胸部 X-ray 影像判讀原則與常用徵象

臺中榮總 胸腔內科

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課程簡介

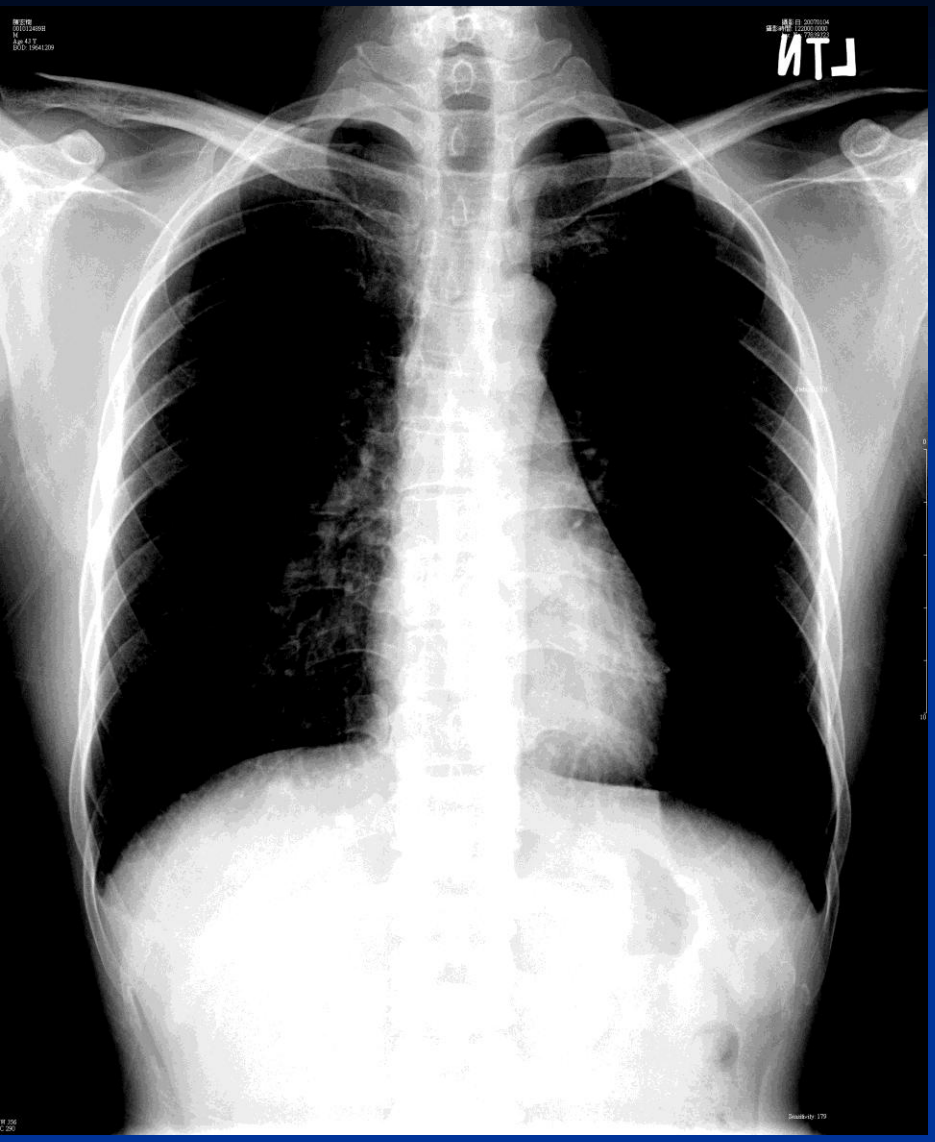
- 一、Normal Anatomy
- 二、Important signs
  - **Signs for localization**
    - **Silhouette sign及其衍生signs**
    - **Extrapleural sign**
    - **Incomplete border sign**
  - Signs of pleural diseases
    - Meniscus sign
    - Deep sulcus sign
  - Signs of pneumomediastinum, continuous diaphragm sign

優質胸部X光影像的判斷標準

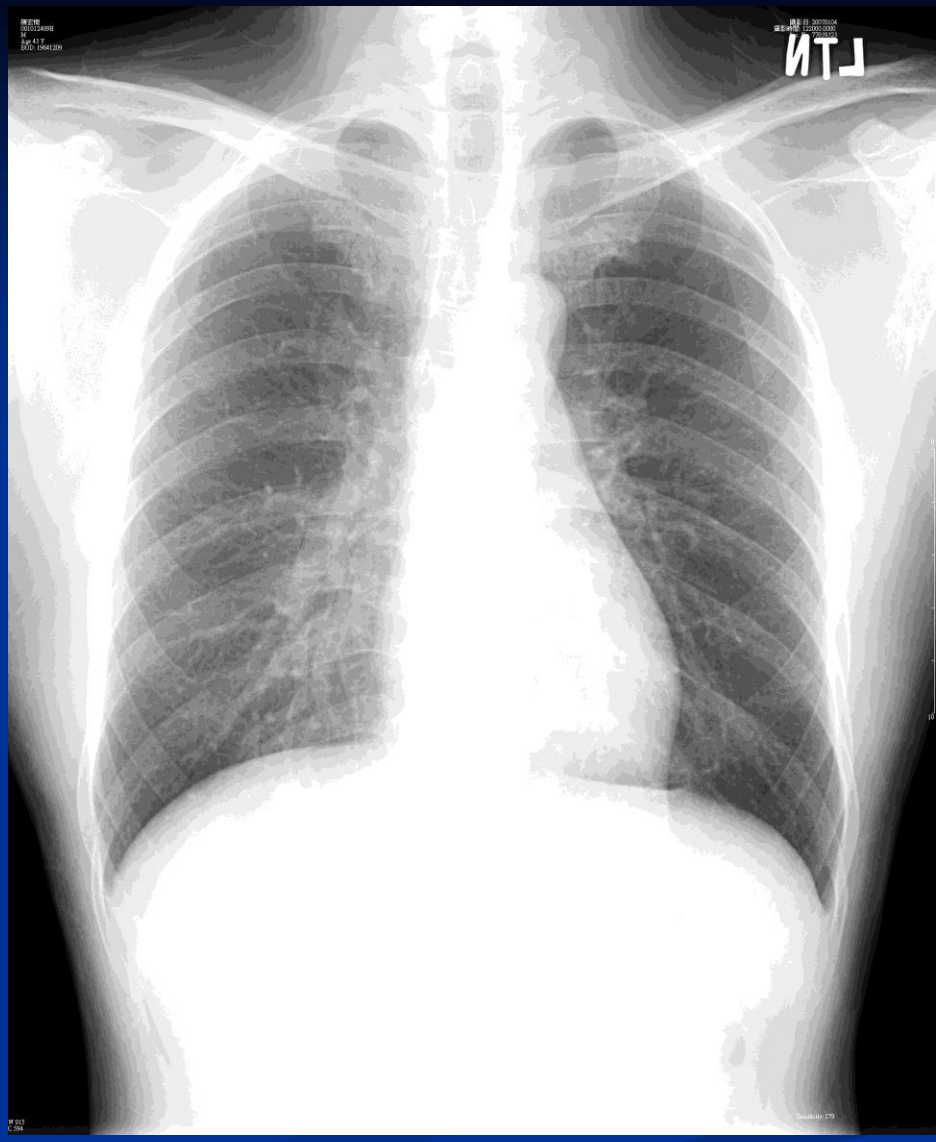
- 影像要清晰（Clear and Sharp），要細膩（Good Detail）
- 片子夠大：應包含頸部、全胸廓、橫膈下面及皮下組織。
- 標上病人姓名、日期、病歷號。
- 左右兩邊要標示(對右位心，或臟器反位者很重要)。
- 吸氣足夠(肋骨前面數來第六根或後面數來第十根)。
- 姿勢是否端正，肩胛骨是否拉開。
- 脊柱隱約可見，但脊椎骨影像不明顯。
- 心臟陰影後面尚可見肺紋。
- 肋骨、心臟、縱膈、橫膈邊緣清晰。
- 氣管透亮影在第三、四胸椎清楚可見，其分歧部、左右主支氣管也隱約可見。
- 肺紋（lung marking，即肺血管影像）鮮明可追蹤。

CXR

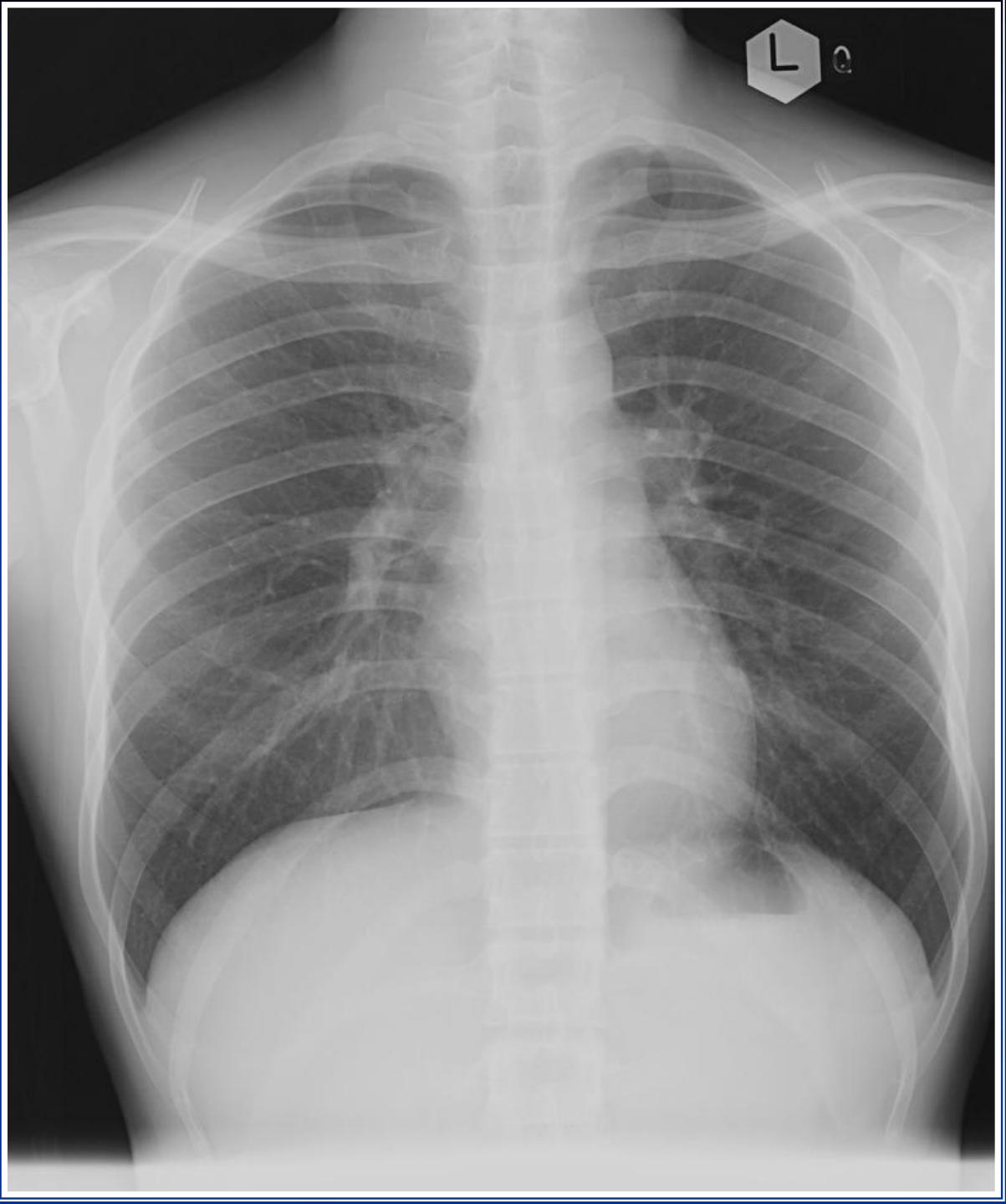
- 正常CXR的濃度:
  - 金屬:最白,X光穿不透
  - 骨頭或鈣化:次白
  - 軟組織:包含臟器、神經、血管
  - 空氣:X光完全穿透,最黑
- 影像品質:
  - 整體CXR是否過黑(high kVp)或過白(low kVp)
  - 心臟後面的肺紋可見，脊椎隱約可見，兩側肺紋同樣清晰



過黑的CXR



過白的CXR



影像品質

片子夠大

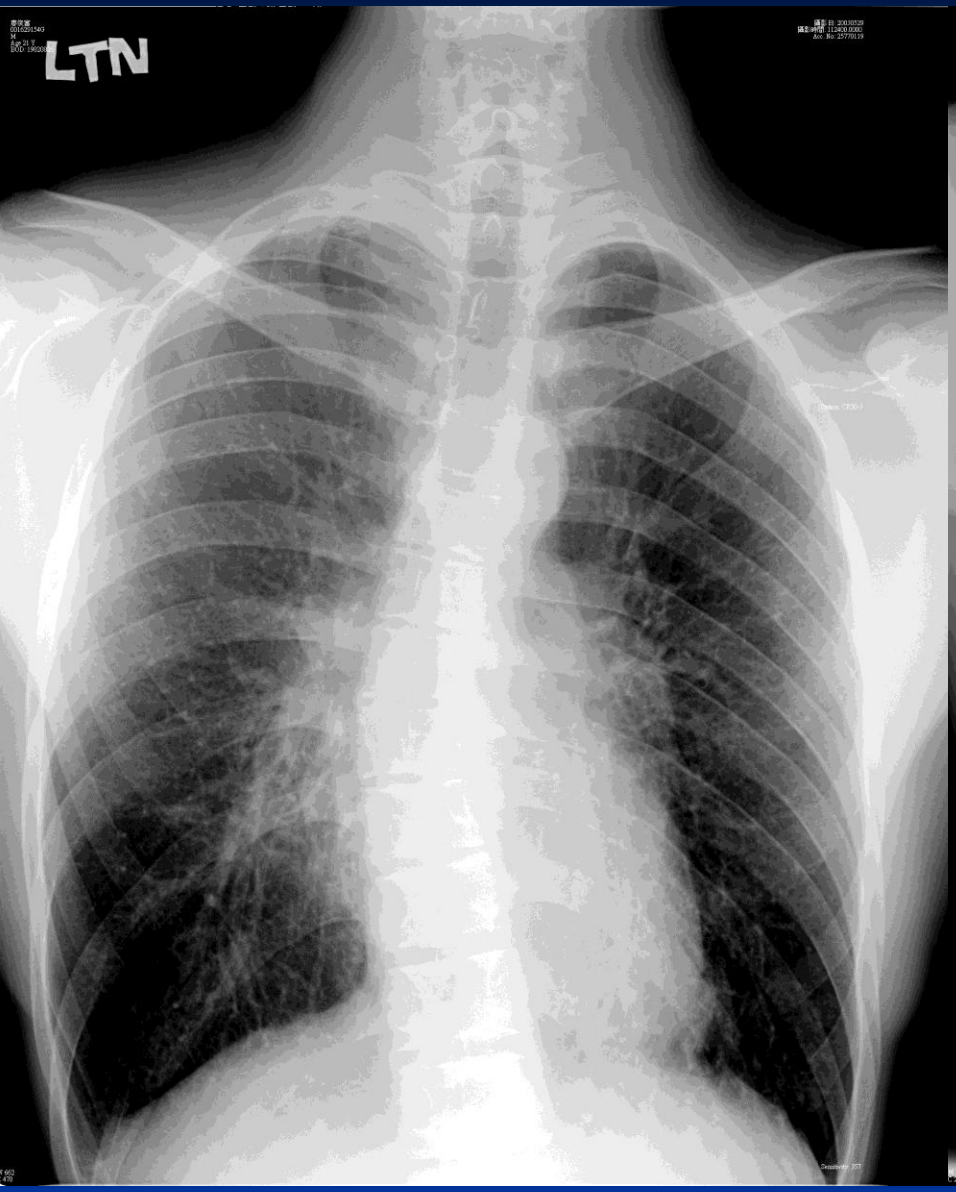
基本資料

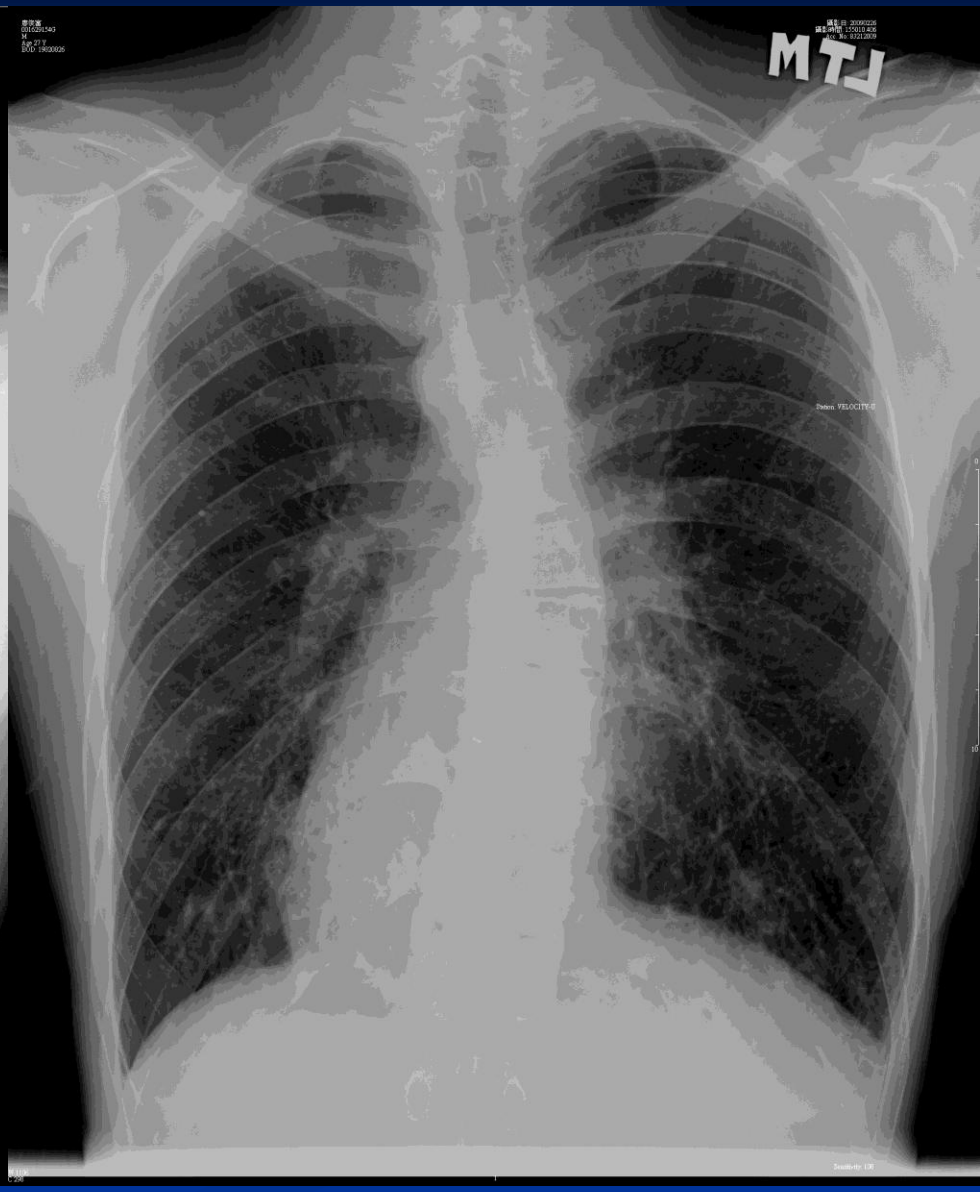
標示左右

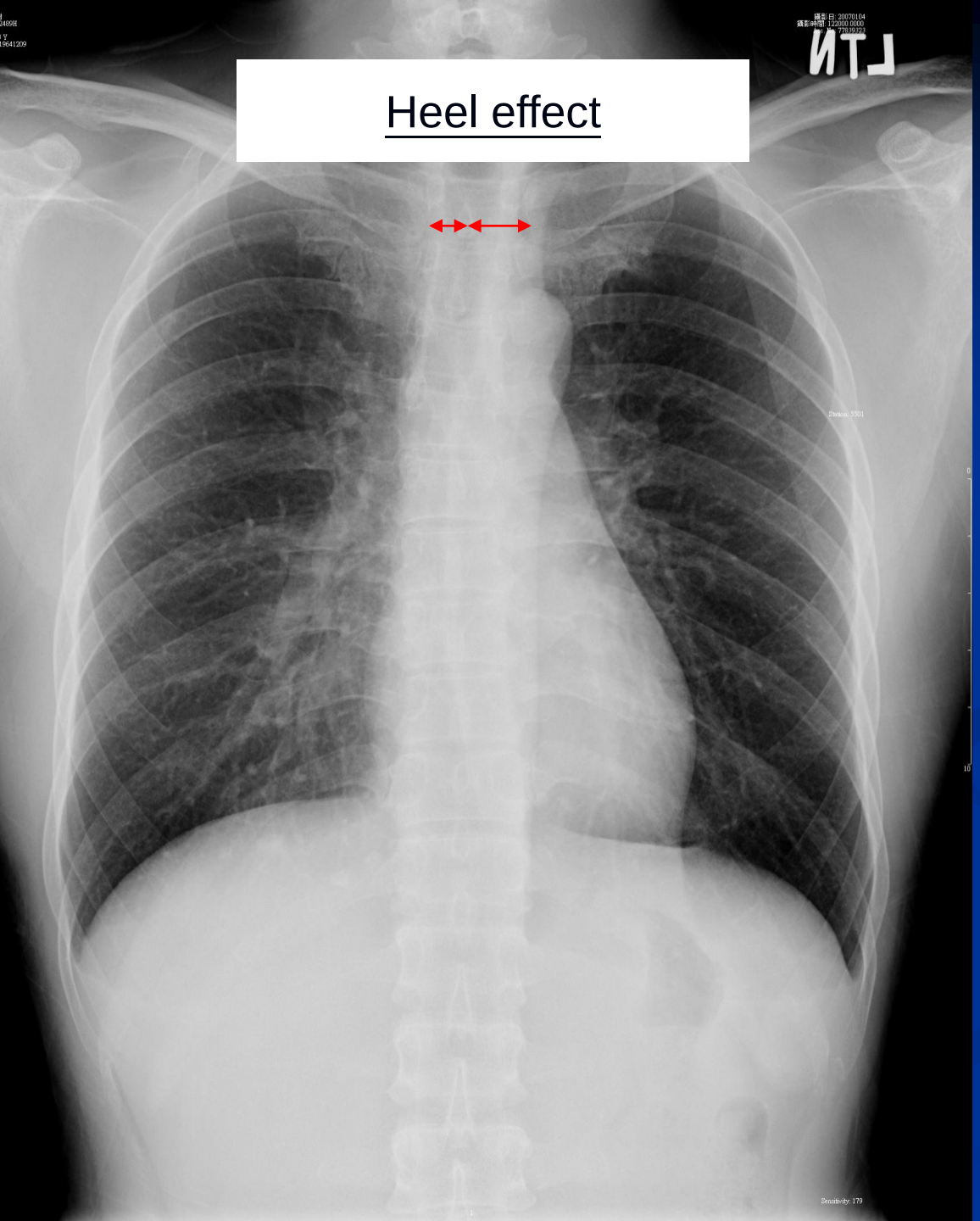
吸氣足夠

姿勢端正

左右兩邊要標示







- 姿勢不端正造成 Heel effect
- 脊突連線至兩邊鎖骨頭之距離不相等，造成身體兩側濃淡不一，右邊較白，左邊較黑。

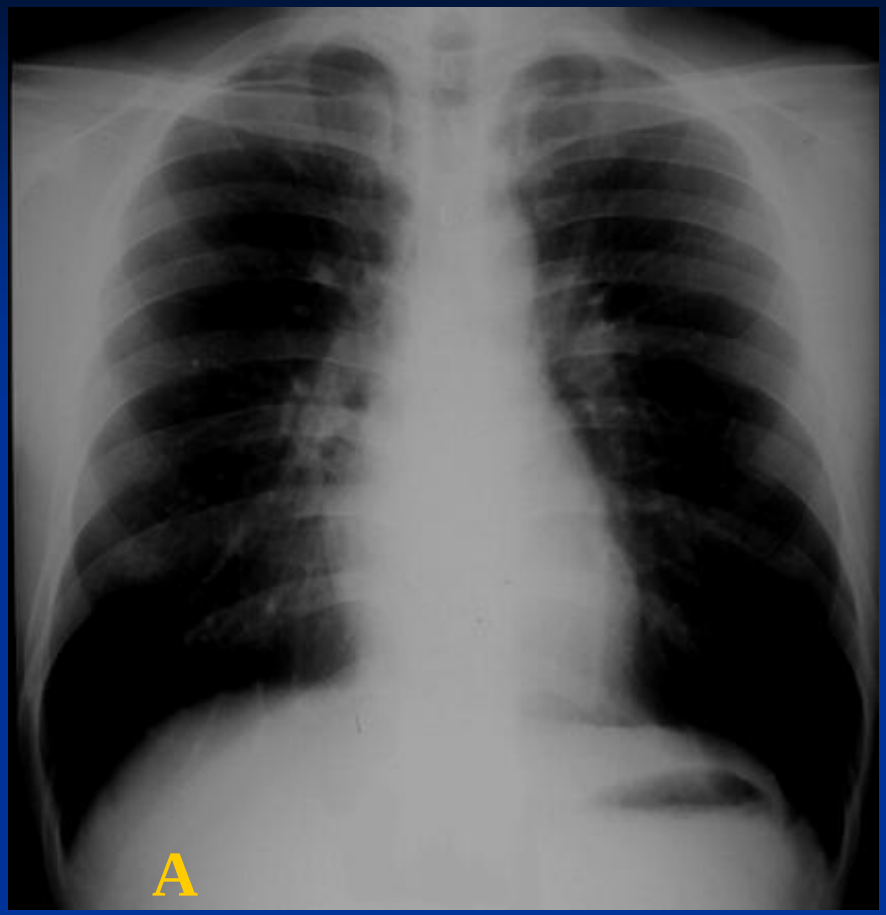
判讀的步驟

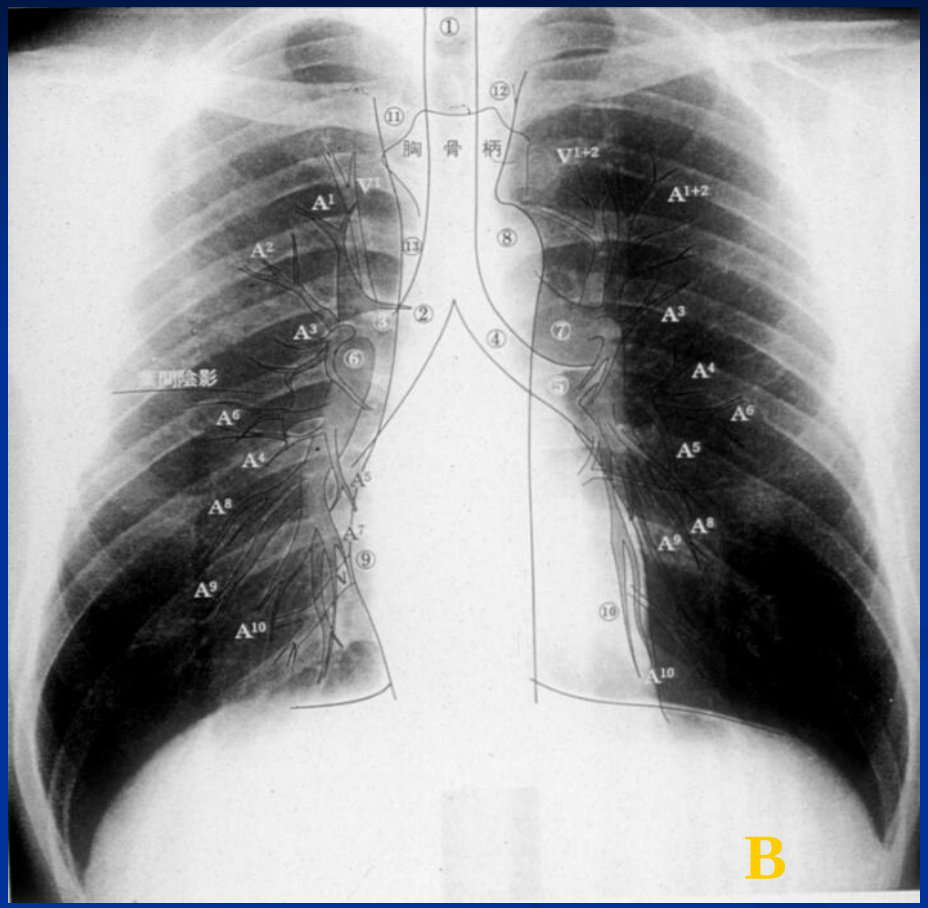
- 全般性的觀察
  - 攝影的體位
  - 年齡
  - 性別
  - 身材

判讀的步驟

- 循序觀察,找出病灶所在
- 由外而內，lung field 最後看(每個人的習慣)
  - 骨骼
  - 軟組織
  - 肋膜
  - 氣管及左右主支氣管
  - 縱膈部及心臟血管
  - 肺門陰影及肺紋
  - 橫膈
  - 肺野

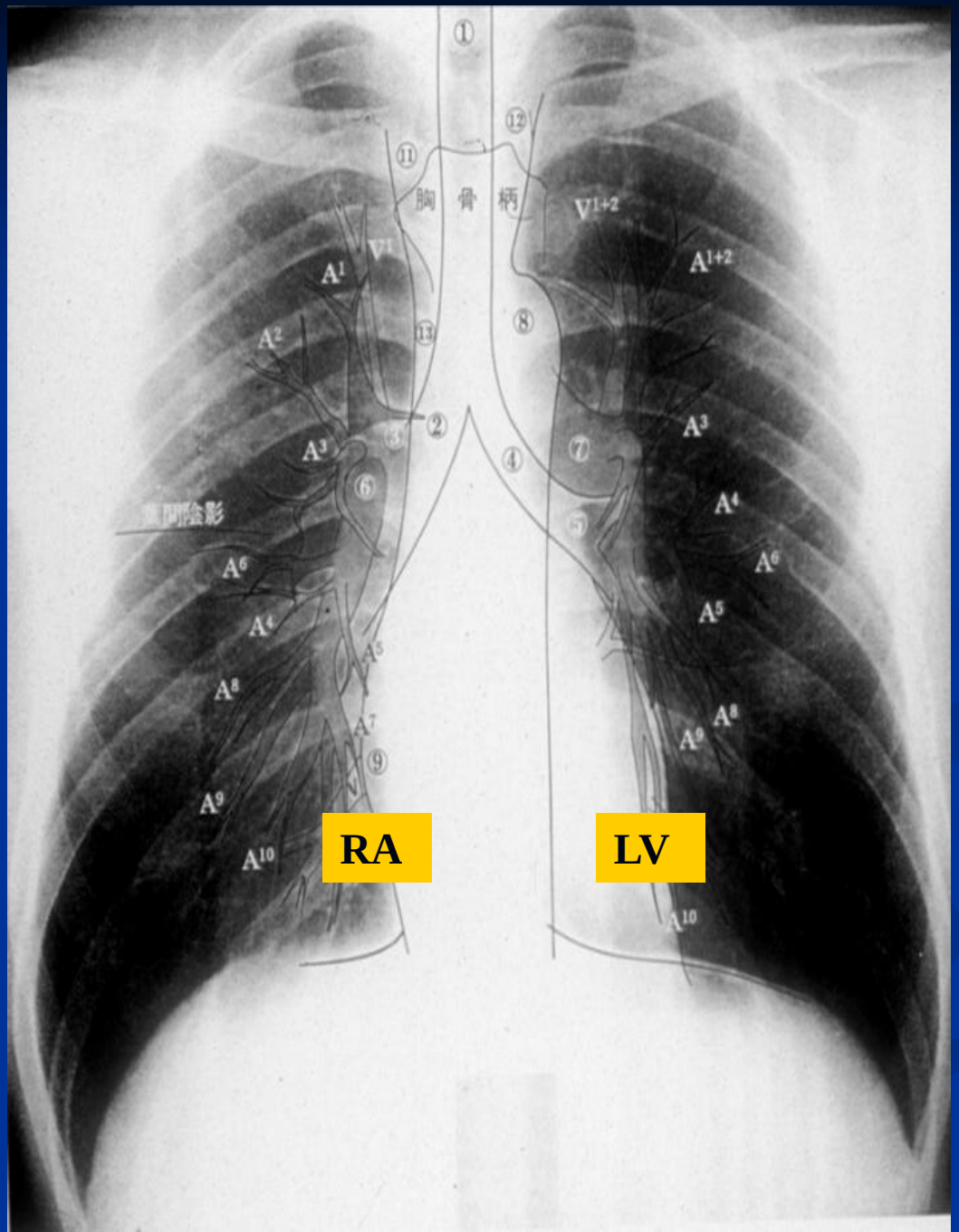
正常正面像與其解剖示意圖之對照



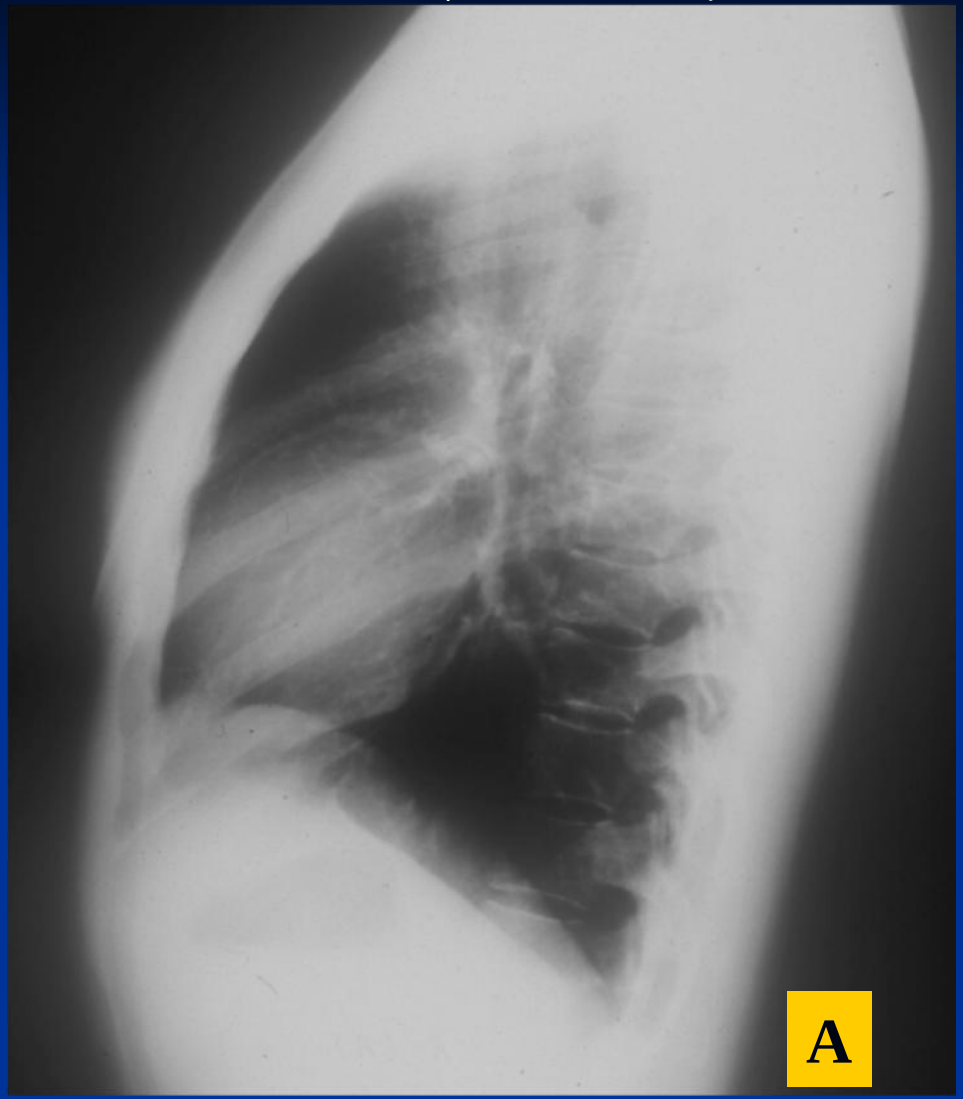


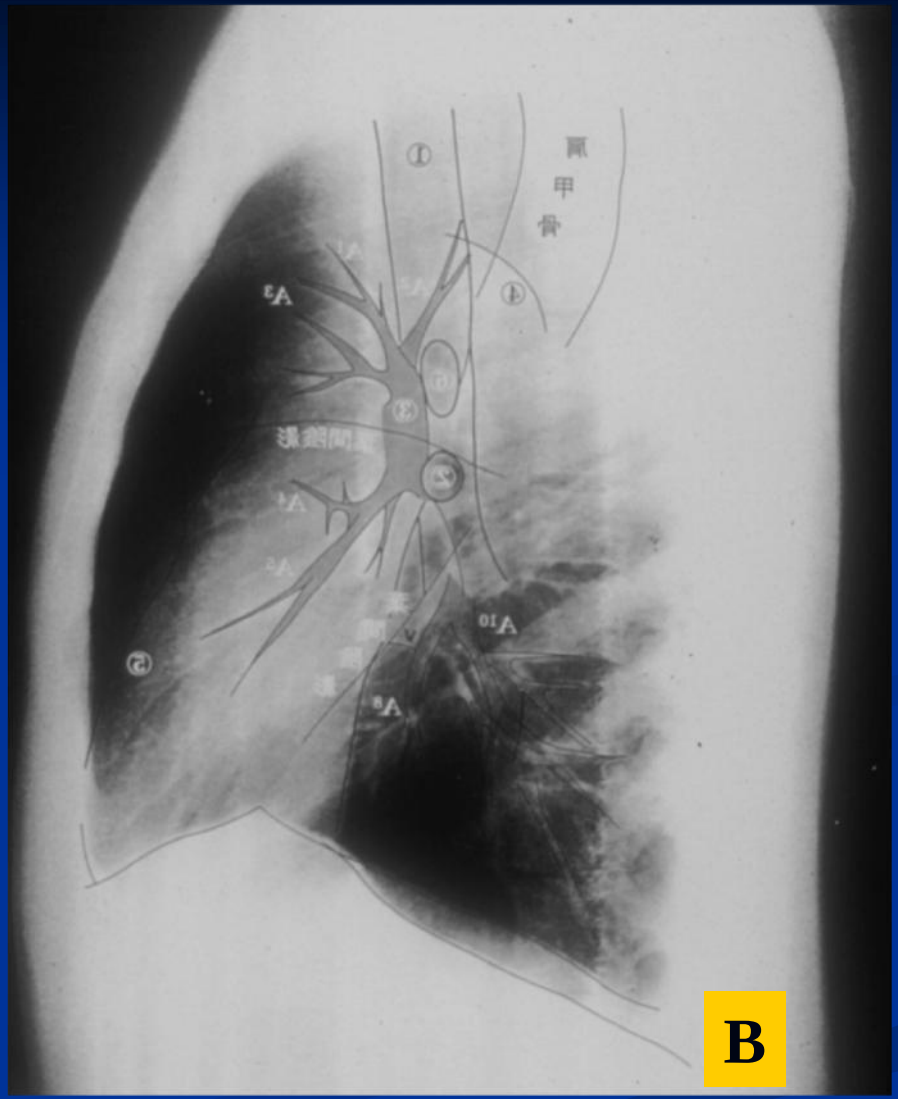
A圖與B圖之詳細對照：

(1)氣管；(2)右主支氣管；(3)右主支氣管口；(4)左主支氣管；(5)左主支氣管口；(6)右肺動脈；(7)左肺動脈；(8)主動脈弓；(9)右心房；(10)左心房；(11)右鎖骨下靜脈；(12)左鎖骨下動脈；(13)上大靜脈


①
⑫
⑪
胸 骨 柄
V1+2
A1+2
V1
A1
A2
⑬
⑧
A3
②
③
⑦
④
A3
⑥
A4
⑤
A6
A6
A4
A5
A5
A8
A8
A7
A9
⑨
A9
A10
RA
LV
A10

正常側面像與其解剖示意圖之對照





A圖與B圖之詳細對照：

(1)氣管；(2)左上葉支氣管口；(3)左肺動脈；(4)主動脈弓；(5)心臟前緣；(6)氣管分歧部

(1)氣管

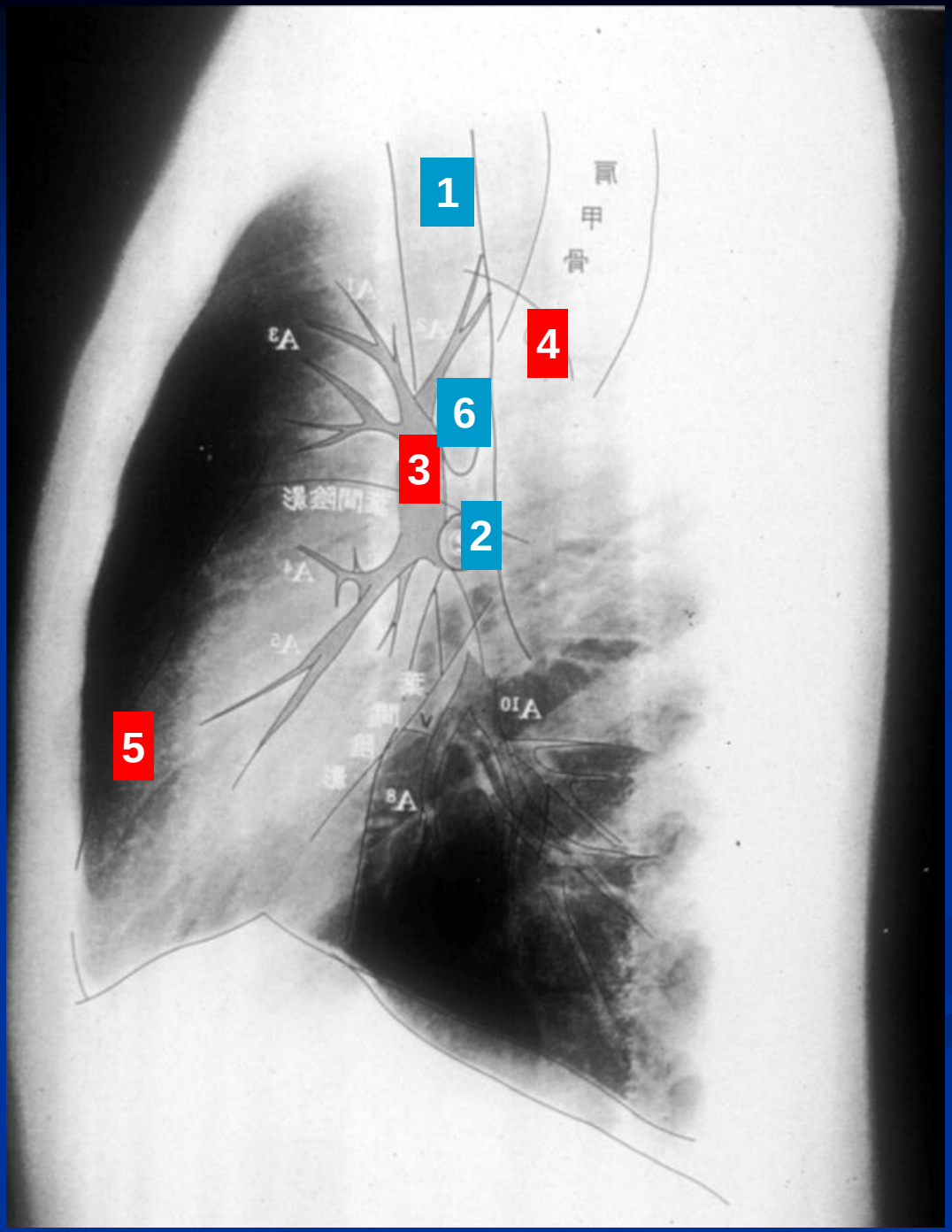
(2)左上葉支氣管口

(3)左肺動脈

(4)主動脈弓

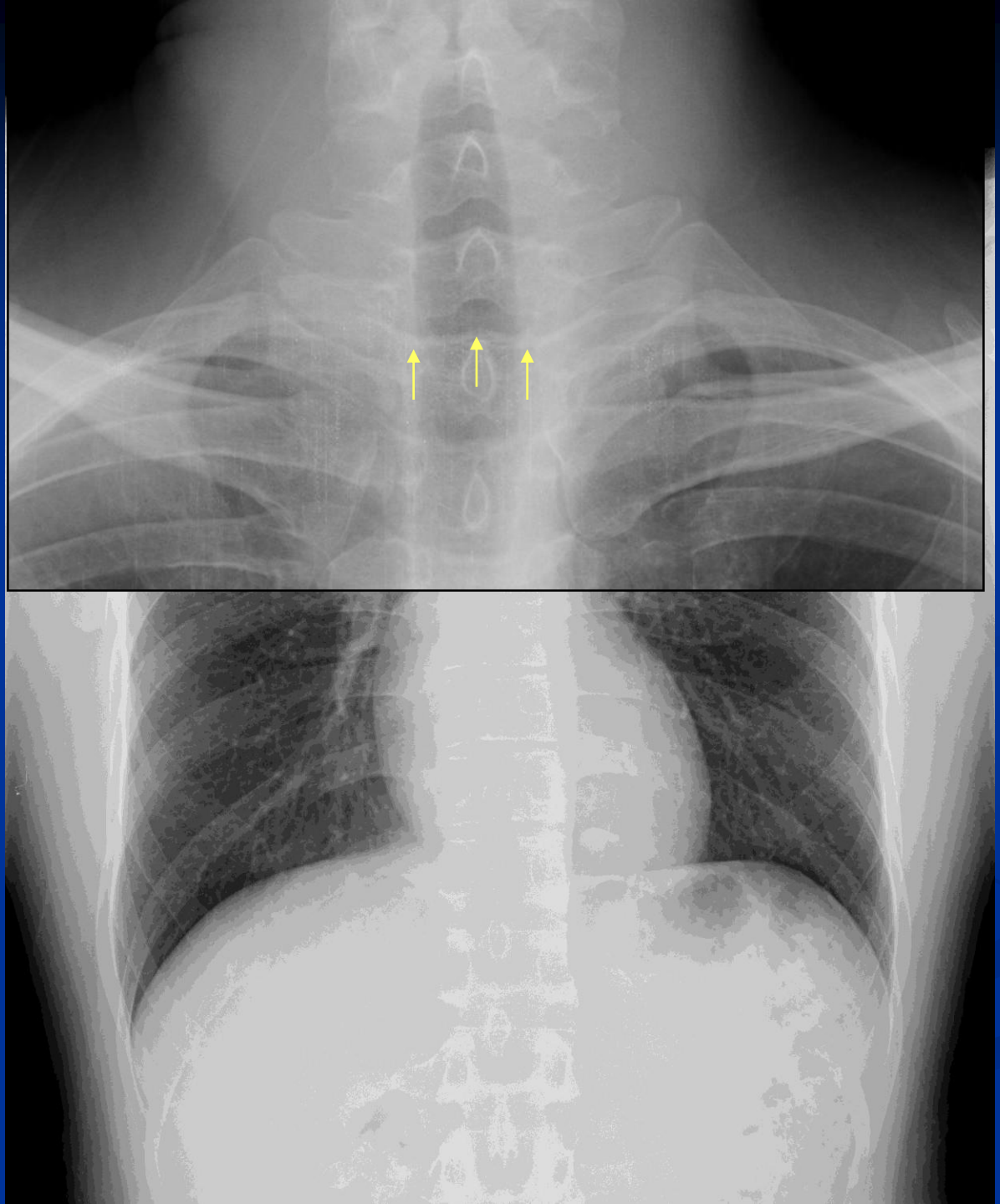
(5)心臓前縁

(6)氣管分岐部



CXR判讀的步驟之一:全般性的觀察

- 攝影的體位:立位或臥位判別要領
  - 肩胛骨是否張開（立位會張開）
  - 鎖骨的形狀與位置（立位鎖骨其上仍有部分肺部空氣）
  - 脊椎骨的形狀（立位脊突會突出，呈現金元寶形狀）
  - 胃內是否有air-fluid level（半臥亦有可能出現）（參考用）
  - 橫膈高低與心臟形狀（立位吸氣較佳:橫膈較低心臟較直）（參考用）
- 年齡:
  - 第一肋軟骨約40歲骨化
  - **主動脈弓內膜層鈣化**表示年齡在50-60歲以上
- 性別:
  - 根據肋軟骨骨化，男性大多為周邊型骨化，女性多為中心型骨化
  - 根據breast shadow來判定（較不準，易有誤差，只能參考）
- 身材:
  - 胖瘦可根據皮下組織厚薄
  - 肥胖者橫膈較高，心臟在橫位，瘦長者橫隔較低，心臟在直位



立位

Stomach gas

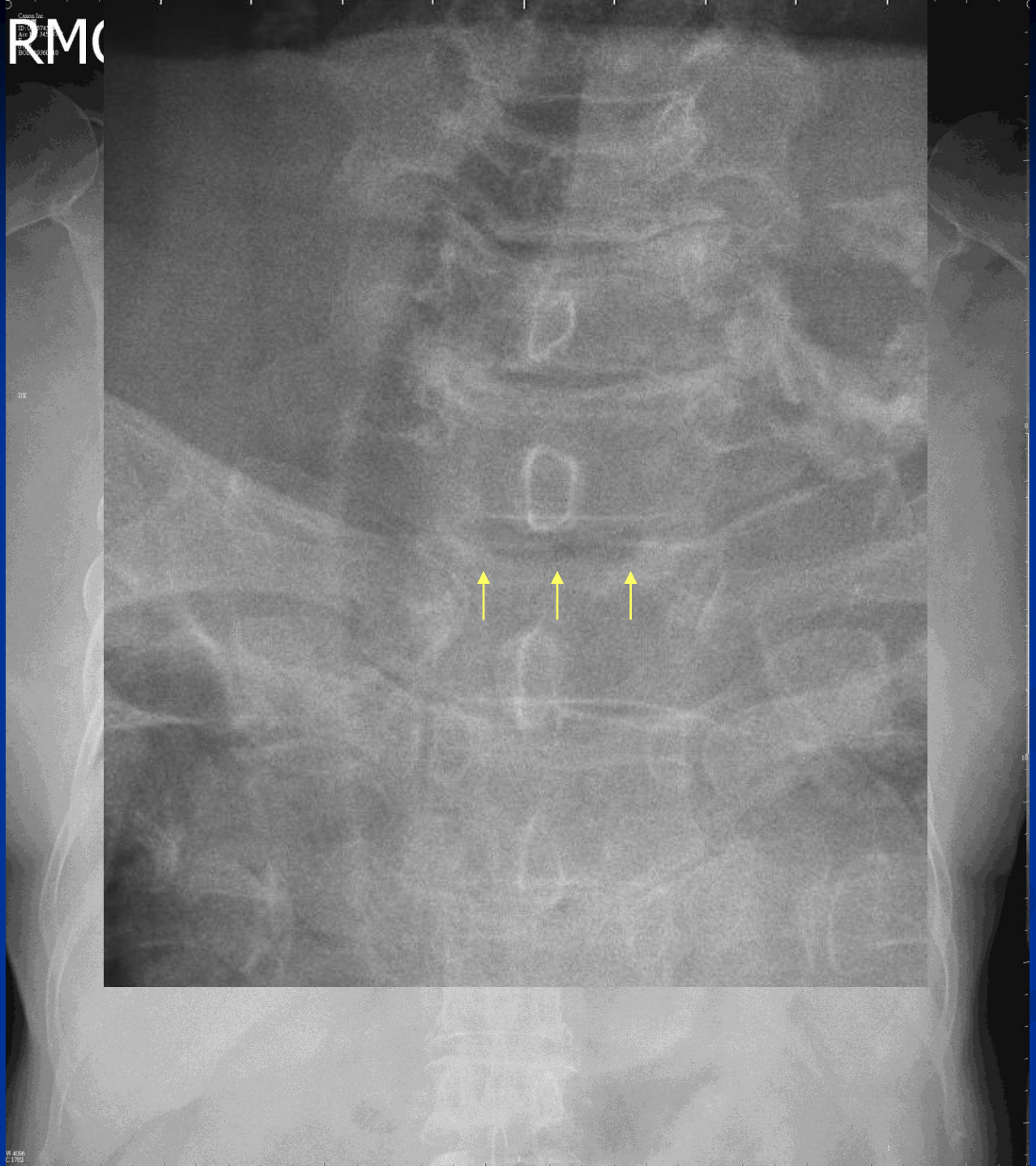
scapula

clavicle

spine

heart

diaphragm



卧位

Stomach gas

Scapula

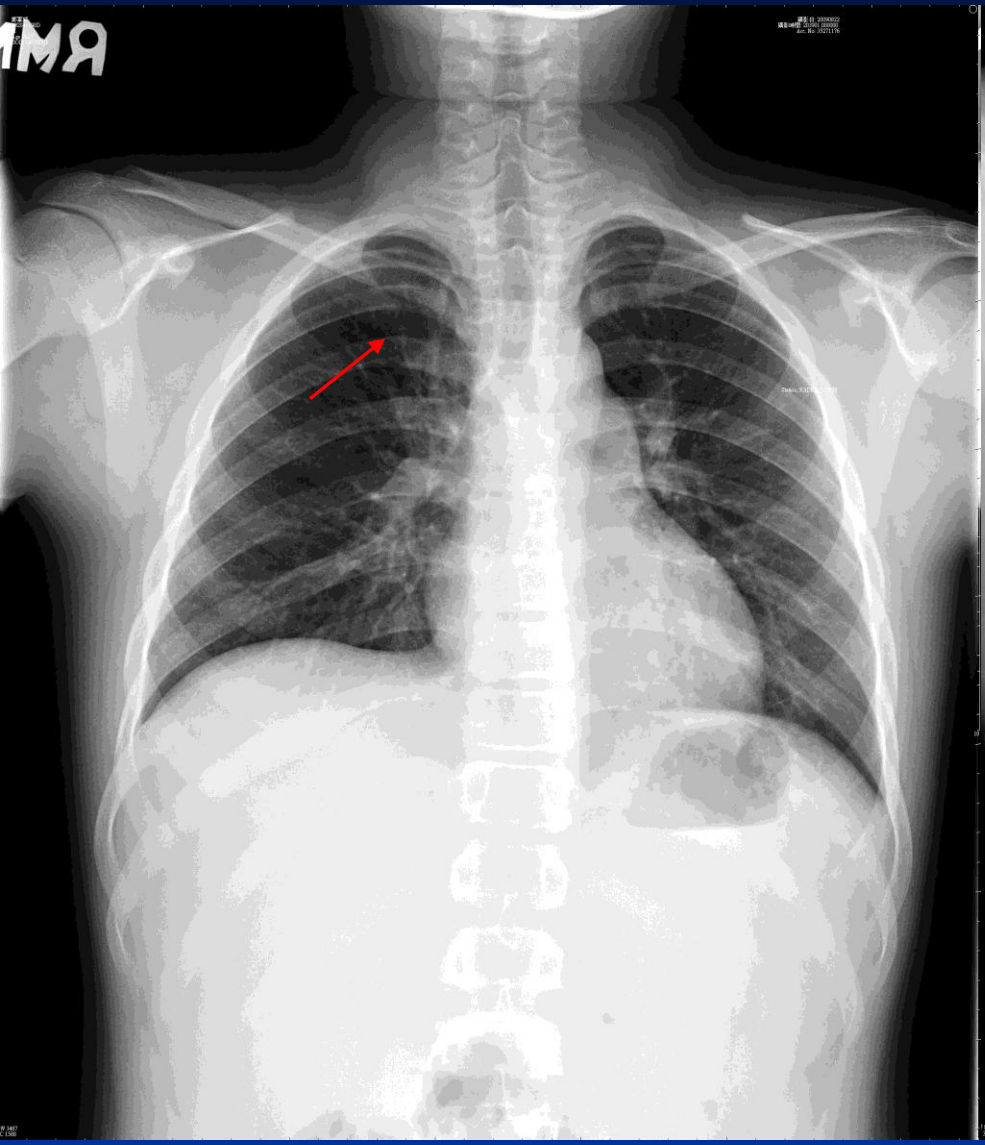
Clavicle

Spine

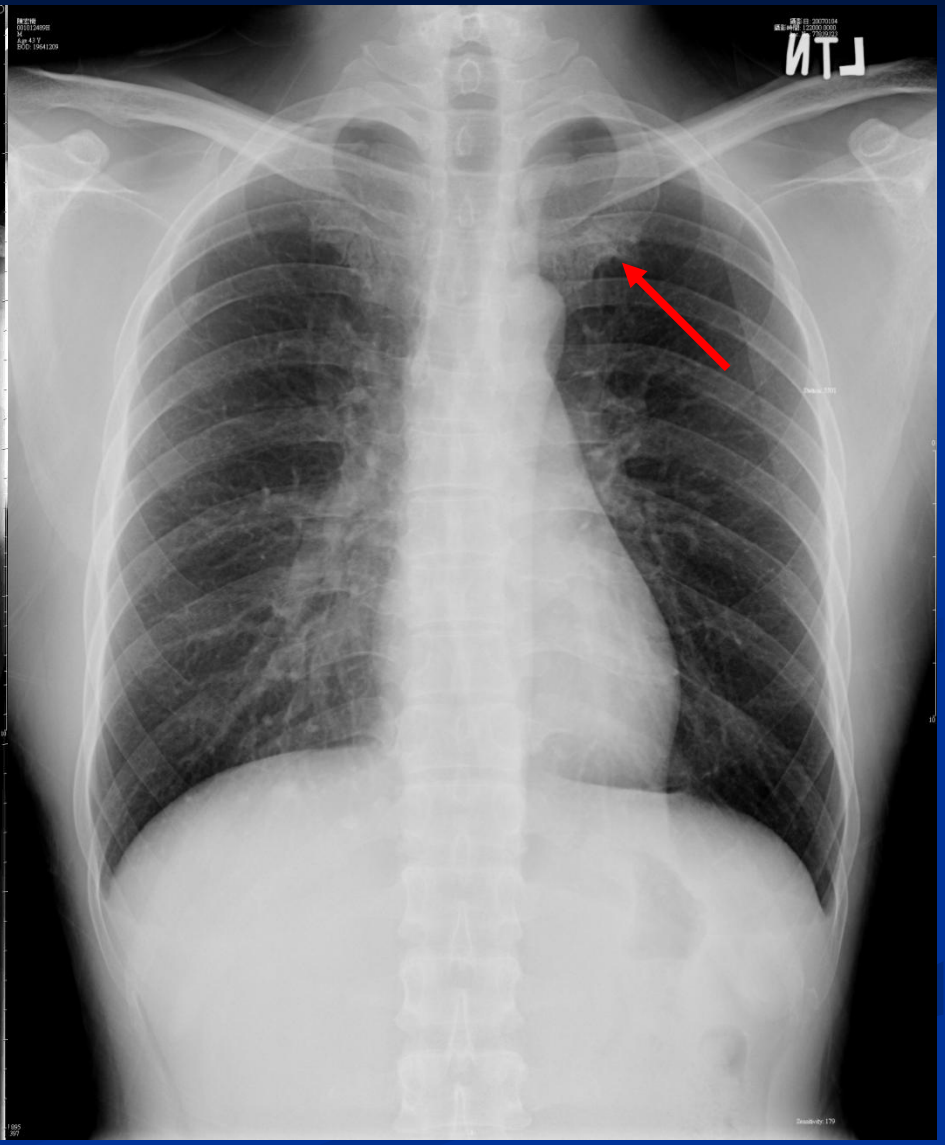
Heart

Diaphragm

年齢–第一肋軟骨骨化

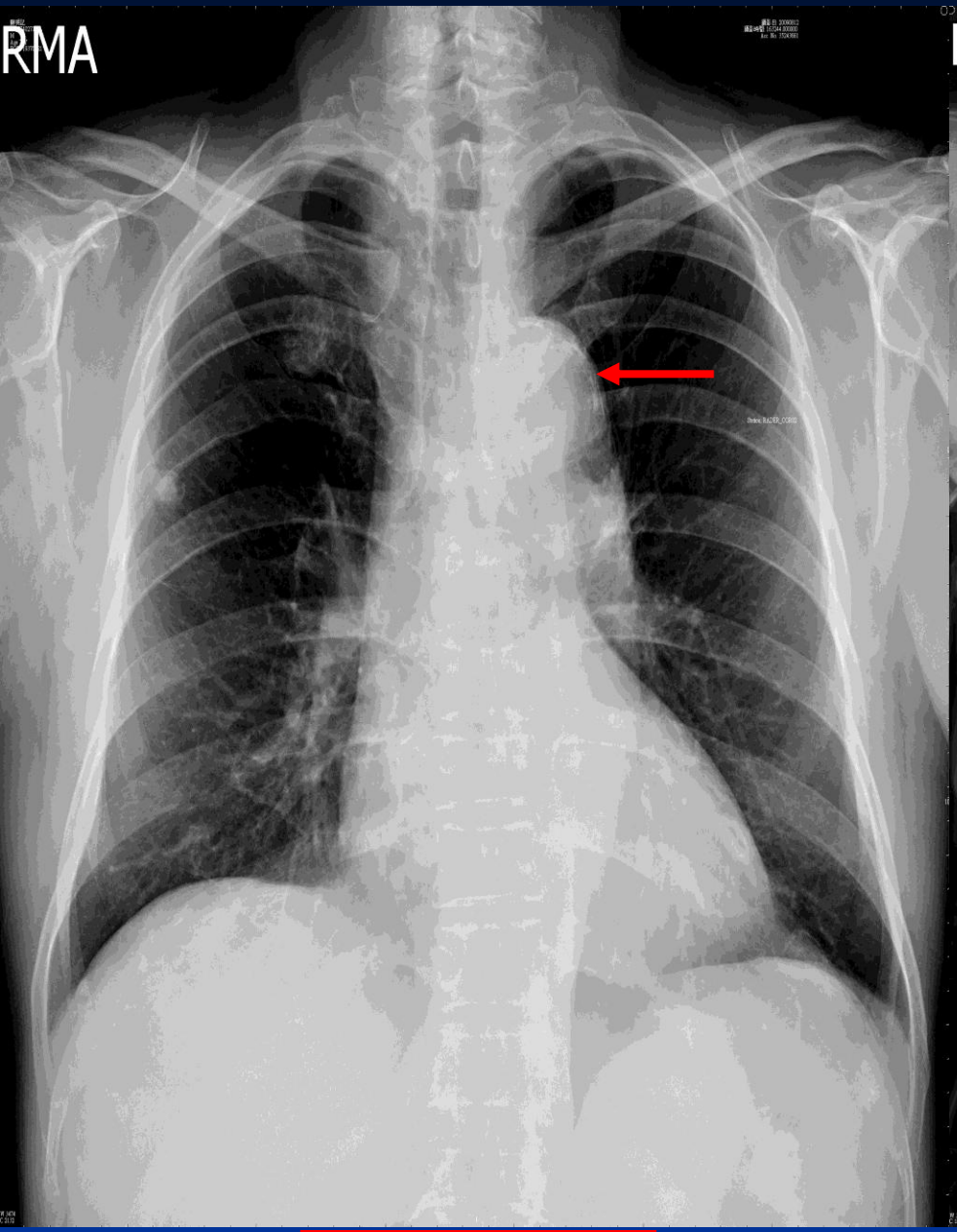


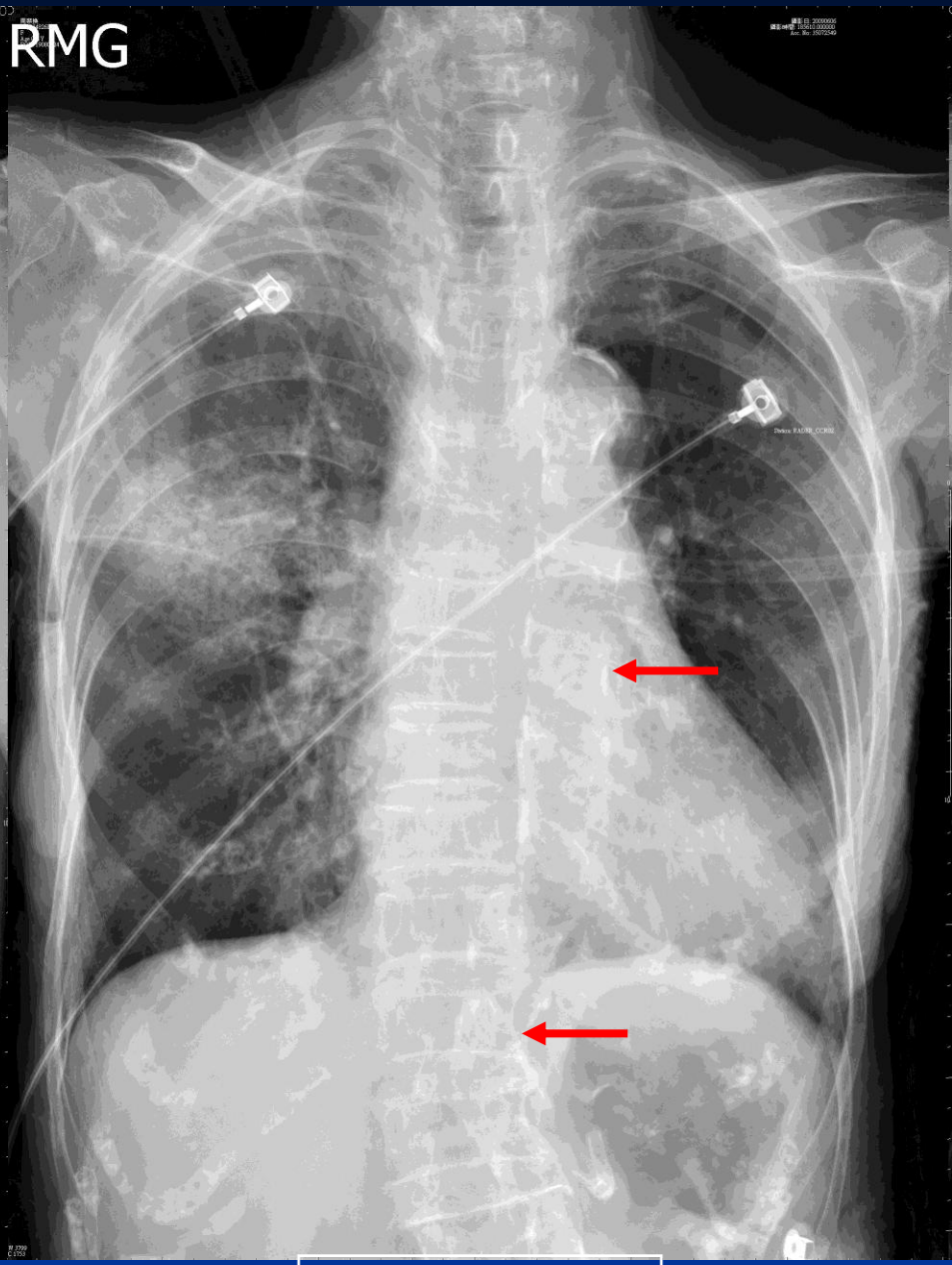
Age:12 y/o



Age:44 y/o,man

年齢-aorta鈣化

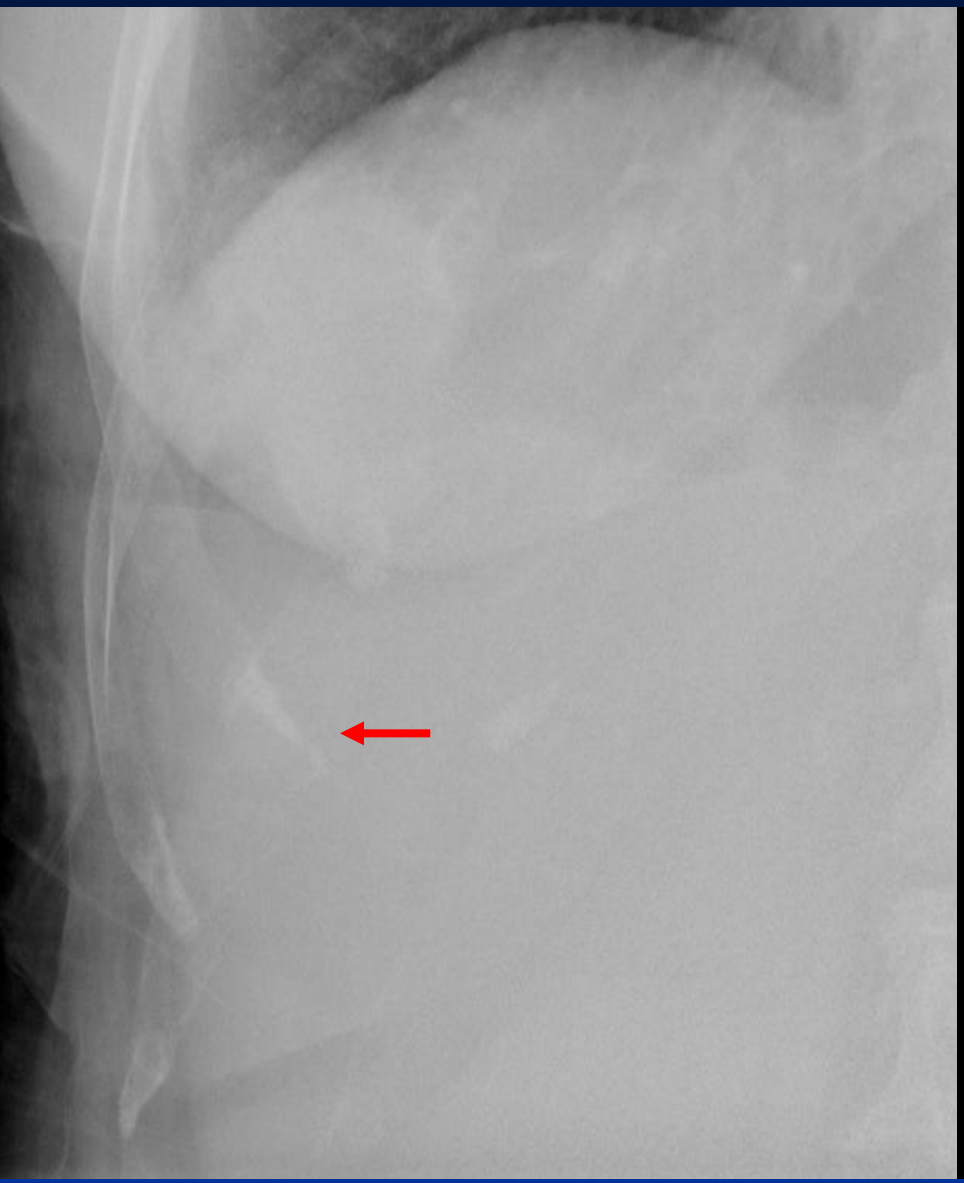




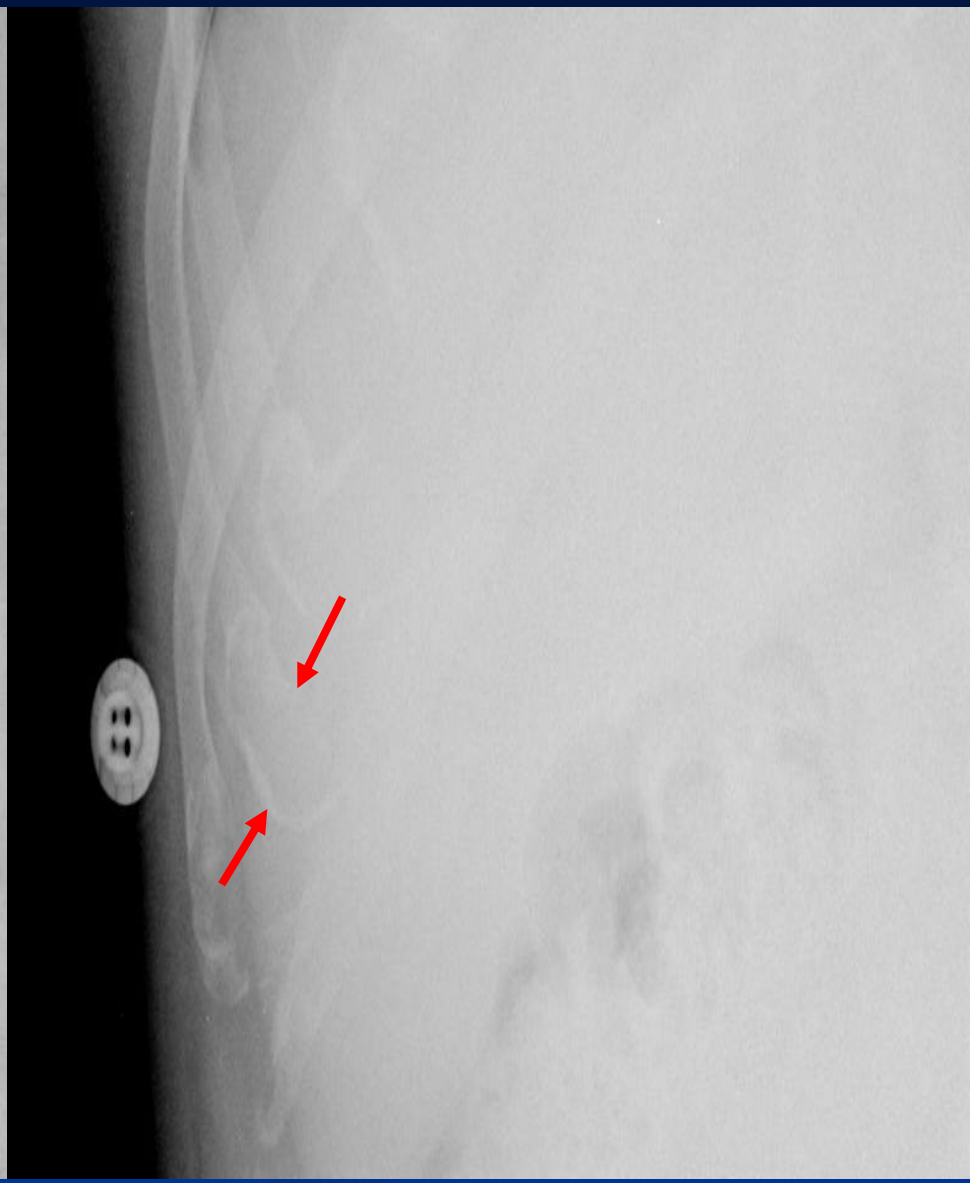
Age:72, man

Age:101, woman

從CXR判定性別—肋軟骨骨化

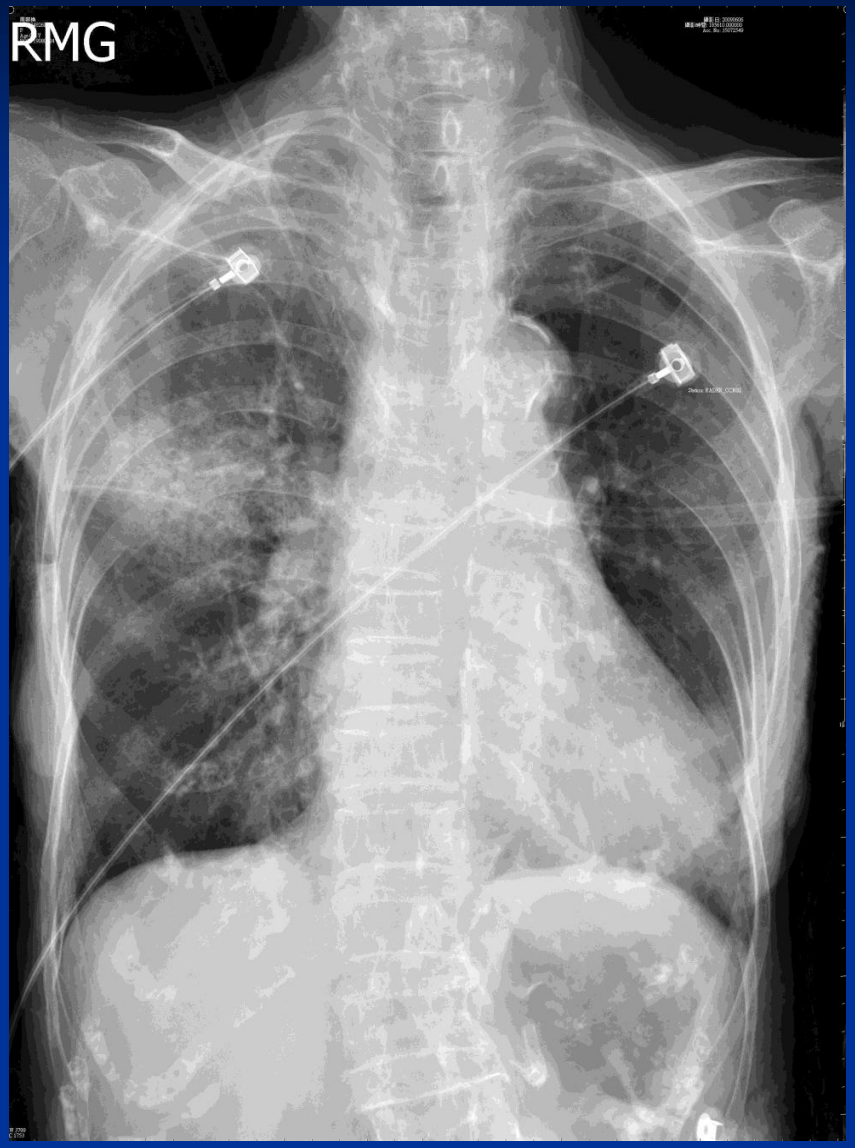


Female:中心型骨化

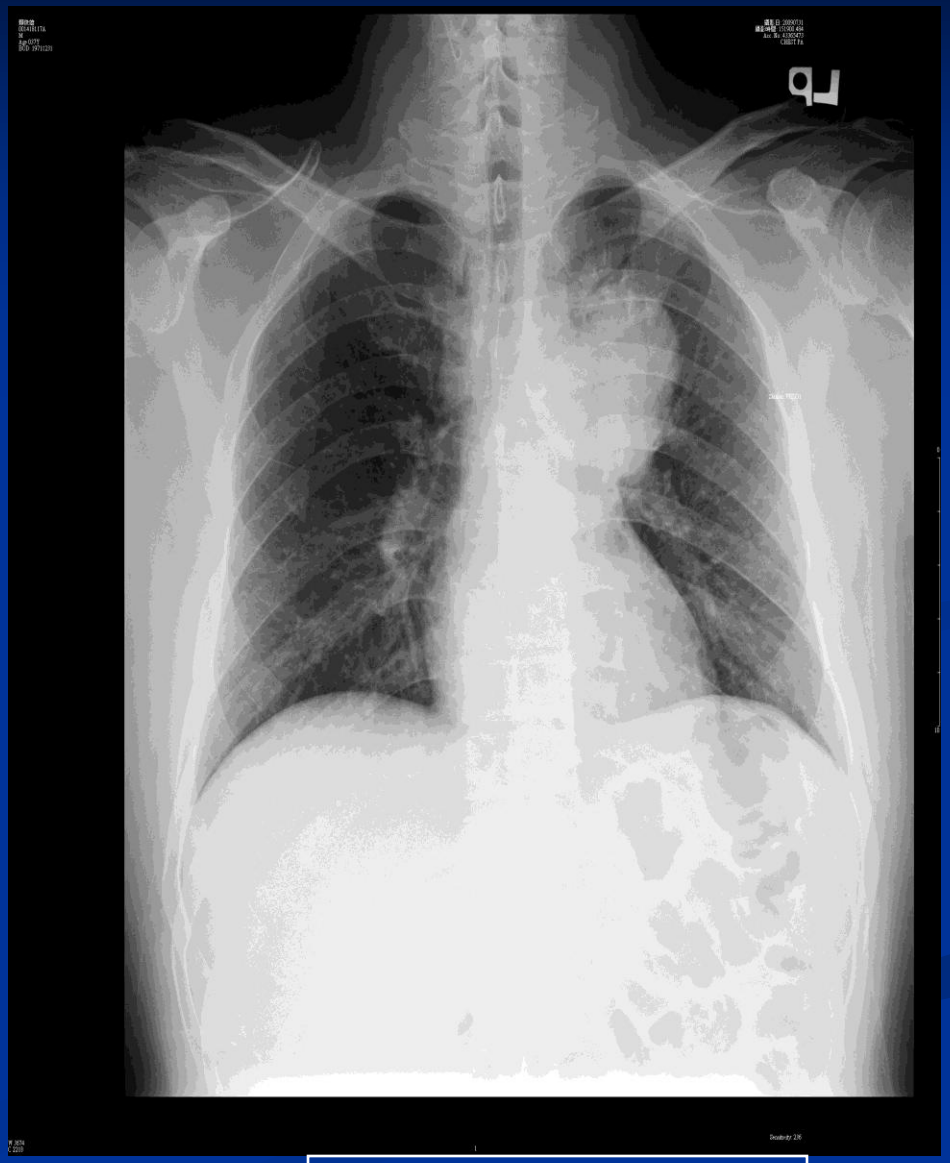


Male: 周邊型骨化

身材-胖瘦，營養狀況



150公分,37公斤



175公分,86公斤

CXR判讀的步驟之二:循序觀察,找出病灶所在

- 骨骼
- 軟組織
- 肋膜
- 氣管及左右主支氣管
- 縱膈部及心臟血管
- 肺門陰影及肺紋
- 橫膈
- 肺野

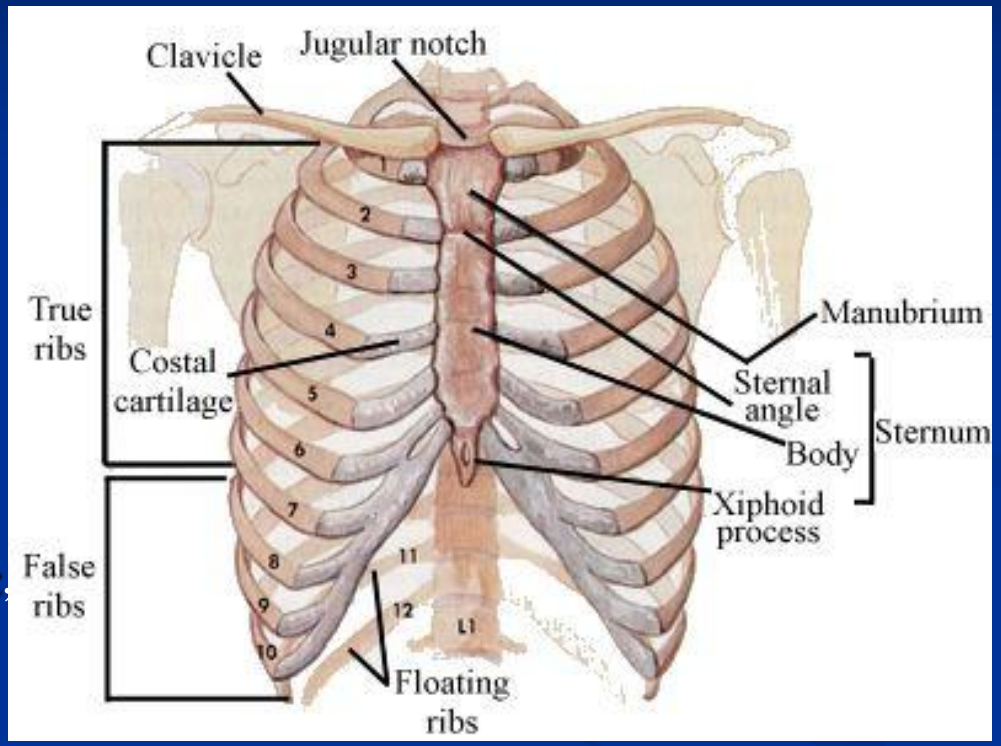
Normal CXR

Anatomy I:

Bone, Pleura, Diaphragm, Airway

Bone

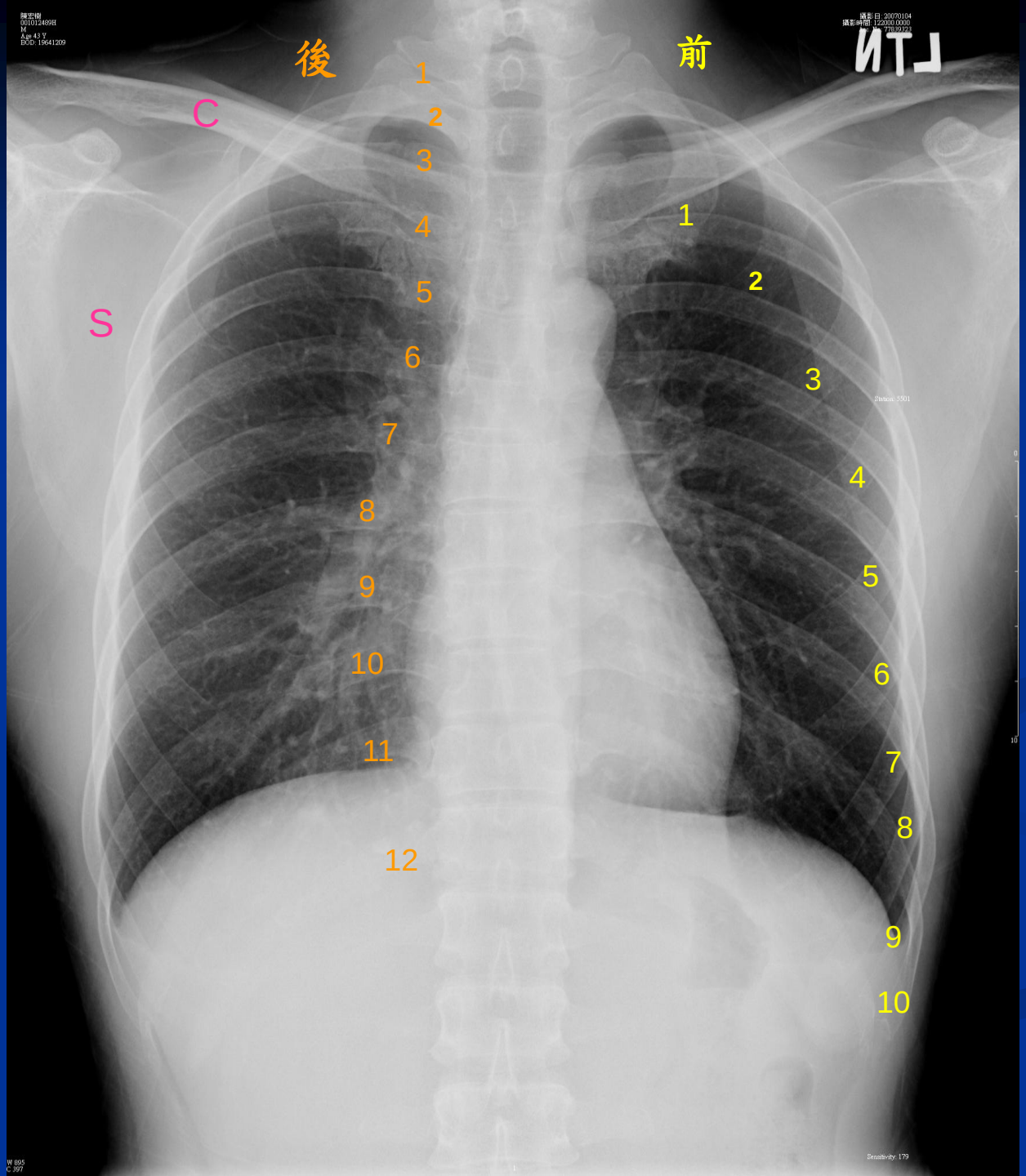
- Clavicle
- Scapula
- Manubrium, sternum
- Rib:
  - 1st-7rd 肋骨與胸骨相連
  - 8th-10th肋骨形成肋軟骨後再與胸骨相連
  - 11th-12th:floating rib
- Spine: vertebral body, disc, transverse process
- 骨頭外緣為 cortex，濃度較 dense（**較白**），骨頭內為 trabecula（**較黑**）

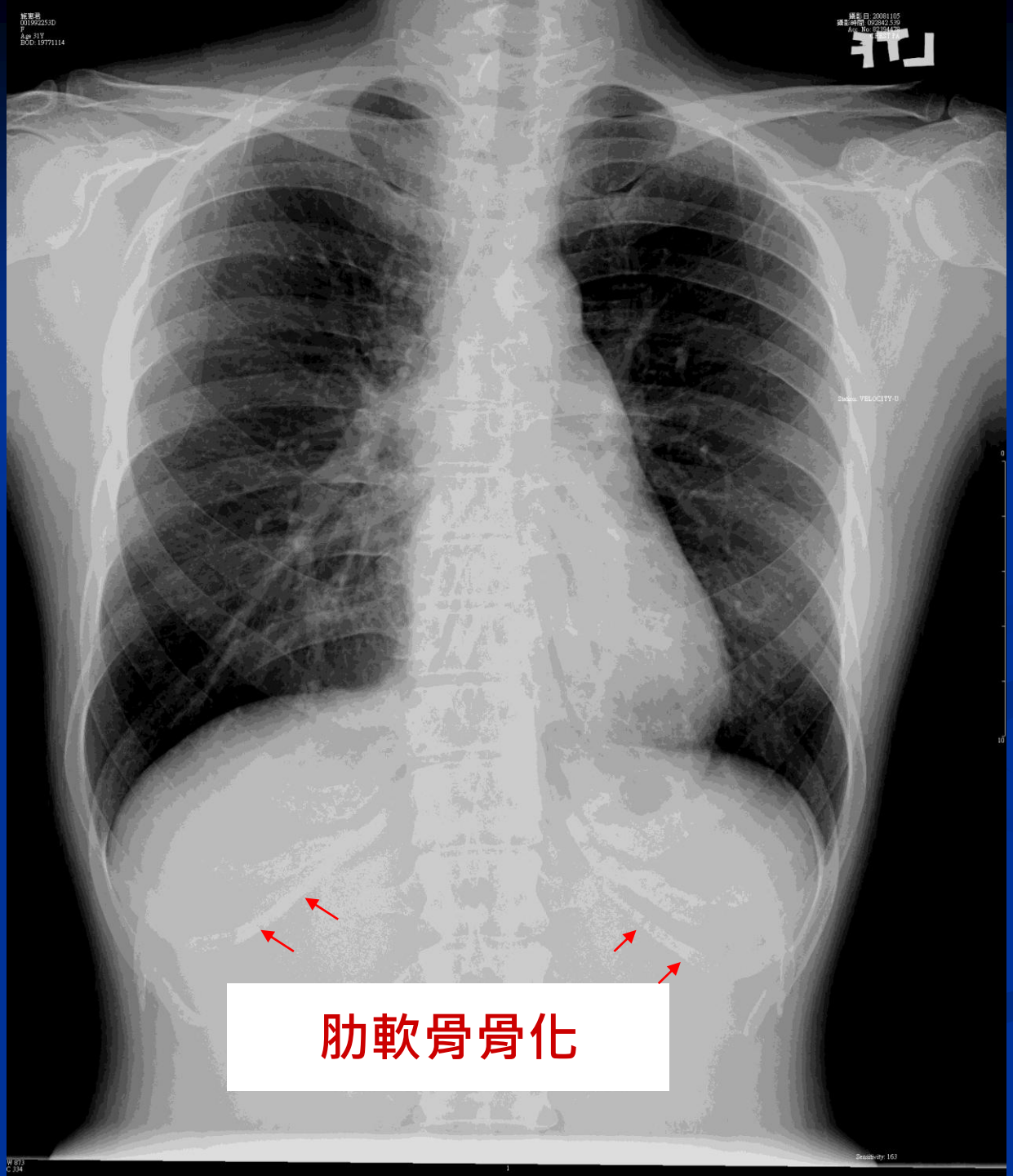


Scapula

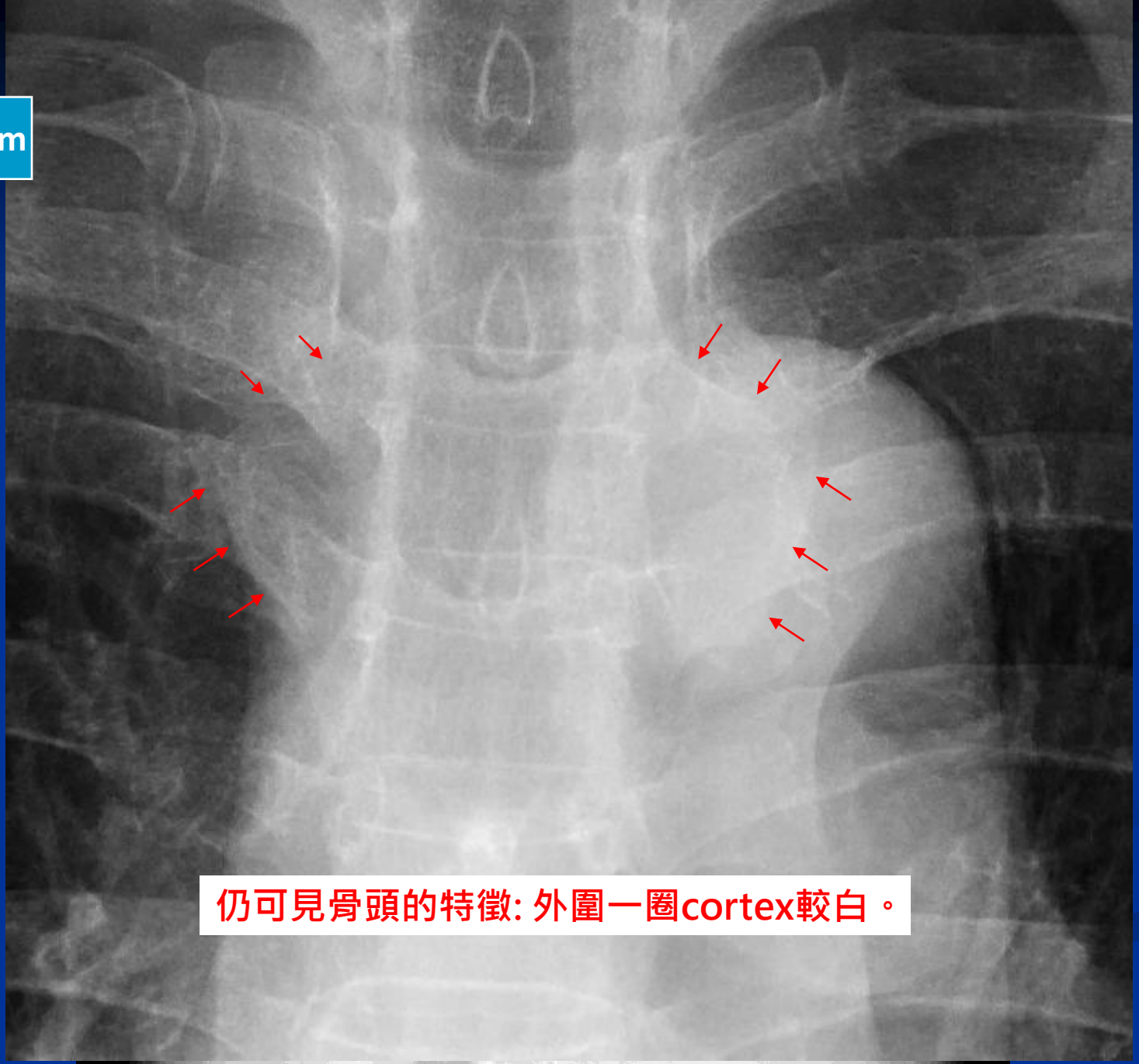
Clavicle

Rib

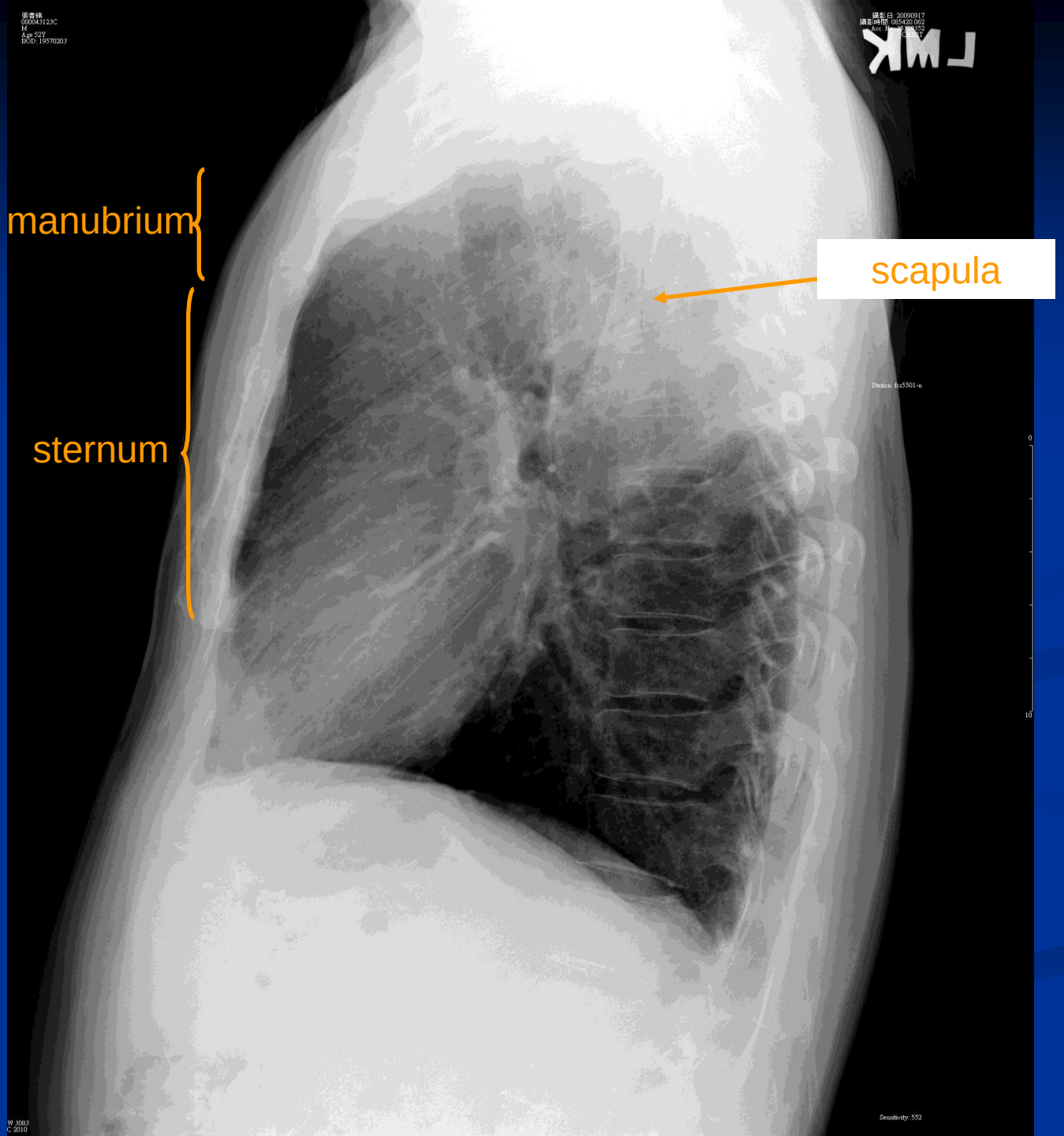



肋軟骨骨化

Manubrium

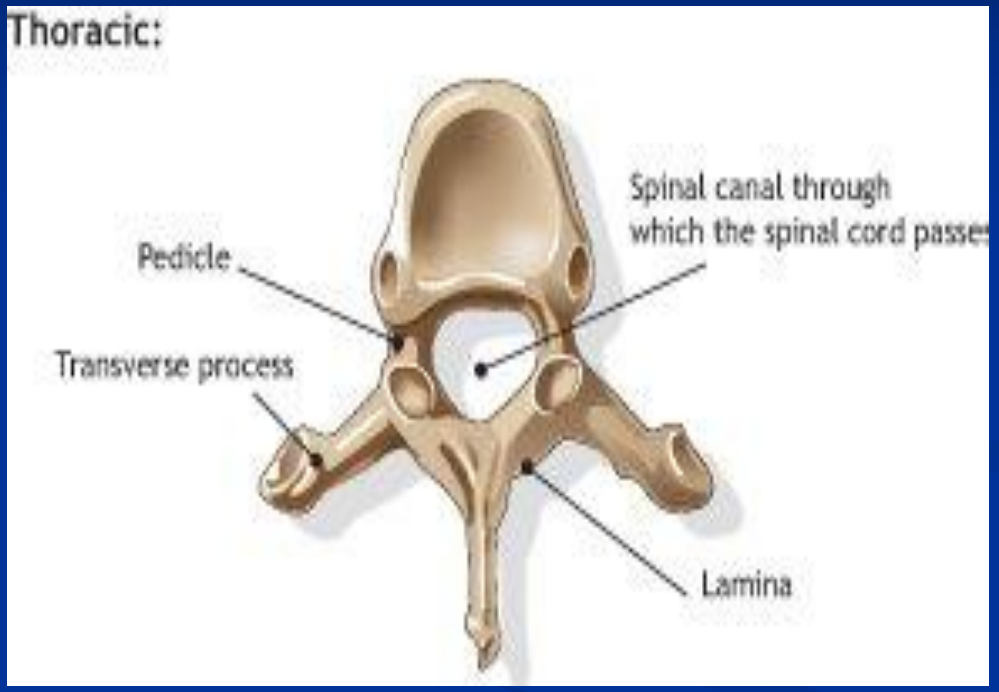


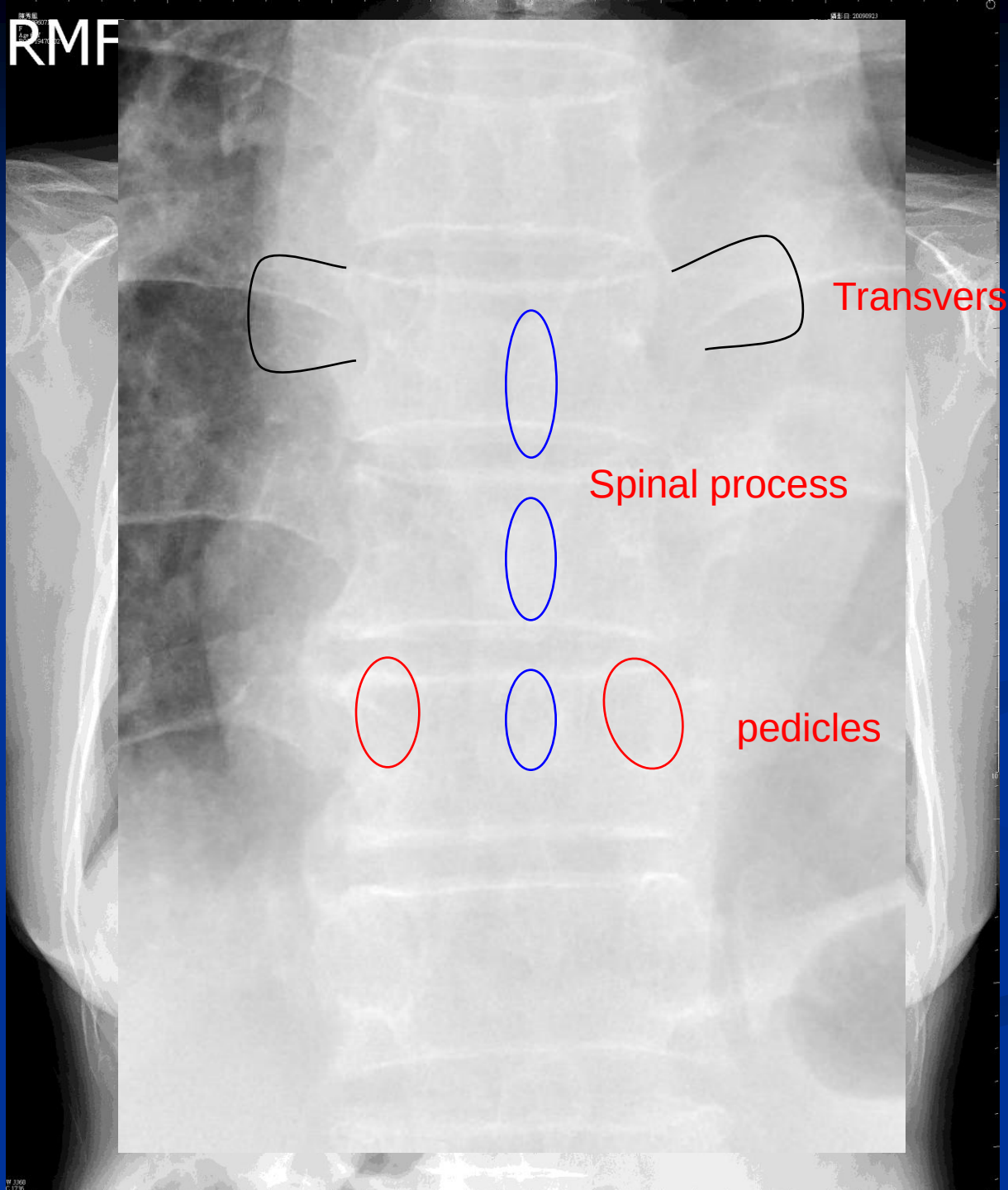
仍可見骨頭的特徵: 外圍一圈cortex較白。


manubrium
sternum
scapula

Spine

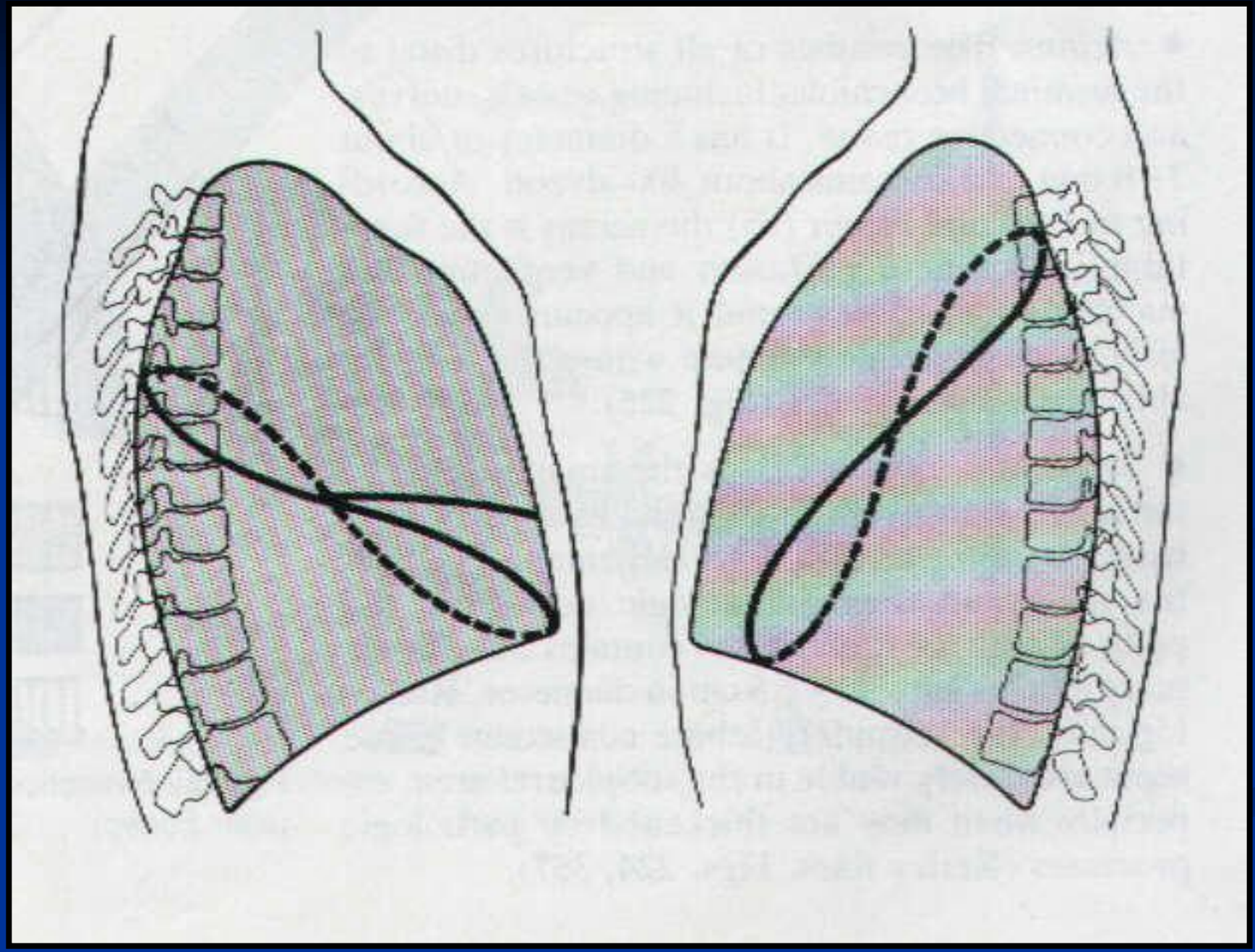
- Vertebral body
- Spinal process
- Transverse process
- Pedicles

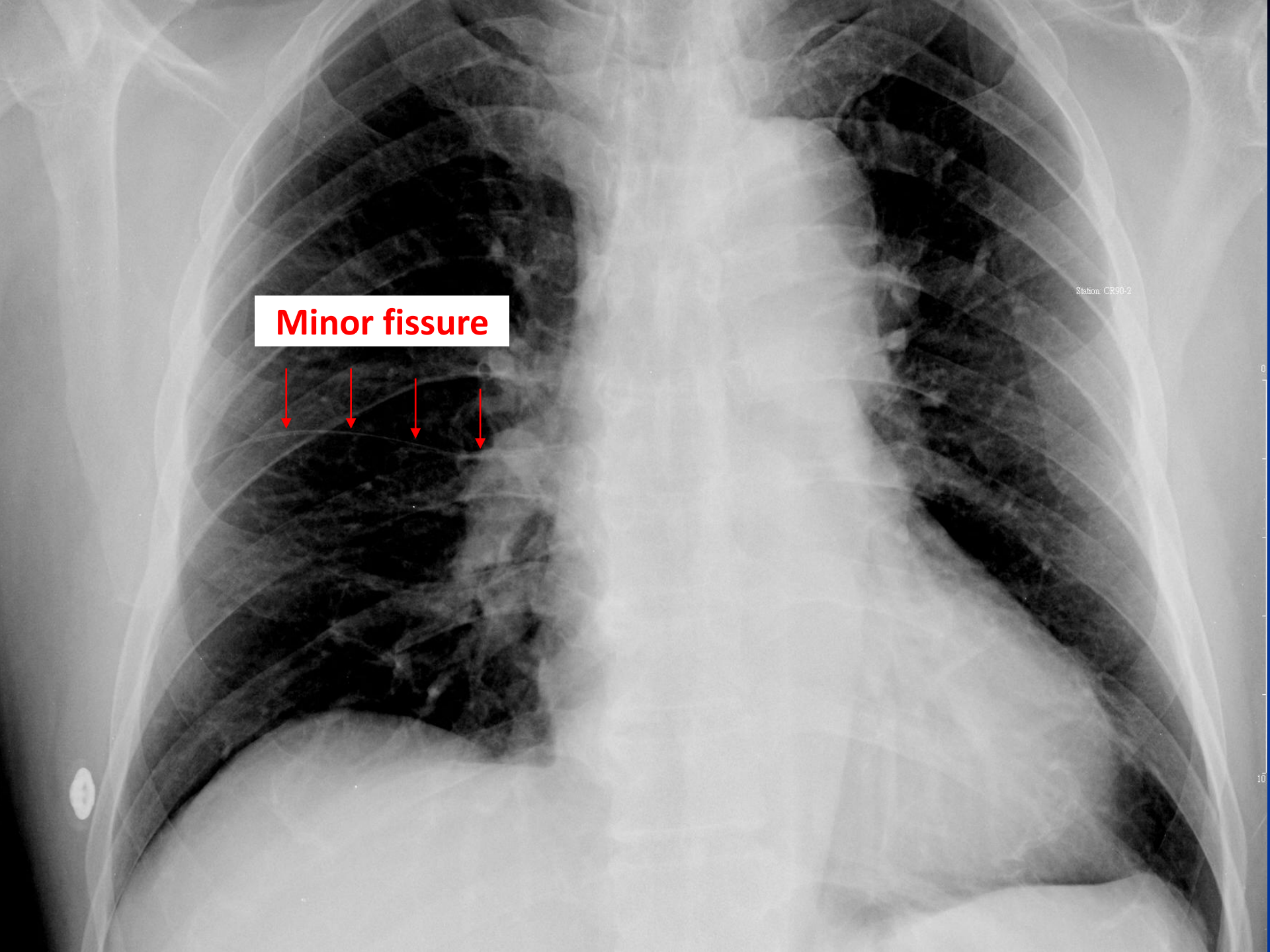


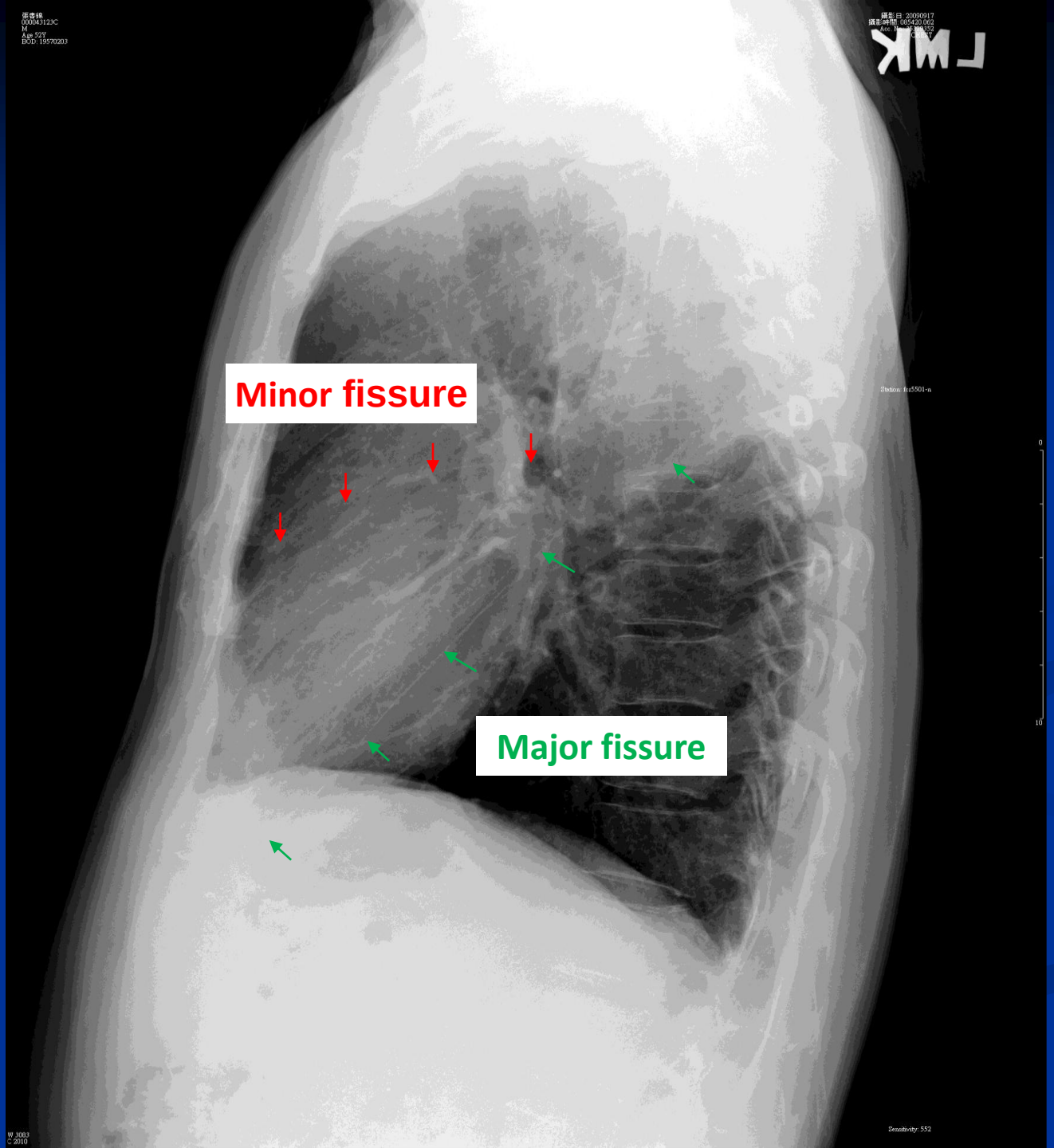

Transverse process
Spinal process
pedicles

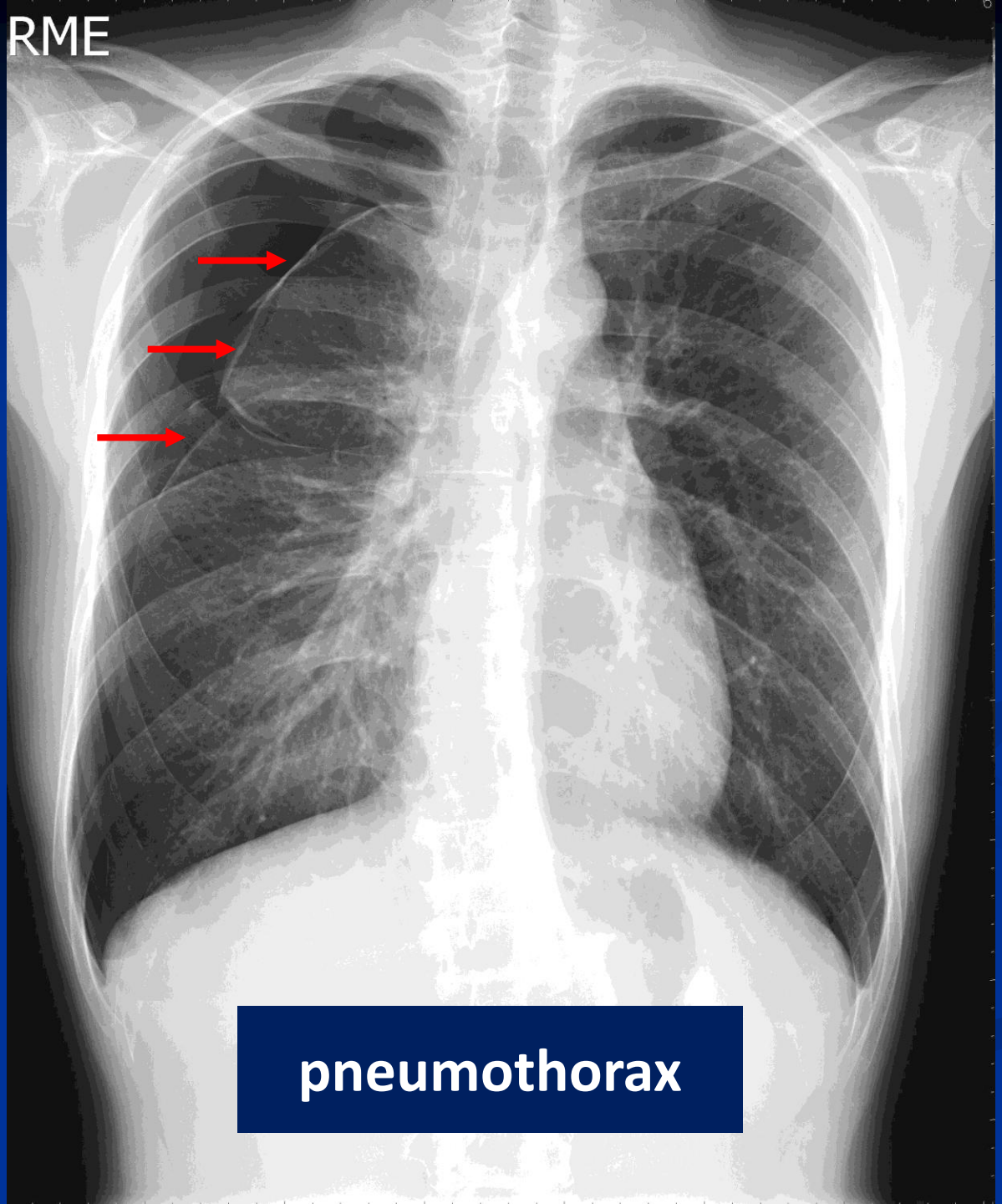
肋膜

- 順著胸廓兩側，由上至下觀察是否有:
  - 肋膜肥厚
  - 氣胸
  - C-P angle 是否呈銳角(變淺變鈍應懷疑有小量積水或局部肋膜增厚、粘連)
  - minor fissure粗細(變粗常表示minor fissure內有液體，或肋膜增厚或腫瘤肋膜散播)
  - minor fissure高低位置(往下位移常表示下葉或中葉肺容積減少)




Minor fissure

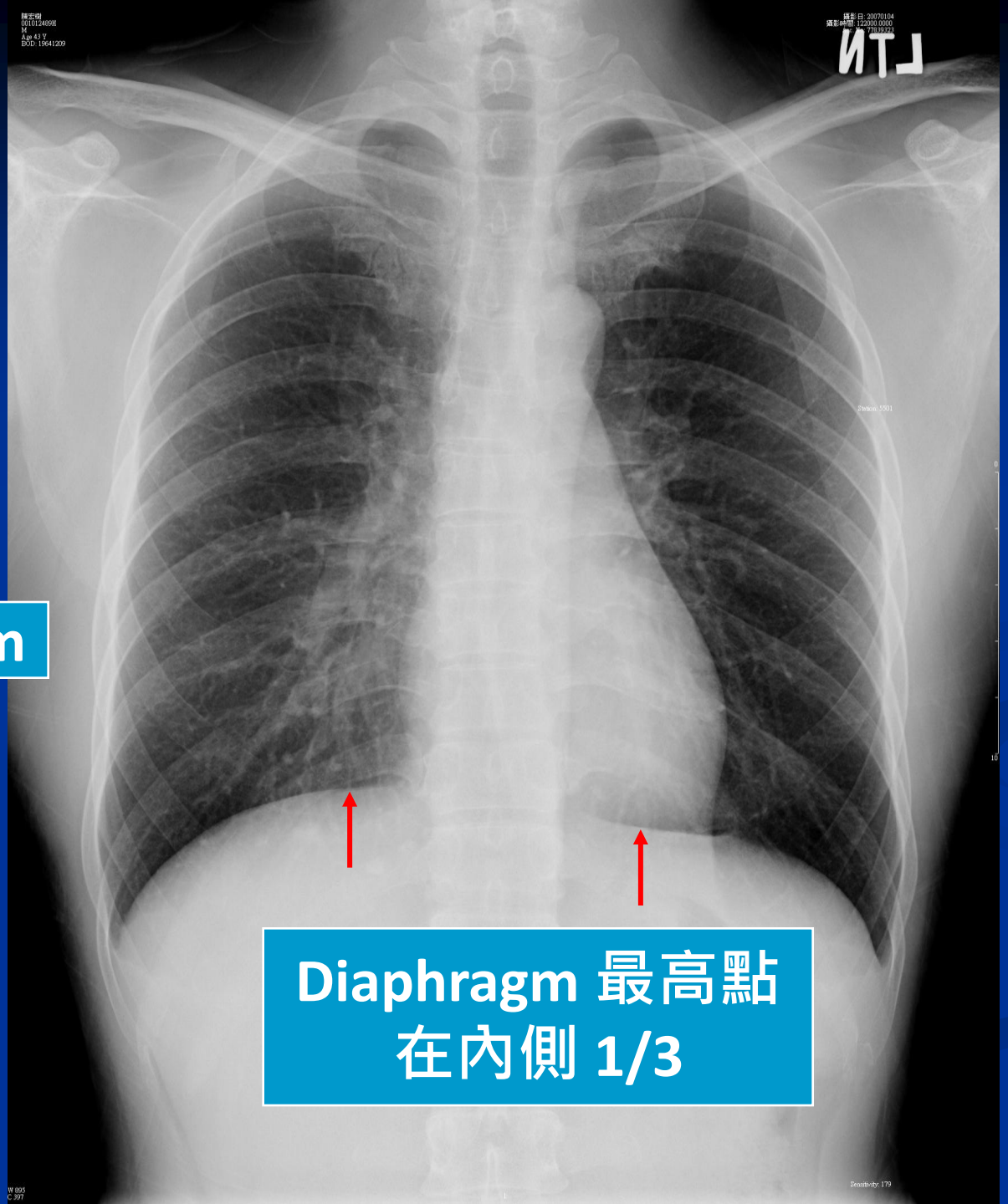

Minor fissure
Major fissure


RME
pneumothorax

Diaphragm

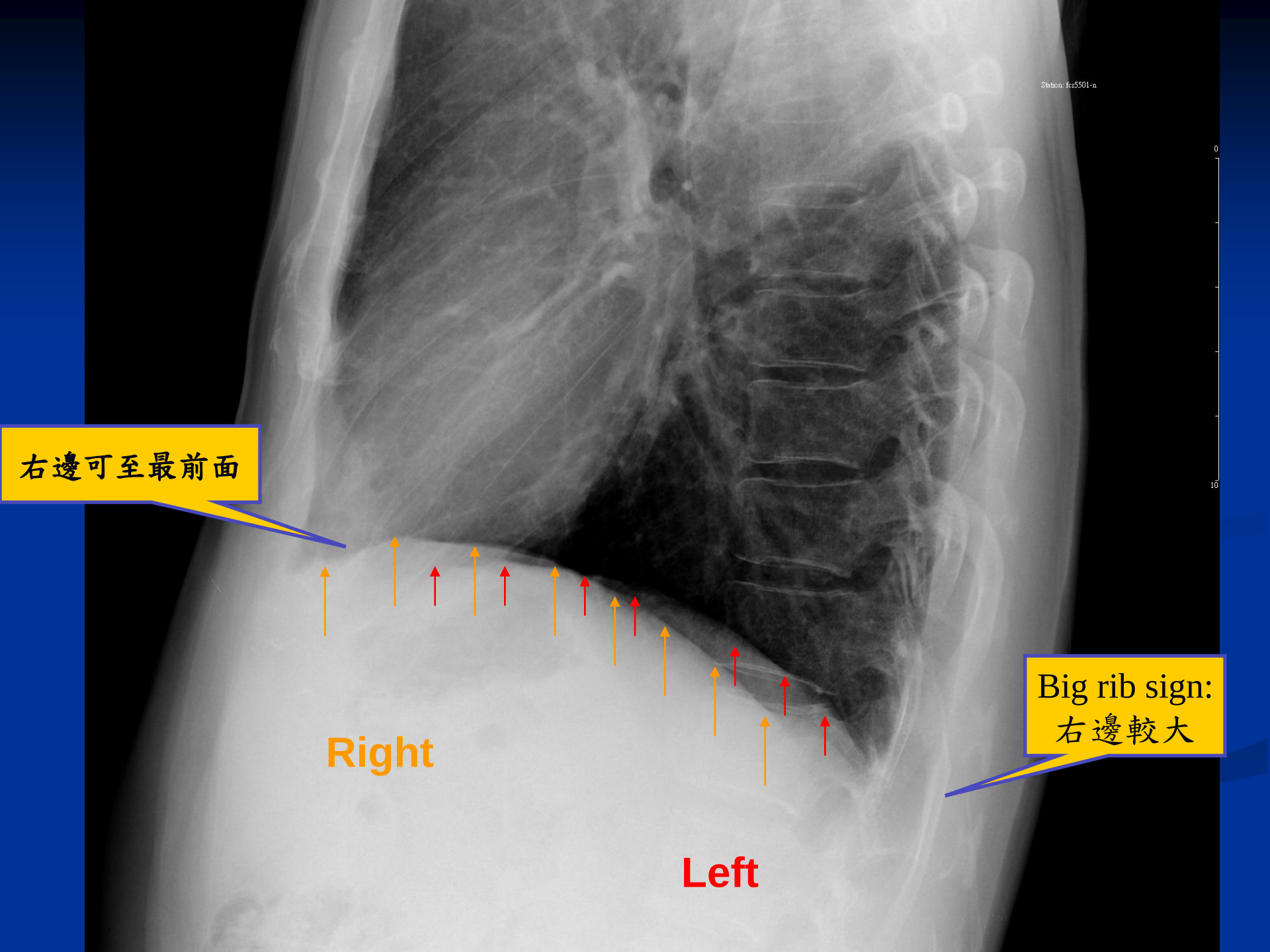
- 正常右高左低
- 橫膈異常:
- Bilateral flattening
  - 在瘦長體格，肺氣腫，雙側氣胸接可見兩側橫膈變較平
- Unilateral depression
  - 單側肺hyperexpansion，tension pneumothorax，下肺也有較大bullae，皆可造成橫膈depression
- Bilateral elevation
  - 吐氣相攝影、肥胖、腹水、肝脾腫大、懷孕
- Unilateral elevation
  - 腹部疾病(liver mass ,interposition of the colon, subphrenic abscess)，Lung volume改變(atelectasis, lobectomy)，Phrenic nerve paralysis….

Diaphragm

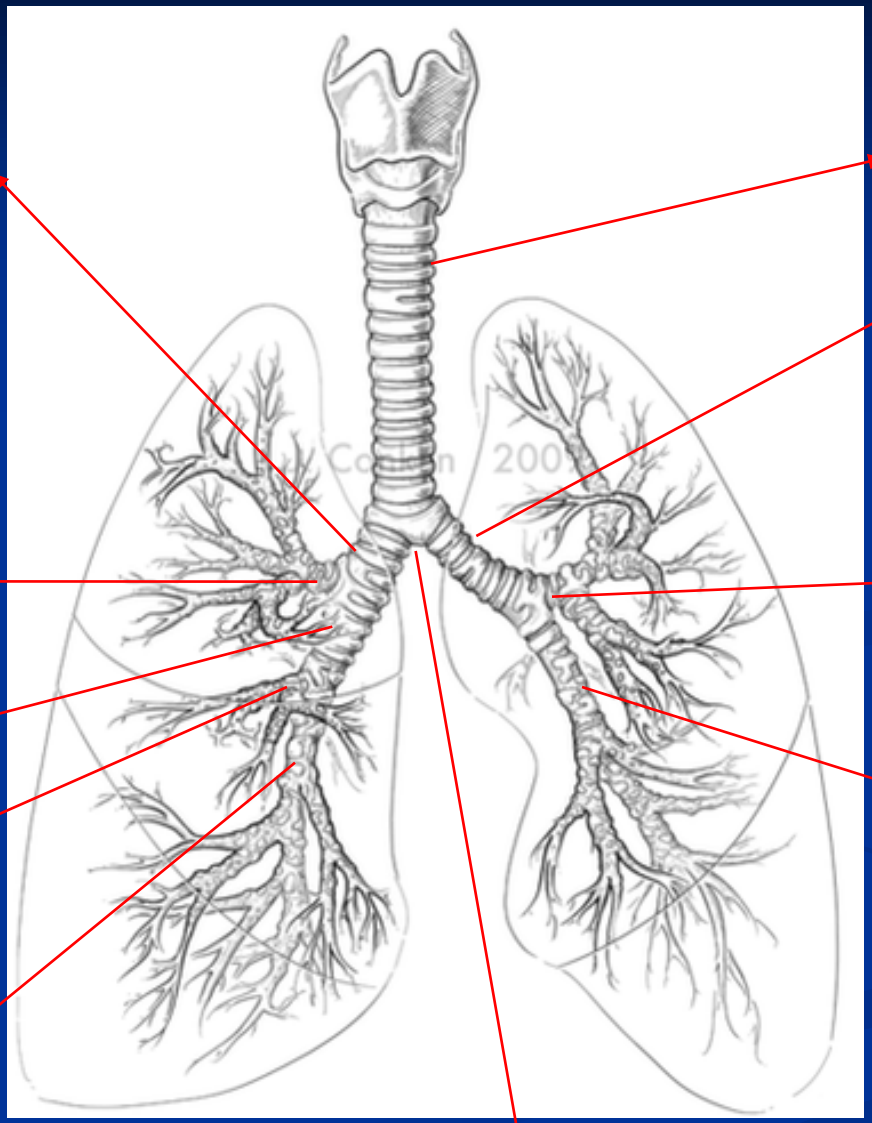


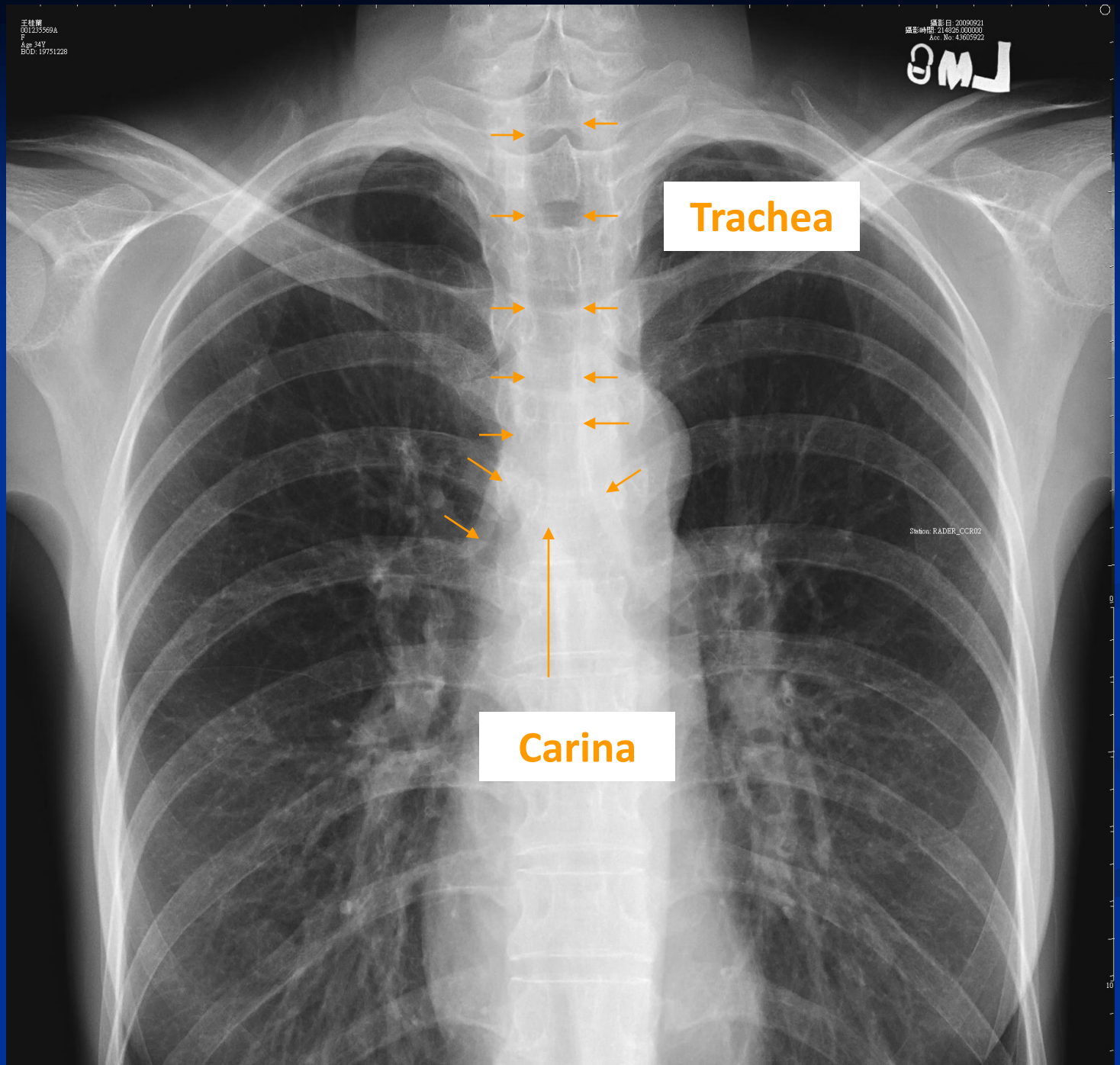
Diaphragm 最高點
在內側 1/3

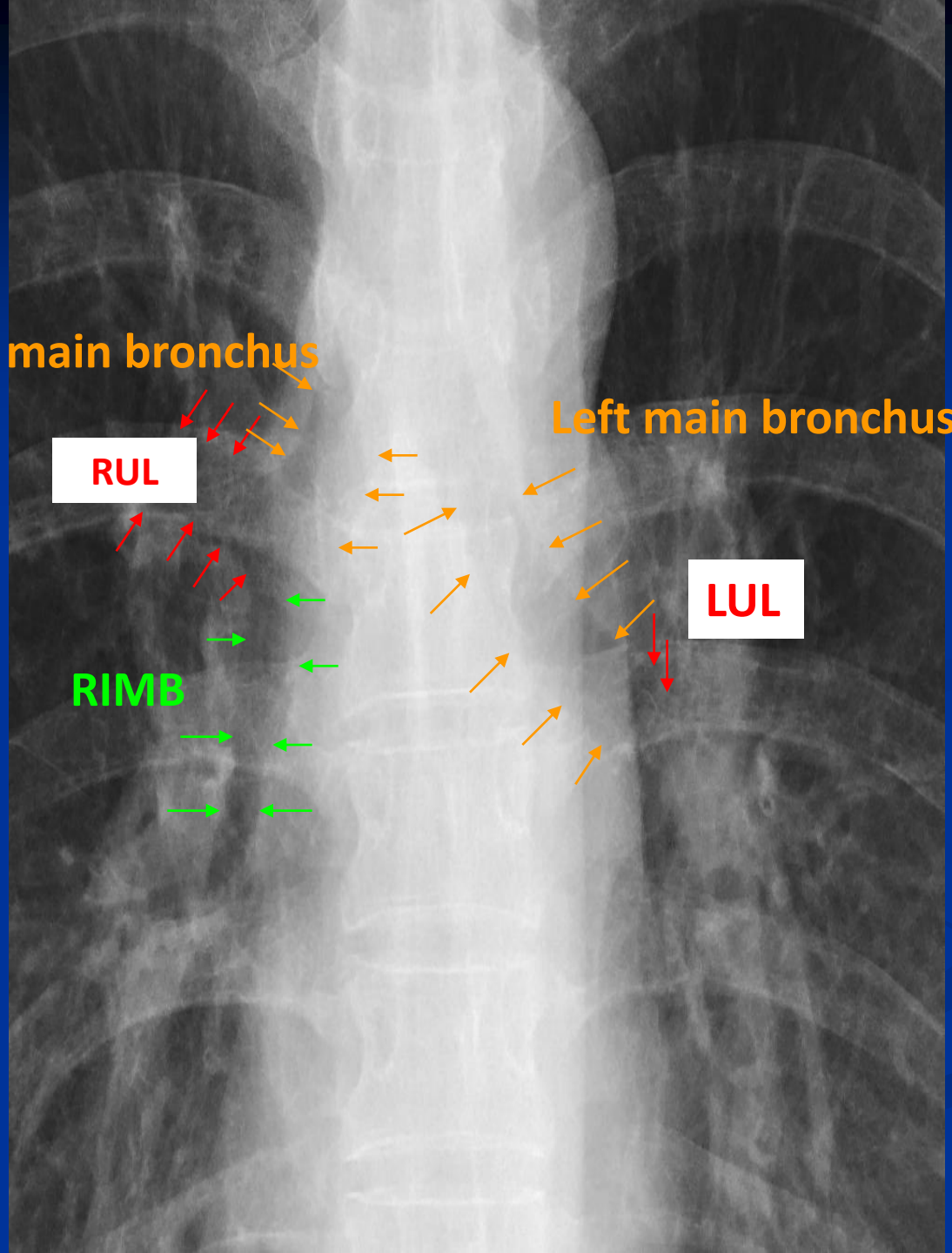
- 側位照分辨左右Diaphragm之方法
  - Gastric air
  - 左邊diaphragm往前遇到heart即停，右邊可連至最前方。
  - **Big rib sign**
    - 一般lateral view為左側照，左側rib會較小(靠近底片)
    - 右側rib會放大，因此順著較大rib (右側) 連出去的即為右邊diaphragm。

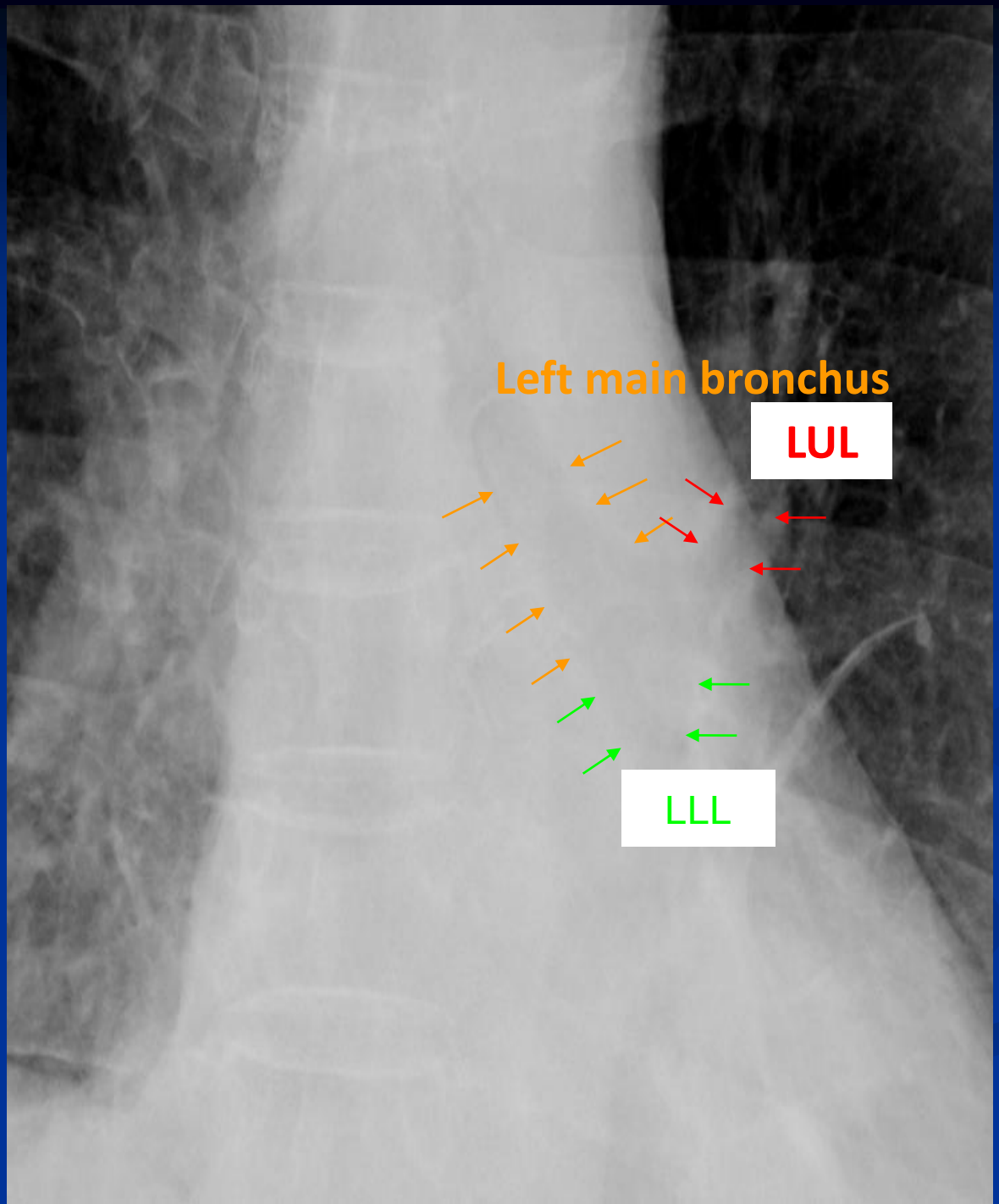

右邊可至最前面
Right
Left
Big rib sign:
右邊較大

Trachea and bronchial trees




Trachea
Carina


Right main bronchus
Left main bronchus
RUL
LUL
RIMB

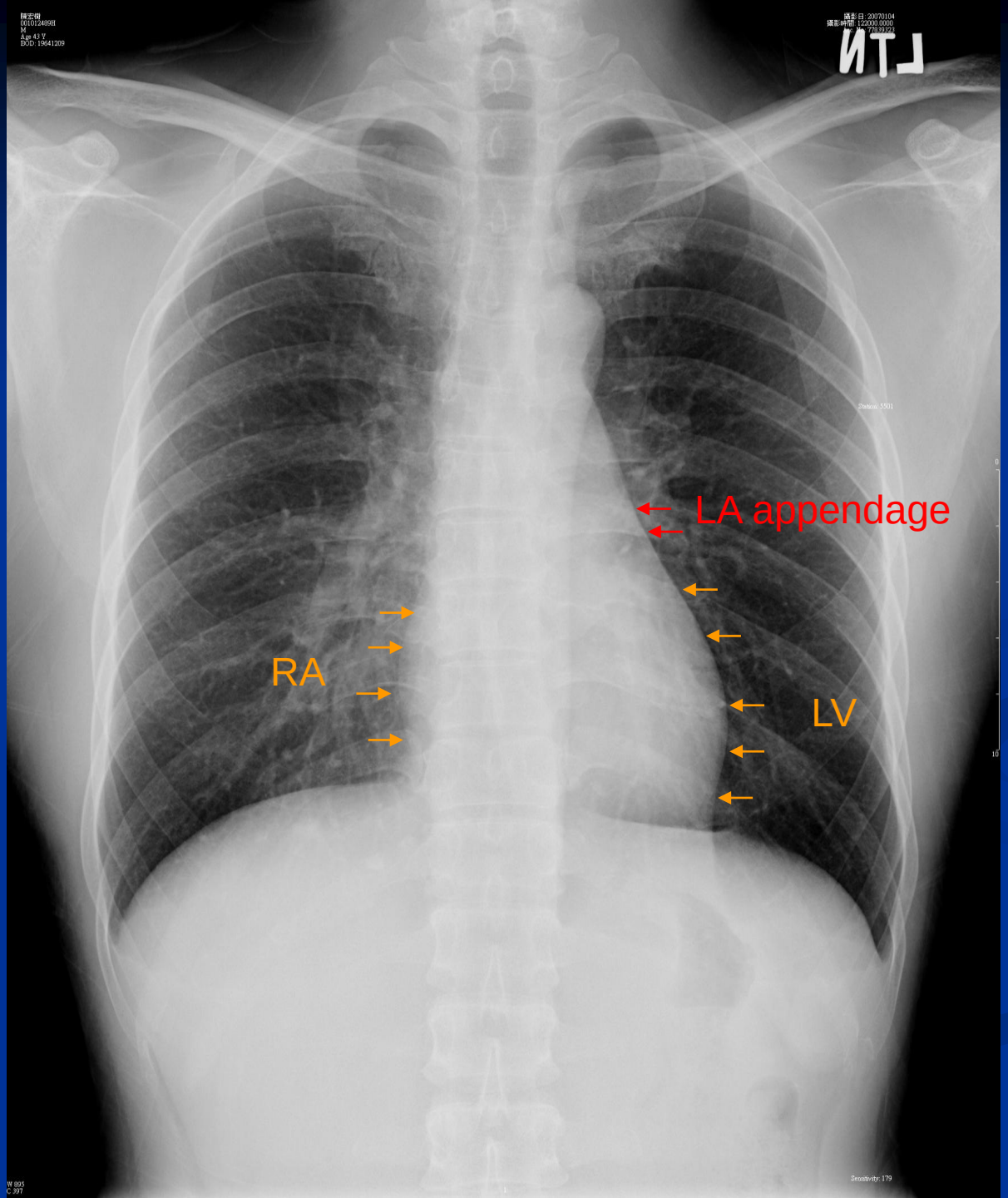

Left main bronchus
LUL
LLL

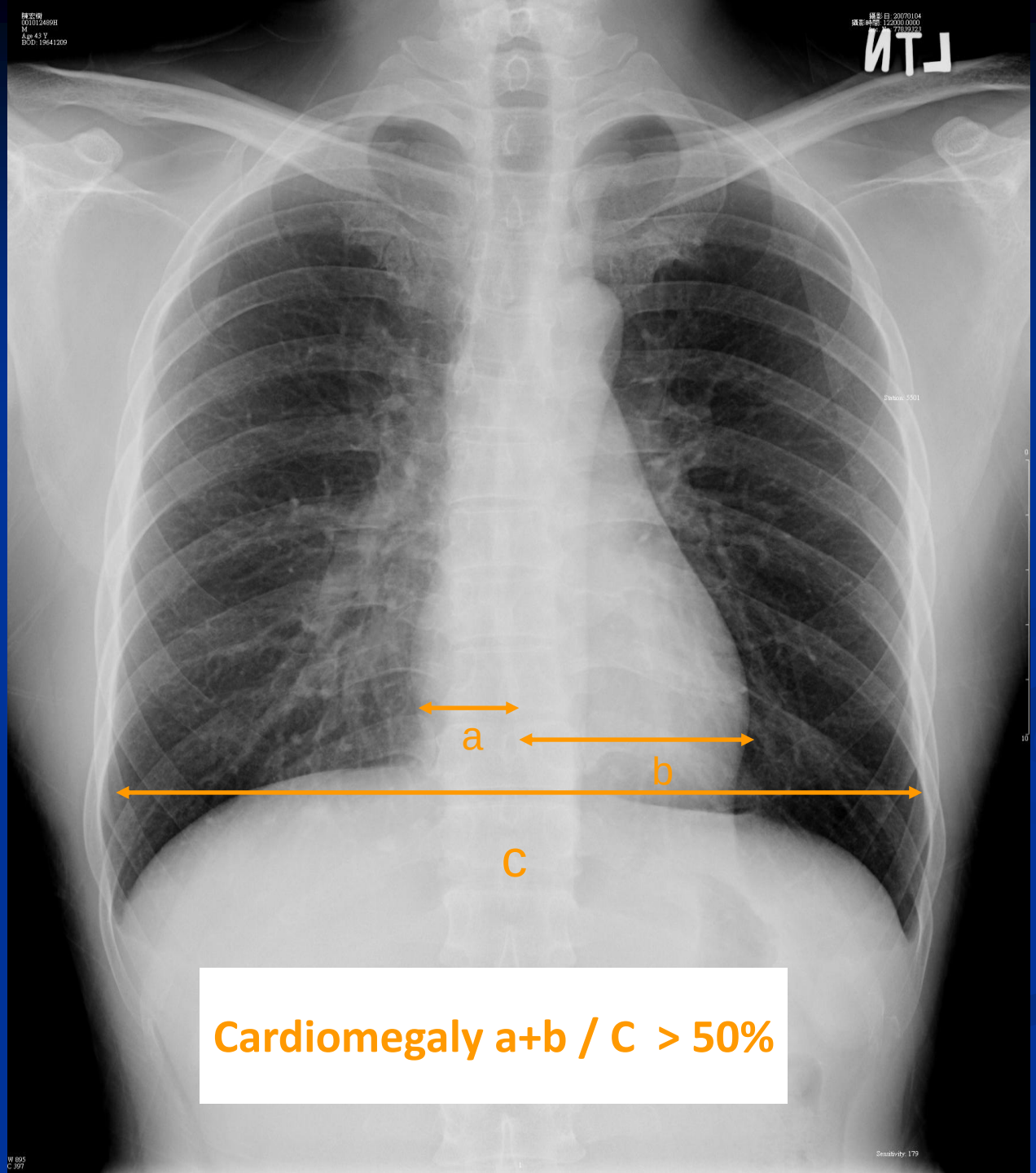
Normal CXR

Anatomy II:

Heart, Vessels, Hilum

Heart



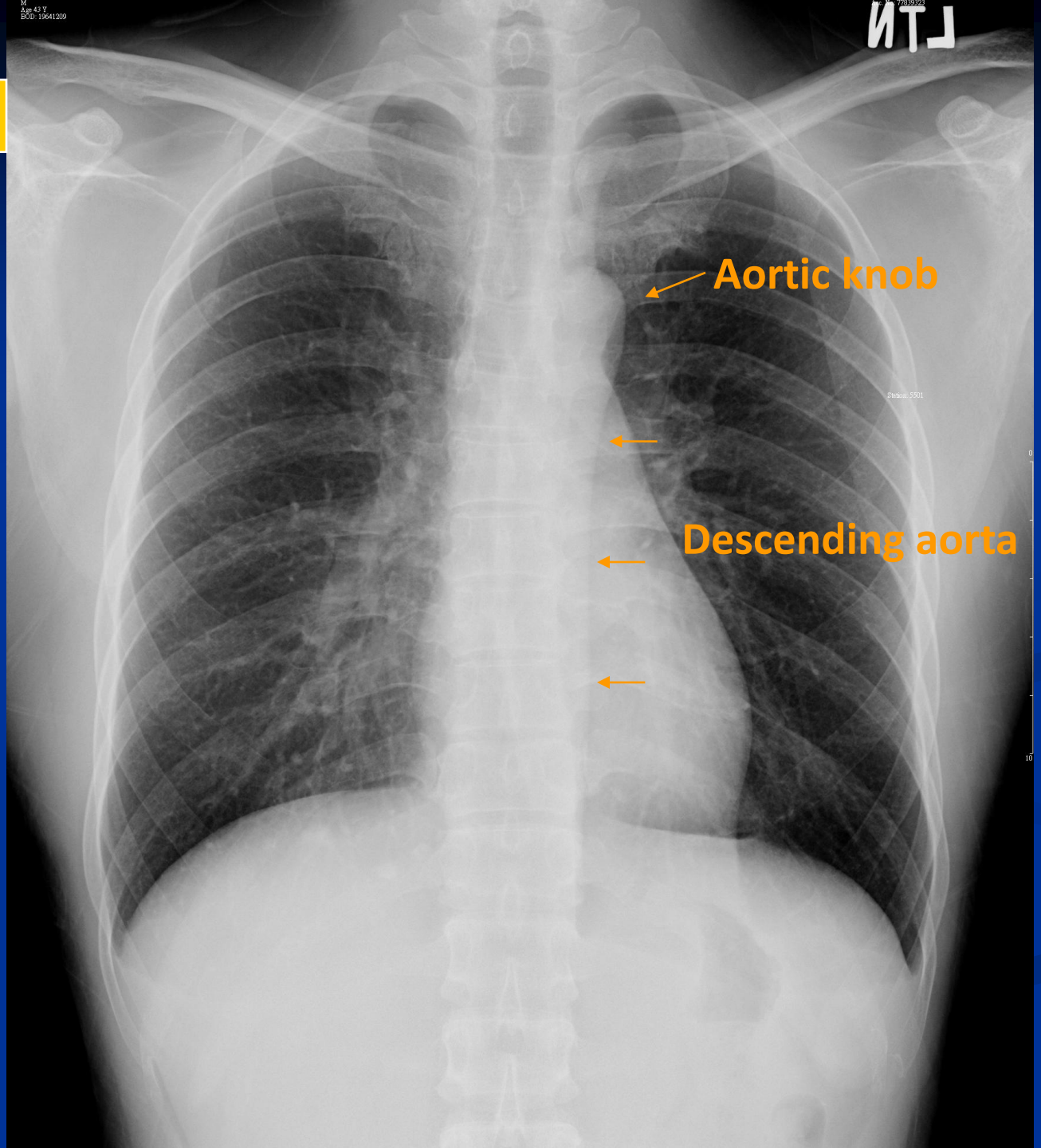


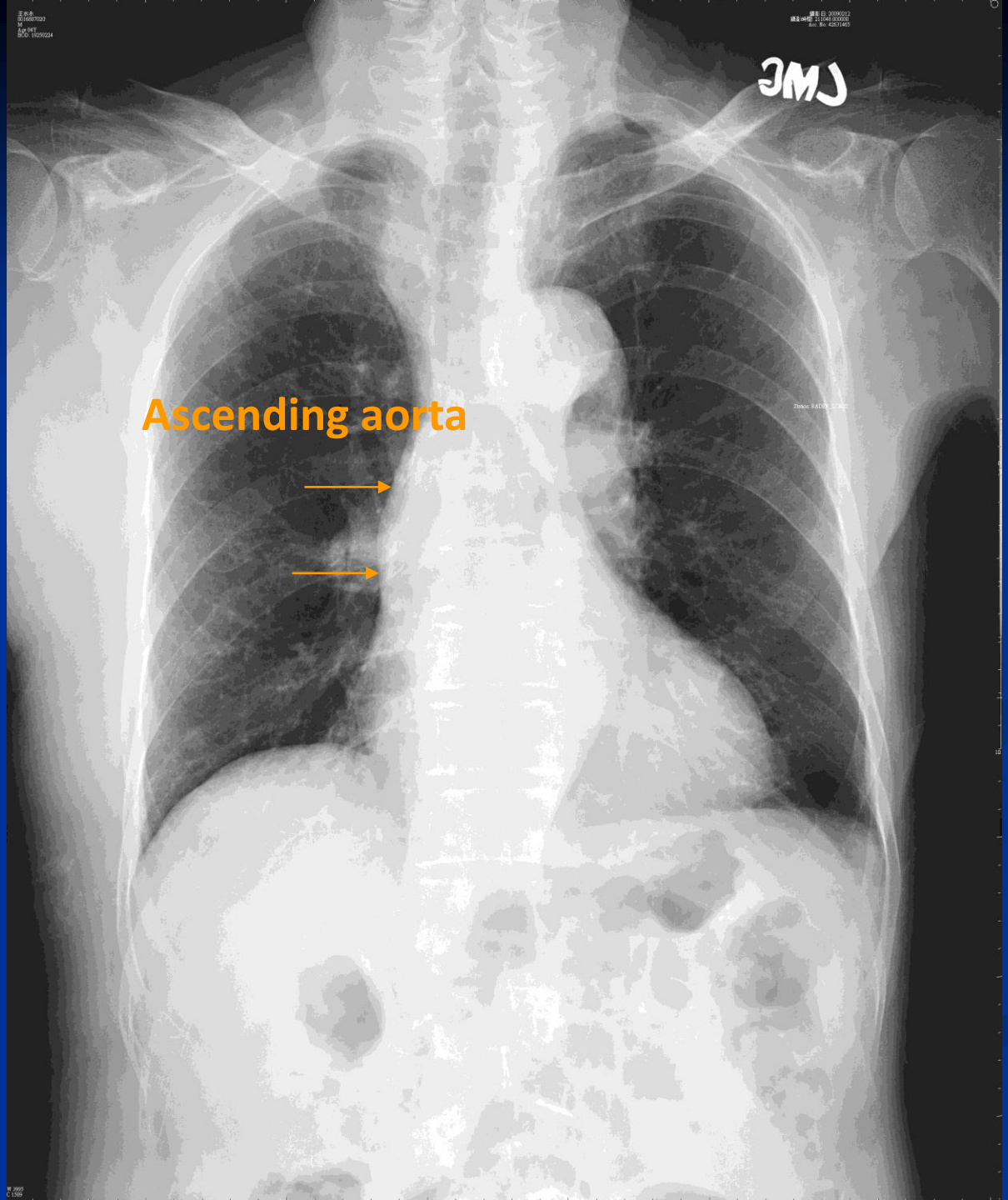
Cardiomegaly a+b / C > 50%

Vessels

- Aorta
- Pulmonary artery and vein

Aorta




Ascending aorta

Pulmonary artery and vein

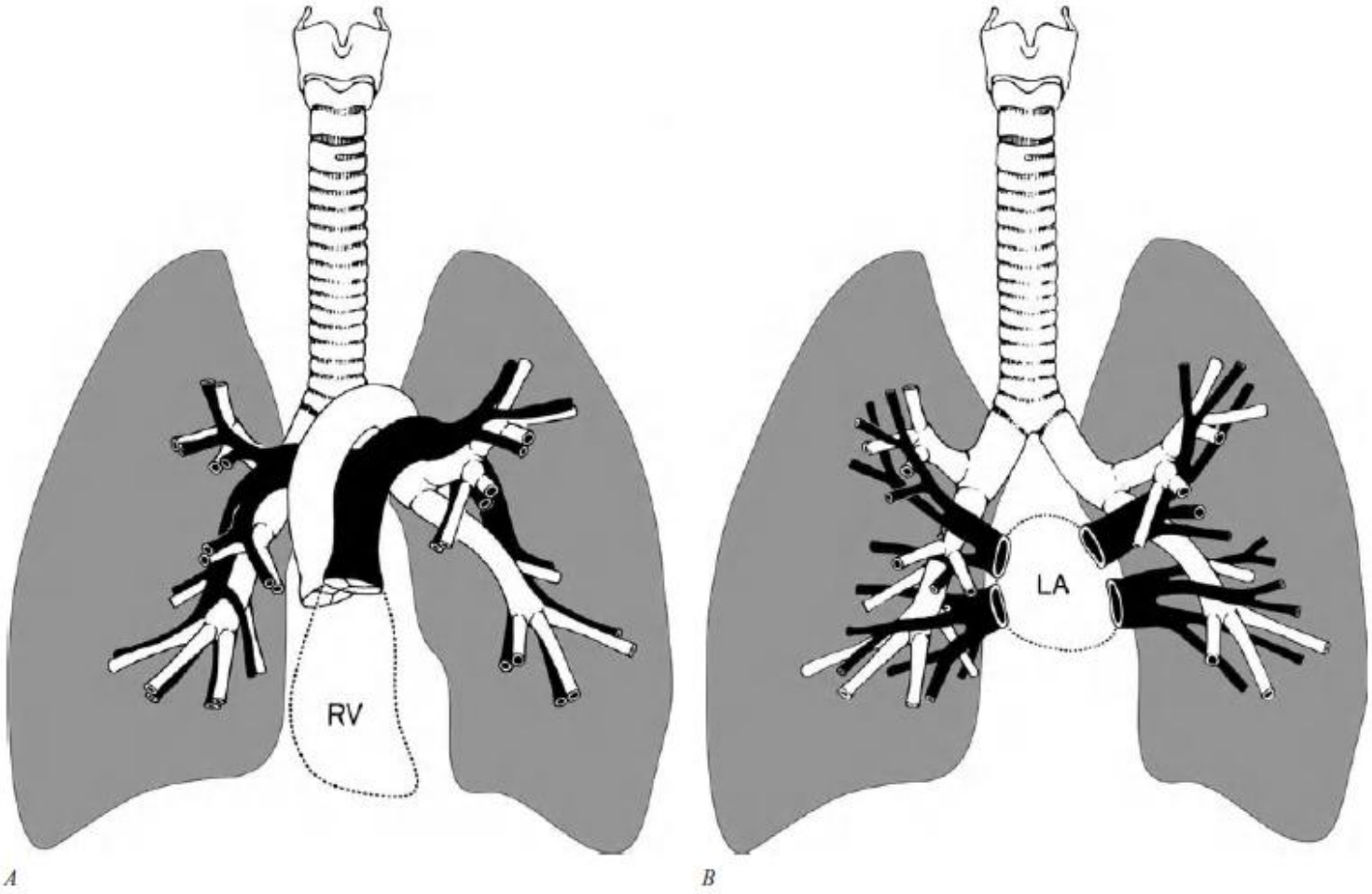
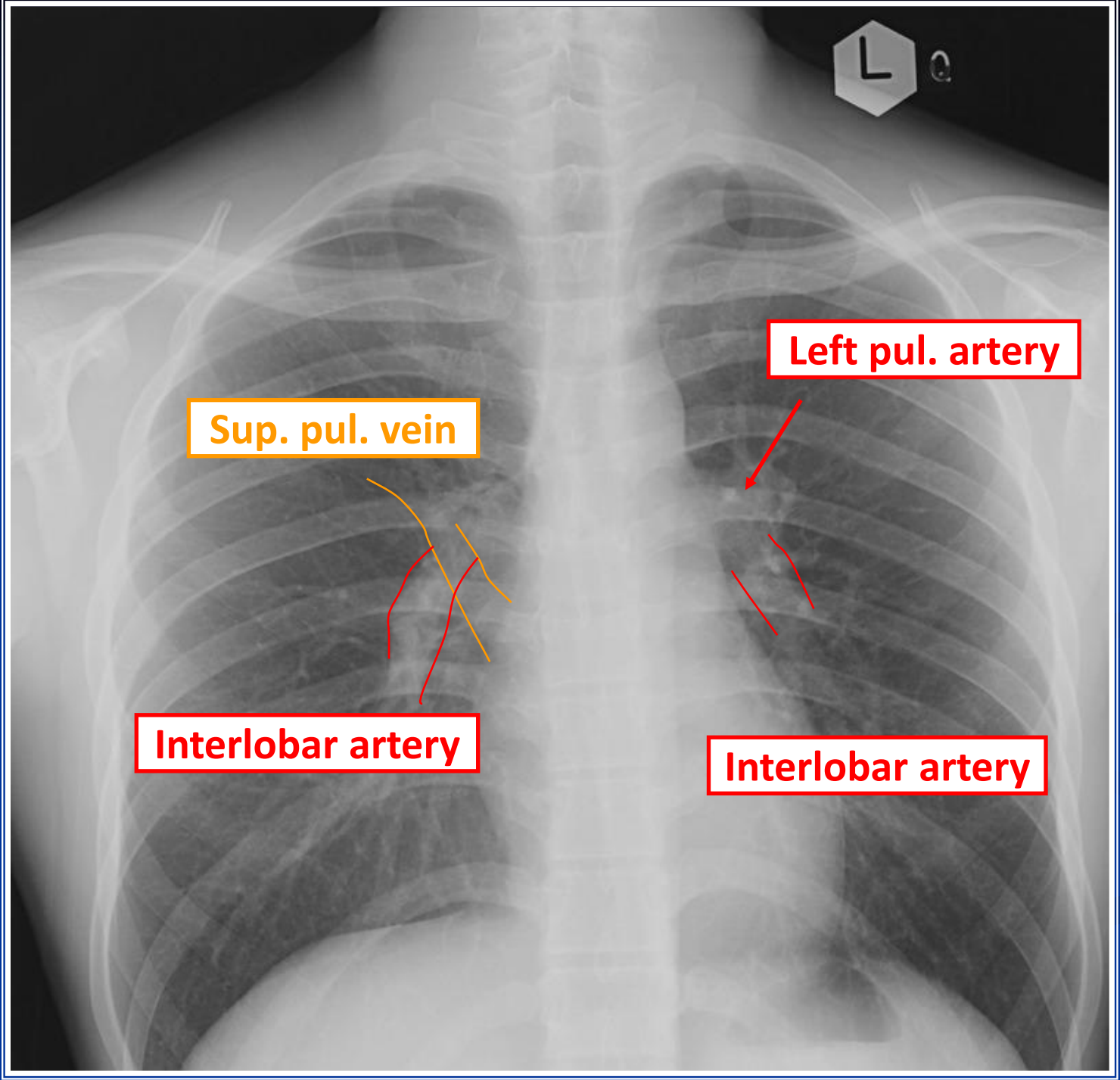


Figure 2-4 Schematic diagrams of the relation of the main branches of pulmonary arteries *(A)* and pulmonary veins *(B)* to the bronchial tree. The arteries follow the airways. Two main stems of pulmonary vein penetrate independently into the lung on each side. LA = left atrium; RV = right ventricle.


Left pul. artery
Sup. pul. vein
Interlobar artery
Interlobar artery

Hilum（肺門）

- Right hilum:

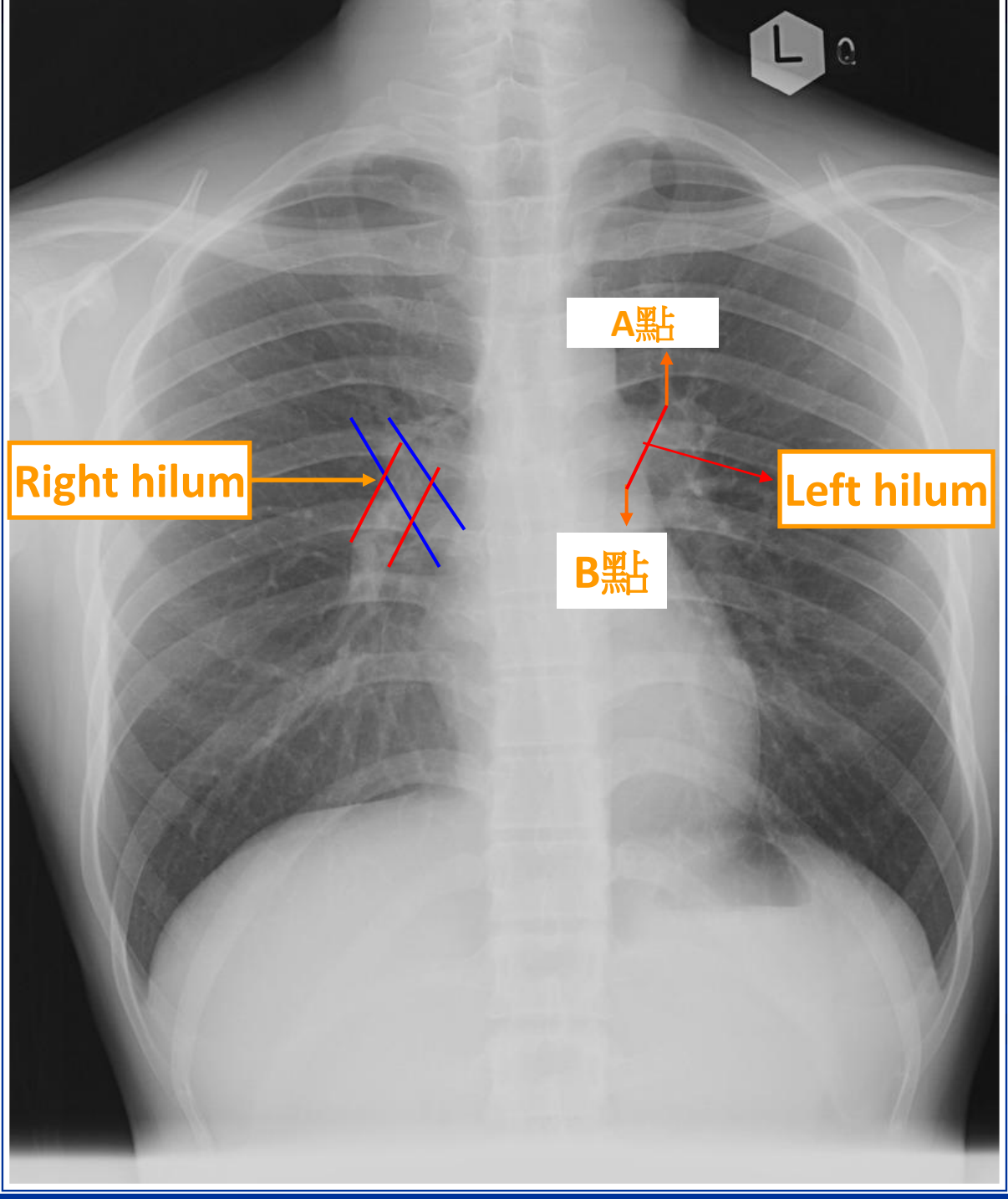
  =>右上肺靜脈與肺動脈下支(interlobar artery)交角.

- Left hilum

  =>左肺動脈第一分支基底部(A點)，**順勢下至左側主支氣管上緣**(B點), A, B兩點連線的中點，就是左邊的hilum.

- 通常**左邊肺門比右邊高**(0.75-3cm).

  (Diaphragm 通常是右側較左側高)


A點
Right hilum
Left hilum
B點

輪廓徵 Silhouette sign

- 定義
  - 相同放射線濃度的構造A與構造B接壤時，其介面之輪廓消失，相同放射線濃度的構造A與構造B看似接壤而實際未接壤時，其介面之其輪廓皆仍清楚可見。反之，不同放射線濃度的構造A與構造B ，無論兩者是否緊密相連，其輪廓皆仍清楚。

在臨床上我們運用的是 Positive Silhouette Sign

輪廓徵 Silhouette sign

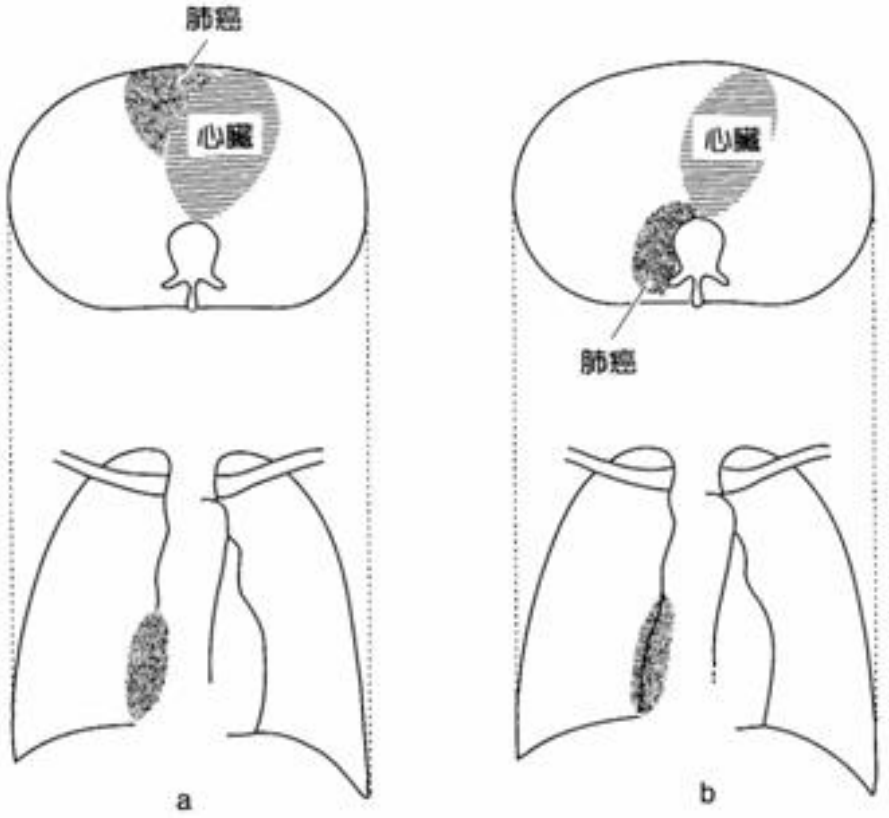


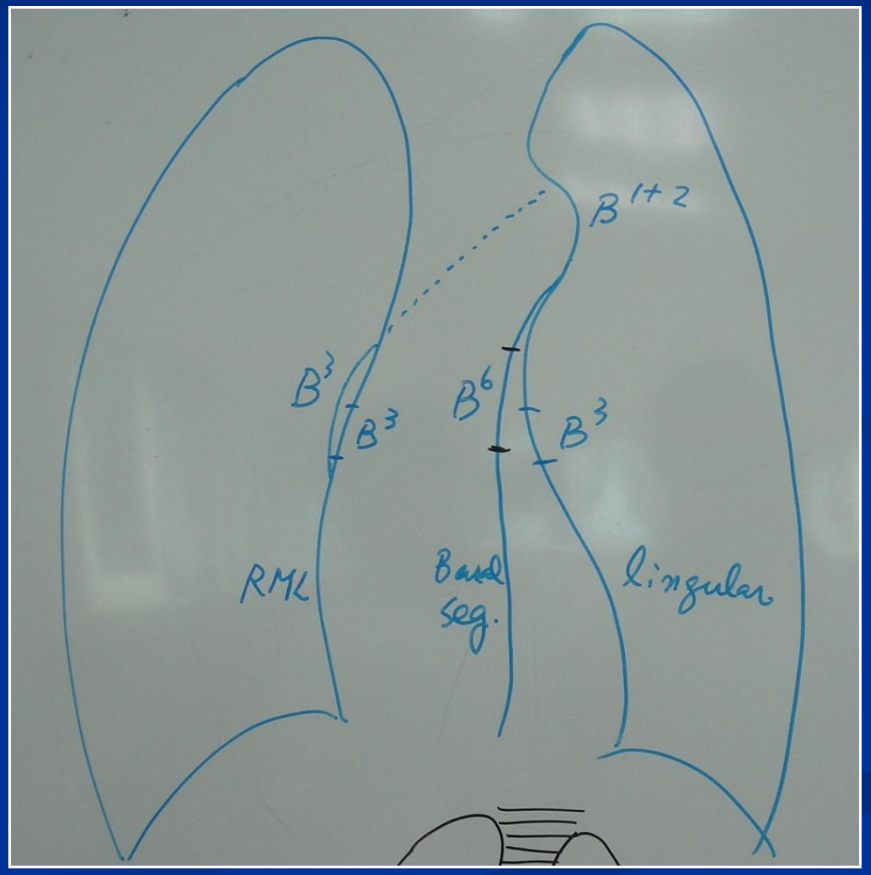
圖2　輪廓徵兆(silhouette sign)的病例

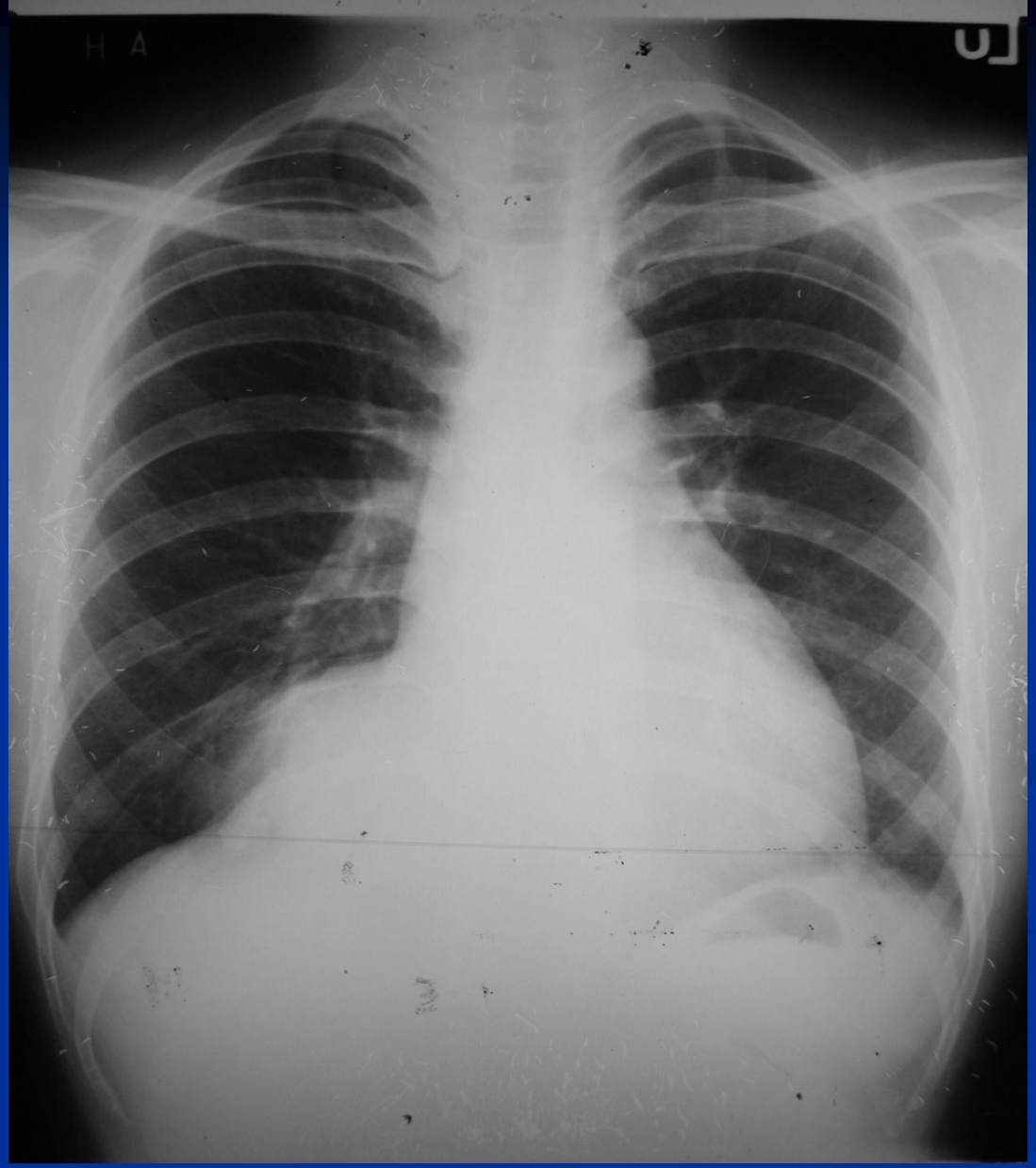
a 肺癌與心臟相接時，就無法看到心右緣的輪廓
＝因肺癌使心右緣呈輪廓徵兆陽性。

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。

Location--Land mark (lung)

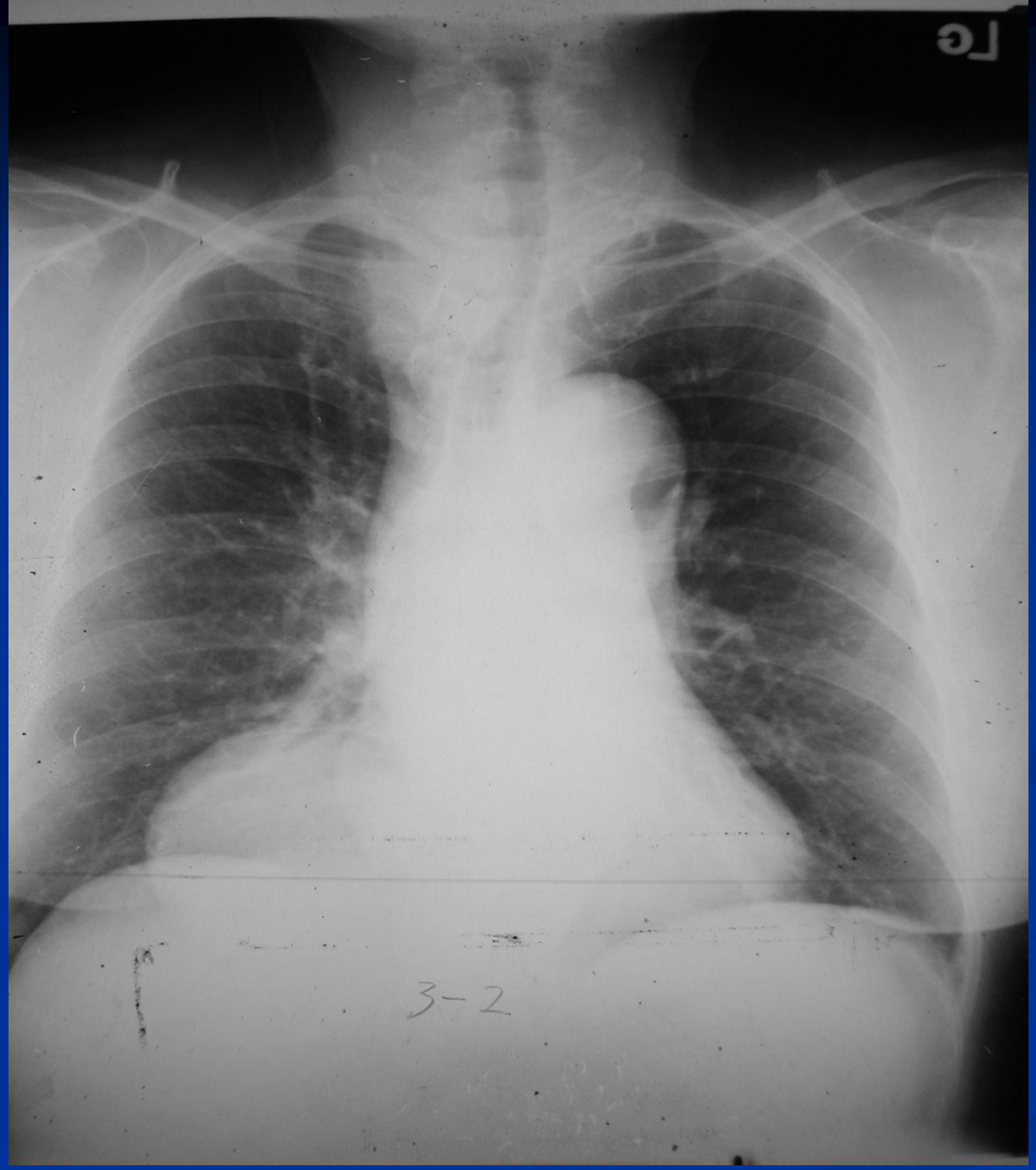
- Right heart border: RML
- Right heart border 上緣: RML or RB3
- Ascending aorta: RML or RB3
- Aortic knob: apico-posterior segment (B1+2)
- Left heart border 上緣: LB3 (ant. segment)
- Left heart border 下緣: lingular segment
- Right diaphragm: RLL,or RML
- Left diaphragm: LLL
- Descending aorta上段緣: apico-posterior segment(B1+2)
- Descending aorta下段緣: LLL





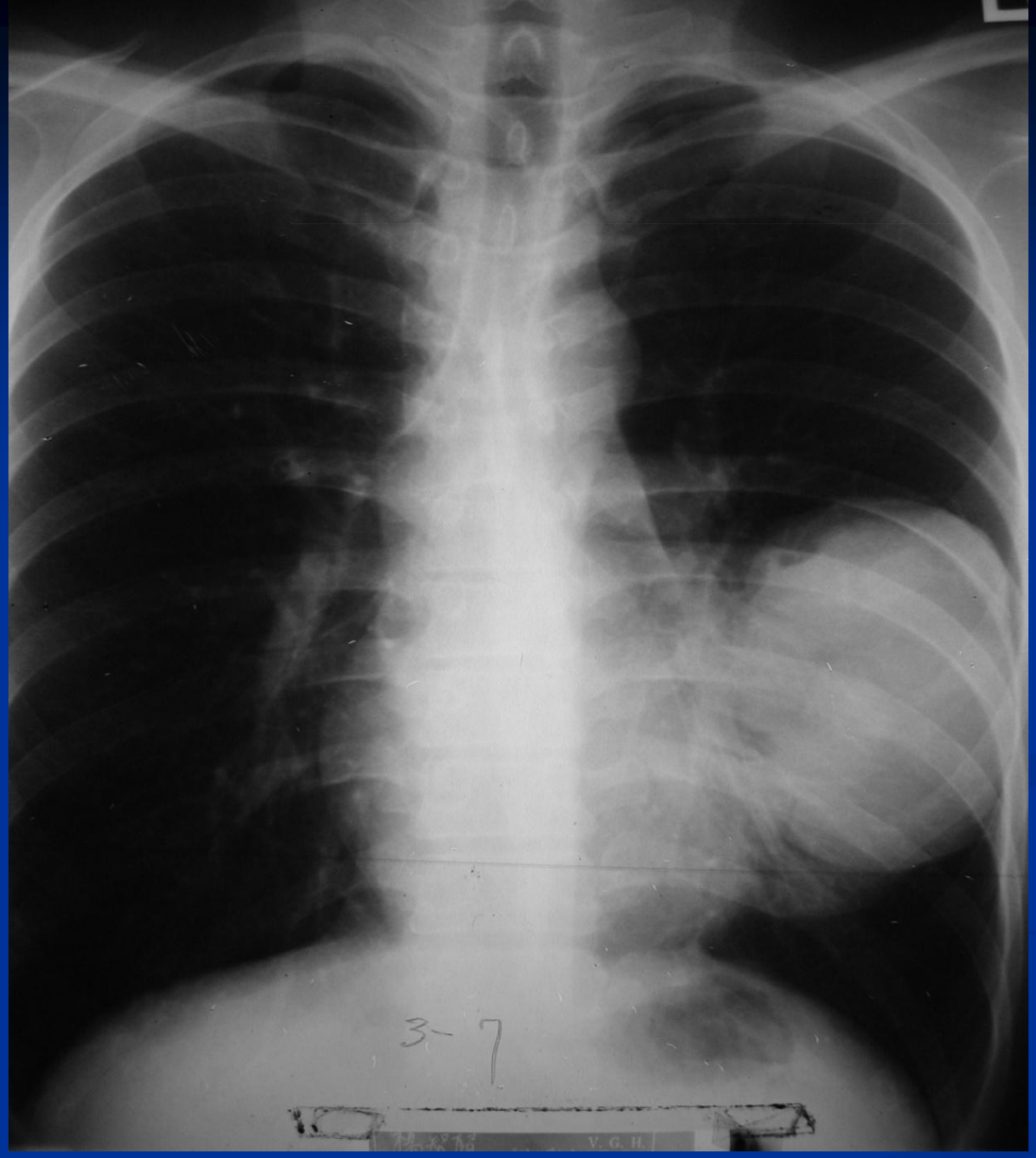
Anterior mediastinal tumor, lymphoma

與右側心臟下緣接壤的是RML，右側心臟下緣消失代表RML病變, Silhouette sign (+)



Posterior mediastinal tumor, neurogenic tumor

Silhouette sign (-) for right heart border



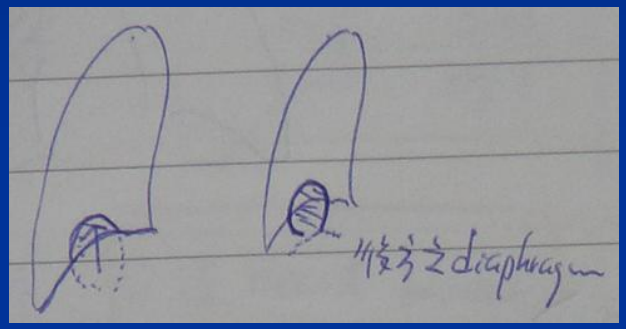
Leiomyosarcoma

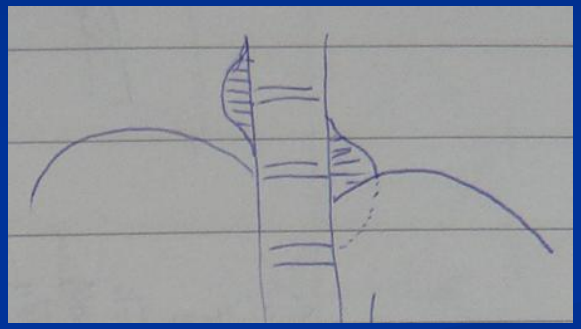
Silhouette sign (+)

與左側心臟下緣接壤的是LUL的 lingular lobe,左側心臟下緣輪廓消失代表 lingular lobe 病變

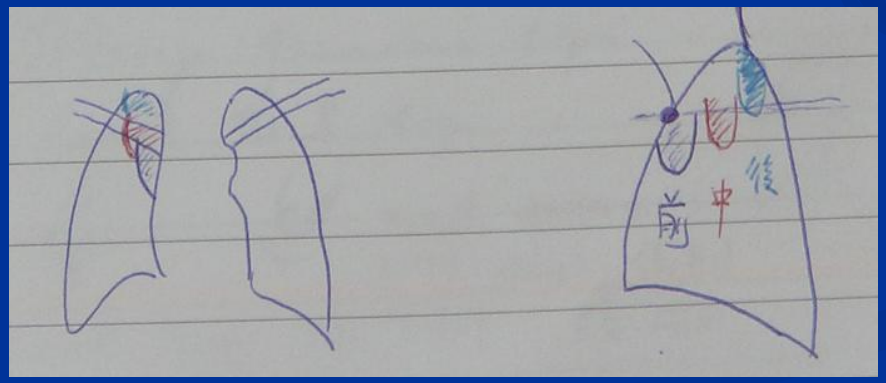
Silhouette sign衍生之徵候

- **Thoracoabdominal sign**



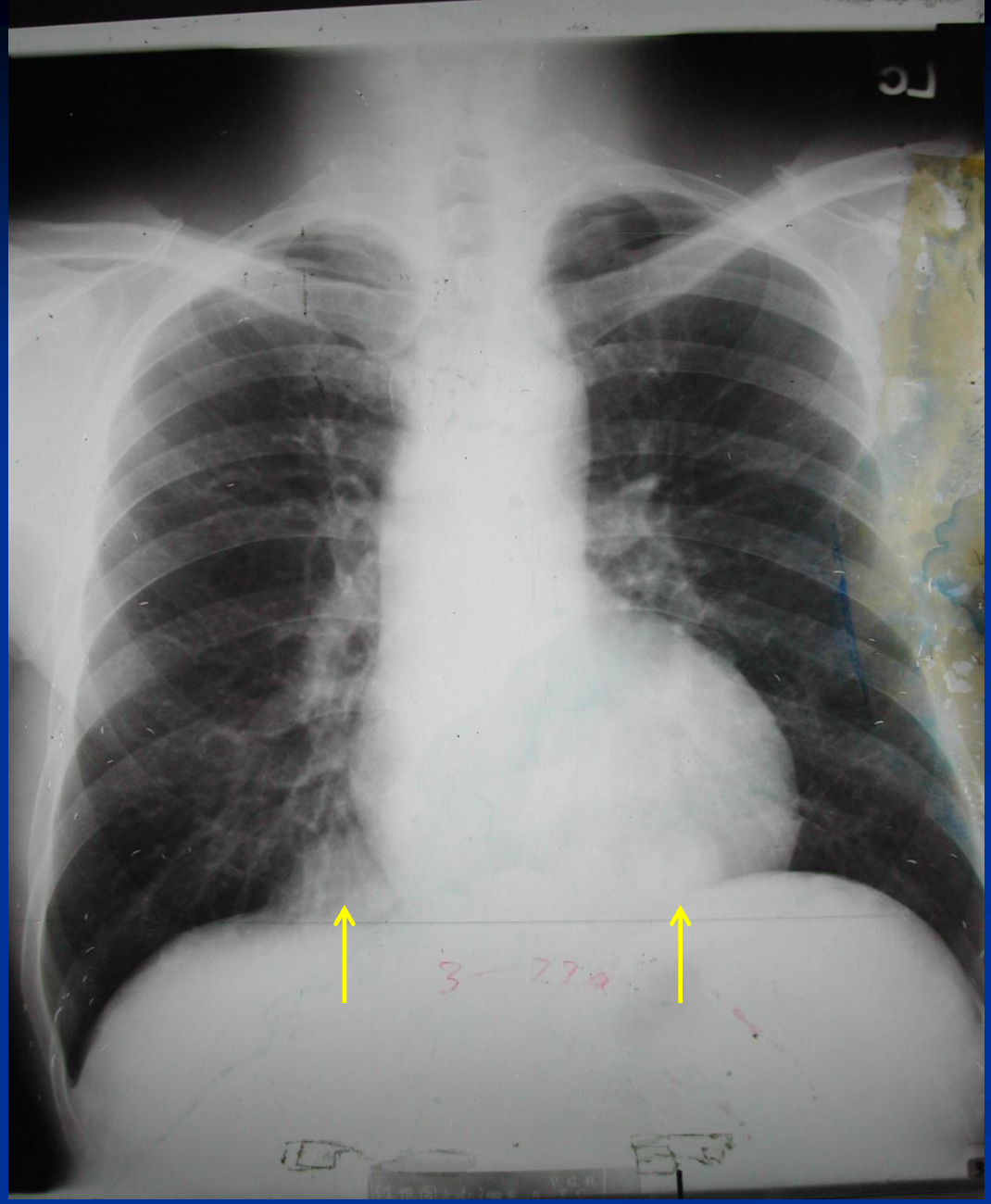


- **Cervicaothoracic sign**



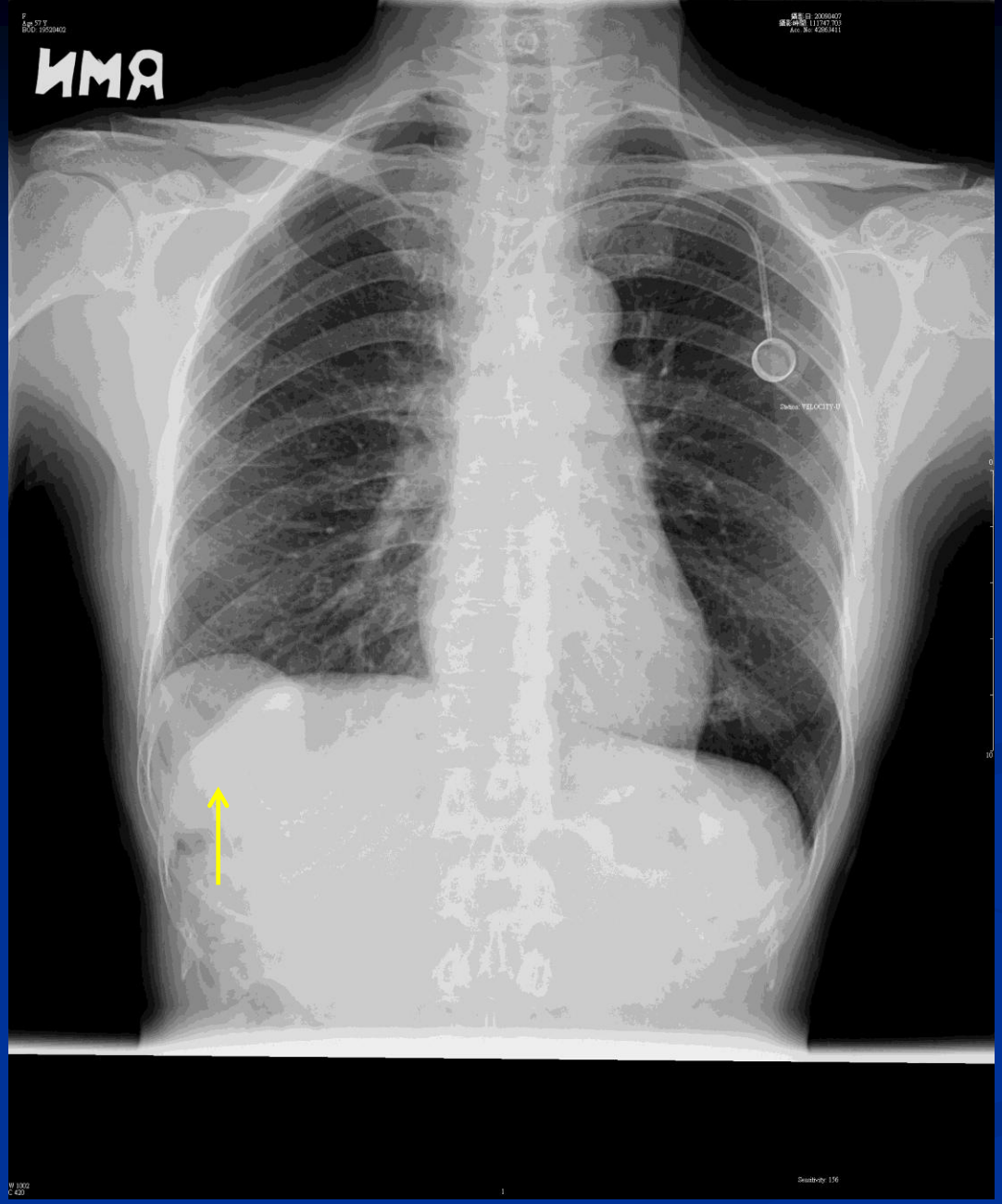
利用clavicle，可分析lesion位於前、中、後縱膈

- **前縱膈**: lesion到clavicle即止
- **中縱膈**: lesion超過clavicle但 未滿至頂端
- **後縱膈**: lesion超過clavicle直到頂端



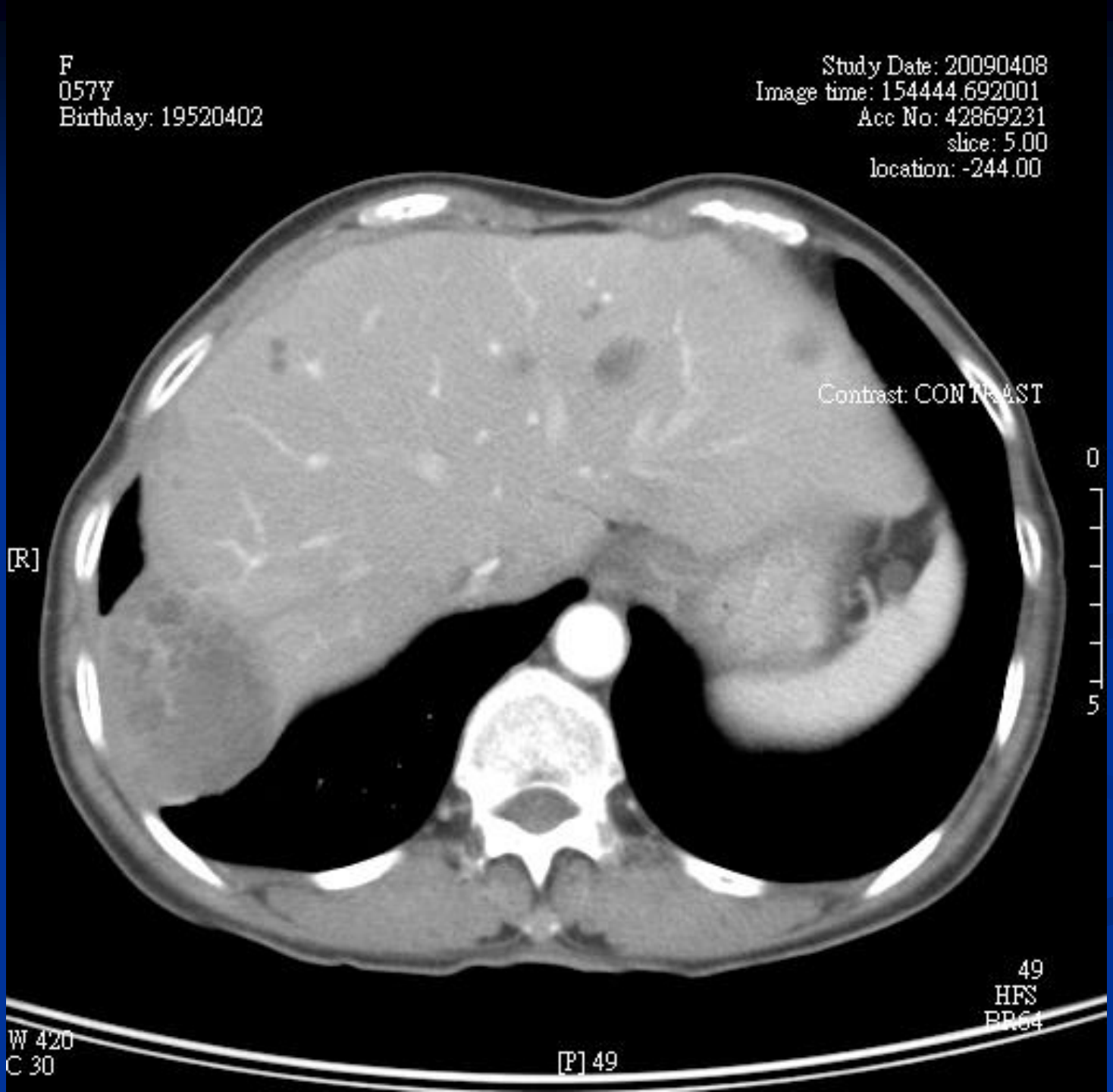
Thoracoabdominal sign (+)

Liver cirrhosis with esophageal varicose vein



Thoracoabdominal sign (+)

Ovarian ca. with metastasis invading right diaphragm


F
057Y
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Study Date: 20090408
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location: -244.00
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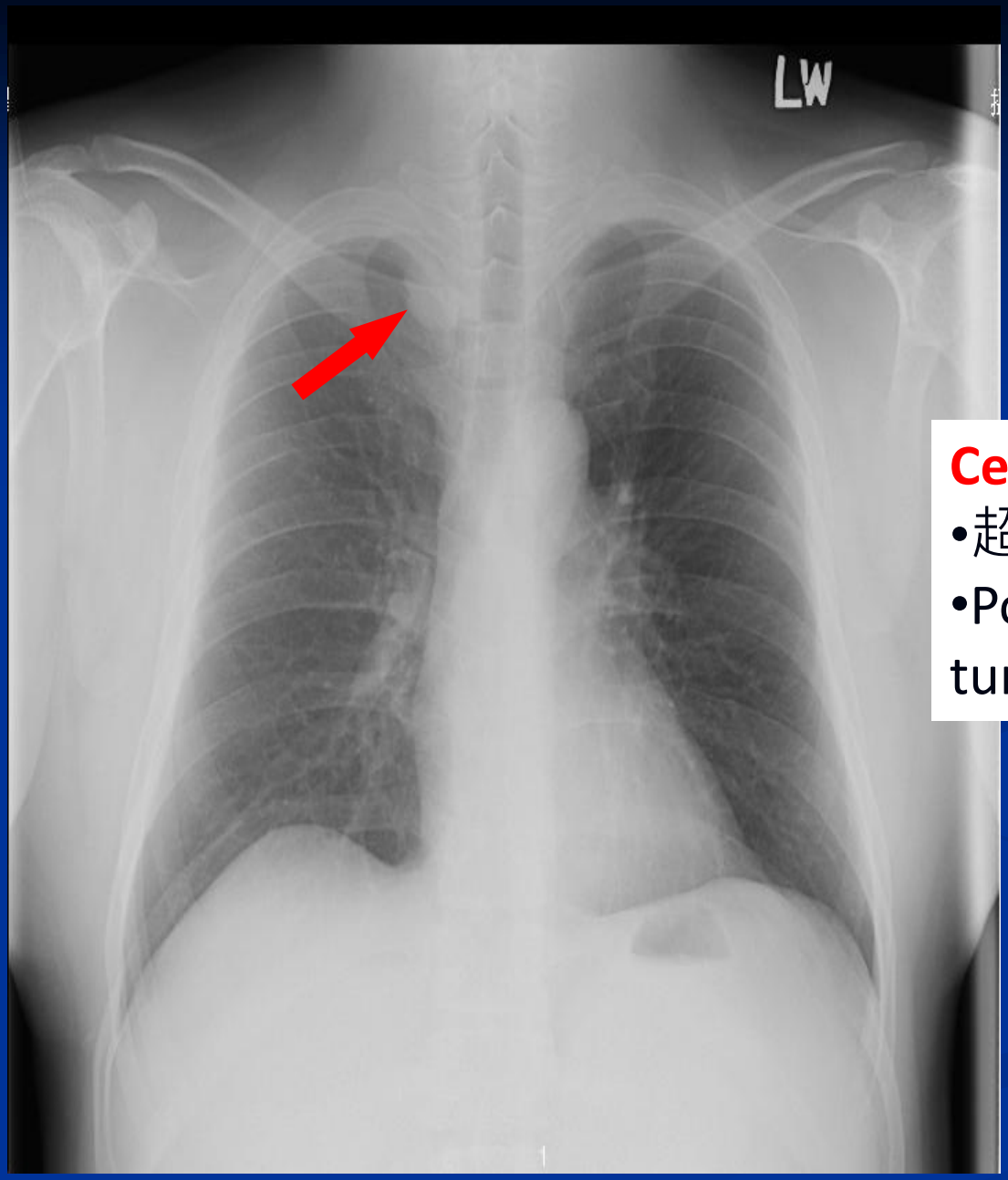
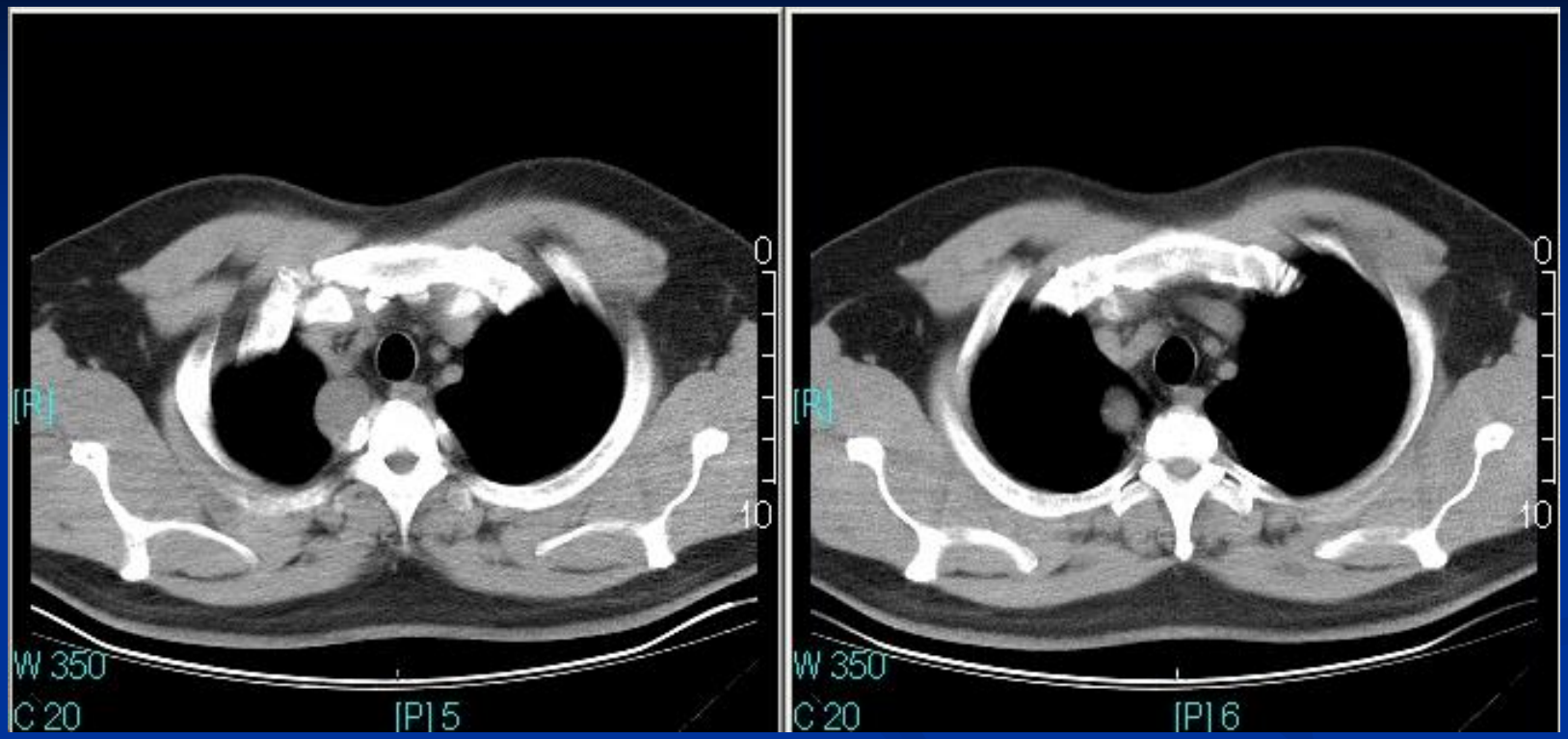
[R]
0
5
49
HFS
W 420
C 30
[P] 49



Cervicothoracic sign之應用

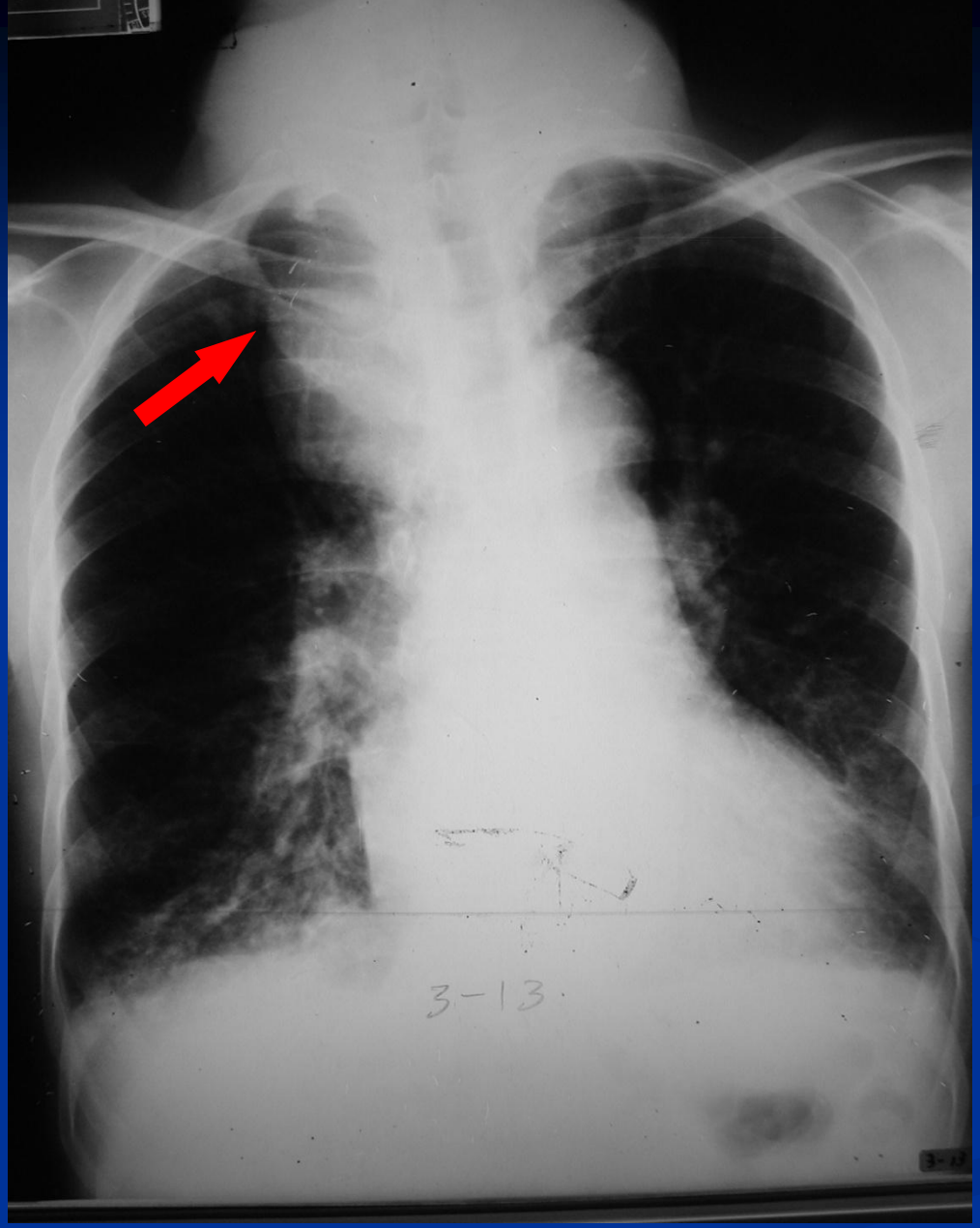
- 超過clavicle至頂端
- Posterior mediastinum tumor



Above clavicle

Post mediastinum tumor

Neurogenic tumor



Cervicothoracic sign (+)

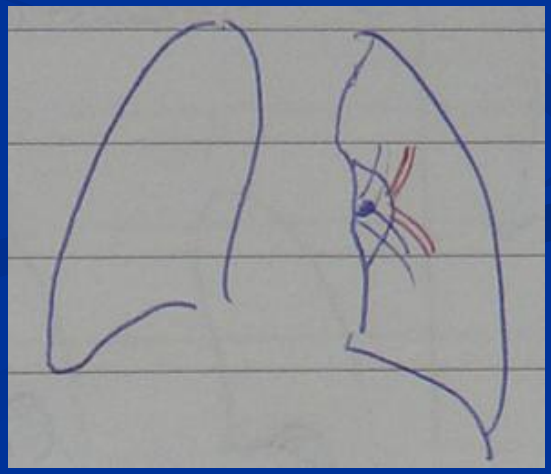
右側mediastinal lesion 之 cephalic border 至 clavicle 即消失, 表示此病灶應位於 anterior mediastinum

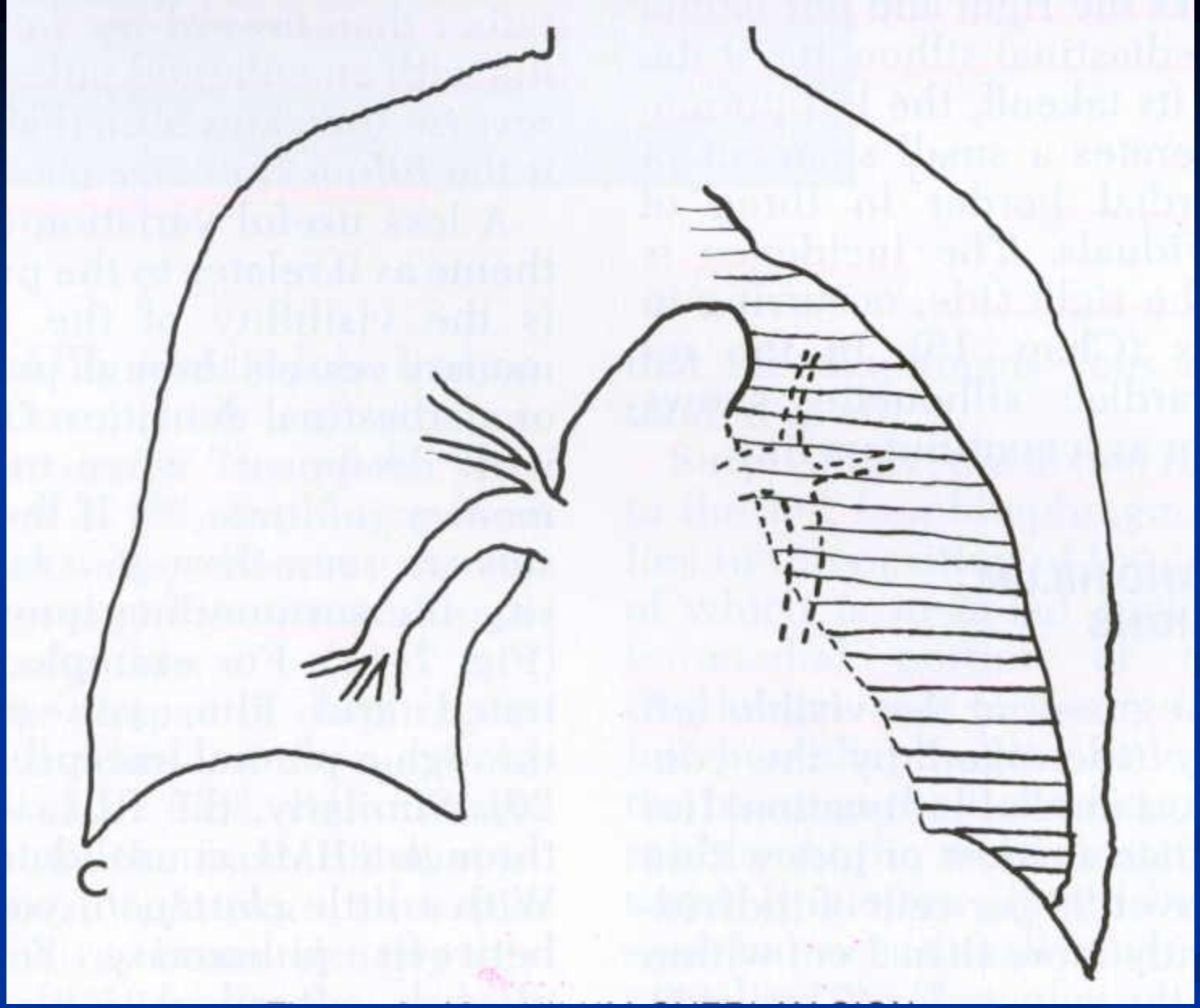
Intrathoracic goiter

Silhouette sign衍生之徵候

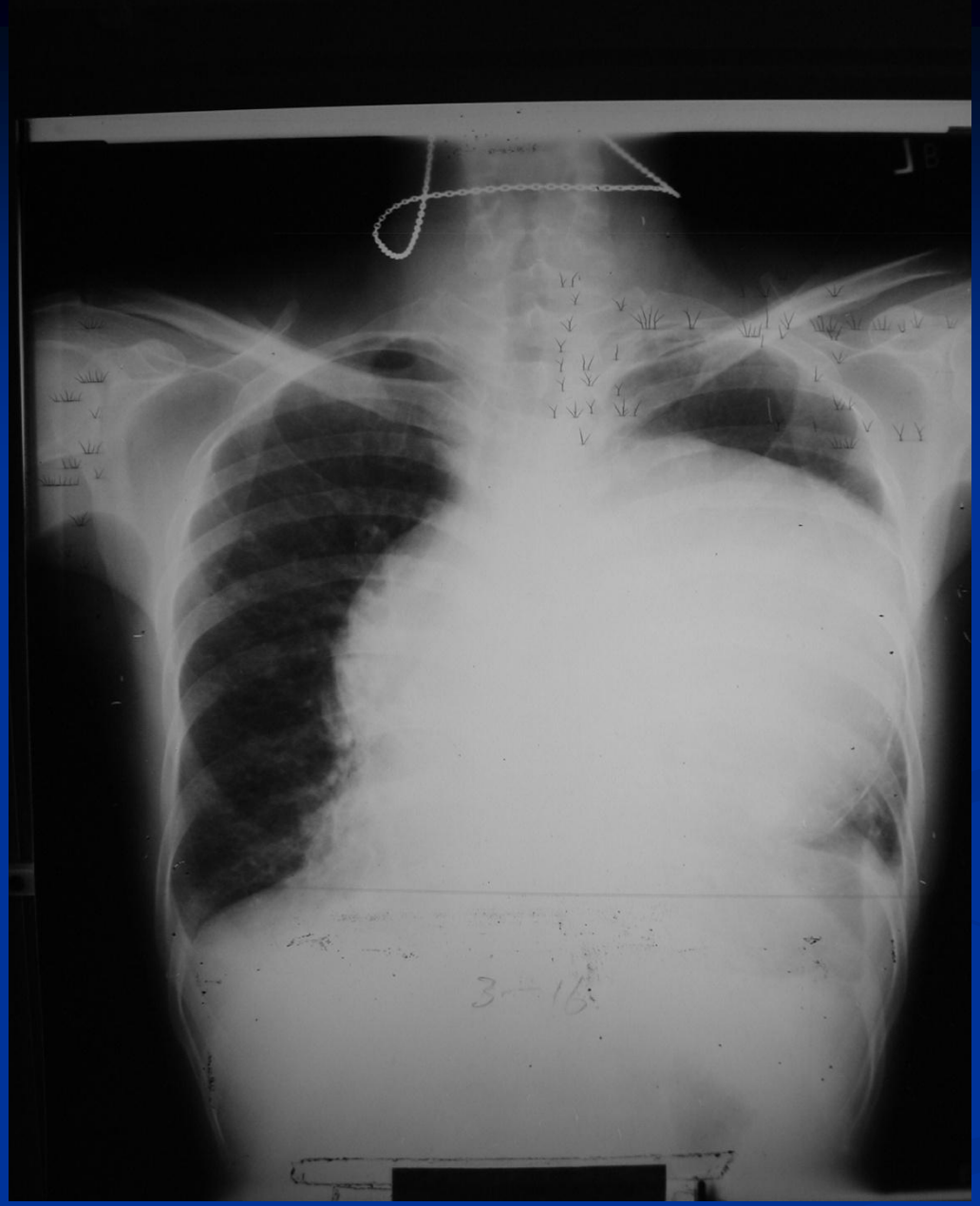
- Hilum overlay sign **(看是否為True Heart border)**
  - Hilum位置通常在heart外側，若見一很像heart border之shadow則需判斷是否為真的heart border。
  - 若hilum在內側，則shadow可能為ant mediastinal tumor or pericardial cyst/effusion。
- Hilum convergence sign

  (看是否為True Hilum)
  - 若血管有進hilum lesion，則hilum lesion較不像是肺血管。



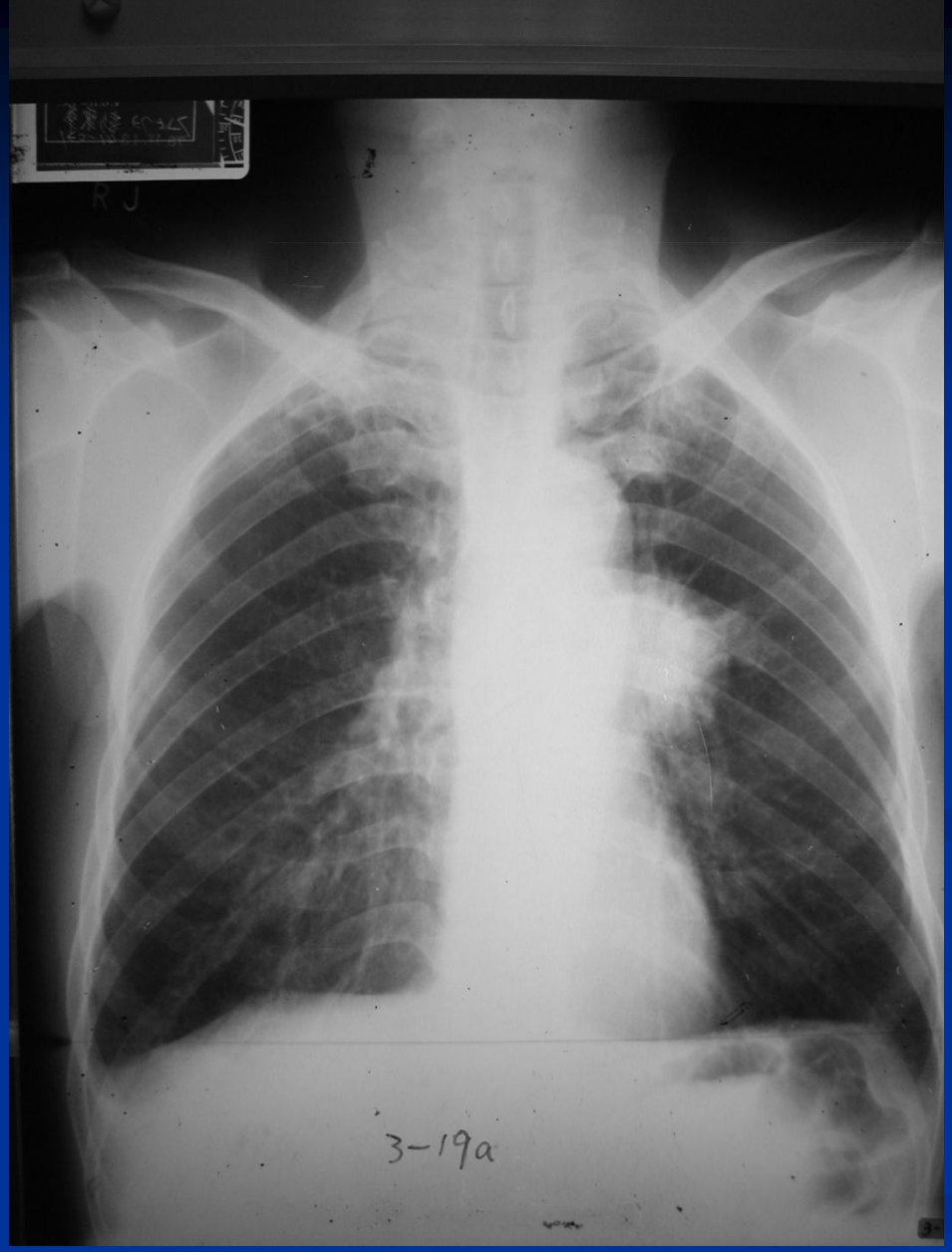


Hilum overlay sign (+) ,not heart border



Huge mediastinal tumor,
Cystic teratoma

Hilar overlay sign

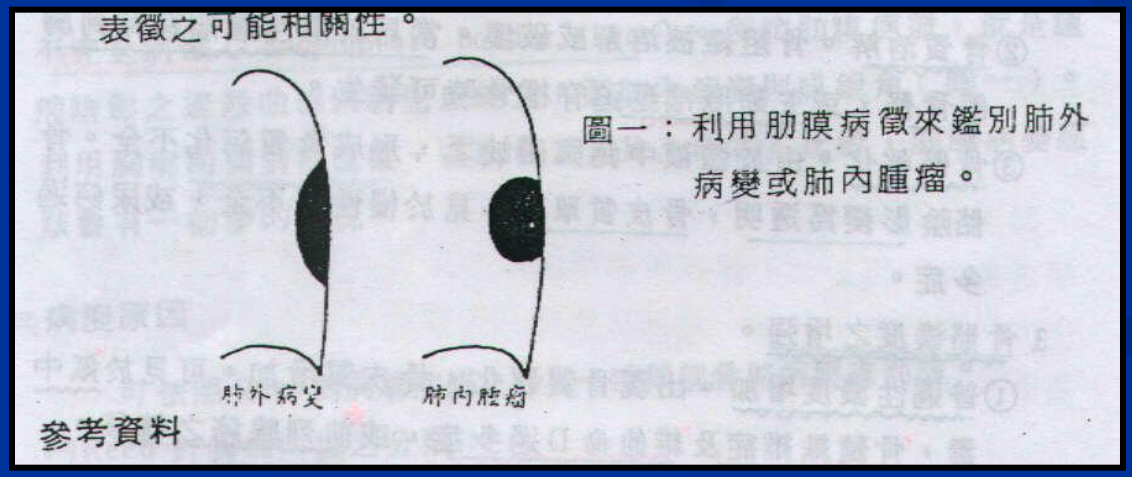


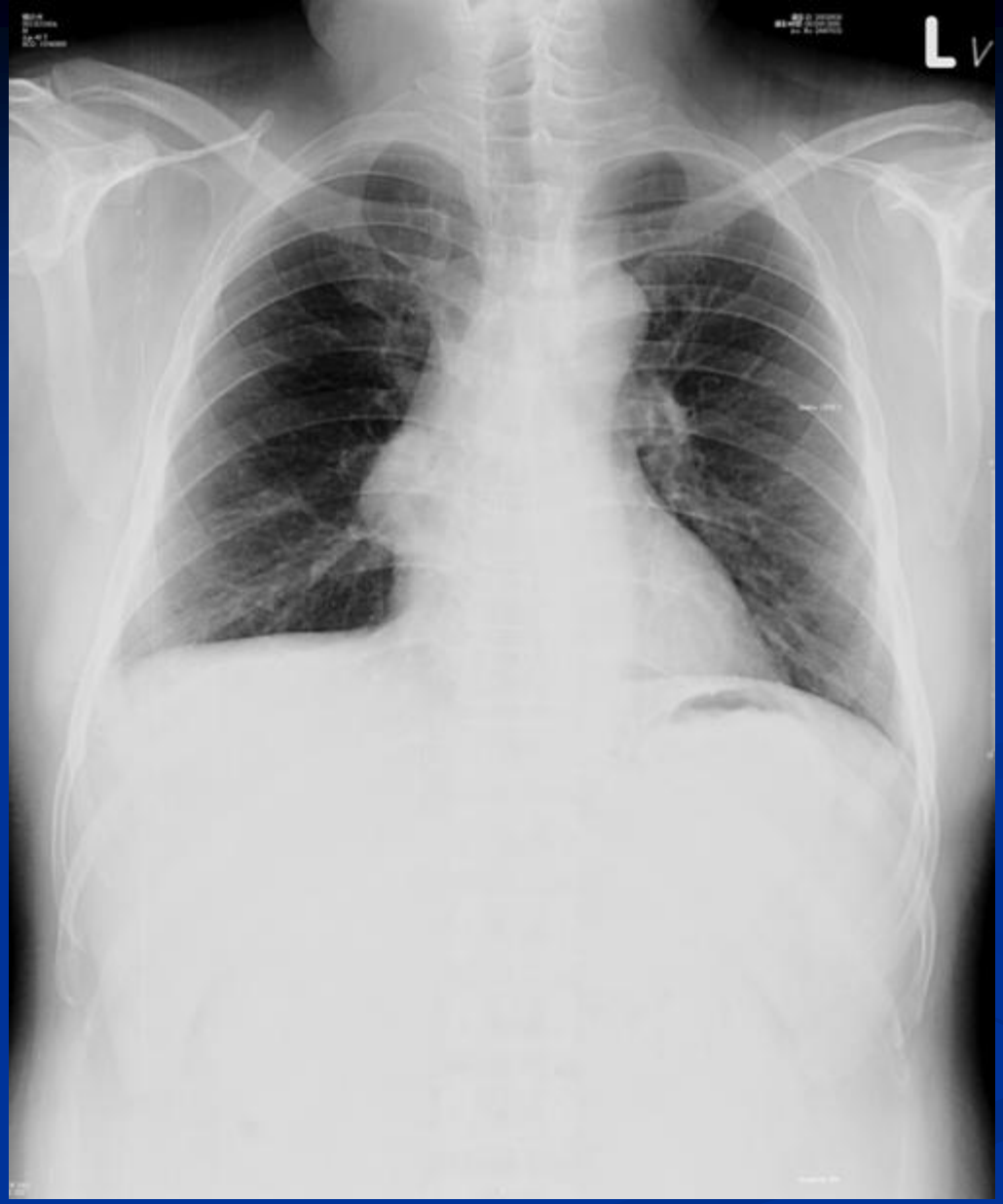
Left hilar enlargement,
Lung cancer, LUL

Hilar convergence sign

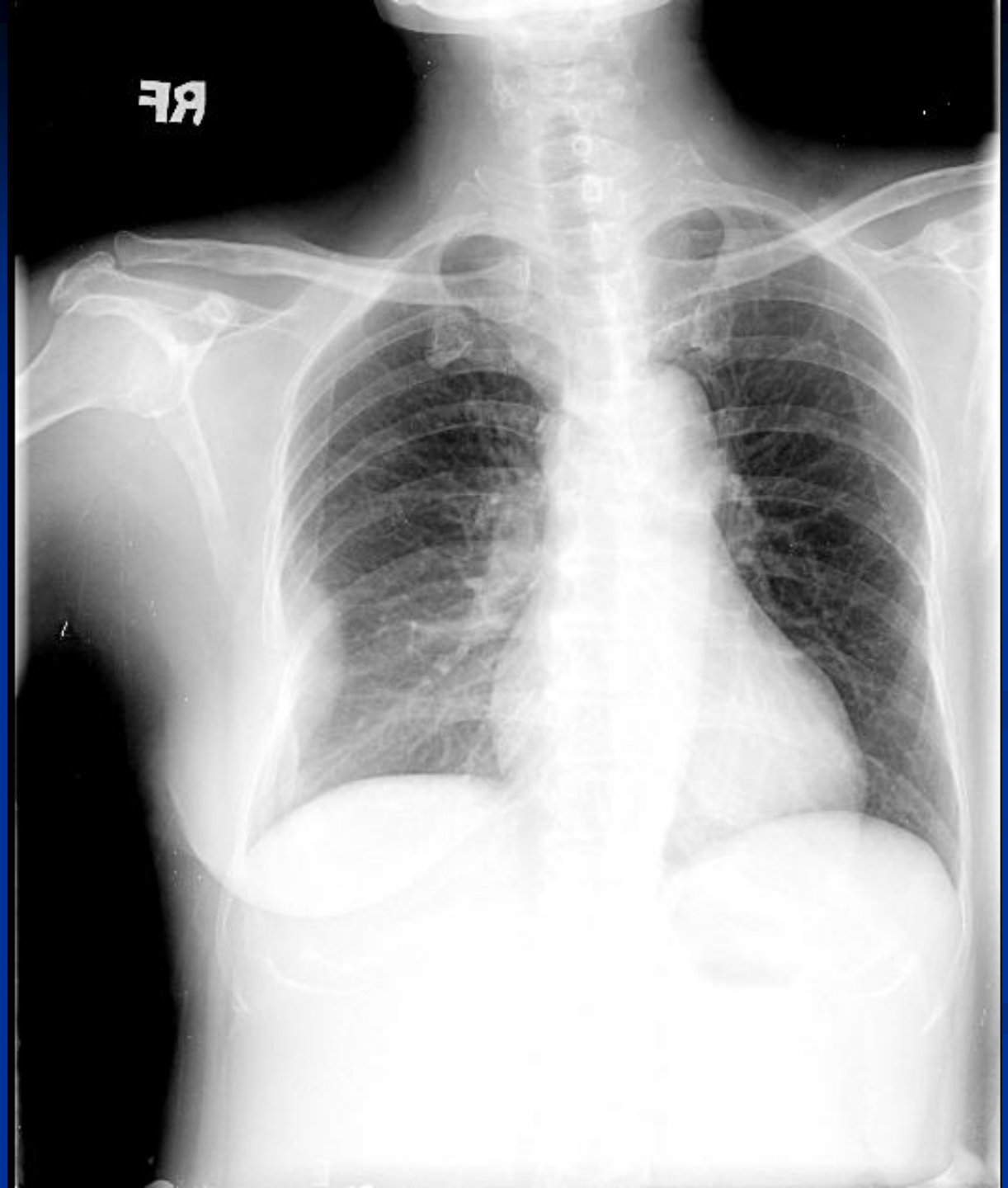
Extrapleural sign

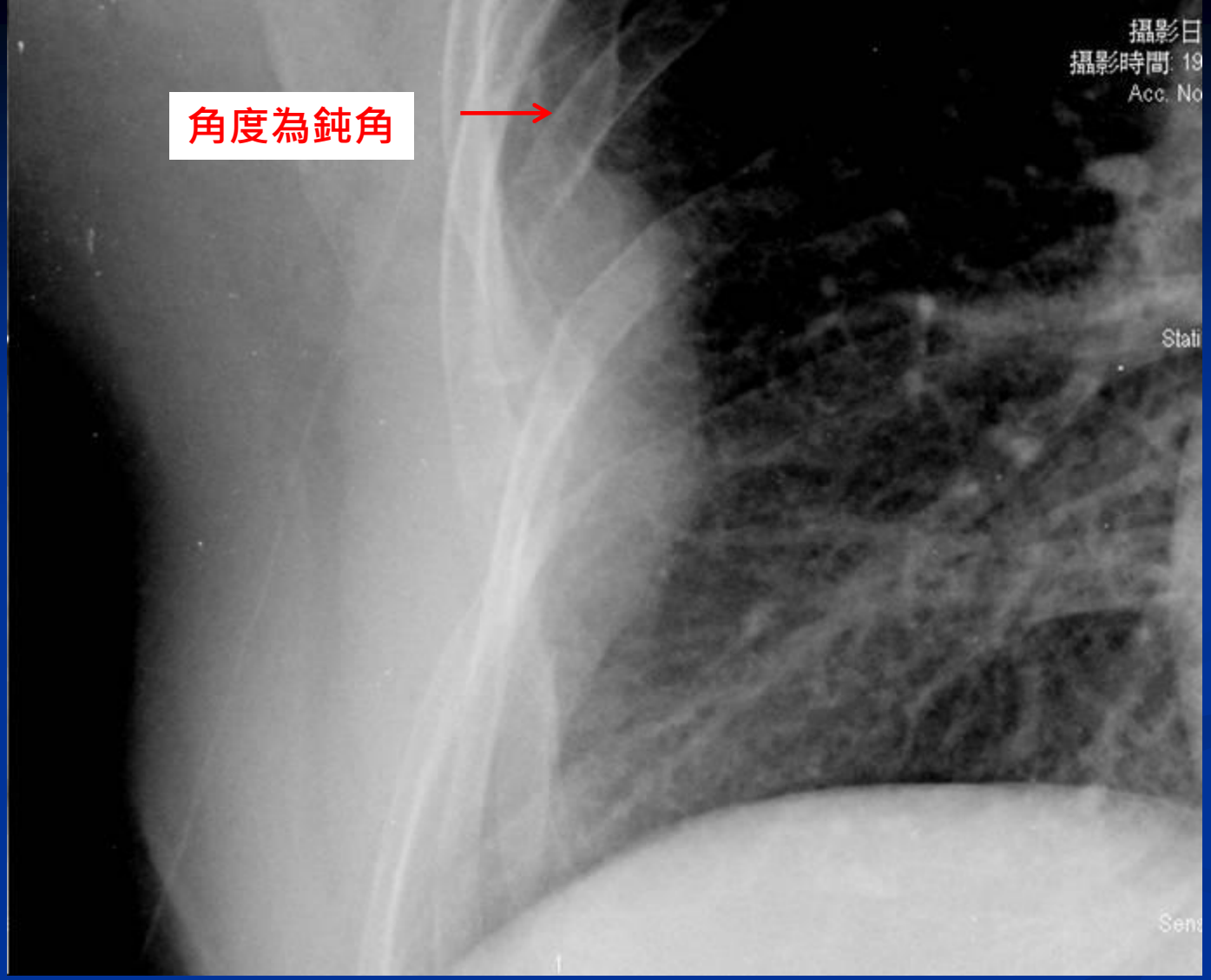
- 指肋膜外的病灶往肺內突入，但因其外圍有兩層肋膜包被，故出現底下三個特徵
  - **Well-defined border**
  - **影像的基底部較寬，與胸廓或橫膈或縱膈之交角為鈍角**
  - **近胸腔側之外緣所劃成圓形的圓心位於胸腔外**





Mediastinum lesion = Op:Thymoma

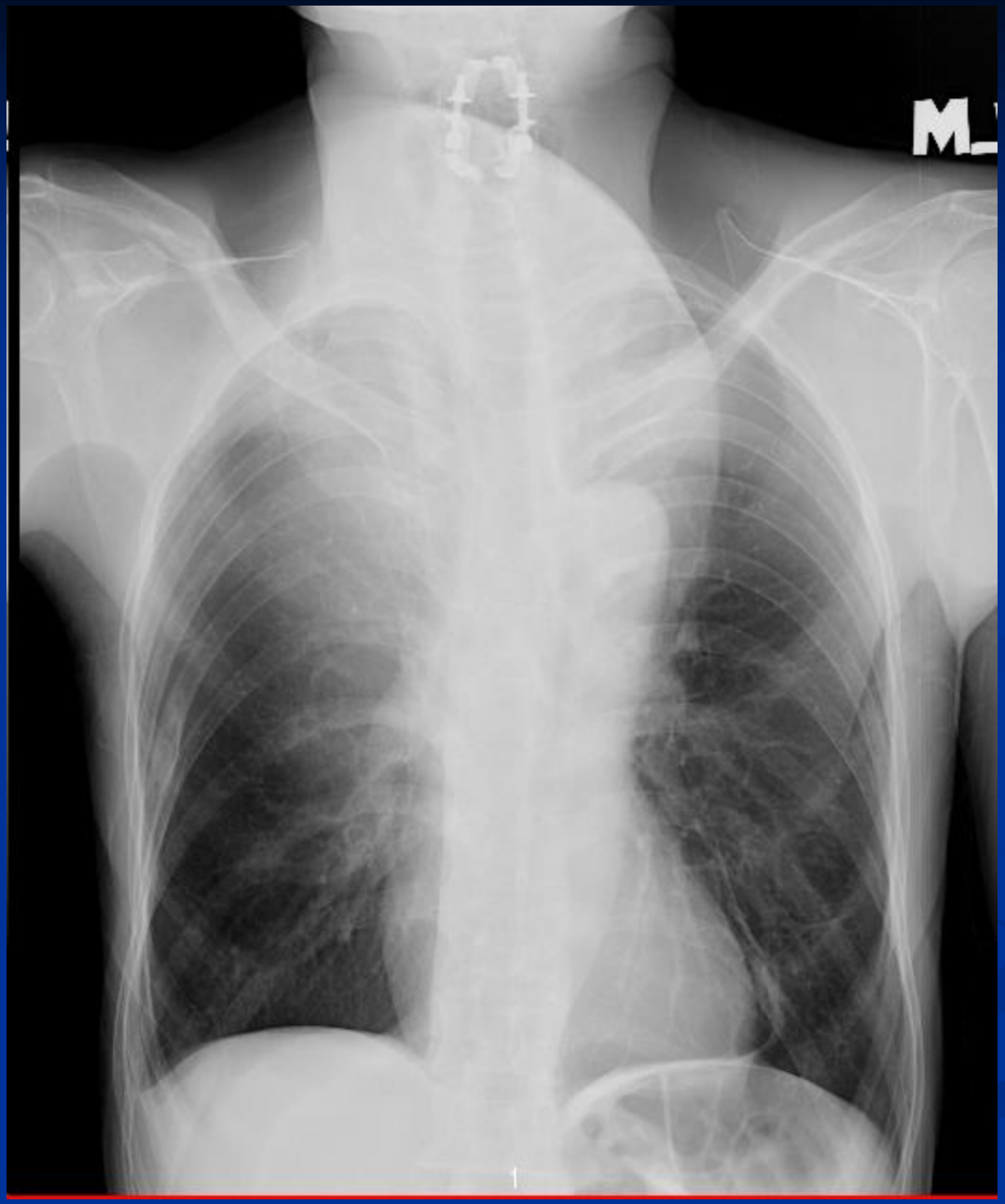

RF

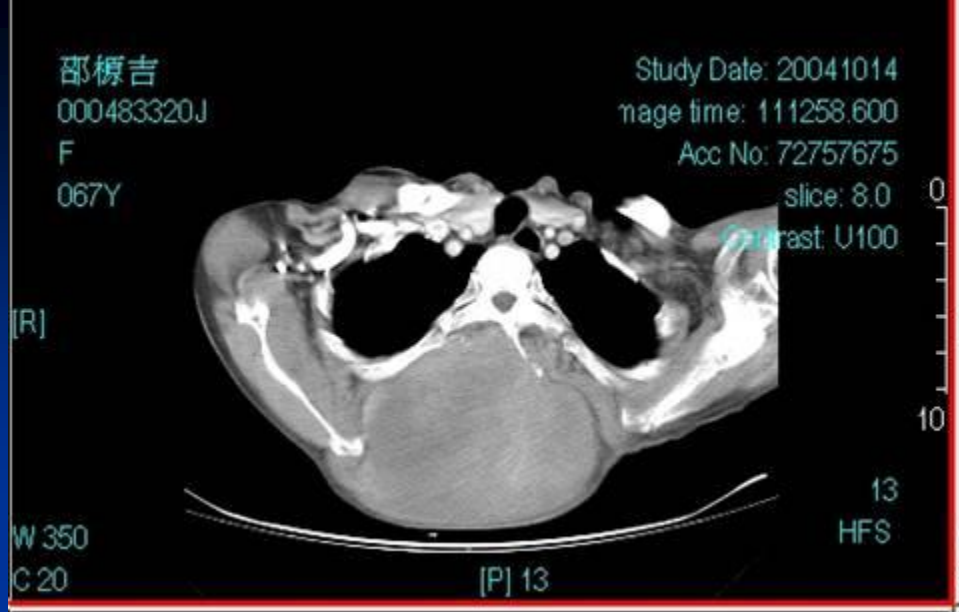


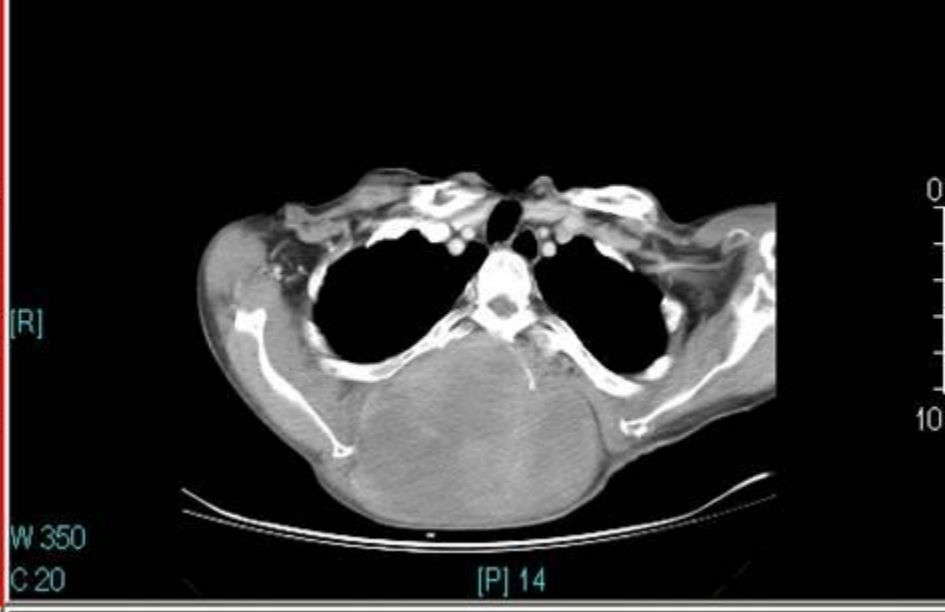
Breast Ca s/p Lt masectomy with Rt rib metastasis

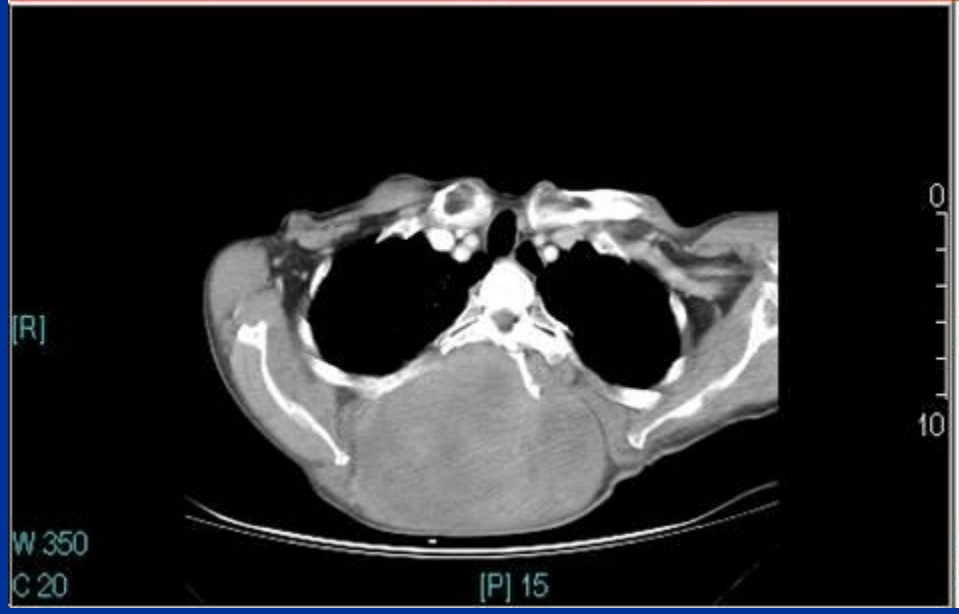
Incomplete border sign

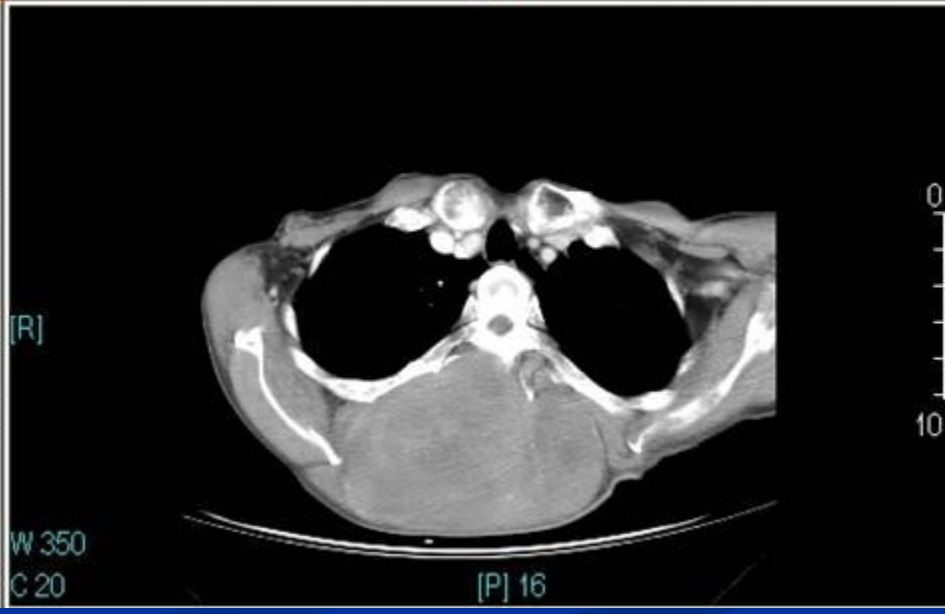
- 肋膜外的病灶只有在突入肺內的部分與肺內空氣產生對比，因而可見該突入部分之邊緣，而病灶位於縱膈或胸壁的部份，則因 positive silhouette sign 的緣故，因此看不到該部分的 border ，故在 X 光向上我們只能看到突入肺內部份所形成的 border ，稱為 incomplete border sign



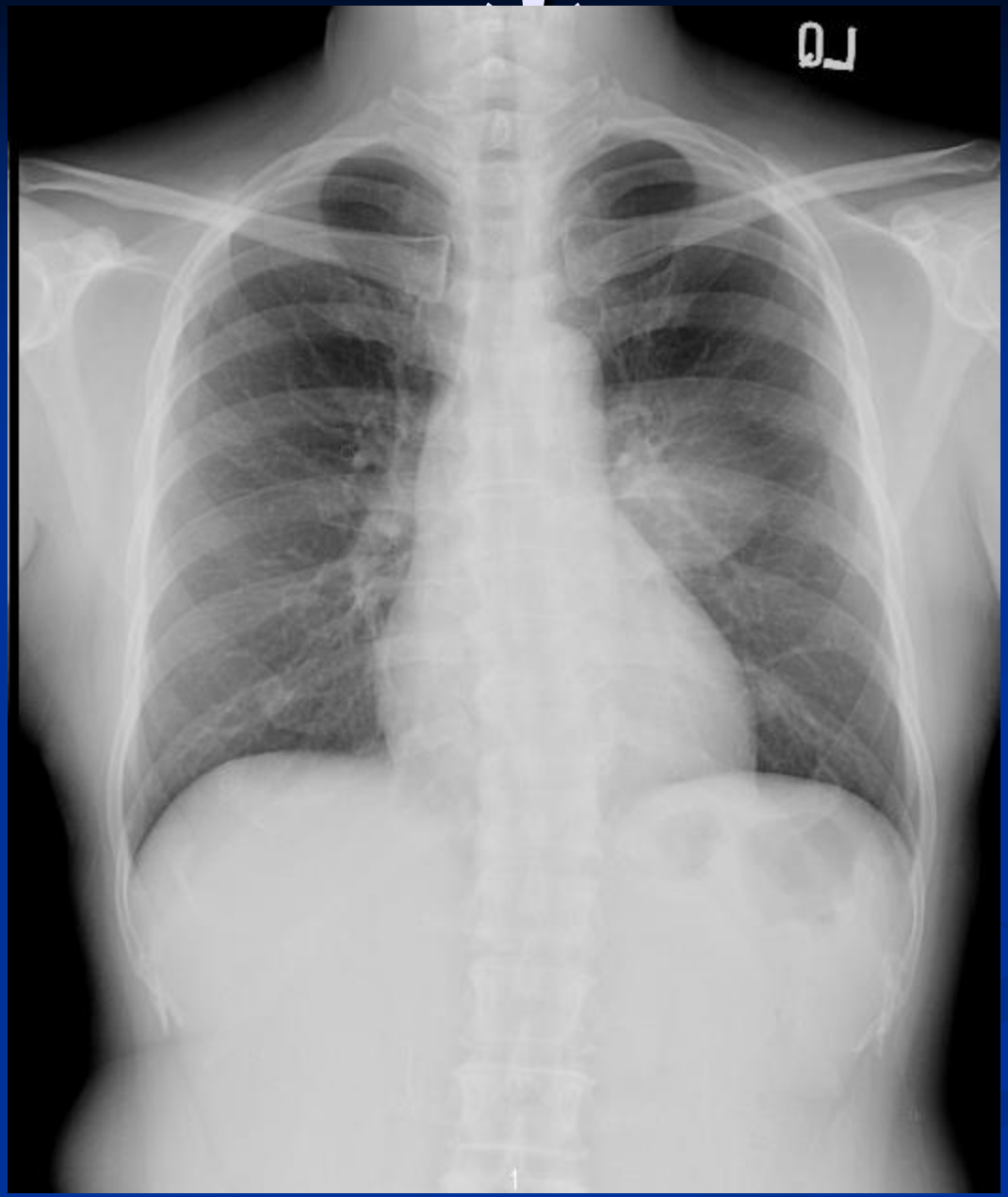


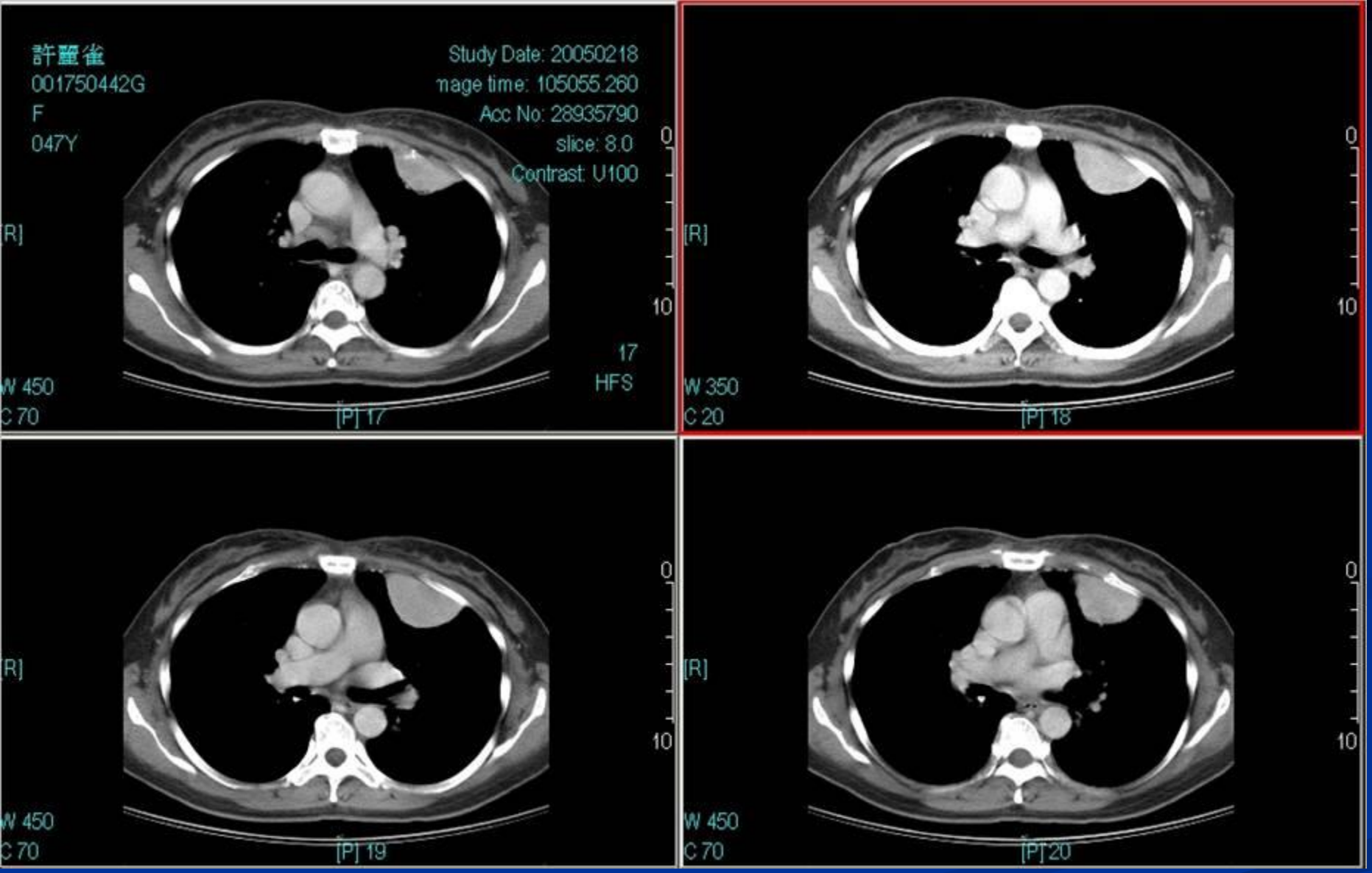




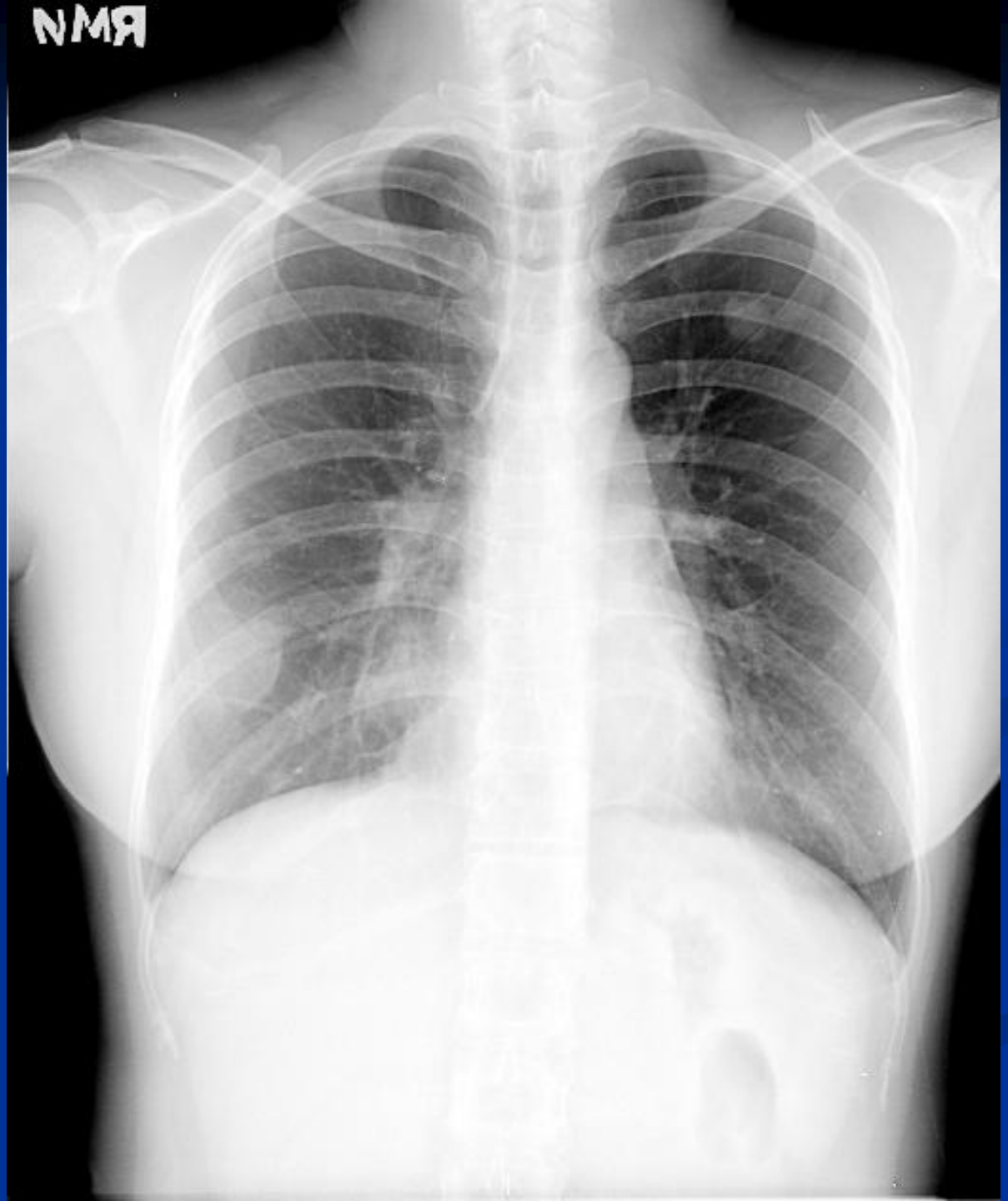


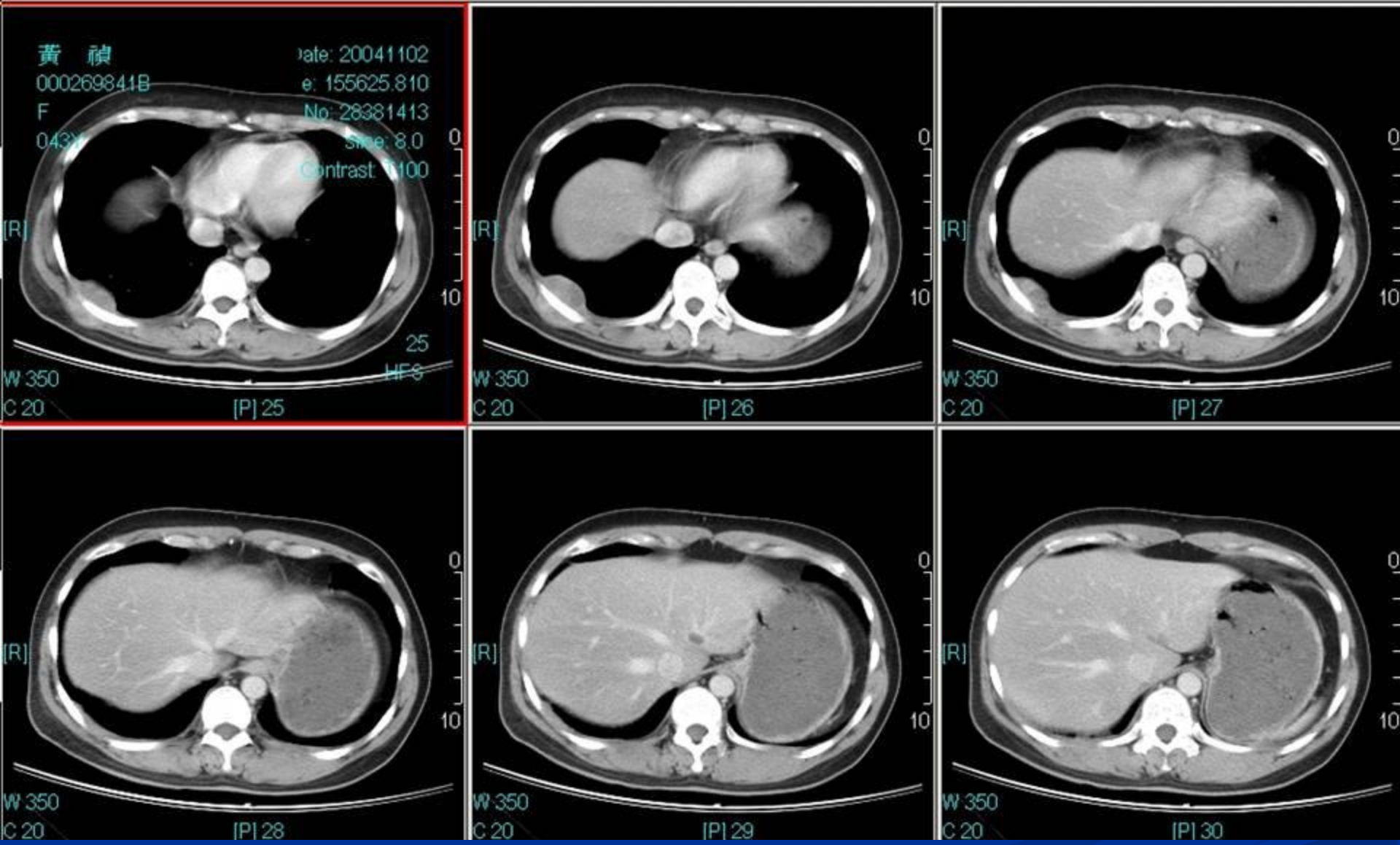
Op pathology : Fibromatosis (extraabdominal desmoid)


OJ



Op pathology :fibrous tumor of lung

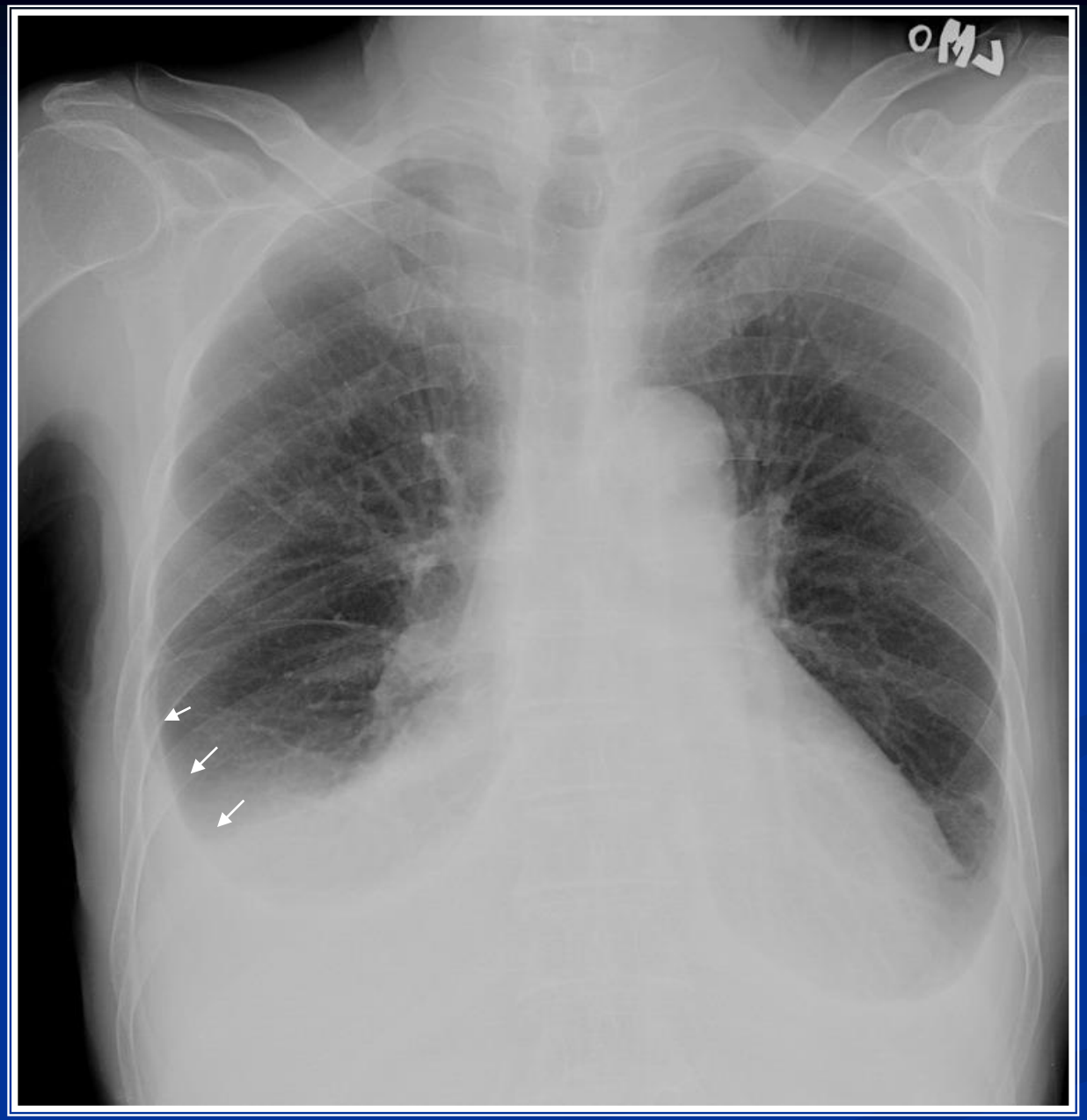

NMR



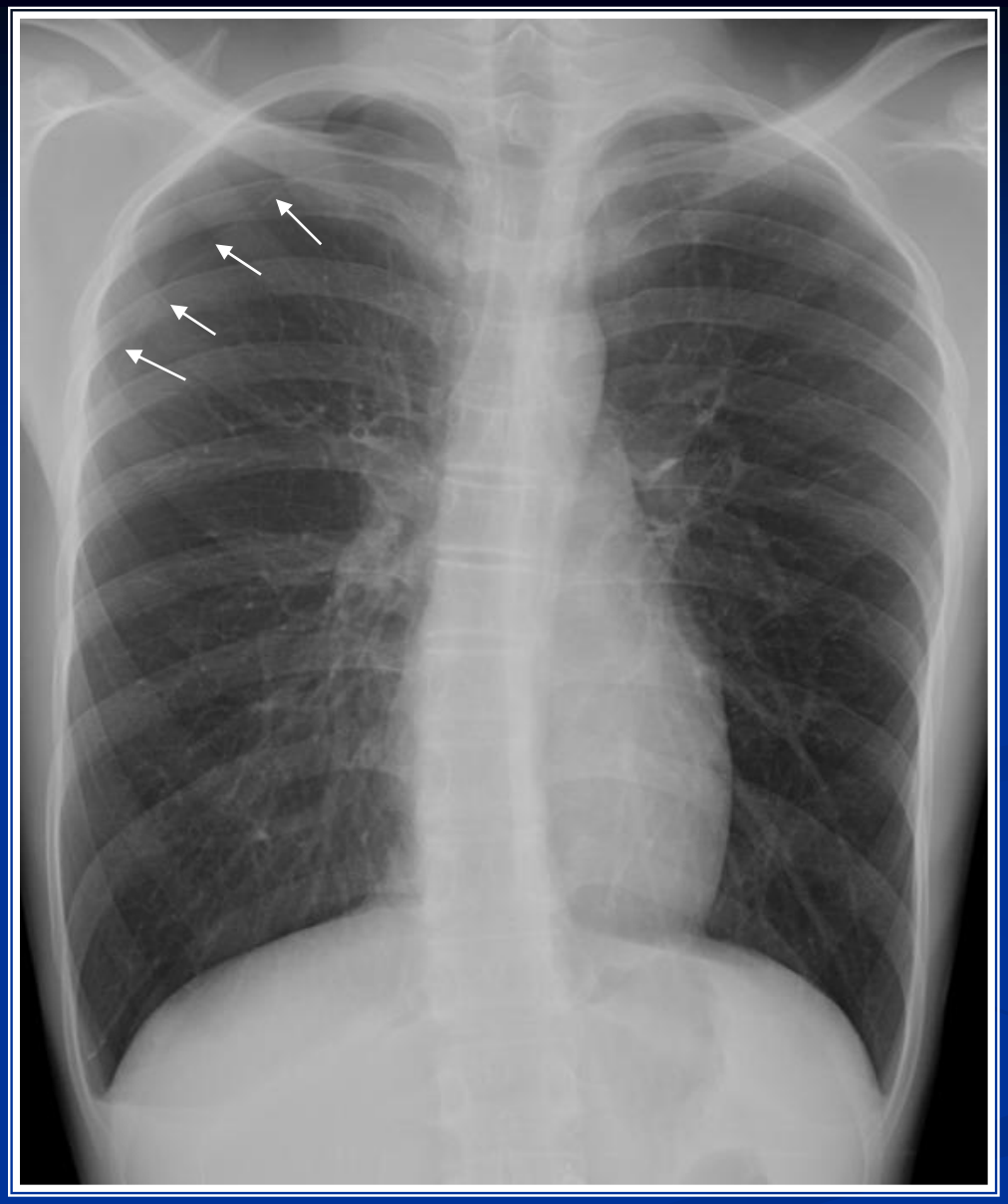
Leiomyosarcoma with LUL and Rt chest wall metastasis

課程簡介

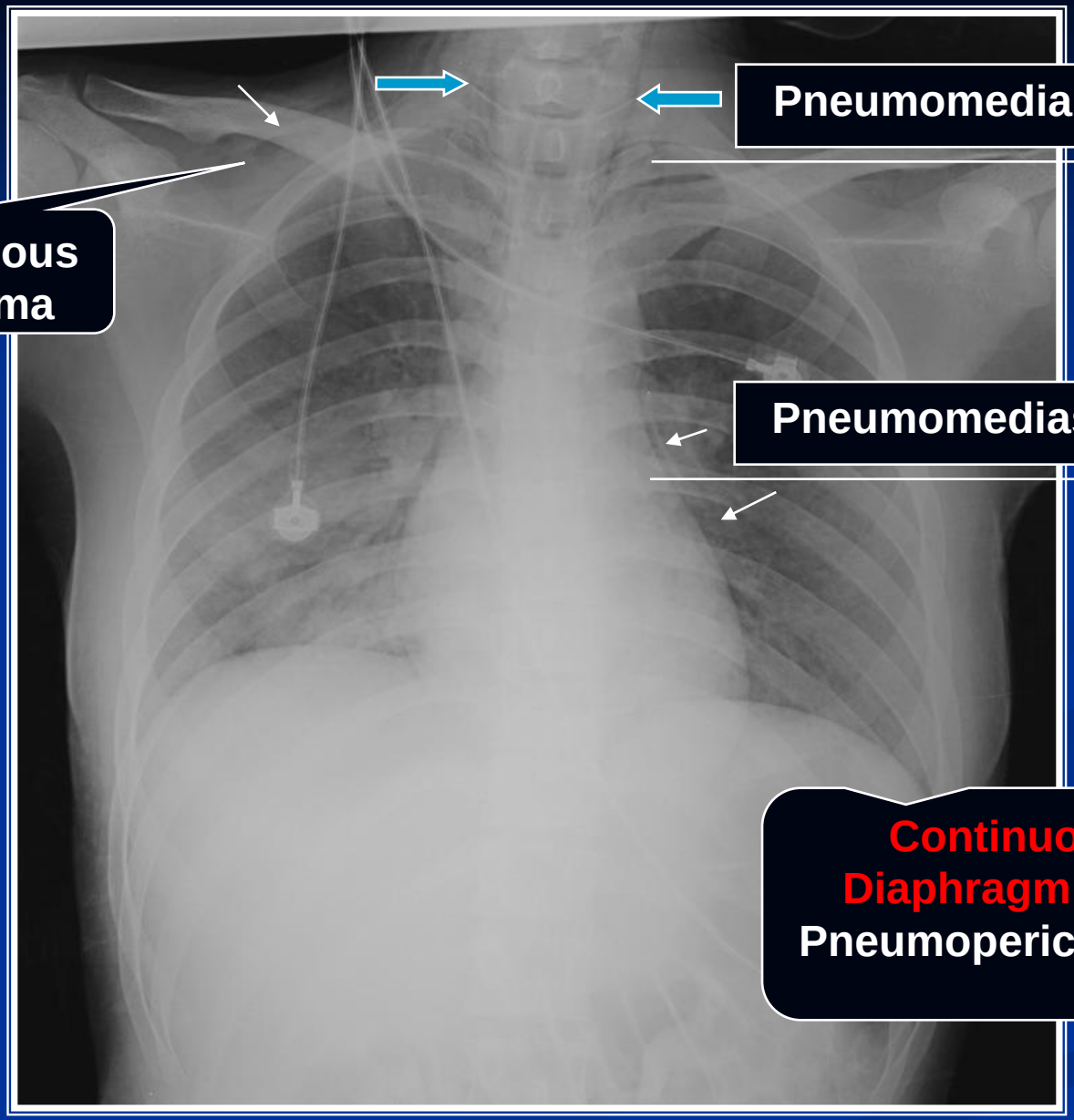
- 一、Normal Anatomy
- 二、Important signs
  - Signs for localization
    - Silhouette sign及其衍生signs
    - Extrapleural sign
    - Incomplete border sign
  - **Signs of pleural diseases**
    - **Meniscus sign**
    - **Deep sulcus sign**
  - **Signs of pneumomediastinum, continuous diaphragm sign**



Pleural effusion, bilateral – Meniscus sign

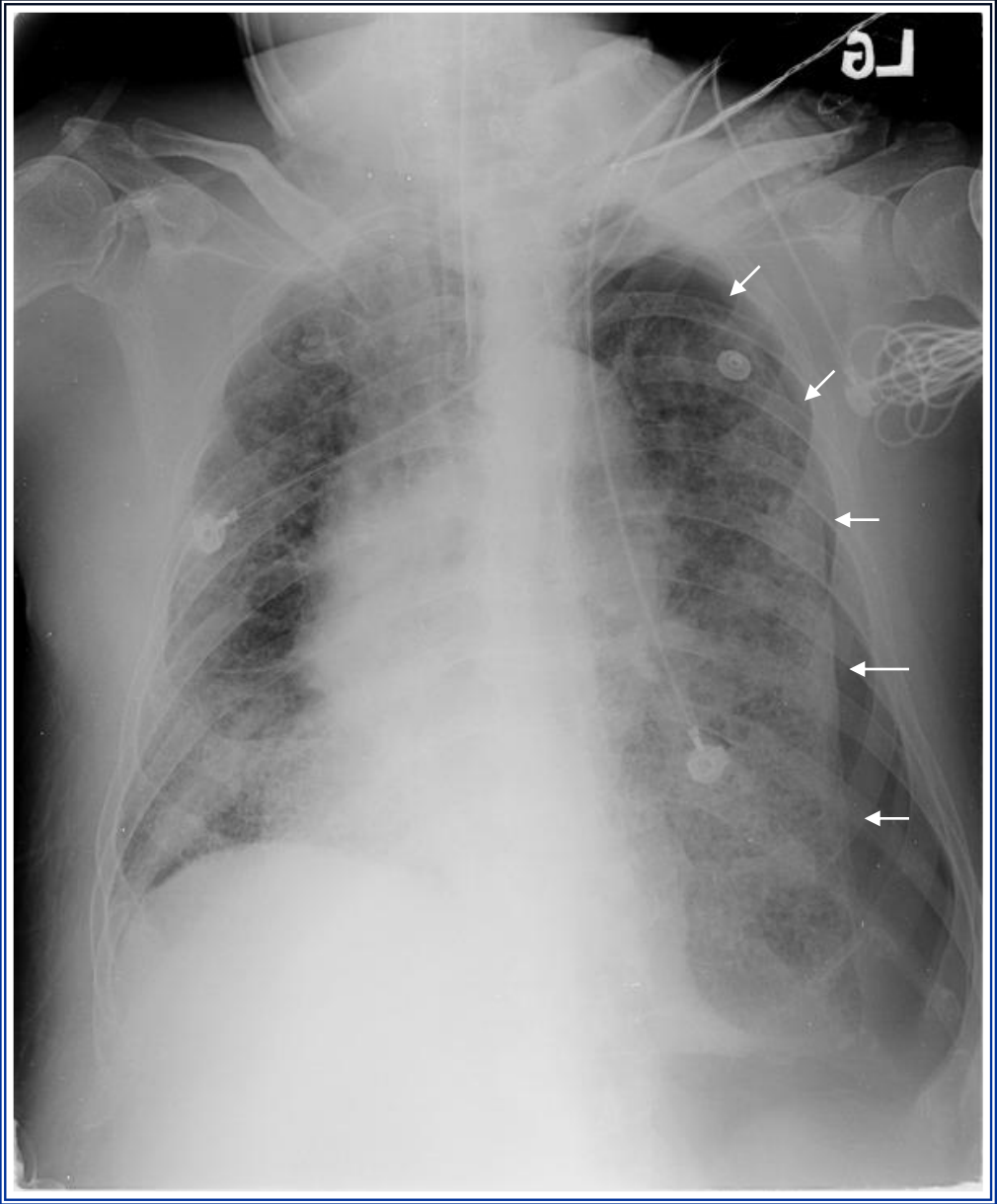


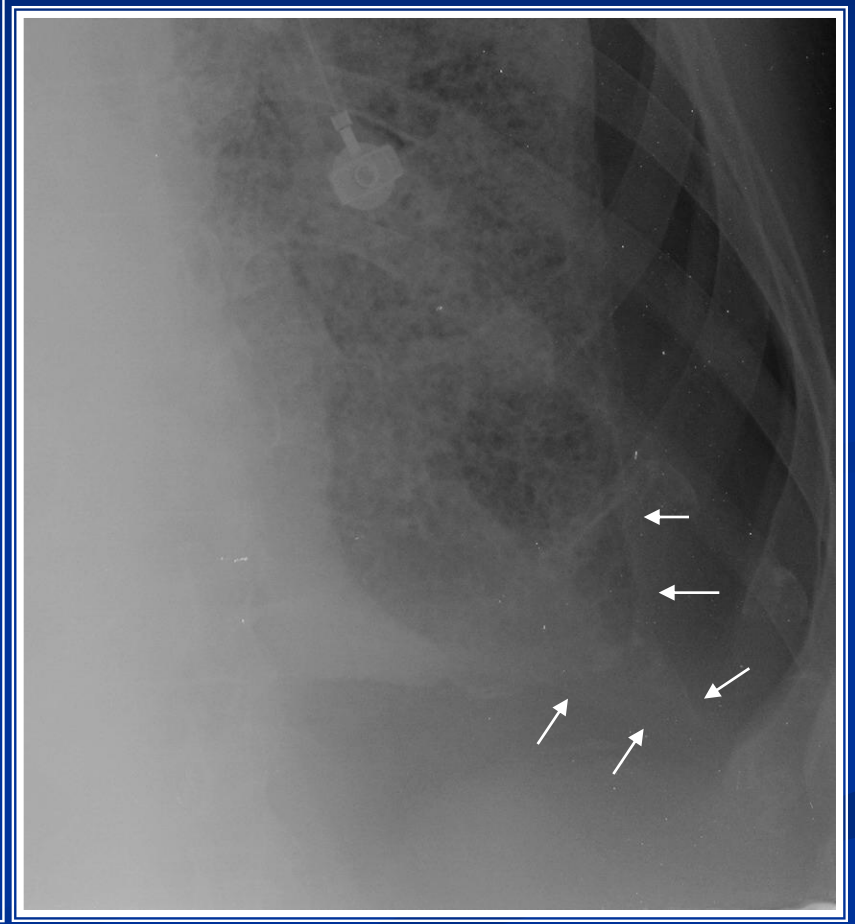
Pneumothorax, R’T



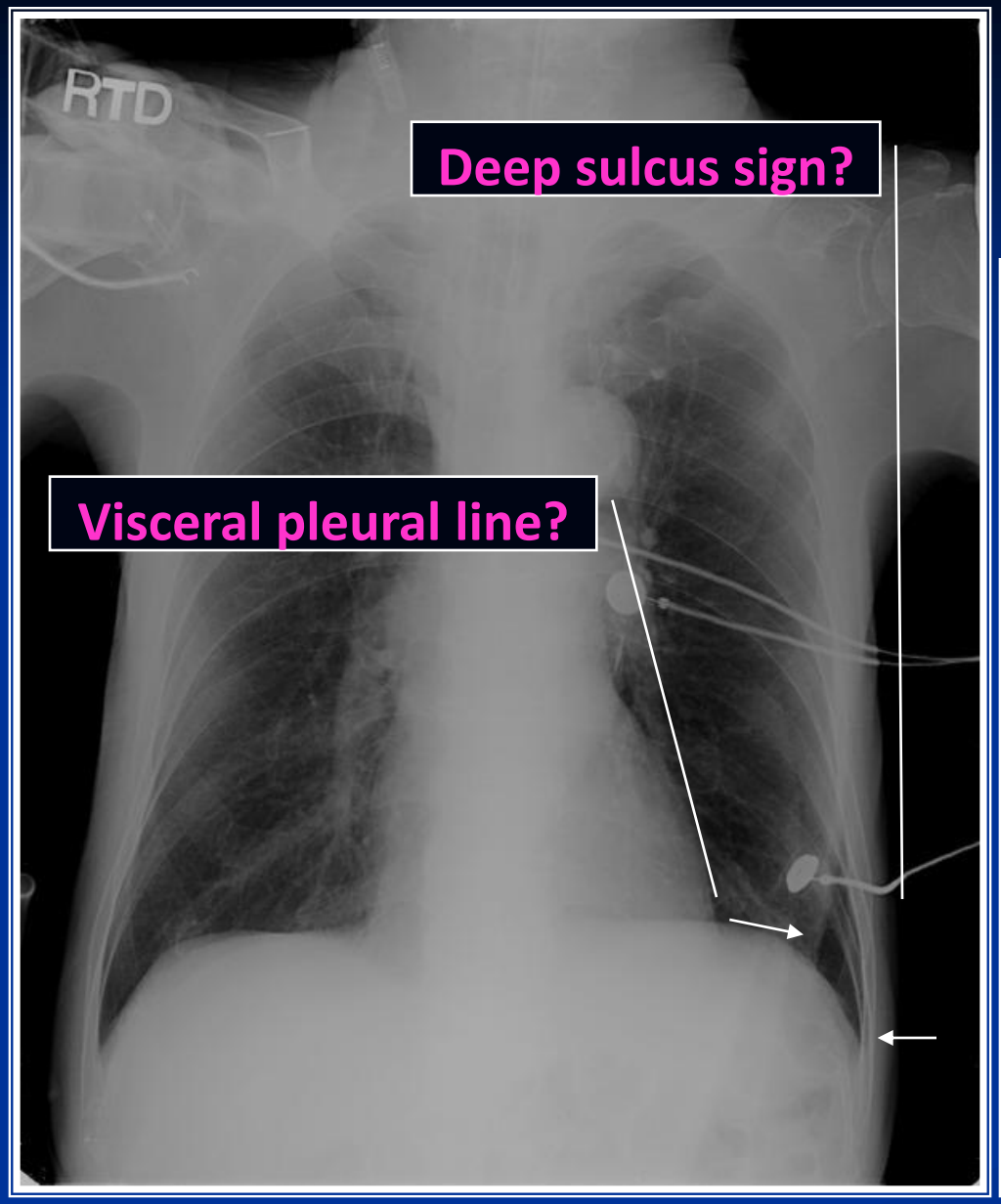
Pneumomediastinum & subcutaneous emphysema

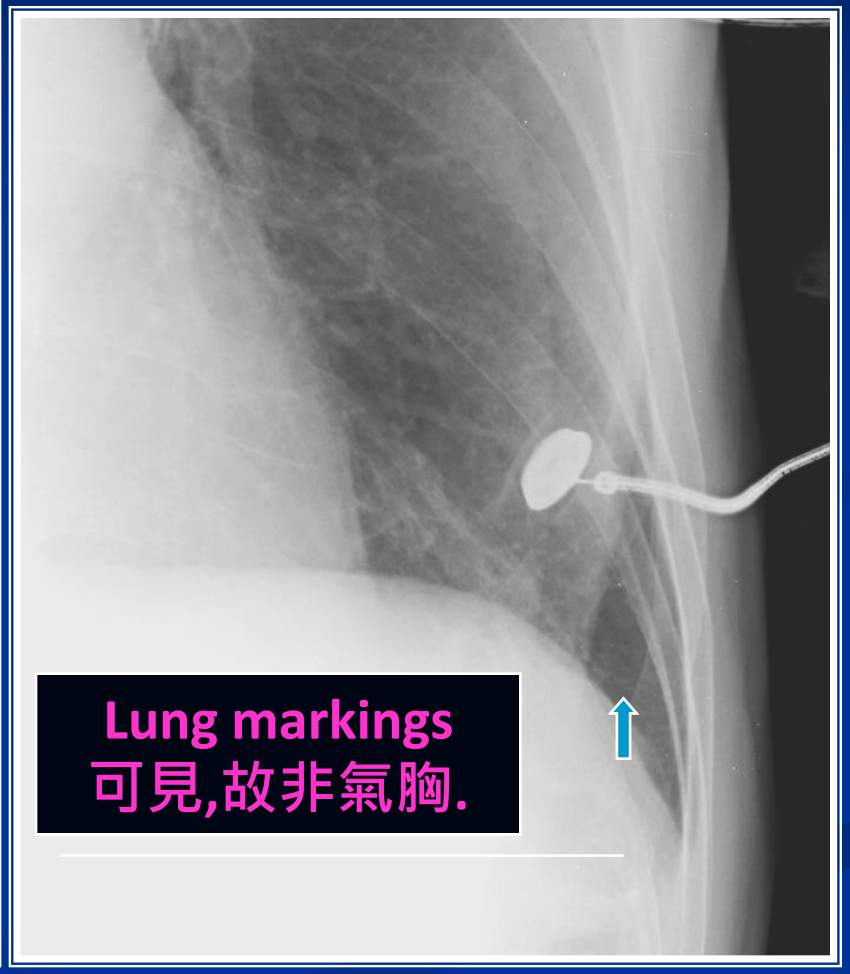
使用呼吸器的病人





Pneumothorax in supine position – deep sulcus sign





Skin fold (不是氣胸)

Important Hints and Pitfalls

- 四個角落: 邊邊角角
- Apex ,Subphrenic area
- Retrocardiac area
- Abdomen area
- Bone
- Skin and Chest wall lesion

Alveolar pattern

- **CXR 的特徵**

- Fluffy margin
- early coalescence
- segmental or lobar distribution
- butterfly (central) distribution
- air alveologram or bronchogram
- acinar or alveolar nodules
- rapid timing

Alveolar pattern

- Differential diagnosis （口訣：血水炎癌）
  - Pulmonary hemorrhage
  - Pulmonary edema (cardiogenic or non-cardiogenic)
  - Infection (pneumonia)
  - Malignancy (alveolar cell ca. or lymphoma)

Ground glass pattern

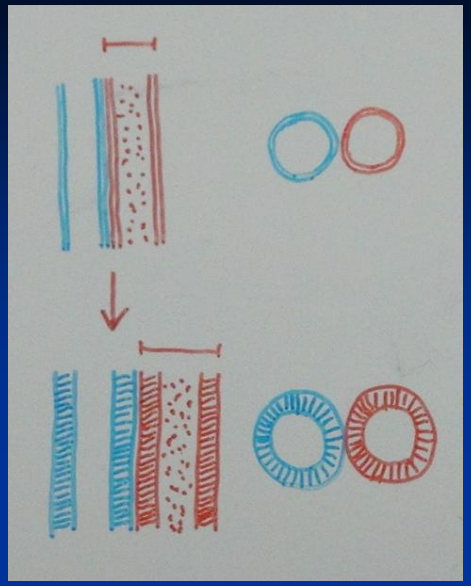
- CXR 的特徵
  - 呈現均勻的不透光度, 有如毛玻璃般
- Differential diagnosis
  - Tumor mass
  - Pleural effusion
  - Chest wall lesion
  - Volume reduction (collapse)
  - Complete consolidation

Interstitial pattern

- CXR 的特徵
  - Axial interstitial pattern (線)
  - Septal pattern (Kerley's line) (線)
  - Diffuse micronodular lesion (點)
  - Fine reticular pattern (Honey combing) (網)

Axial

(沿著bronchovascular bundle)



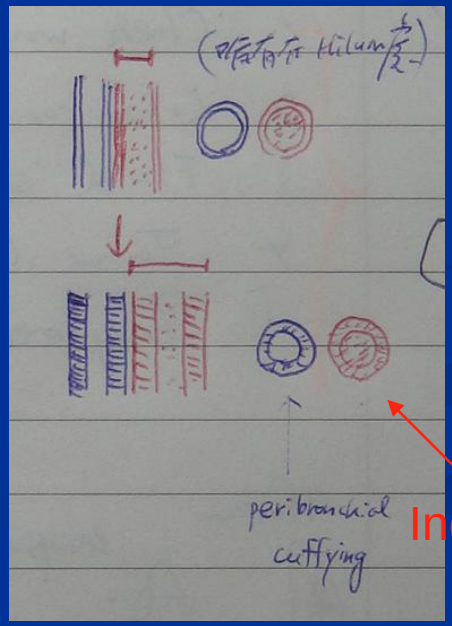
- Increased lung marking ←血管
  - 非量的增加，而是變粗
- Peribronchial cuffing(支氣管邊包裹) ←氣道

- 常見於

  1.edema

  2.atypical pneumonia

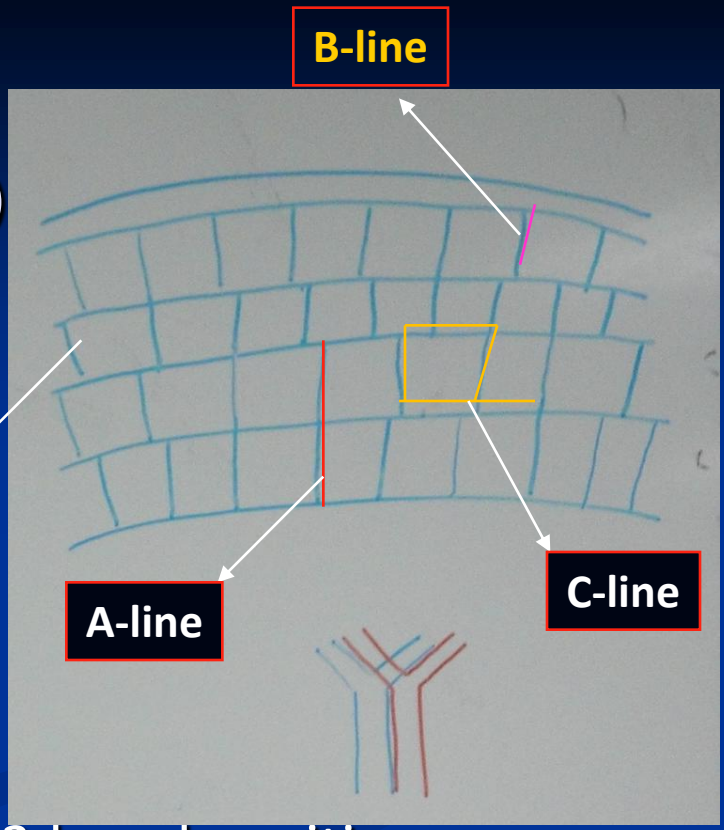
  3.lymphangitis ….
  (..PAP, pneumoconiosis)



Increased lung marking

Septal

(interlobular septum)



- CT上 → septum變明顯
- CXR上→Kerley's line
  - A – 長 , 與pleura 無關係
  - B – 短(1-2cm) , 垂直pleura
  - C – 短 , 轉折網狀

- 常見於1,edema 2.atypical pneumonia 3.lymphangitis .... (..PAP, pneumoconiosis)

 # 1小格- secondary lobule : 2-2.5cm , so B-line 約2cm

Septal

- Septal pattern (Kerley's A, B, C line)
  - Acute
    - Pulmonary edema
    - Infection: atypical pneumonia
  - Chronic
    - Edema
    - Malignancy: Lymphangitis
    - Idiopathic (old age)

Take Home Message

- 看片的順序
- 了解可能的盲點及陷阱點
- 了解常見的輪廓徵象
- 虛心學習
- 反覆練習