

# Chest Radiography

## Lecture 10

### Fracture

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[www.foxvalleyradiology.com](http://www.foxvalleyradiology.com)

# FRACTURE

INDICATIONS: injury, chest pain. Some patients may fracture a rib with severe coughing, especially if they are osteoporotic.

FINDINGS: cortical discontinuity, bone contour abnormality including compression deformity of the vertebral body.

IMPRESSION: Fracture.

# FRACTURE - COMMENTS

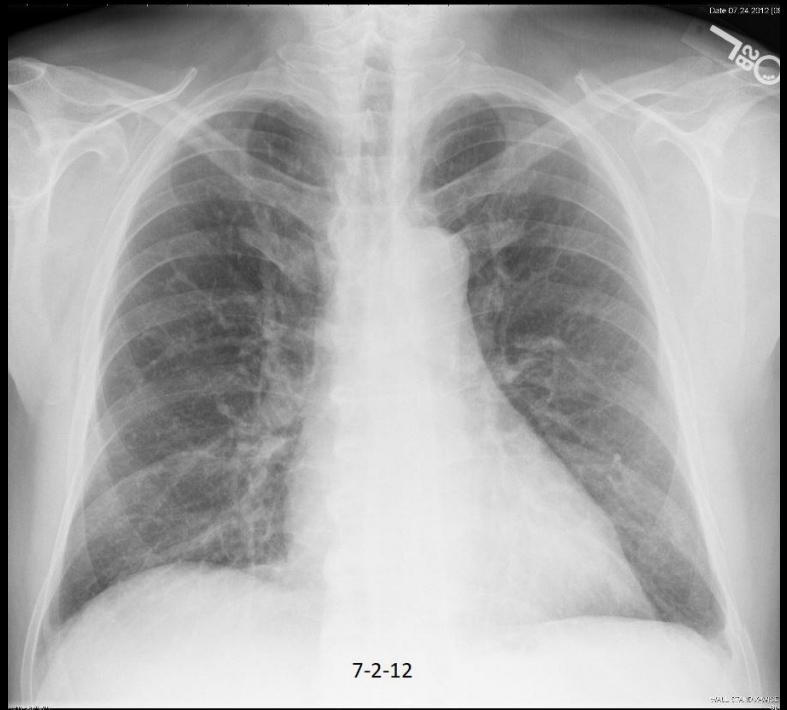
Isolated minimally displaced rib fractures may be difficult or impossible to see on a chest radiograph. Rib detail films or chest CT may show rib fractures not seen (or at least not easily seen) on a chest radiograph. Such minimally displaced fractures may be diagnosed on clinical grounds without imaging when the patient has the appropriate history and physical exam findings, and the main purpose of the chest radiograph is to exclude accompanying pneumothorax or hemothorax or an alternative cause of chest pain.

Similarly, chest CT or thoracic spine MR may show thoracic spine fractures not seen (or at least not easily seen) on a chest radiograph. Such fractures may indicate osteoporosis and such patients may need to be evaluated with a bone mineral density study.

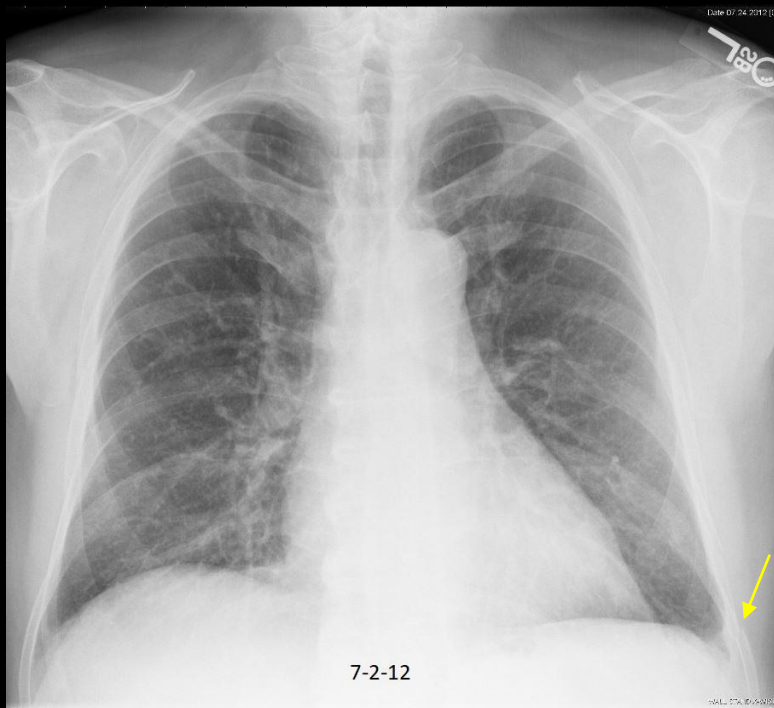
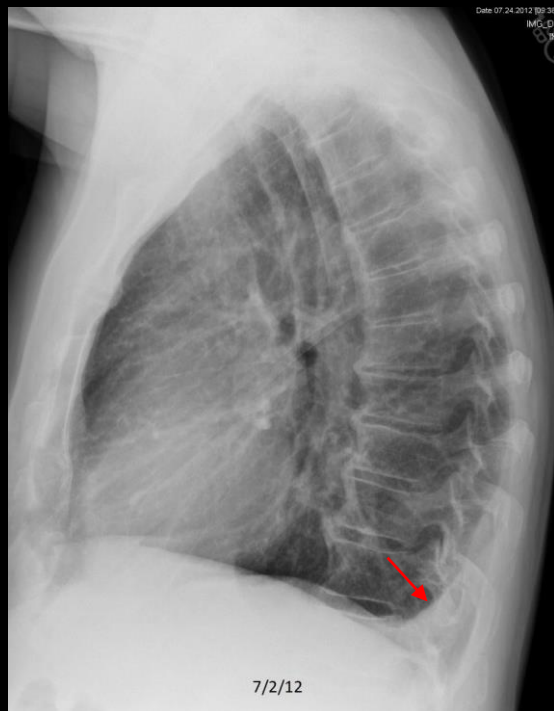
Sternal fractures usually imply significant chest trauma and these patients usually require a chest CT to evaluate any accompanying vascular injury.

**FRACTURE**

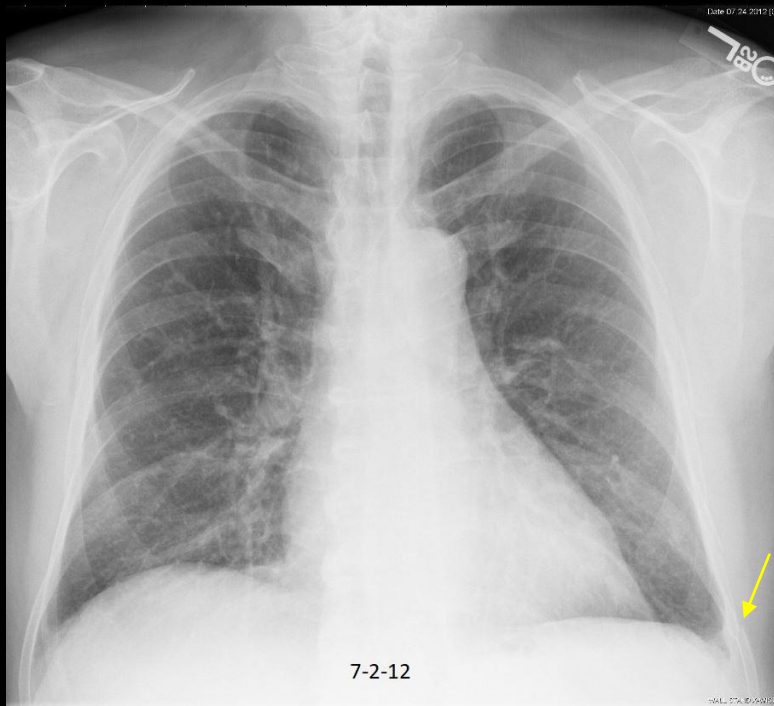
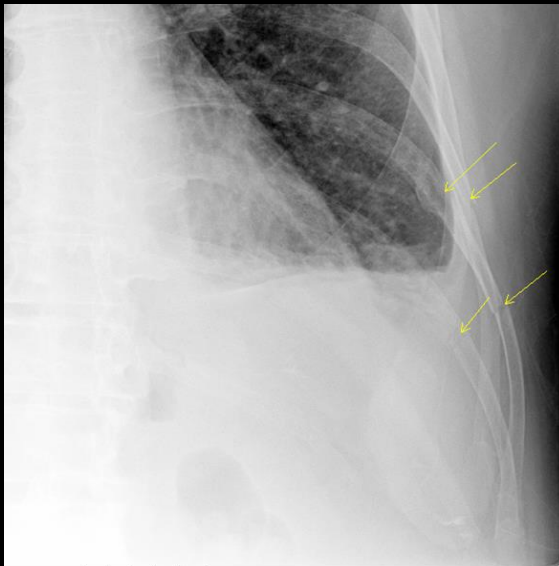
**ILLUSTRATED FINDINGS**



C194. 75 year old with chest pain following injury. Left rib fracture. Left pleural effusion.



C194. 75 year old with chest pain following injury. **Left rib fracture.** **Left pleural effusion.**



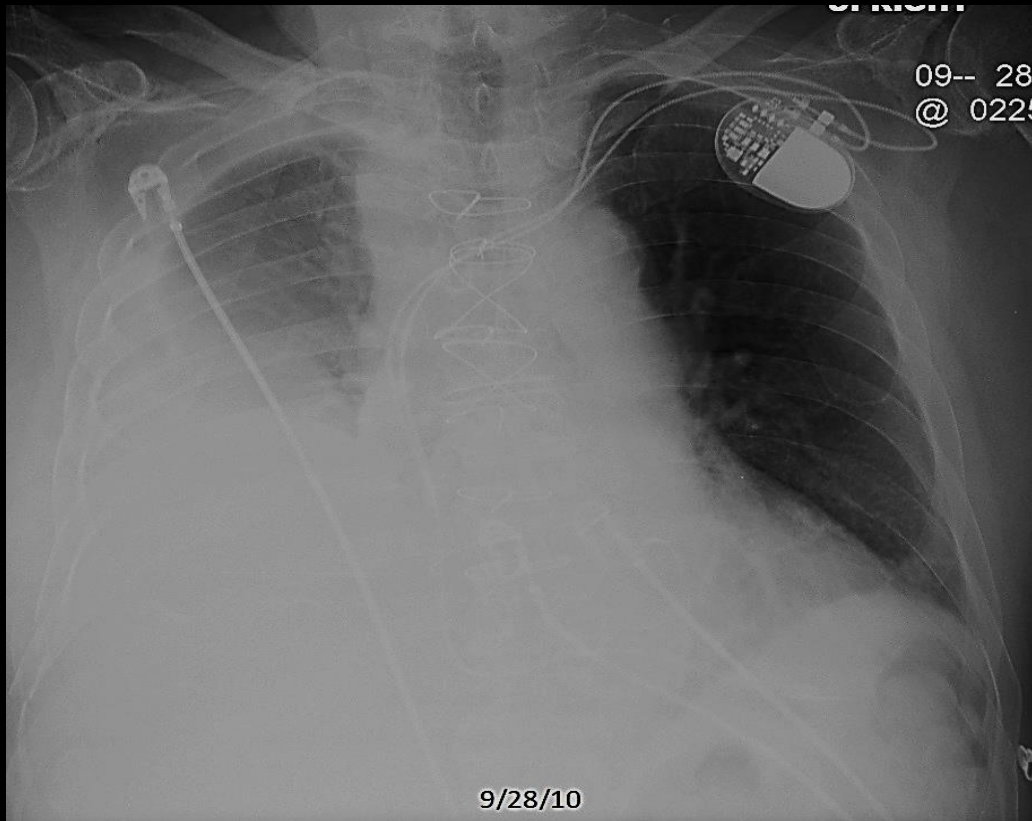
C194. 75 year old with chest pain following injury. **Additional fractures identified on rib detail studies.**

**FRACTURE**

**EXAMPLES**

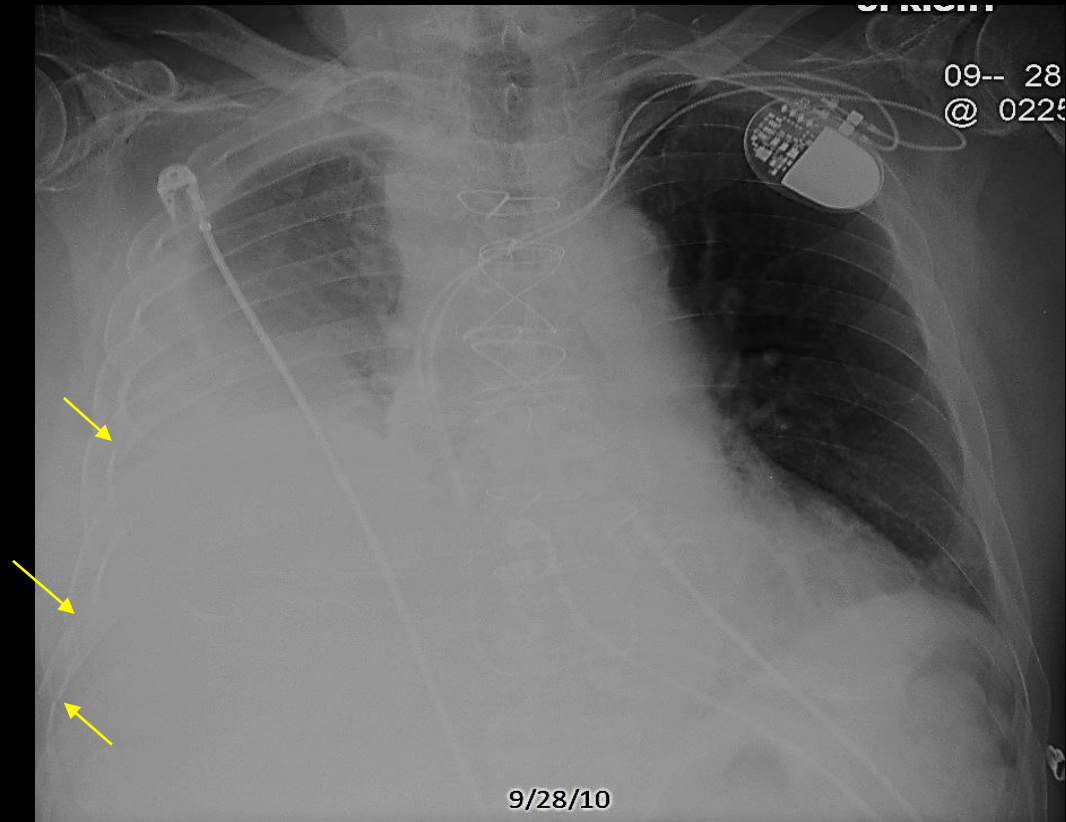


# Example 1 of 10



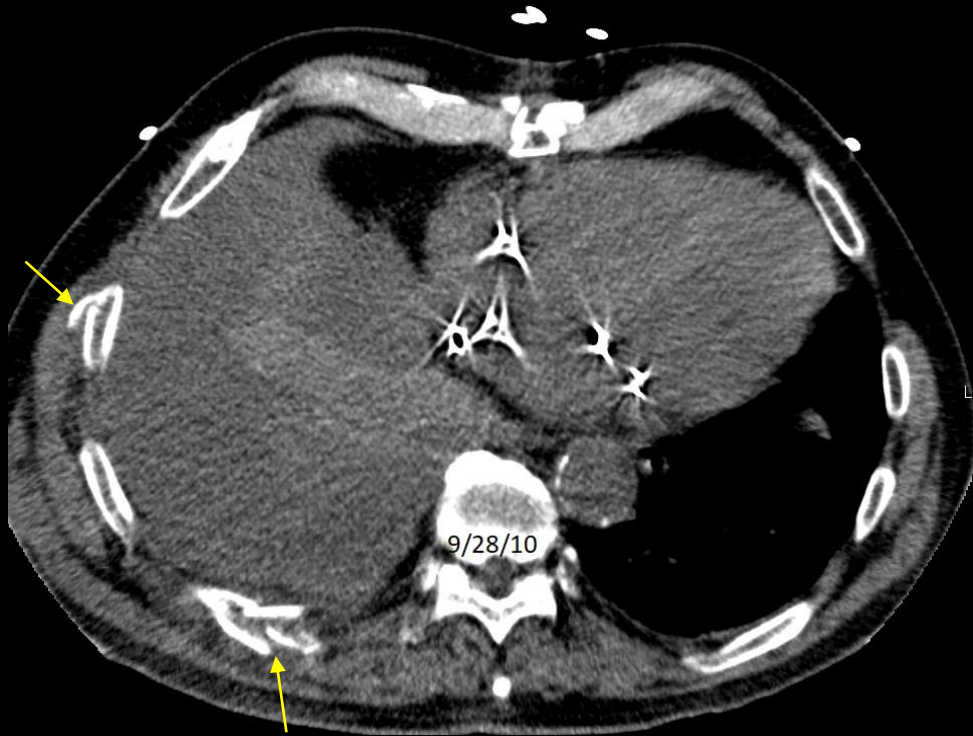
C186. 86 year old with chest pain following injury, on anti-coagulant therapy. Multiple right rib fractures and hydrothorax. Pacer.

# Example 1 of 10

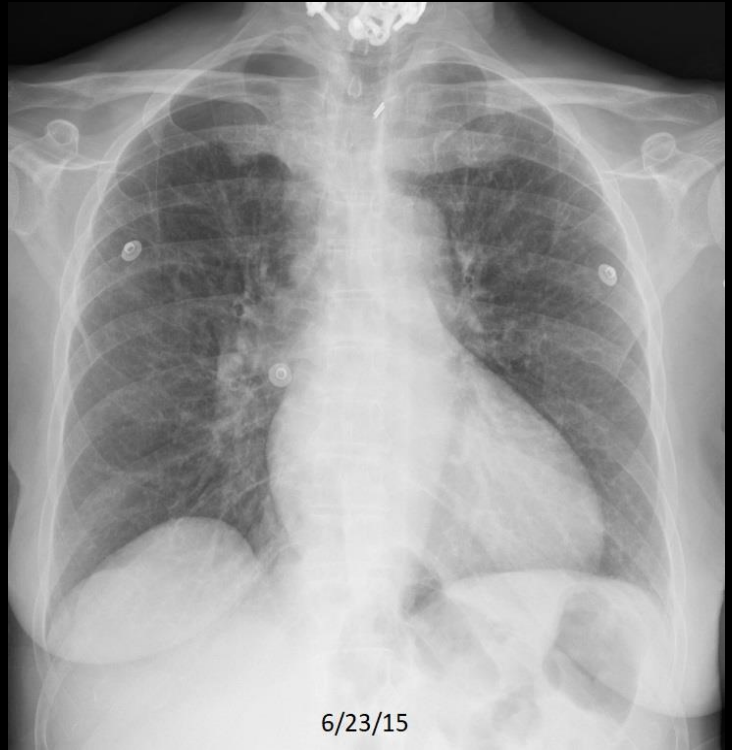


C186. 86 year old with chest pain following injury, on anti-coagulant therapy. Multiple right rib fractures and hydrothorax. Pacer.

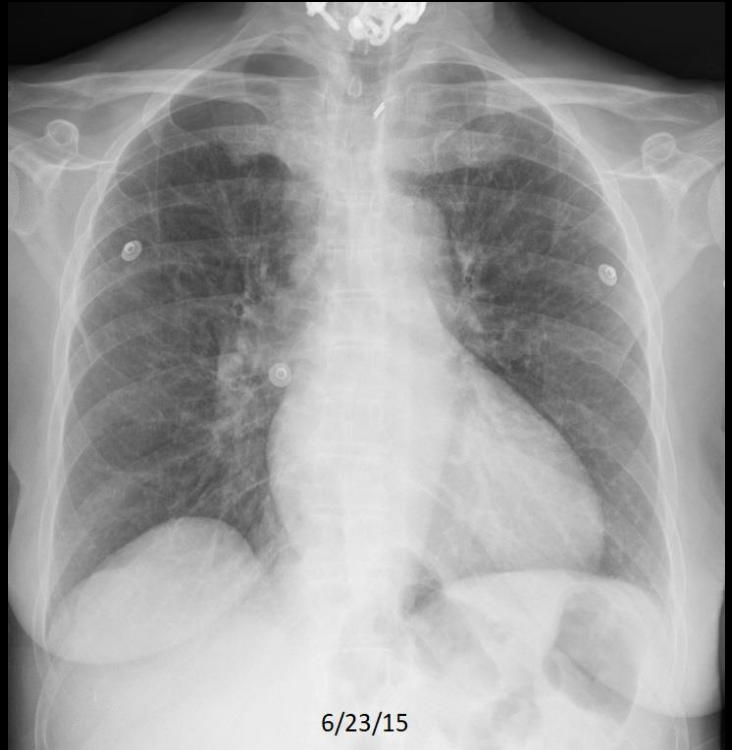
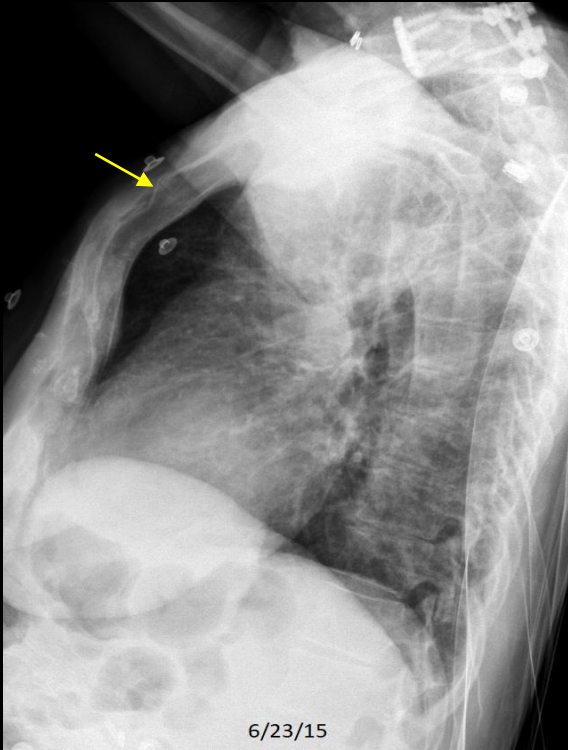
## Example 1 of 10



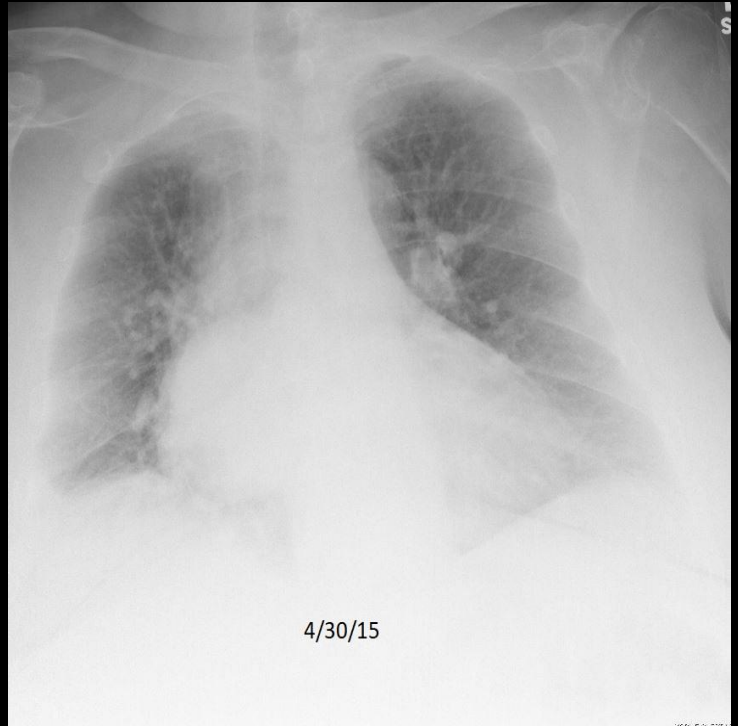
## Example 2 of 10



## Example 2 of 10

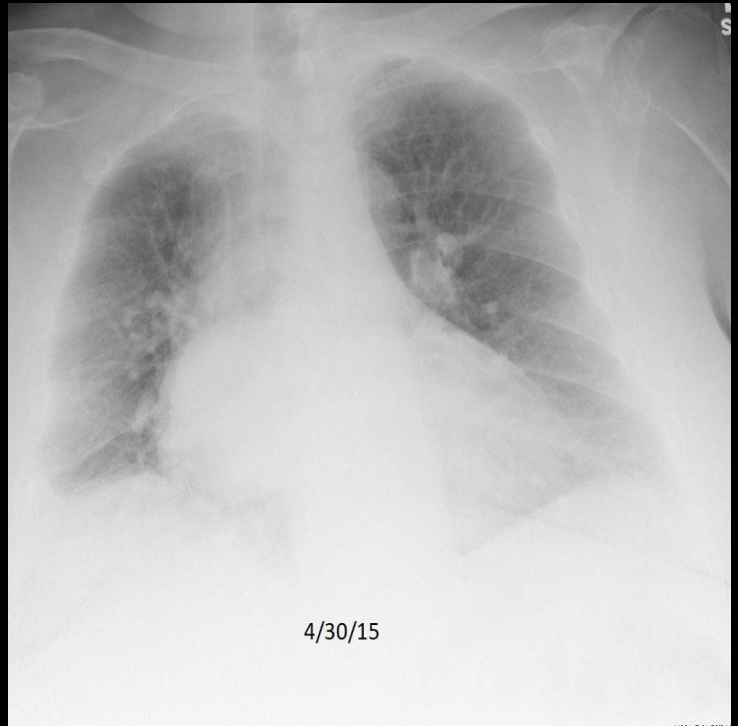
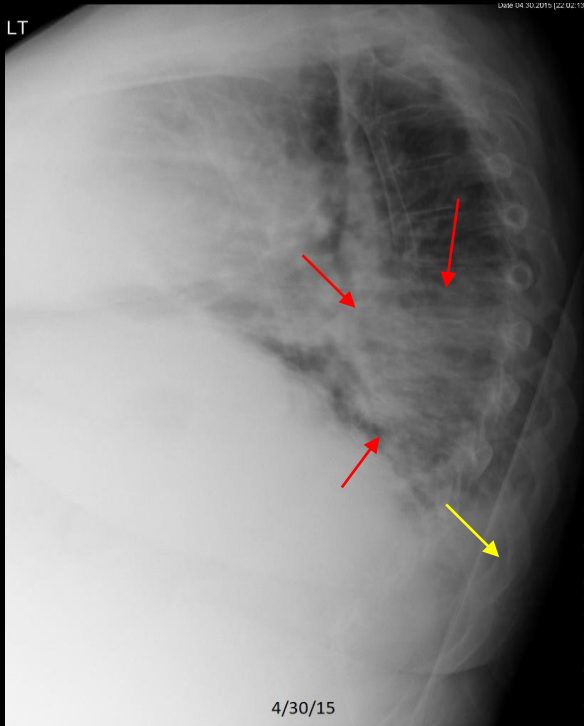


# Example 3 of 10



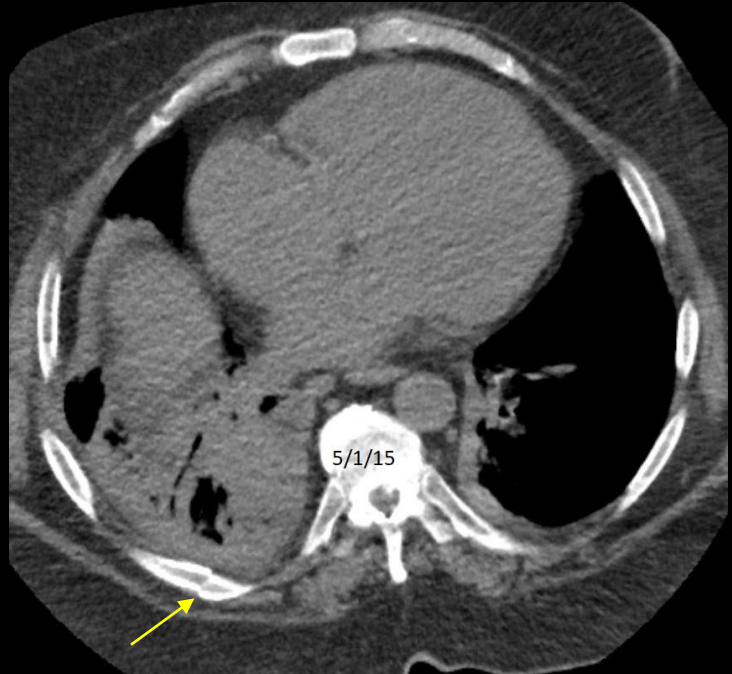
C192. 80 year old with chest pain following injury. Rib fracture and hematoma.

# Example 3 of 10





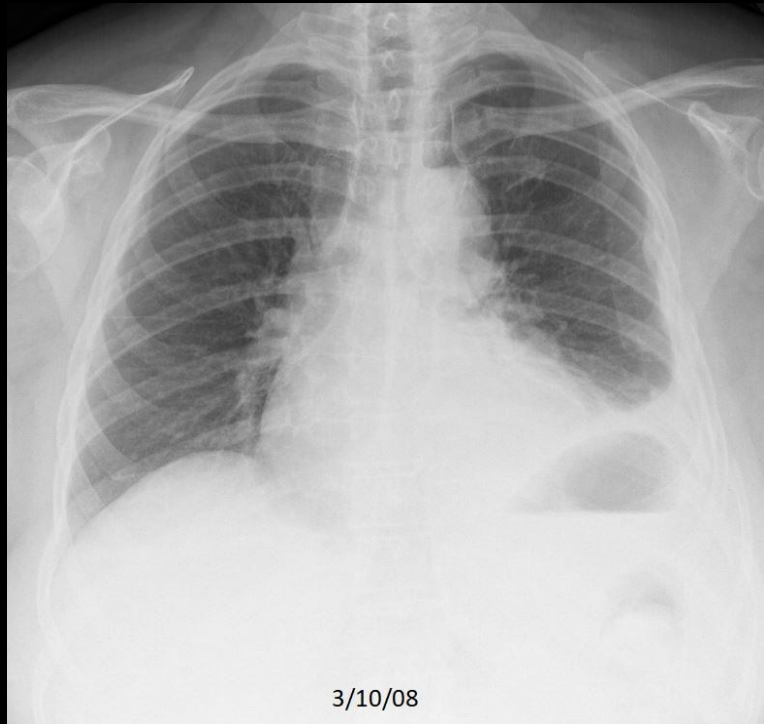
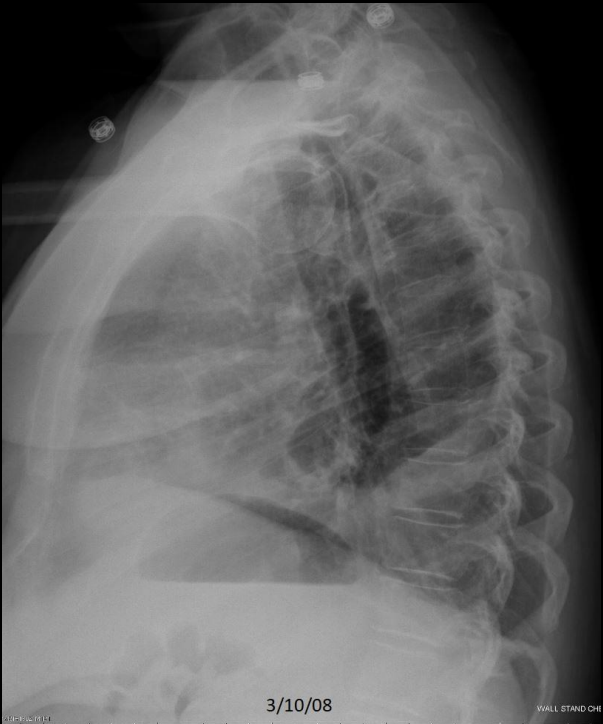
## Example 3 of 10



C192. 80 year old with chest pain following injury. Rib fracture and hematoma.

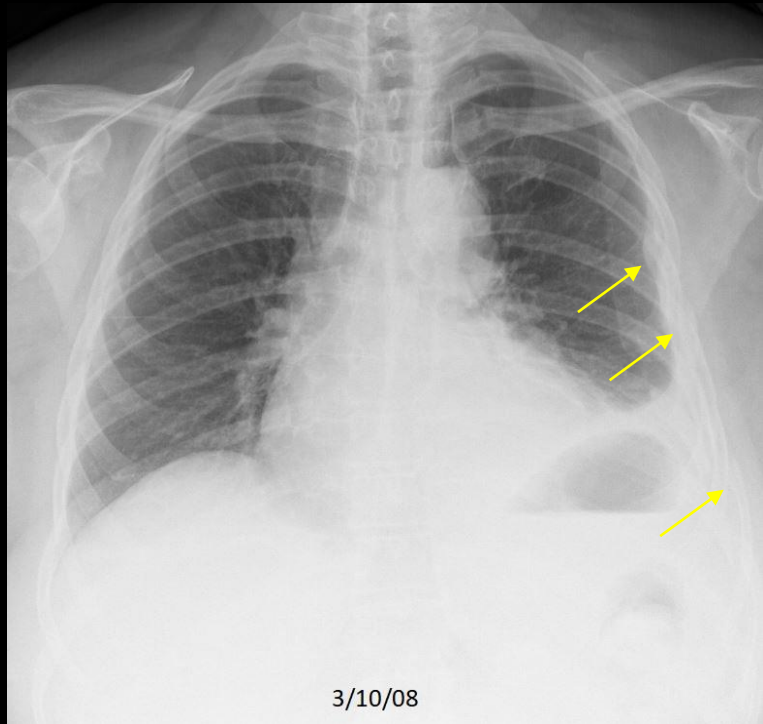
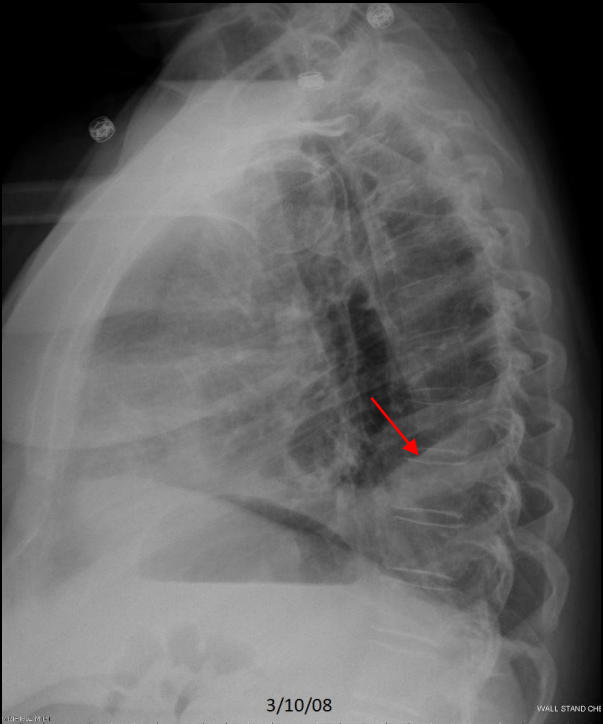


## Example 4 of 10



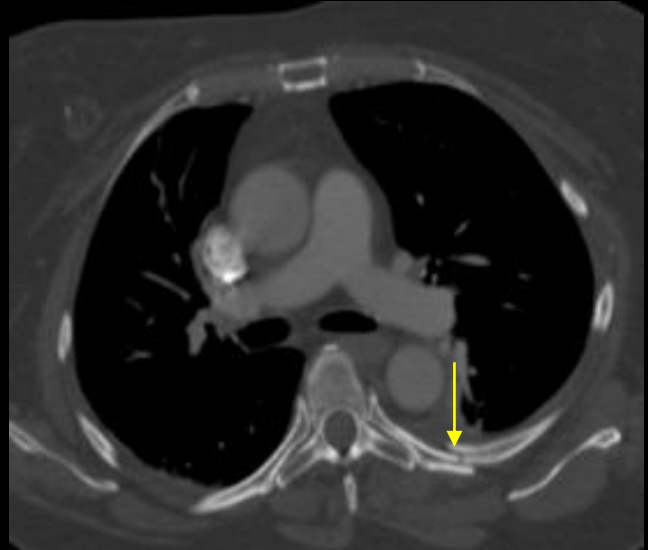
C196. 65 year old woman with chest pain following injury. Multiple left rib fractures with hemothorax (hemorrhagic effusion).

## Example 4 of 10

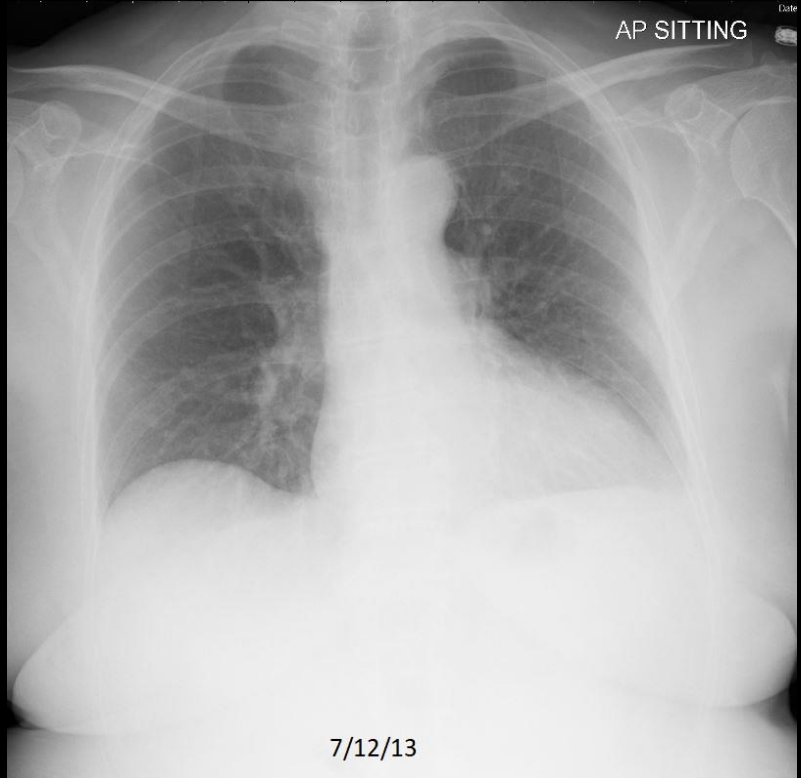


C196. 65 year old woman with chest pain following injury. Multiple left rib fractures with hemothorax (hemorrhagic effusion).

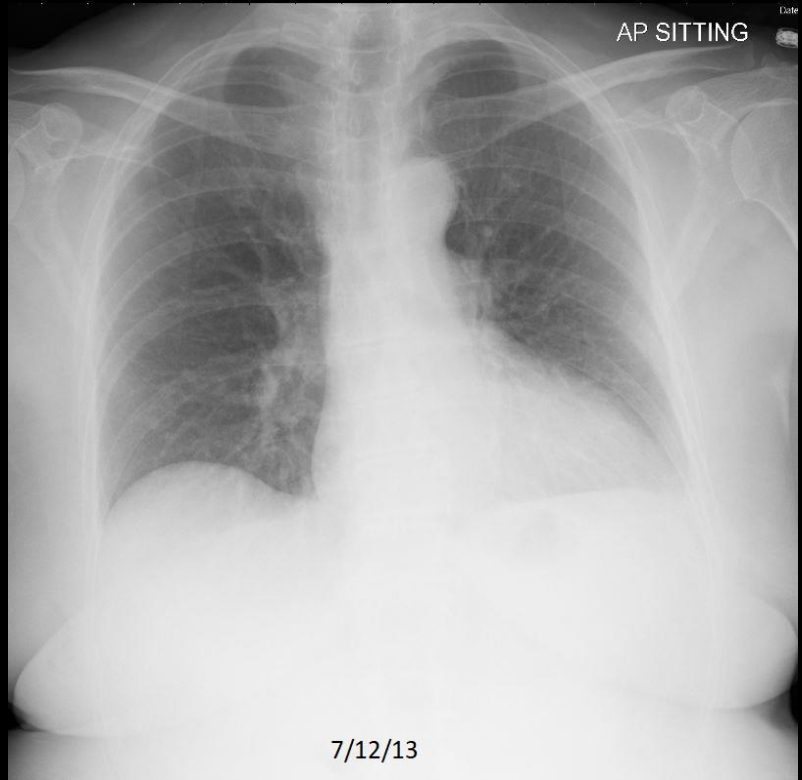
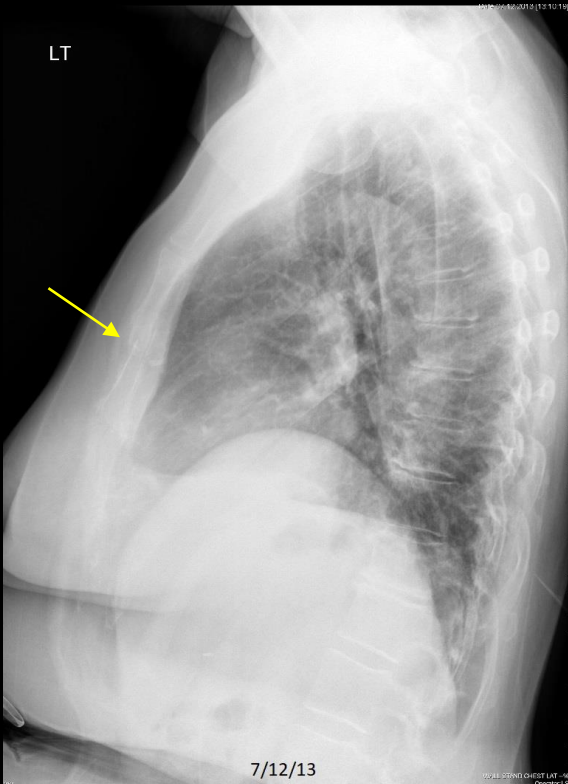
## Example 4 of 10



## Example 5 of 10



## Example 5 of 10

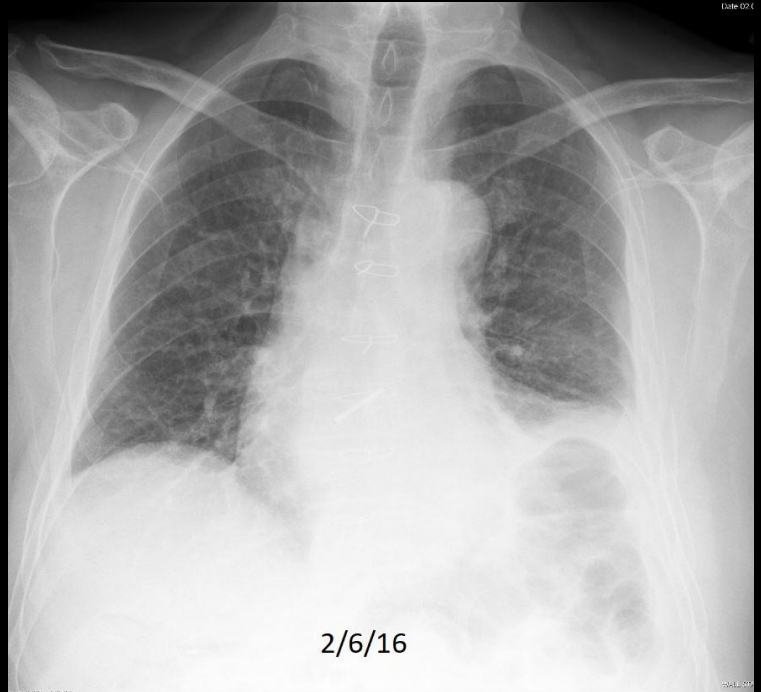


## Example 5 of 10



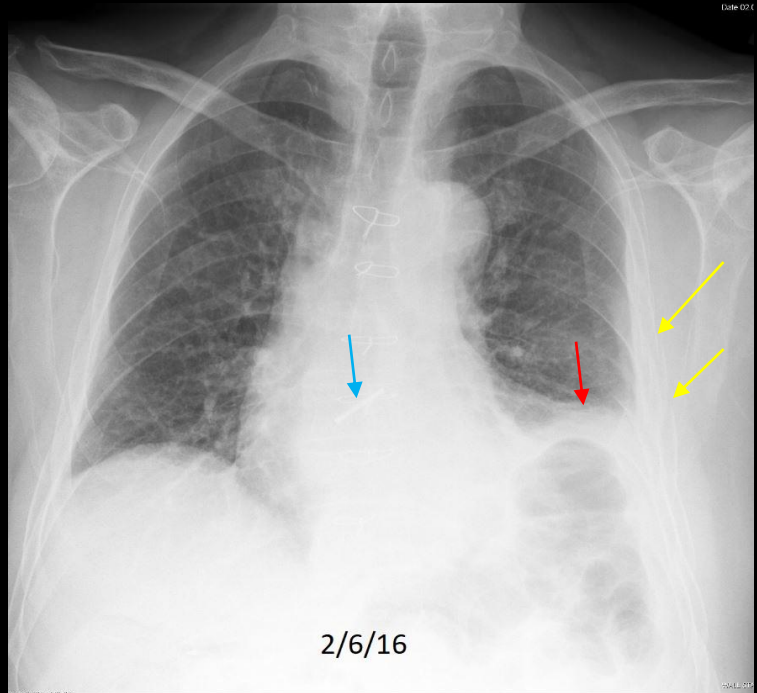
C197. 62 year old with chest pain following injury from MVA. **Sternal fracture** new from prior study.

## Example 6 of 10





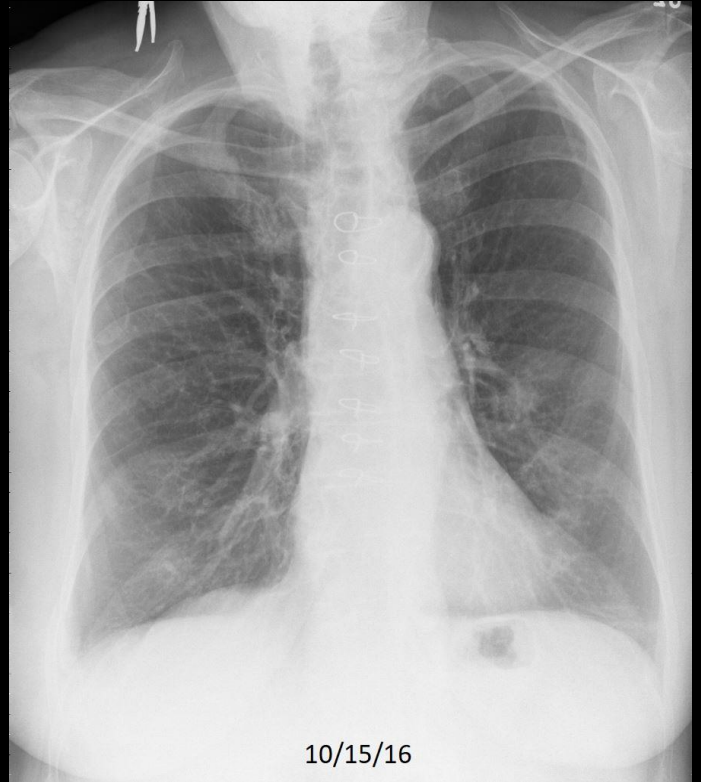
## Example 6 of 10



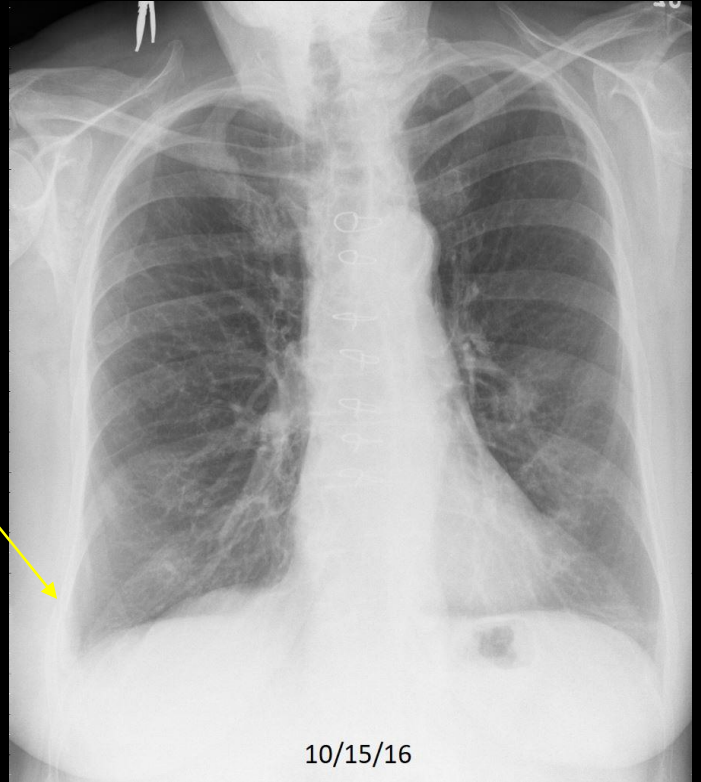
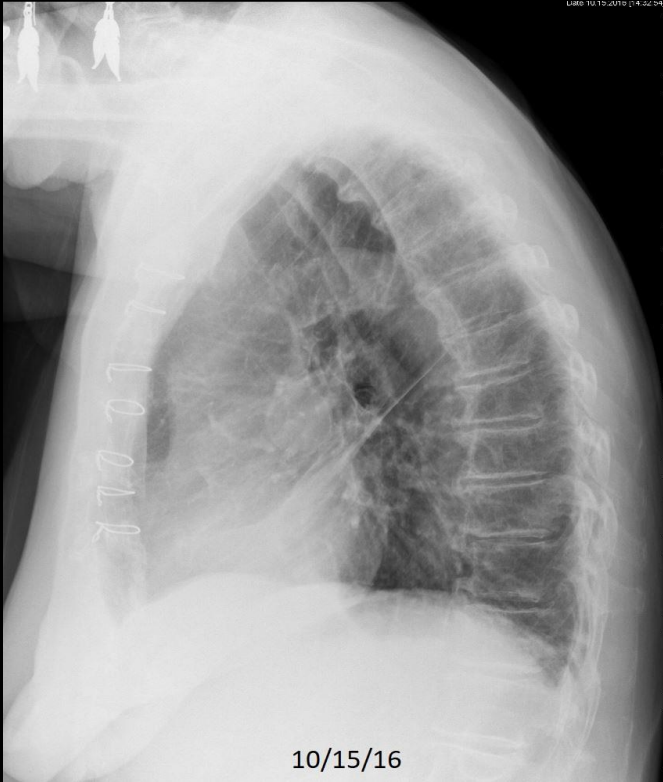
C273. 72 year old with chest pain following injury. **Left rib fractures.** Left lung atelectasis/contusion/hemothorax. **Aortic valve replacement.**



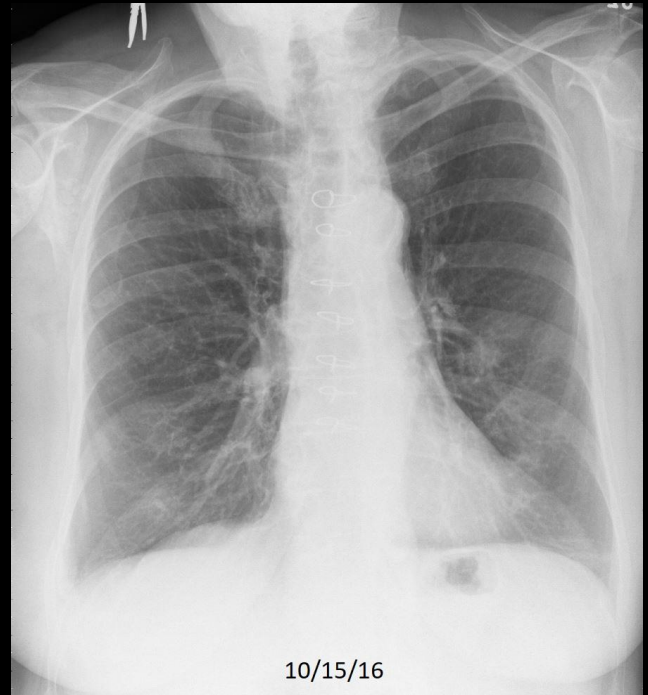
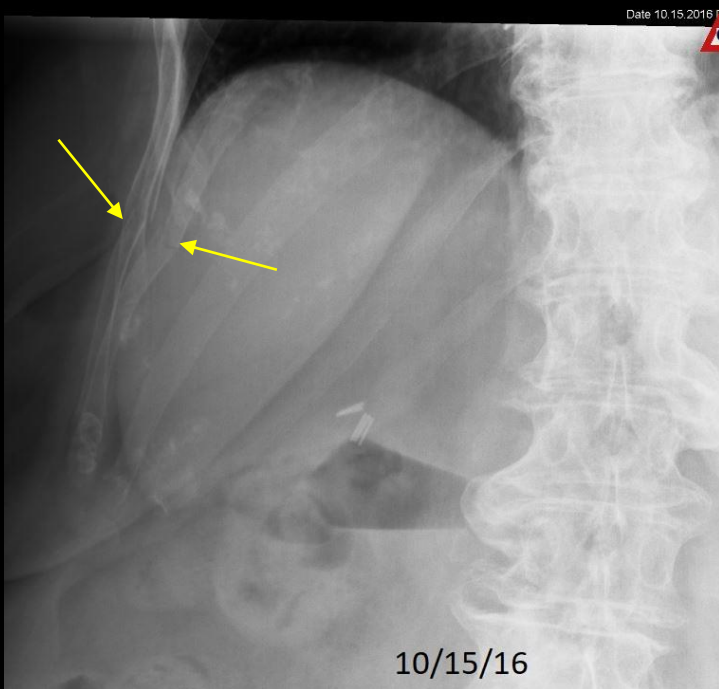
## Example 7 of 10



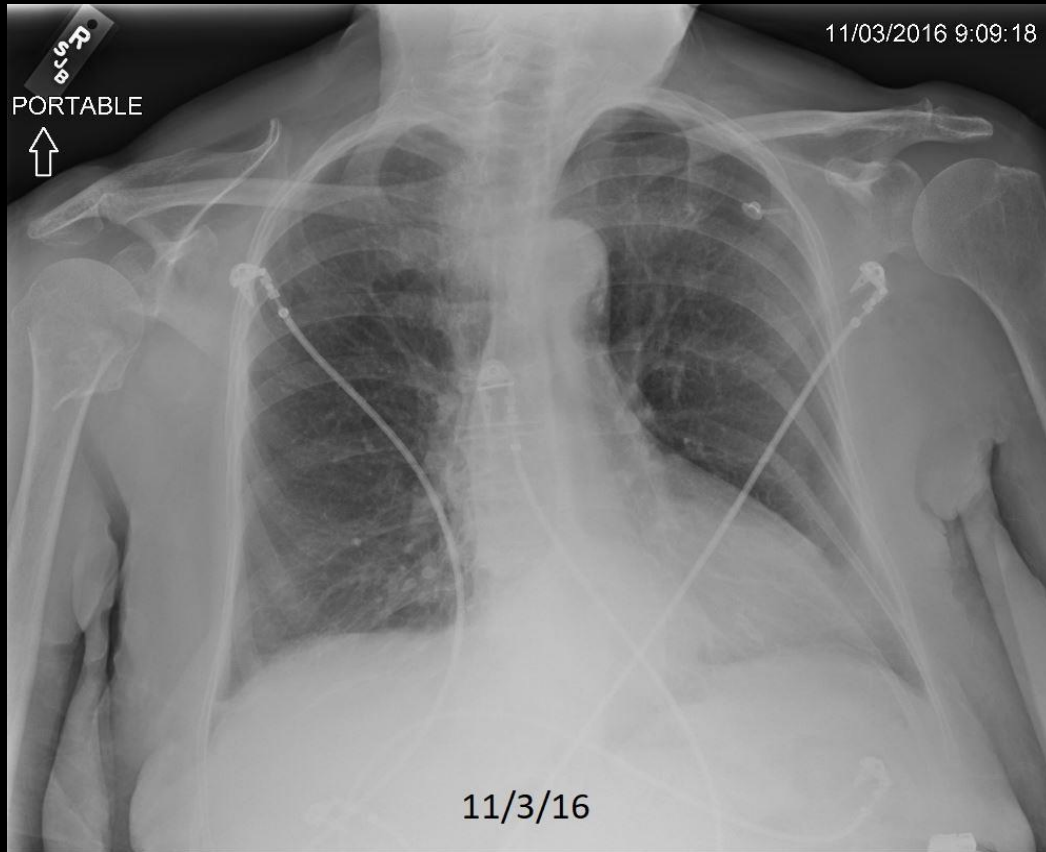
## Example 7 of 10



## Example 7 of 10

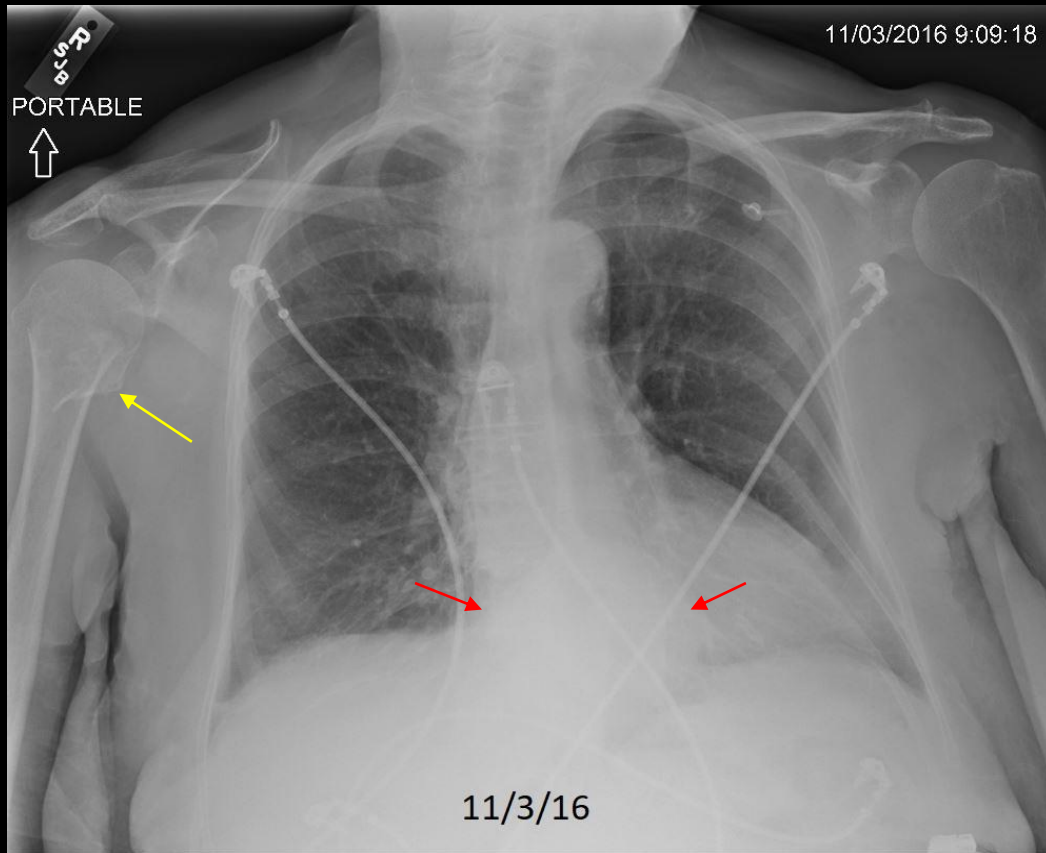


## Example 8 of 10



C289. 83 year old woman with pain following injury. Right humerus fracture. Hiatal hernia.

## Example 8 of 10



C289. 83 year old woman with pain following injury. **Right humerus fracture.** **Hiatal hernia.**

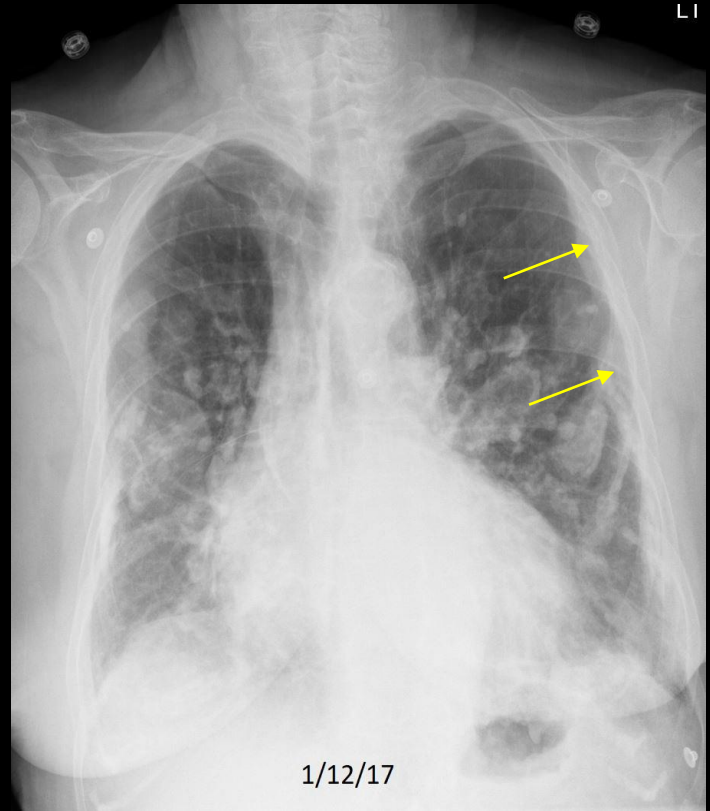
## Example 9 of 10



C298. 87 year old woman with chest pain following injury. Left rib fractures. Calcified pleural plaque and congestive heart failure.

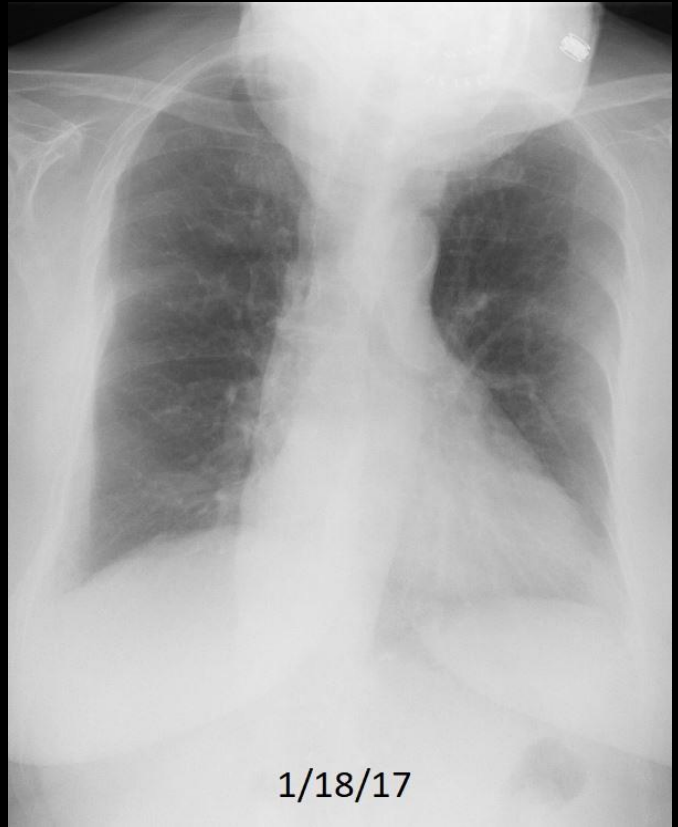
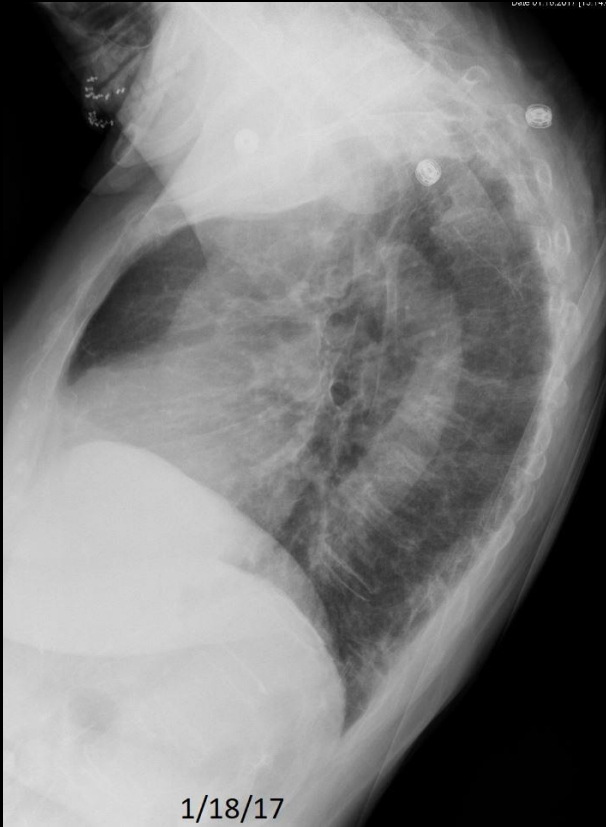


## Example 9 of 10



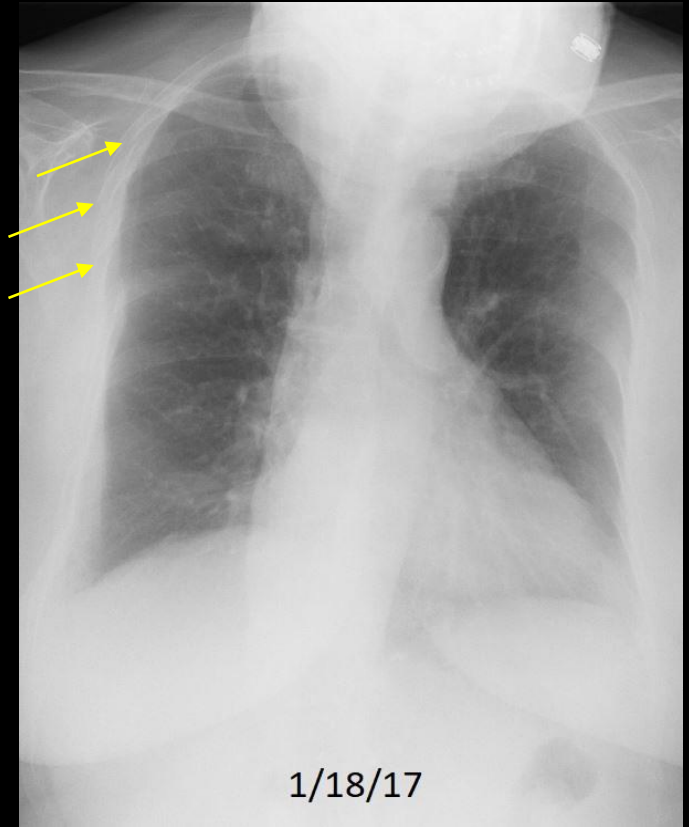
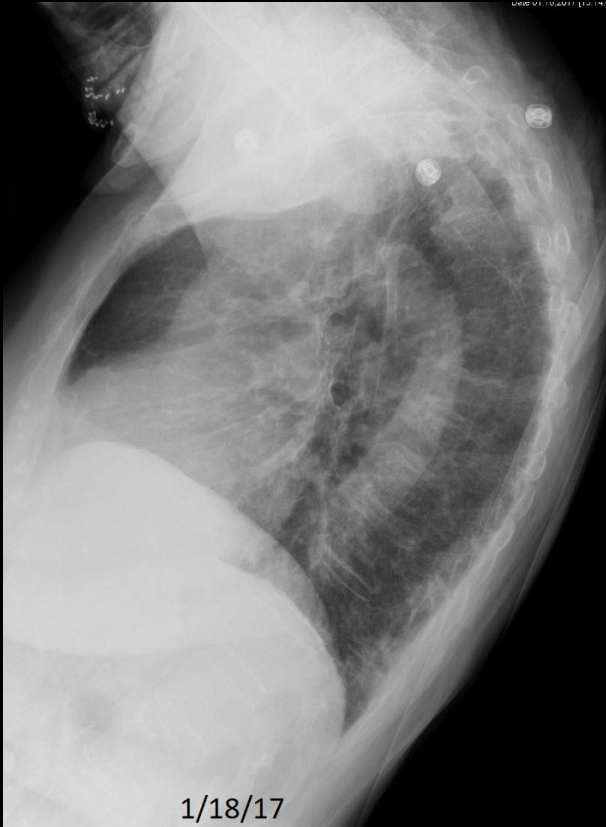
C298. 87 year old woman with chest pain following injury. **Left rib fractures**. Calcified pleural plaque and congestive heart failure.

# Example 10 of 10





# Example 10 of 10

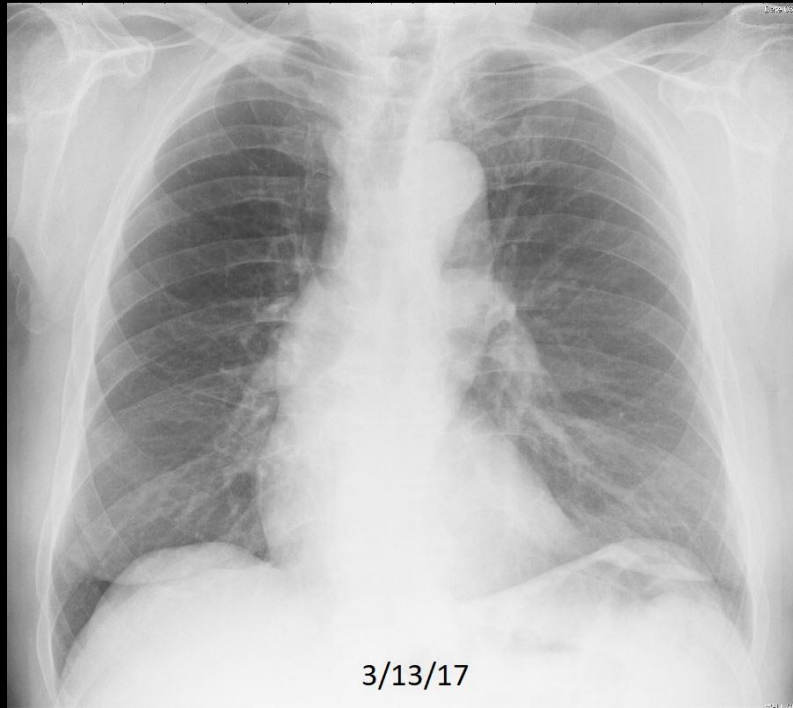


# **QUIZ**

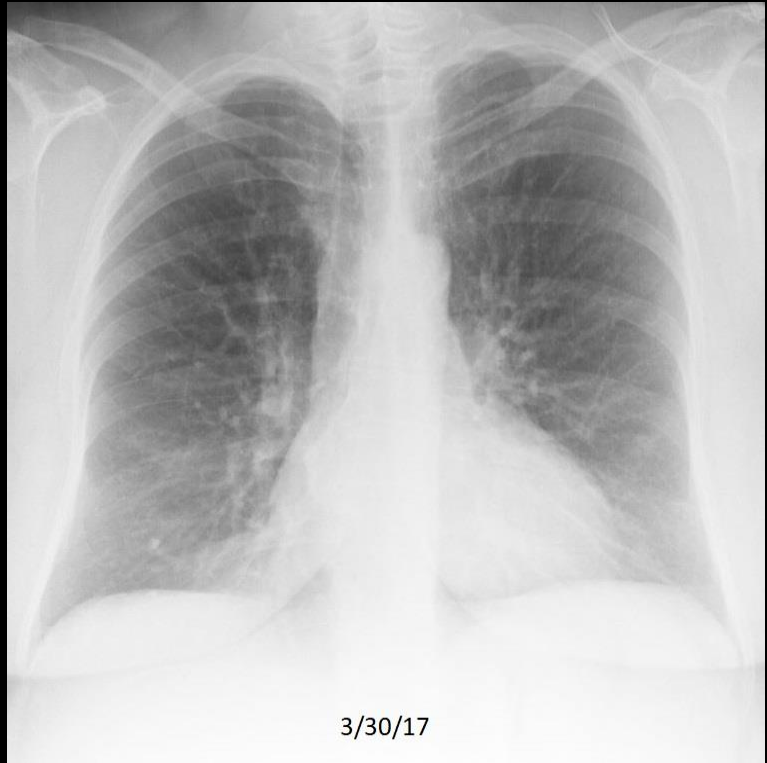
## **NORMAL VERSUS FRACTURE**

**Select which CXR shows Fracture  
(a or b)  
for the following 10 pairs of cases**

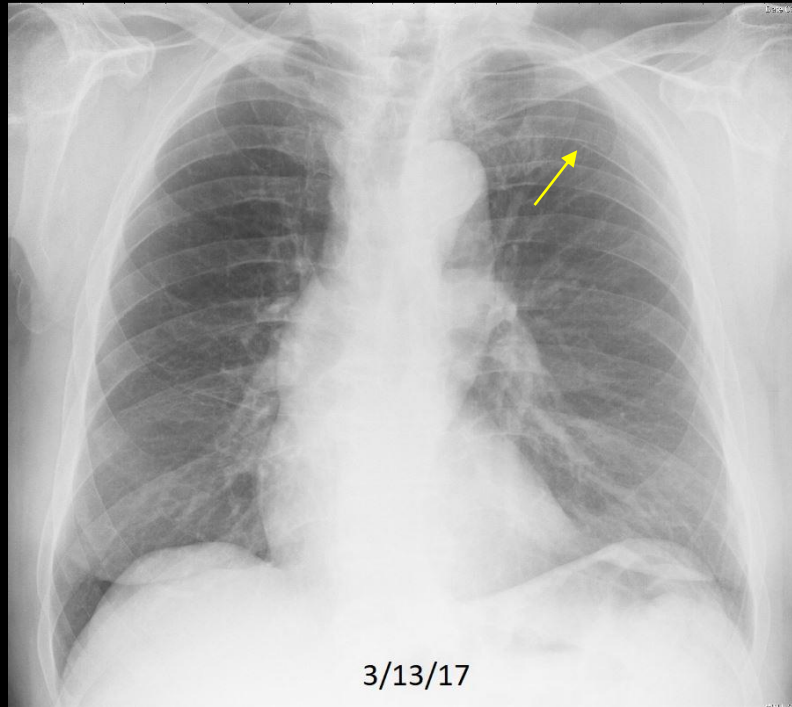
# Quiz Case 1 of 10 - A



## Quiz Case 1 of 10 – B

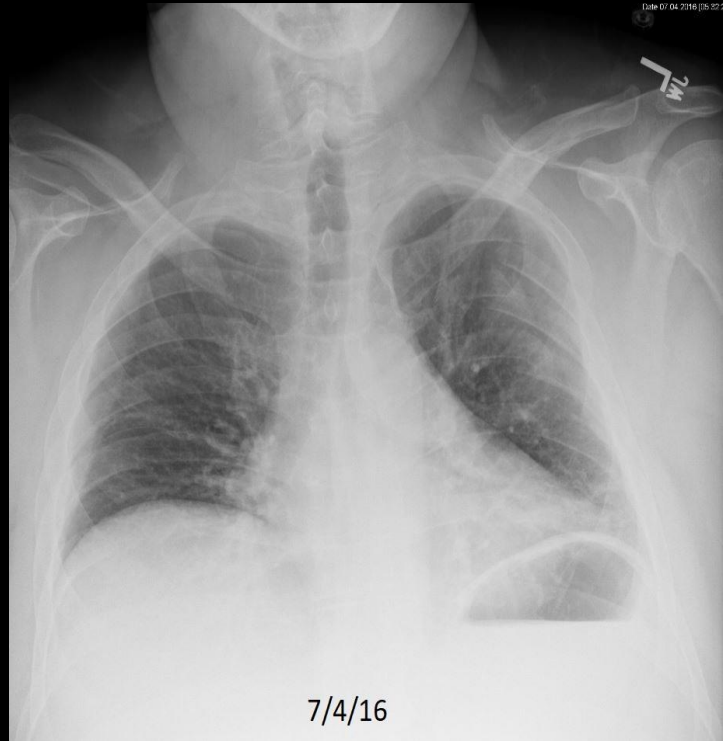


# Quiz Case 1 of 10 – A shows fracture

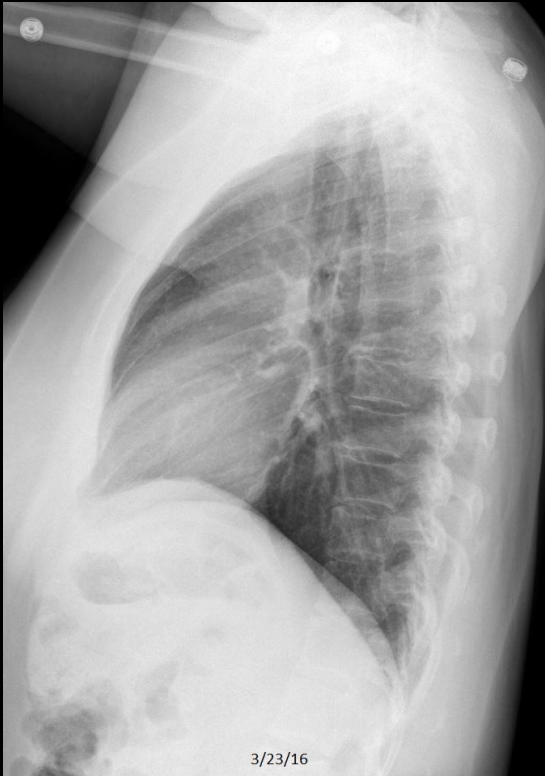


C350. 72 year old man with left chest pain following injury. **Minimally displaced left 5th rib fracture.**

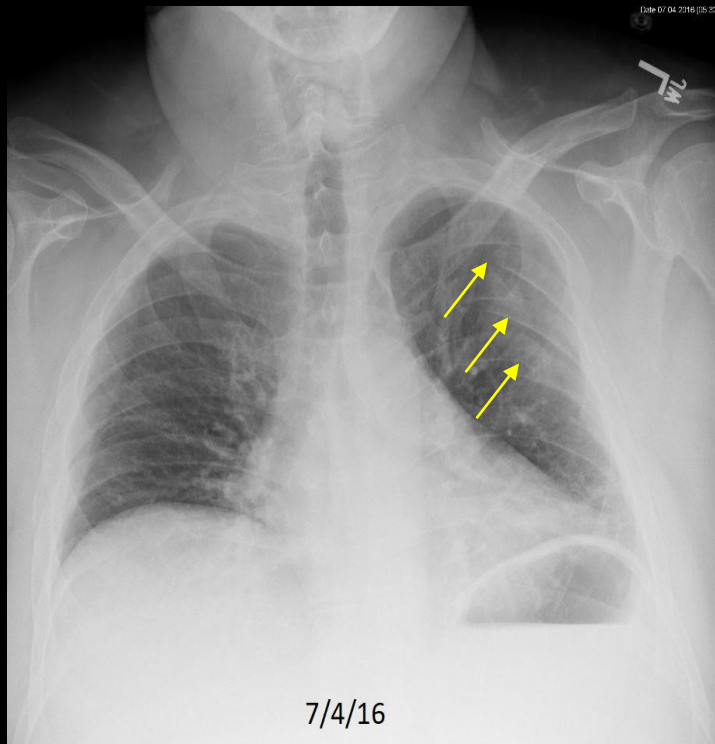
## Quiz Case 2 of 10 - A



## Quiz Case 2 of 10 – B

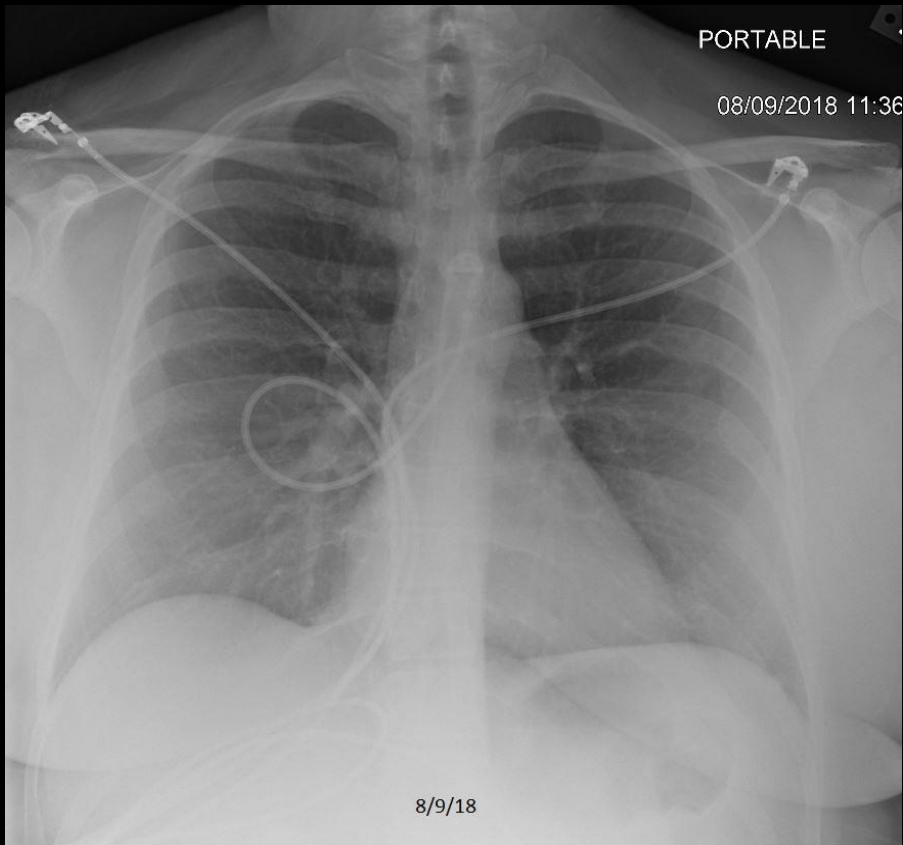


# Quiz Case 2 of 10 – A shows fracture

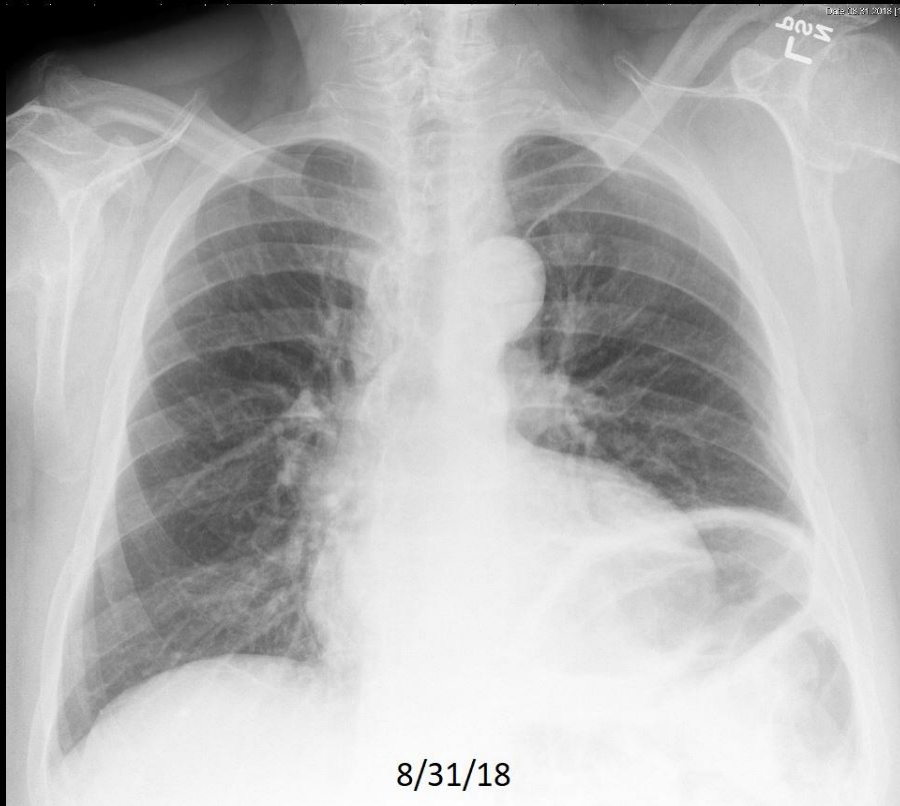




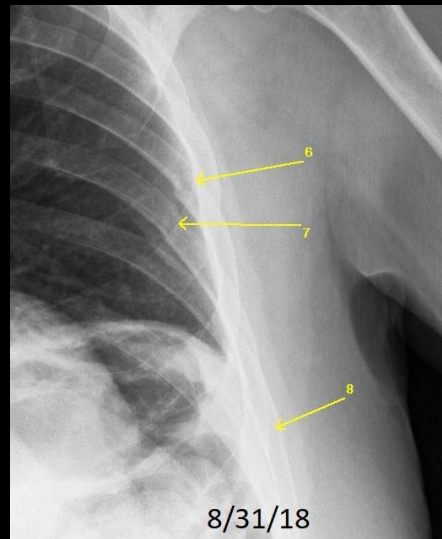
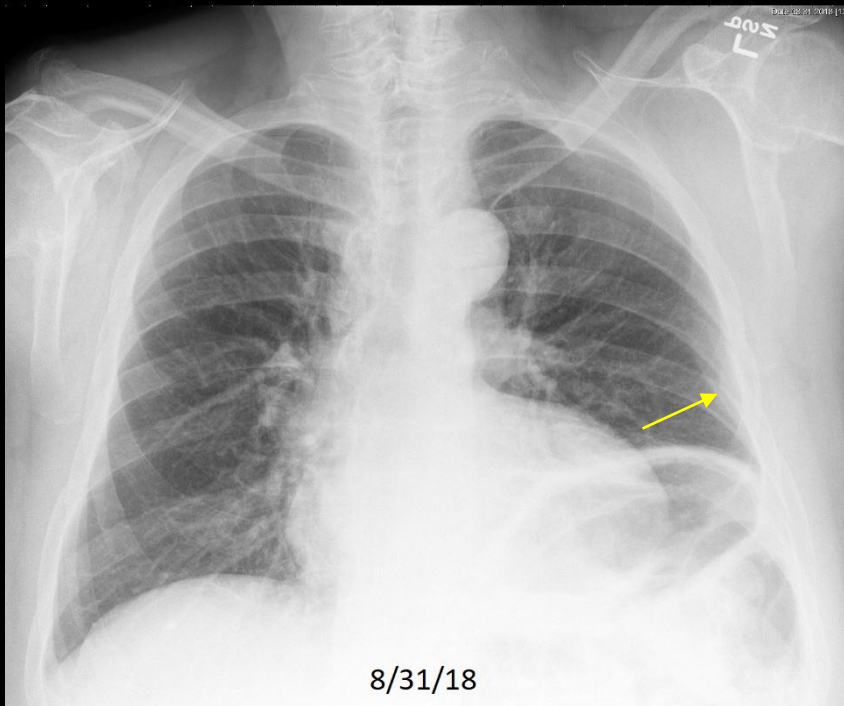
## Quiz Case 3 of 10 – A



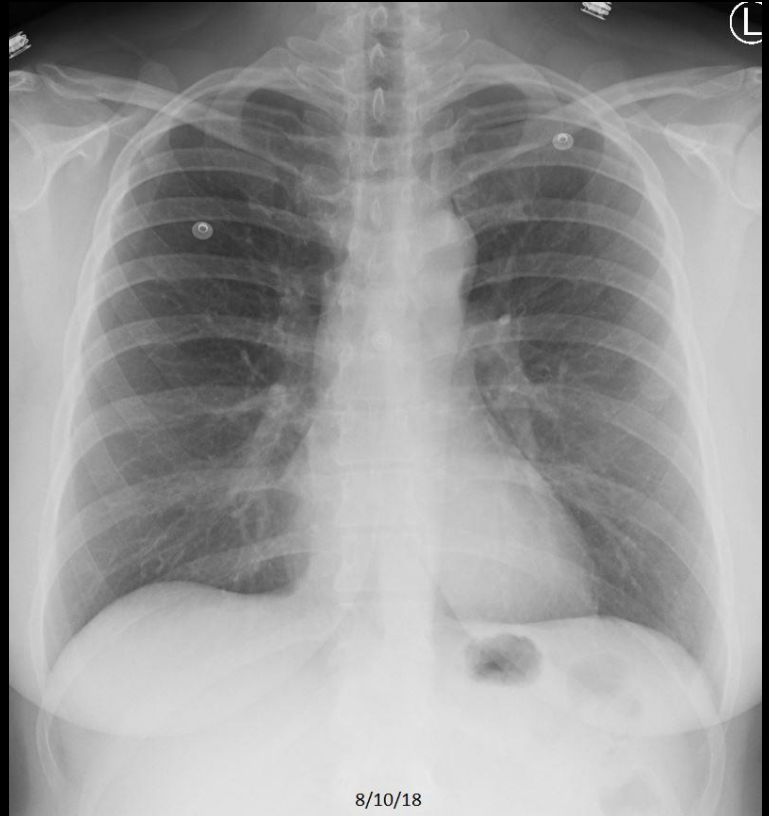
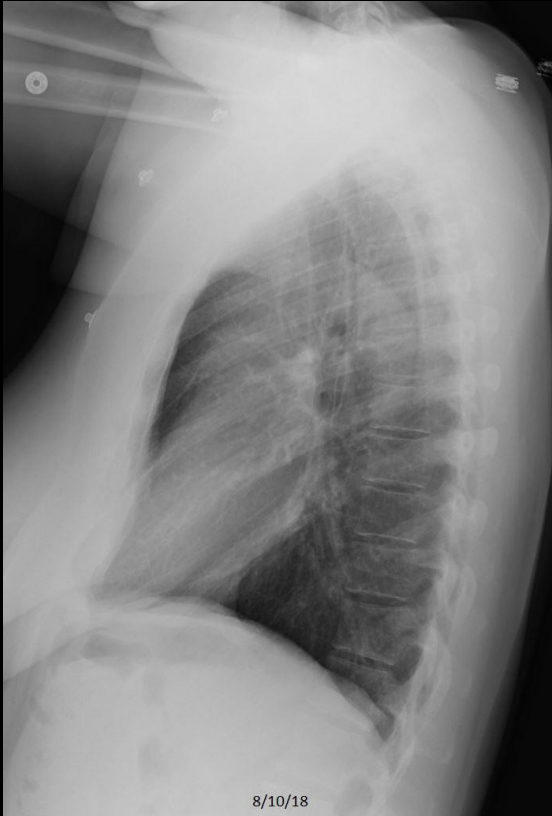
## Quiz Case 3 of 10 – B



# Quiz Case 3 of 10 – B shows fractures

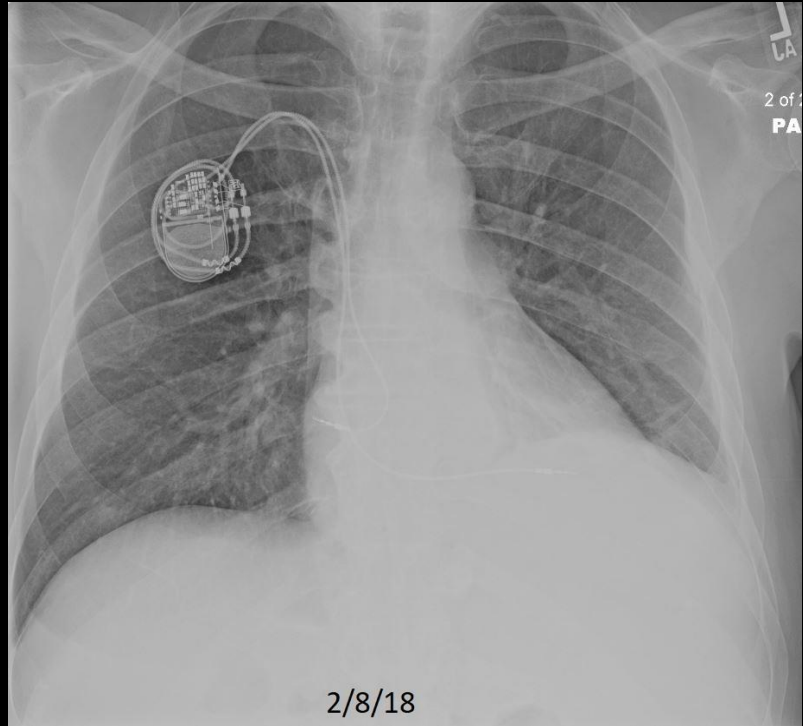


## Quiz Case 4 of 10 – A

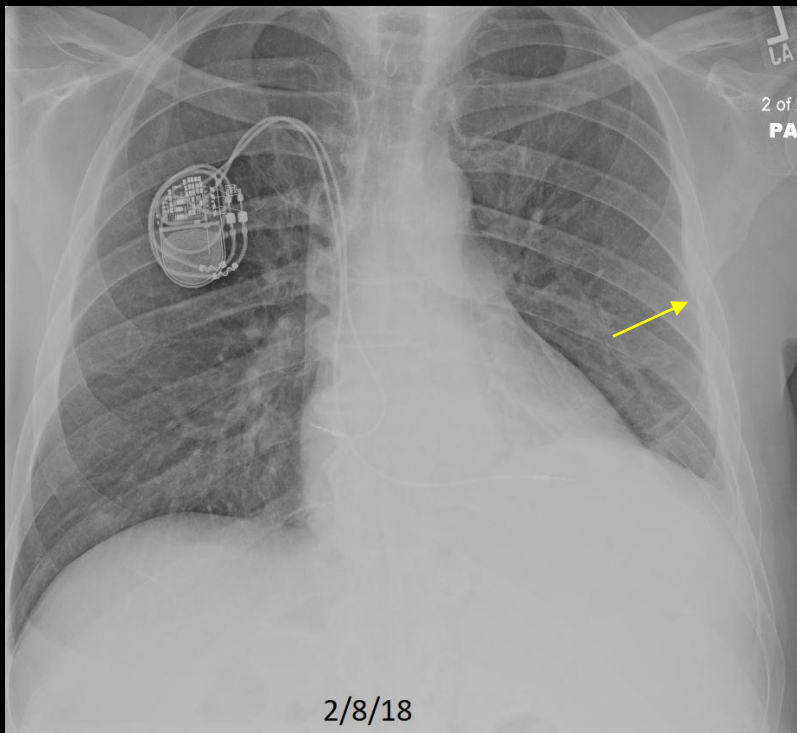
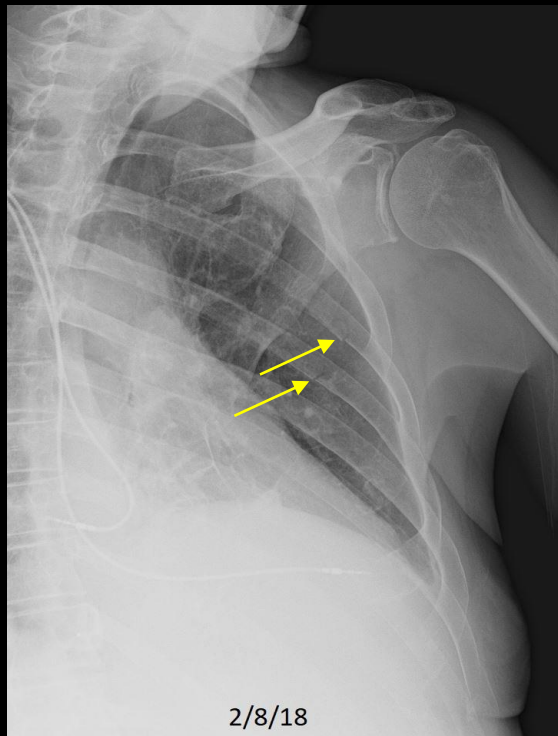


C178. 55 year old woman with dyspnea.

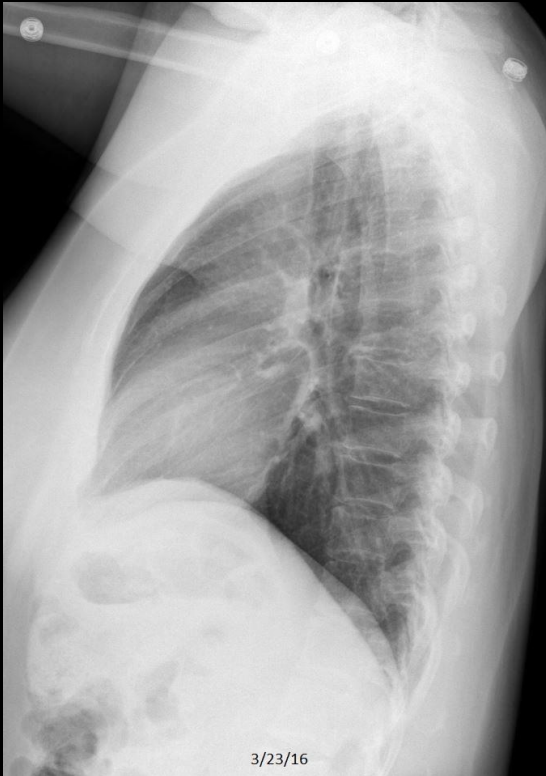
## Quiz Case 4 of 10 – B



## Quiz Case 4 of 10 – B shows fractures

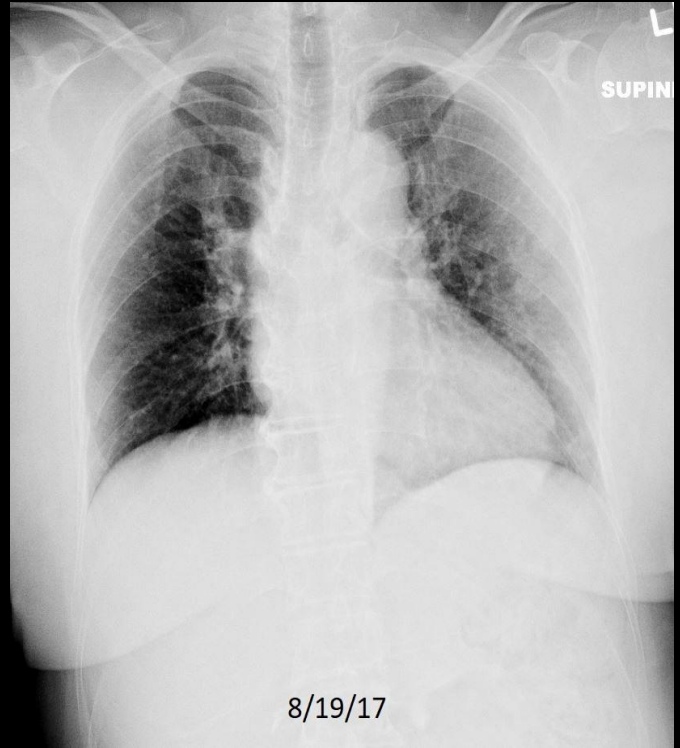


## Quiz Case 5 of 10 – A



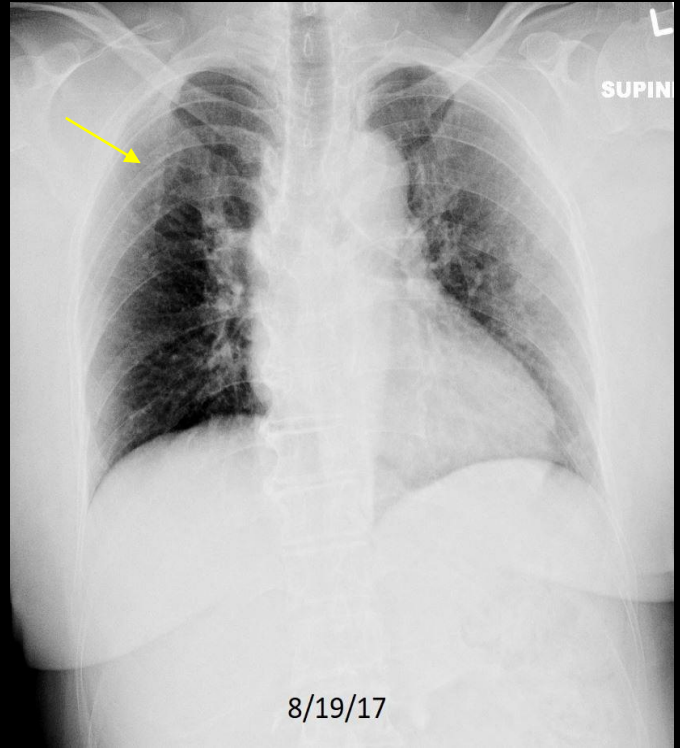


## Quiz Case 5 of 10 – B

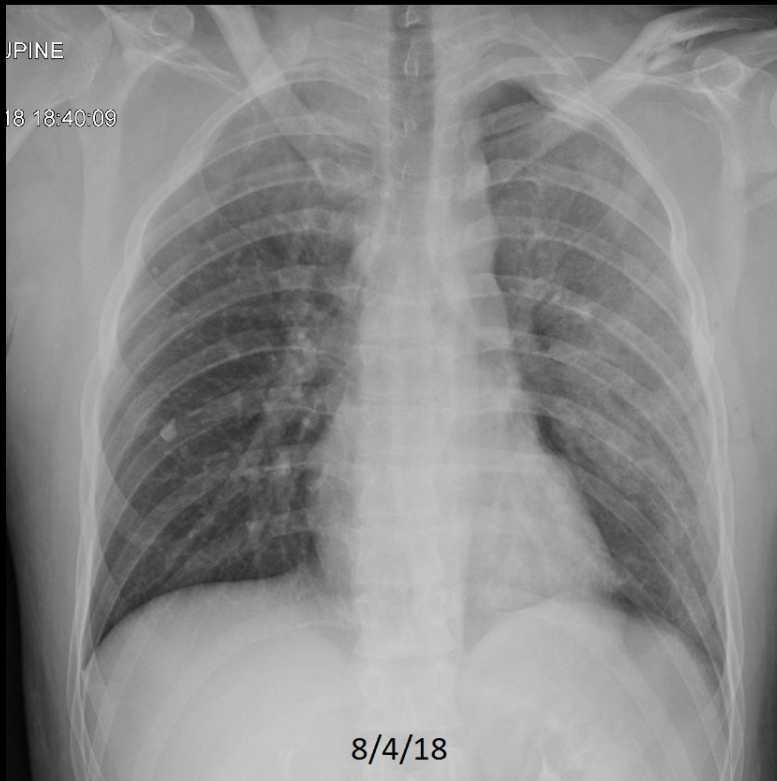




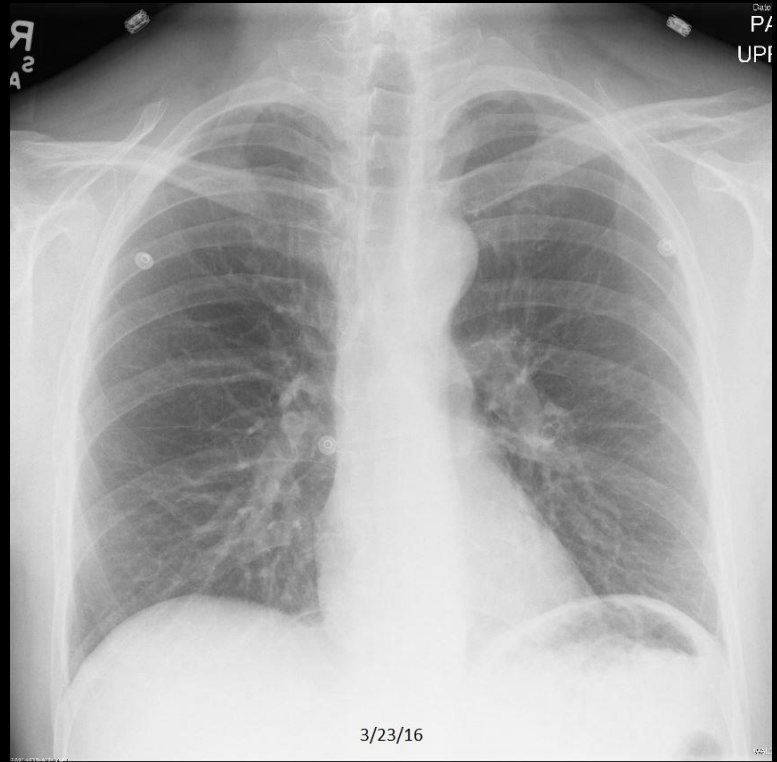
# Quiz Case 5 of 10 – B shows fracture



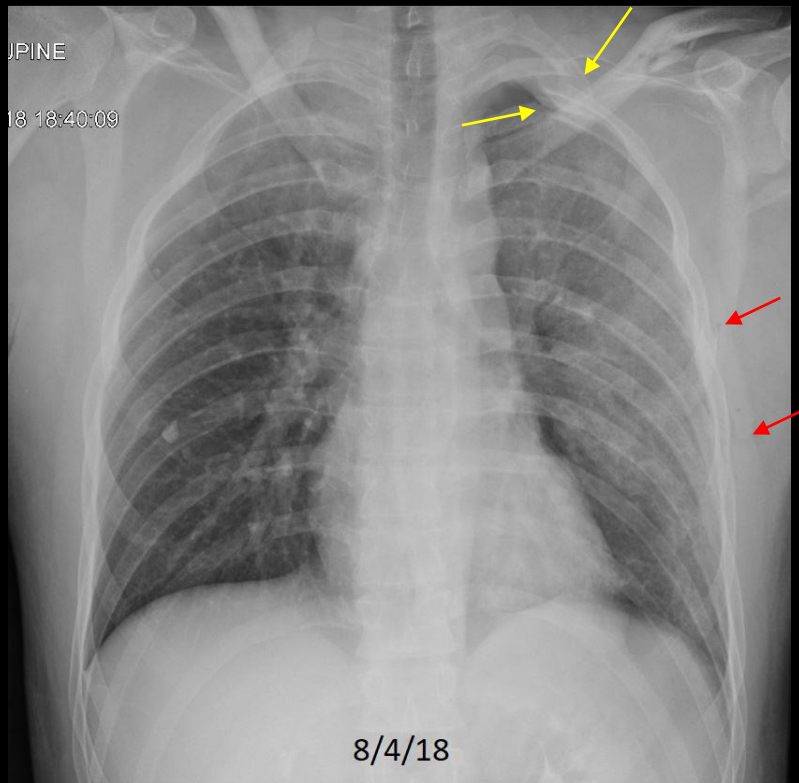
# Quiz Case 6 of 10 – A



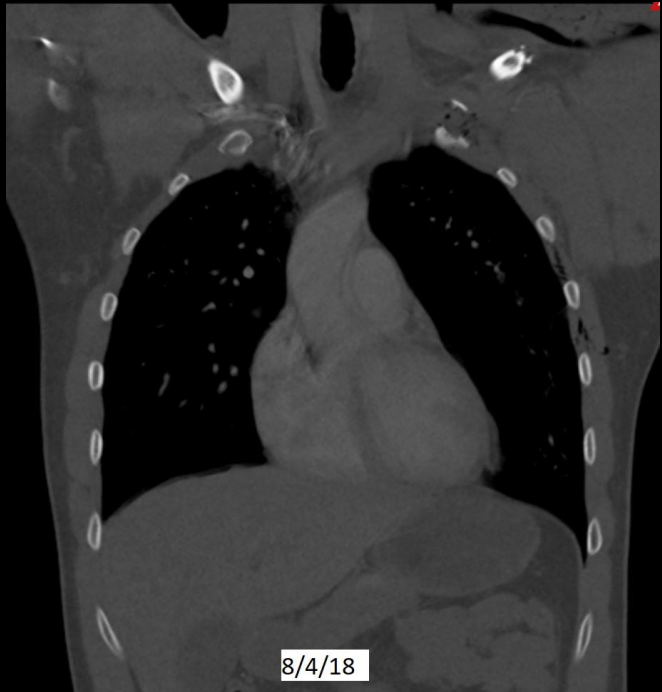
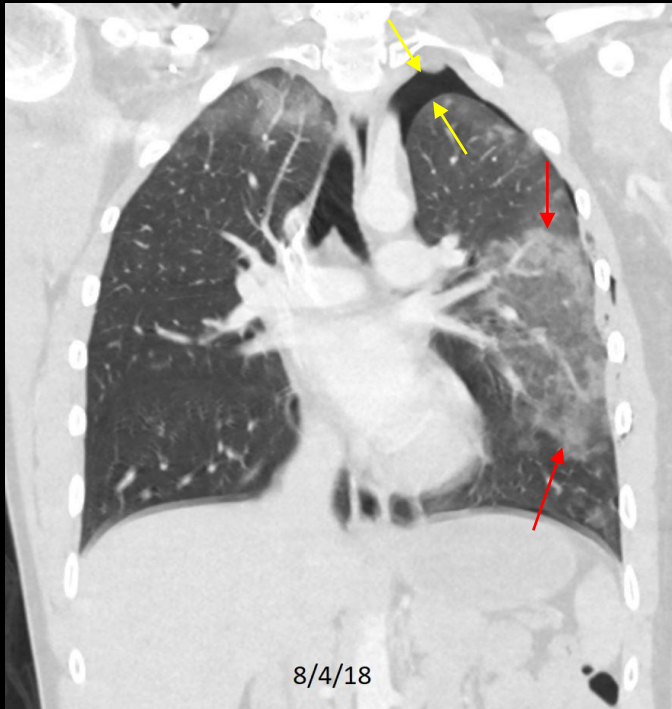
## Quiz Case 6 of 10 – B



# Quiz Case 6 of 10 – A shows fractures

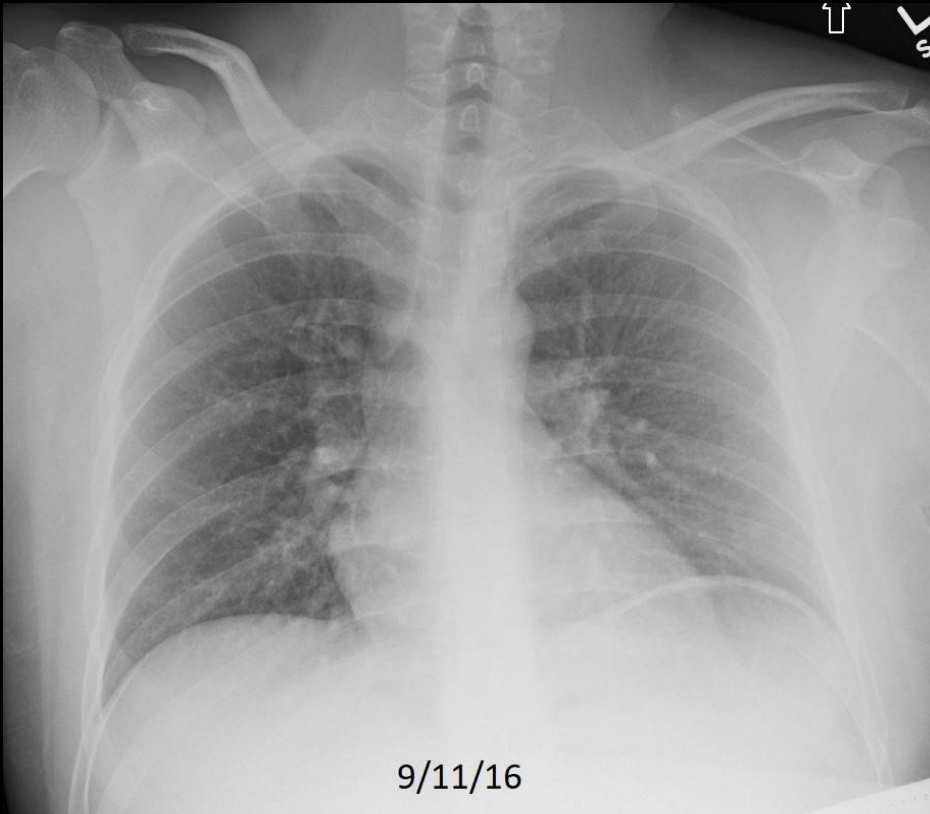


# Quiz Case 6 of 10 – A shows fractures

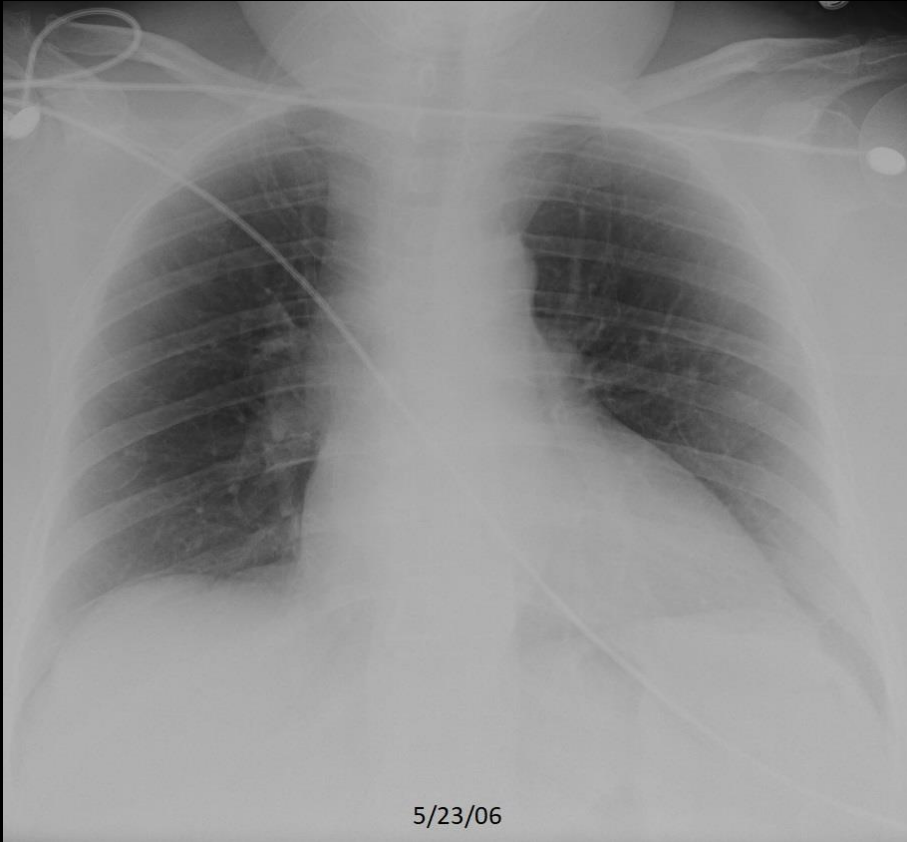


C393. 28 year old with chest pain following injury. Left rib fractures and subcutaneous emphysema. **Pneumothorax** and **pulmonary contusion** better seen on CT.

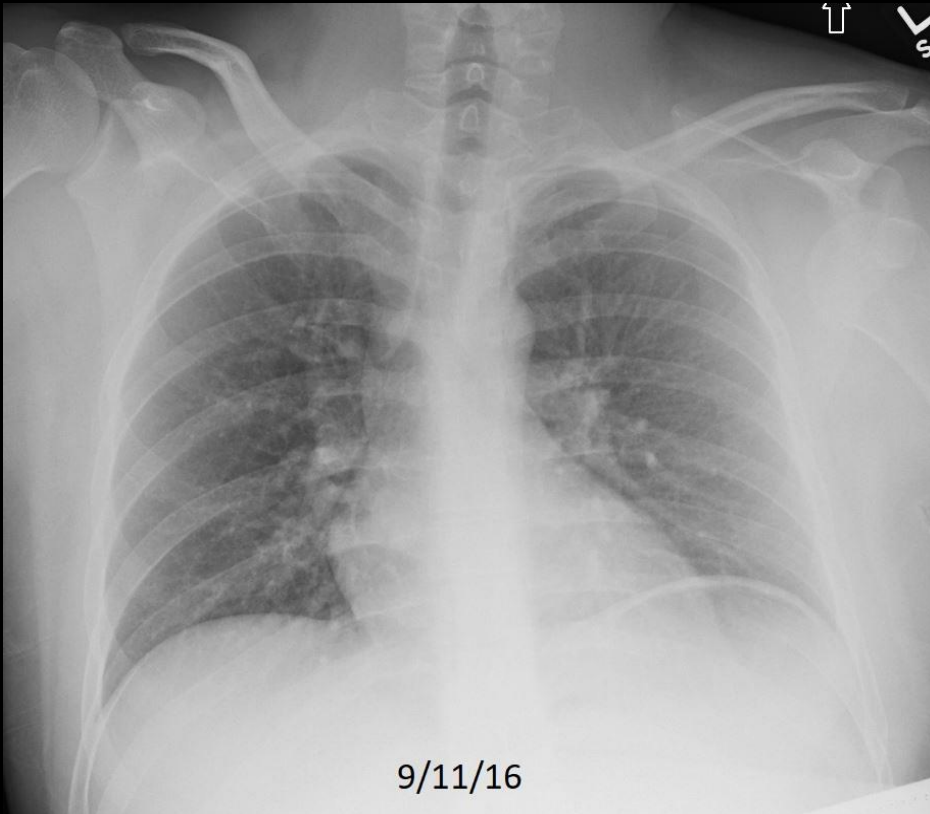
## Quiz Case 7 of 10 – A



## Quiz Case 7 of 10 – B



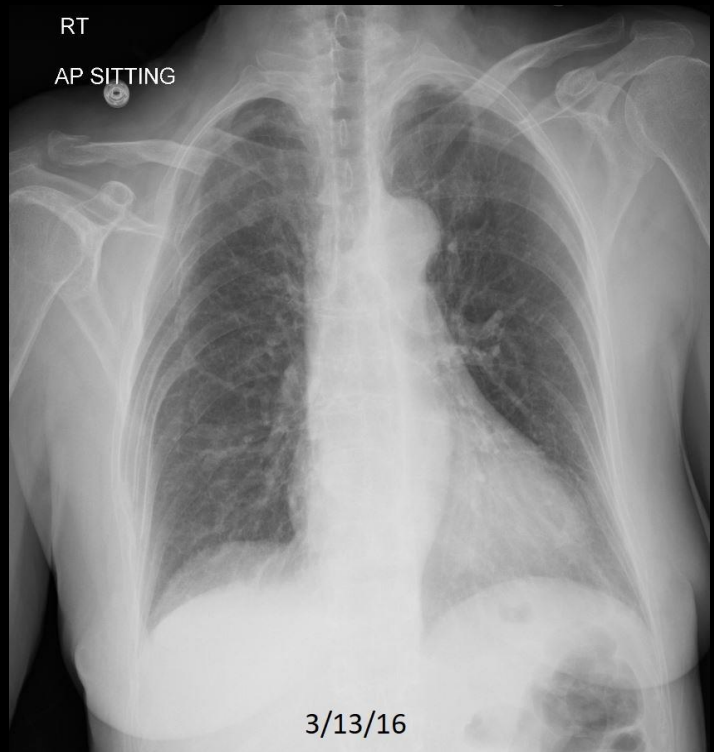
# Quiz Case 7 of 10 – A shows shoulder dislocation



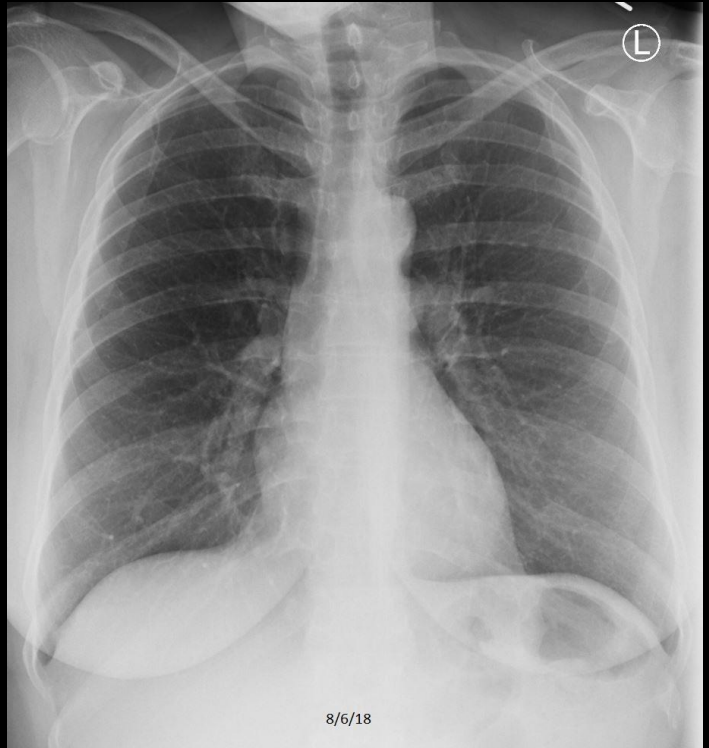
C416. 25 year old man with pain following MVA. Left shoulder dislocation.



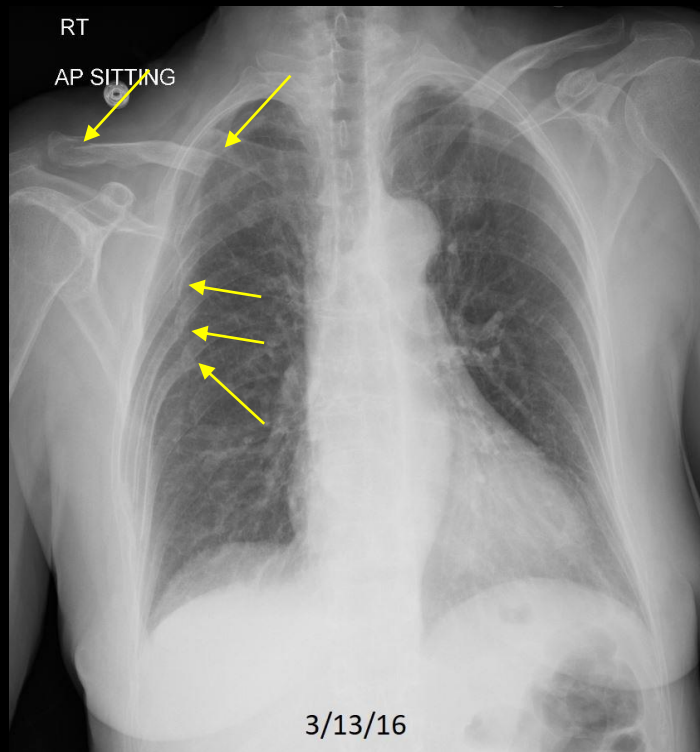
# Quiz Case 8 of 10 – A



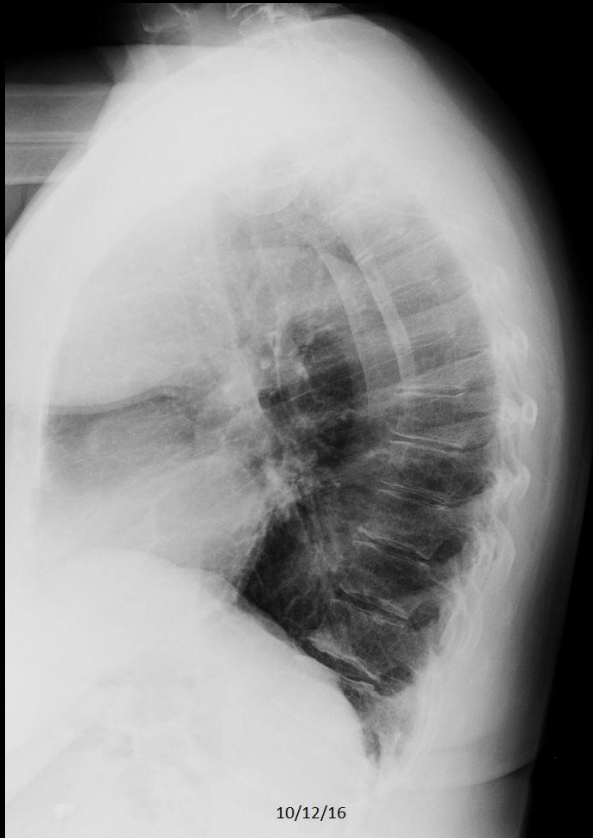
# Quiz Case 8 of 10 – B



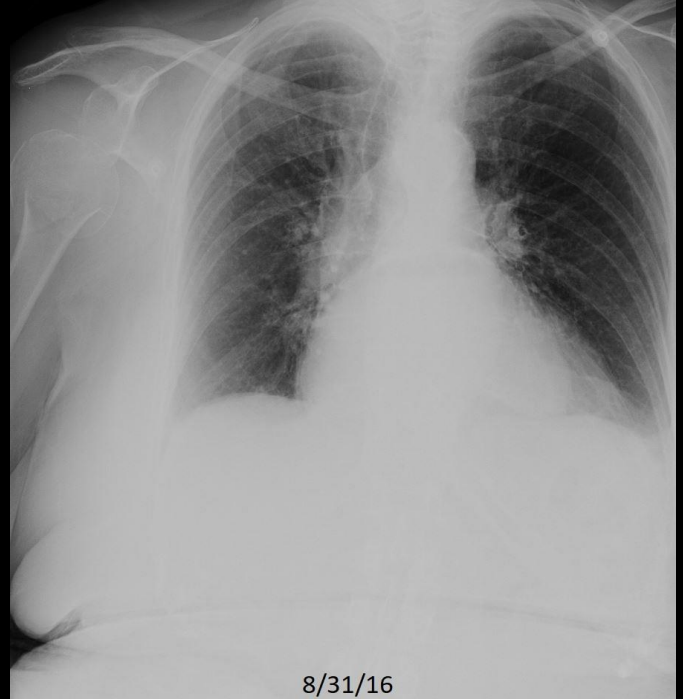
# Quiz Case 8 of 10 – A shows fractures



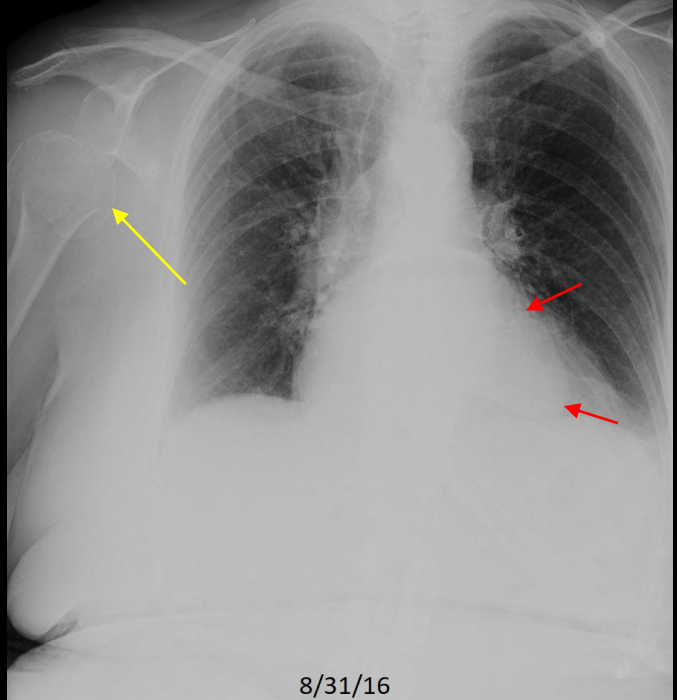
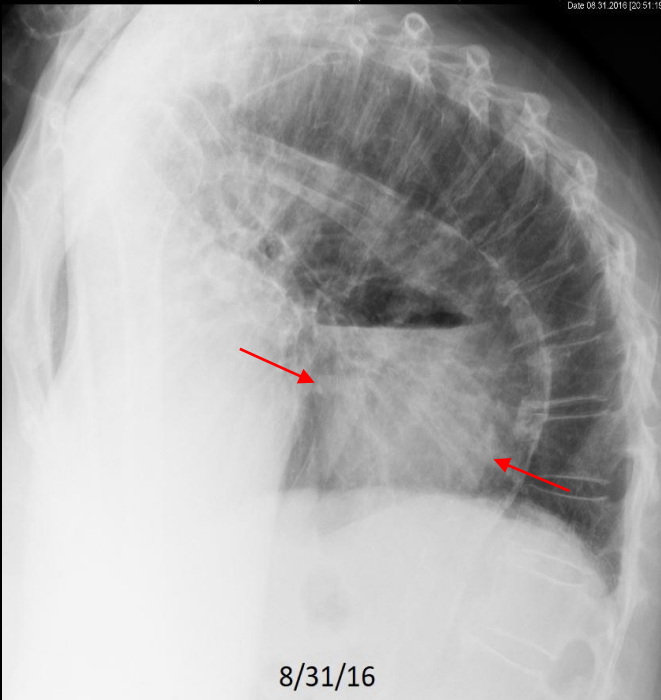
## Quiz Case 9 of 10 – A



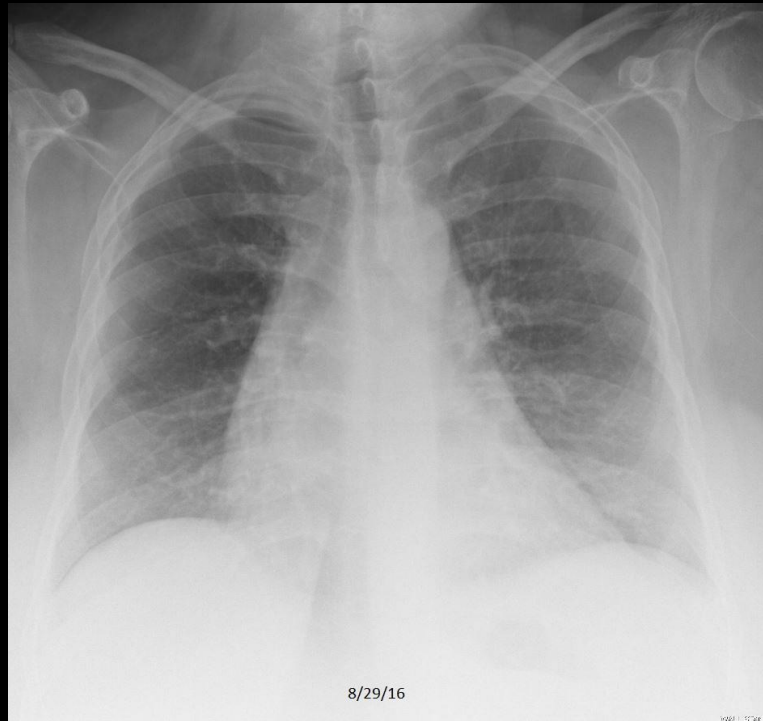
## Quiz Case 9 of 10 – B



# Quiz Case 9 of 10 – B shows fracture



# Quiz Case 10 of 10 – A



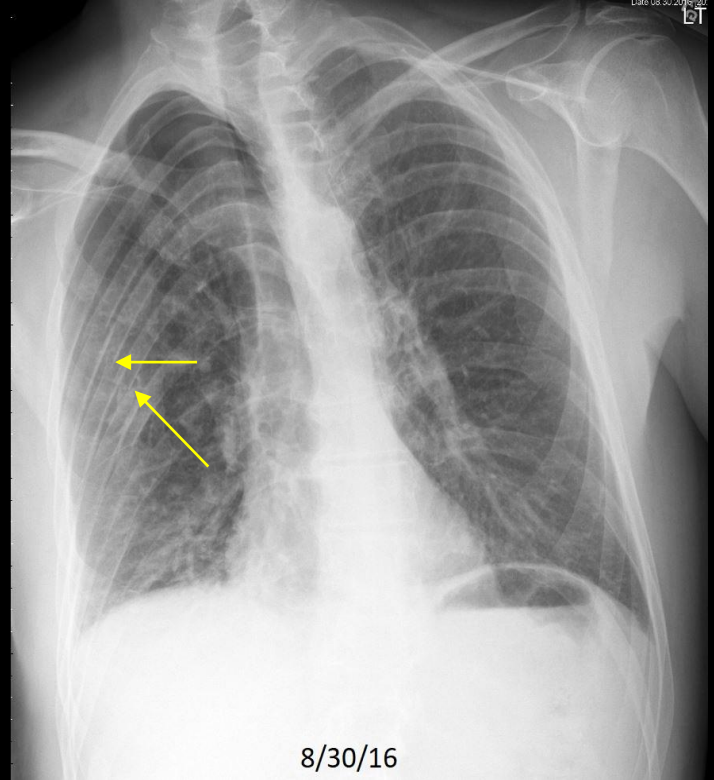
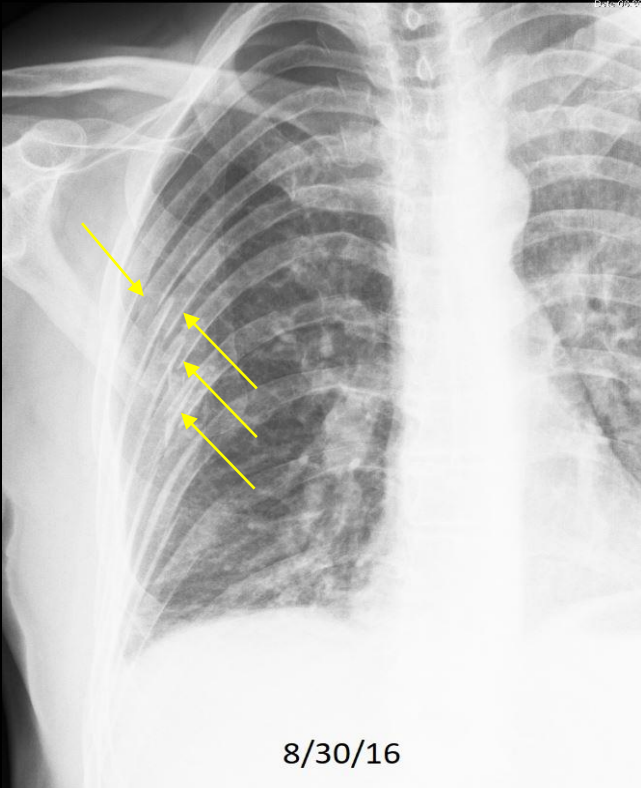


# Quiz Case 10 of 10 – B





# Quiz Case 10 of 10 – B shows fracture



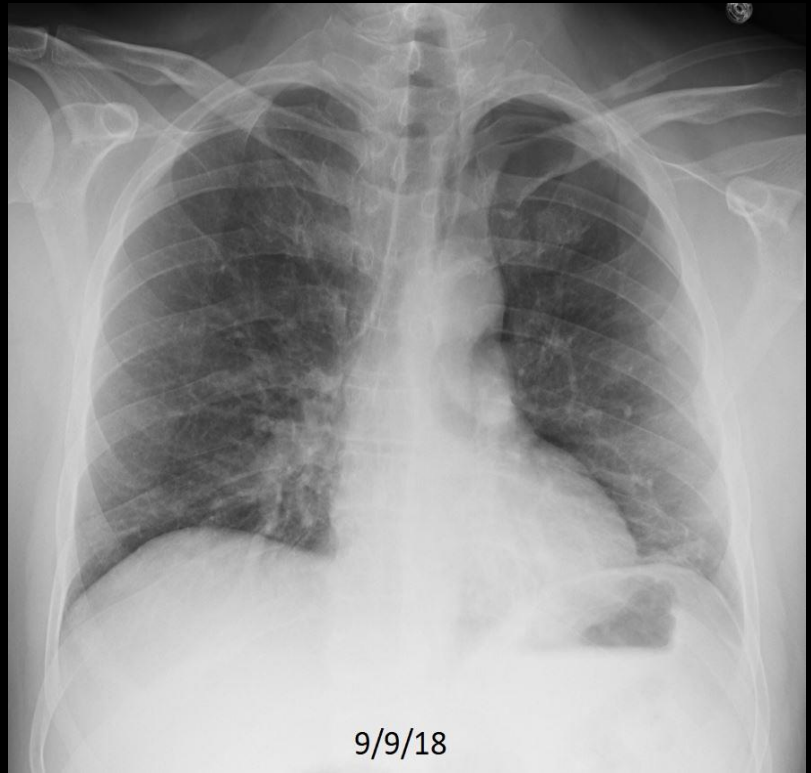
# **Review Quiz**

**Identify Each CXR as:**

**Normal, CHF, Pneumonia,  
Emphysema, Cardiomegaly without  
CHF, Atelectasis/Scar, Focal Chest  
Density, Pleural Effusion, Hiatal  
Hernia, or Fracture**

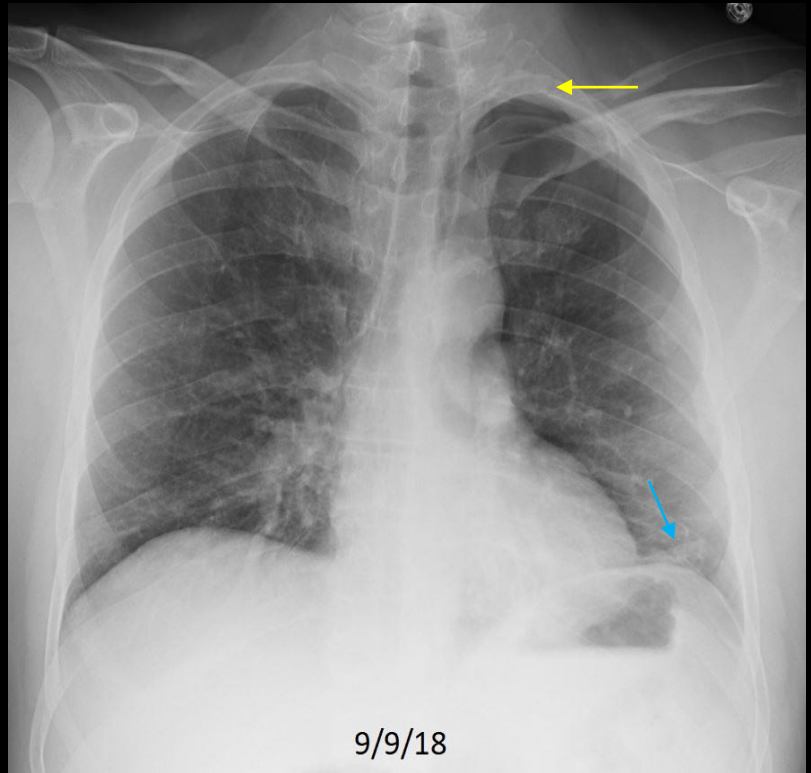
## Review Quiz Case 1 of 10

Normal, CHF, Pneumonia, Emphysema, Cardiomegaly without Failure, Atelectasis/Scar, Focal Chest Density, Pleural Effusion, Hiatal Hernia, or Fracture



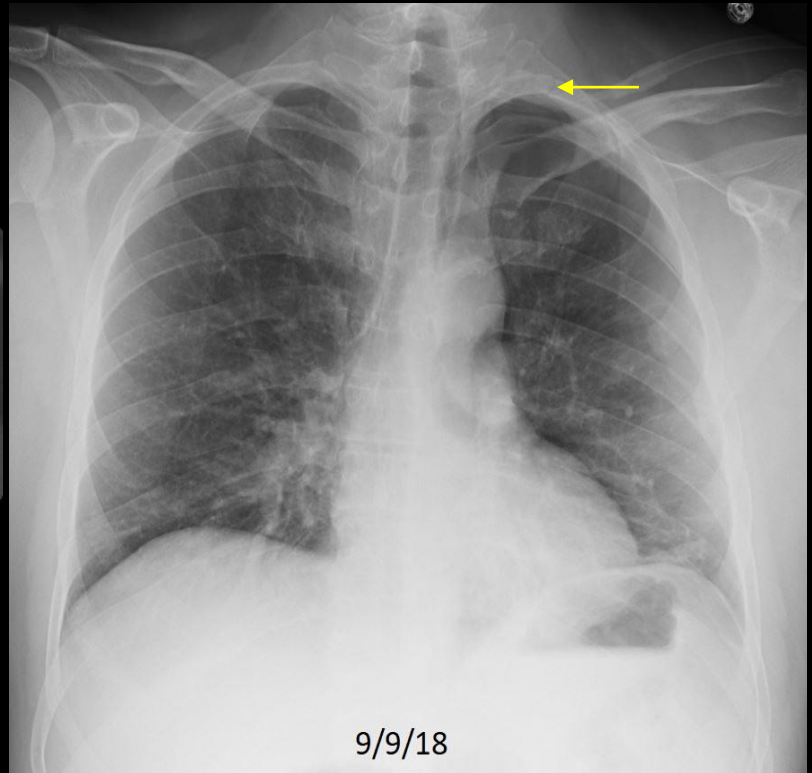
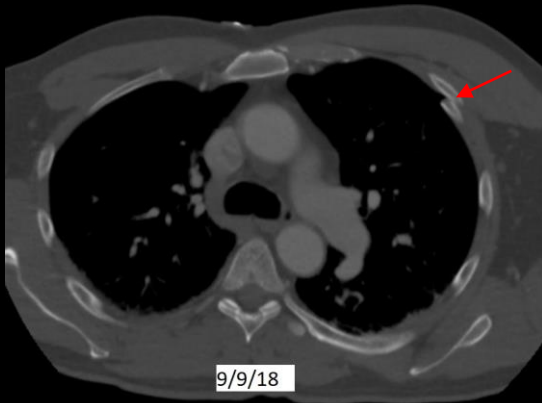
## Review Quiz Case 1 of 10

### Fracture and Atelectasis/Scar



## Review Quiz Case 1 of 10

### Fracture



C414. 59 year old man with chest pain following bicycle accident. Left rib fractures. There is a **left 2<sup>nd</sup> rib fracture on the radiograph**. Multiple additional fractures were seen on a CT study (**one is shown on the demonstrated slice**).

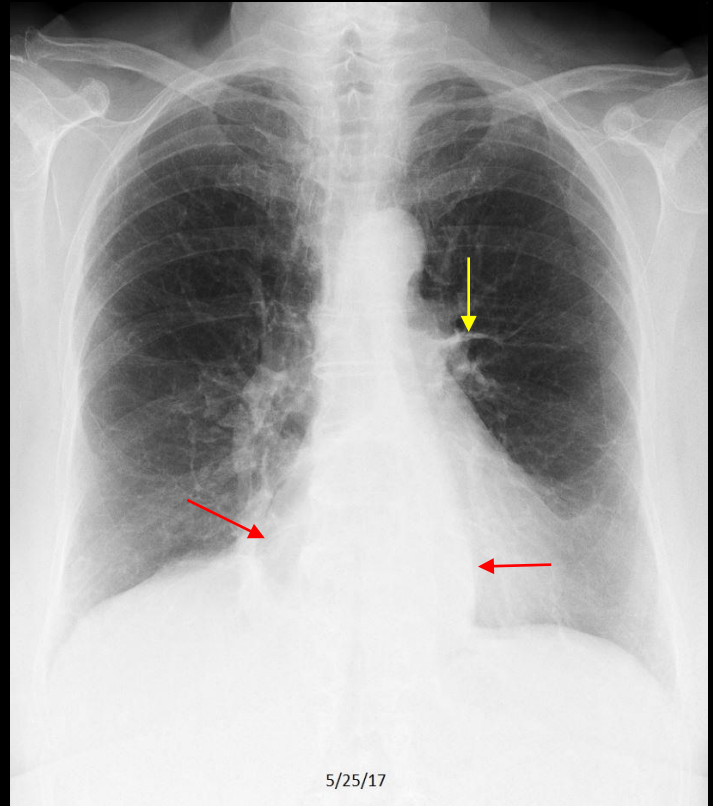
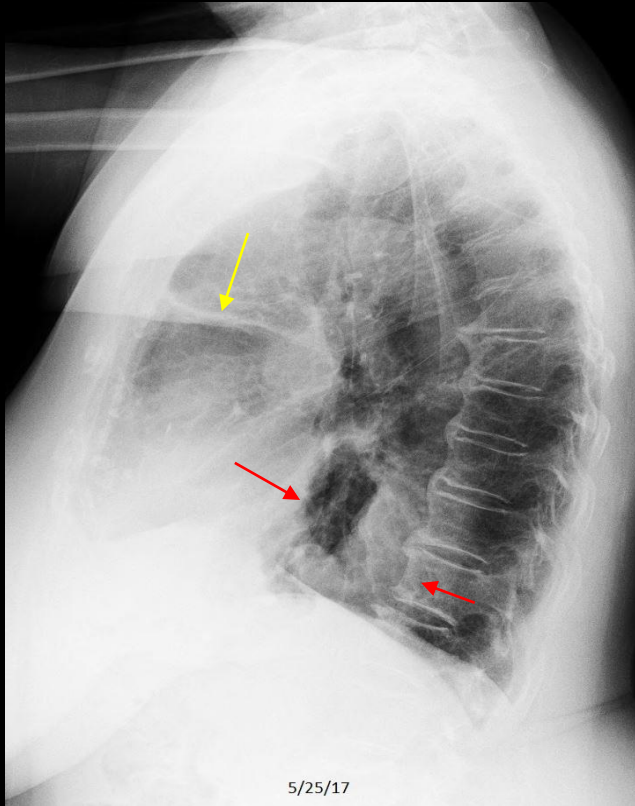
## Review Quiz Case 2 of 10

Normal, CHF, Pneumonia, Emphysema, Cardiomegaly without Failure, Atelectasis/Scar, Focal Chest Density, Pleural Effusion, Hiatal Hernia, or Fracture



## Review Quiz Case 2 of 10

### Atelectasis/Scar and Hiatal Hernia

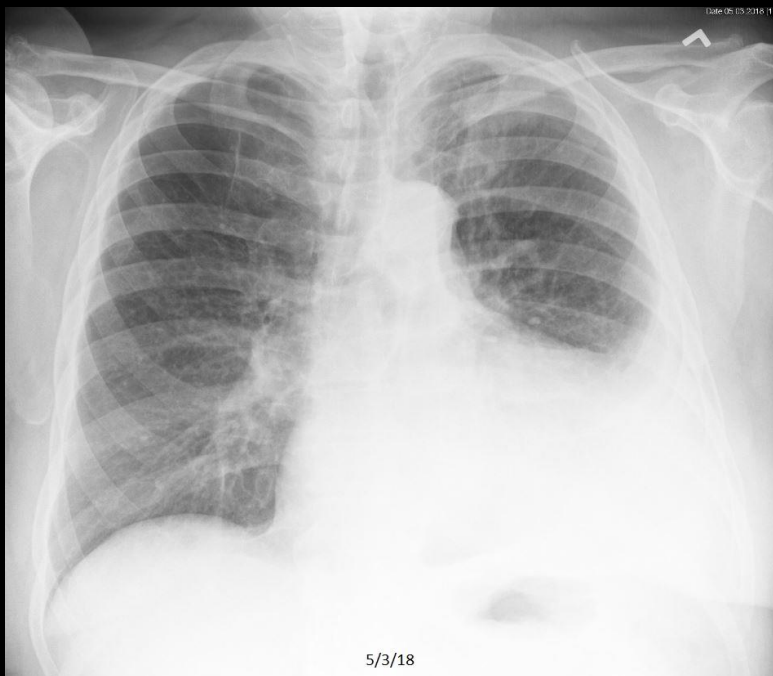


C456. 92 year old with chest pain following injury sustained in a fall. **Atelectasis/scar** and **hiatal hernia**.



## Review Quiz Case 3 of 10

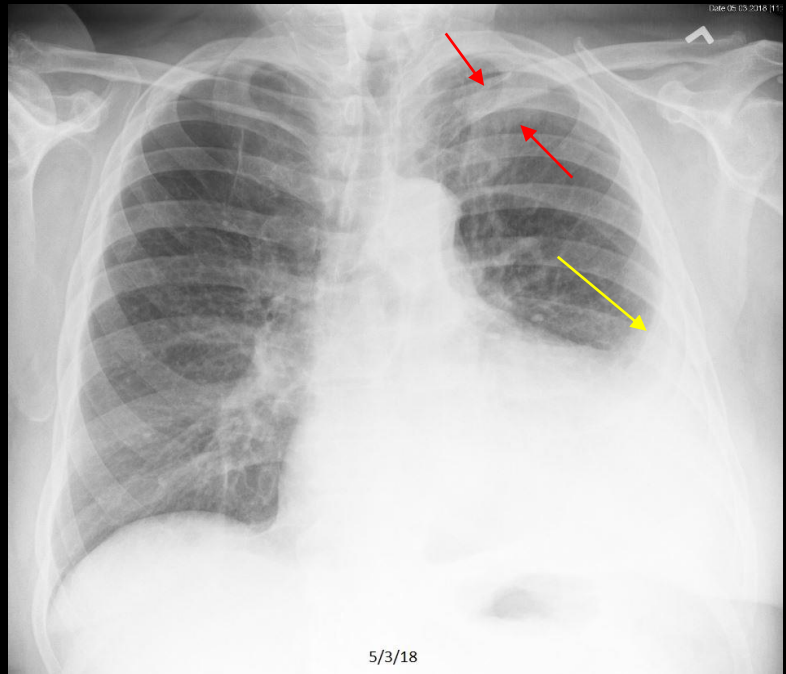
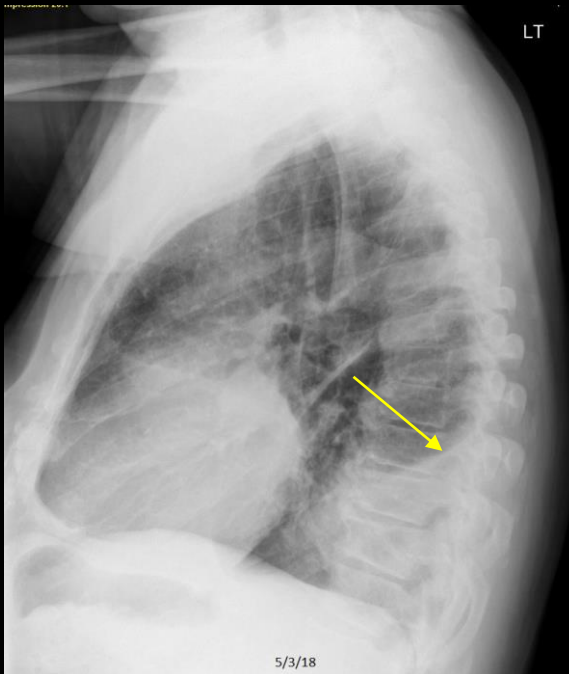
Normal, CHF, Pneumonia, Emphysema, Cardiomegaly without Failure, Atelectasis/Scar, Focal Chest Density, Pleural Effusion, Hiatal Hernia, or Fracture





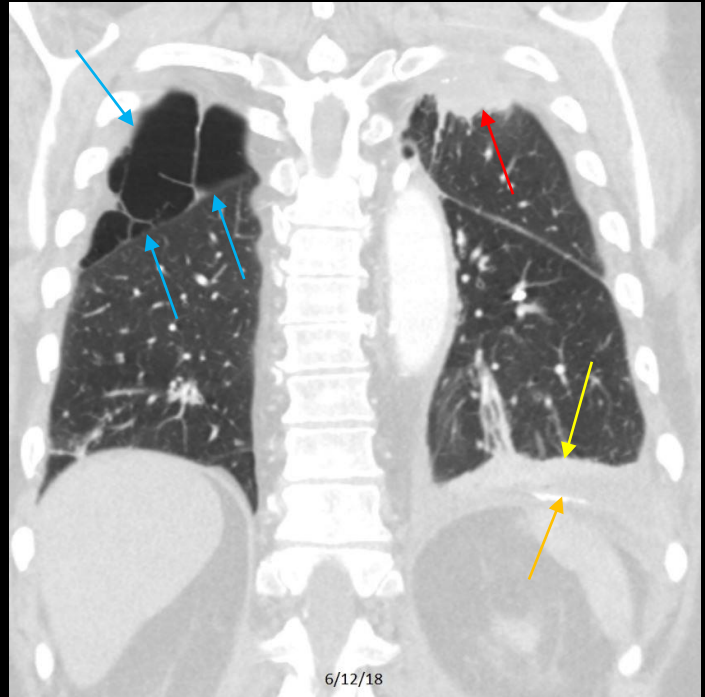
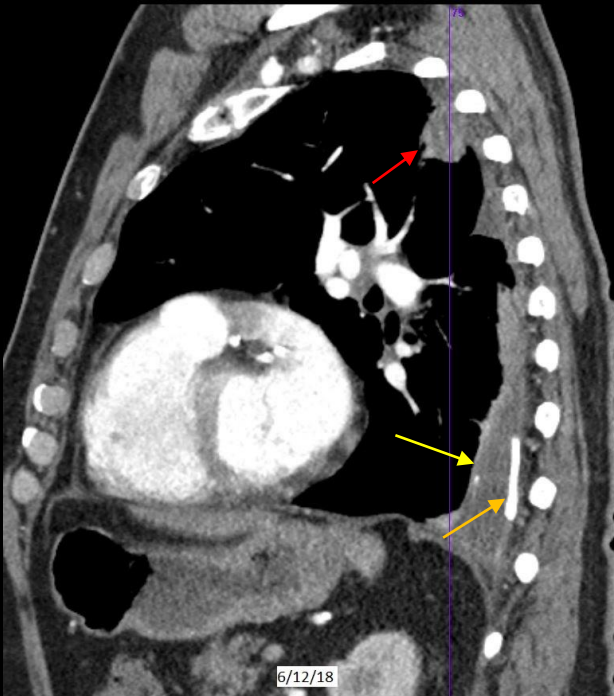
## Review Quiz Case 3 of 10

### Focal Chest Density *and* Pleural Effusion



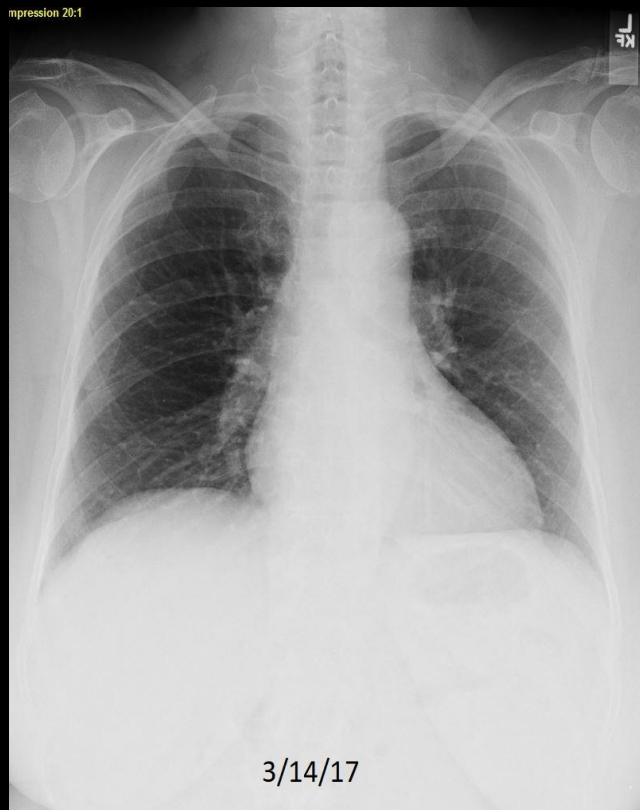
## Review Quiz Case 3 of 10

### Focal Chest Density *and* Pleural Effusion



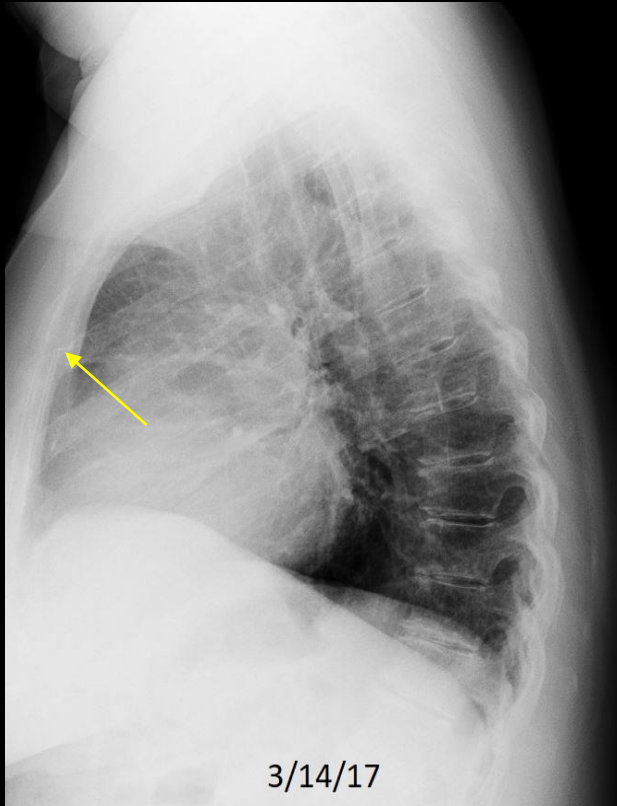
## Review Quiz Case 4 of 10

Normal, CHF, Pneumonia, Emphysema, Cardiomegaly without Failure, Atelectasis/Scar, Focal Chest Density, Pleural Effusion, Hiatal Hernia, or Fracture



## Review Quiz Case 4 of 10

### Fracture



C420. 78 year old with chest pain following injury. **Sternal fracture.**

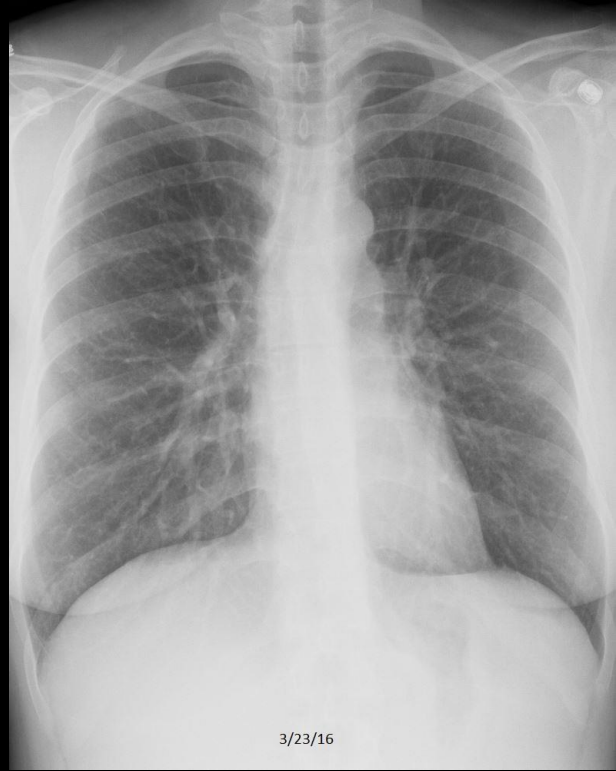
## Review Quiz Case 5 of 10

Normal, CHF, Pneumonia, Emphysema, Cardiomegaly without Failure, Atelectasis/Scar, Focal Chest Density, Pleural Effusion, Hiatal Hernia, or Fracture



## Review Quiz Case 5 of 10

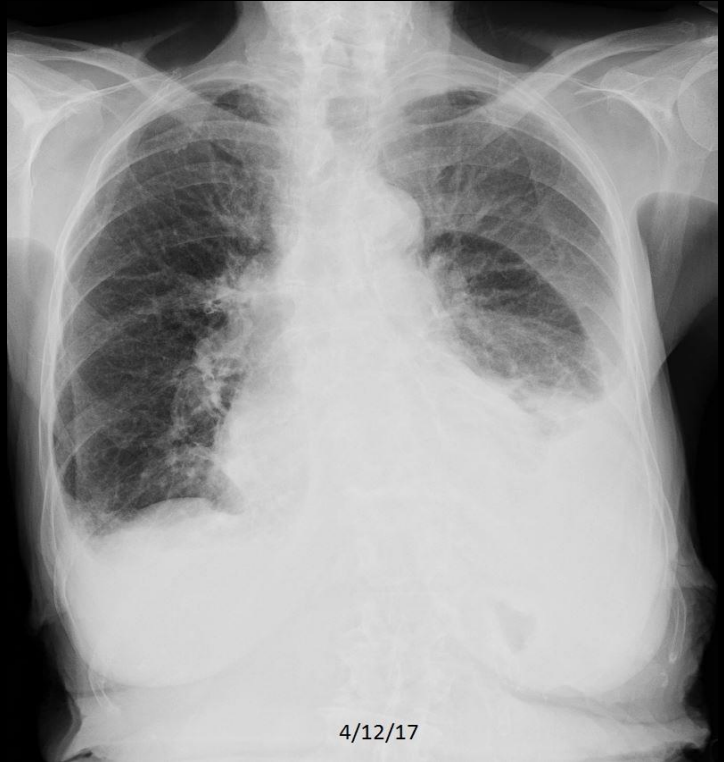
### Normal





## Review Quiz Case 6 of 10

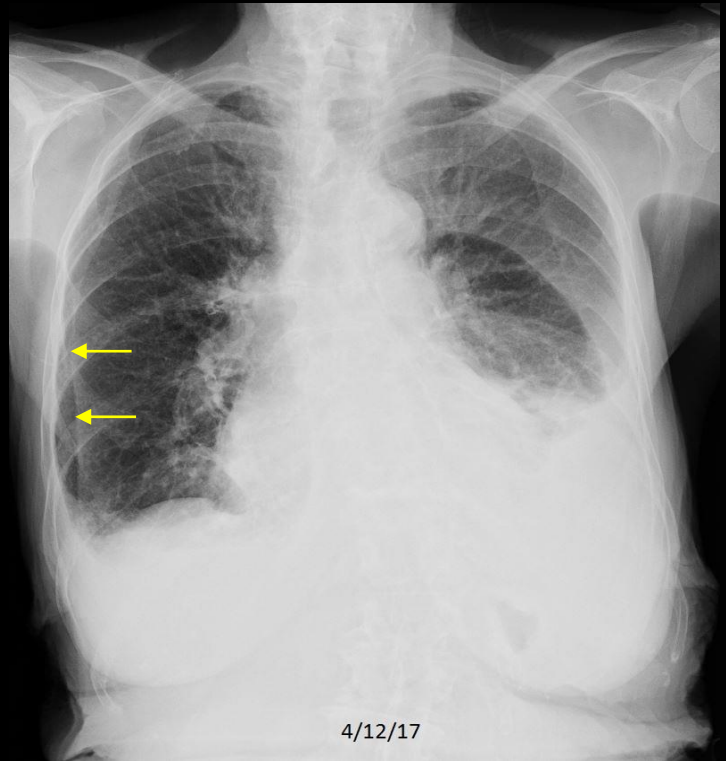
Normal, CHF, Pneumonia, Emphysema, Cardiomegaly without Failure, Atelectasis/Scar, Focal Chest Density, Pleural Effusion, Hiatal Hernia, or Fracture





## Review Quiz Case 6 of 10

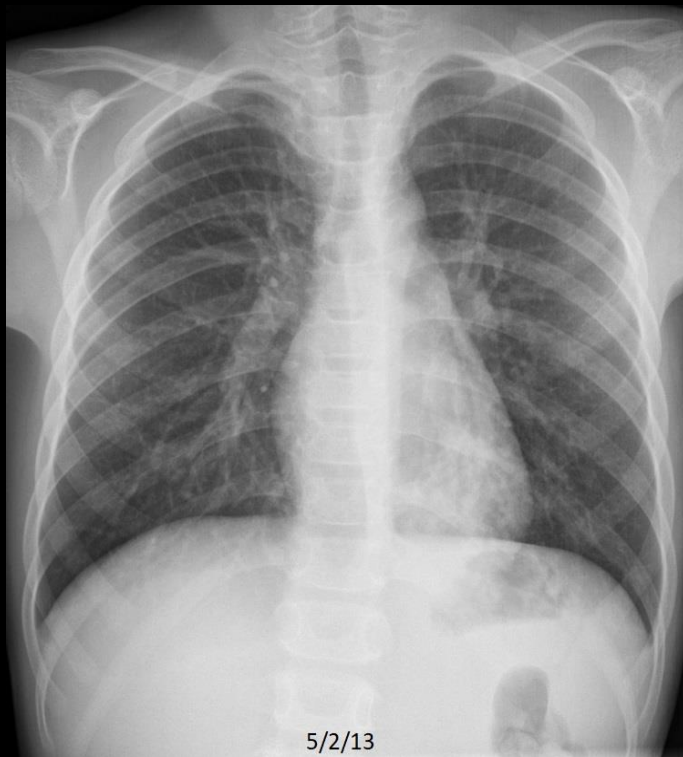
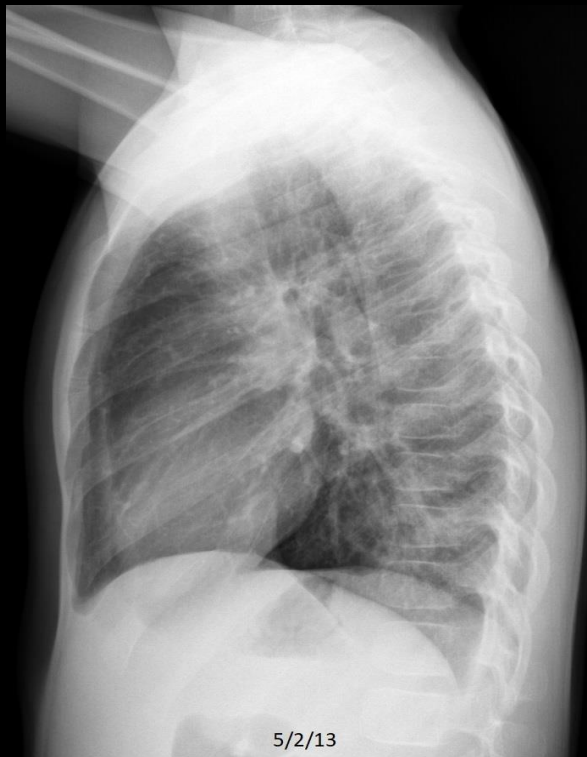
### Cardiomegaly without Failure



C429. 92 year old woman with dyspnea. Cardiomegaly, left greater than right pleural effusions, and vascular redistribution. Incidentally noted is a **right sided skin fold**.

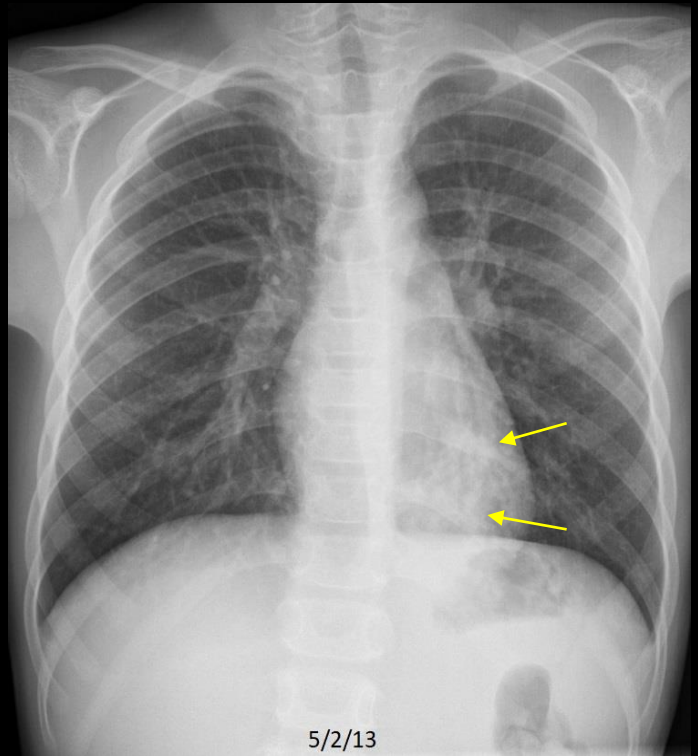
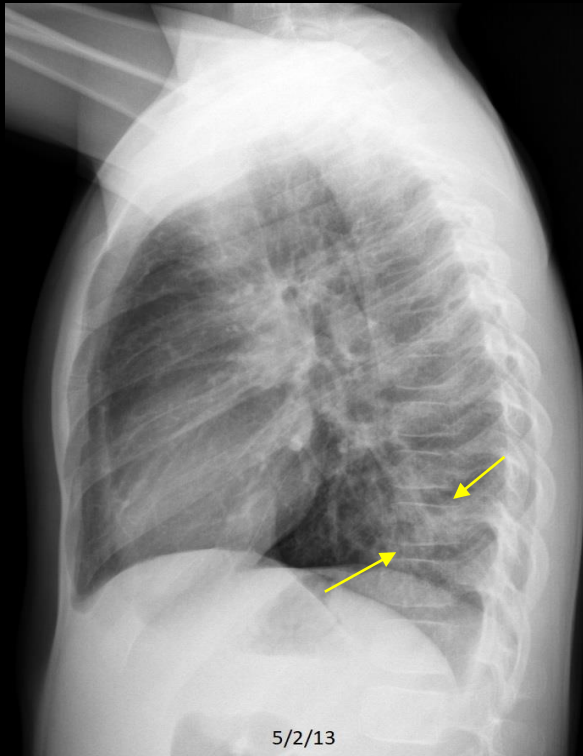
## Review Quiz Case 7 of 10

Normal, CHF, Pneumonia, Emphysema, Cardiomegaly without Failure, Atelectasis/Scar, Focal Chest Density, Pleural Effusion, Hiatal Hernia, or Fracture



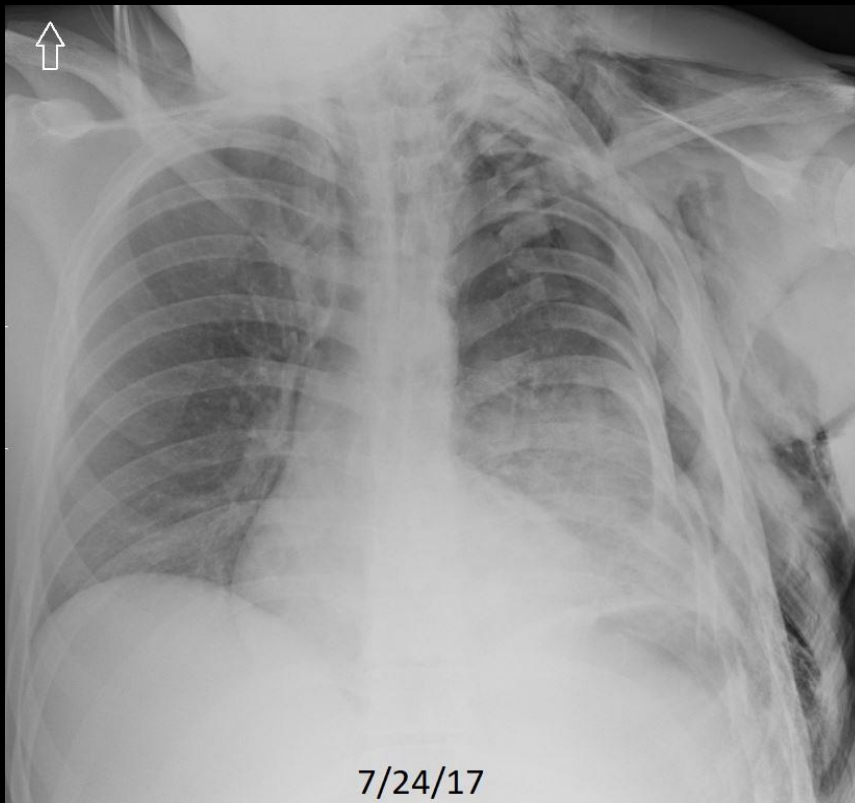
## Review Quiz Case 7 of 10

### Pneumonia



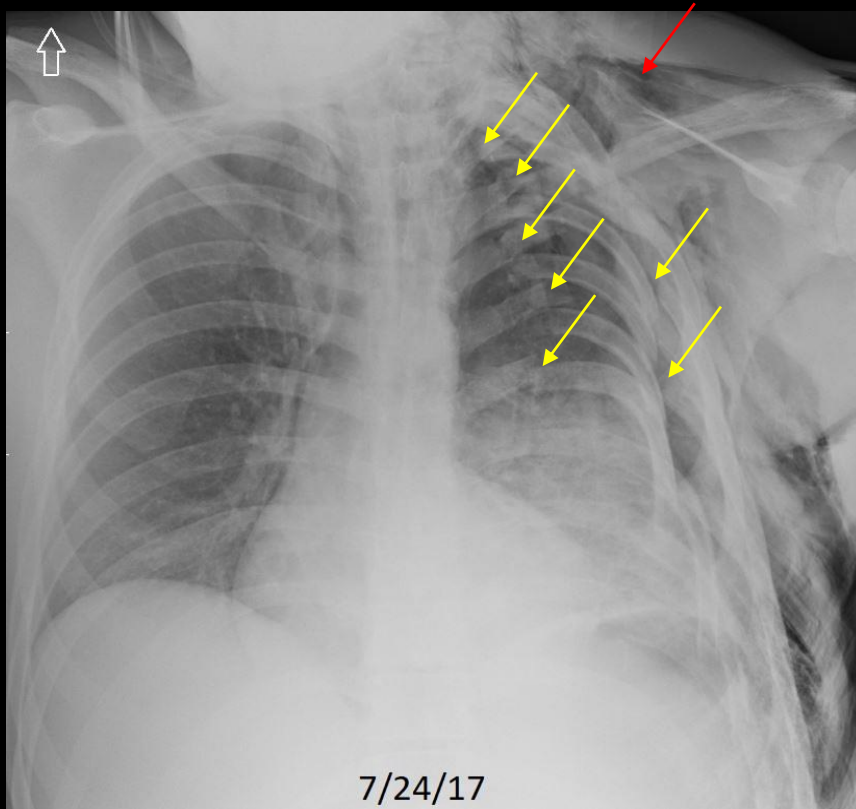
## Review Quiz Case 8 of 10

Normal, CHF, Pneumonia, Emphysema, Cardiomegaly without Failure, Atelectasis/Scar, Focal Chest Density, Pleural Effusion, Hiatal Hernia, or Fracture



## Review Quiz Case 8 of 10

### Fracture



C466. 24 year old with flail chest from multiple rib fractures. Subcutaneous free air.

## Review Quiz Case 9 of 10

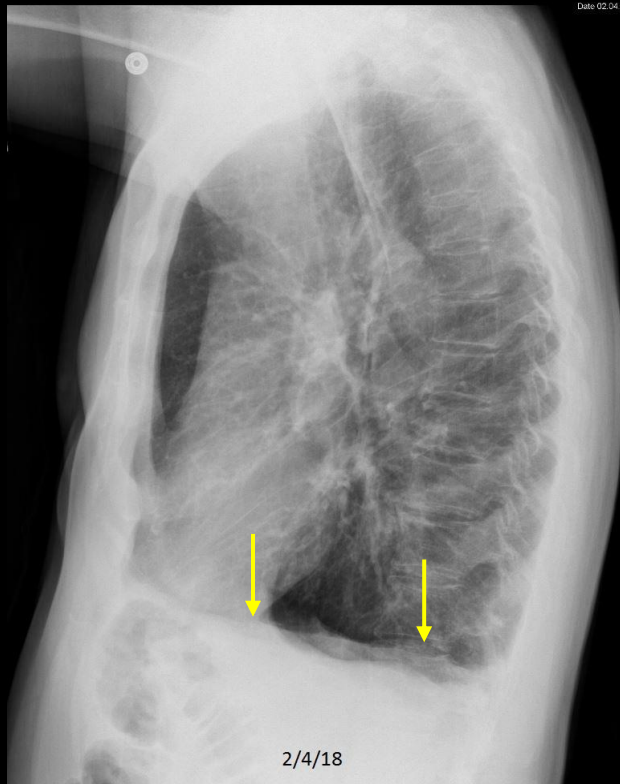
Normal, CHF, Pneumonia, Emphysema, Cardiomegaly without Failure, Atelectasis/Scar, Focal Chest Density, Pleural Effusion, Hiatal Hernia, or Fracture



C541. 68 year old man with dyspnea.

## Review Quiz Case 9 of 10

Normal, CHF, Pneumonia, Emphysema, Cardiomegaly without Failure, Atelectasis/Scar, Focal Chest Density, Pleural Effusion, Hiatal Hernia, or Fracture

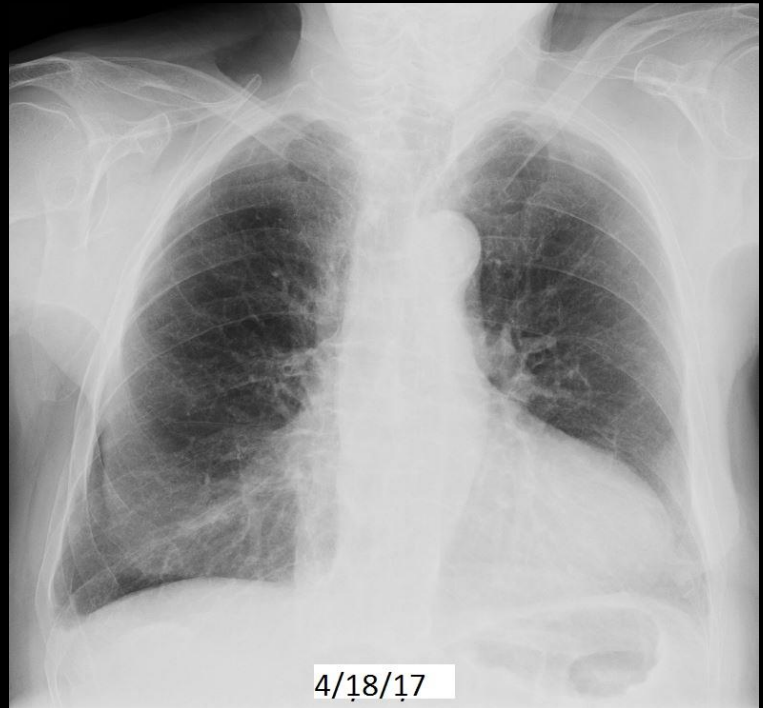


C541. 68 year old man with dyspnea. Hyperinflated lungs with flattened diaphragm.



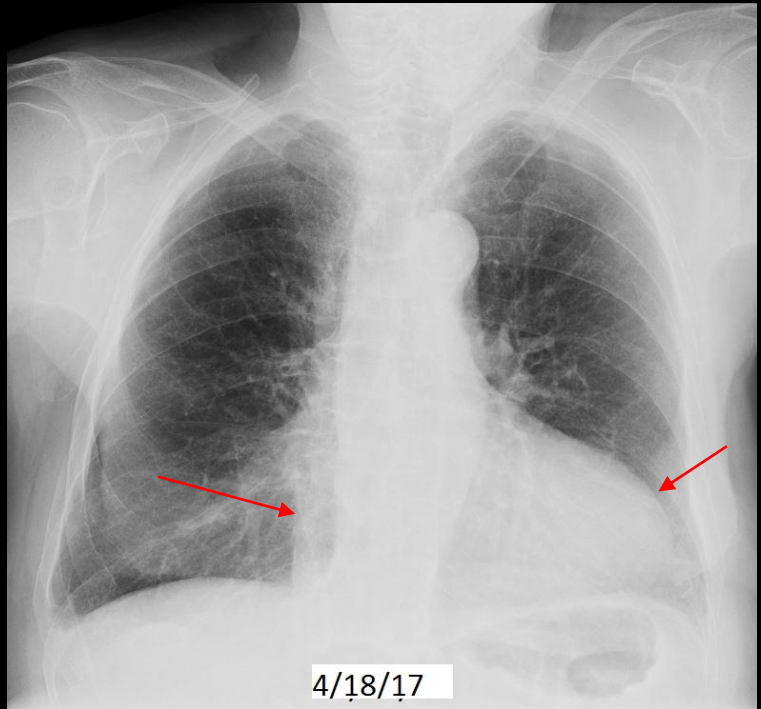
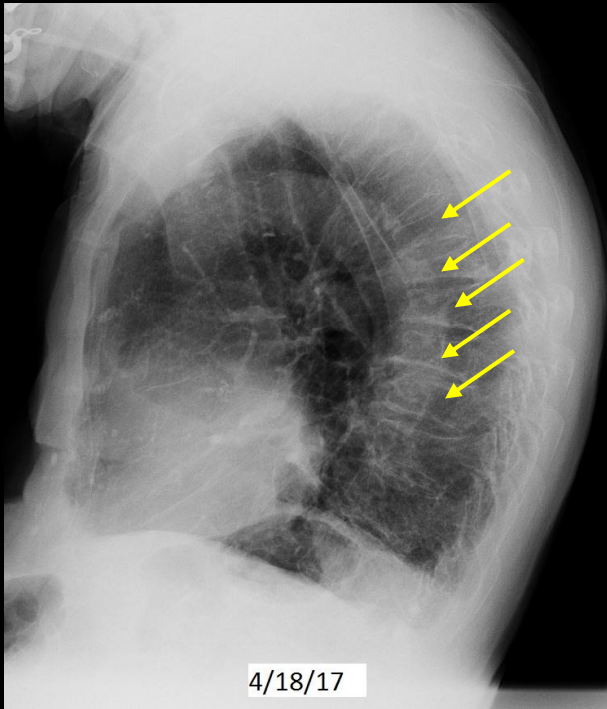
## Review Quiz Case 10 of 10

Normal, CHF, Pneumonia, Emphysema, Cardiomegaly without Failure, Atelectasis/Scar, Focal Chest Density, Pleural Effusion, Hiatal Hernia, or Fracture



# Review Quiz Case 10 of 10

## Cardiomegaly without Failure and Fracture

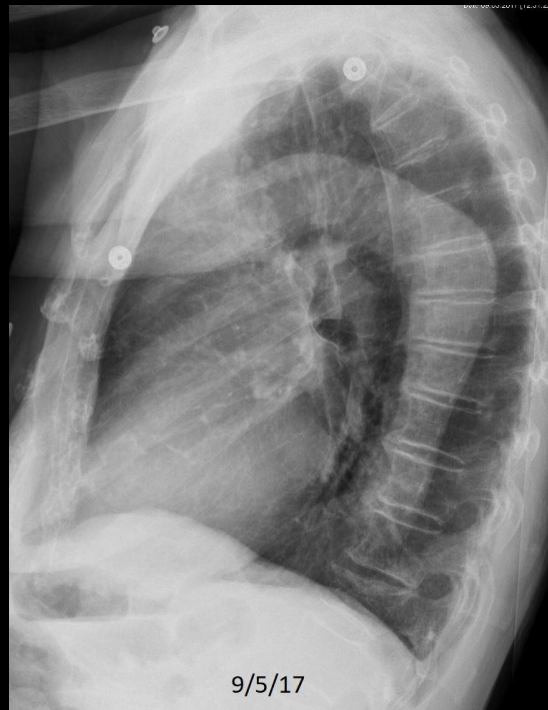


Review Quiz Case 10 of 10  
Cardiomegaly without Failure and Fracture

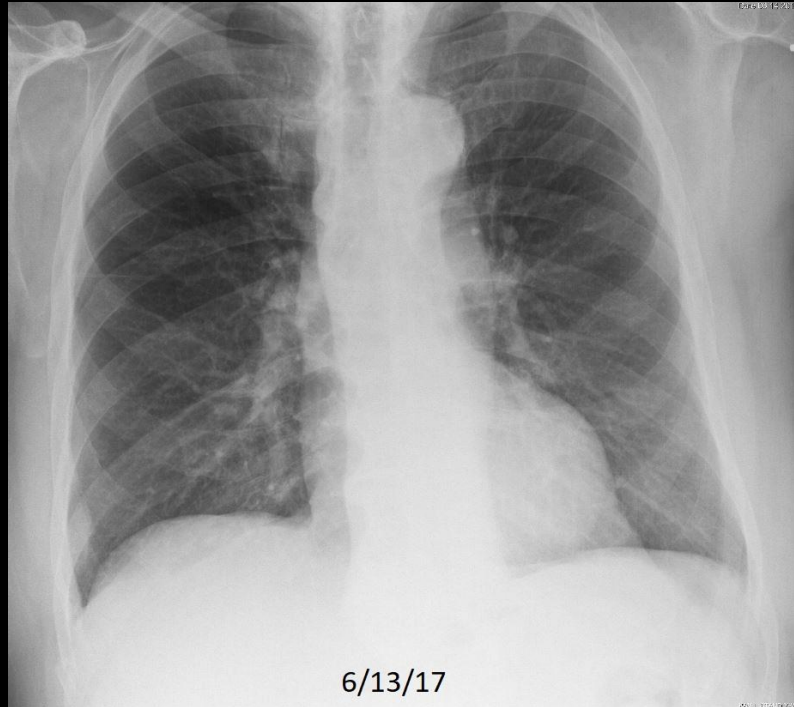




C471. 81 year old with back pain. T12 fracture..

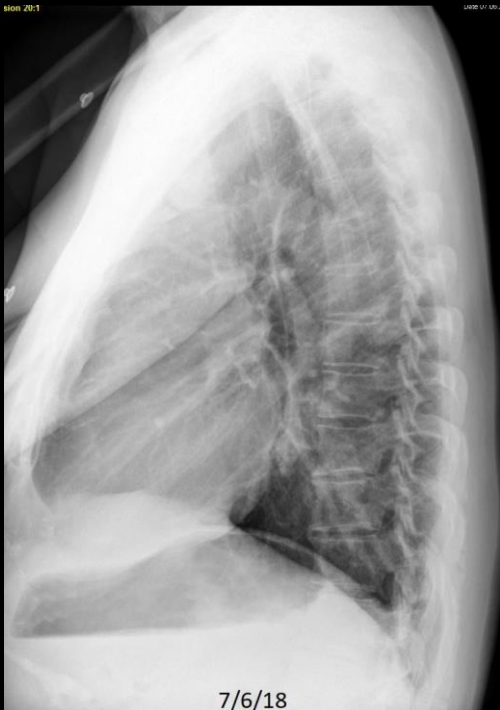


C471. 81 year old with back pain. T12 fracture. Fracture is new from prior study.



C460. 81 year old man with pain following injury sustained in a fall. Right rib fracture.



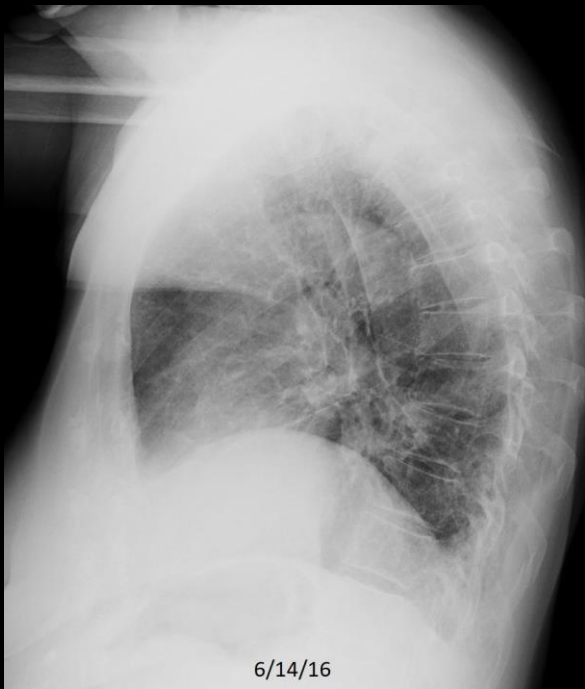


C553. 65 year old man with pain following injury. Separation of the right AC joint.





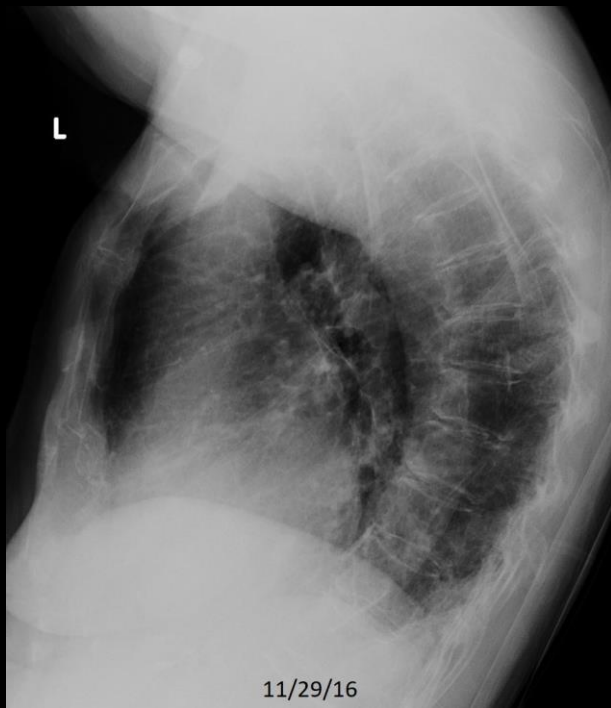
C553. 65 year old man with pain following injury. Separation of the right AC joint.



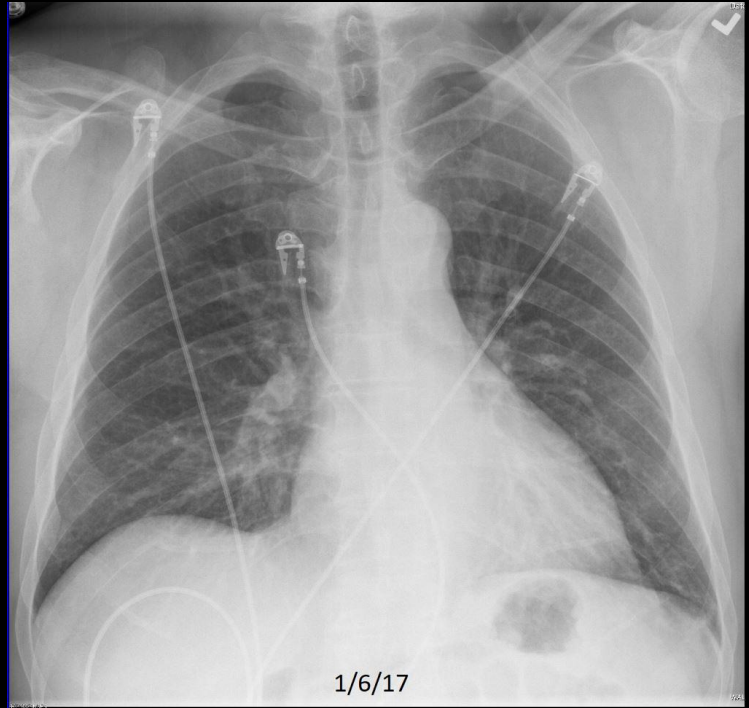
C592. 81 year old with chest pain following injury. Right rib fracture. Elevated right hemidiaphragm and cardiomegaly.



C592. 81 year old with chest pain following injury. Right rib fracture. Elevated right hemidiaphragm and cardiomegaly.



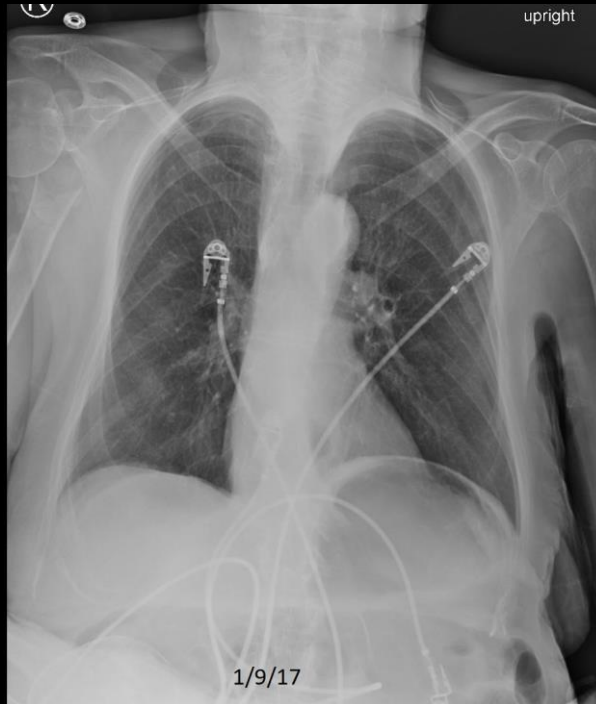
C609. 84 year old with chest pain following injury. Sternal fracture.



C611. 59 year old man with chest pain following injury. Sternal fracture..

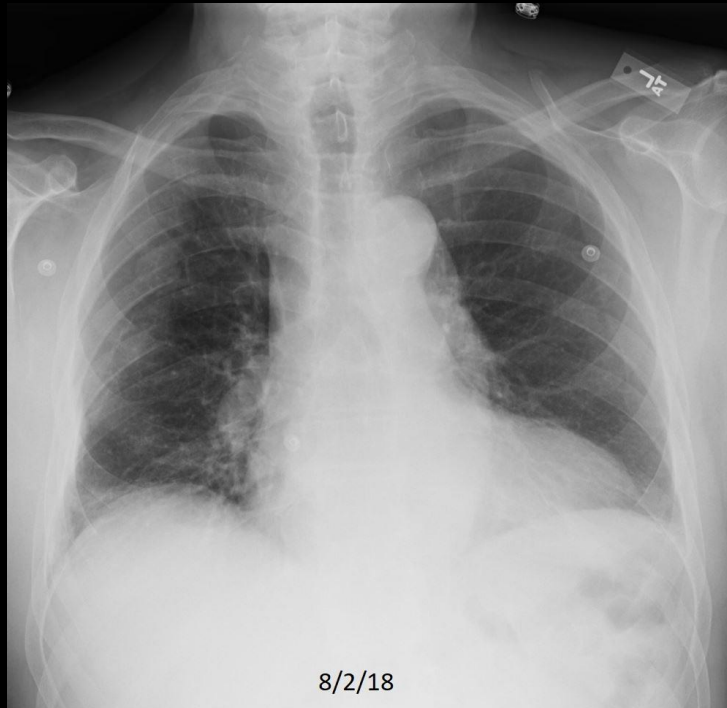
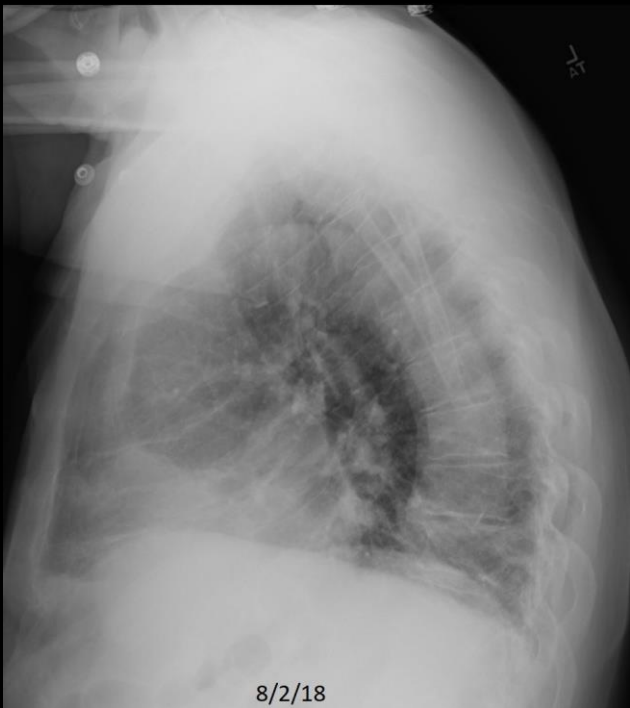


C611. 59 year old man with chest pain following injury. Sternal fracture..

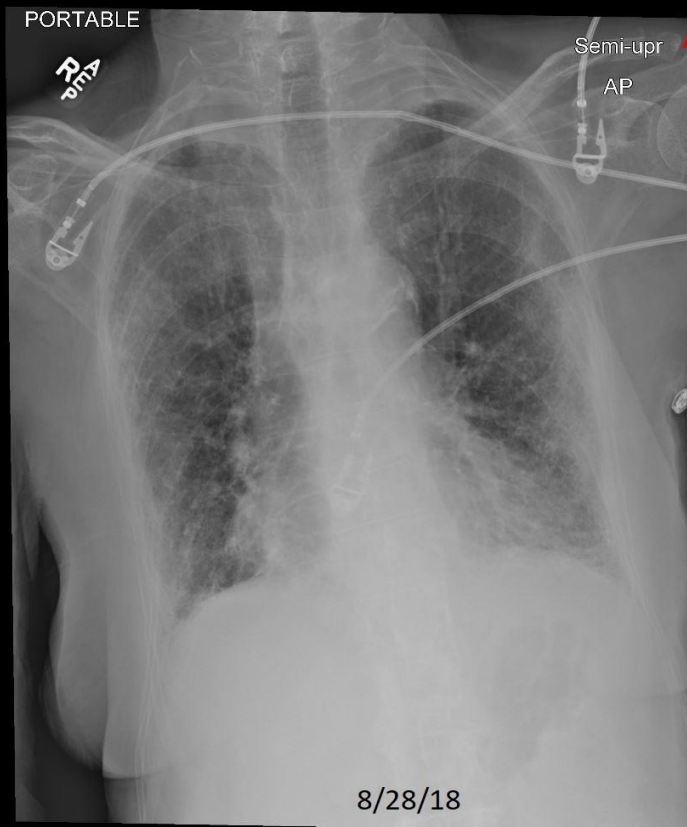


C612. 82 year old woman with pain following injury. Right humerus fracture.

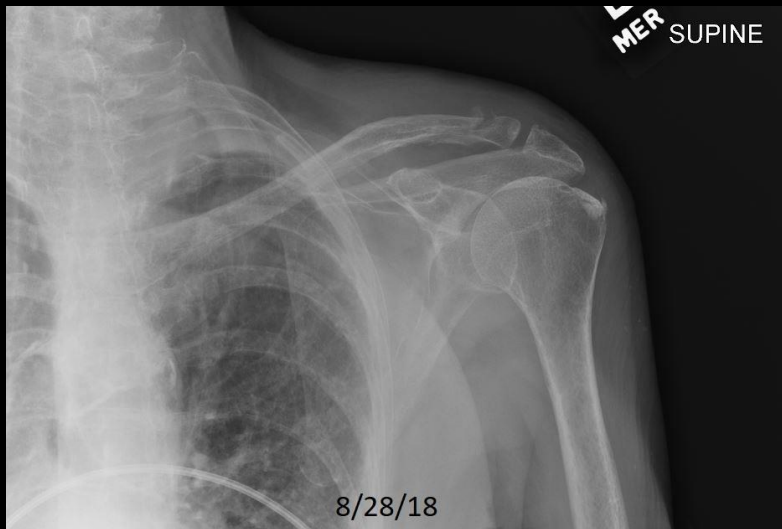




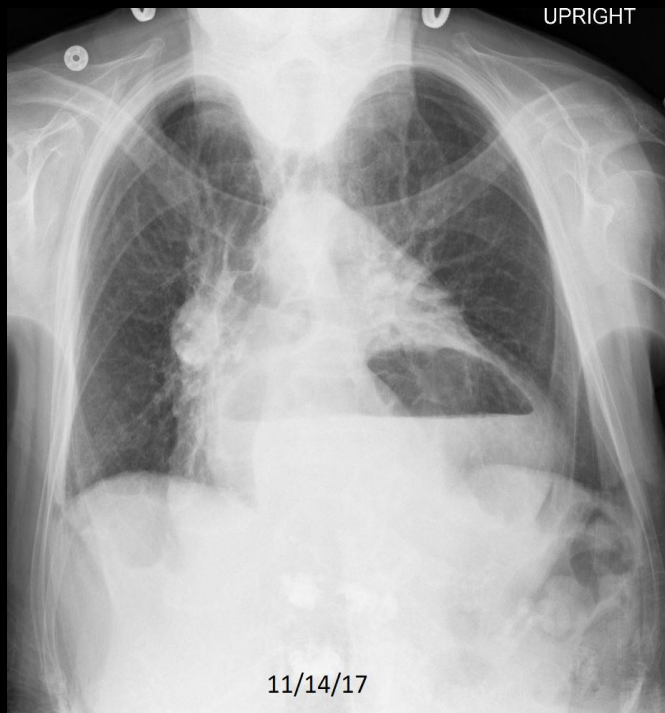
C616. 78 year old man with chest pain following injury. Right rib fractures. Cardiomegaly.



C310. 79 year old with a hip fracture following injury. Left clavicle fracture. Chronic diffuse lung disease.



C310. 79 year old with a hip fracture following injury. Left clavicle fracture. Obscured by marker on original portable chest CR.



C367. 85 year old woman with acute on chronic thoracic spine pain. Vertebroplasty changes and thoracic compression fractures. Hiatal hernia.

# RECAPITULATION

## FRACTURE

INDICATIONS: injury, chest pain. Some patients may fracture a rib with severe coughing, especially if they are osteoporotic.

FINDINGS: cortical discontinuity, bone contour abnormality including compression deformity of the vertebral body.

IMPRESSION: Fracture.

# Chest Radiography

## End of Lecture 10

### Fracture

Go to Lecture 11

Diffuse Lung Disease