Chest Imaging 2019

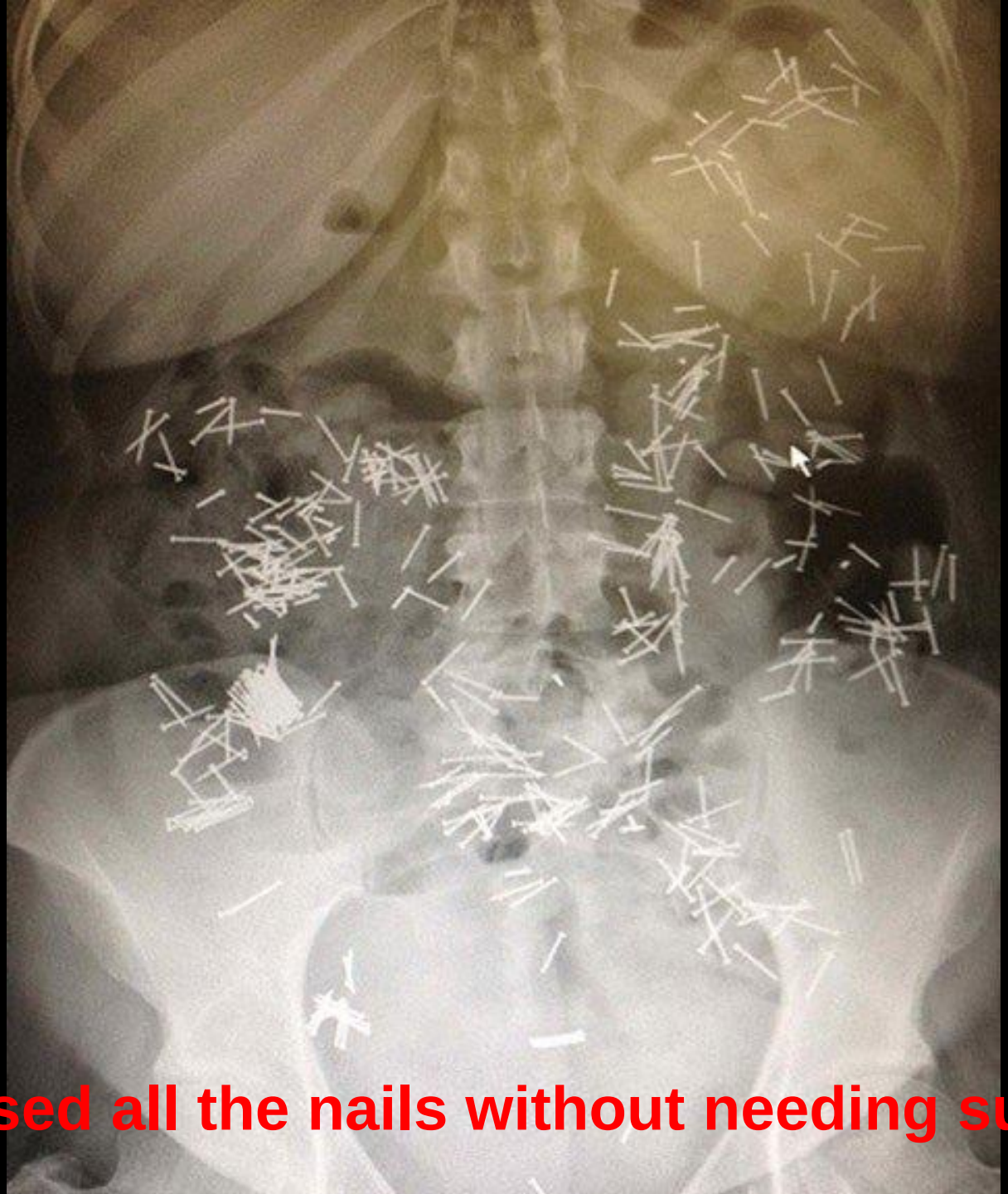
Michael Chandler, MD

Glossary

- CXR
  - Chest X-Ray aka Chest Radiograph
- US
  - Ultrasound
- CT
  - Computed Tomography

Chest Imaging

- Chest Radiography Interpretation
- Chest US Interpretation
- CT Chest Interpretation



Passed all the nails without needing surgery

Chest Imaging

- Chest Radiography Interpretation
- Chest US Interpretation
- CT Chest Interpretation

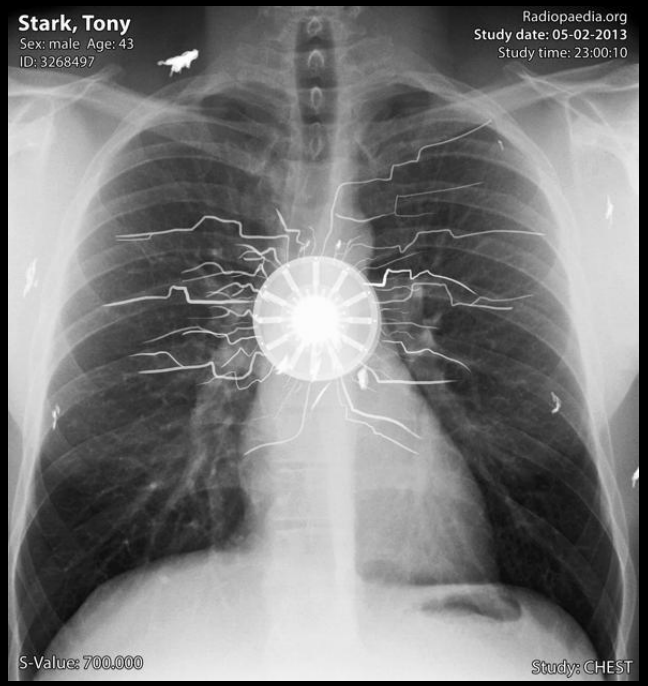
Chest Imaging

- Chest Radiography Interpretation
  - Atelectasis
  - Pneumothorax
  - Pleural Effusion
  - Consolidation
  - Heart Failure
- Chest US Interpretation
- CT Chest Interpretation

Chest Radiograph Interpretation

Chest Radiograph Interpretation

- 3 STEP SYSTEM
  - POD
  - RIP
  - ABCDEF
- As you practice, add a layer



Chest Radiograph Interpretation

- 3 STEP SYSTEM
  - POD
  - RIP
  - ABCDEF

Chest Radiograph Interpretation

- Interpretation
  - P
  - O
  - D

Chest Radiograph Interpretation

- Interpretation
  - Patient
  - Orientation
  - Date

Chest Radiograph Interpretation

- Interpretation
  - Patient
    - Patient correct?
  - O
  - D

Chest Radiograph Interpretation

Chest Radiograph Interpretation

- Interpretation
  - P
  - O
  - D

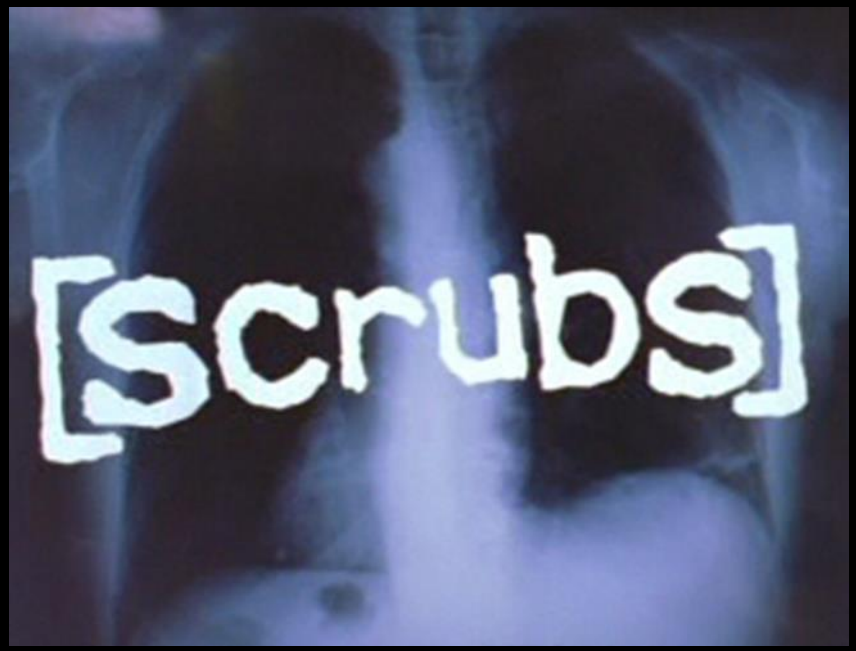
Chest Radiograph Interpretation

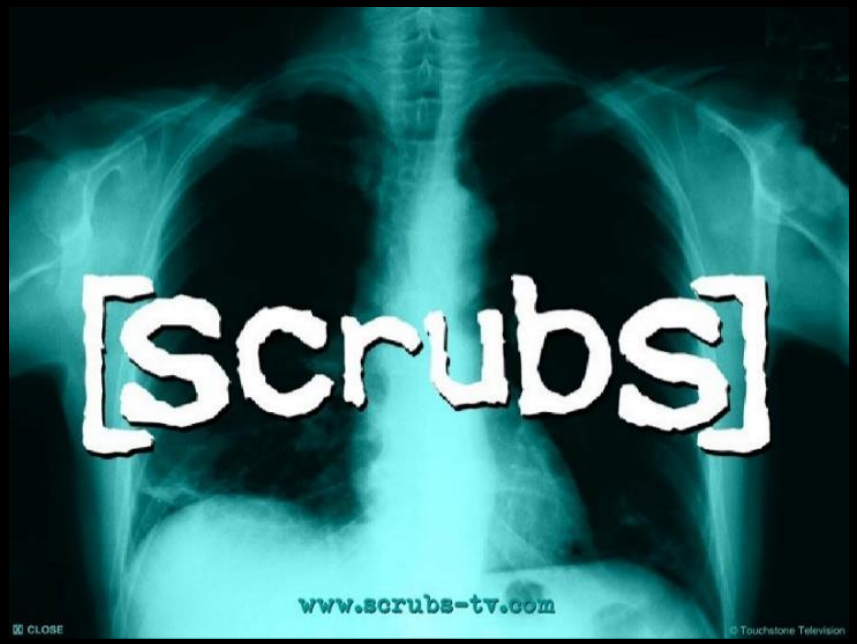
- Interpretation
  - P
  - Orientation
    - Orientation correct?
  - D

Chest Radiograph Interpretation

- Interpretation
  - P
  - Orientation
    - Orientation correct?
      - CXR reversed?
  - D

Chest Radiograph Interpretation





Chest Radiograph Interpretation

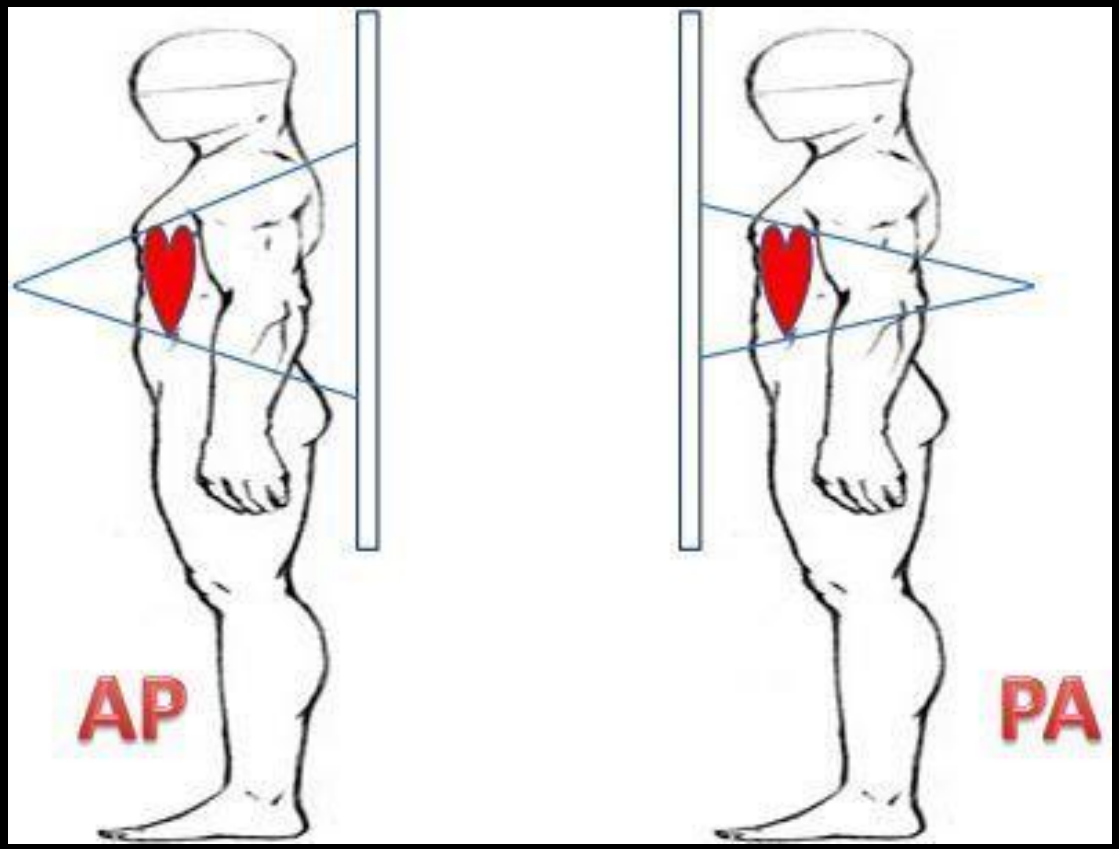
- Interpretation
  - P
  - Orientation
    - PA (Posterior Anterior) or AP (Anterior Posterior)
      - PA: CXR tube 72” away
      - AP: CXR tube 40” away
  - D

Chest Radiograph Interpretation

Chest Radiograph Interpretation

- Interpretation
  - P
  - Orientation
    - PA (Posterior Anterior) or AP (Anterior Posterior)
      - Image Projection
  - D

Chest Radiograph Interpretation



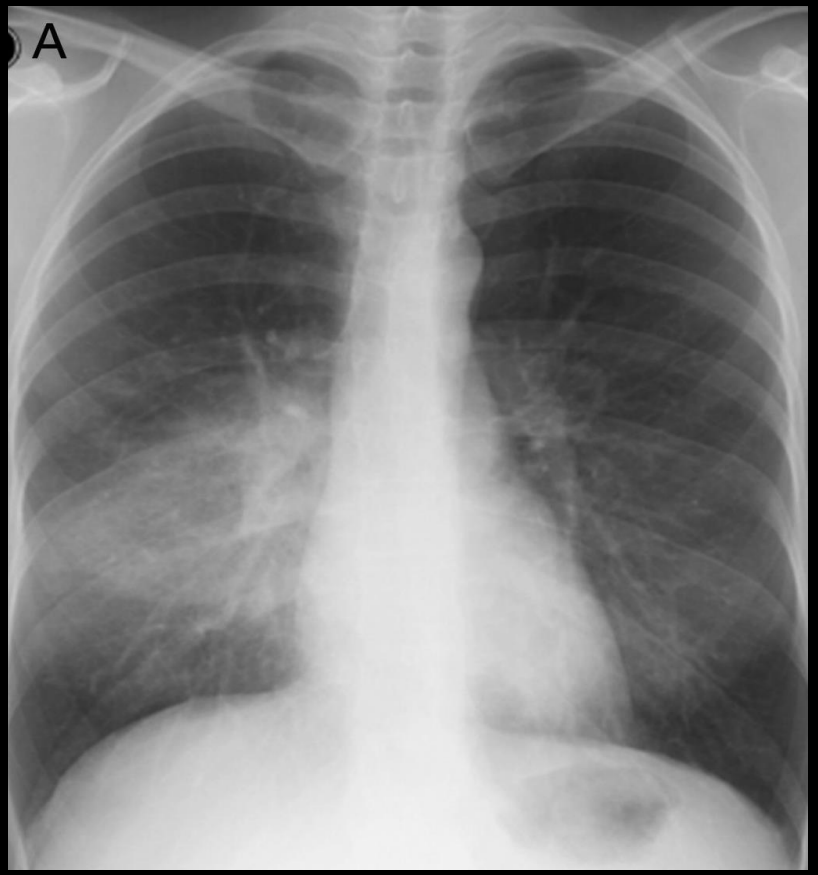
Chest Radiograph Interpretation

- Interpretation
  - P
  - O
  - D

Chest Radiograph Interpretation

- Interpretation
  - P
  - O
  - Date
    - Correct date?

Chest Radiograph Interpretation

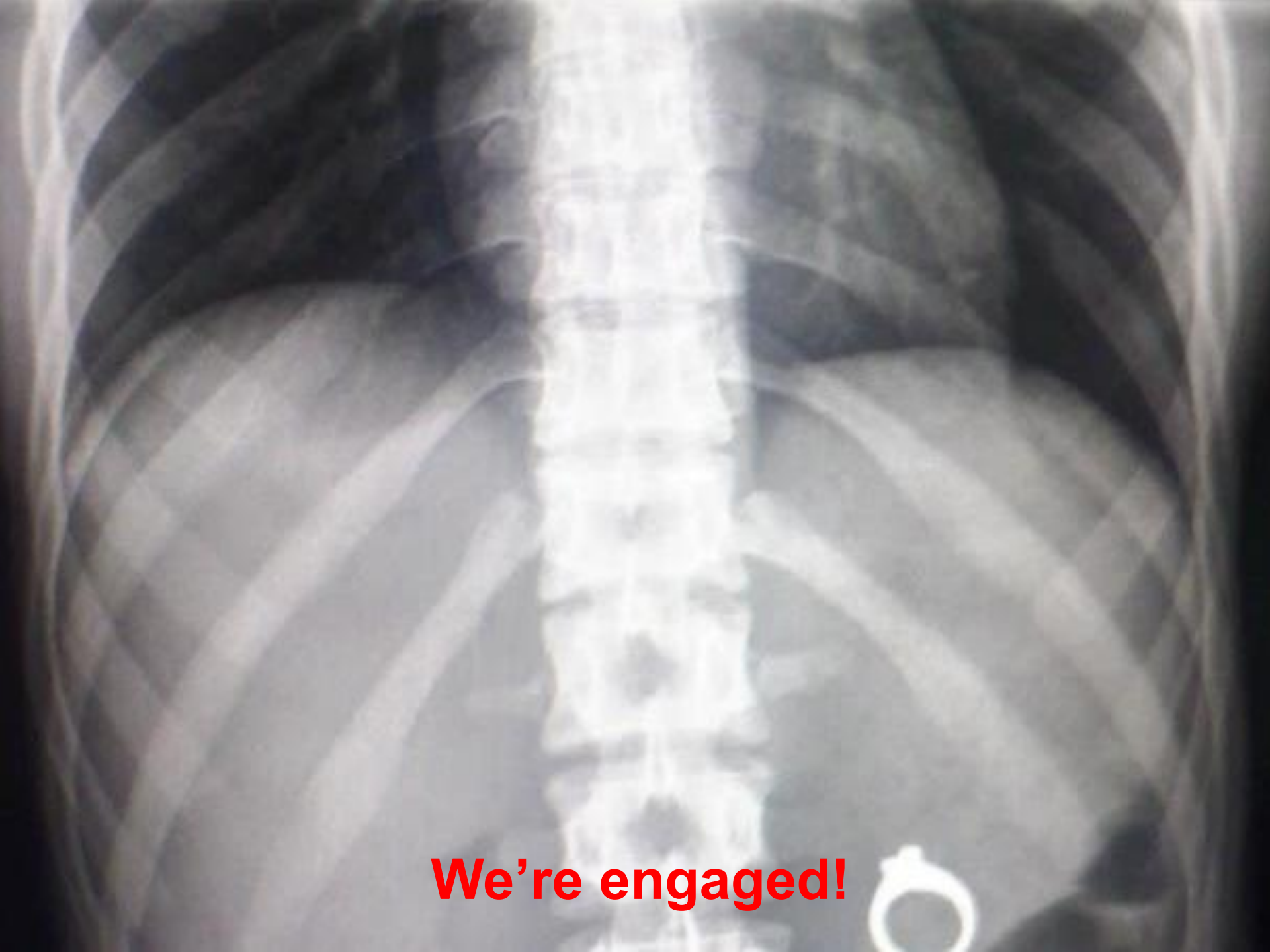


Chest Radiograph Interpretation

- Interpretation
  - P
  - O
  - D

Chest Radiograph Interpretation

- Interpretation
  - Patient
  - Orientation
  - Date


We’re engaged!

Chest Radiograph Interpretation

- 3 STEP SYSTEM
  - POD
  - RIP
  - ABCDEF

Chest Radiograph Interpretation

- 3 STEP SYSTEM
  - POD
  - RIP
  - ABCDEF

Chest Radiograph Interpretation

- R
- I
- P

Chest Radiograph Interpretation

- Rotation
- Inspiration
- Penetration

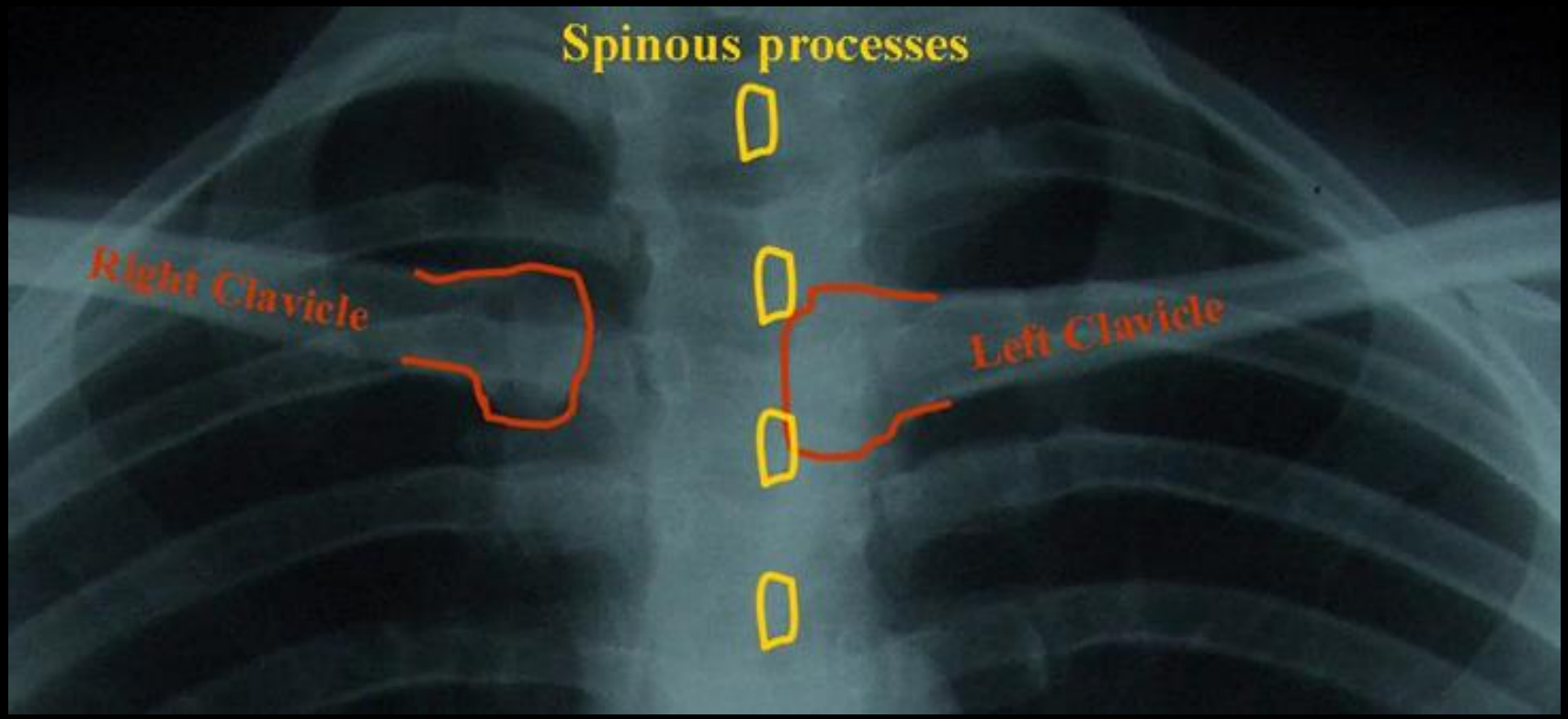
Chest Radiograph Interpretation

- R
- I
- P

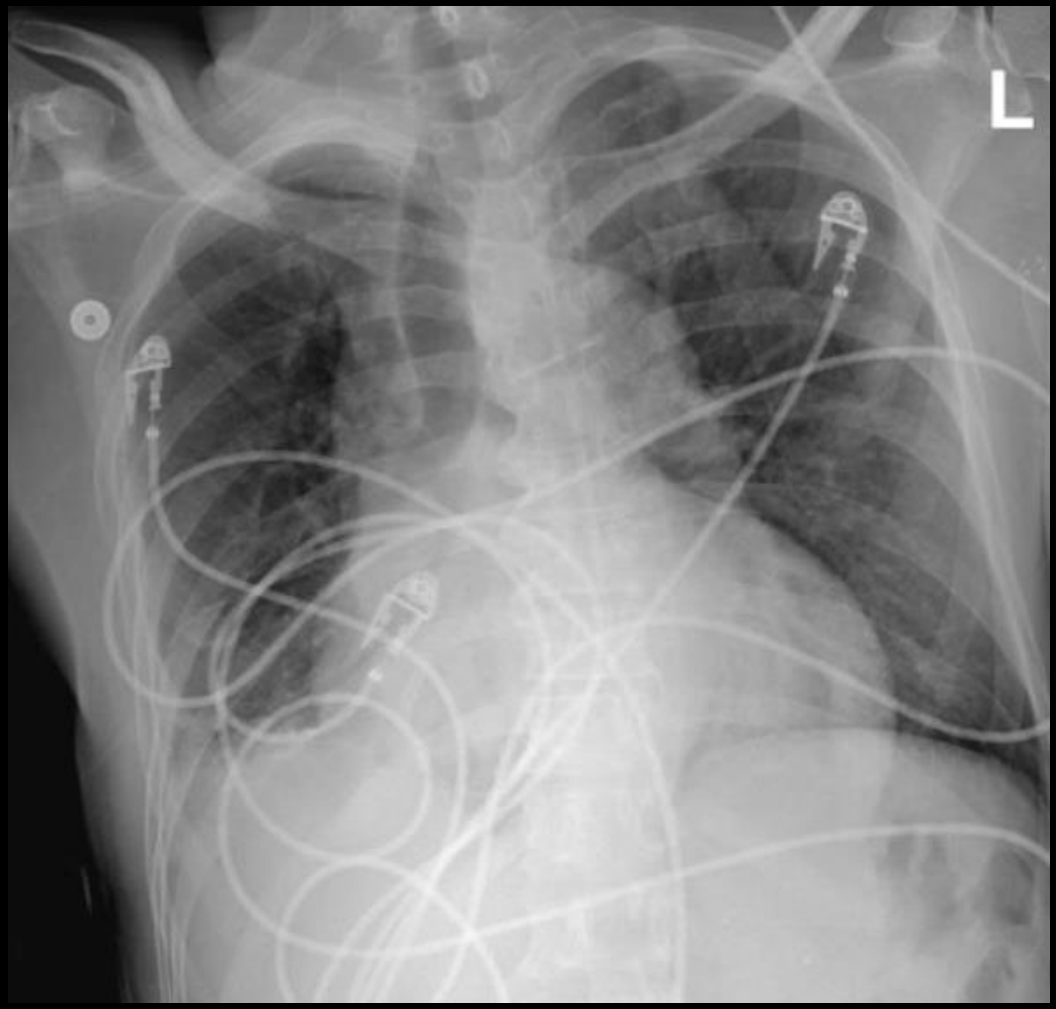
Chest Radiograph Interpretation

- Rotation
  - Clavicles equidistant from spine
- I
- P

Chest Radiograph Interpretation



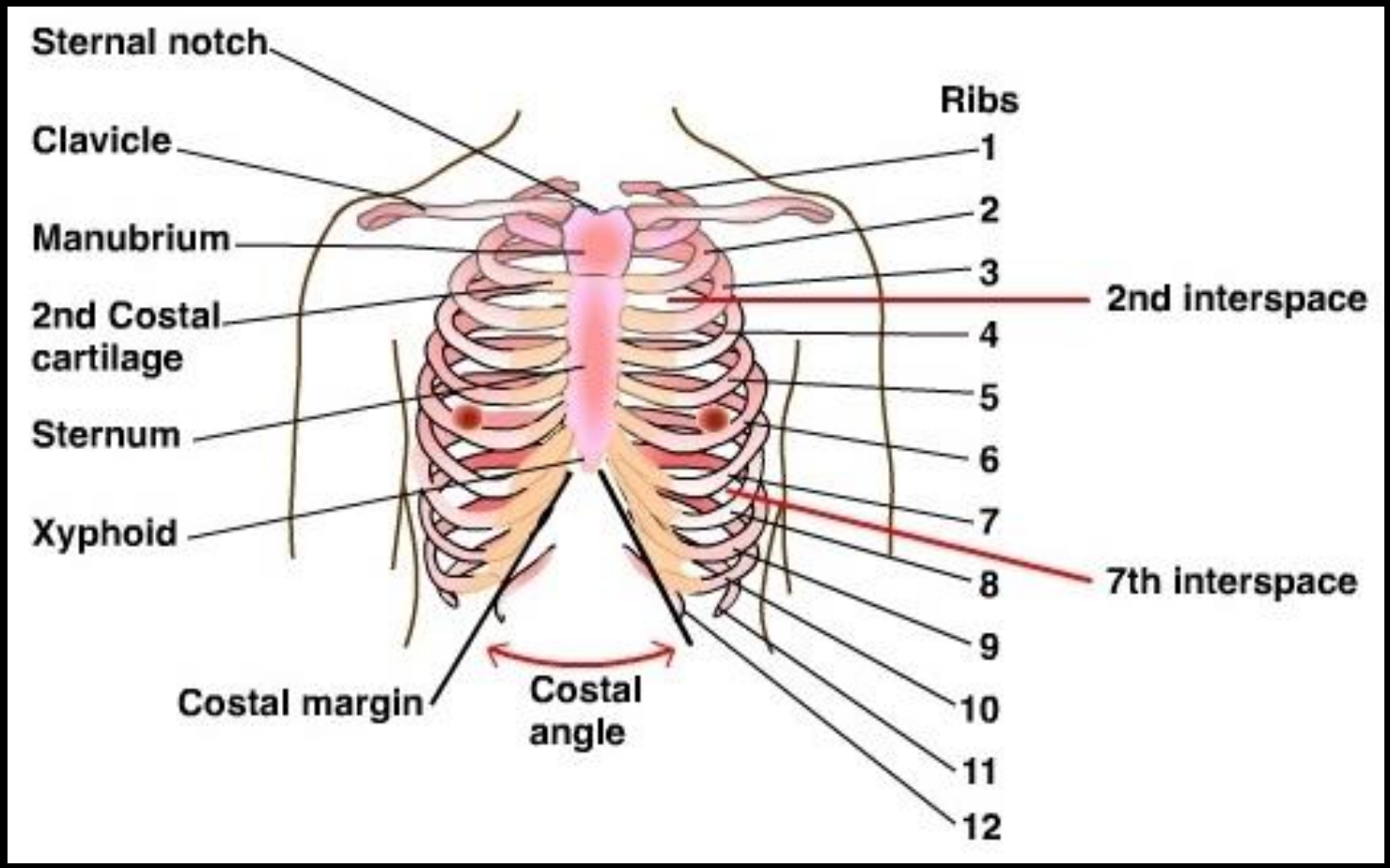
Chest Radiograph Interpretation

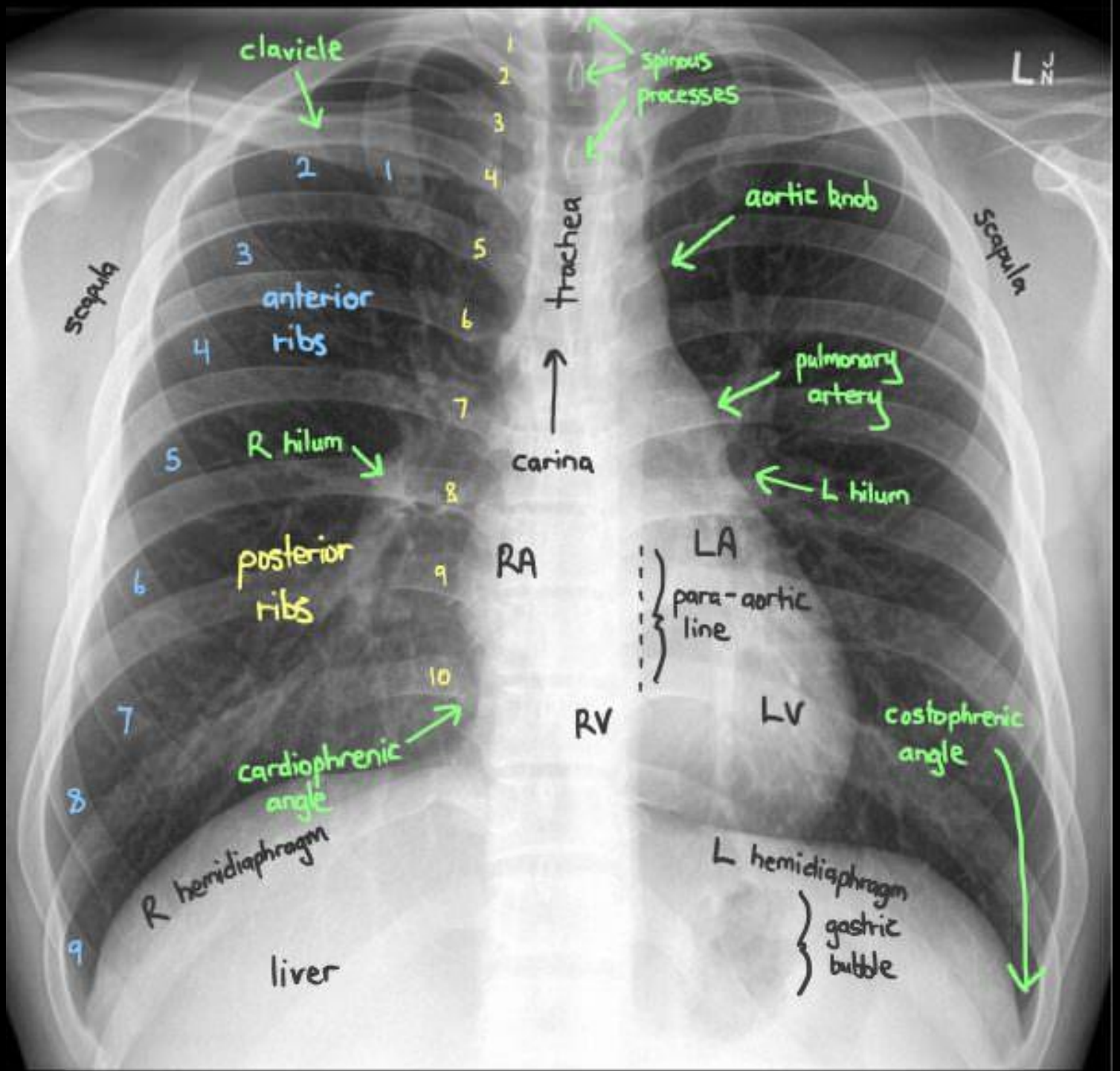


Chest Radiograph Interpretation

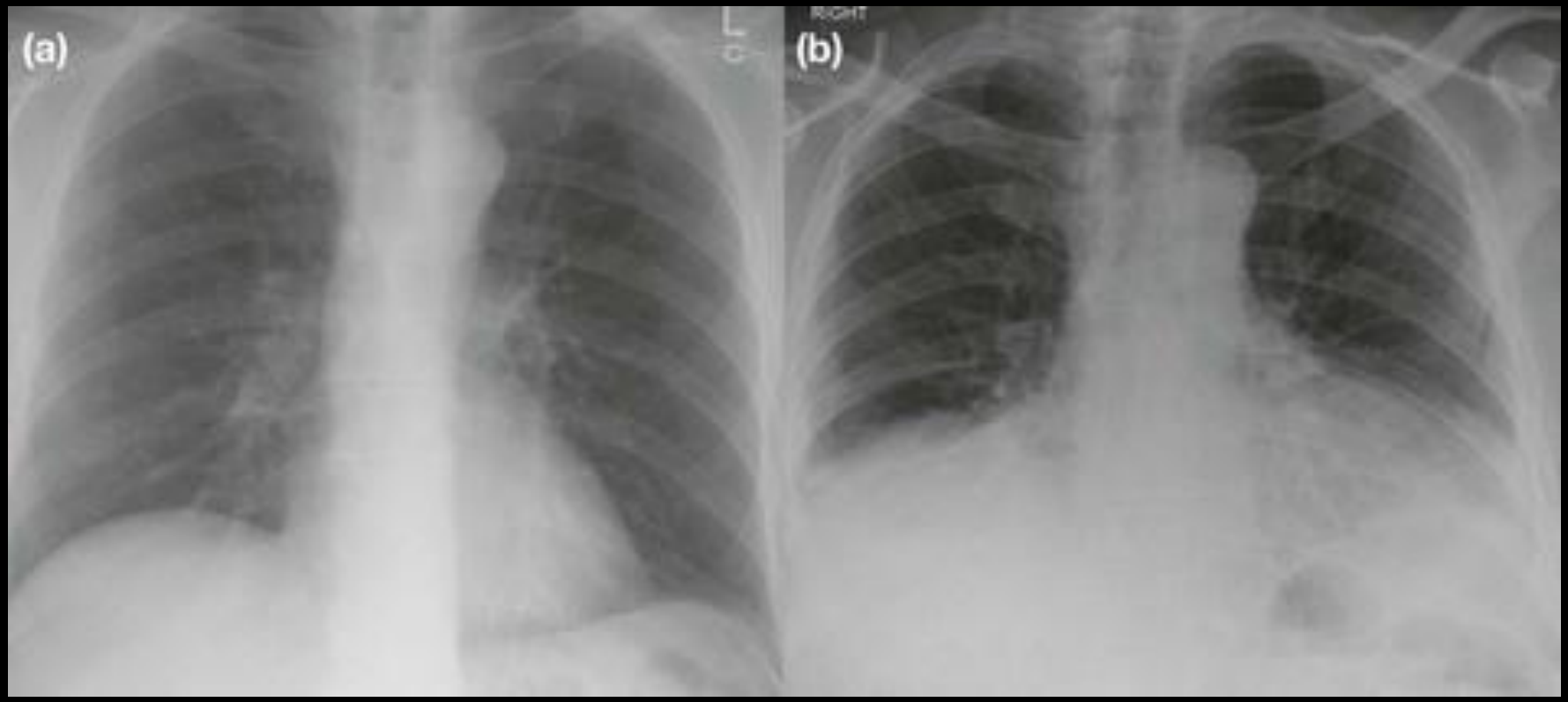
- R
- Inspiration
  - At least 9 (ideally 10-11) rib pairs
- P

Chest Radiograph Interpretation




clavicle
spinous processes
aortic knob
scapula
scapula
anterior ribs
trachea
pulmonary artery
R hilum
carina
L hilum
posterior ribs
RA
LA
para-aortic line
RV
LV
costophrenic angle
cardiophrenic angle
R hemidiaphragm
L hemidiaphragm
gastric bubble
liver

Chest Radiograph Interpretation



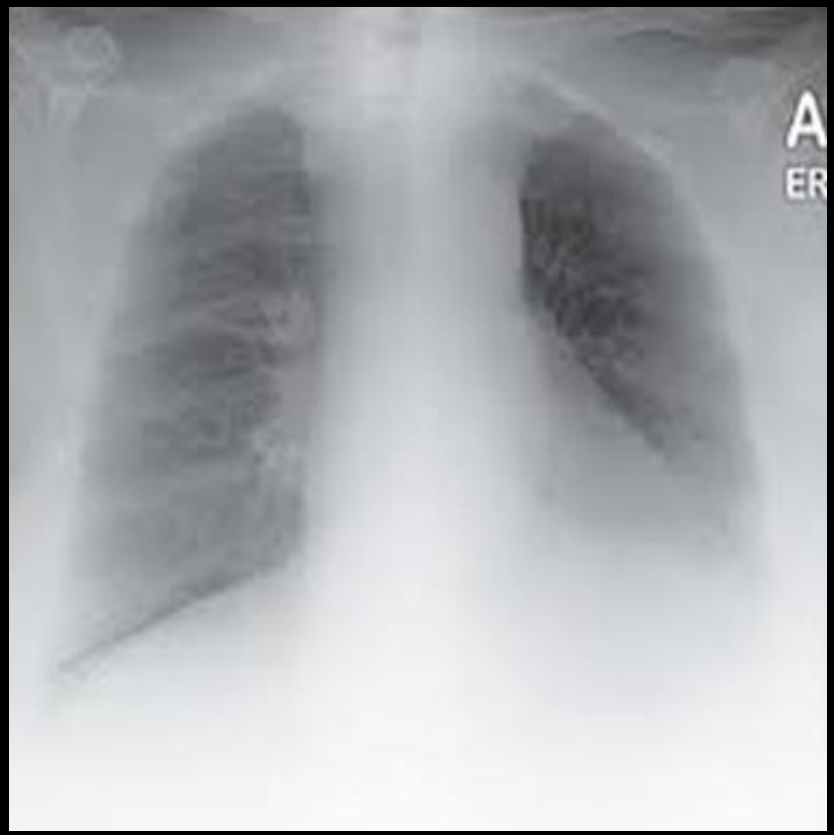
Chest Radiograph Interpretation

- R
- I
- P

Chest Radiograph Interpretation

- R
- I
- Penetration
  - Vertebrae should be just visualized down heart
    - Overpenetrated: see every detail of spine
    - Underpenetrated: can’t see spine behind heart

Chest Radiograph Interpretation




Two wrongs don’t make a right

Chest Radiograph Interpretation

- 3 STEP SYSTEM
  - POD
  - RIP
  - ABCDEF

Chest Radiograph Interpretation

- 3 STEP SYSTEM
  - POD
  - RIP
  - ABCDEF

Chest Radiograph Interpretation

- Interpretation
  - Airway & Adenopathy
  - Bones & Breast shadows
  - Cardiac silhouette
  - Diaphragm
  - Everything else
  - Fields

Chest Radiograph Interpretation

communications to the editor

Communications for this section will be published as space and priorities permit. The comments should not exceed 350 words in length, with a maximum of five references; one figure or table can be printed. Exceptions may occur under particular circumstances. Contributions may include comments on articles published in this periodical, or they may be reports of unique educational character. Please include a cover letter with a complete list of authors (including full first and last names and highest degree), corresponding author's address, phone number, fax number, and email address (if applicable). Specific permission to publish should be cited in the cover letter or appended as a postscript. CHEST reserves the right to edit letters for length and clarity.

Are Digital Chest X-rays Good Enough?

To the Editor:

I am writing about the growing use of digital radiography (teleradiology) for chest x-rays. I solicit responses from other more knowledgeable chest physicians regarding their experience and recommendations for this new technology.

One of my community hospitals has for 2 years had such a system in its emergency department (ED) and plans to extend its use throughout the institution. My experience with this system has been disappointing and frustrating on many occasions. This has held true whether I have viewed images on the monitors, in the ED, in the radiology department, after transfer to film (in small or large format), with or without radiologists' consultation. The images appear grainy and of low resolution. I frequently find it impossible to distinguish these artifacts from important pathologic findings such as congestive heart failure or interstitial infiltrates. With gross and obvious findings, these images are "okay." With subtle findings, I have found them woefully inadequate and universally have had to repeat with a standard film the next day. Furthermore, the limited number of monitors at a workstation (two) makes it impossible to compare a series of films side-by-side, thus gutting a very important clinical tool.

I have worried about this system since I began using it and have questioned its validity. I have been told, "Oh, you just have to get used to it!" and "You have to fiddle with the dials." I have been admonished that "This is the wave of the future" and that "All the studies show this is better than standard films." While I am not a radiation physicist, radiologist, or computer imaging expert, something just did not seem right.

So I did a Grateful Med search hoping to find lots of large clinical studies, but did not. I found a 1997 Norwegian study[1] of 120 chest x-rays that concluded, "We found the accuracy and sensitivity of the teleradiology system to be *clearly inferior to film evaluation.*" The recent German work[2] studied high spatial resolution images such as chest x-rays and low spatial resolution images such as liver CTs. In comparing conventional light-box reading to digital images in 446 cases, "there *was a noticeable loss of diagnostic accuracy* for the high spatial resolution films . . ."

The hospital's digital x-ray system has been featured on television and has engendered favorable publicity. I understand that file rooms, film storage, and associated personnel are very costly and that electronic data storage is ultimately less expensive. I acknowledge the financial realities of 1997 and the great pressures placed on hospital administrators (and the professionals who now work for them) to cut costs. I too can feel the excitement for the *avante garde* wizardry of digitized images.

Different types of images may be more or less suitable for digital technique in present state of the art. Our system may or may not be the finest available. I may be inadequately trained in using the system. Before launching major new technology and abandoning the traditional standard, I hope the new systems will be validated clinically in prospective, randomized, controlled, clinical trials. I look forward to assistance from the readership.

Bennett E. Ojserkis, MD, FCCP
Linwood, New Jersey

References

1 Stormer J, Bolle SR, Sund T, et al. ROC study of a teleradiology workstation versus film readings. Acta Radiol 1997; 38:176-80
2 Krause M, Brado M, Schosser R, et al. Diagnostic accuracy in remote expert consultation using standard video-conference technology. Eur Radiol 1996; 6:932-38

The ABCs of Chest X-ray Film Interpretation

To the Editor:

Learning to interpret the routine chest radiograph is an important task for all students of clinical medicine. It is a test that is commonly ordered, readily available, relatively inexpensive, and offers a tremendous amount of pertinent information to aid in medical decision making in a wide variety of clinical circumstances. However, the information is provided as a complex two-dimensional collection of shadows that require a considerable degree of skill to interpret. To the beginning student, the usual advice to "be systematic" so as not to miss any important findings is sensible, but often of little practical value.

To aid our residents and medical students in their endeavor to develop skills at interpreting the chest radiograph, we have employed the alphabet as a simple learning tool. To be certain, this, or variations on this theme, must have been employed elsewhere, and we therefore make no claims to originality. Still, we have found our specific use of an alphabetical mnemonic to be of value as both a teaching and a learning tool.

In approaching the chest radiograph, either frontal (posteroanterior or anteroposterior) or lateral projections, the reader is asked to assess the quality of the film and then resist first focusing on the lung fields in favor of the systematic, alphabetic approach outlined here:

A—Airway and adenopathy: Review the airway, inspecting the trachea and mainstem bronchi and looking for deviation or evidence of luminal obstruction. Adenopathy, either peritracheal or hilar, is also assessed.

B—Bones and breast shadows: Inspect the bones for radiographic density, fractures, lytic lesions, or bony deformity. Evaluate the breast shadows for gross asymmetry, evidence of prior surgery, and any gross calcification.

C—Cardiac silhouette: Assess the cardiac silhouette for general size and contour.

D—Diaphragm: Assess the diaphgram(s) with attention to the contour and costaphrenic angle, bilaterally.

E—Everything else: Review everything else around the lung fields including the subcutaneous soft tissues and pleural boundaries.

F—Fields: Finally, review the lung fields themselves looking for evidence of infiltrate, mass, and pattern of vascularity.

It is my experience that new learners using this approach are able to recognize both the presence of chest radiographic abnormality and absence of normality. Further, as their experience grows, they are readily able to add interpretation of these abnormalities with clear differential diagnoses and place them in the appropriate clinical context.

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Chronic Ventilator Unit Admission Criteria

To the Editor:

I greatly enjoyed reading the article entitled, "A Community-Based Regional Ventilator Weaning Unit: Development and Outcomes," by Bagley and Cooney in the April issue of *CHEST*.[1] Their stress of rehabilitation of ventilator-dependent patients in their unit is an important aspect in successful weaning of these patients. I thought that it was an excellent article.

I do have one comment about a statement made on page 1027 of the "Discussion" section in this article. The authors stated, "To be accepted by the Mayo Clinic unit, the Health Care Financing Administration (HCFA) required that the attending physician attest in writing that the patient was likely to wean or return to home on a regimen of mechanical ventilation." I would like to point out that these criteria applied to all four of the HCFA weaning unit demonstration sites. I believe that the reason for this requirement was that HCFA desired not to have these units filled with hopeless ventilator patients, which would cost them a great deal of money. Instead, they wished to have some assurance that the patient was either likely to be weaned or would have caregivers or other resources in the home, which would allow for mechanical ventilation within the home on discharge. This latter situation is extremely difficult to achieve in the elderly Medicare population.

I believe that the efficacy of these units was demonstrated by the HCFA demonstration project and that further steps need to be taken by HCFA to take advantage of this study. There is no reason for suitable patients to be discharged to waivered ventilator units outside of acute care hospitals if appropriate patients can be better served in the acute care hospital where they currently reside, dependent on mechanical ventilation. This study by Bagley and Cooney is another in a continuum of studies that demonstrates the efficacy of these ventilator-dependent units, whether they be in the acute care hospital or freestanding.

Douglas R. Gracey, MD, FCCP
Chronic Ventilator Dependent Unit
Pulmonary & Critical Care Medicine
Mayo Clinic
Rochester, Minnesota

Reference

1 Bagley PH, Cooney E. A community-based regional ventilator weaning unit: development and outcomes. Chest 1997; 111:1024-29

To the Editor:

The Health Care Financing Administration (HCFA) ventilator weaning demonstration projects for which data are available,[1,2] clearly show that a high percentage of carefully selected patients that have become ventilator dependent can be weaned using the principles of rehabilitation medicine. I believe the location of such a unit, inside or outside of an acute care hospital, is less important than the multidisciplinary rehabilitation approach.

Weaning from mechanical ventilation is only one of the useful roles rehabilitation-based ventilator units may play in the medical community. Dr. Gracey's comments illustrate the dilemma of selection criteria for a ventilator unit. In many communities, long-term care facilities for ventilator patients are rare, resulting in the custodial care of an estimated 11,500 ventilated patients in US acute care hospitals in 1990.[3] If extramural ventilator units do not accept the "hopeless" patients to which Dr. Gracey refers, substantial losses accrue to acute care institutions. Further, many ventilator-dependent patients have potential to regain the ability to perform many of the activities of daily living, even though they remain fully or partially ventilator dependent. Because, as Dr. Gracey points out, it is extremely difficult to marshal sufficient resources to permit these patients to receive mechanical ventilation at home, the HCFA guidelines may have the effect of denying such patients beneficial treatment.

Capitation may remove some of the inefficient artificial regulatory barriers that direct patients into various sorts of post-acute care settings, allowing attention to be focused on where the best outcomes and most efficient care can be provided. Dr. Gracey certainly has been a leader in the area of specialized weaning units. I hope that his comments continue to focus attention on the role ventilator units can play in the integrated delivery systems now developing.

Also, please note that in the acknowledgments section of our article, the name of Dr. Michael Baron was inadvertently omitted.

Peter H. Bagley, MD
Memorial Medical Group
Worcester, Mass

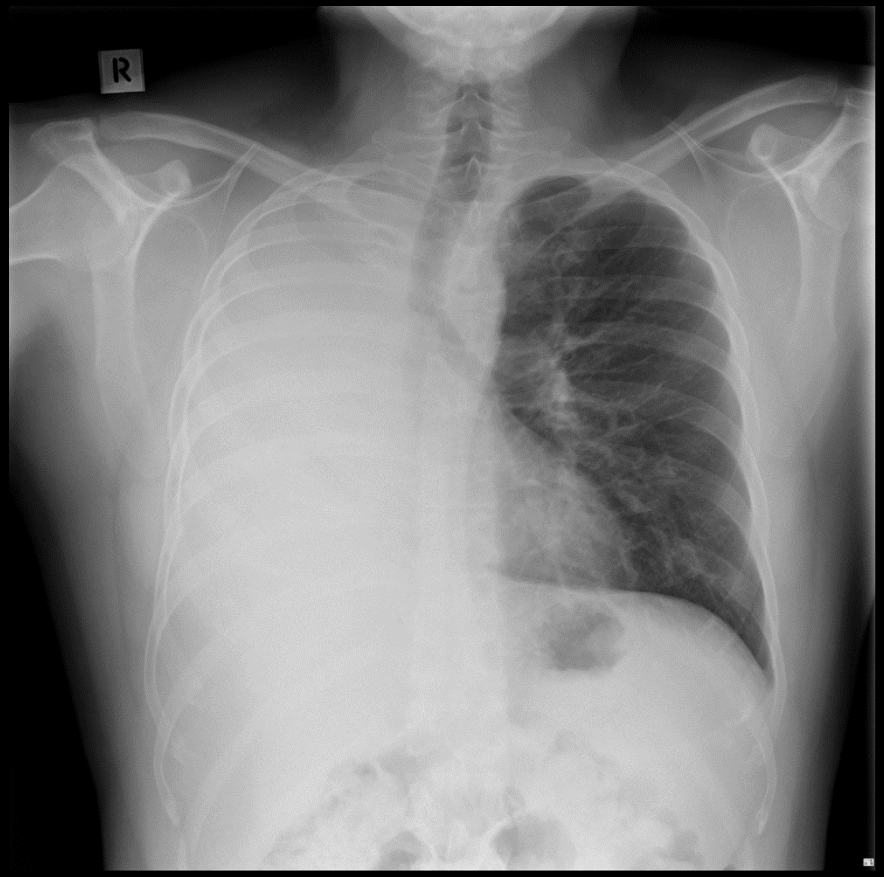
References

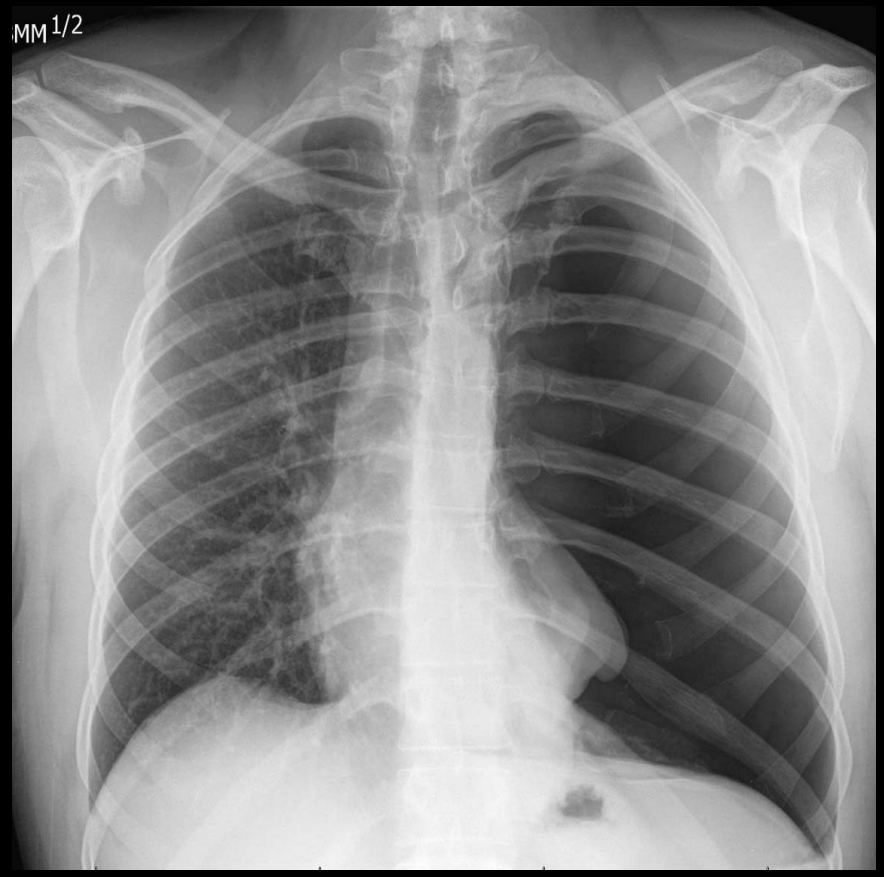
1 Criner GJ, Kreimer DT, Pidlaoan L. Patient outcome following prolonged mechanical ventilation via tracheostomy [abstract]. Am Rev Respir Dis 1993; 147:A574
2 Gracey DR. Ventilator care beyond the intensive care unit. Mayo Clin Proc 1995; 70:595-97
3 A study of chronic ventilator patients in the hospital: A patient profile and analysis conducted by the Gallup organization for the American Association of Respiratory Care. Dallas: AARC, 1991

Chest Radiograph Interpretation

- Interpretation
  - Airway & Adenopathy
    - Trachea/Bronchus deviated or obstructed?
  - Bones & Breast shadows
  - Cardiac silhouette
  - Diaphragm
  - Everything else
  - Fields

Chest Radiograph Interpretation

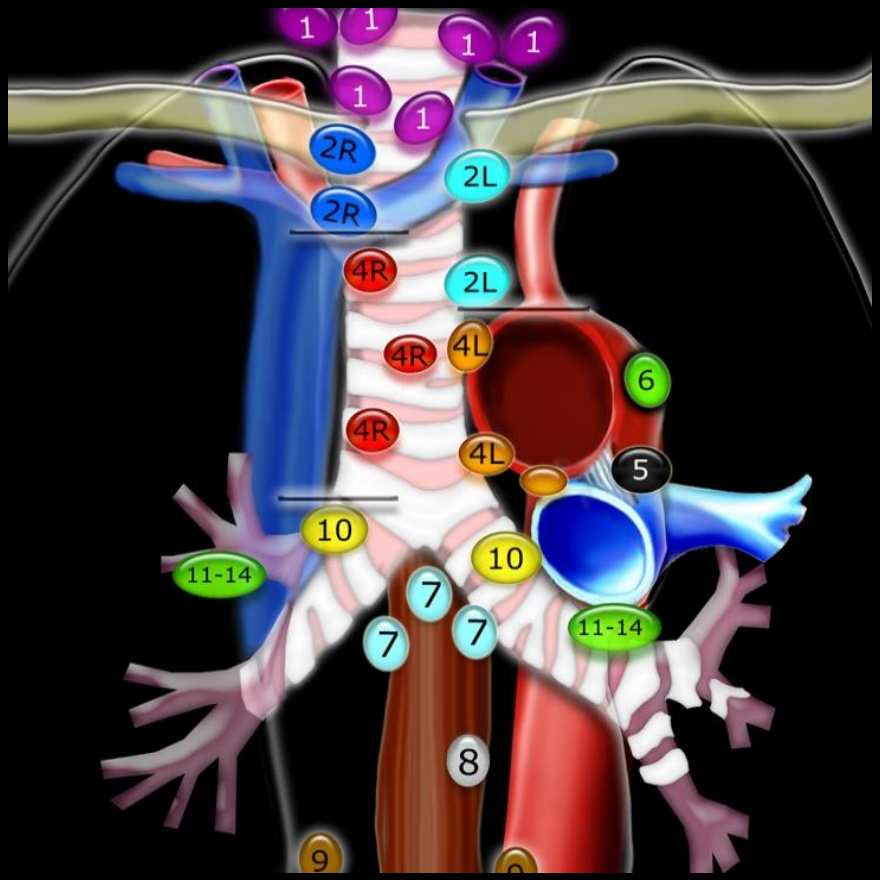


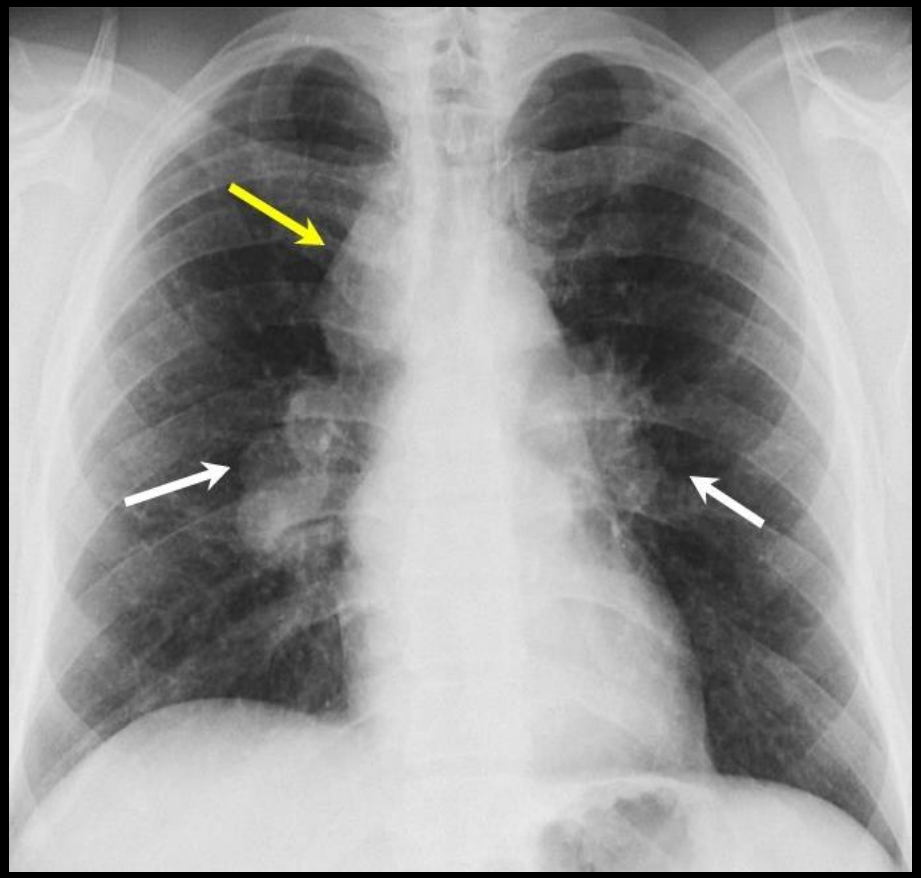


Chest Radiograph Interpretation

- Interpretation
  - Airway & Adenopathy
    - Peritracheal or Hilar adenopathy?
  - Bones & Breast shadows
  - Cardiac silhouette
  - Diaphragm
  - Everything else
  - Fields

Chest Radiograph Interpretation





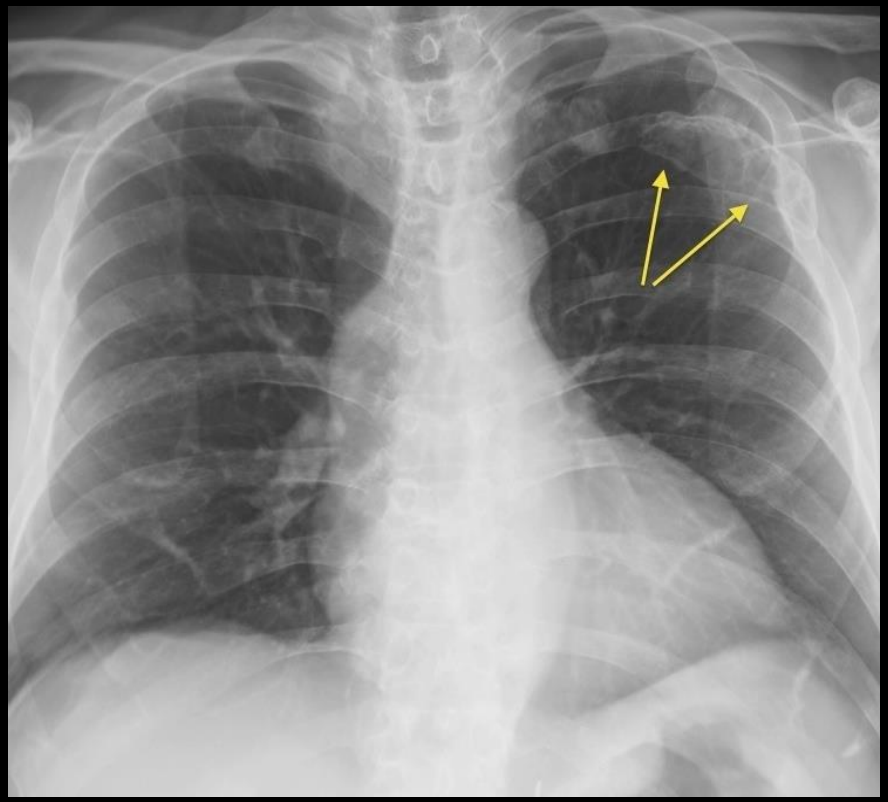
Chest Radiograph Interpretation

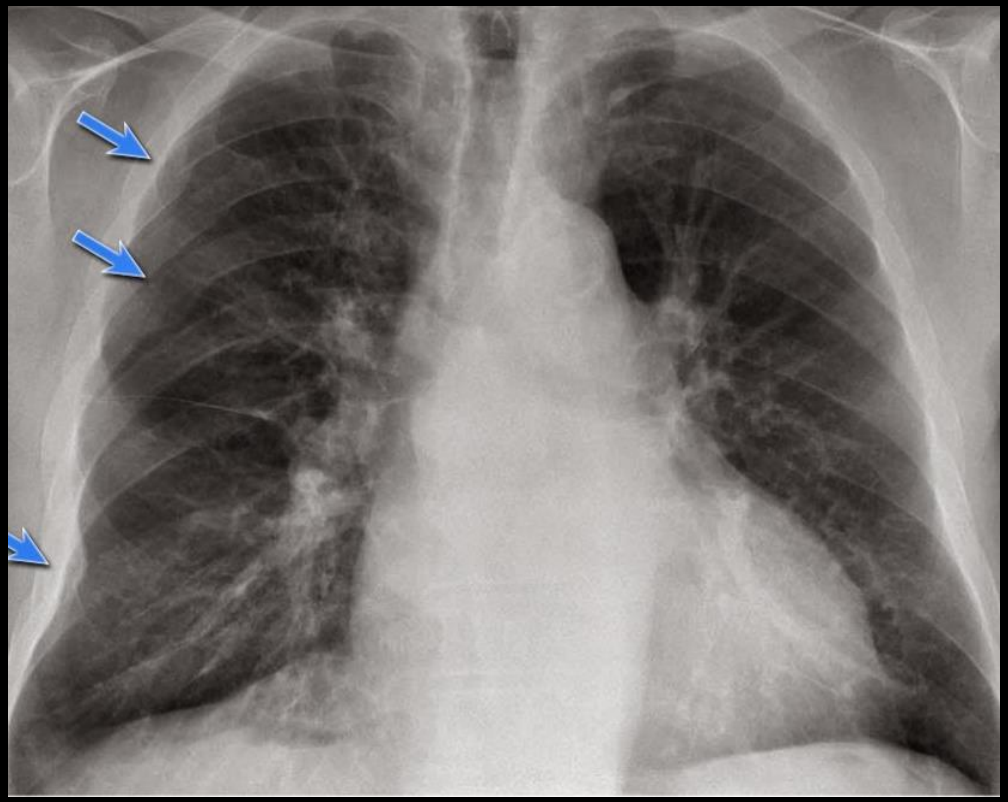
- Interpretation
  - Airway & Adenopathy
  - Bones & Breast shadows
  - Cardiac silhouette
  - Diaphragm
  - Everything else
  - Fields

Chest Radiograph Interpretation

- Interpretation
  - Airway & Adenopathy
  - Bones & Breast shadows
    - Fractures, lytic lesions or deformities?
  - Cardiac silhouette
  - Diaphragm
  - Everything else
  - Fields

Chest Radiograph Interpretation

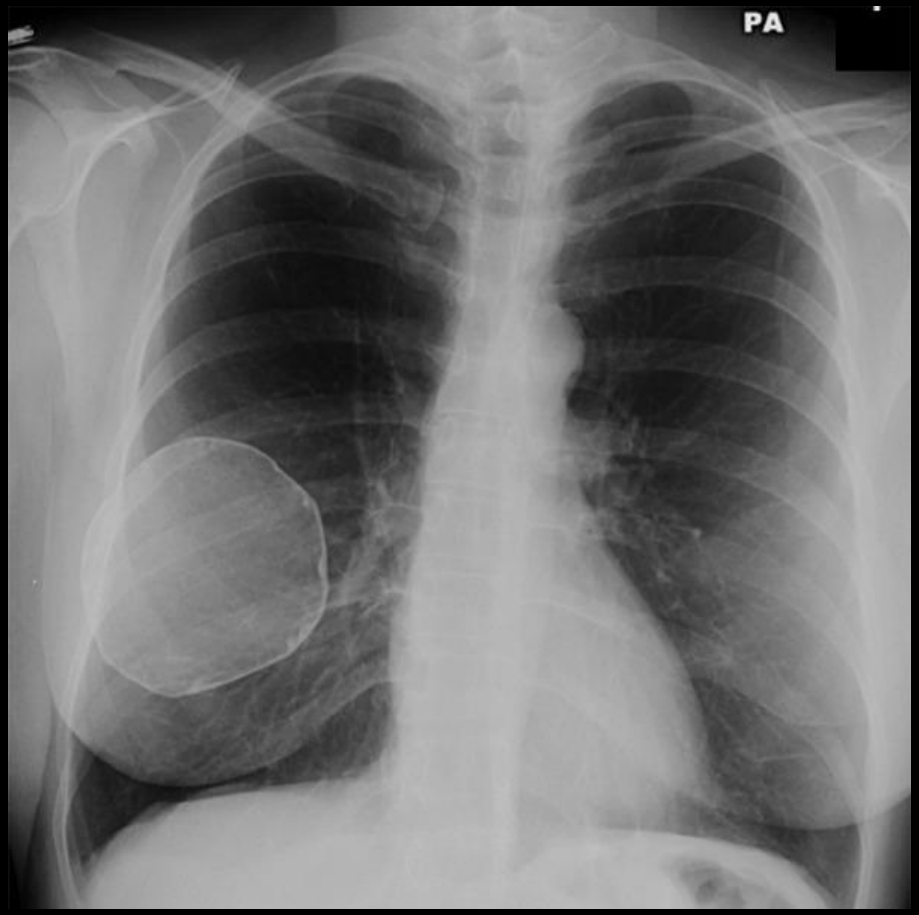




Chest Radiograph Interpretation

- Interpretation
  - Airway & Adenopathy
  - Bones & Breast shadows
    - Breasts surgical changes or calcifications?
    - PA & Lat: is there Spine Sign?
  - Cardiac silhouette
  - Diaphragm
  - Everything else
  - Fields

Chest Radiograph Interpretation



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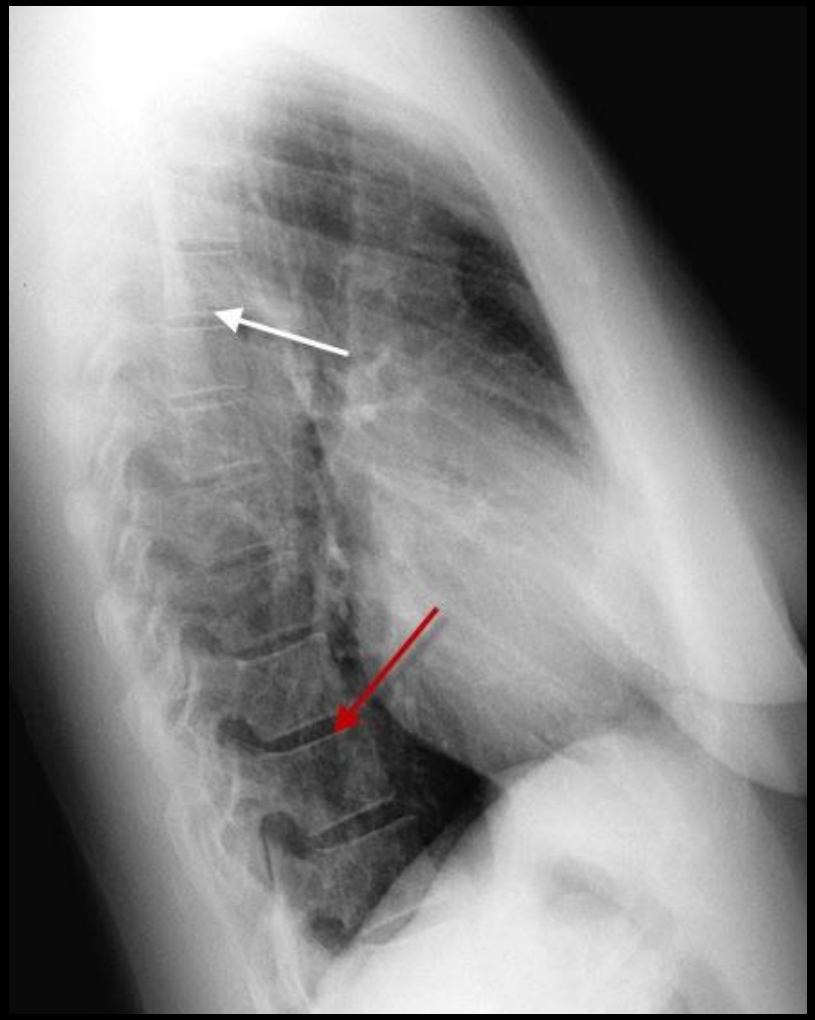
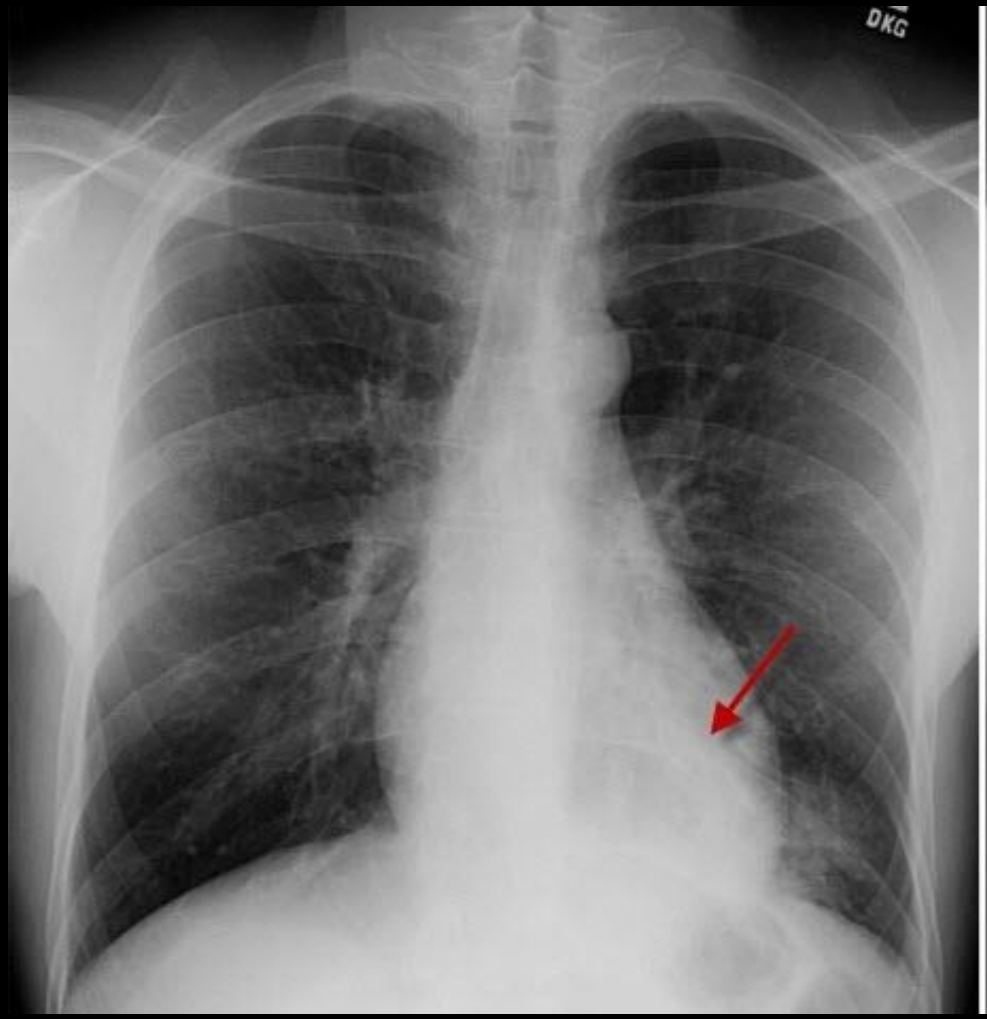
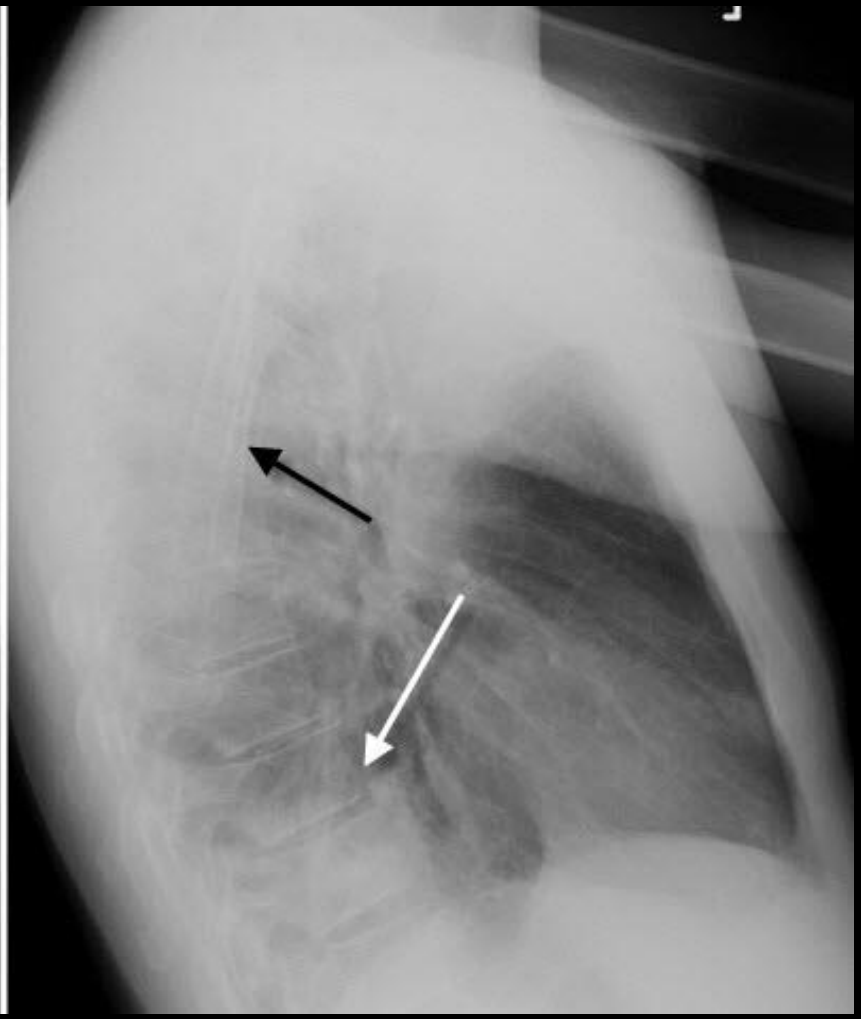


Chest Radiograph Interpretation





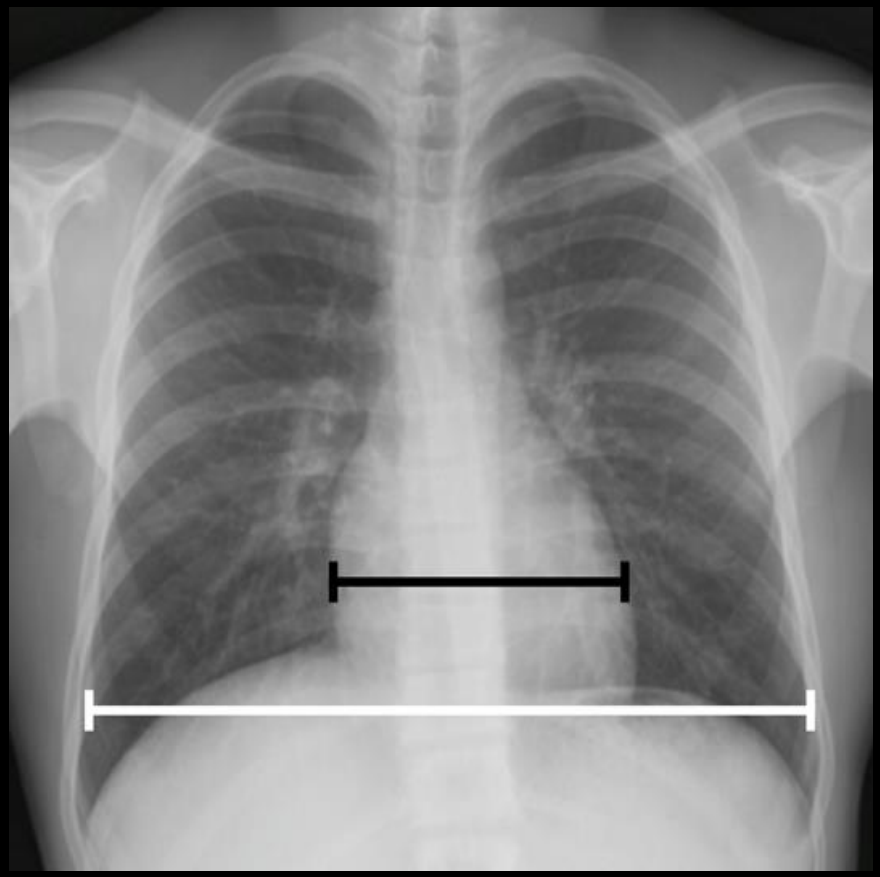
Chest Radiograph Interpretation

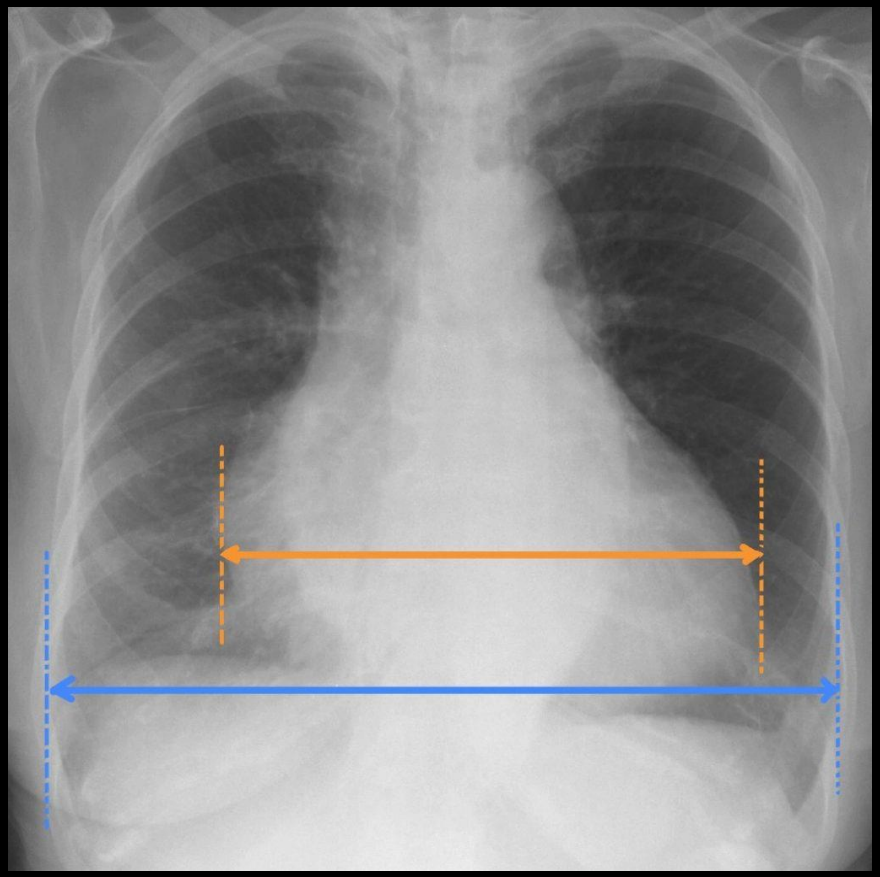
- Interpretation
  - Airway & Adenopathy
  - Bones & Breast shadows
  - Cardiac silhouette
  - Diaphragm
  - Everything else
  - Fields

Chest Radiograph Interpretation

- Interpretation
  - Airway & Adenopathy
  - Bones & Breast shadows
  - Cardiac silhouette
    - Cardiomegaly
      - Heart diameter > ½ widest transthoracic diameter measured from inner aspect of rib cage
      - Remember AP vs PA influences (AP exaggerates)
  - Diaphragm
  - Everything else
  - Fields

Chest Radiograph Interpretation



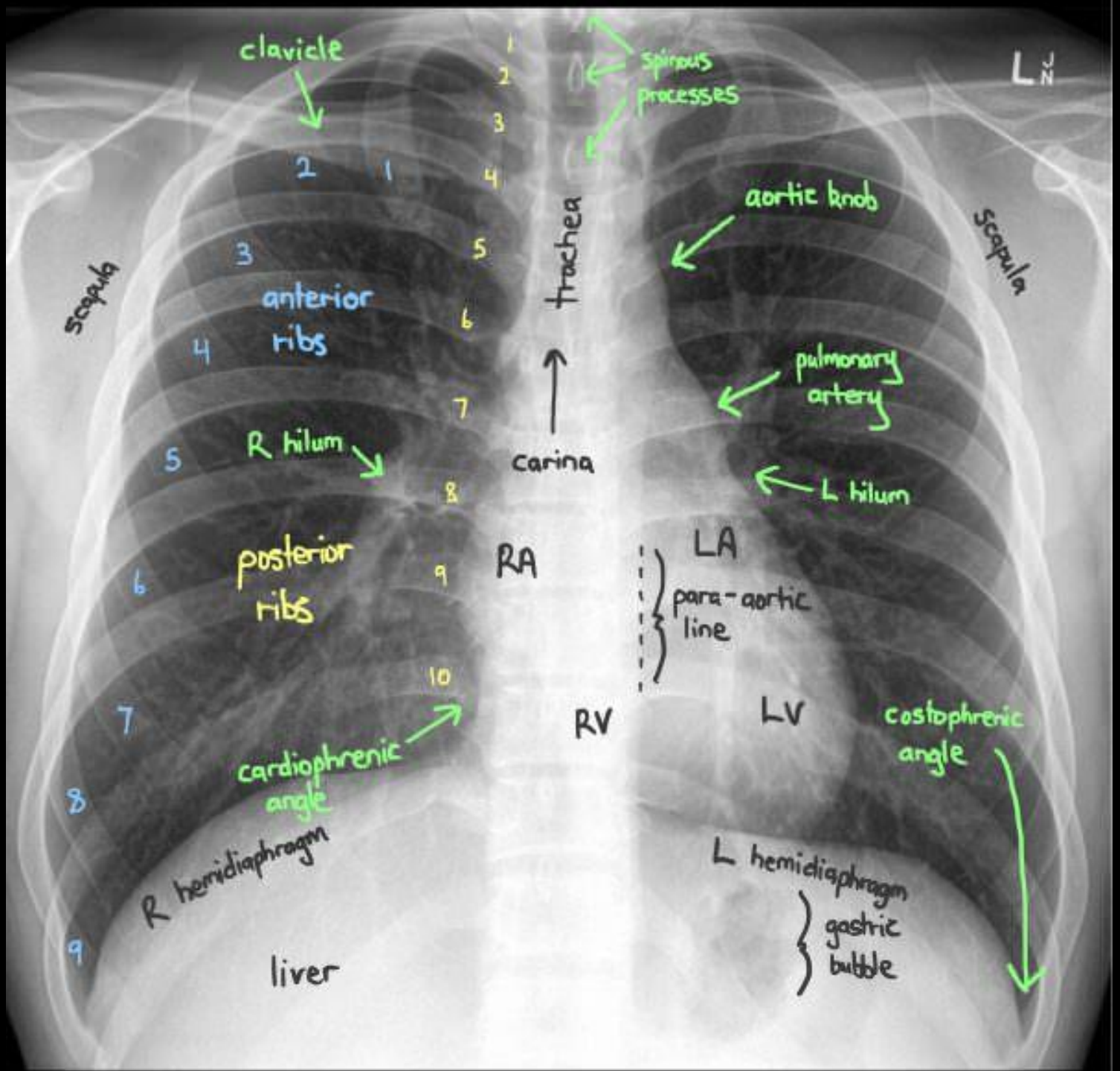


Chest Radiograph Interpretation

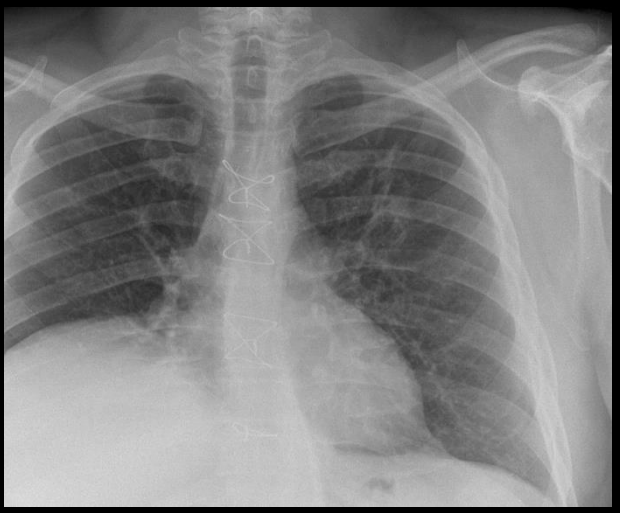
- Interpretation
  - Airway & Adenopathy
  - Bones & Breast shadows
  - Cardiac silhouette
  - Diaphragm
  - Everything else
  - Fields

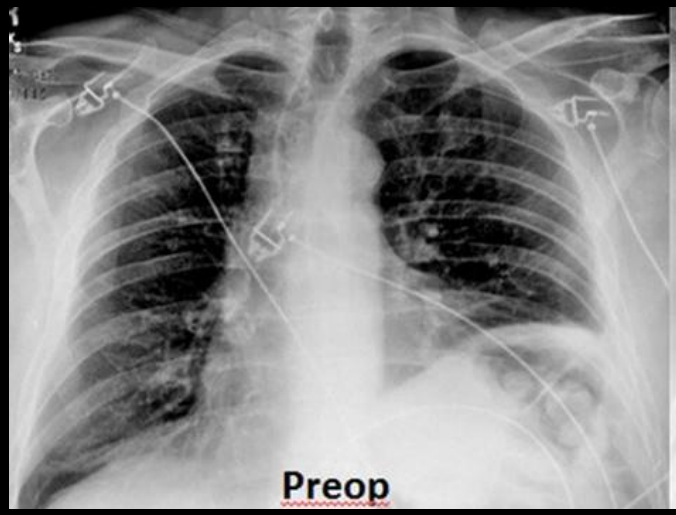
Chest Radiograph Interpretation

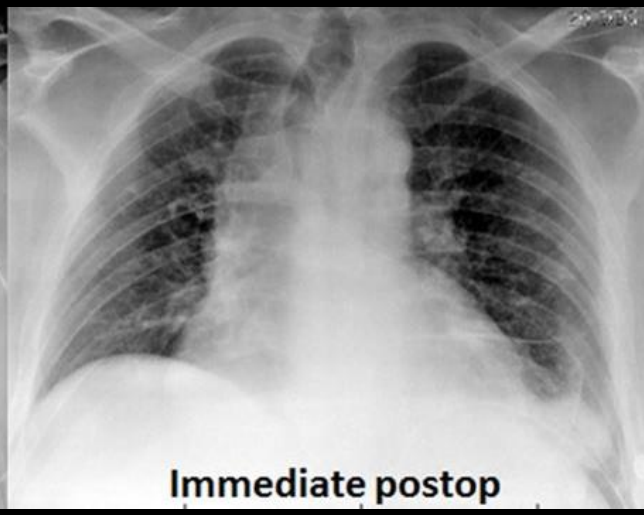
- Interpretation
  - Airway & Adenopathy
  - Bones & Breast shadows
  - Cardiac silhouette
  - Diaphragm
    - Left diaphragm should be lower
    - Air under diaphragm?
  - Everything else
  - Fields


clavicle
spinous processes
aortic knob
scapula
scapula
anterior ribs
trachea
pulmonary artery
R hilum
carina
L hilum
posterior ribs
RA
LA
para-aortic line
RV
LV
costophrenic angle
cardiophrenic angle
R hemidiaphragm
L hemidiaphragm
gastric bubble
liver

Chest Radiograph Interpretation

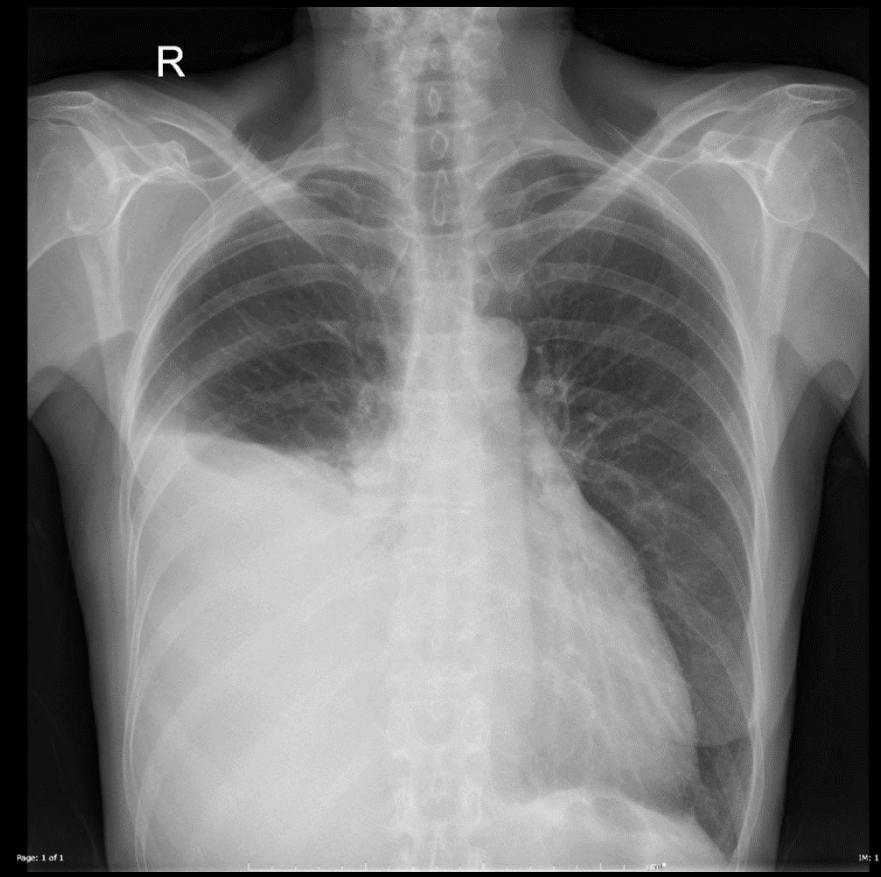


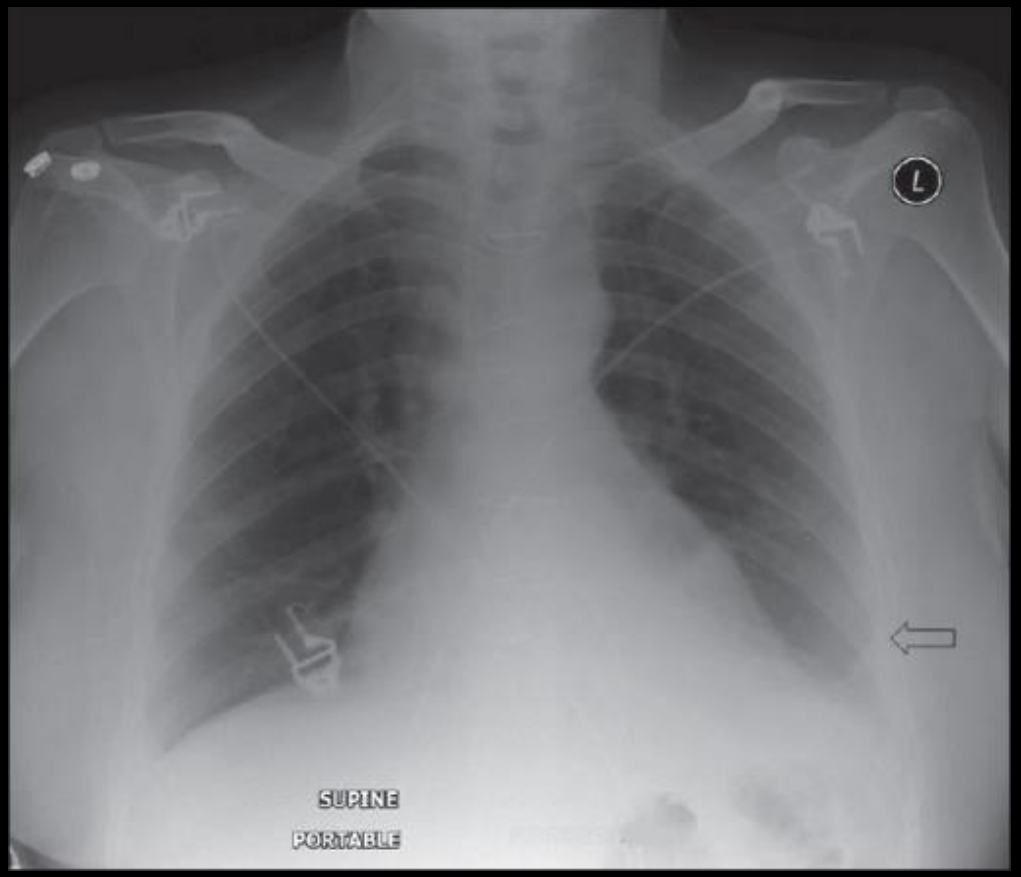




Chest Radiograph Interpretation

Chest Radiograph Interpretation

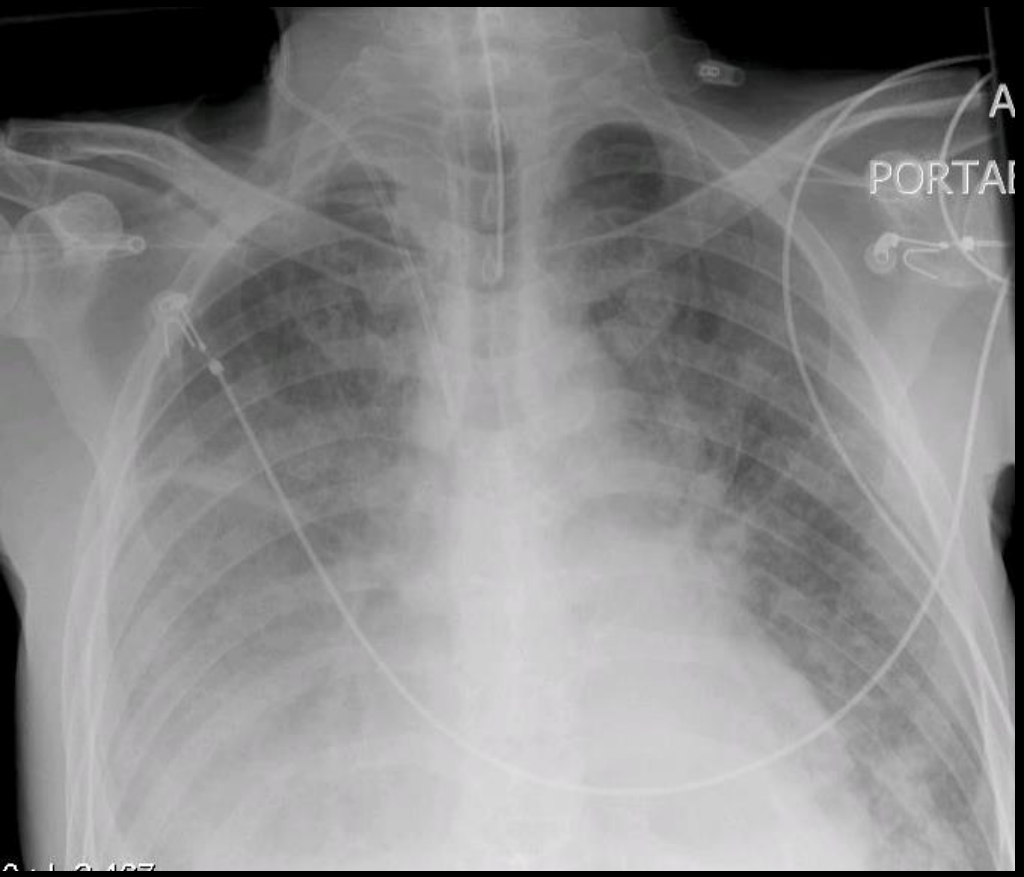


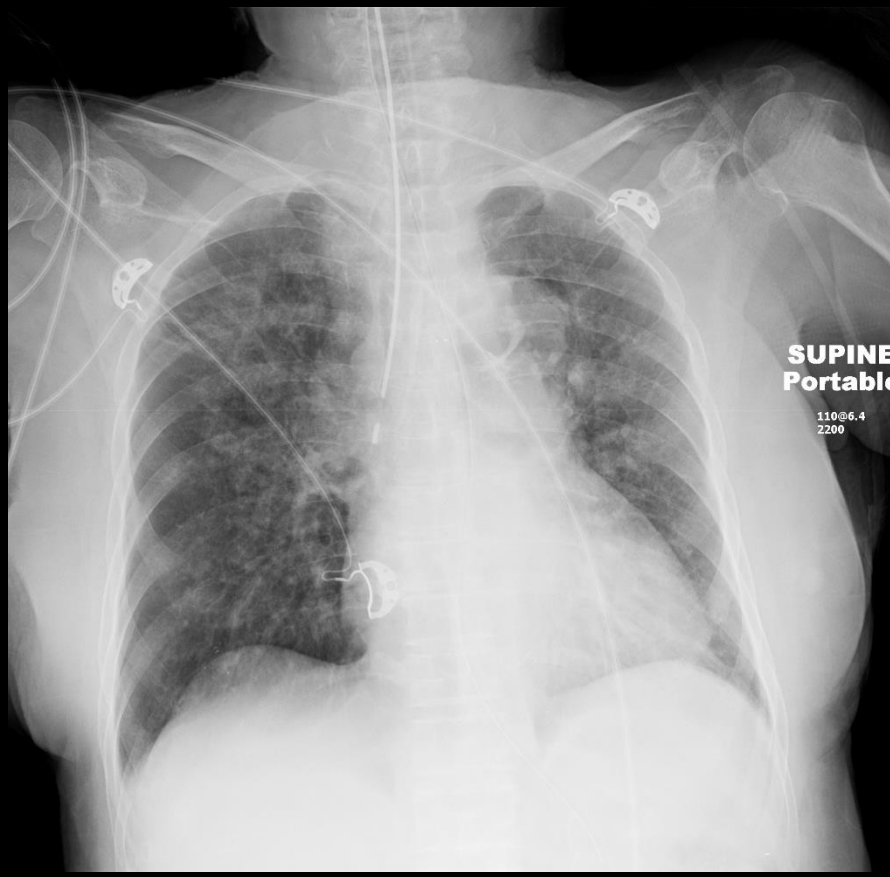


Chest Radiograph Interpretation

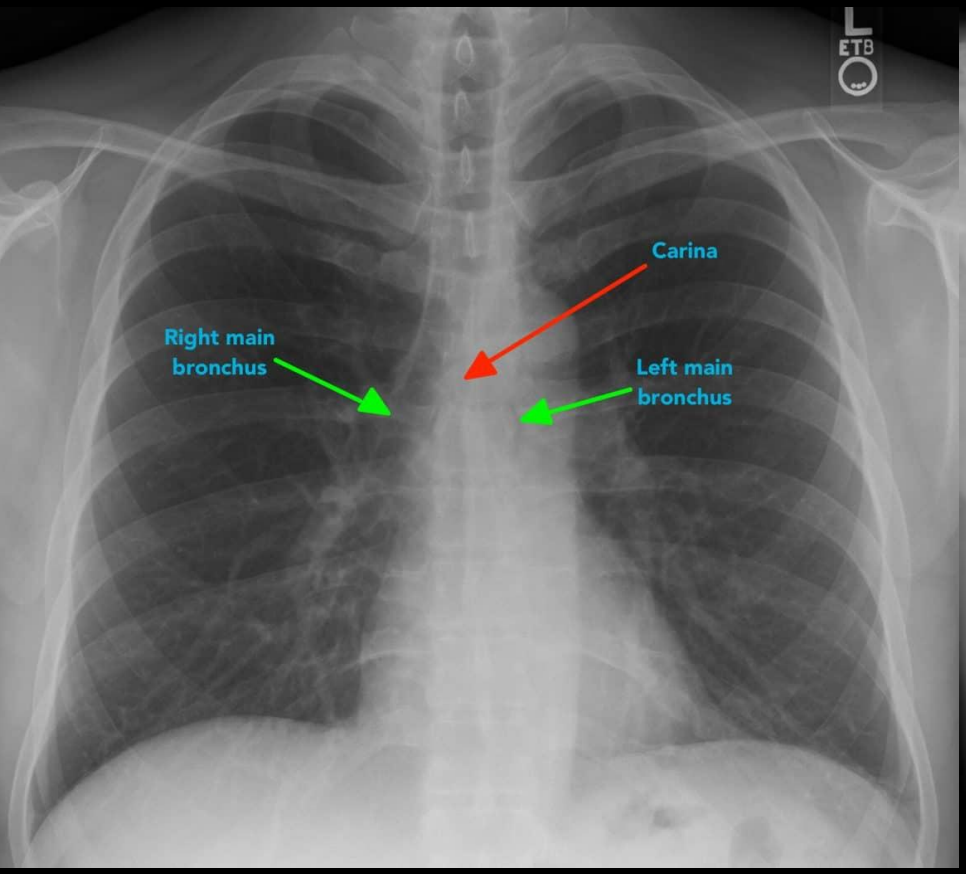
- Interpretation
  - Airway & Adenopathy
  - Bones & Breast shadows
  - Cardiac silhouette
  - Diaphragm
  - Everything else
    - Endotracheal Tube (3-4cm above carina)?
    - Central lines (in SVC)?
    - Foreign bodies?
  - Fields

Chest Radiograph Interpretation





Chest Radiograph Interpretation



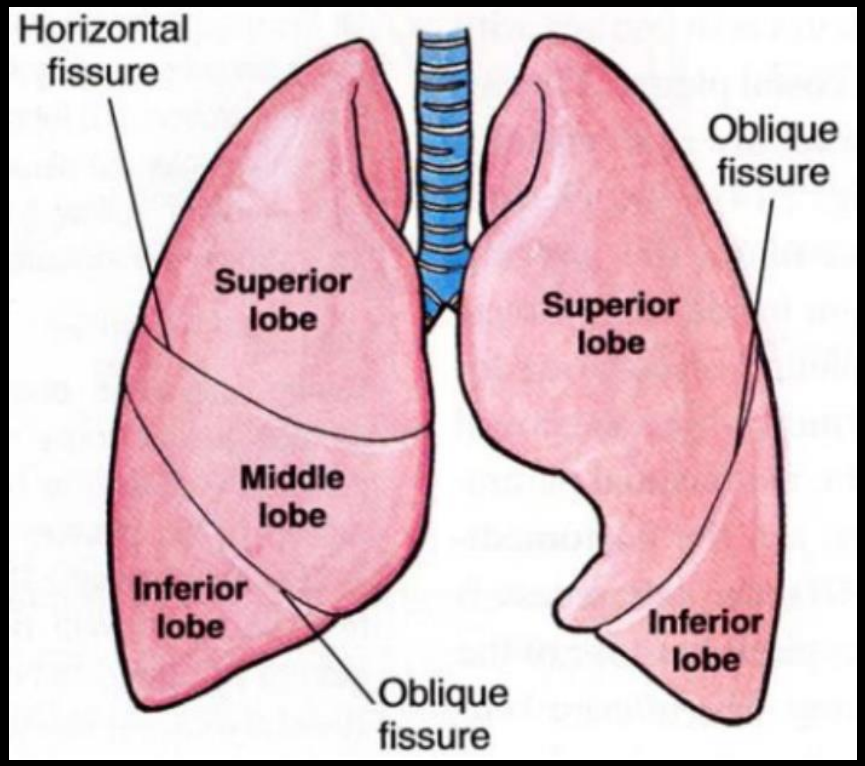
Chest Radiograph Interpretation

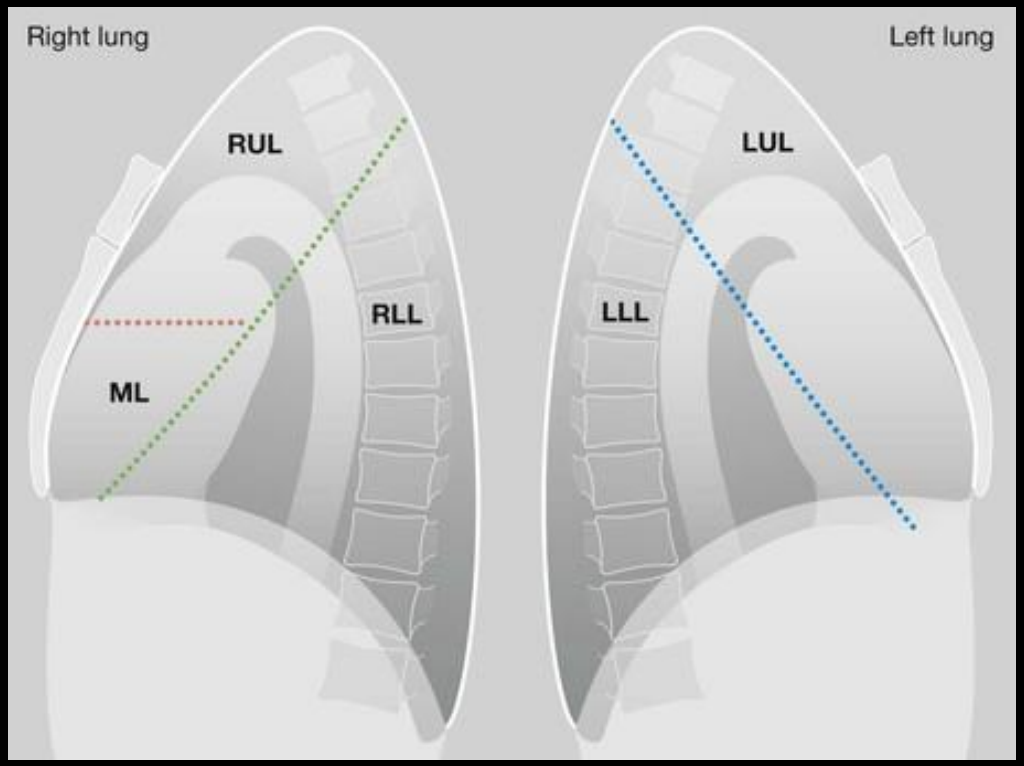
- Interpretation
  - Airway & Adenopathy
  - Bones & Breast shadows
  - Cardiac silhouette
  - Diaphragm
  - Everything else
  - Fields

Chest Radiograph Interpretation

- Interpretation
  - Airway & Adenopathy
  - Bones & Breast shadows
  - Cardiac silhouette
  - Diaphragm
  - Everything else
  - Fields
    - Determine location of opacities
    - Identify signs of pulmonary congestion

Chest Radiograph Interpretation

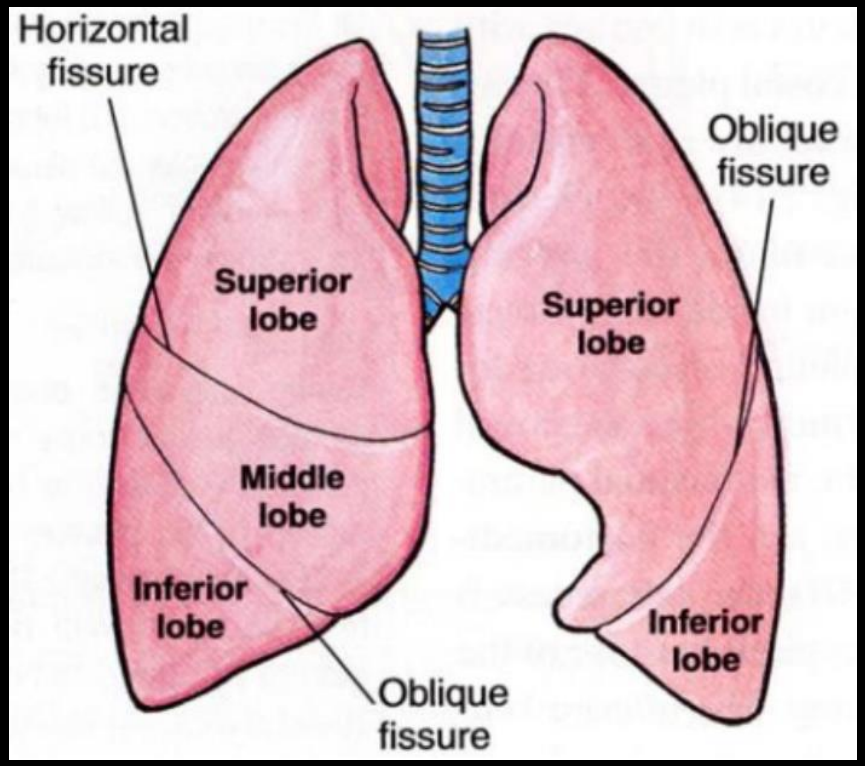


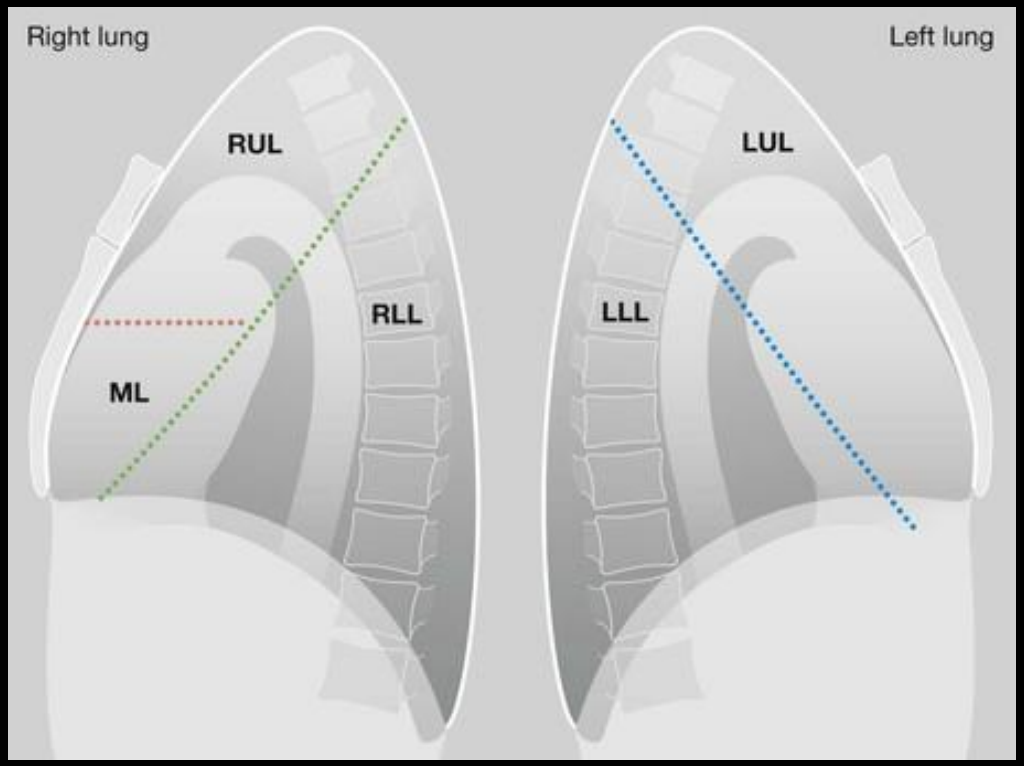


Chest Radiograph Interpretation

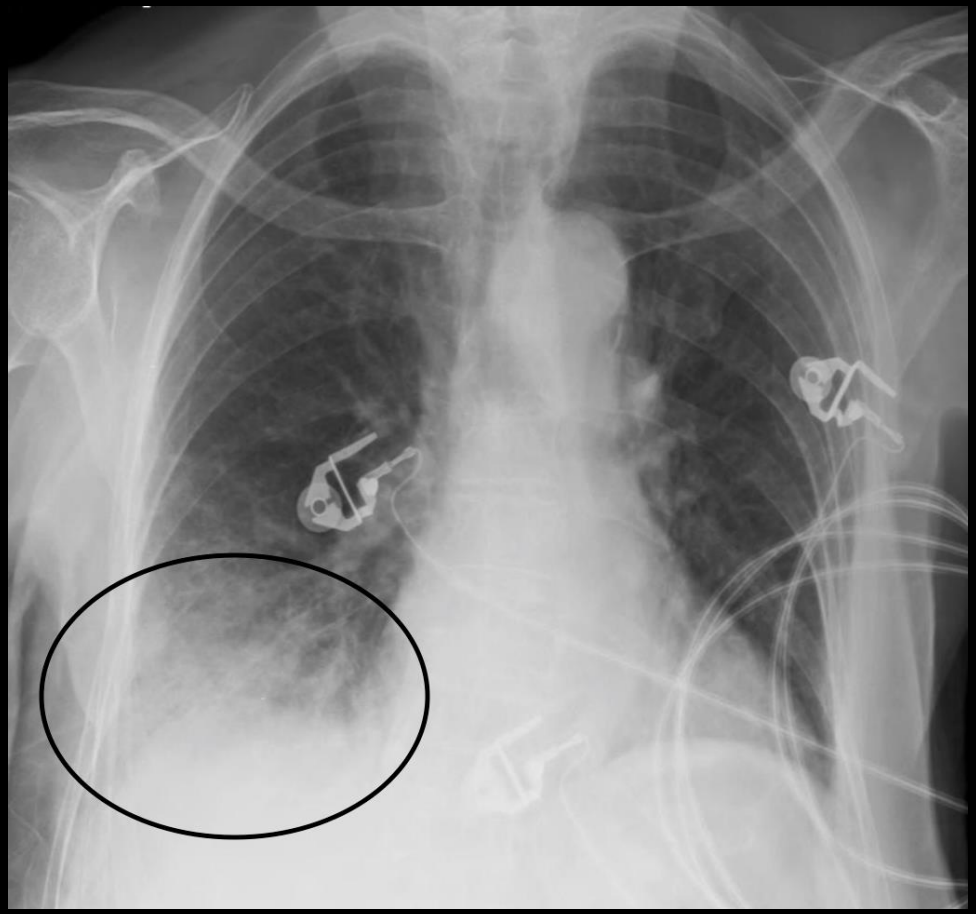
- Interpretation
  - Fields
    - R mediastinum obscured = RUL process
    - R heart border obscured = RML process
    - Supraclavicular = RUL or LUL process
    - Diaphragm obscured = RLL or LLL process
    - L heart border obscured = Lingular (LUL) process
    - Retrocardiac = LLL process

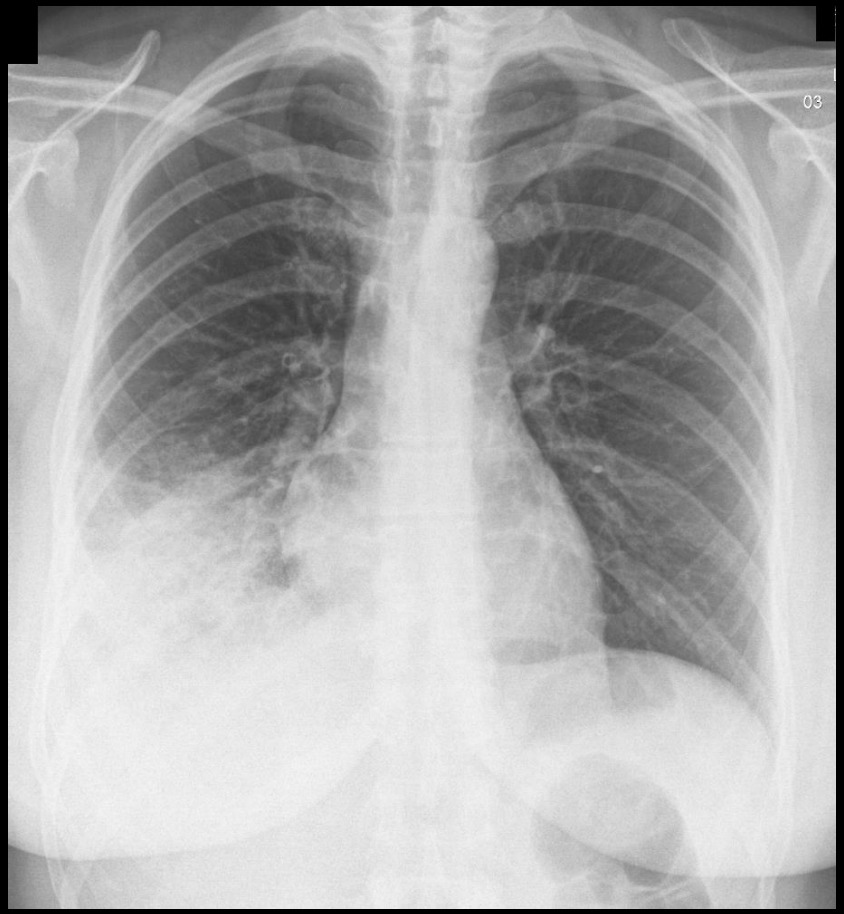
Chest Radiograph Interpretation





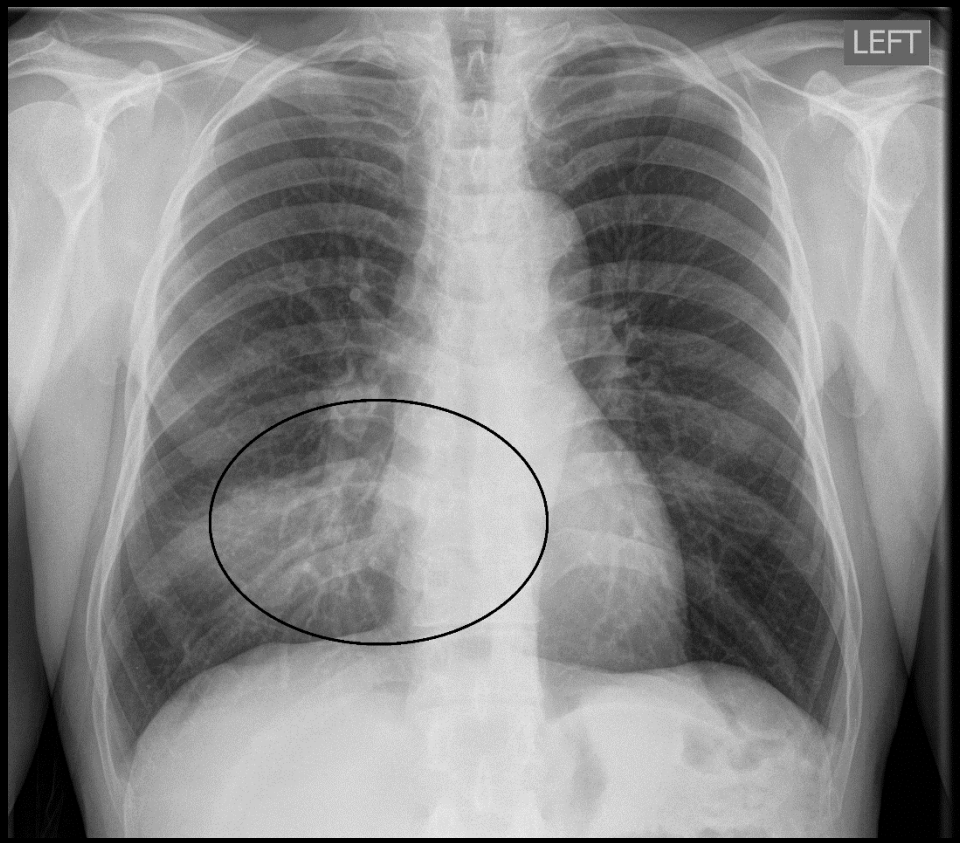
Chest Radiograph Interpretation

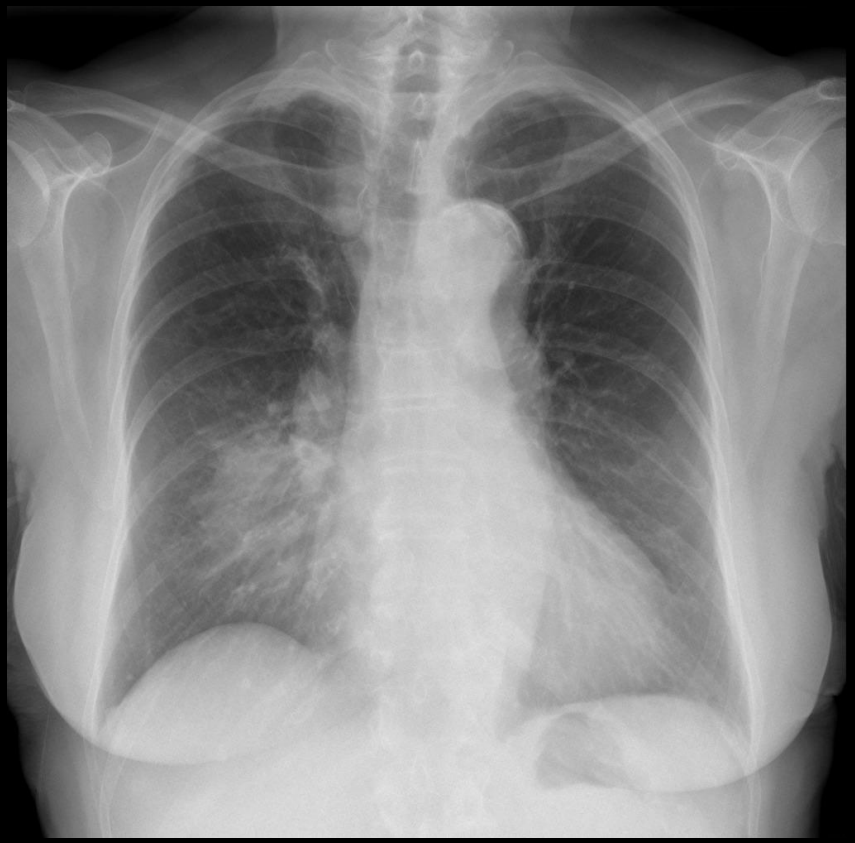




- Right lower lobe pneumonia

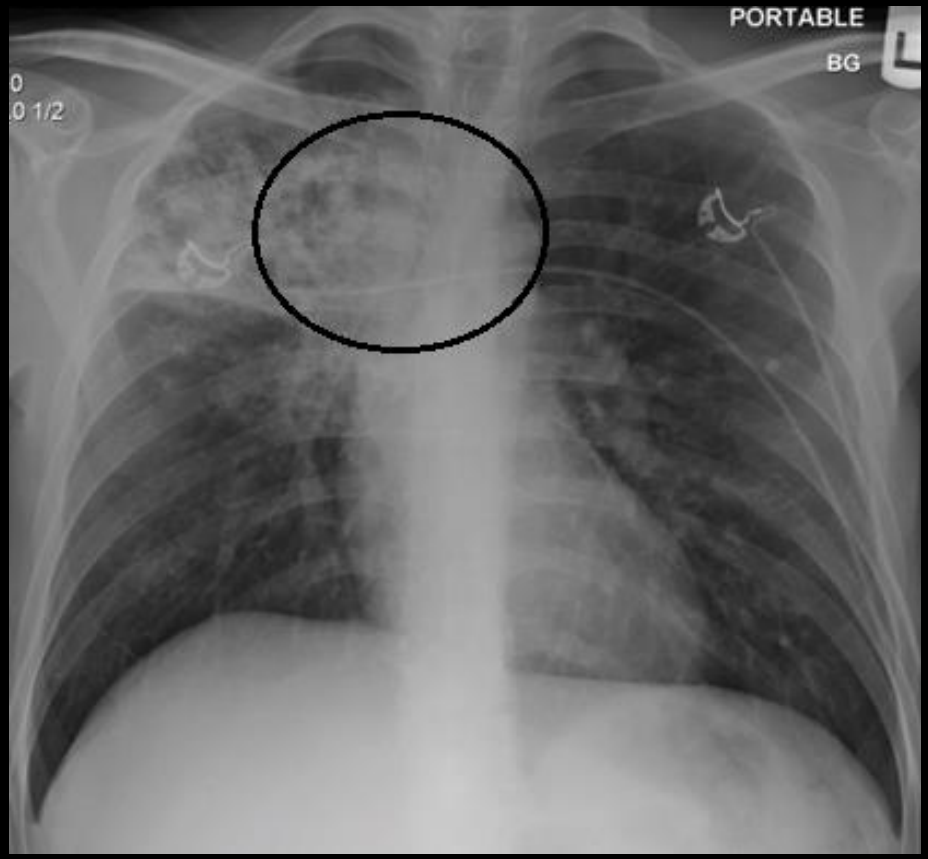
Chest Radiograph Interpretation





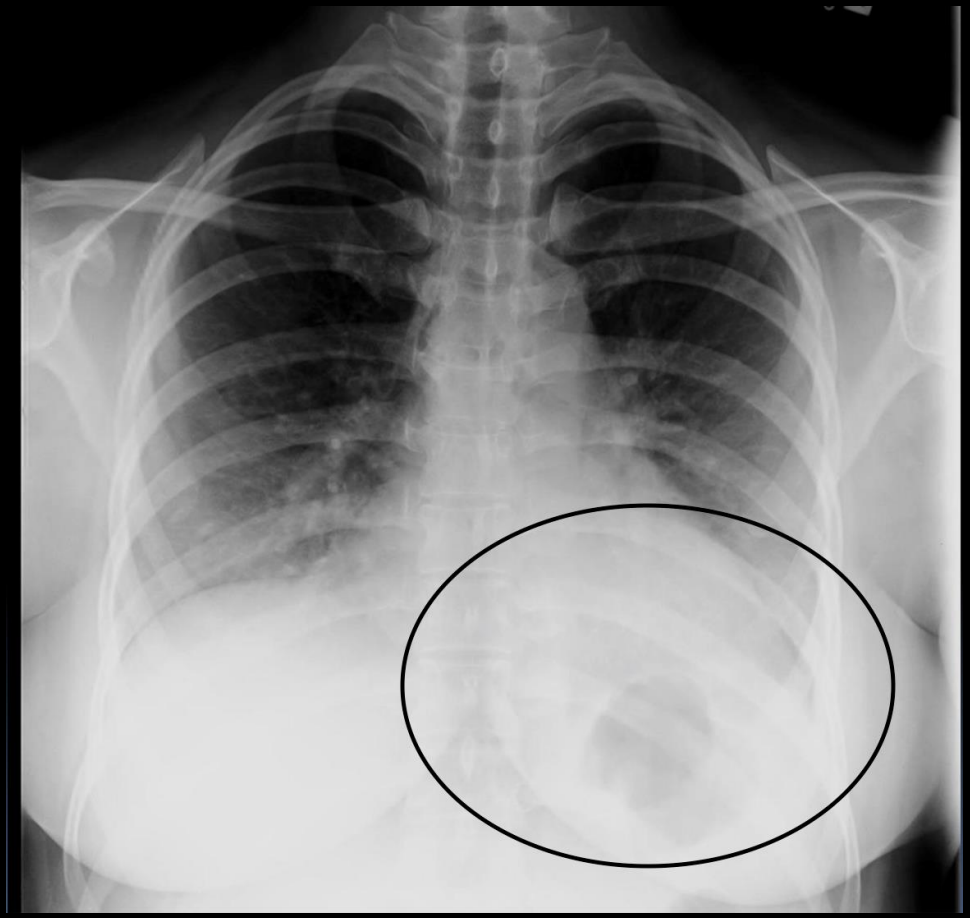
- Right middle lobe pneumonia

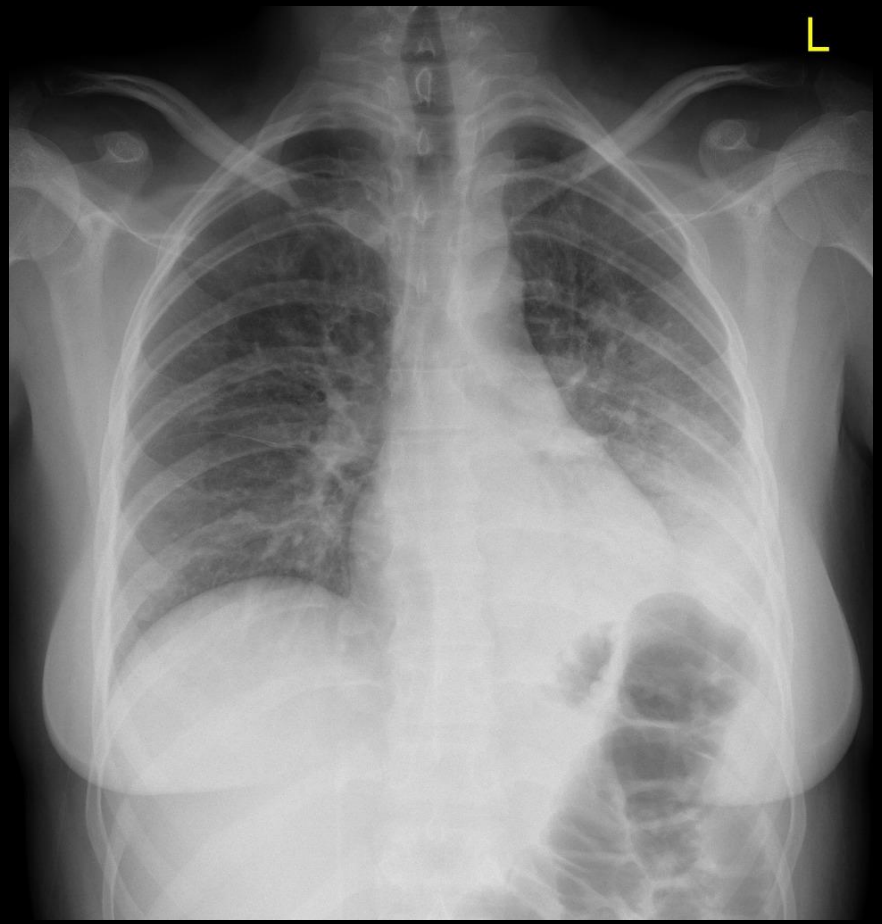
Chest Radiograph Interpretation



- Right upper lobe pneumonia

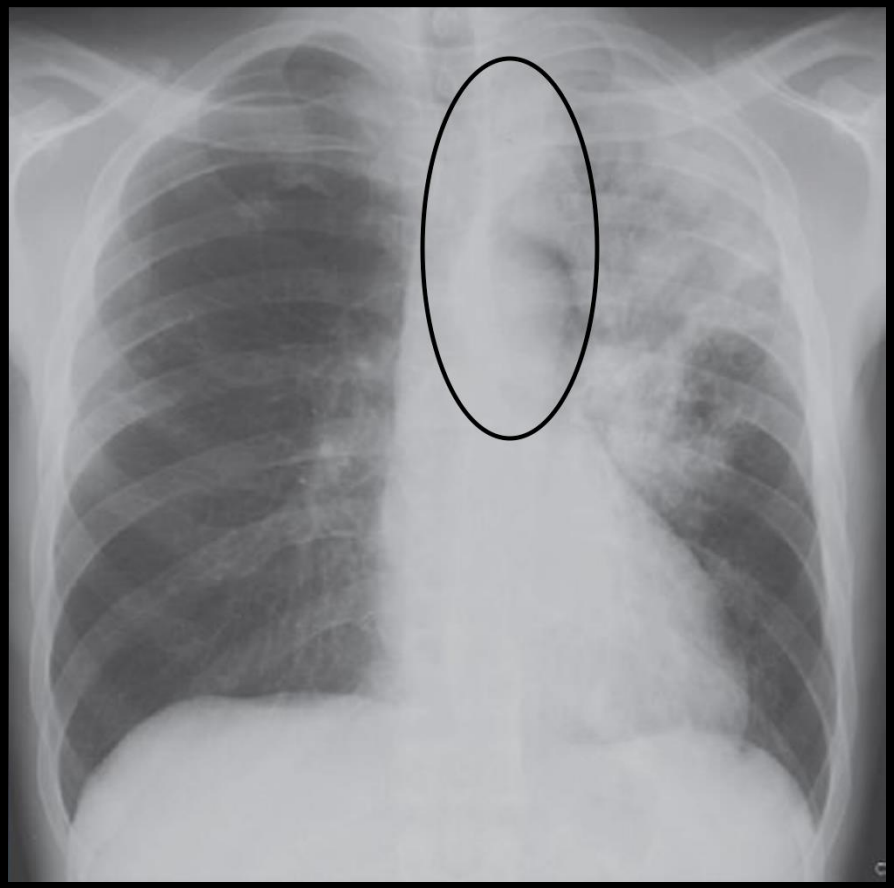
Chest Radiograph Interpretation

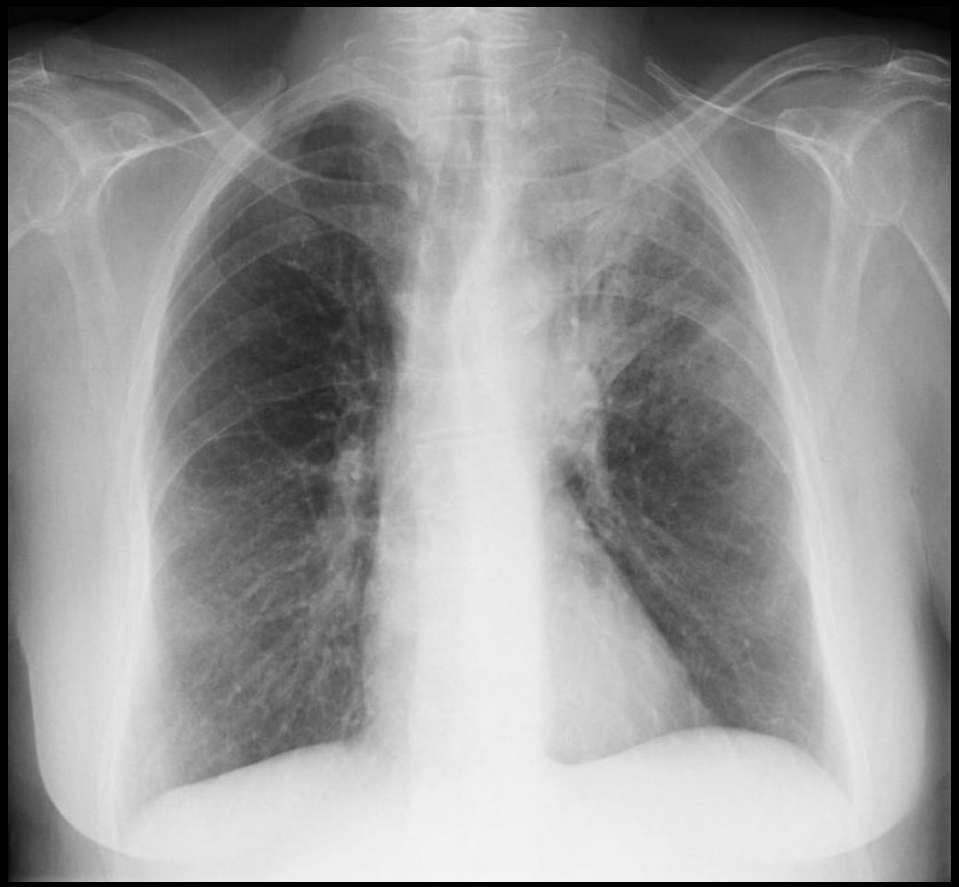




- Left lower lobe pneumonia

Chest Radiograph Interpretation



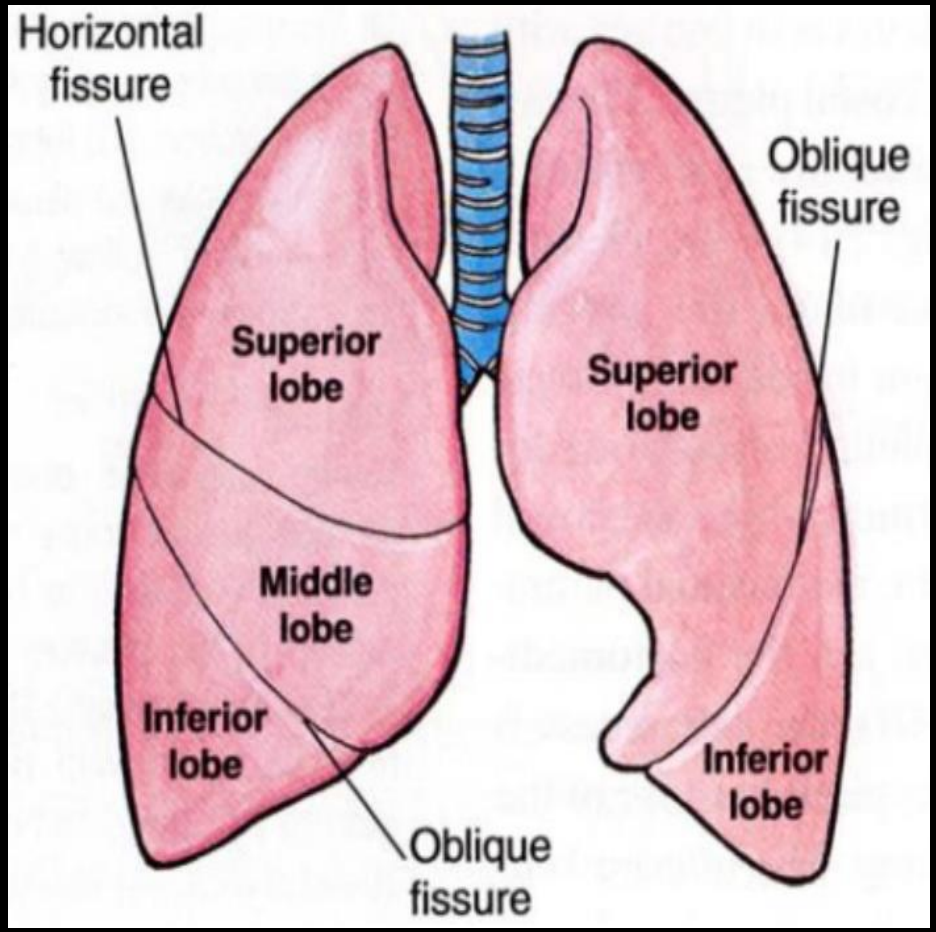


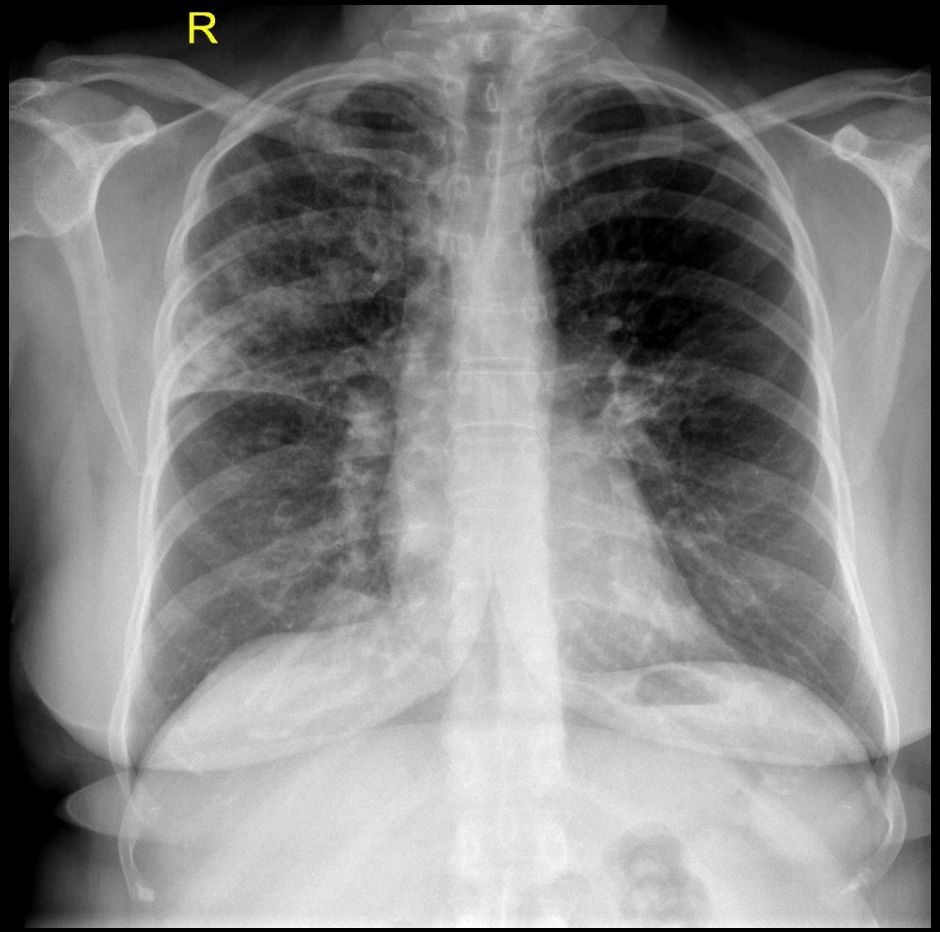
- Left upper lobe pneumonia

Chest Radiograph Interpretation

- Interpretation
  - Fields
    - Fissures can also suggest location
    - If not sure, OK to describe “lung zone”

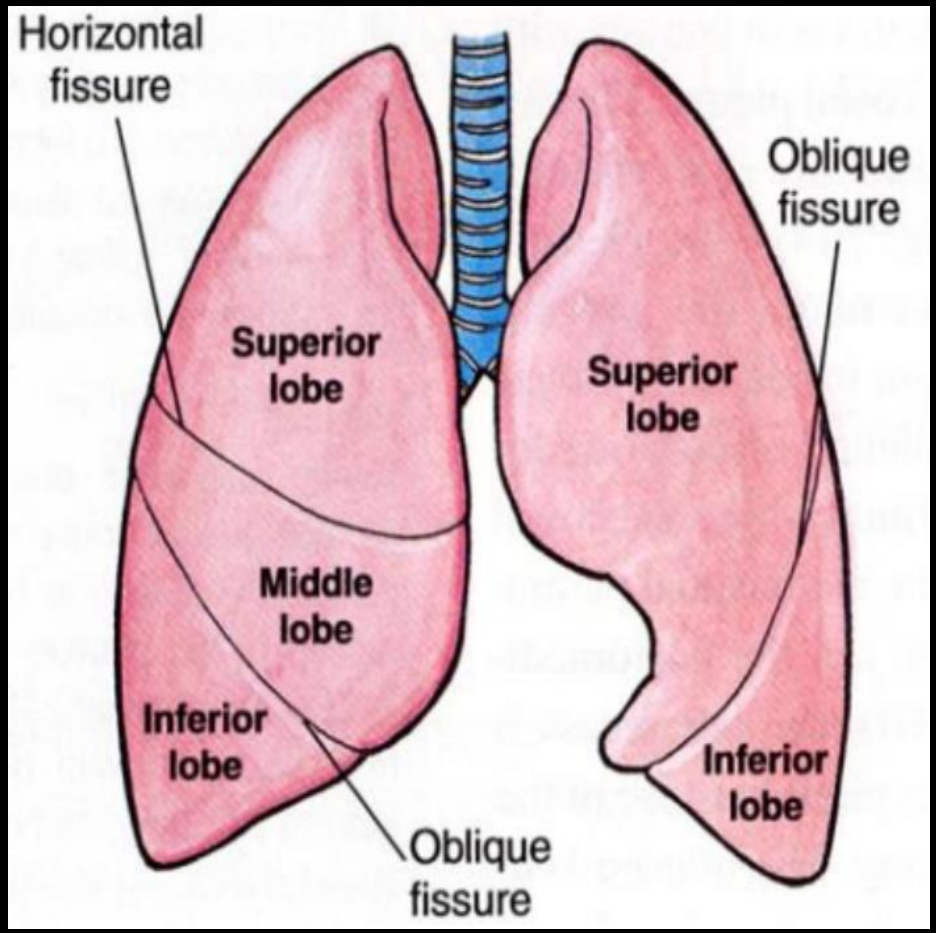
Chest Radiograph Interpretation





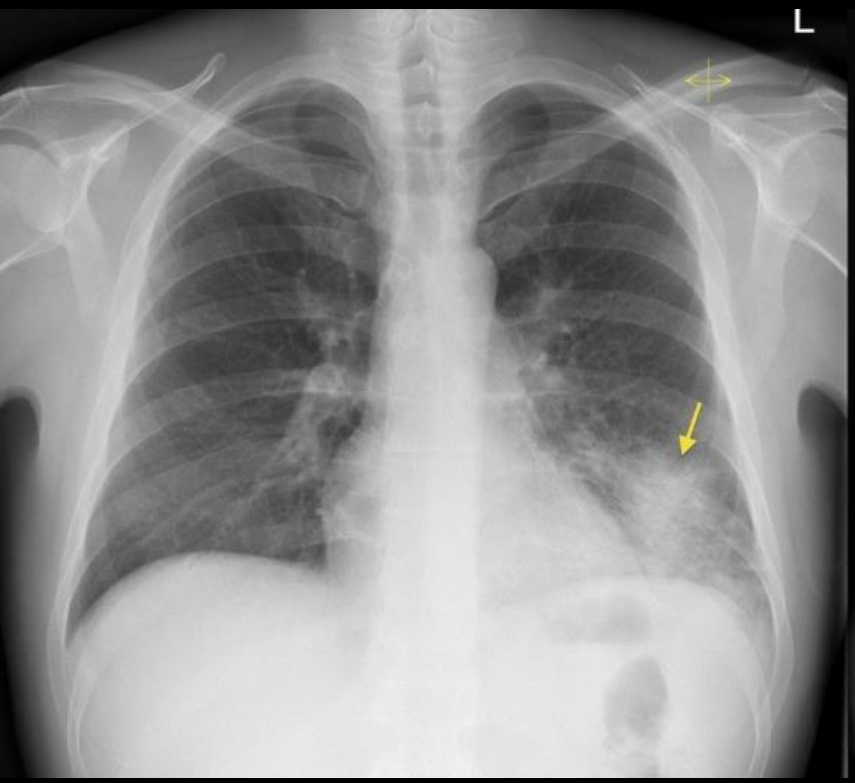
- Right upper lobe pneumonia

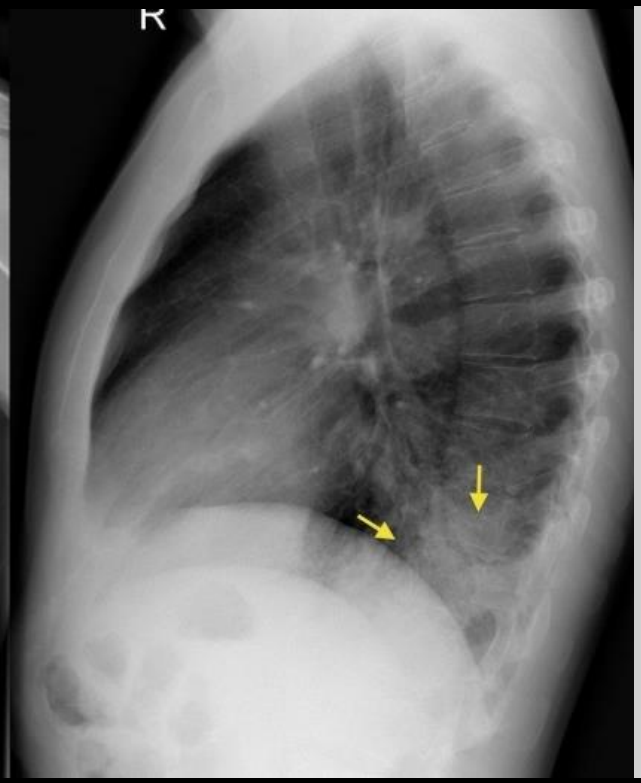
Chest Radiograph Interpretation



- Right middle lobe pneumonia

Chest Radiograph Interpretation





- Left lower lobe pneumonia
  - Unclear unless get lateral CXR
    - Without lateral: “opacity in left lower lung zone”

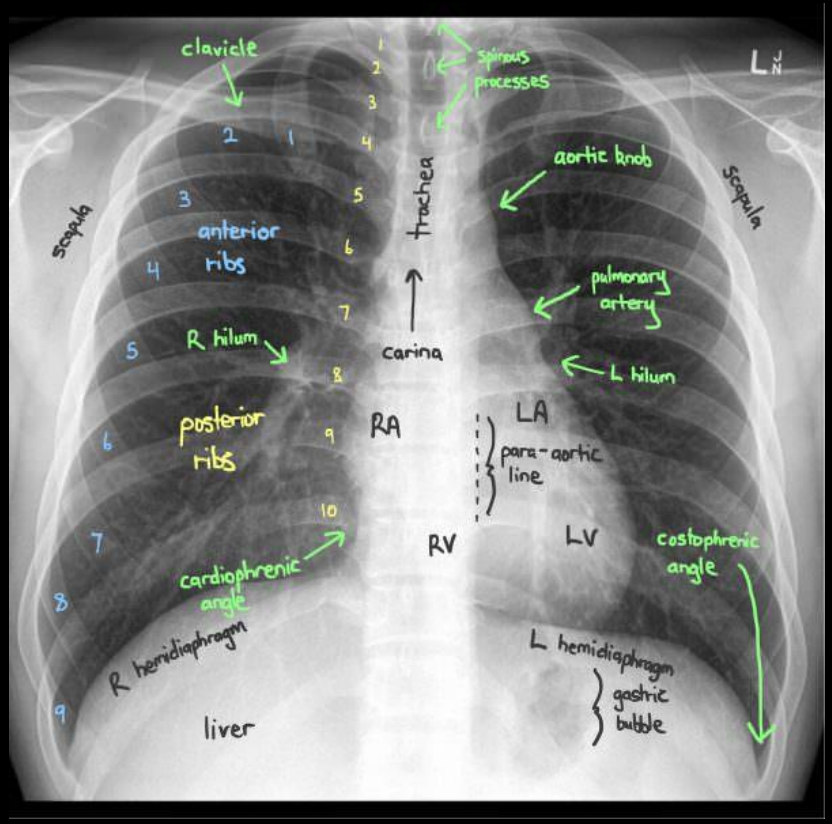
Chest Radiograph Interpretation

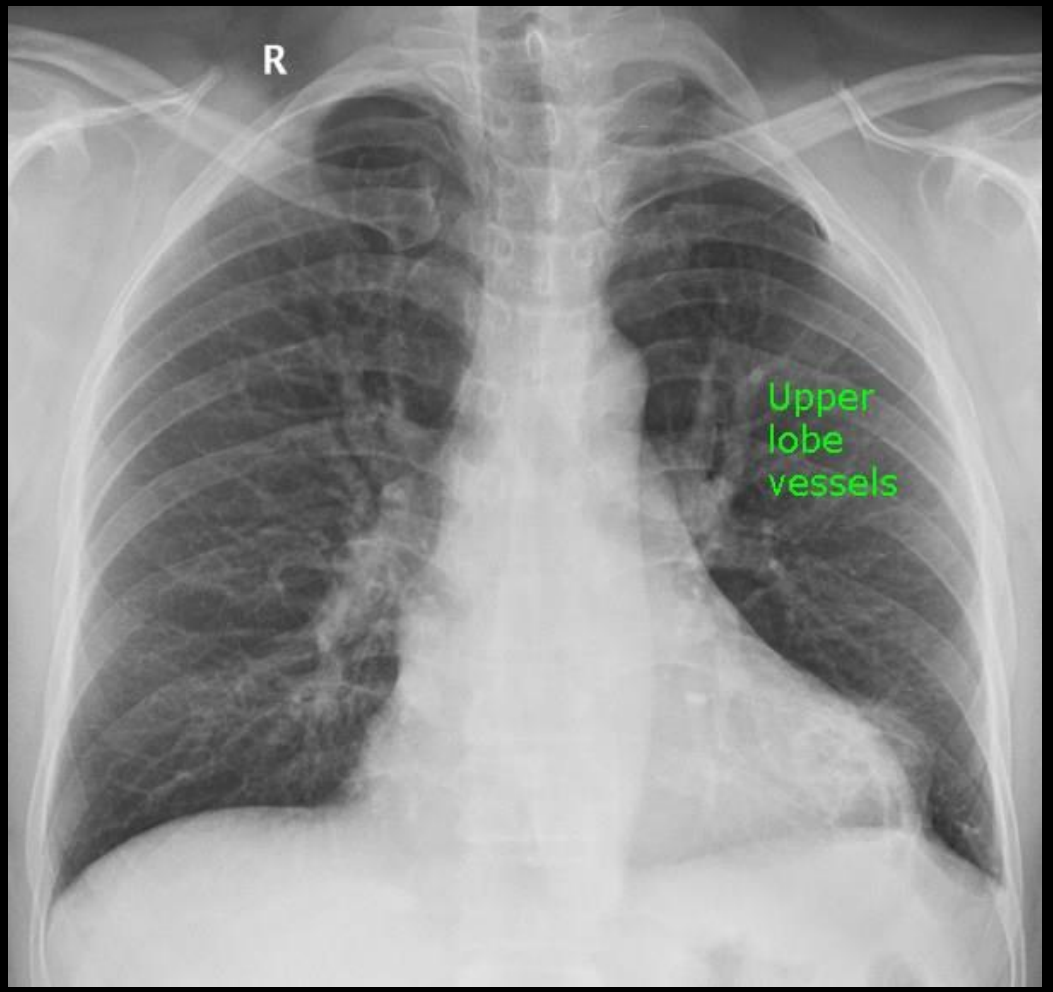
- Interpretation
  - Fields
    - Pulmonary Edema progression
      - Cephalization
      - Kerley B lines
      - Perihilar Edema
      - Pleural Effusions

Chest Radiograph Interpretation

- Interpretation
  - Fields
    - Pulmonary Edema progression
      - Cephalization
        - Upper Pulm Veins are 1/3 size of basilar Pulm Veins
        - >1/3: Basilar edema shunting flow to upper Pulm Vs
      - Kerley B lines
      - Perihilar Edema
      - Pleural Effusions

Chest Radiograph Interpretation

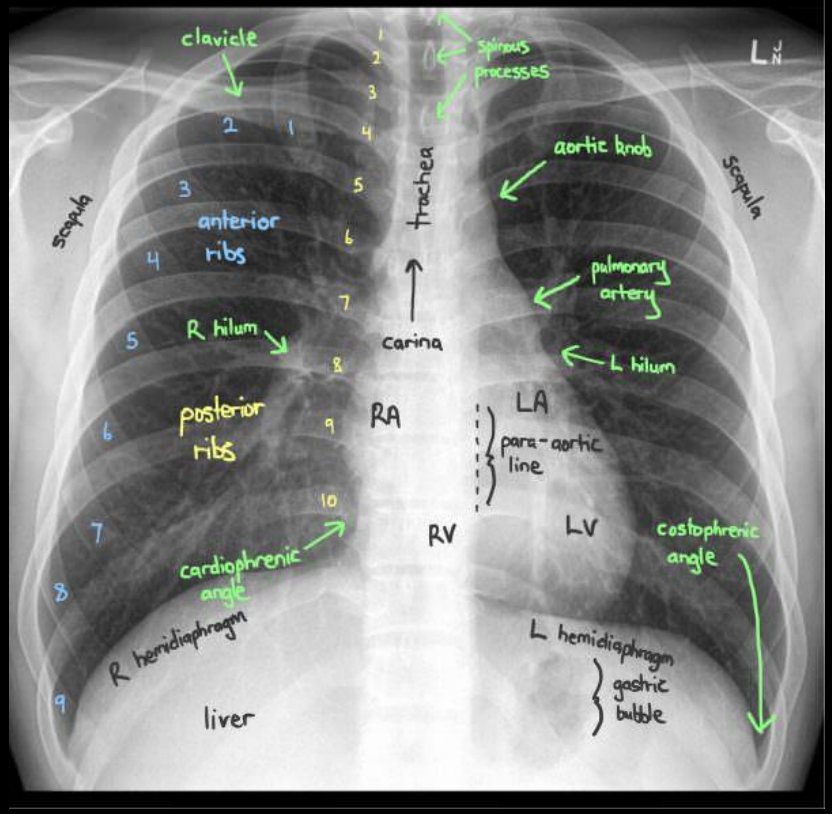


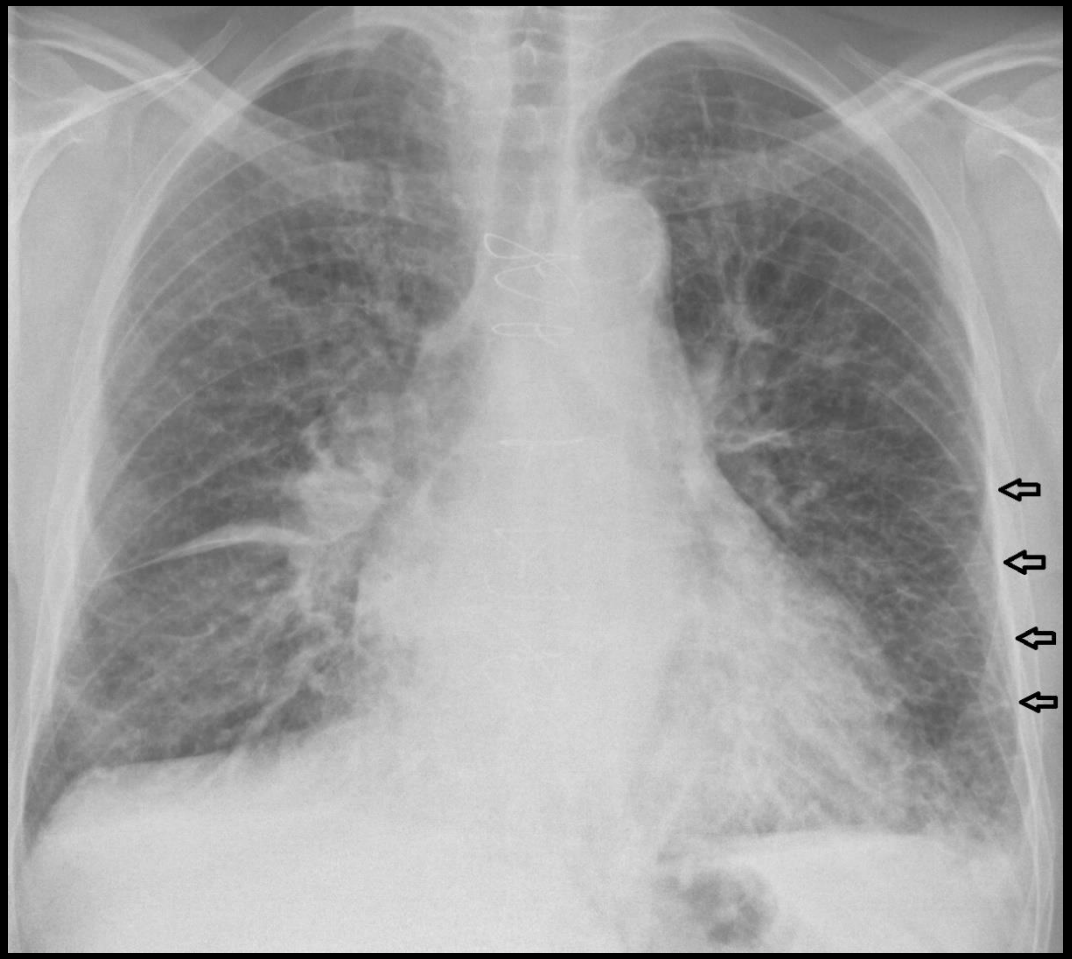


Chest Radiograph Interpretation

- Interpretation
  - Fields
    - Pulmonary Edema progression
      - Cephalization
      - Kerley B lines
        - 1-2cm lines perpendicular to pleura
        - Due to swollen lymphatics
      - Perihilar Edema
      - Pleural Effusions

Chest Radiograph Interpretation

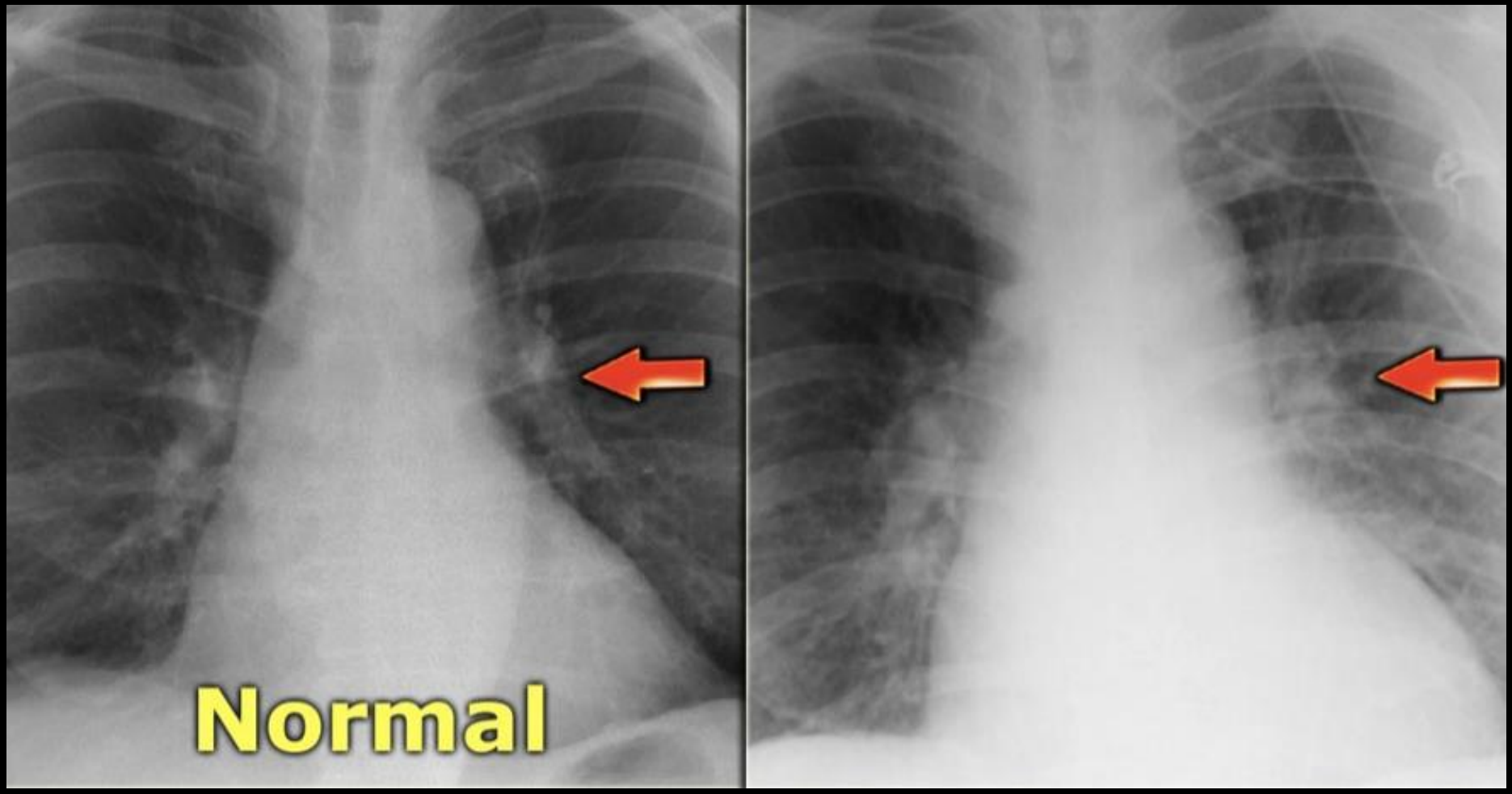




Chest Radiograph Interpretation

- Interpretation
  - Fields
    - Pulmonary Edema progression
      - Cephalization
      - Kerley B lines
      - Perihilar Edema
      - Pleural Effusions

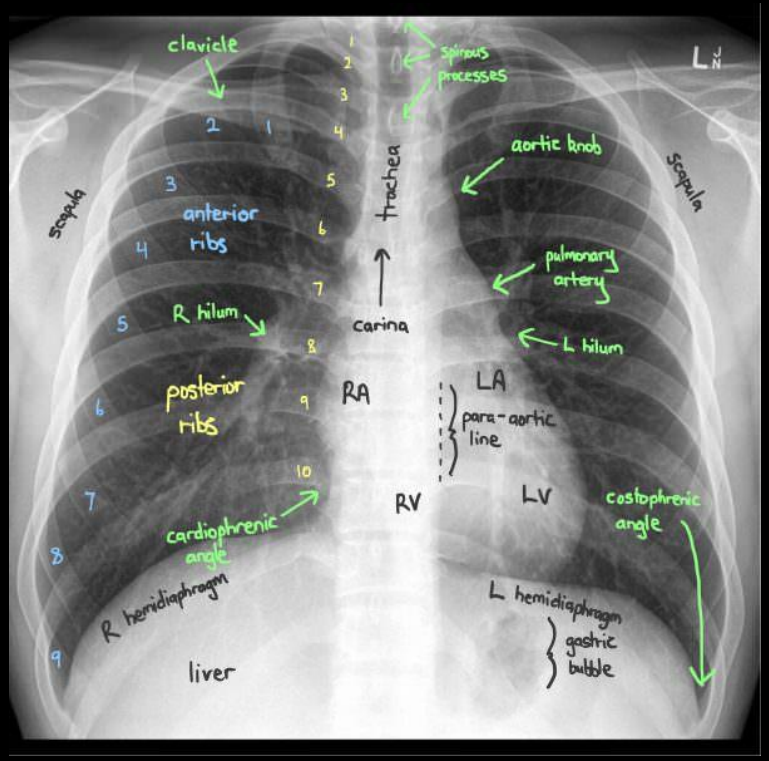
Chest Radiograph Interpretation

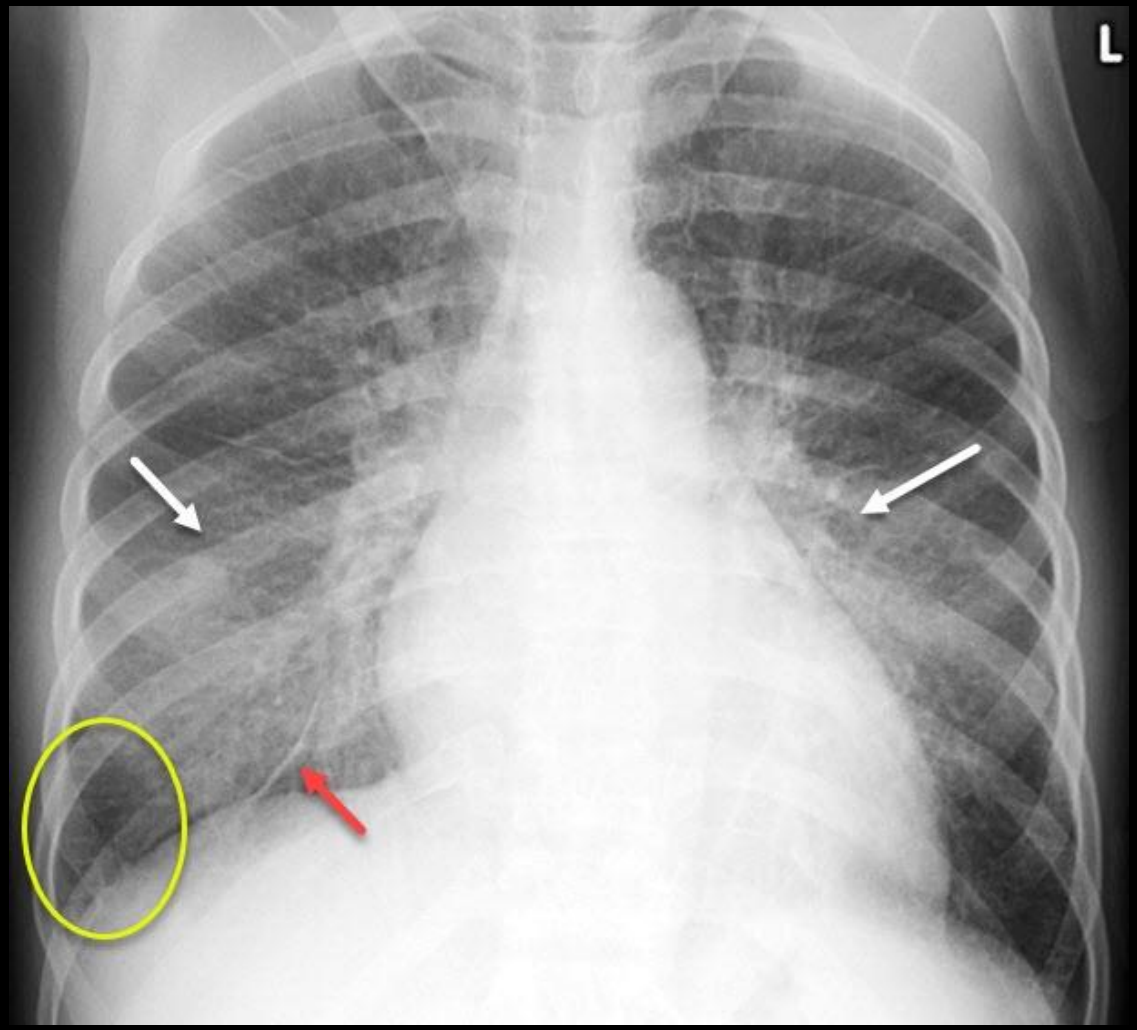


Chest Radiograph Interpretation

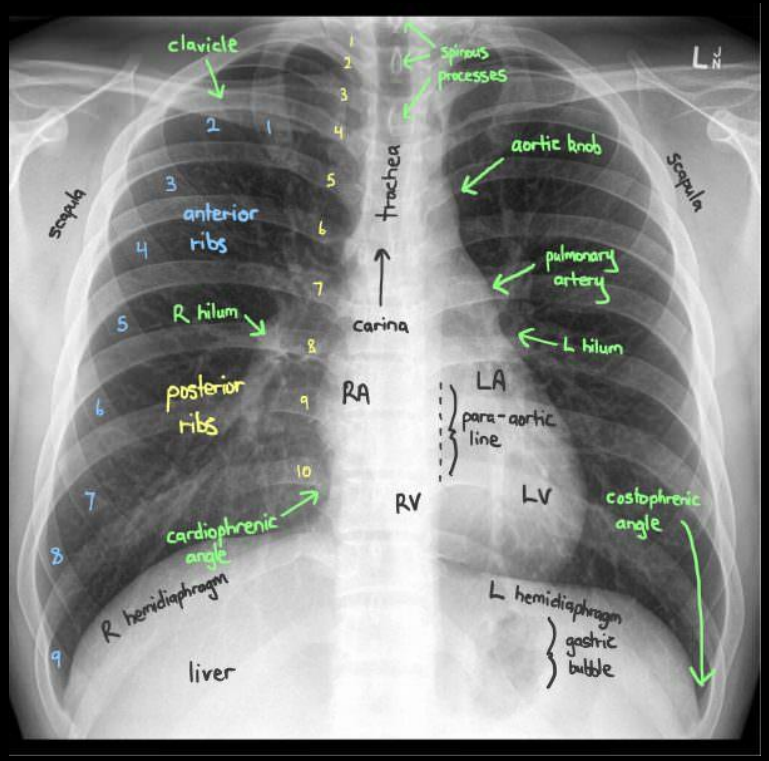
- Interpretation
  - Fields
    - Pulmonary Edema progression
      - Cephalization
      - Kerley B lines
      - Perihilar Edema
      - Pleural Effusions

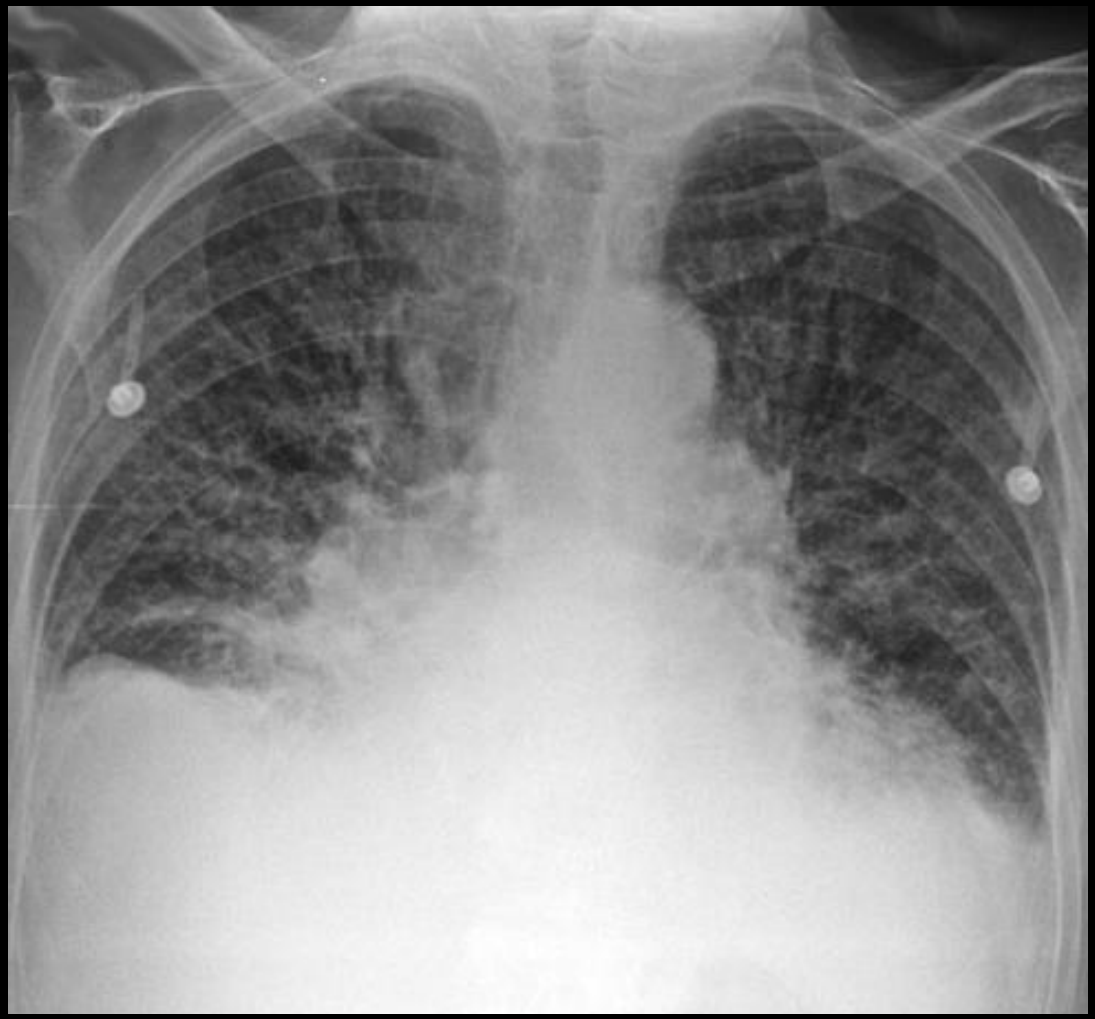
Chest Radiograph Interpretation





Chest Radiograph Interpretation

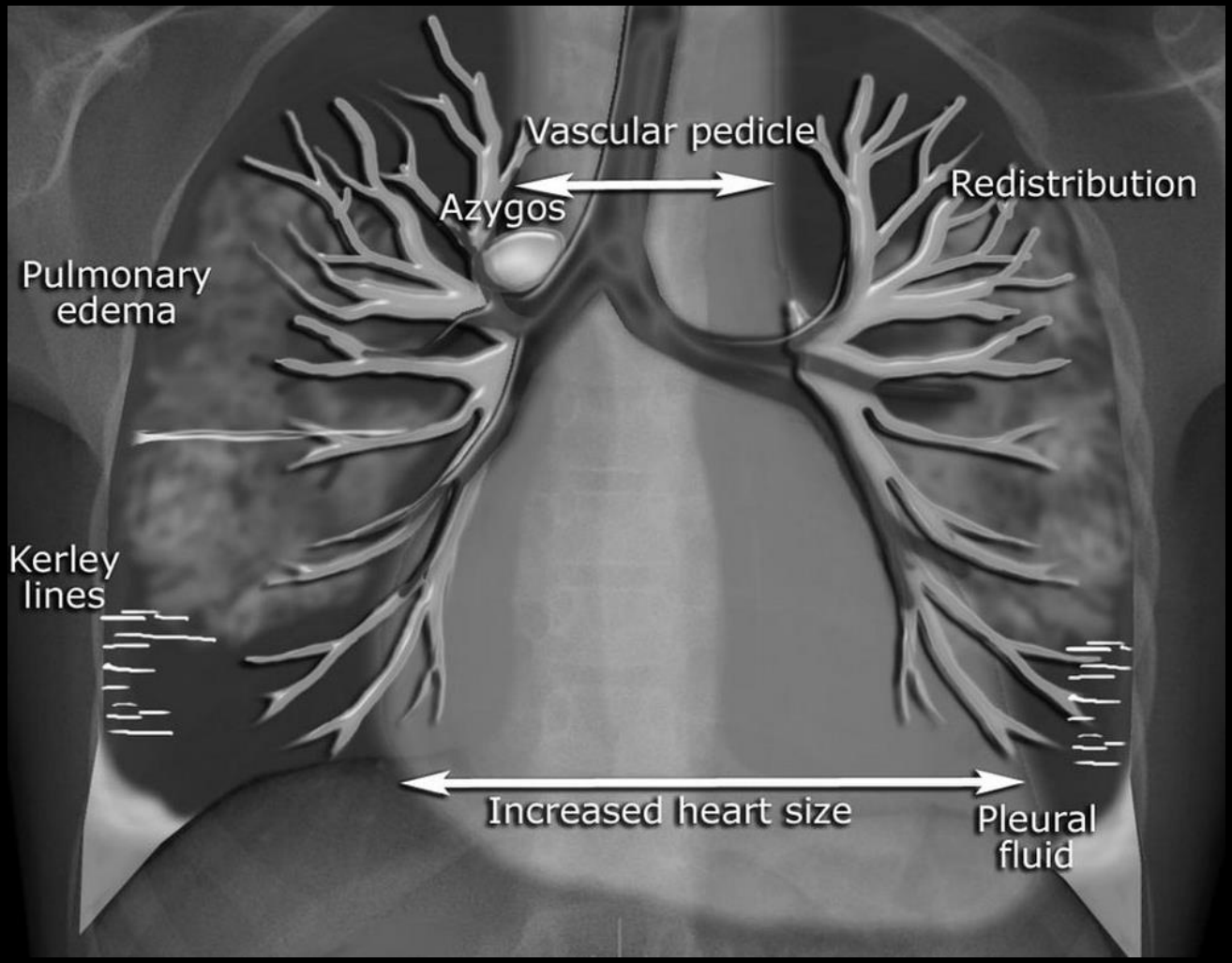




Chest Radiograph Interpretation

- Interpretation
  - Fields
    - Pulmonary Edema progression
      - Cephalization
      - Kerley B lines
      - Perihilar Edema
      - Pleural Effusions

Chest Radiograph Interpretation



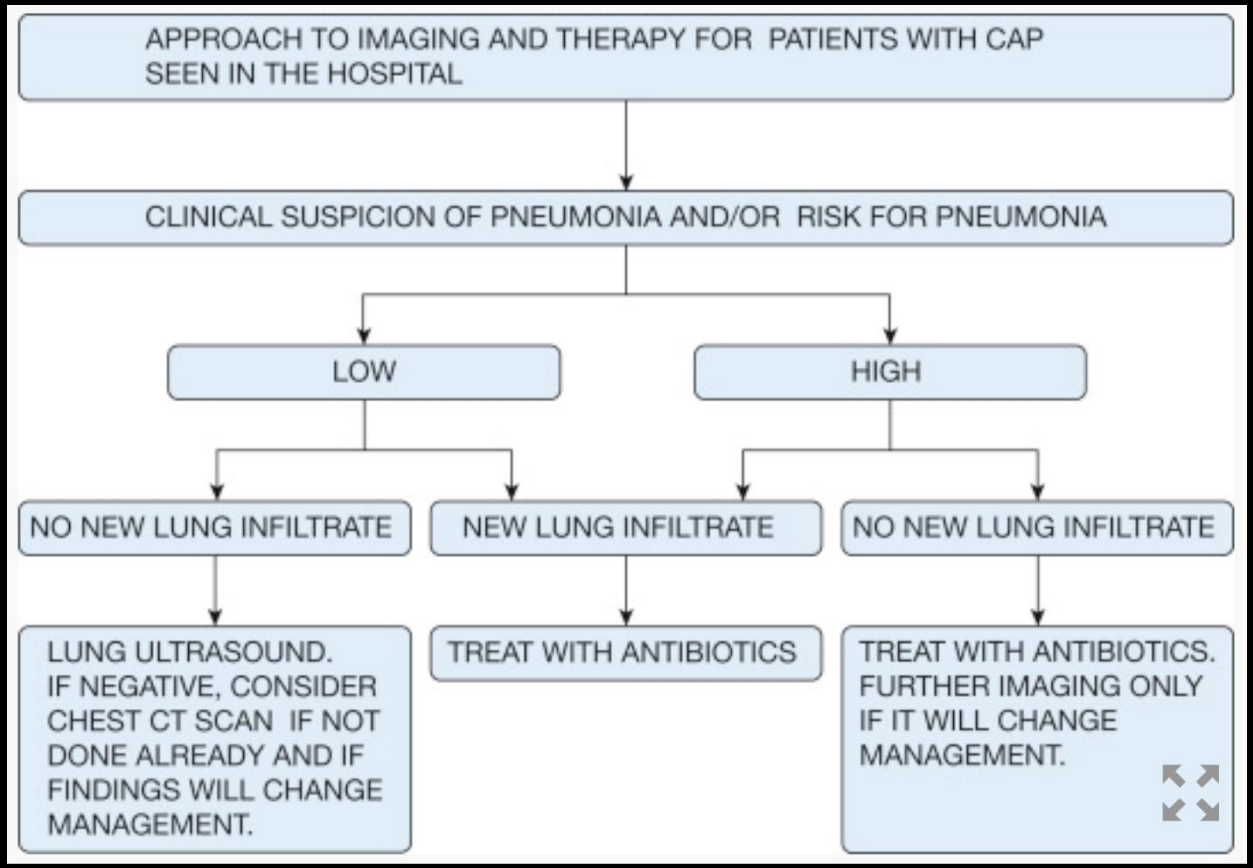
Chest Radiograph Interpretation

- Use CXR for diagnosis of
  - Acute CHF
    - 1st line study: ≥ 70% sensitive
  - Pneumonia
    - 1st line study: PA & Lateral CXR
    - Infiltrate required by ATS/IDSA
      - If CXR/CT NEG, may have sx but dx with Bronchitis/URI
    - Infiltrate not necessarily required by ACCP
      - See next slide

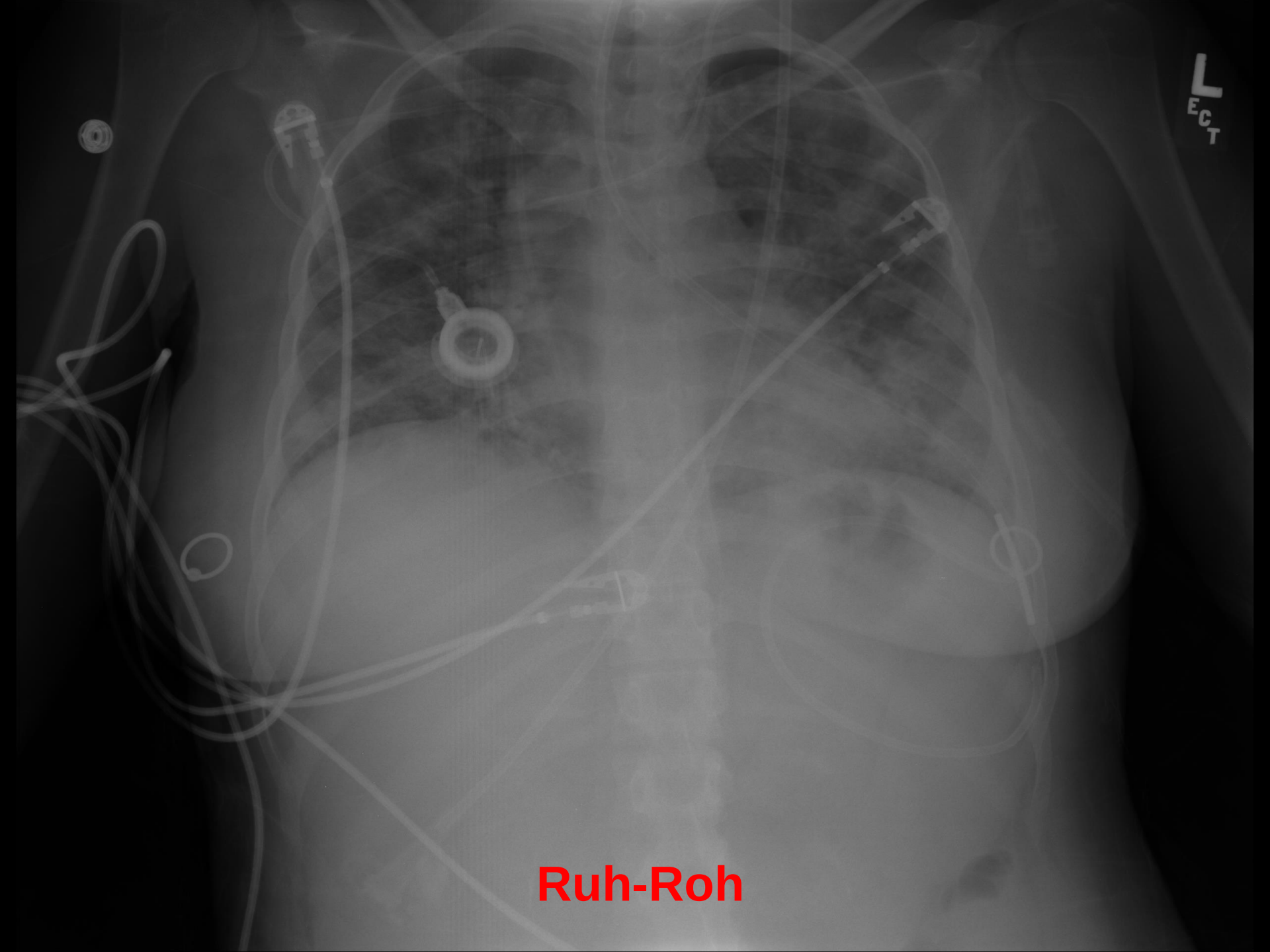
ATS/IDSA 2007
Self Am J Emerg Med 2013
Upchurch Chest 2018
Niederman Chest 2018

Chest Radiograph Interpretation

- Suggested algorithm



Niederman Chest 2018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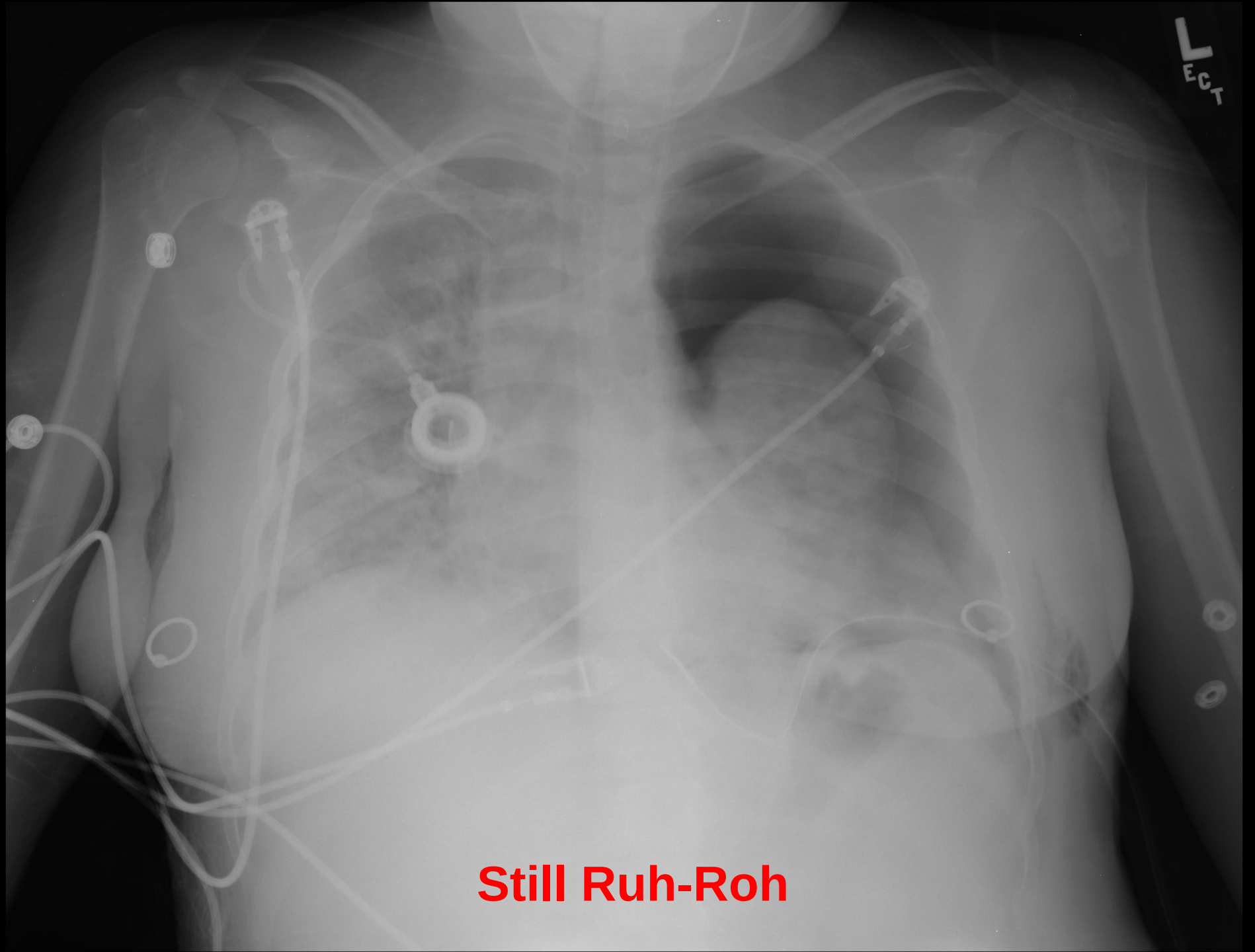
Ruh-Roh



Still Ruh-Roh

Chest Imaging

- Chest Radiography Interpretation
- Chest US Interpretation
- CT Chest Interpretation

Chest Imaging

- Chest Radiography Interpretation
- Chest US Interpretation
- CT Chest Interpretation

Chest Imaging

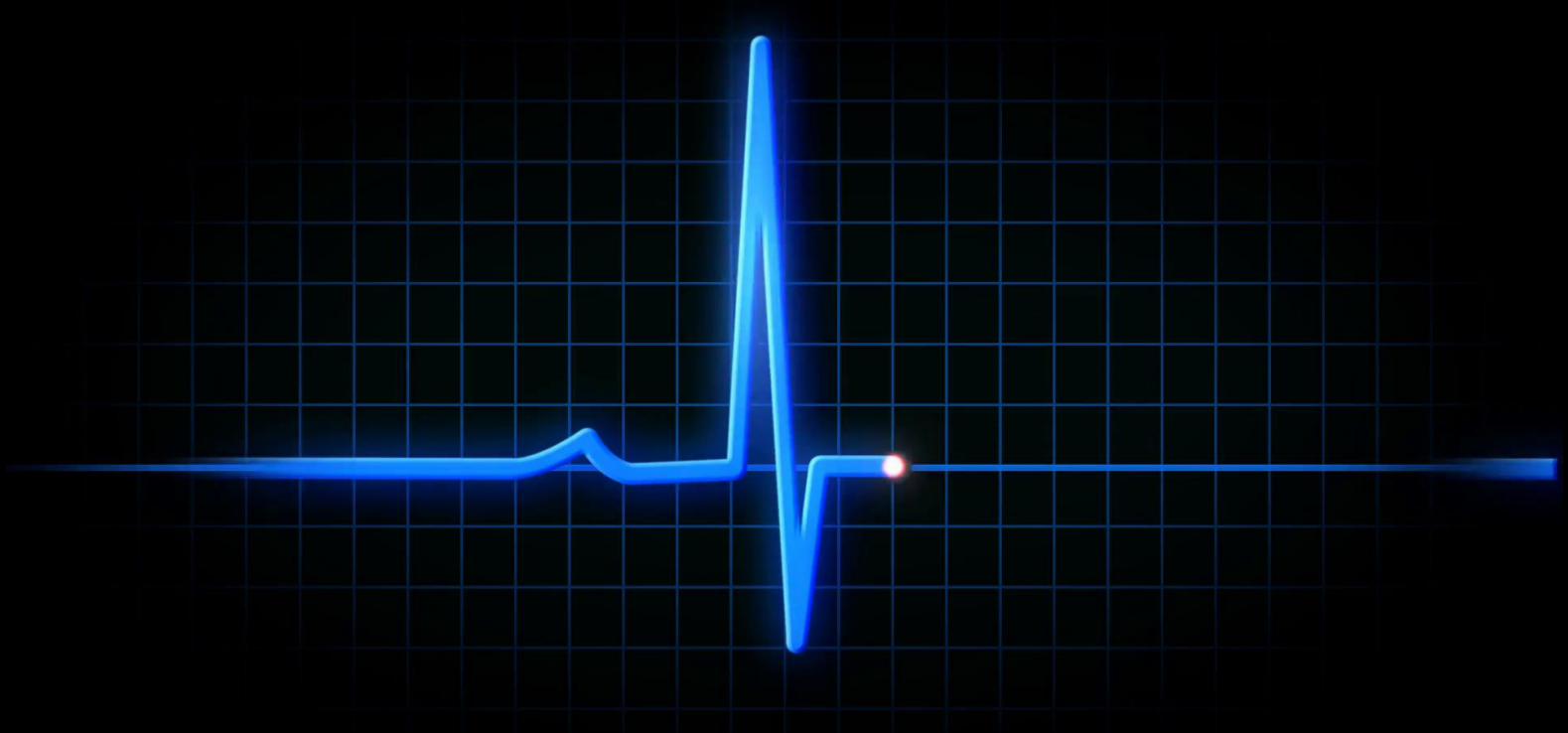
- Chest Radiography Interpretation
- Chest US Interpretation
  - Heart Failure / ARDS
  - Atelectasis
  - Consolidation
  - Pleural Effusion
  - Pneumothorax
- CT Chest Interpretation

Chest US Interpretation

- Use Chest US for diagnosis of
  - Sensitivity/Specificity
    - Pneumonia 90%/98%
    - Pleural Effusion 97%/94%
    - Small Pneumothorax 79%/100%
    - Large Pneumothorax 100%/91%

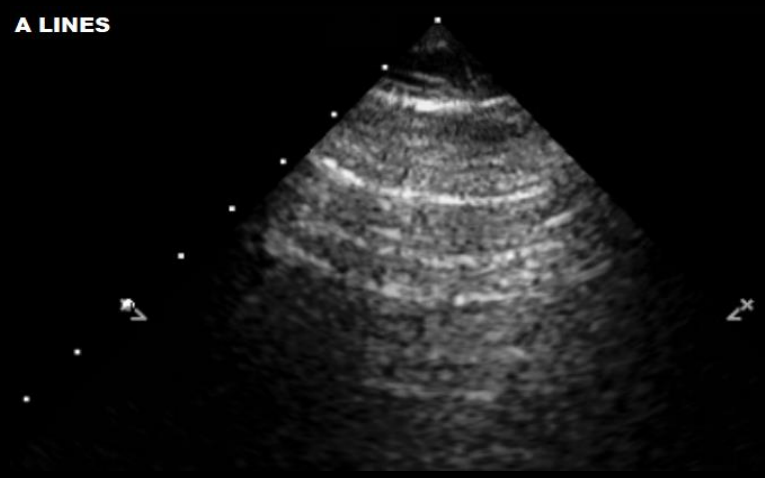
Chest US Interpretation

- Not anatomic
  - Use patterns of artifact to diagnose dz
    - NOT intuitive



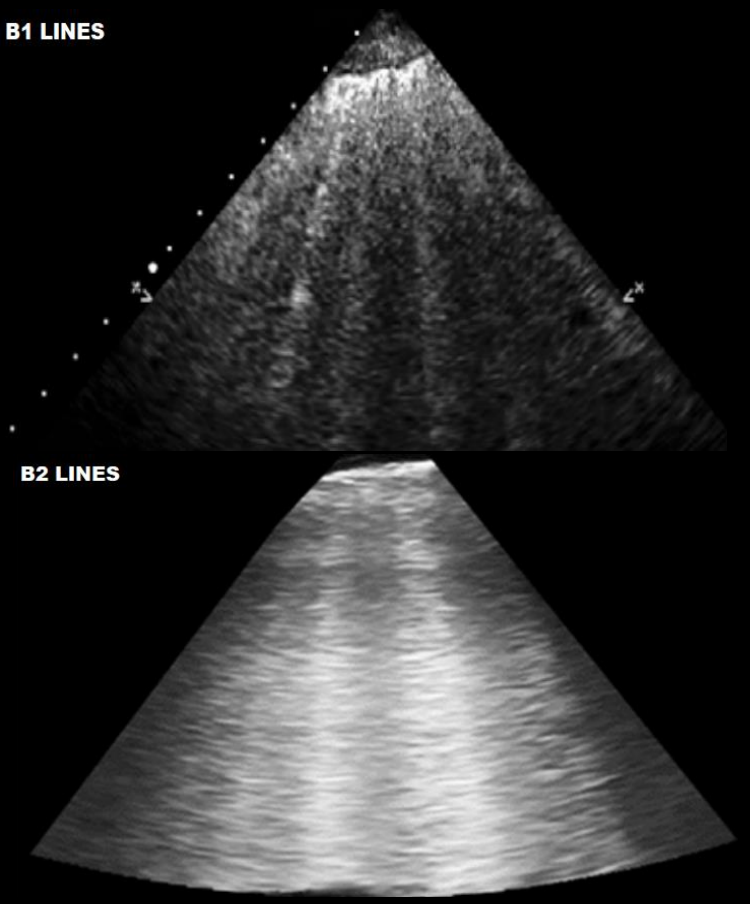
Chest US Interpretation

- A Lines
  - Horizontal lines parallel to pleural line
  - Normal Lung
  - If dyspnea, thinking COPD, PE, or Acidosis



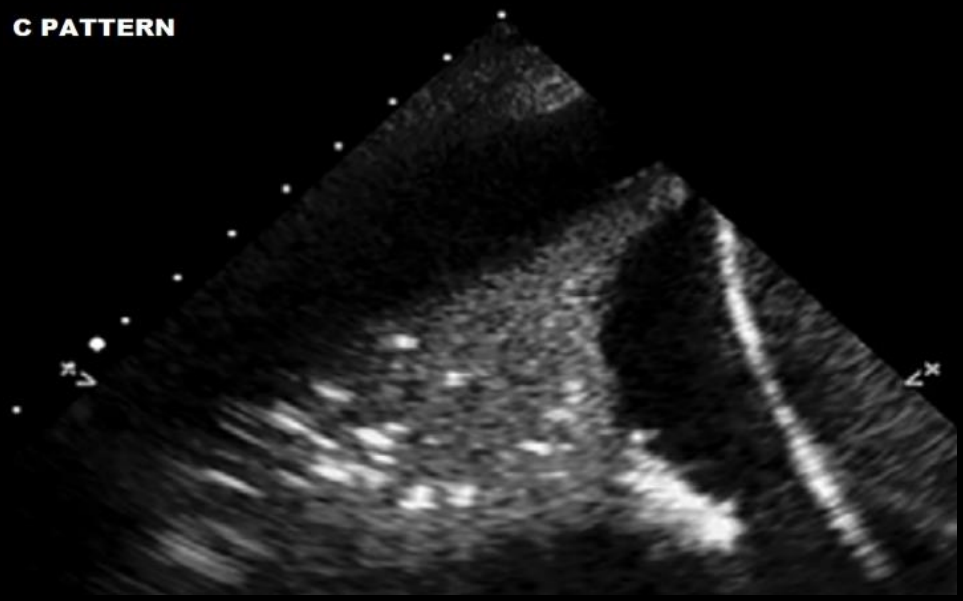
Chest US Interpretation

- B Lines
  - Fluid interlobular septum
    - Shows up before CXR
    - 3 or more pathologic
    - CHF, ARDS, ILD
      - Early Pneumonia



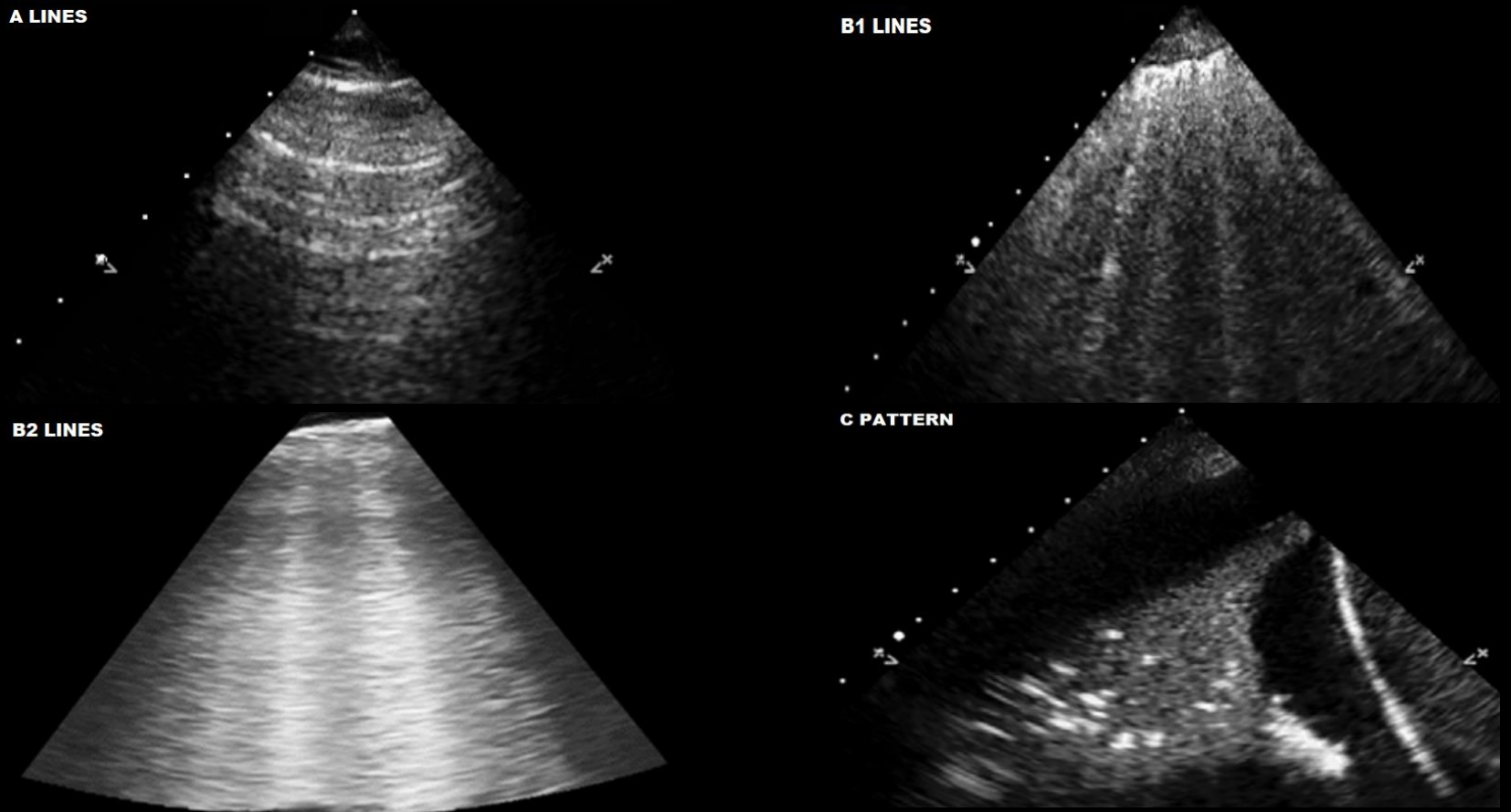
Chest US Interpretation

- C Pattern
  - Consolidation
    - Pneumonia
    - Atelectasis



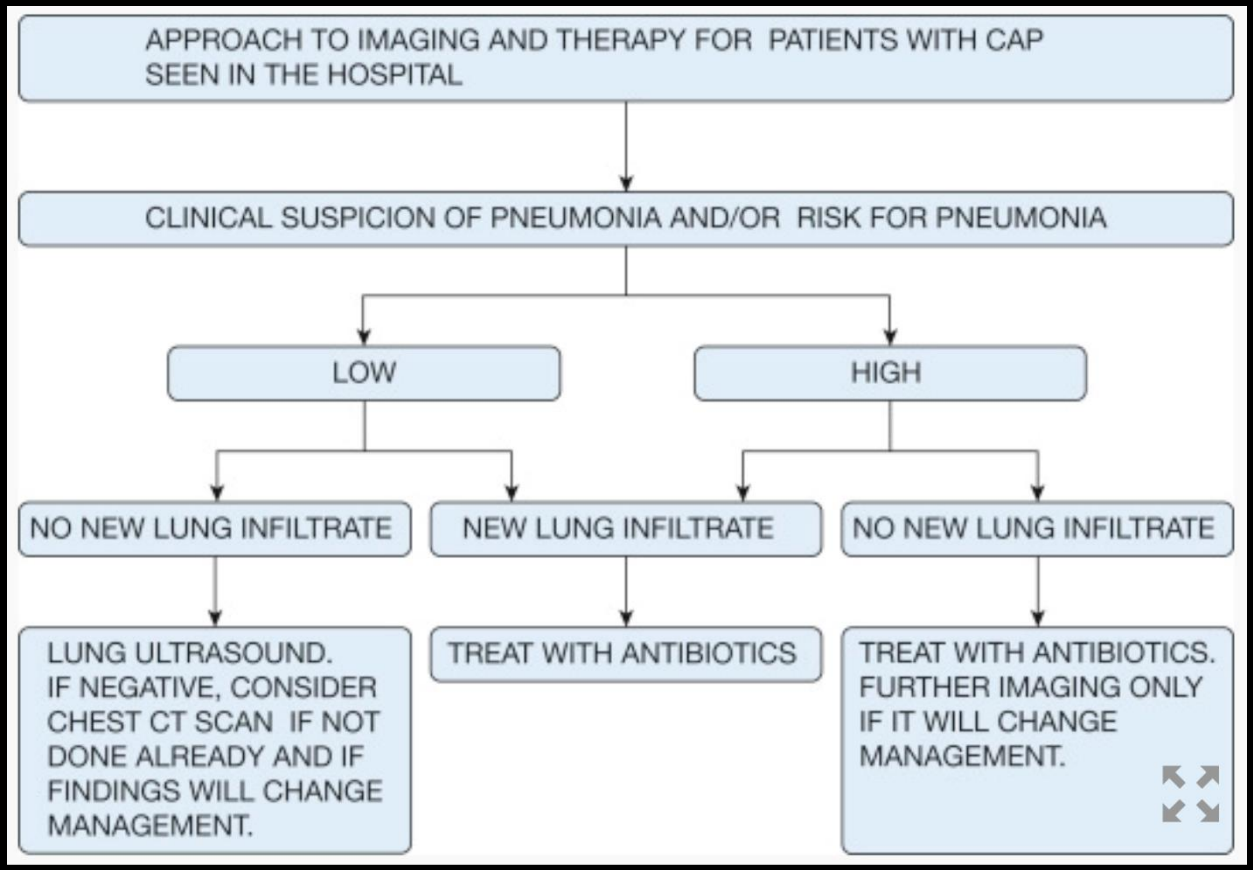
Chest US Interpretation

- Chest Ultrasound A, B, Cs



Chest US Interpretation

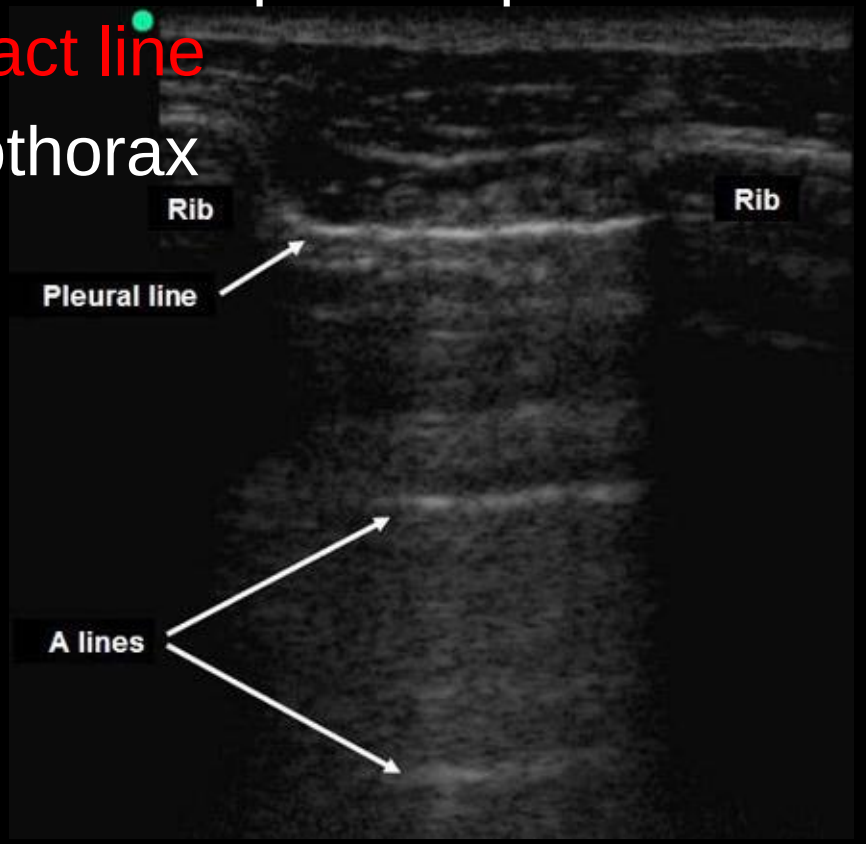
- Approach to Imaging Pneumonia (CAP)



Niederman Chest 2018

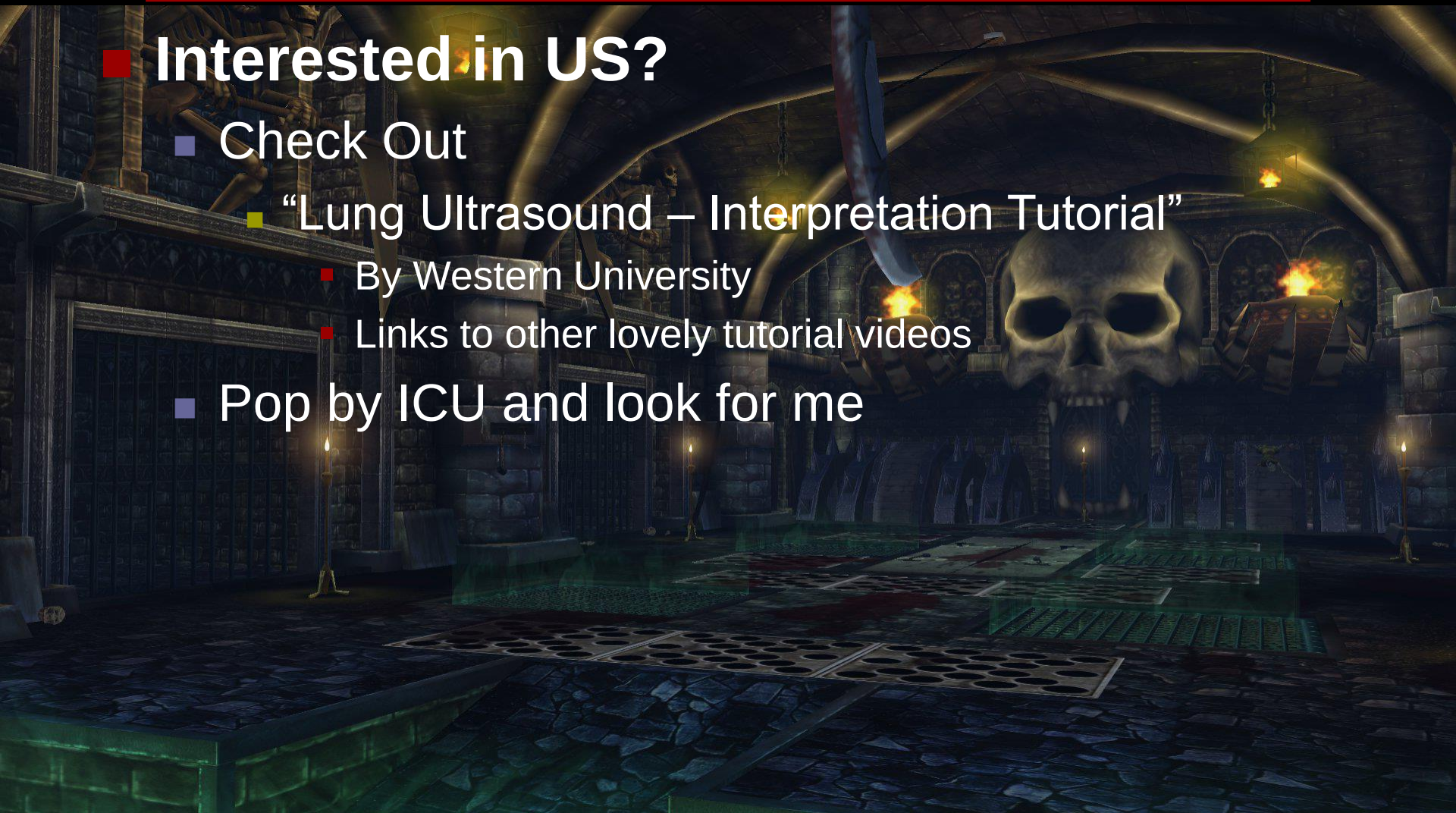
Chest US Interpretation

- Sliding Lung
  - Movement between visceral and parietal pleura causes hyperechoic artifact line
  - 100% Rules out Pneumothorax



Chest US Interpretation

Chest US Interpretation



- **Interested in US?**
  - Check Out
    - “Lung Ultrasound – Interpretation Tutorial”
      - By Western University
      - Links to other lovely tutorial videos
  - Pop by ICU and look for me

It’s just contrast you sickos

Chest Imaging

- Chest Radiography Interpretation
- Chest US Interpretation
- CT Chest Interpretation

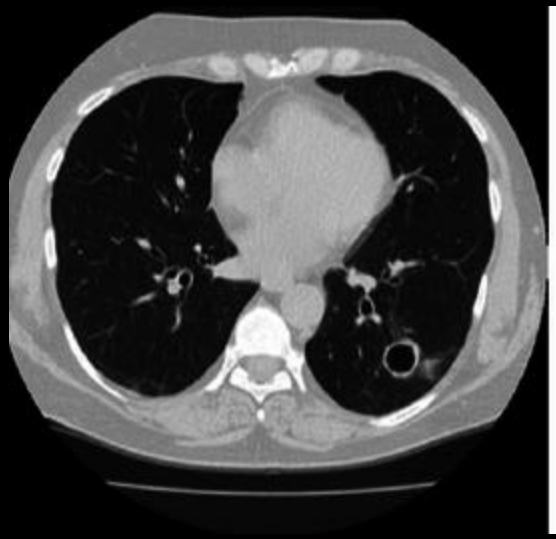
Chest Imaging

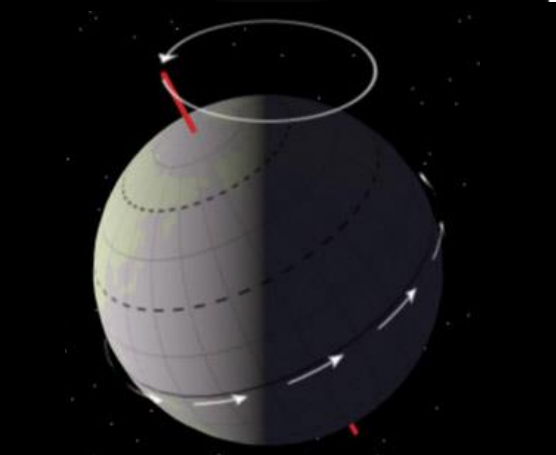
- Chest Radiography Interpretation
- Chest US Interpretation
- CT Chest Interpretation

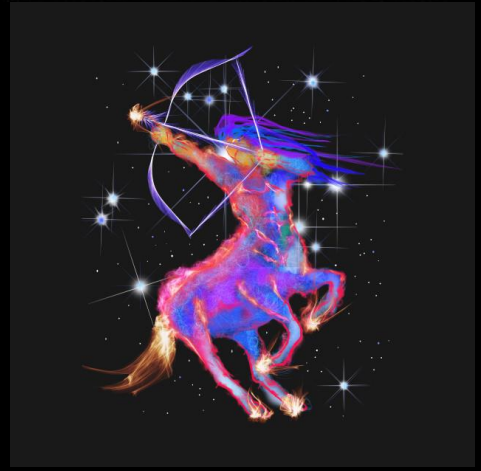
Chest Imaging

- Chest Radiography Interpretation
- Chest US Interpretation
- CT Chest Interpretation
  - Lung Nodules & Masses
  - Consolidation
  - Pulmonary Embolism

CT Chest Interpretation

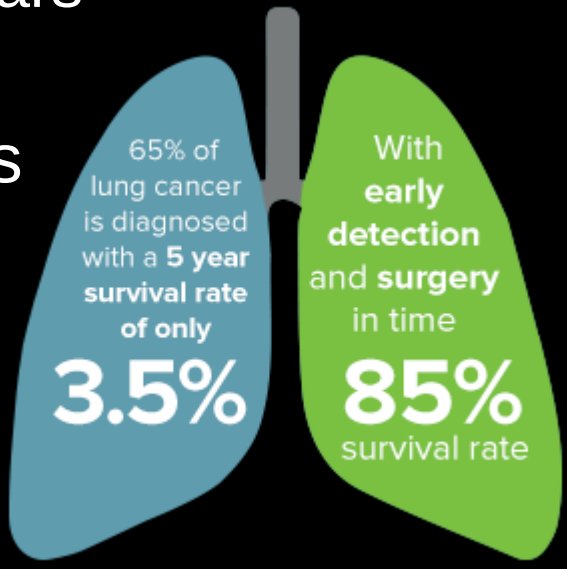






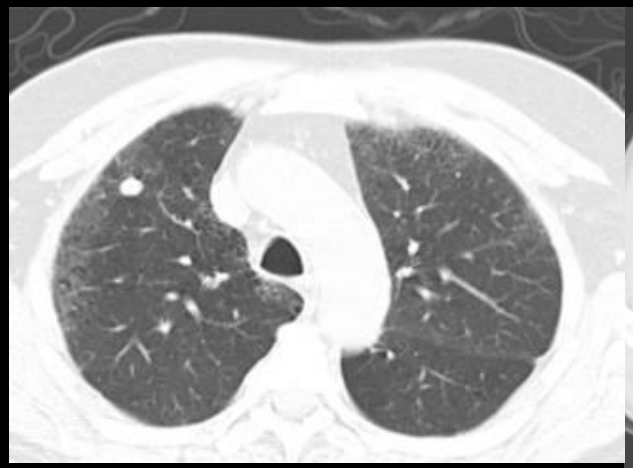
CT Chest Interpretation

- Nodules & Masses
  - Screening CT
    - 55-79 years of age
    - 30 pack year + still smoking/ quit ≤15 years
    - Quit screening when quit > 15 years
      - US Preventive Services Task Force
  - Lacks professional grp consensus



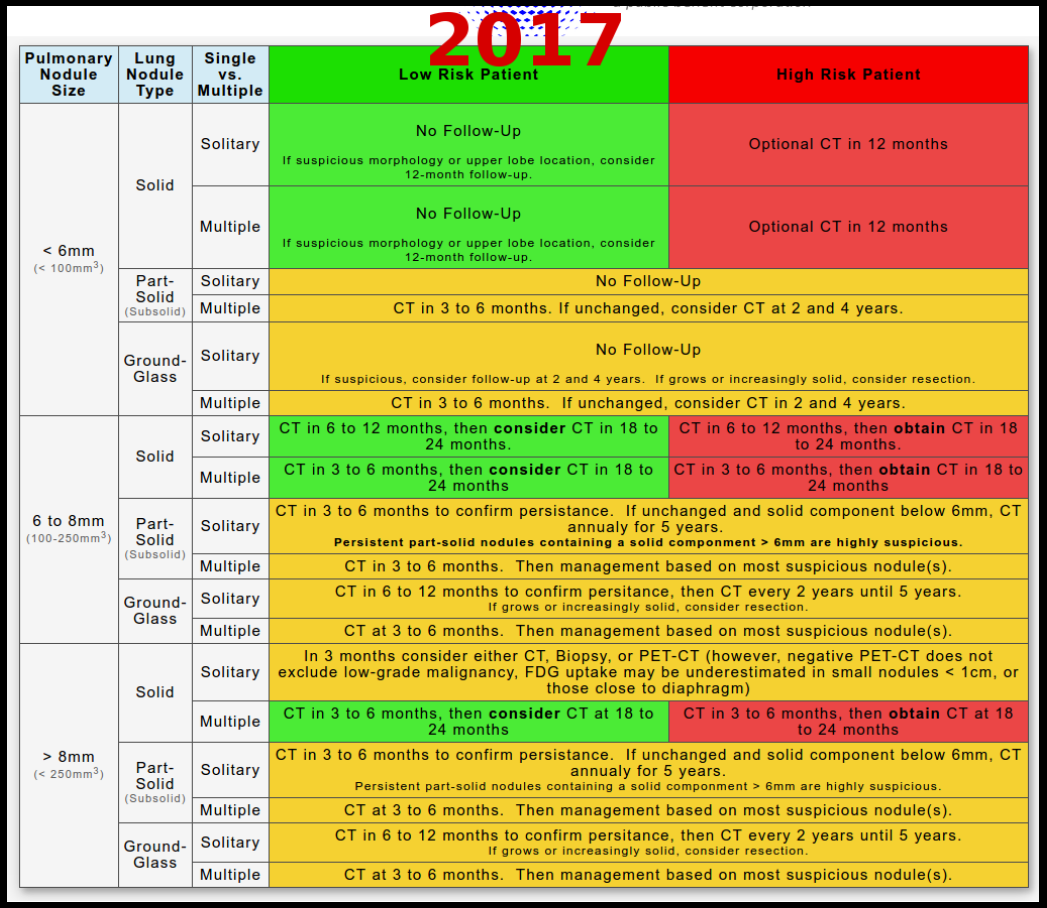
CT Chest Interpretation

- Nodules & Masses
  - Sizes
    - Subcentimeter Nodules (≤8mm) Fleischner society
    - Pulmonary Nodules (<3cm) Refer to pulm
    - Lung Mass (≥3cm) Inform pt likely CA, refer to pulm



CT Chest Interpretation

- Nodules & Masses: Fleischner Society



2017

Pulmonary Nodule Size	Lung Nodule Type	Single vs. Multiple	Low Risk Patient	High Risk Patient
< 6mm (< 100mm^3)	Solid	Solitary	No Follow-Up If suspicious morphology or upper lobe location, consider 12-month follow-up.	Optional CT in 12 months
		Multiple	No Follow-Up If suspicious morphology or upper lobe location, consider 12-month follow-up.	Optional CT in 12 months
	Part-Solid (Subsolid)	Solitary	No Follow-Up	
		Multiple	CT in 3 to 6 months. If unchanged, consider CT at 2 and 4 years.	
	Ground-Glass	Solitary	No Follow-Up If suspicious, consider follow-up at 2 and 4 years. If grows or increasingly solid, consider resection.	
		Multiple	CT in 3 to 6 months. If unchanged, consider CT in 2 and 4 years.	
6 to 8mm (100-250mm^3)	Solid	Solitary	CT in 6 to 12 months, then **consider** CT in 18 to 24 months.	CT in 6 to 12 months, then **obtain** CT in 18 to 24 months.
		Multiple	CT in 3 to 6 months, then **consider** CT in 18 to 24 months	CT in 3 to 6 months, then **obtain** CT in 18 to 24 months
	Part-Solid (Subsolid)	Solitary	CT in 3 to 6 months to confirm persistance. If unchanged and solid component below 6mm, CT annualy for 5 years. **Persistent part-solid nodules containing a solid componment > 6mm are highly suspicious.**	
		Multiple	CT in 3 to 6 months. Then management based on most suspicious nodule(s).	
	Ground-Glass	Solitary	CT in 6 to 12 months to confirm persitance, then CT every 2 years until 5 years. If grows or increasingly solid, consider resection.	
		Multiple	CT at 3 to 6 months. Then management based on most suspicious nodule(s).	
> 8mm (< 250mm^3)	Solid	Solitary	In 3 months consider either CT, Biopsy, or PET-CT (however, negative PET-CT does not exclude low-grade malignancy, FDG uptake may be underestimated in small nodules < 1cm, or those close to diaphragm)	
		Multiple	CT in 3 to 6 months, then **consider** CT at 18 to 24 months	CT in 3 to 6 months, then **obtain** CT at 18 to 24 months
	Part-Solid (Subsolid)	Solitary	CT in 3 to 6 months to confirm persistance. If unchanged and solid component below 6mm, CT annualy for 5 years. Persistent part-solid nodules containing a solid componment > 6mm are highly suspicious.	
		Multiple	CT at 3 to 6 months. Then management based on most suspicious nodule(s).	
	Ground-Glass	Solitary	CT in 6 to 12 months to confirm persitance, then CT every 2 years until 5 years. If grows or increasingly solid, consider resection.	
		Multiple	CT at 3 to 6 months. Then management based on most suspicious nodule(s).	

CT Chest Interpretation

- Nodules & Masses: Fleischner Society
  - Don't use for (and refer to Pulm if)
    - Patients who have a known cancer
    - Immunosuppressed patients
    - Lung cancer screening (screened annually)
    - Intra-fissural, perifissural, and subpleural pulmonary nodules
    - Cancer history

CT Chest Interpretation

- Nodules & Masses: Fleischner Society
  - What's Risk?
    - Low risk, which corresponds to an estimated risk of cancer of less than 5%, is associated with young age, less smoking, smaller nodule size, regular margins, and location in an area other than the upper lobe.
    - To estimate high risk, we recommend combining the ACCP intermediate-risk (5%–65% risk) and high-risk (>65% risk) categories. High-risk factors include older age, heavy smoking, larger nodule size, irregular or spiculated margins, and upper lobe location. Subjects with intermediate risk share both high- and low-risk characteristics.
    - Getting uncomfortable… maybe refer to PULM

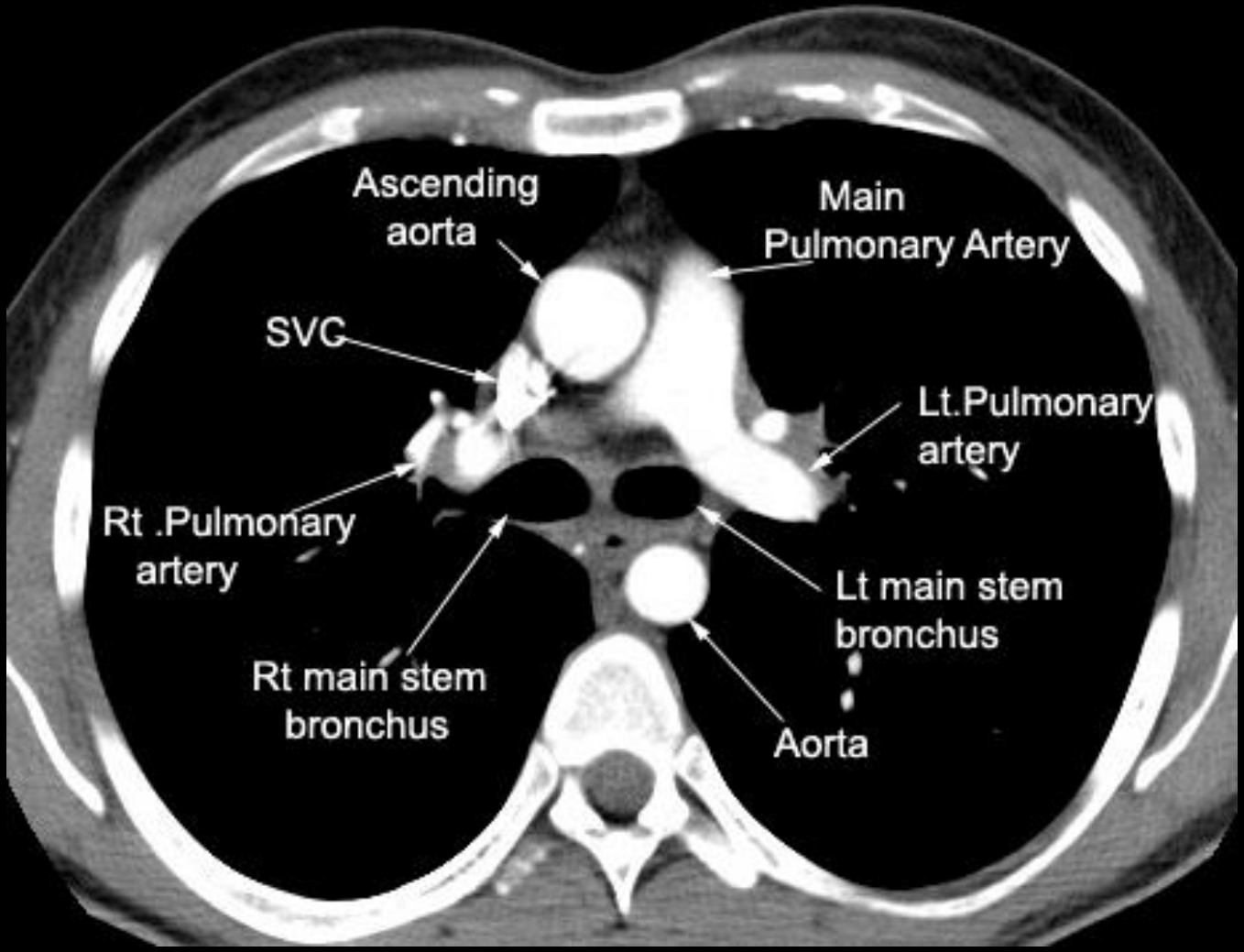
CT Chest Interpretation

- Consolidation: Don’t need my help

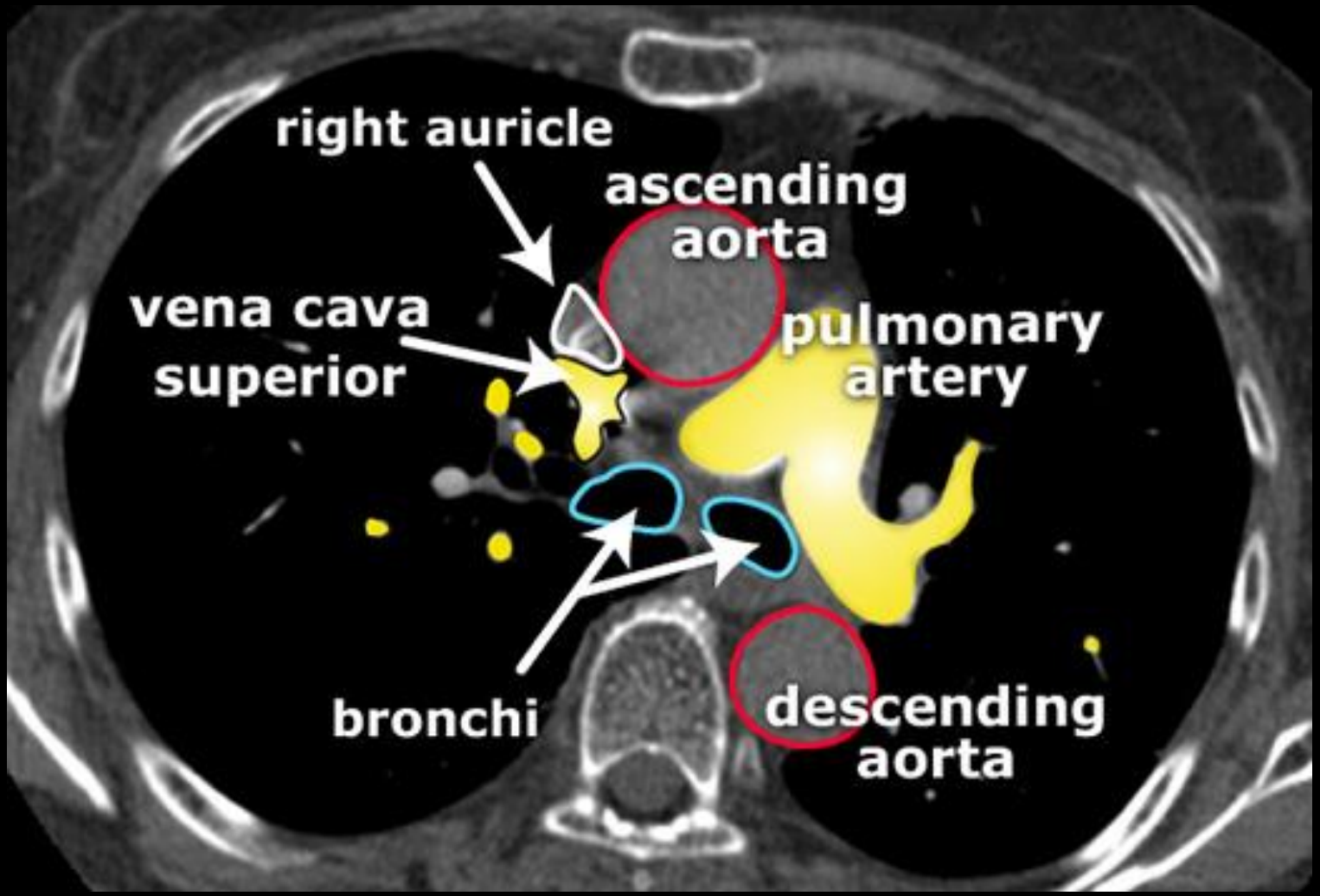
CT Chest Interpretation

- Pulmonary Arteries
  - #1 Make sure looking at Pulm A *not Pulm V*
    - Axial: Pulm A: I look "upside down Y" between Ascend Aorta and Descend Aorta

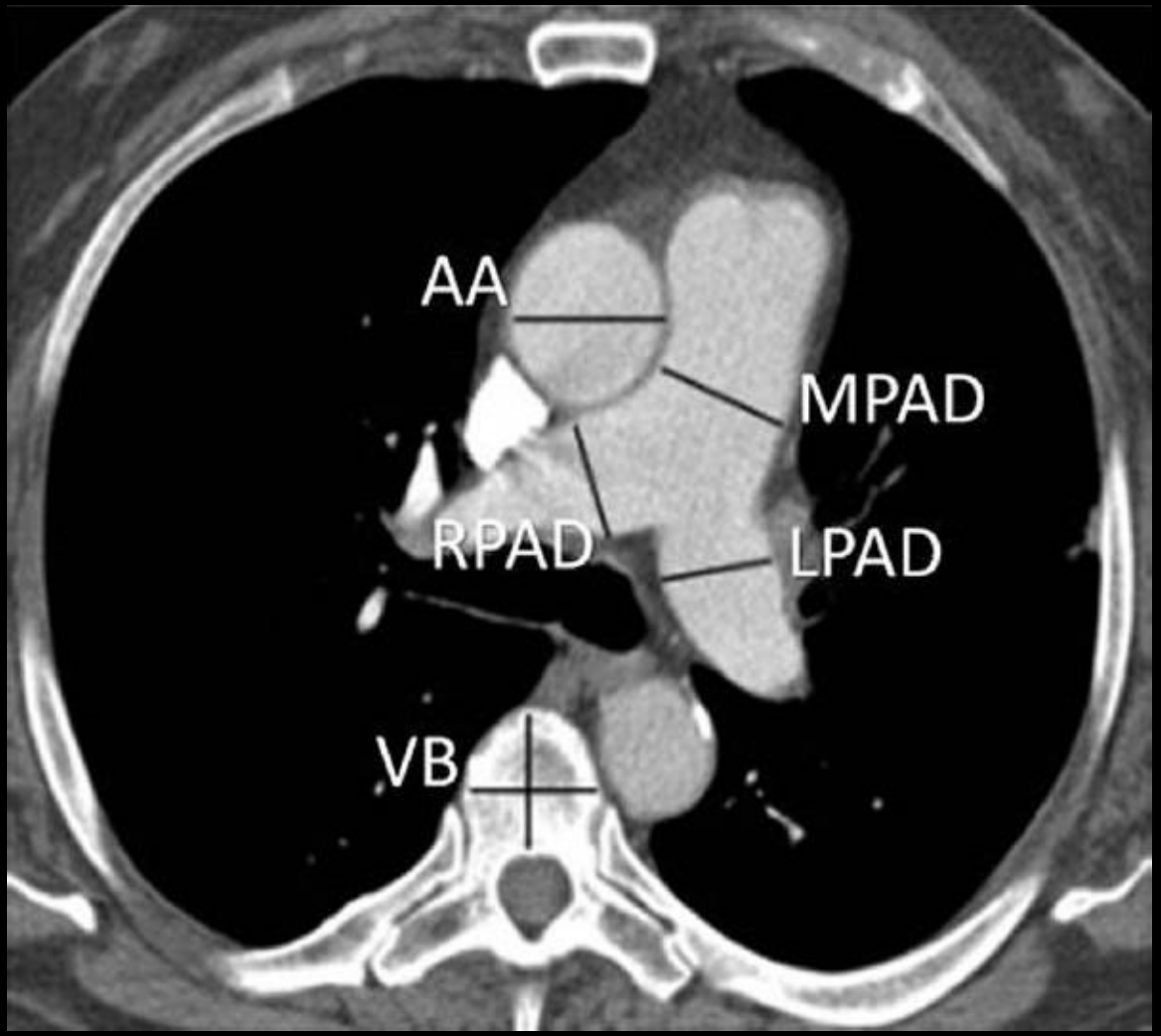
CT Chest Interpretation



CT Chest Interpretation



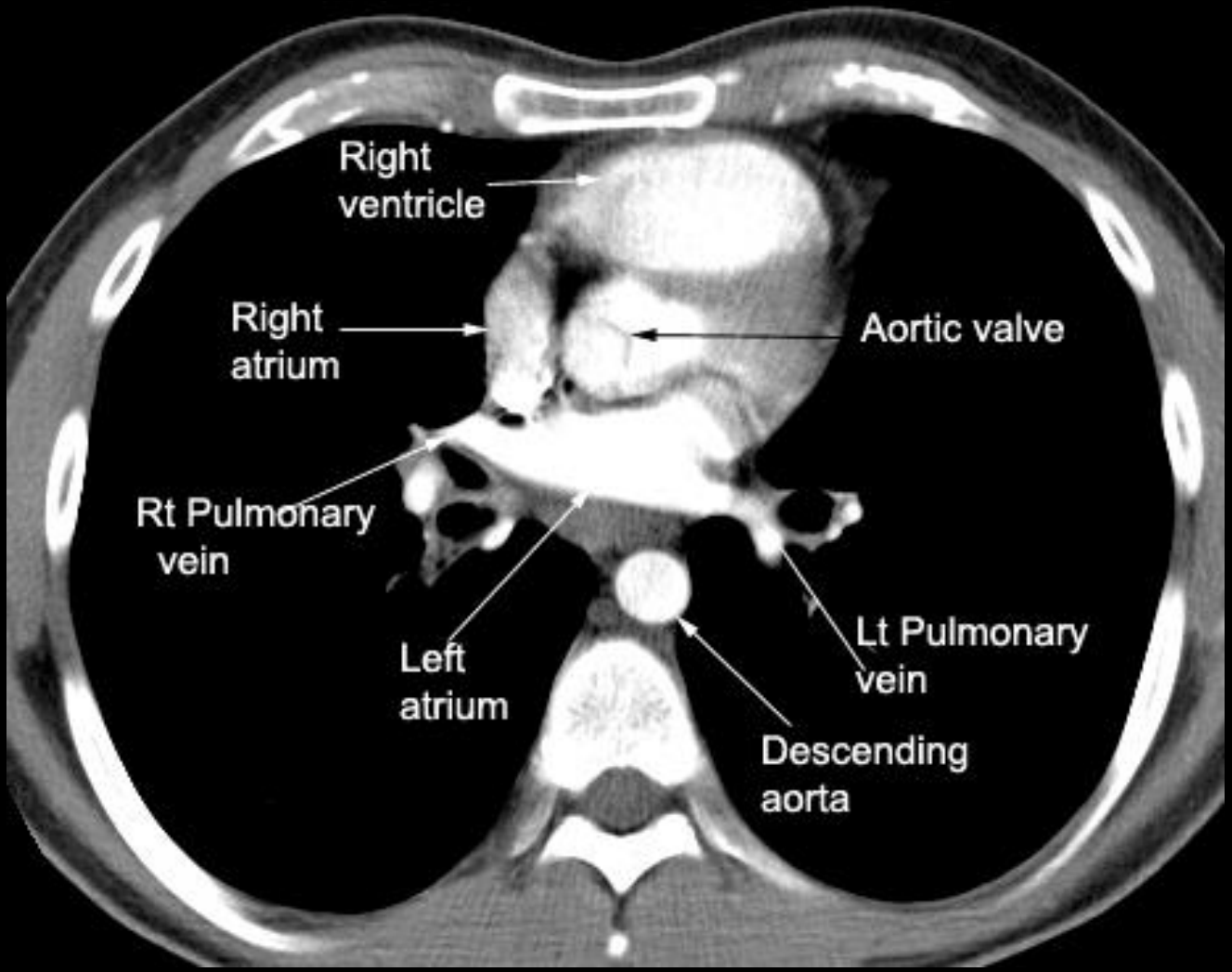
CT Chest Interpretation



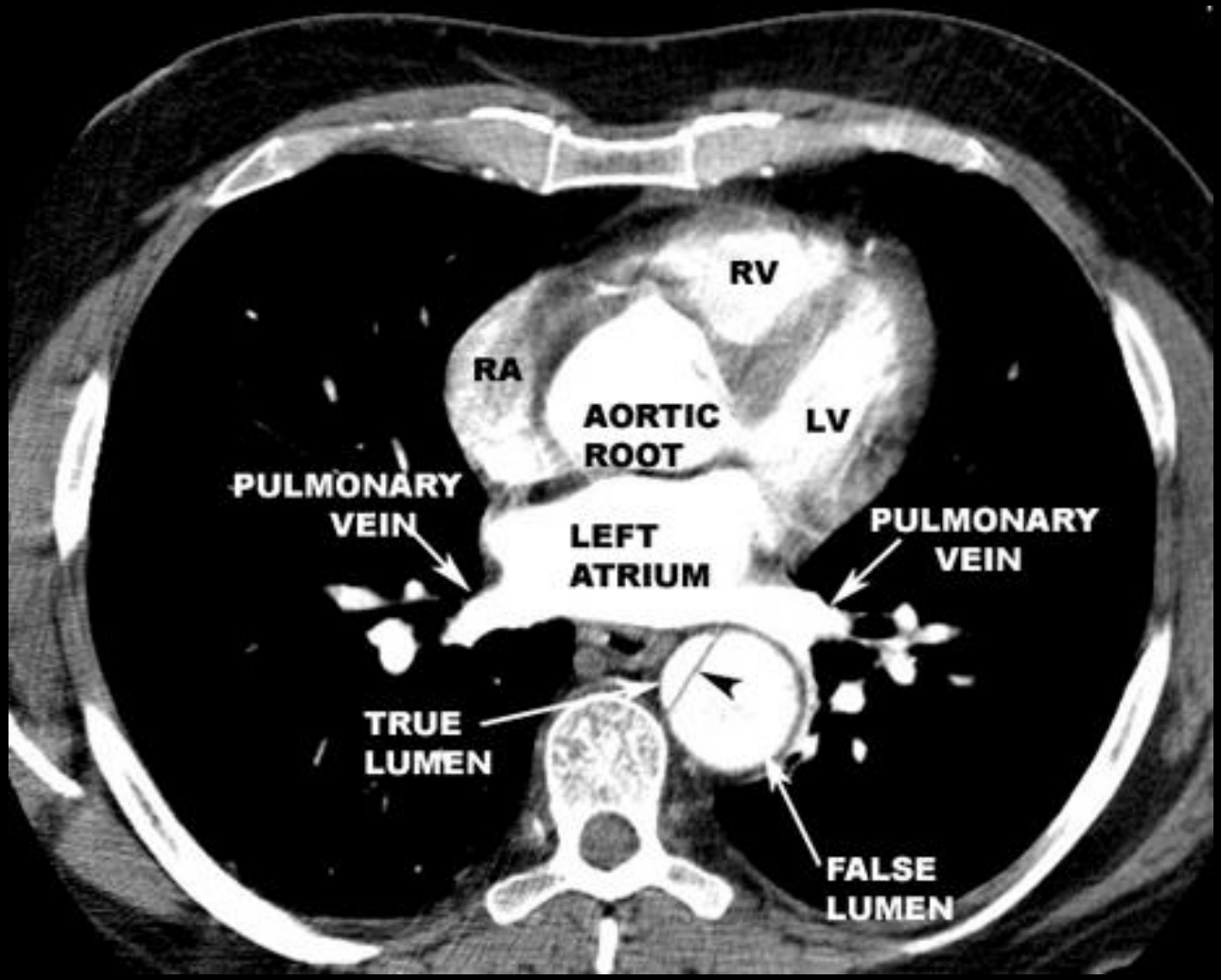
CT Chest Interpretation

- Pulmonary Arteries
  - #1 Make sure looking at Pulm A not Pulm V
    - Axial: Pulm A: I look "upside down Y" between Ascend Aorta and Descend Aorta
    - Axial: Left Atrium is posterior structure
      - If vessel terminates into, it is Pulm V

CT Chest Interpretation

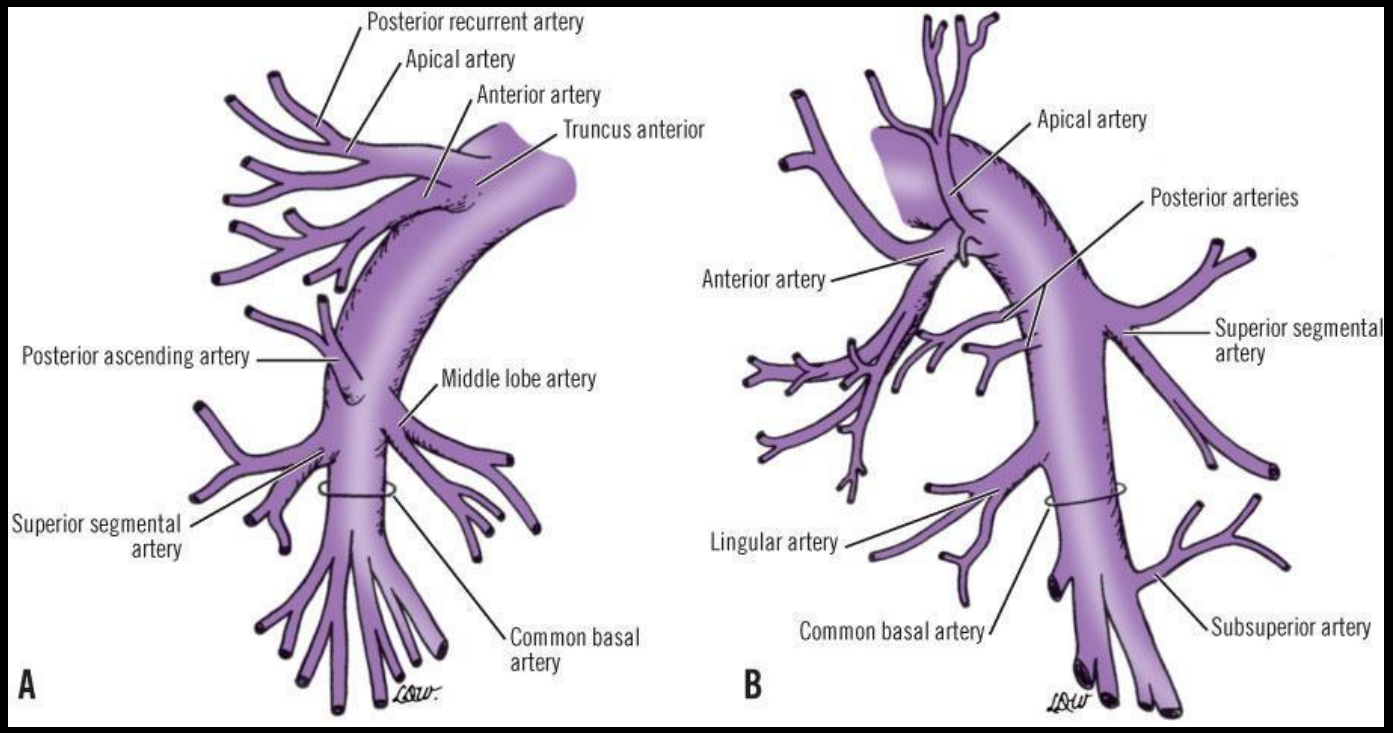


CT Chest Interpretation

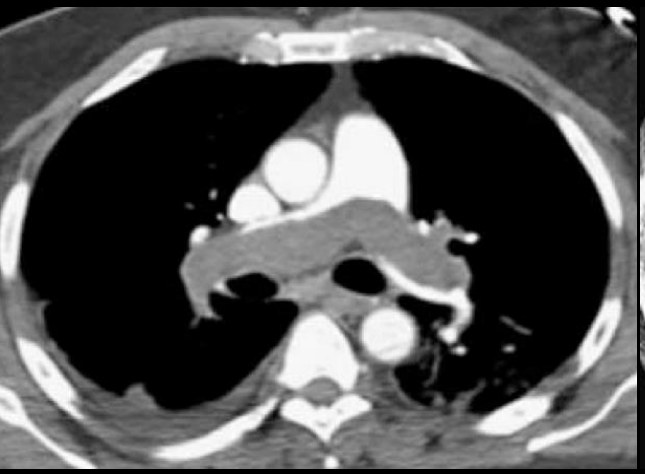


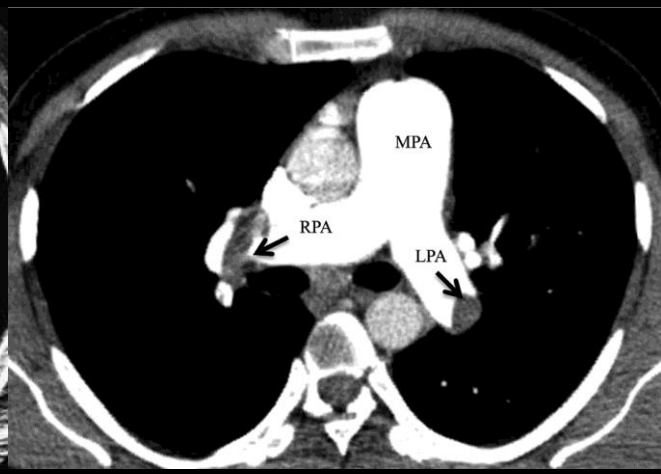
CT Chest Interpretation

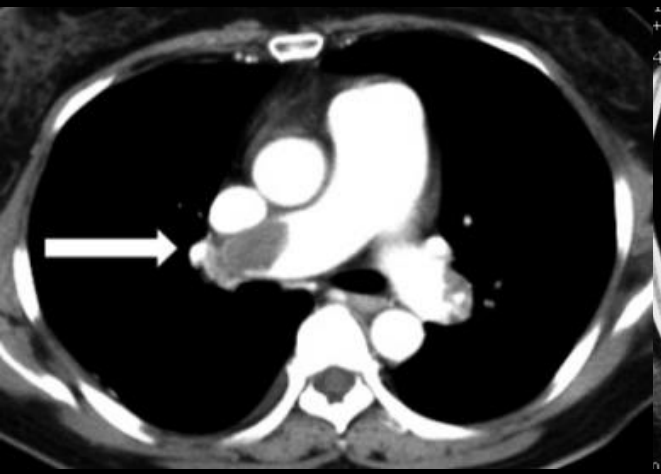
- Pulmonary Embolism
  - Saddle, Main PA, Segmental PA, Subsegmental PA
    - PA = Pulmonary Artery

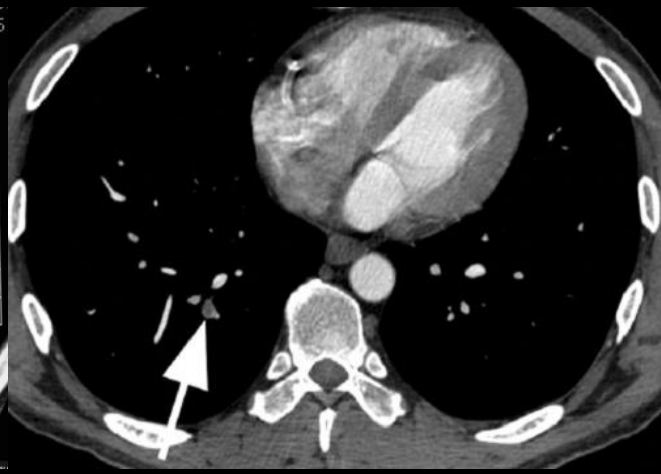


CT Chest Interpretation

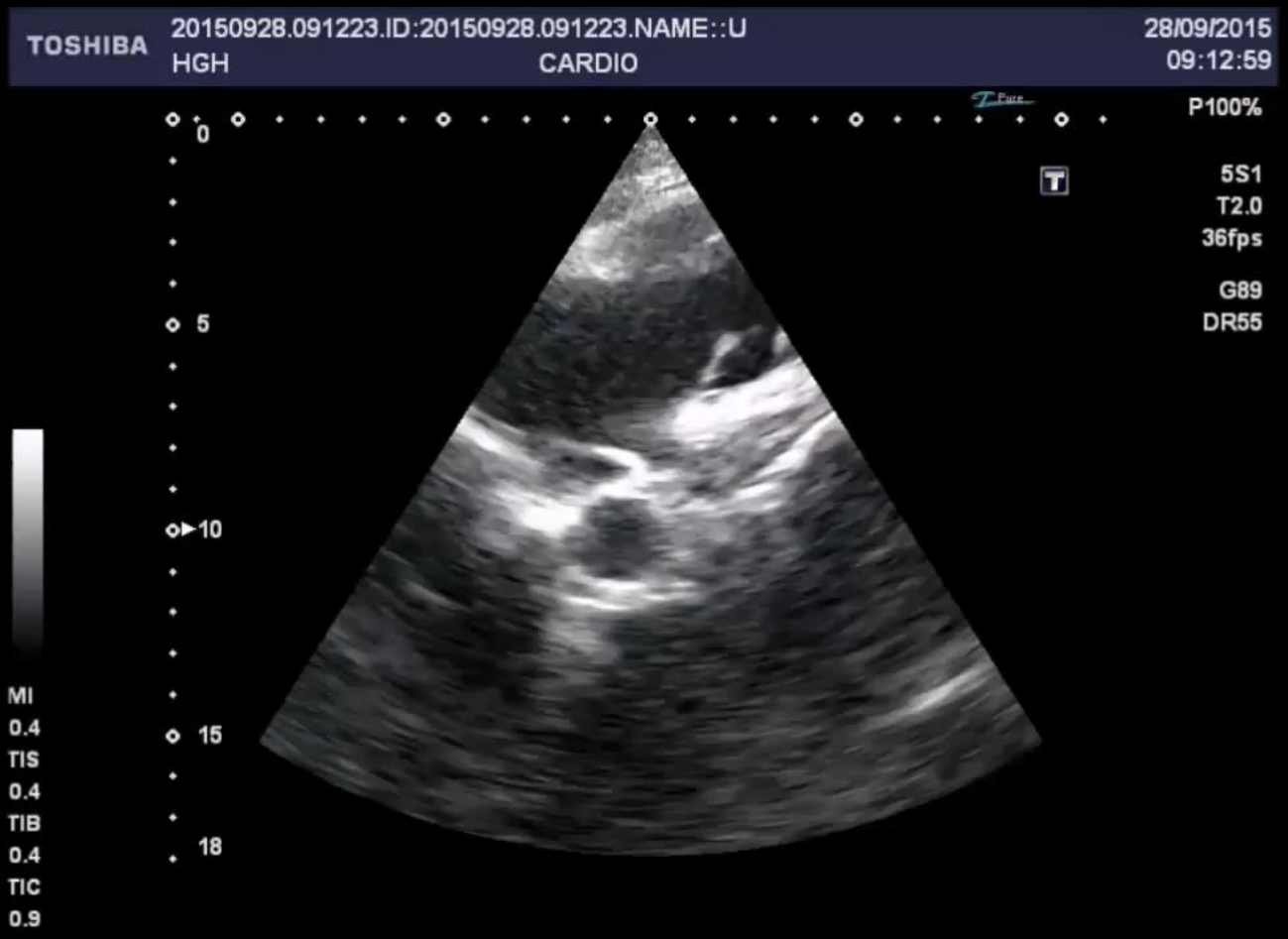








CT Chest Interpretation



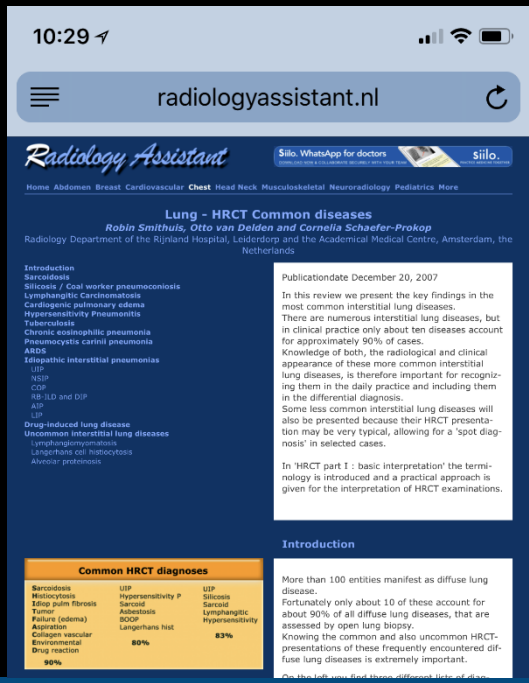
OK… This needed surgery

Chest Imaging

- Chest Radiography Interpretation
- Chest US Interpretation
- CT Chest Interpretation

An Independent Learner?

- Try www.radiologyassistant.nl



Radiology Assistant

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Thanks!