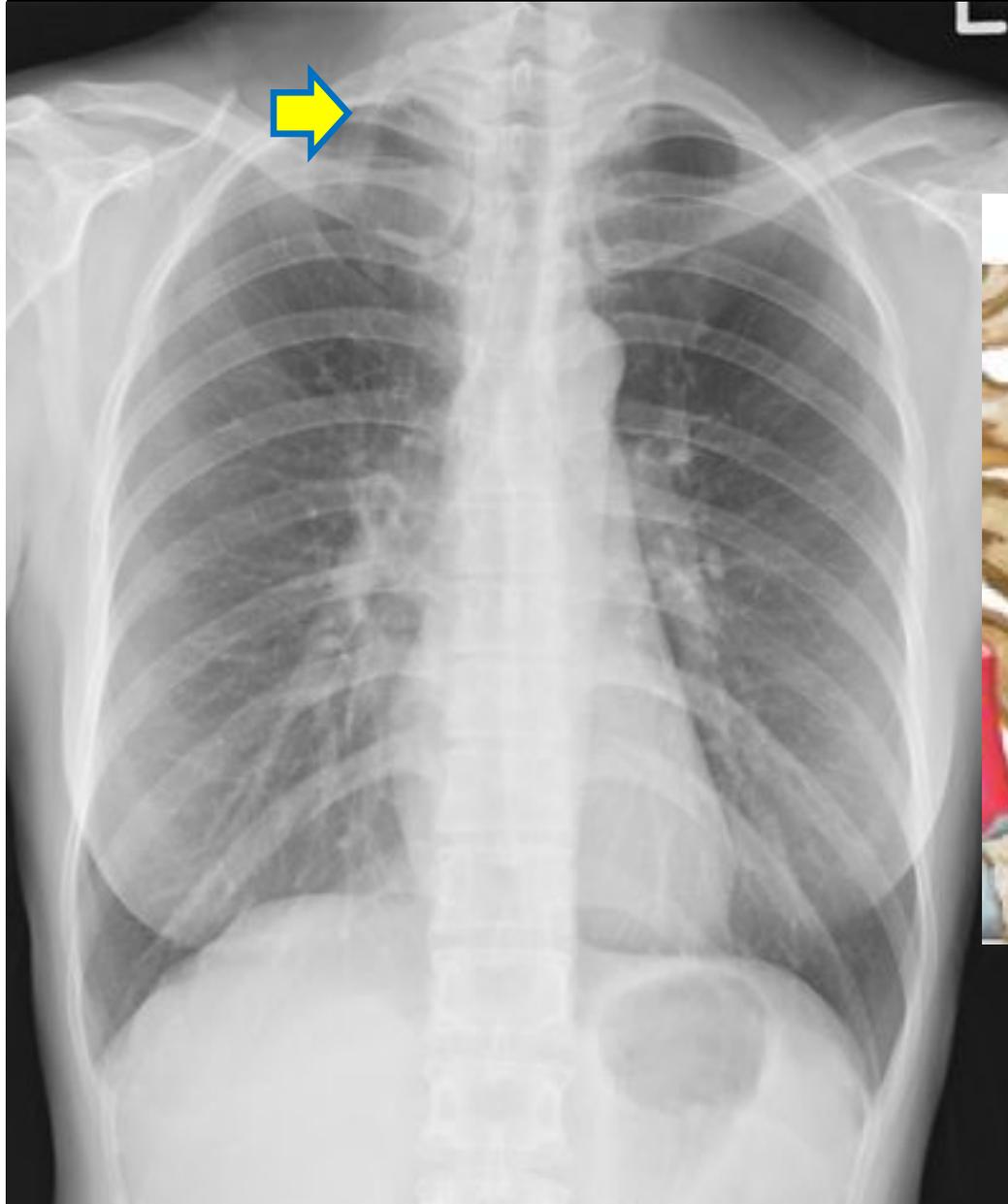


# Lordotic view

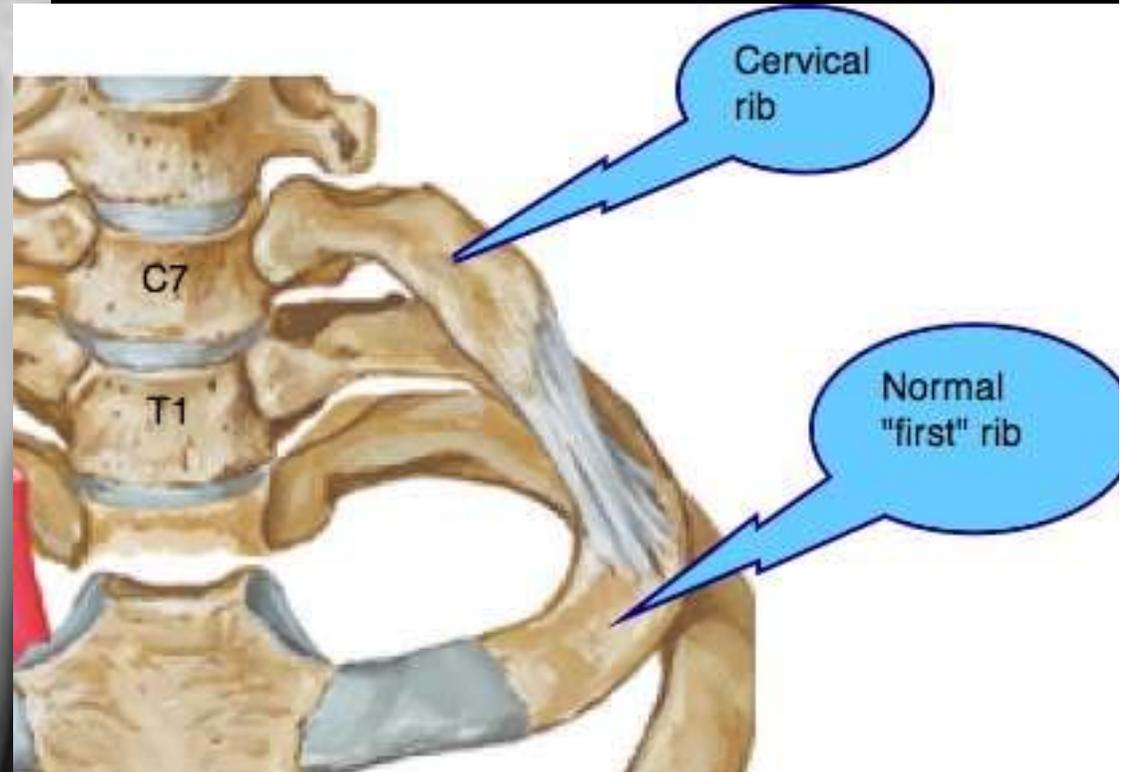


# Easy missing lesions in lung apex

45/F, no symptom

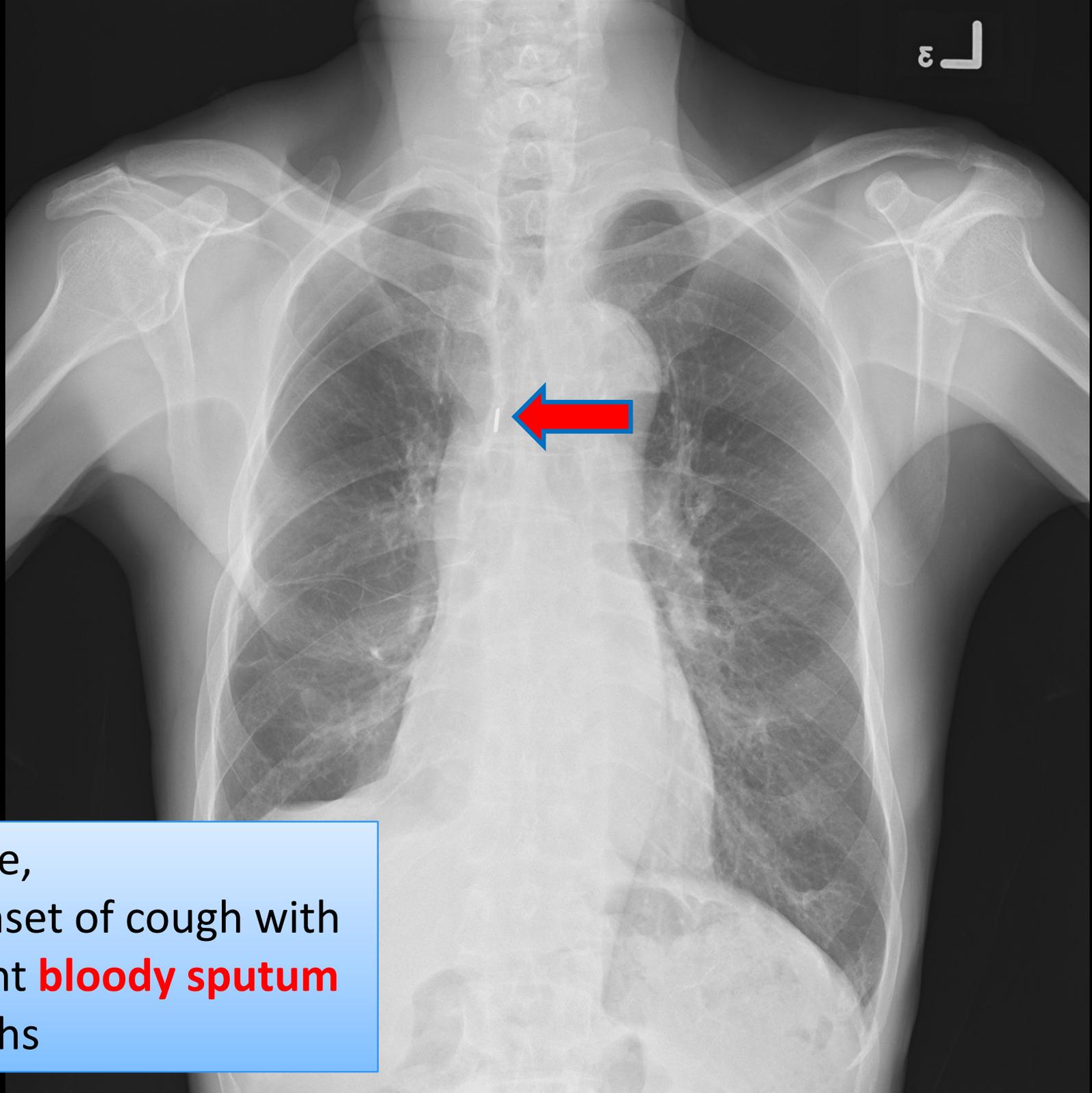


## Cervical rib



## 盲點：常見的判讀陷阱(四大死角)

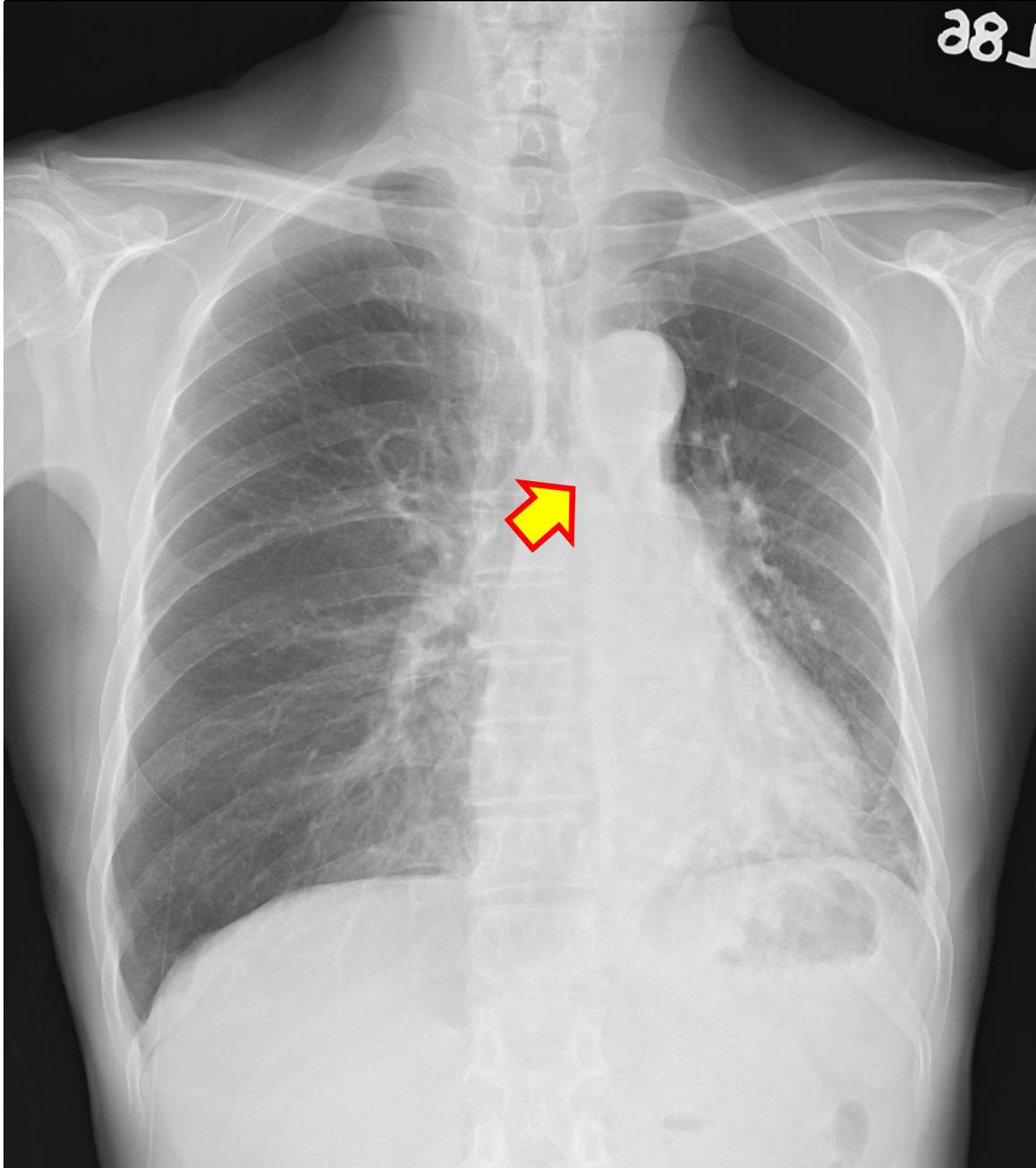
- Bilateral Apex (bone overlapping)
- **Large Airway**
- Retrocardiac region
- Bilateral lung bases  
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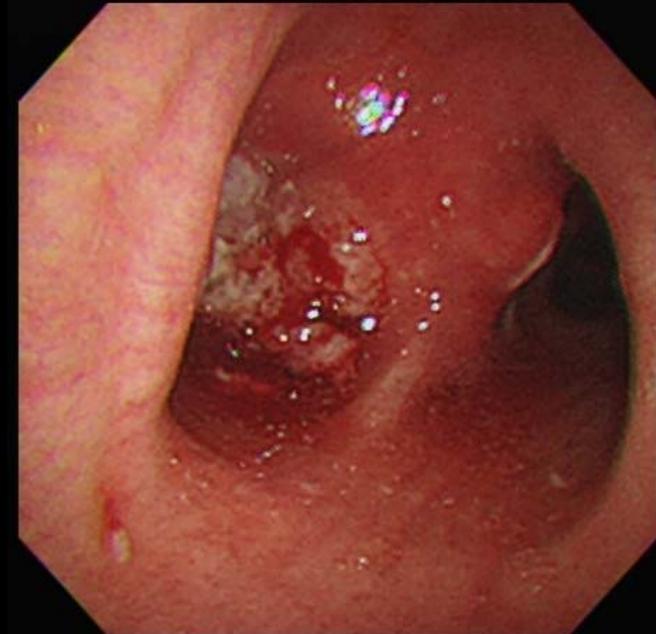
71 y/o male,  
Gradual onset of cough with  
intermittent **bloody sputum**  
for 2 months

# Easy missing lesions in large airways

71M, r/o COPD with AE



SqCC of lung with  
LMB narrowing



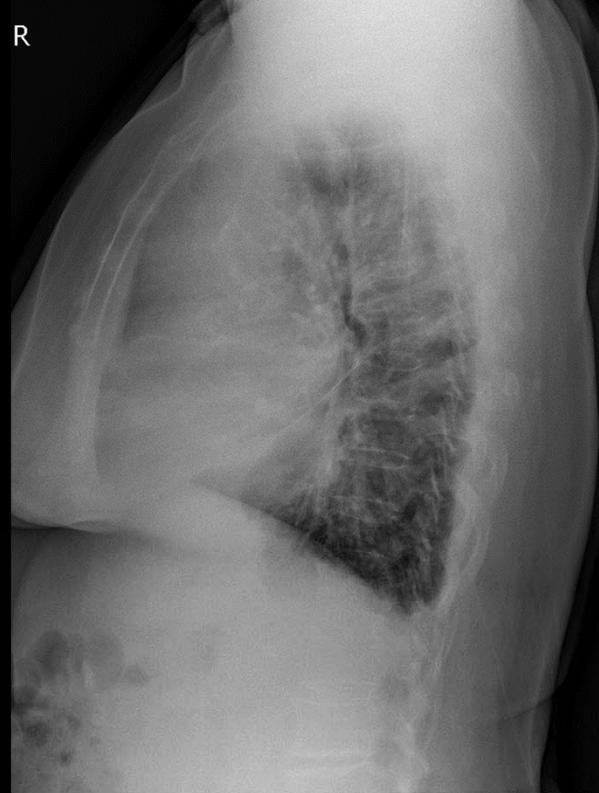
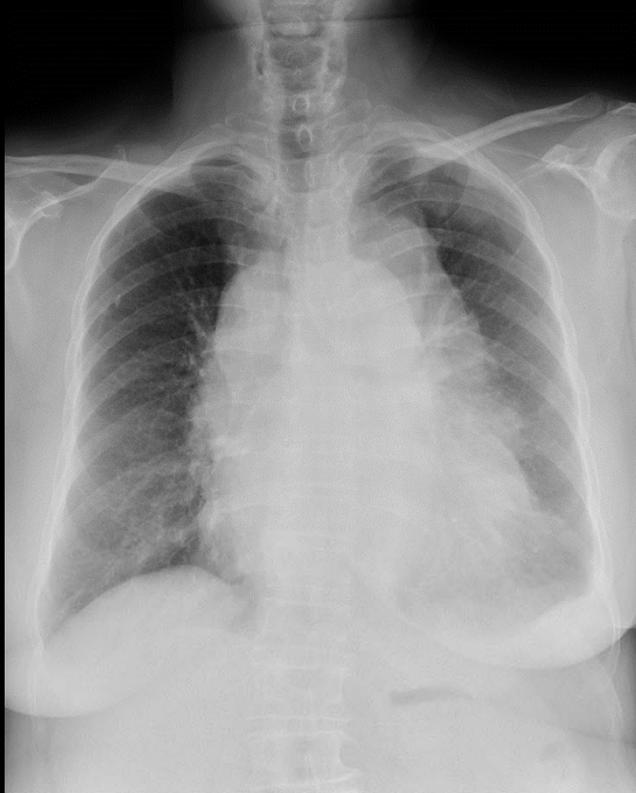
# 盲點：常見的判讀陷阱(四大死角)

- Bilateral Apex (bone overlapping)
- Large Airway
- **Retrocardiac region**
- Bilateral lung bases  
(especially sub-diaphragm)

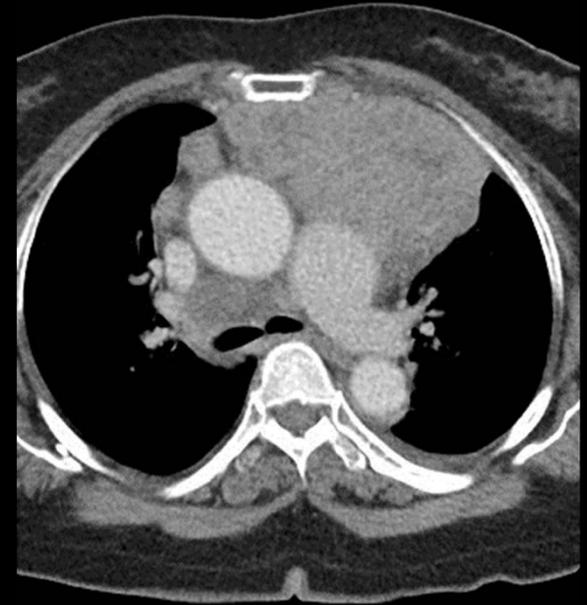
# Retrosternal and retrocardiac space

- 正常這兩個地方是clear的，而兩者的透亮度大約相同。如有顯著不同，則表示可能其中之一有病變。
- Anterior mediastinal lesion時常可以在 **retrosternal space** 看見。
- **Retrocardiac lesion**
  - 在PA view不易identify，但是在 lateral view 則容易許多。
  - 在PA view中的線索是 **loss of normal vascular shadow over this region**

R

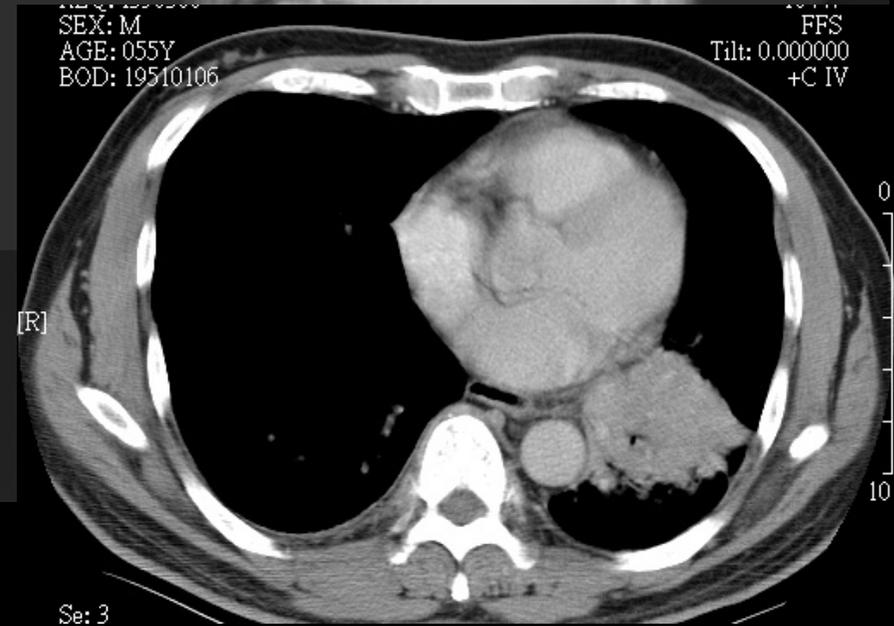
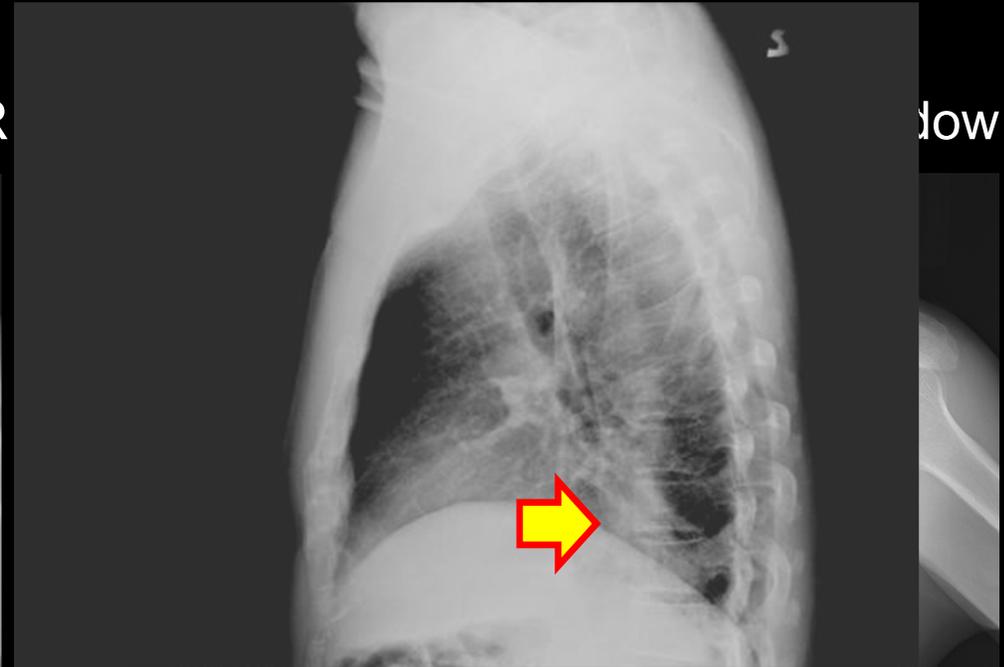
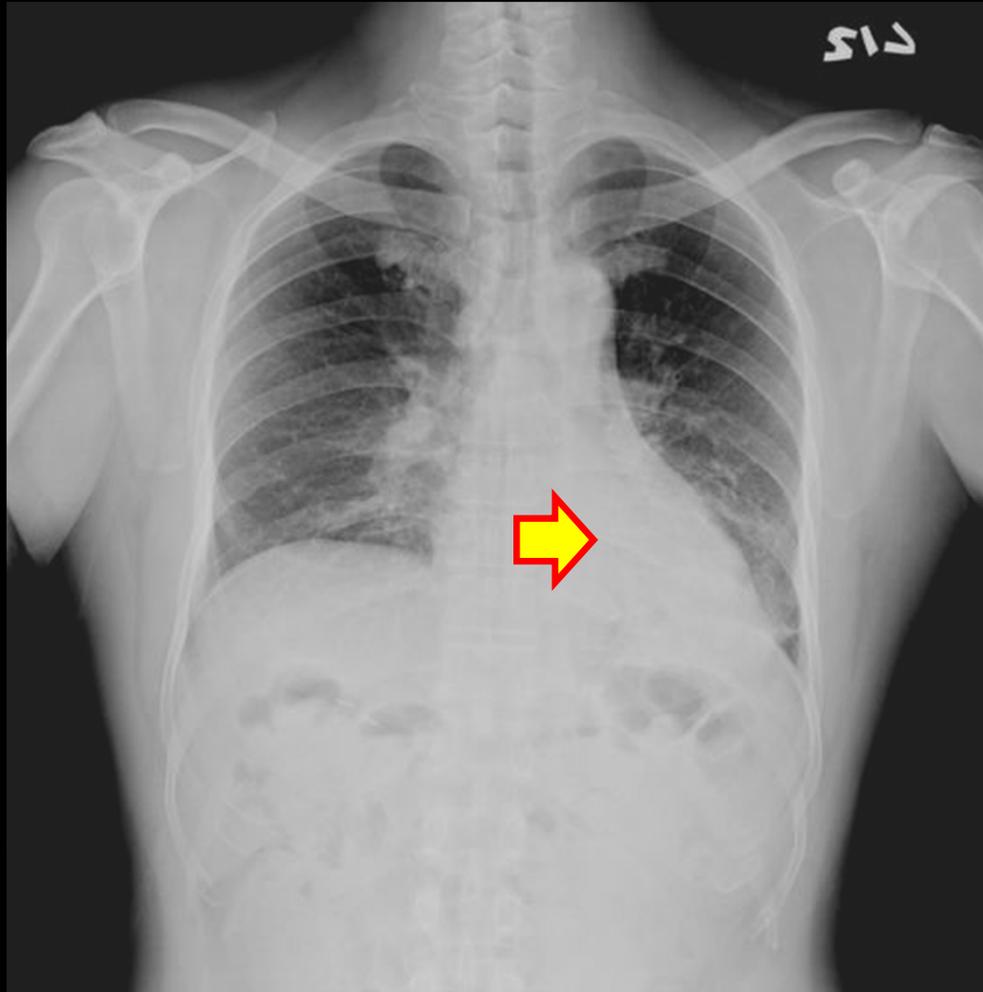


# Anterior mediastinal tumor (retrosternal)



# Easy missing lesions in retrocardiac area

66/M, incidentally finding of abnormal CXR



Adenocarcinoma, LLL

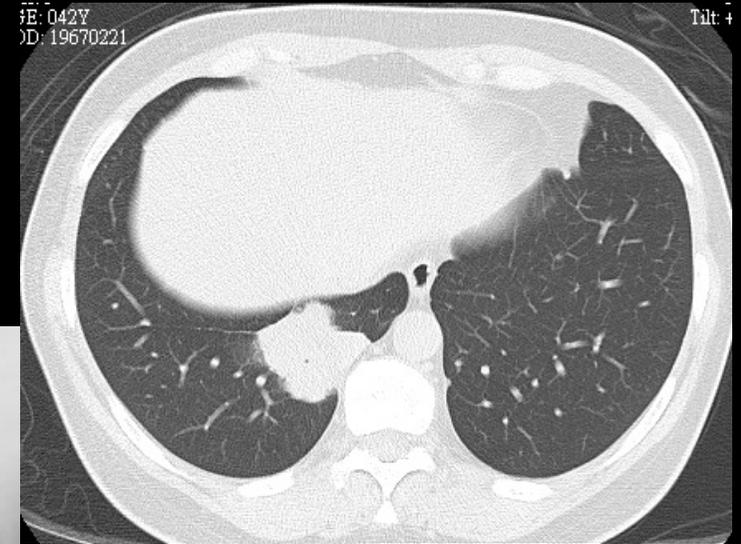
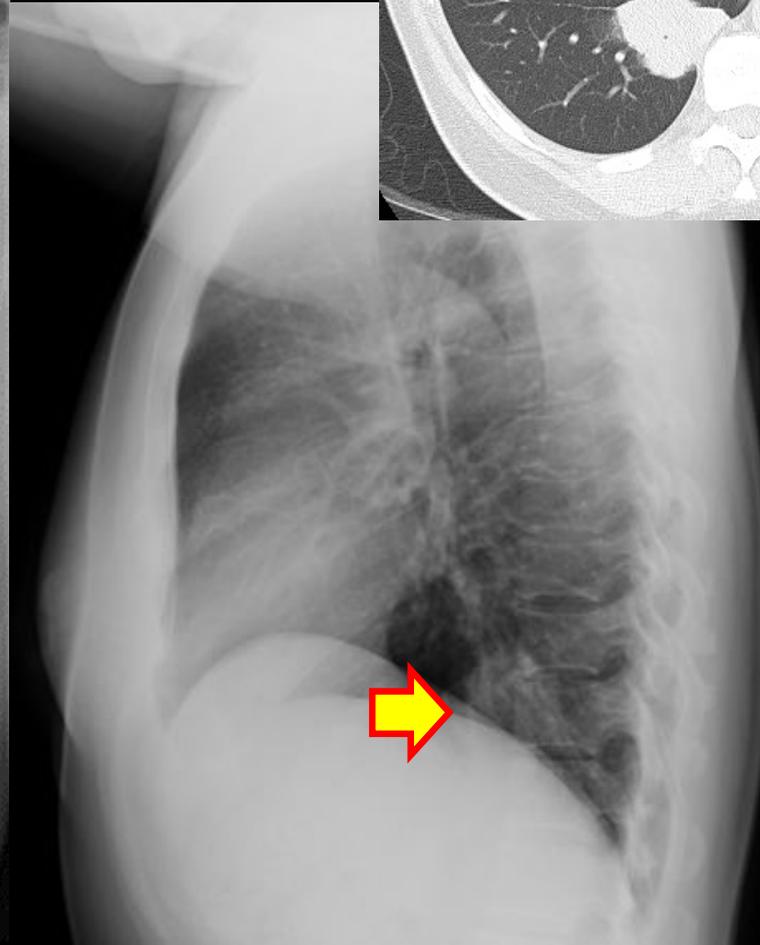
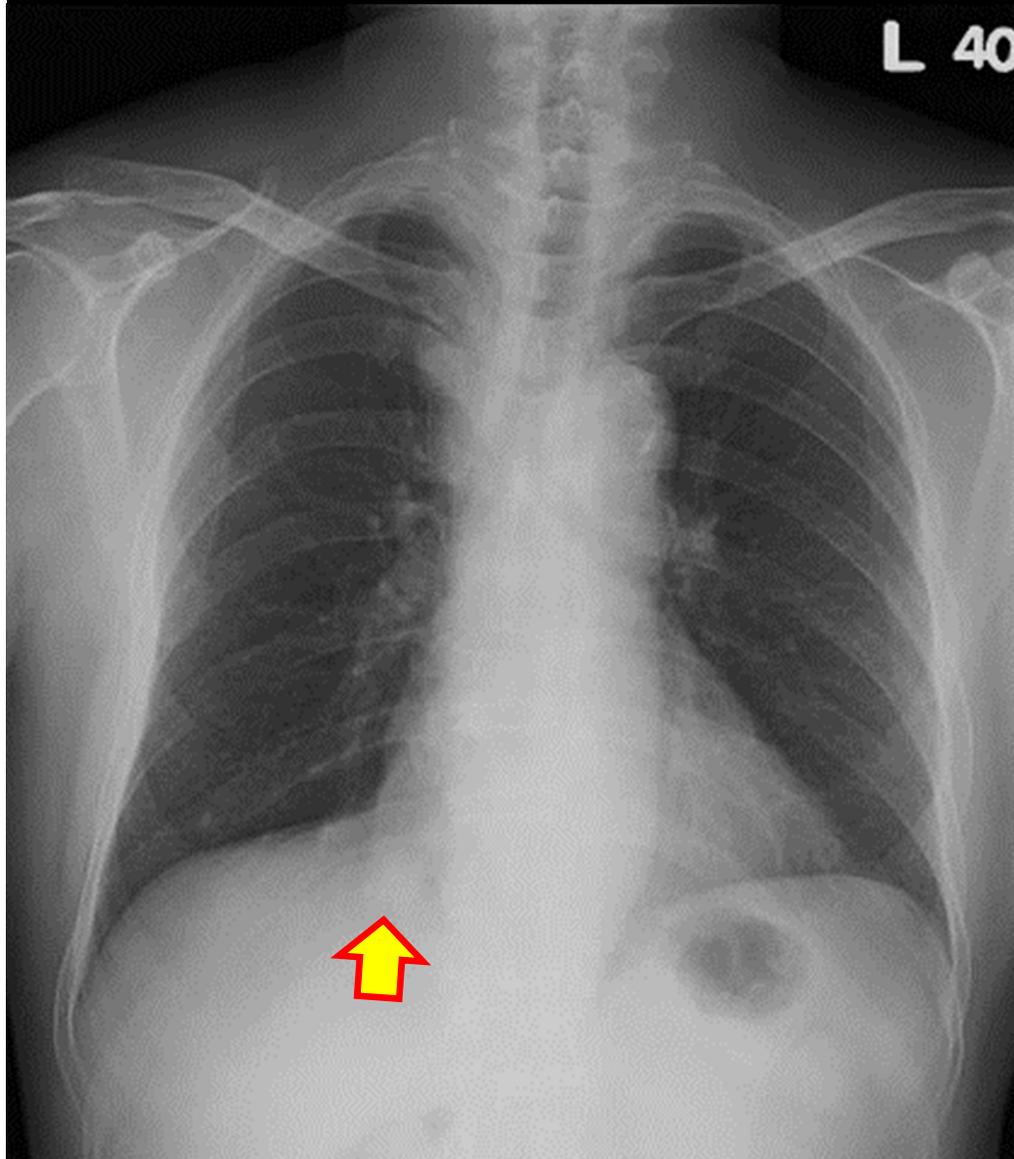
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- Bilateral Apex (bone overlapping)
- Large Airway
- Retrocardiac region
- **Bilateral lung bases  
(especially sub-diaphragm)**

# Easy missing lesions in sub-diaphragm area

## Adenocarcinoma, RLL

50F, bloody sputum for 6 months



## 盲點：常見的判讀陷阱(四大死角)

- Bilateral Apex (bone overlapping)
- Large Airway
- Retrocardiac region
- Bilateral lung bases  
(especially sub-diaphragm)

特色：跟軟組織/骨頭重疊

# 胸部X光片之判讀要領

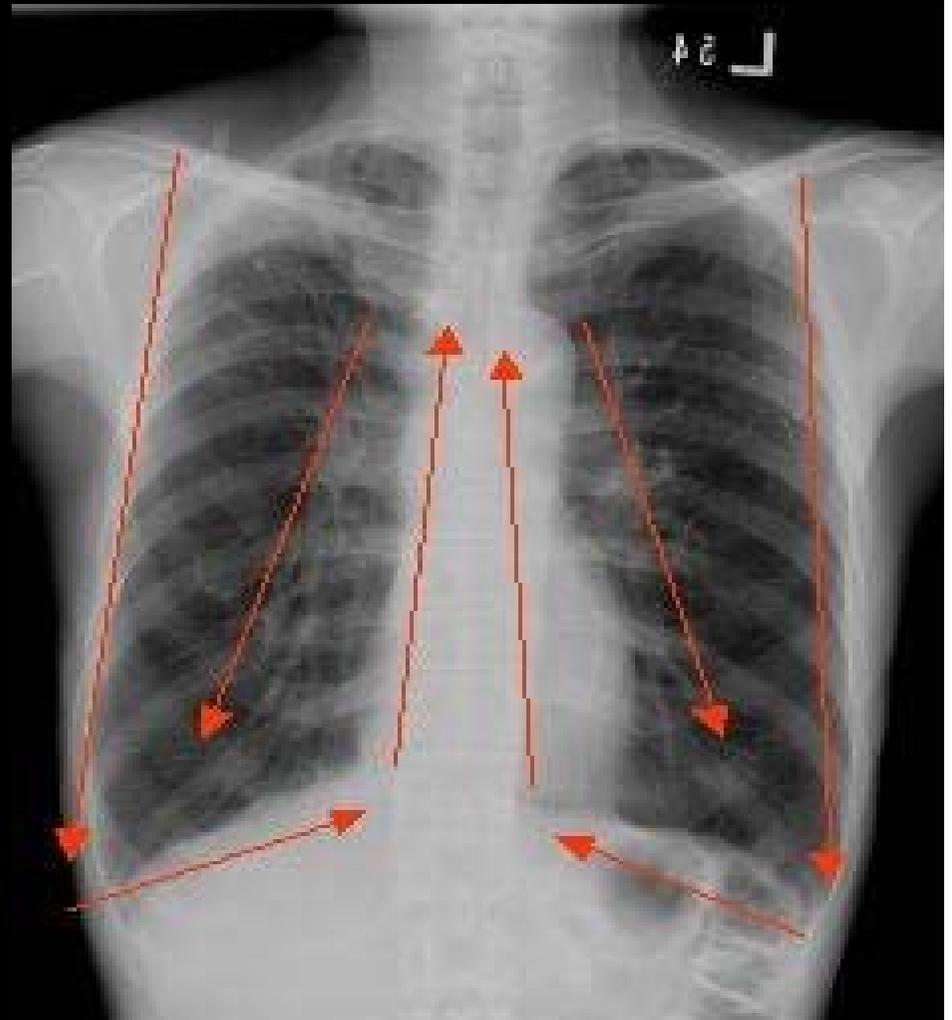
- 片子：良好
  - 照相品質
  - 病人姿勢
  - 基本資訊
- 知識：
  - 了解正常解剖學與影像
  - 以patterns & signs作鑑別診斷
  - 熟悉疾病之典型表現，再學習其多樣化表現
- 技巧：
  - 固定的判讀程序，避免遺漏。
  - 利用不同階段的X光片，以病灶的時序變化作鑑別診斷
  - 利用不同的照像技術
  - 參考臨床資料

# 系統性的判讀

每個人可以建立自己的讀片順序

## Felson: There Are Many Lung Lesions

1. T(thorax): 胸廓及其外軟組織
2. A(abdomen): 橫膈及腹部器官
3. M(mediastinum): 縱膈，含大氣道和肺門
4. L(單側肺區): 肺裂、肺紋及支氣管分支
5. L(兩側肺區左右比較)



# 應該注意的重點，以Felson建議的順序

- **Thorax**

- Bone: 形狀、濃度(osteolytic, osteoblastic)、trabecula
- Soft tissue: breast完整性、皮下氣腫、mass

- **Mediastinum**

- 寬度(變寬：食道、大血管、lipomatosis、mass)、位移、異常空氣(食道疾病、pneumomediastinum、mediastinitis)
- Airway: 位置、intraluminal、carina angle(<60 or >90異常)
- 食道：異常的air column
- 心臟：大小、形狀、後面
- 肺門：大小、形狀、位置、濃度

- **Abdomen**

- 橫膈：形狀、位置、C-P angle、橫膈下(subdiaphragm)
- 肝臟：hepatomegaly, liver abscess
- 胃氣(gastric bubble): 與L't hemidiaphragm距離、intra gastric mass、extragastric (splenomegaly)、loss of gastric bubble(hiatal hernia, achalasia, 躺著照)

- **Lung**

- 肋膜：變厚、氣胸、長水、mass
- 肺紋
- 左右比較

- 最後再檢查一次**死角**：apex、airway裡面、心臟後面、橫膈下面

# Easy missing points on CXR

- 左右 : situs inversus
- 咪咪 : s/p mastectomy, pectoris major loss
- **A**irway : endobronchial tumor
- **B**one : left apex tumor overlapping with 1st rib
- **C**ardia: retrocardiac area
- **D**iaphragm : PPU, gastric cancer, lower lung cancer

**Thank you for your attention!**

