

# Chest Radiography

## Lecture 4

### Emphysema

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# EMPHYSEMA

INDICATIONS: dyspnea, cough, hyper-resonant lungs, history of smoking.

FINDINGS: hyperinflated lungs (flattened diaphragm, increased anterior clear space, reduced heart size), bullae.

# UpToDate Points

“Emphysema is a pathologic term that describes some of the structural changes sometimes associated with chronic obstructive pulmonary disease. These changes include abnormal and permanent enlargement of the airspaces distal to the terminal bronchioles that is accompanied by destruction of the airspace walls, without obvious fibrosis.”

“Chest radiography and computed tomography are typically performed in patients with COPD when the cause of dyspnea or sputum production is unclear and during acute exacerbations to exclude complicating processes (e.g., pneumonia, pneumothorax, heart failure).”

“Plain chest radiographs have a poor sensitivity for detecting COPD [50% sensitivity for COPD of moderate severity].”

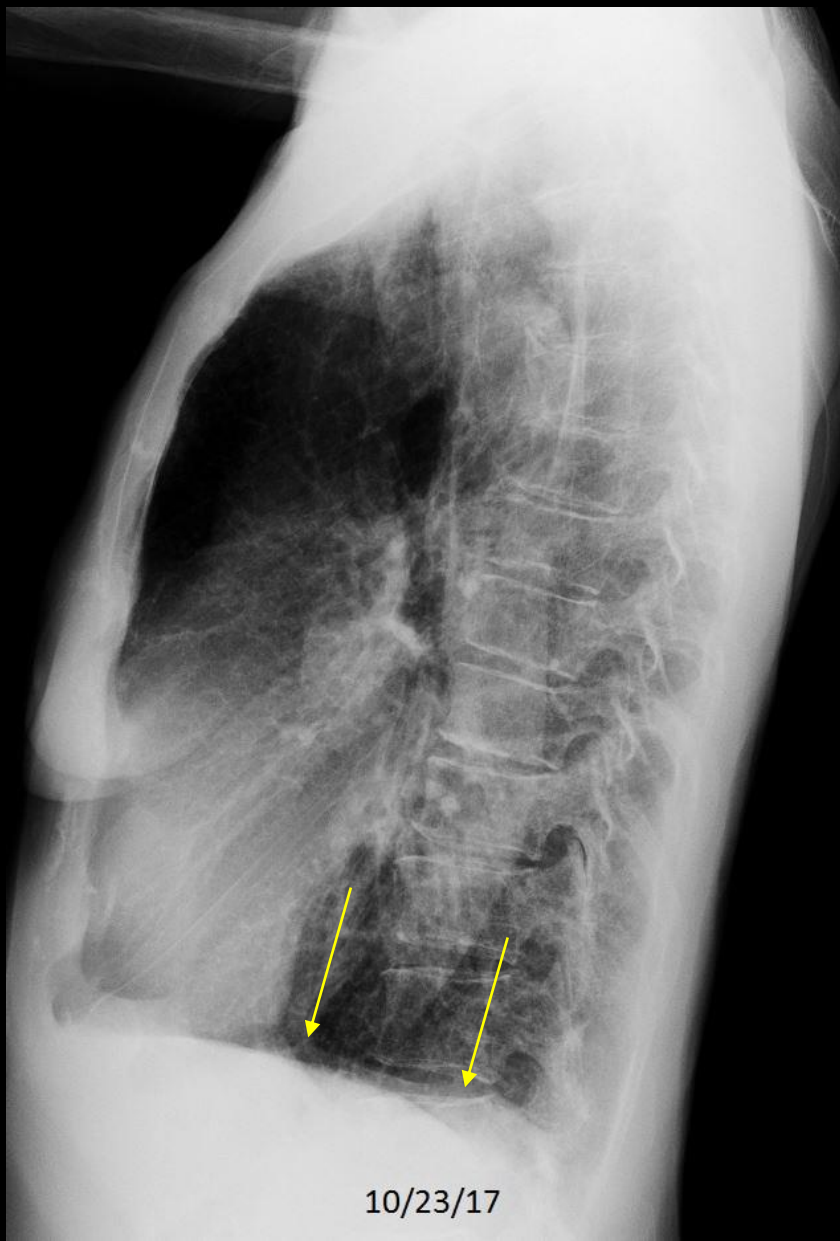
Han MK, Dransfield MT, and Martinez FJ. Chronic obstructive pulmonary disease: definition, clinical manifestations, diagnosis, and staging. UpToDate, accessed 3/29/20 (last updated 3/25/20).

**EMPHYSEMA**

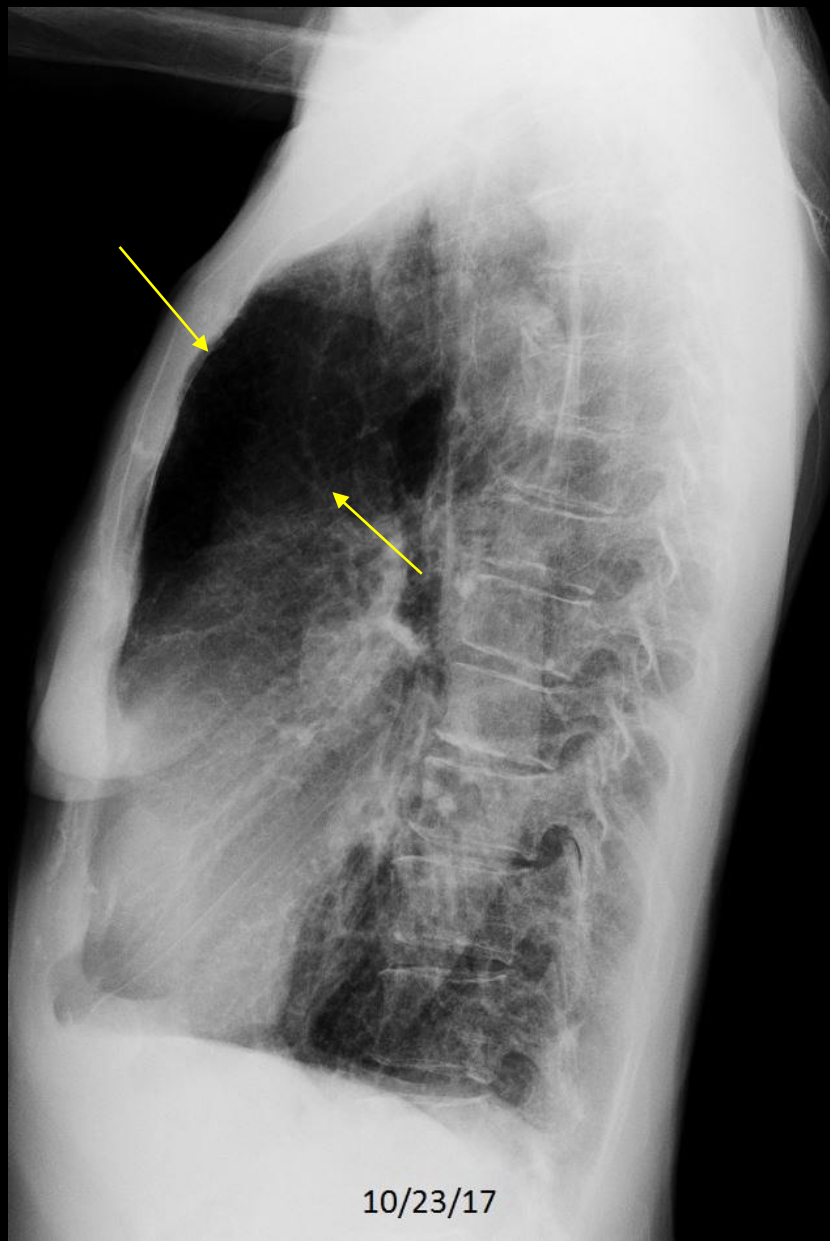
**ILLUSTRATED FINDINGS**



C513. 69 year old with cough. Hyperinflated lungs with flattened diaphragm and increased anterior clear space.

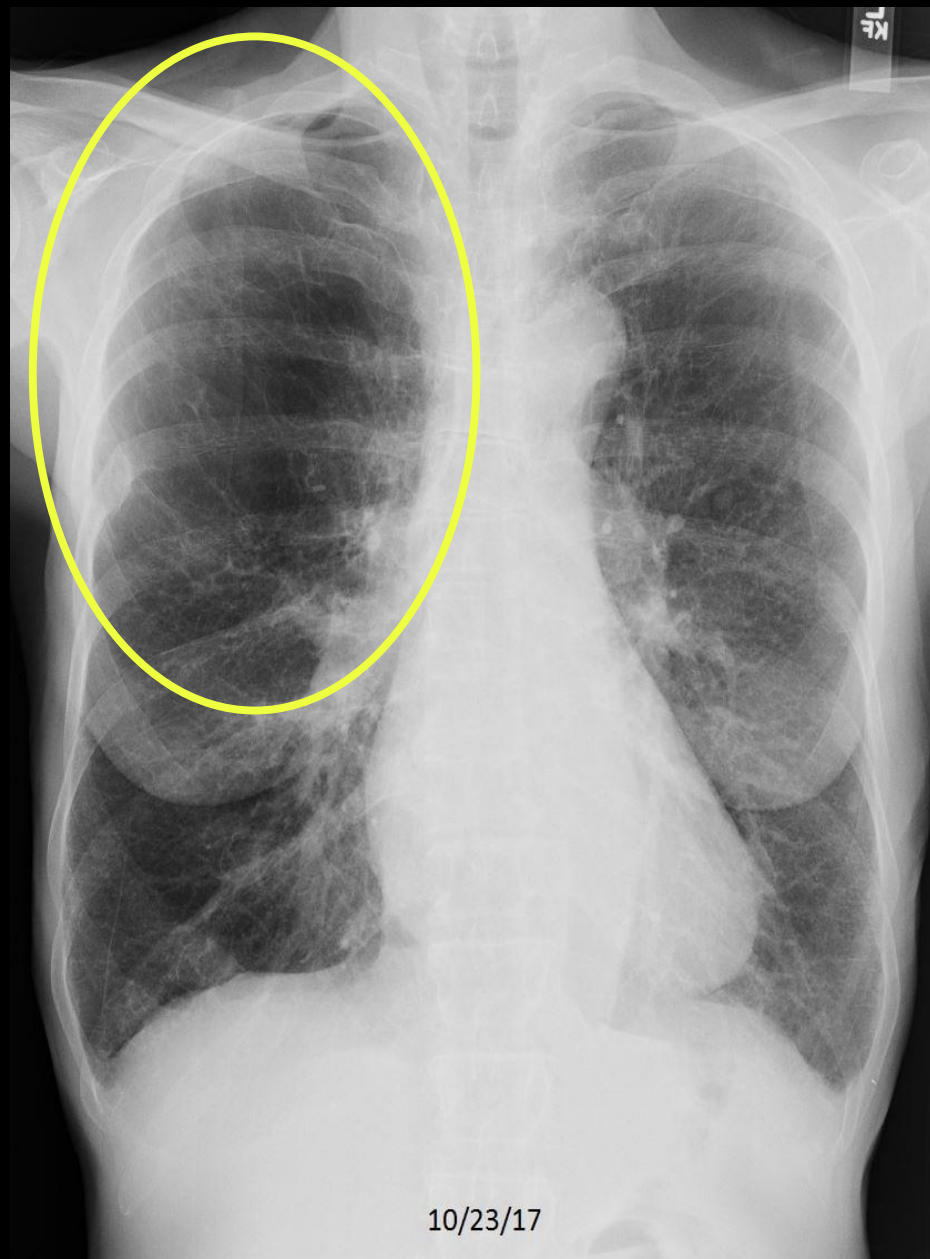


C513. 69 year old with cough. Hyperinflated lungs with flattened diaphragm and increased anterior clear space.



C513. 69 year old with cough. Hyperinflated lungs with flattened diaphragm and **increased anterior clear space**.





C513. 69 year old with cough. Hyperlucency of the lung apices, especially on the right, indicating bullae.



**EMPHYSEMA**

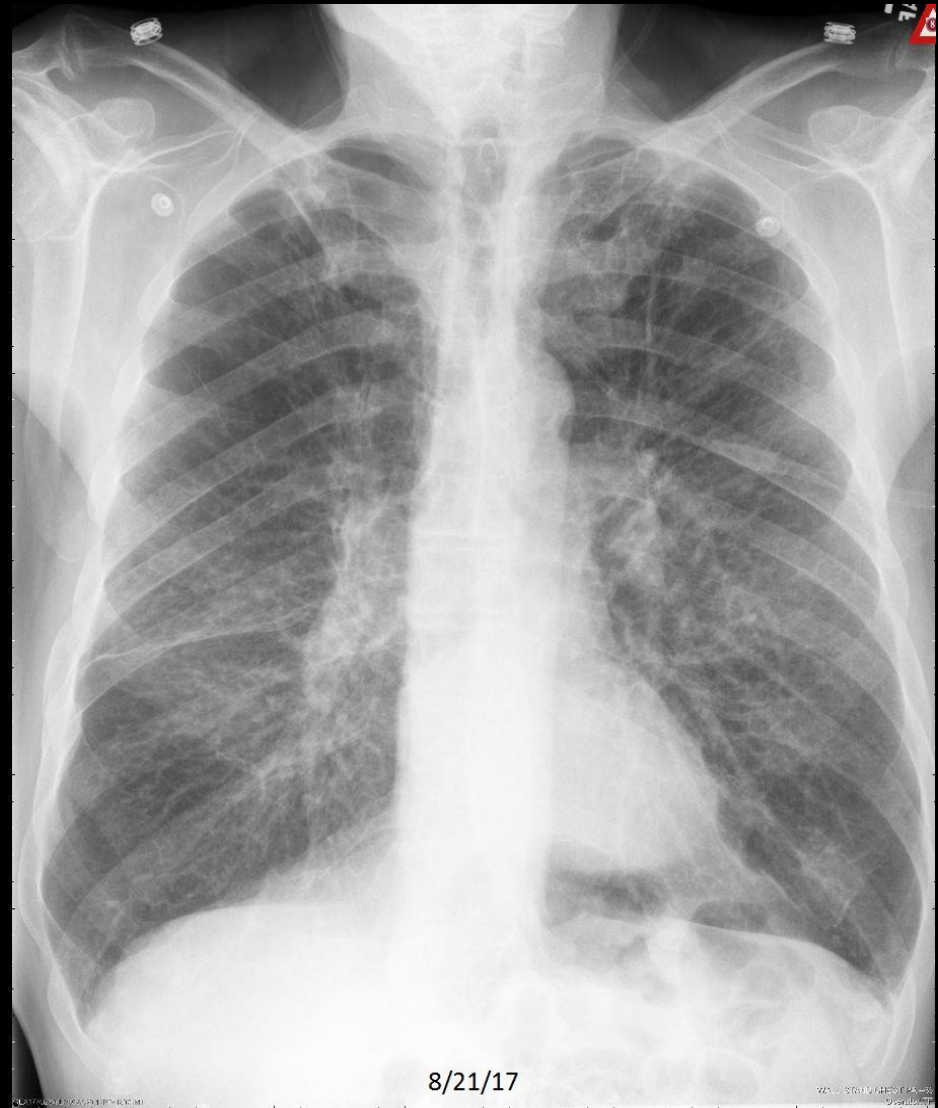
**EXAMPLES**

## Example 1 of 10



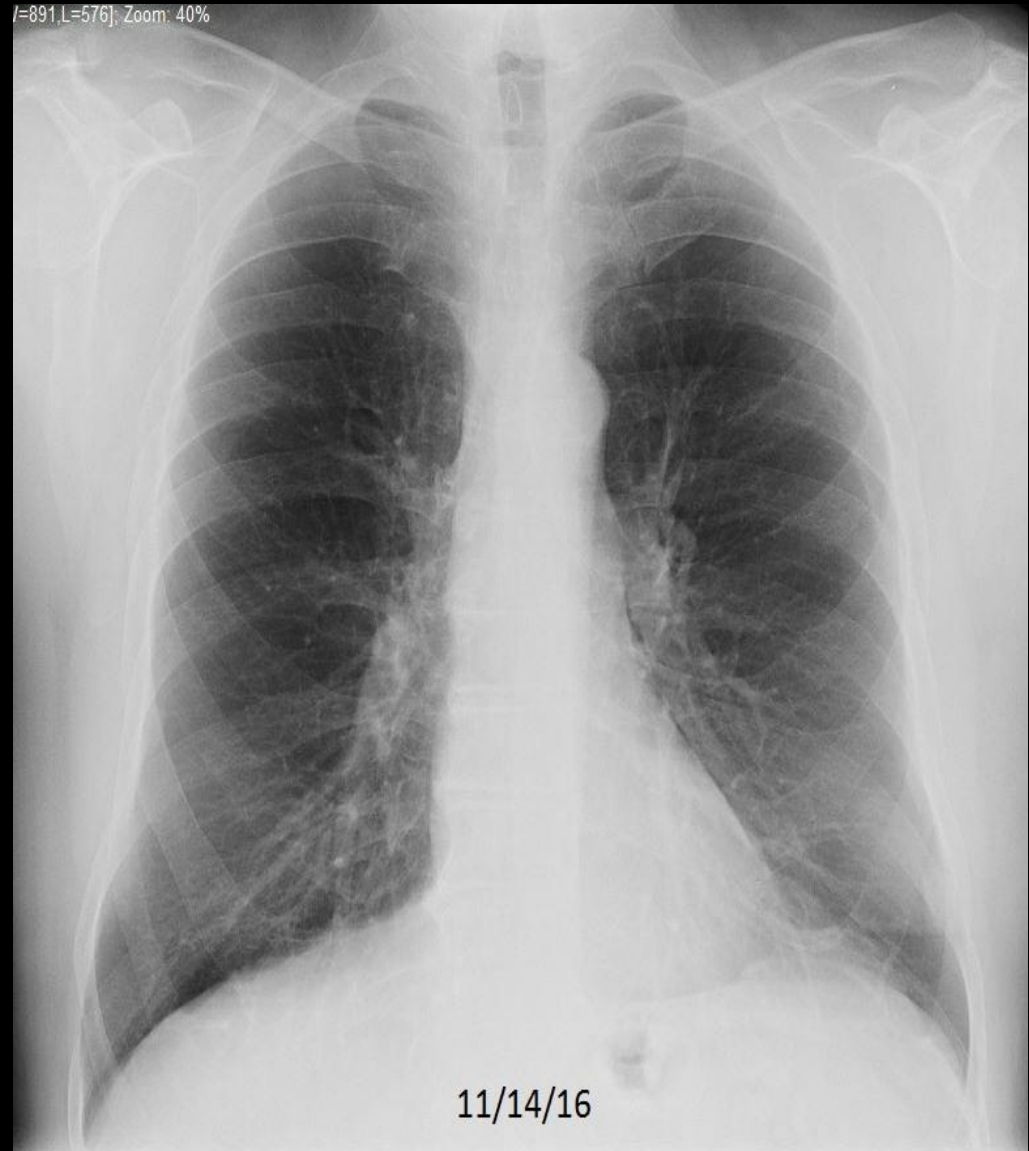
C179. 59 year old woman with chronic shortness of breath. There is emphysema with marked hyperinflation of the lungs, along with scarring of the right lung/minor fissure.

## Example 2 of 10



C253. 63 year old man with dyspnea and a history of smoking. Hyperinflated lungs with flattening of the diaphragm and increased anterior clear space. There is accentuation of small irregular lung markings presumably from chronic cigarette smoking.

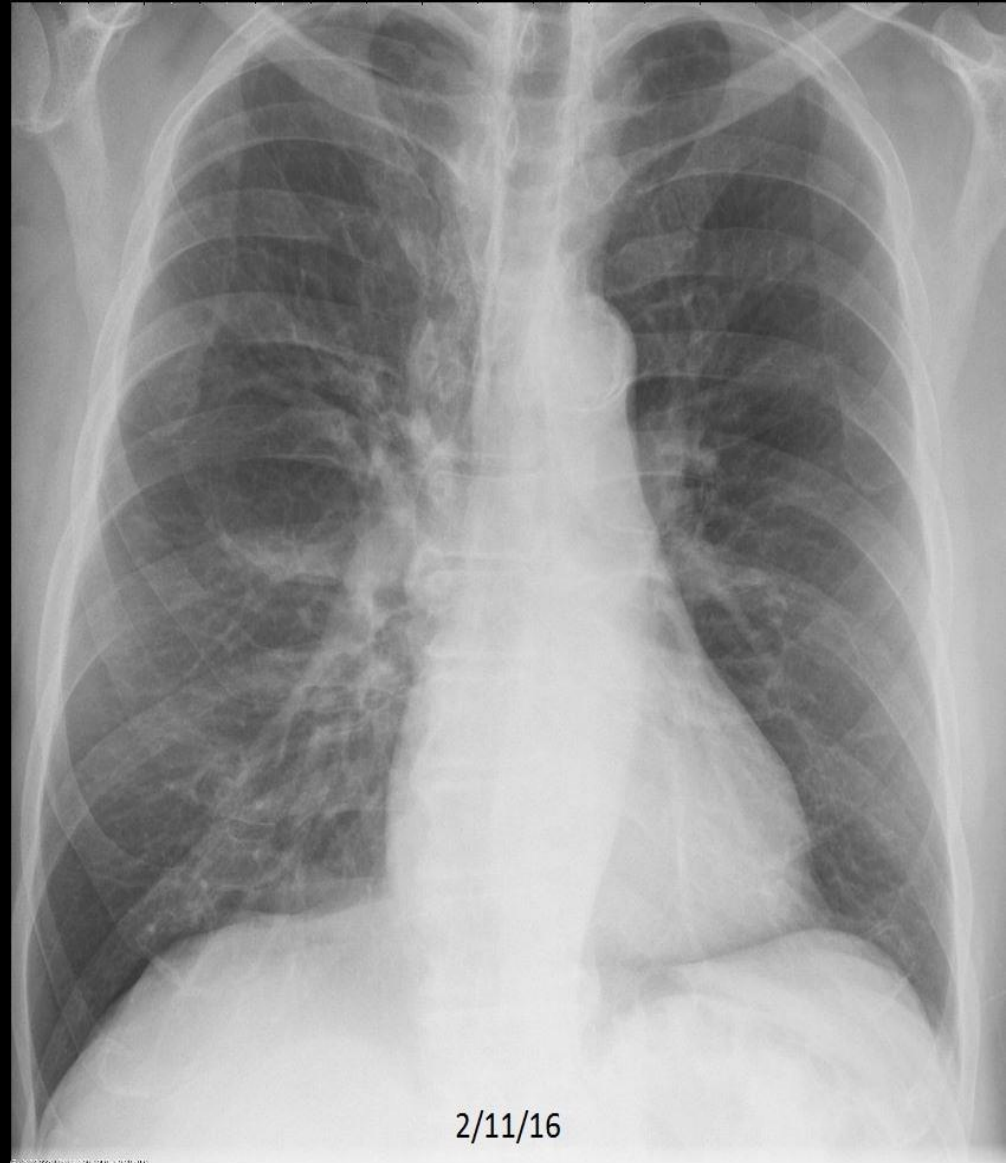
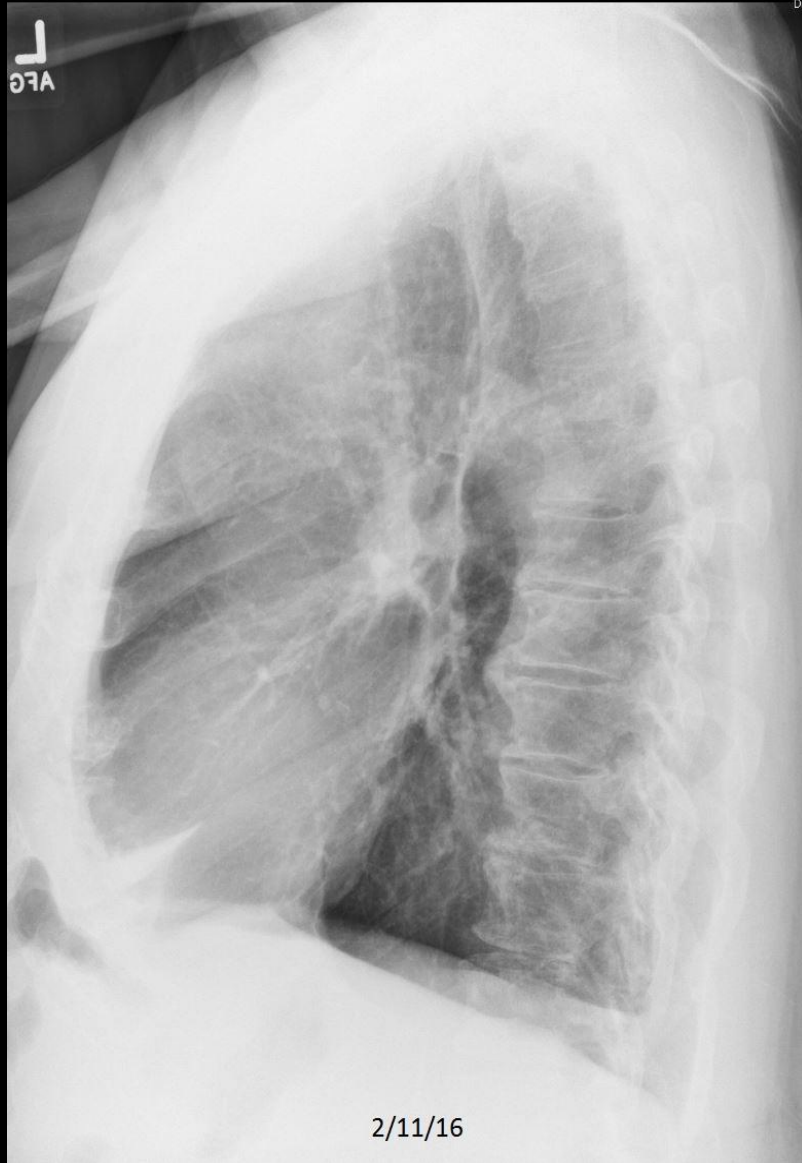
## Example 3 of 10



C273. 70 year old man with dyspnea and a history of smoking. Hyperinflated lungs with flattening of the diaphragm.

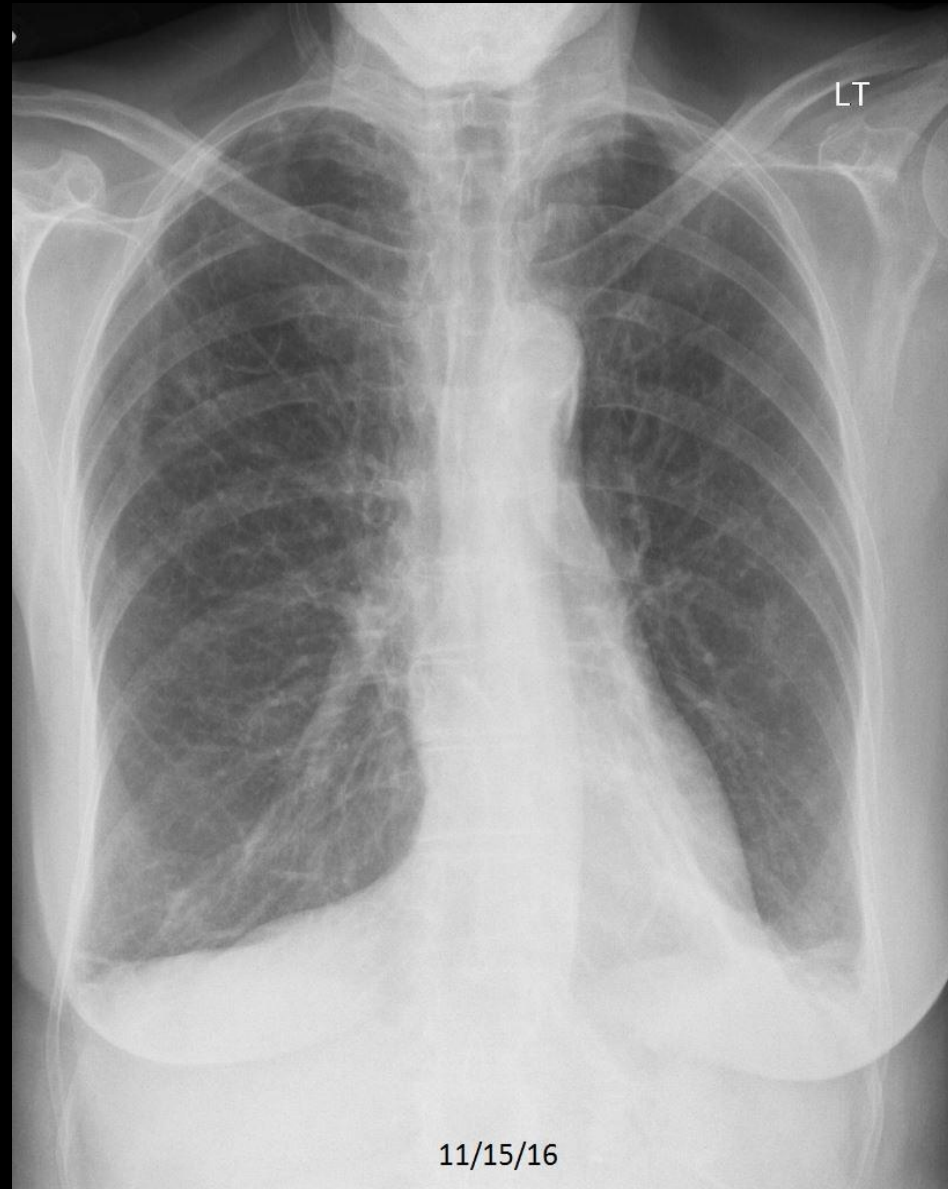


## Example 4 of 10



C276. 79 year old man with dyspnea. Hyperinflated lungs with flattening of the diaphragm.

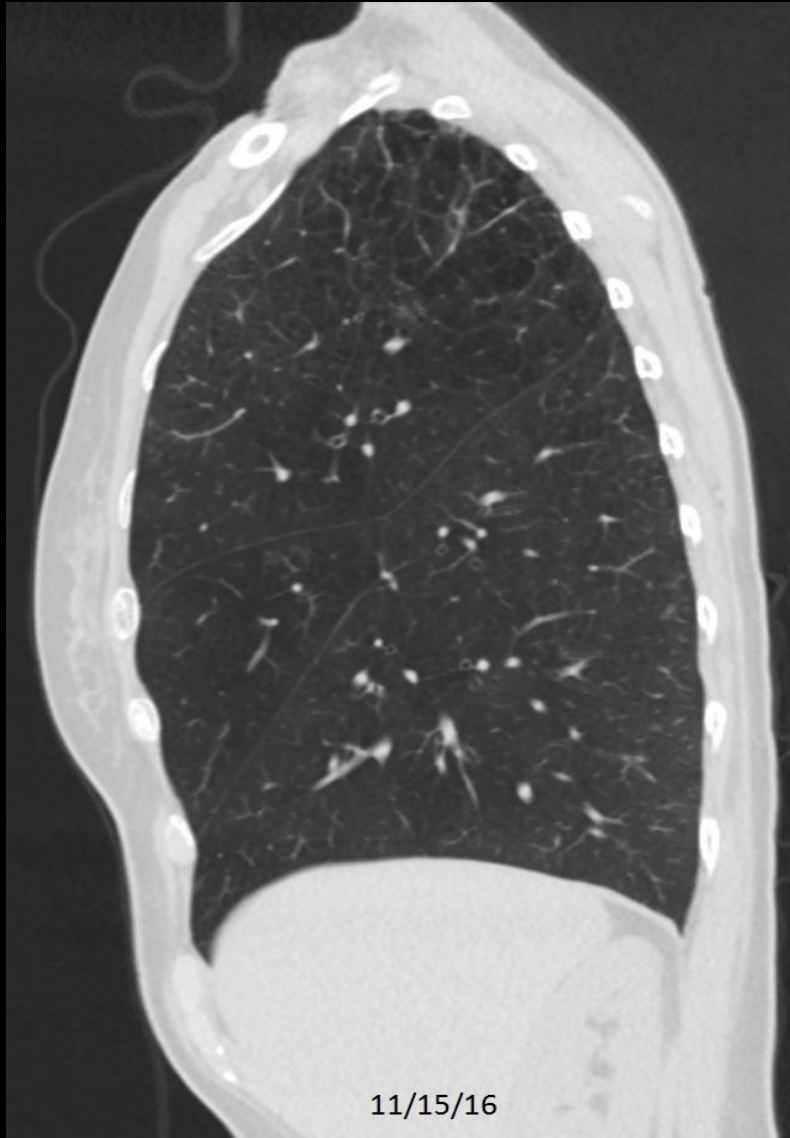
## Example 5 of 10



C290. 66 year old with dyspnea. Hyperinflated lungs.



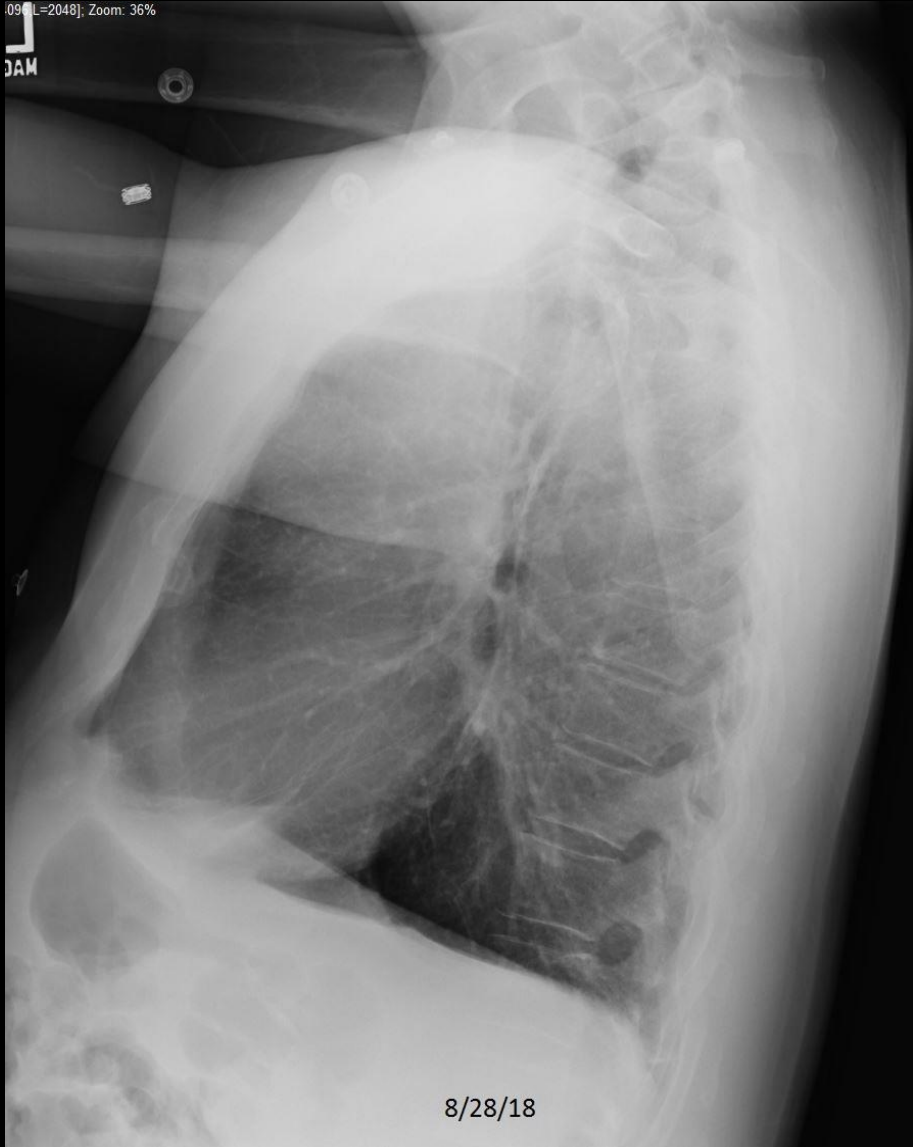
## Example 5 of 10



C290. 66 year old with dyspnea. Biapical bullous emphysema.

## Example 6 of 10

09 [L=2048]. Zoom: 36%



C300. 65 year old man with dyspnea. Hyperinflated lungs with flattening of the diaphragm.

## Example 7 of 10



C306. 55 year old man with dyspnea. Hyperinflated lungs.

## Example 7 of 10



C306. 55 year old man with dyspnea. Hyperinflated lungs and biapical bullae.



## Example 8 of 10



C321. 64 year old with dyspnea and cough. Hyperinflated lungs. Right apical scarring.

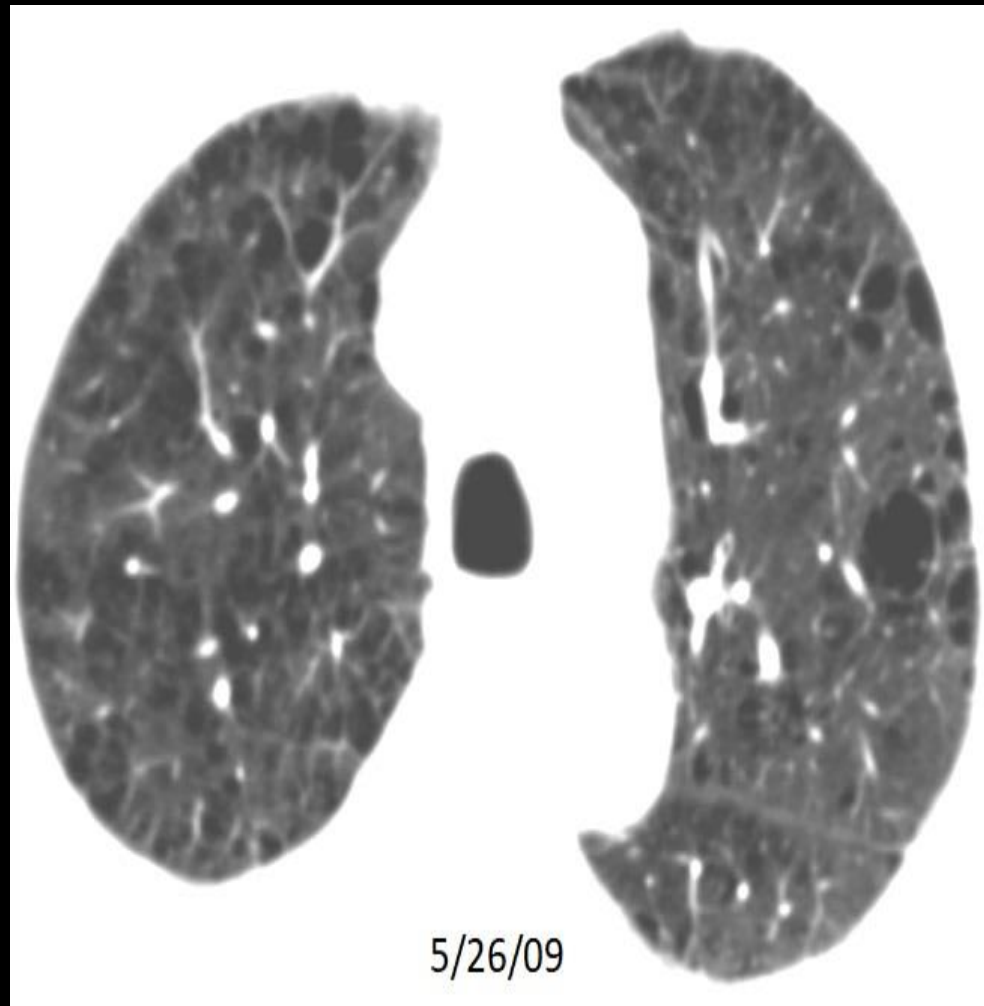
## Example 9 of 10



C333. 79 year old man with chronic dyspnea. There is flattening of the diaphragm best appreciated on the lateral study.



## Example 9 of 10



## Example 10 of 10



C377. 61 year old man with chest pain following a motor vehicle accident. Hyperinflated lungs with flattening of the diaphragm and increased retrosternal clear space.

# **QUIZ**

## **NORMAL VERSUS EMPHYSEMA**

**Select which CXR shows Emphysema  
(a or b)**

**for the following 10 pairs of cases  
(two slides will be shown so that both the frontal  
and lateral exam can be displayed for each case)**

## Quiz Case 1 of 10 - A



C363. 65 year old man with chest pain. Hyperinflated lungs with flattening of the diaphragm.

## Quiz Case 1 of 10 - B



C108. 63 year old woman with chest pain.



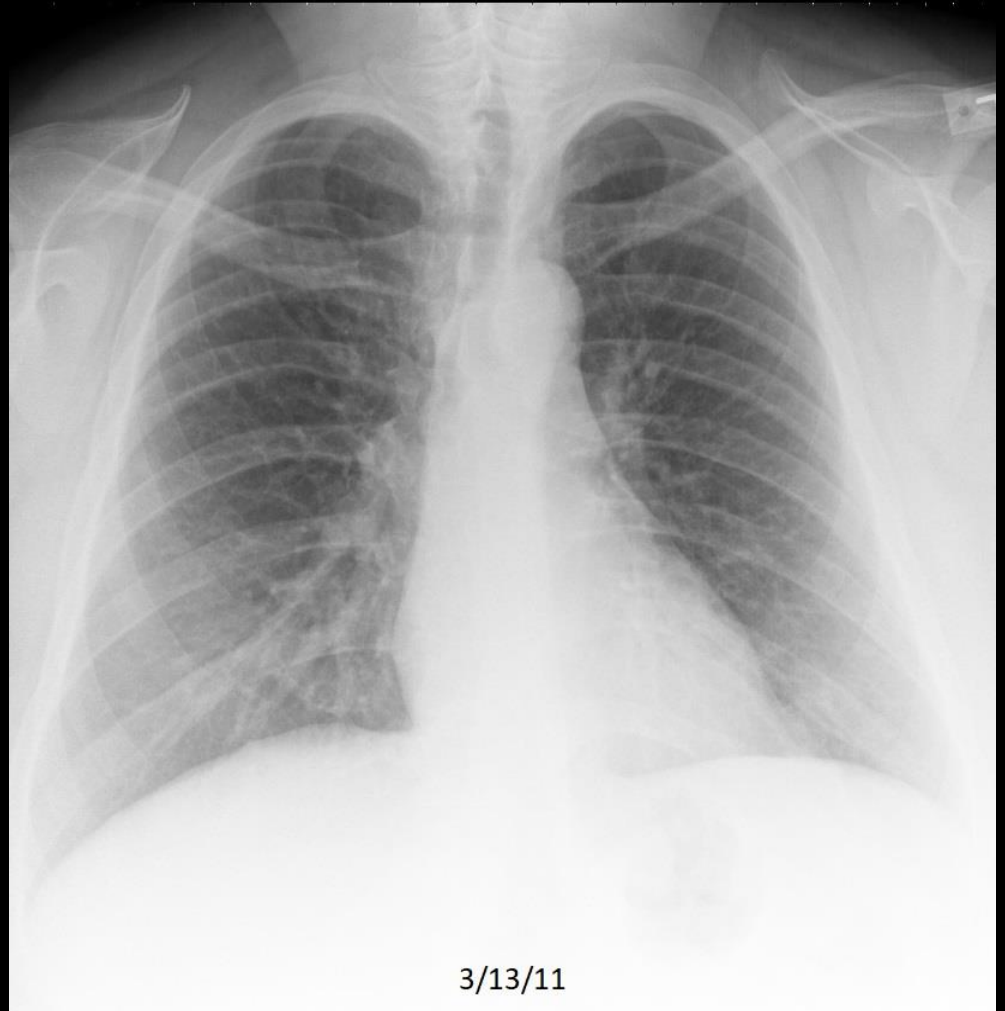
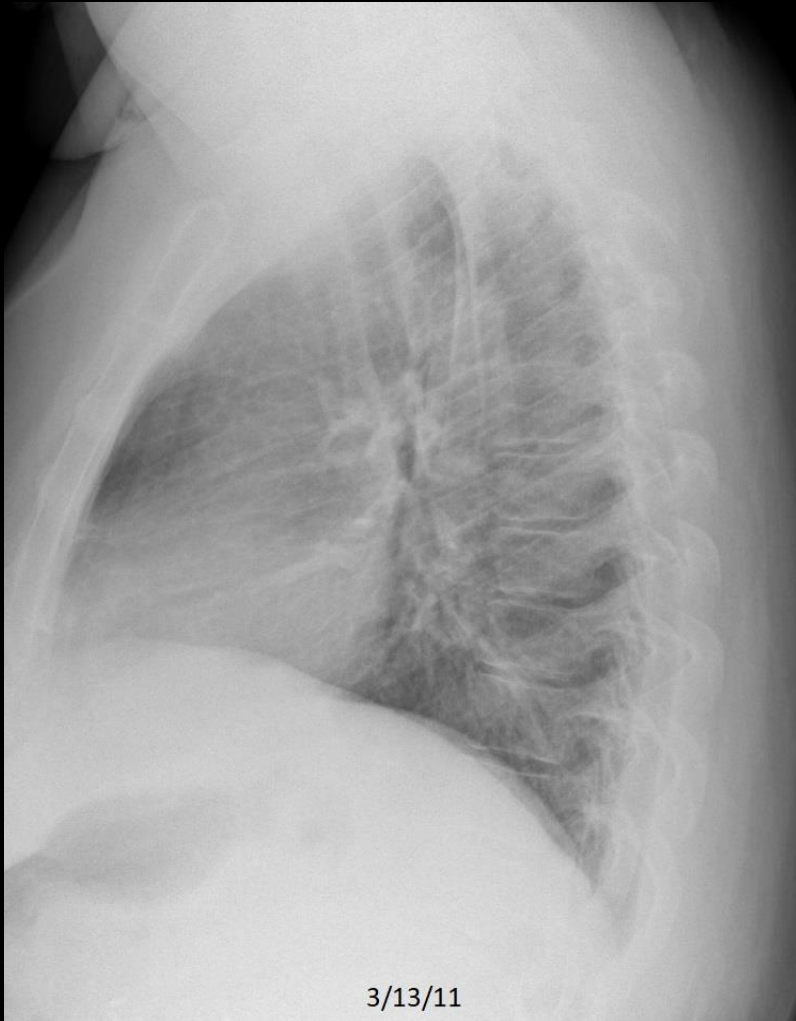
## Quiz Case 1 of 10 – A shows emphysema



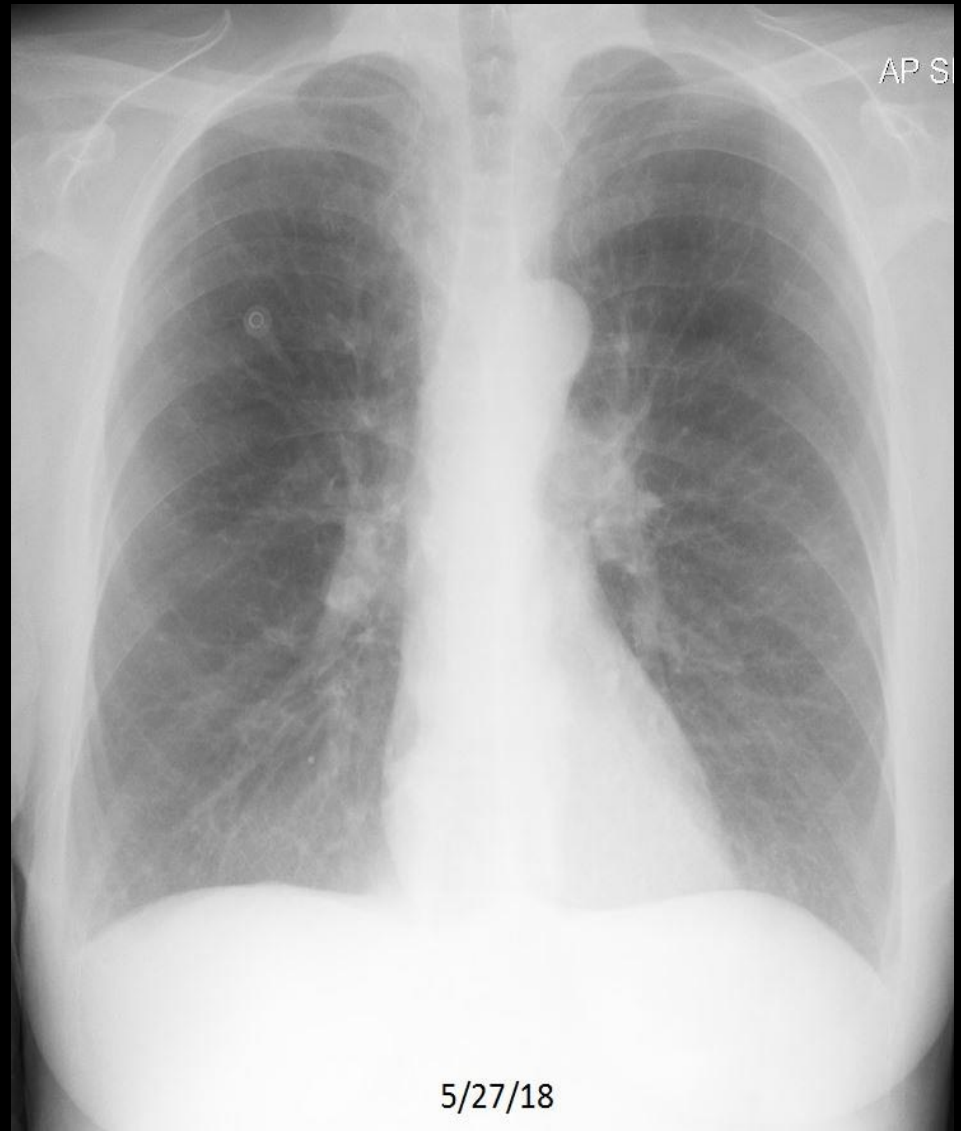
C363. 65 year old man with chest pain. Hyperinflated lungs with flattening of the diaphragm.



## Quiz Case 2 of 10 - A

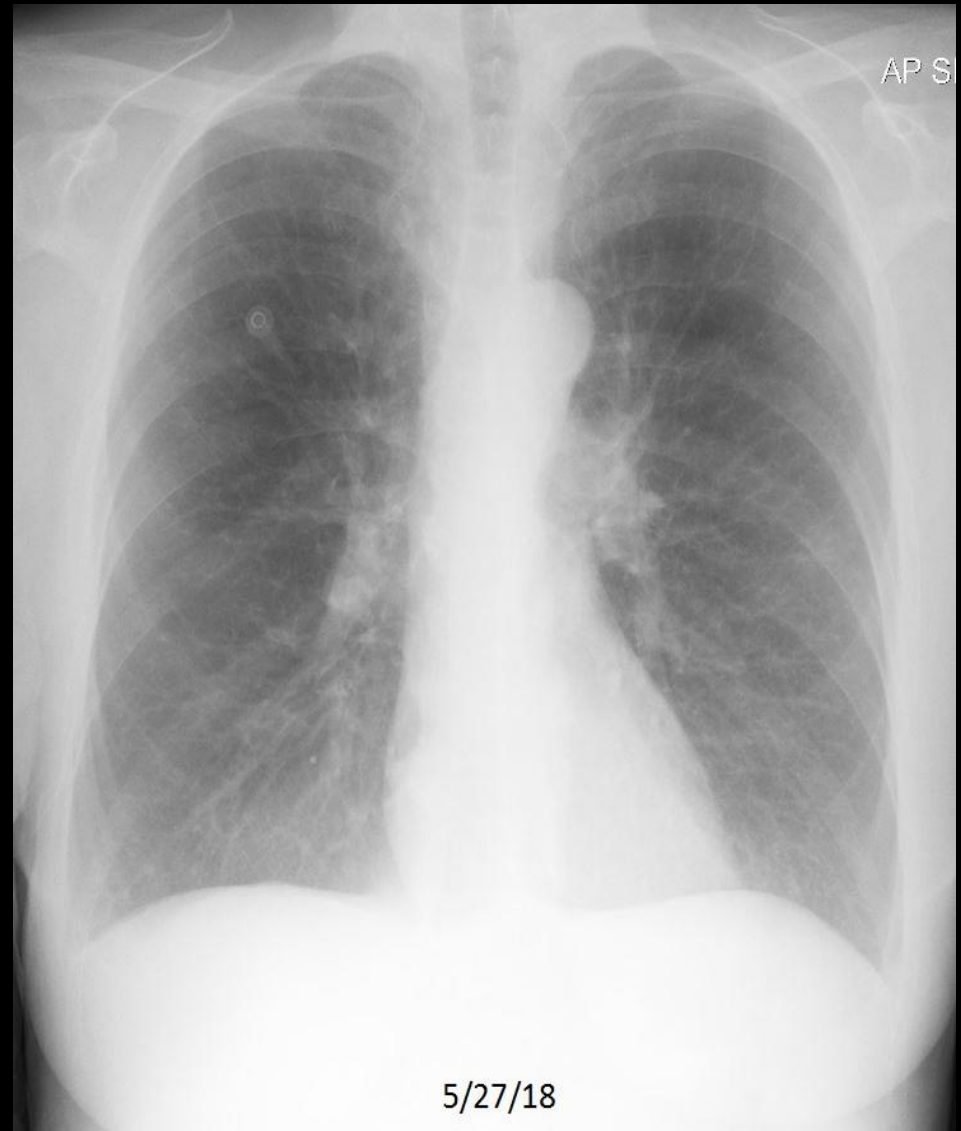


## Quiz Case 2 of 10 - B



C388. 64 year old woman with dyspnea.

## Quiz Case 2 of 10 – B shows emphysema



C388. 64 year old woman with dyspnea. Hyperinflated lungs with flattening of the diaphragm and increased retrosternal clear space. Pruned peripheral pulmonary vessels.

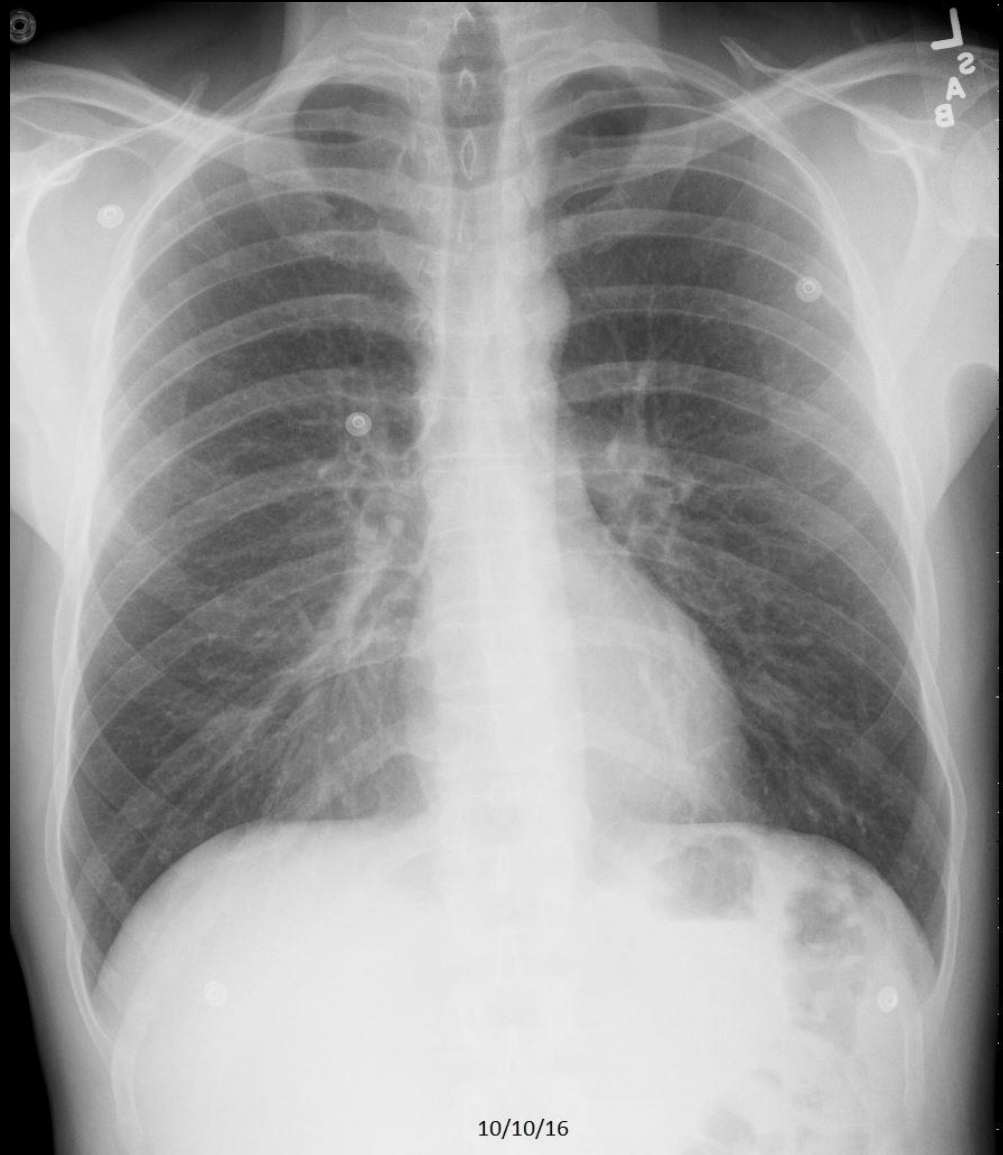
## Quiz Case 3 of 10 - A



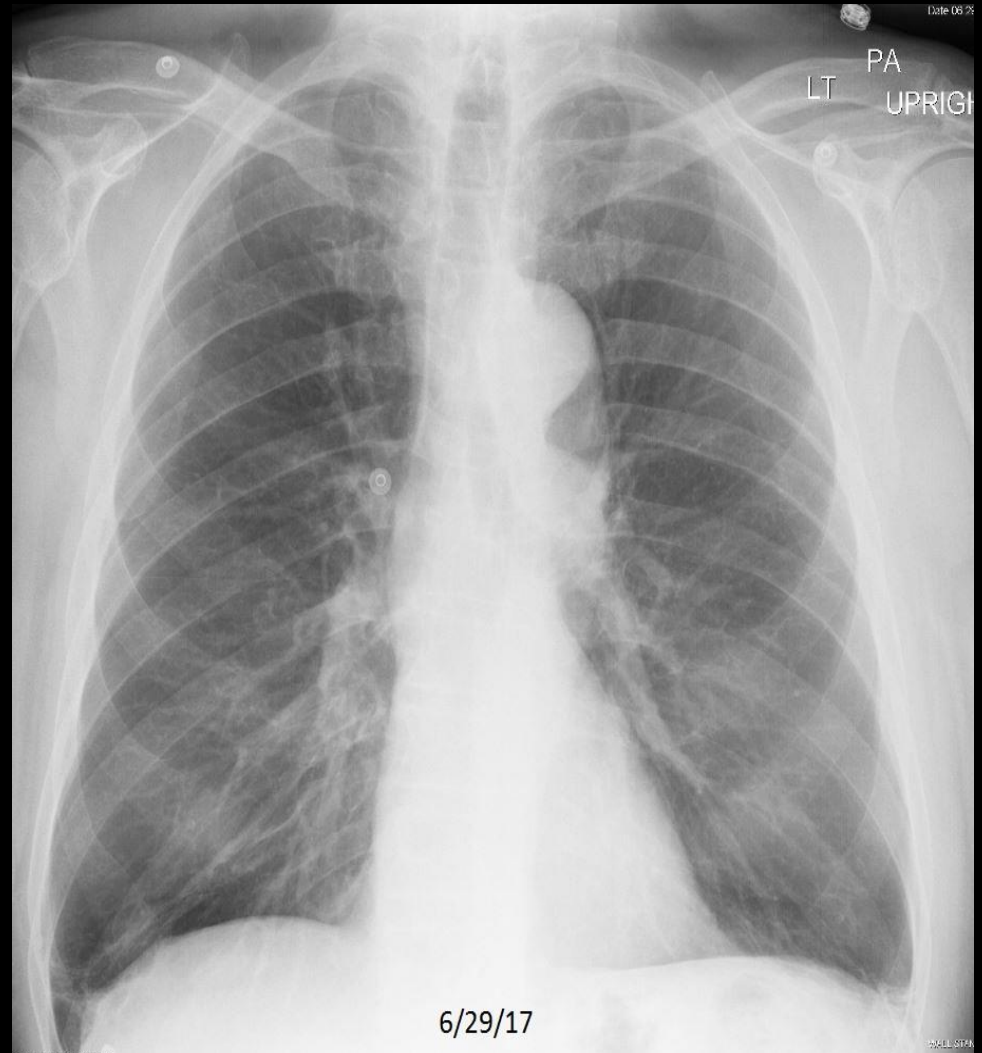
C394. 90 year old with dyspnea.



## Quiz Case 3 of 10 - B



## Quiz Case 3 of 10 – A shows emphysema



C394. 90 year old with dyspnea. **Hyperinflated lungs with flattening of the diaphragm.**



## Quiz Case 4 of 10 - A

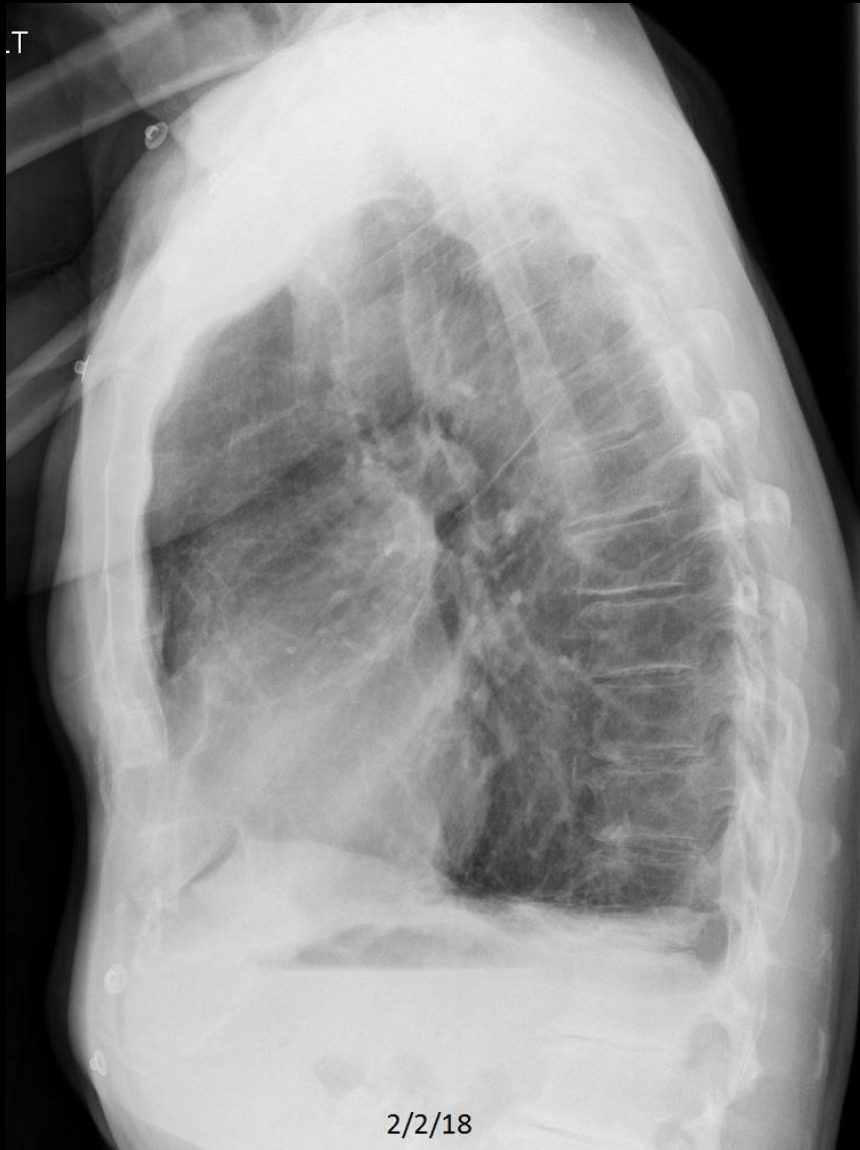


C398. 81 year old man with dyspnea.

## Quiz Case 4 of 10 - B



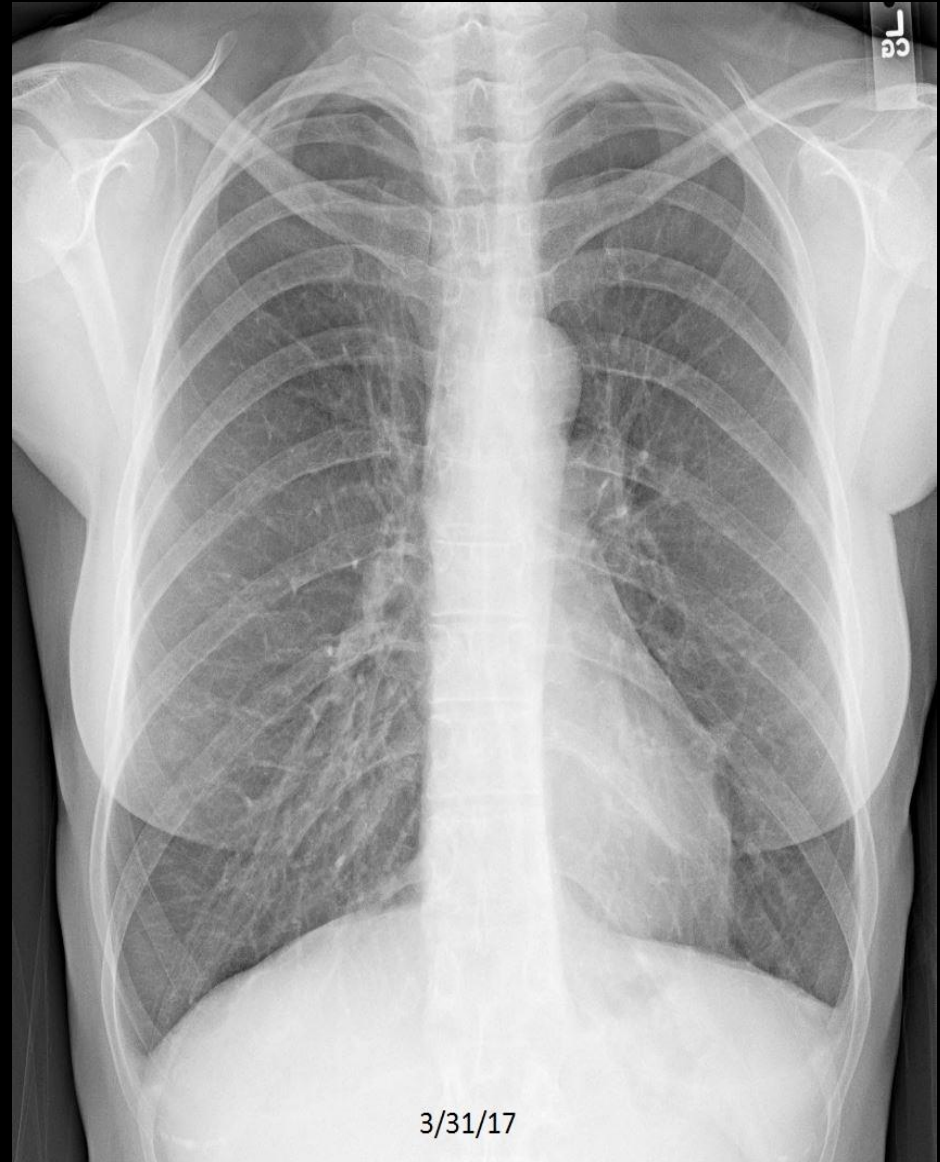
## Quiz Case 4 of 10 – A shows emphysema



C398. 81 year old man with dyspnea. Hyperinflated lungs with flattening of the diaphragm.



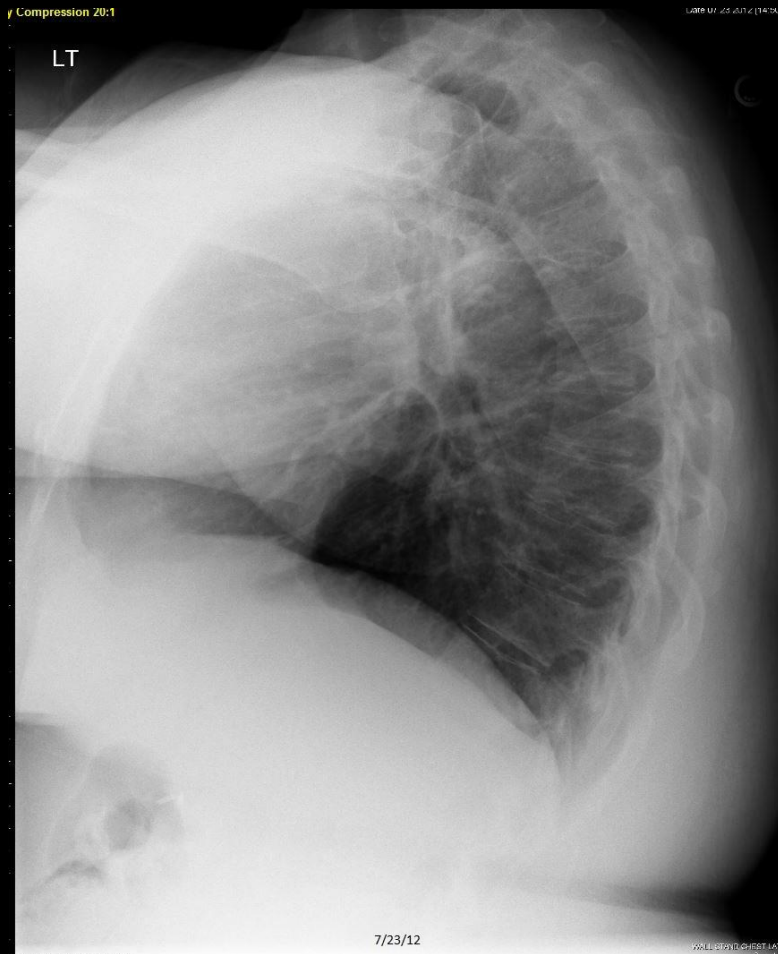
## Quiz Case 5 of 10 - A



C409. 59 year old woman with dyspnea.

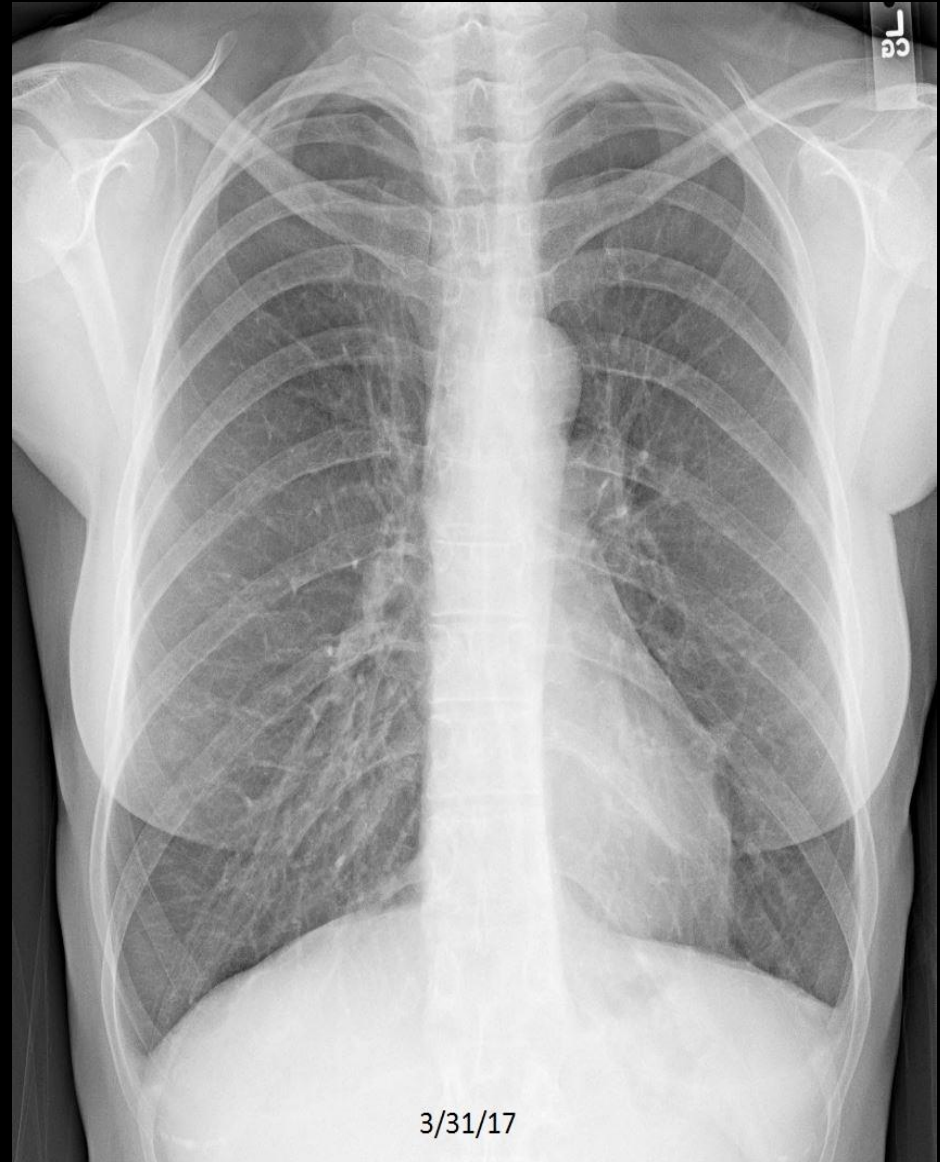


# Quiz Case 5 of 10 - B



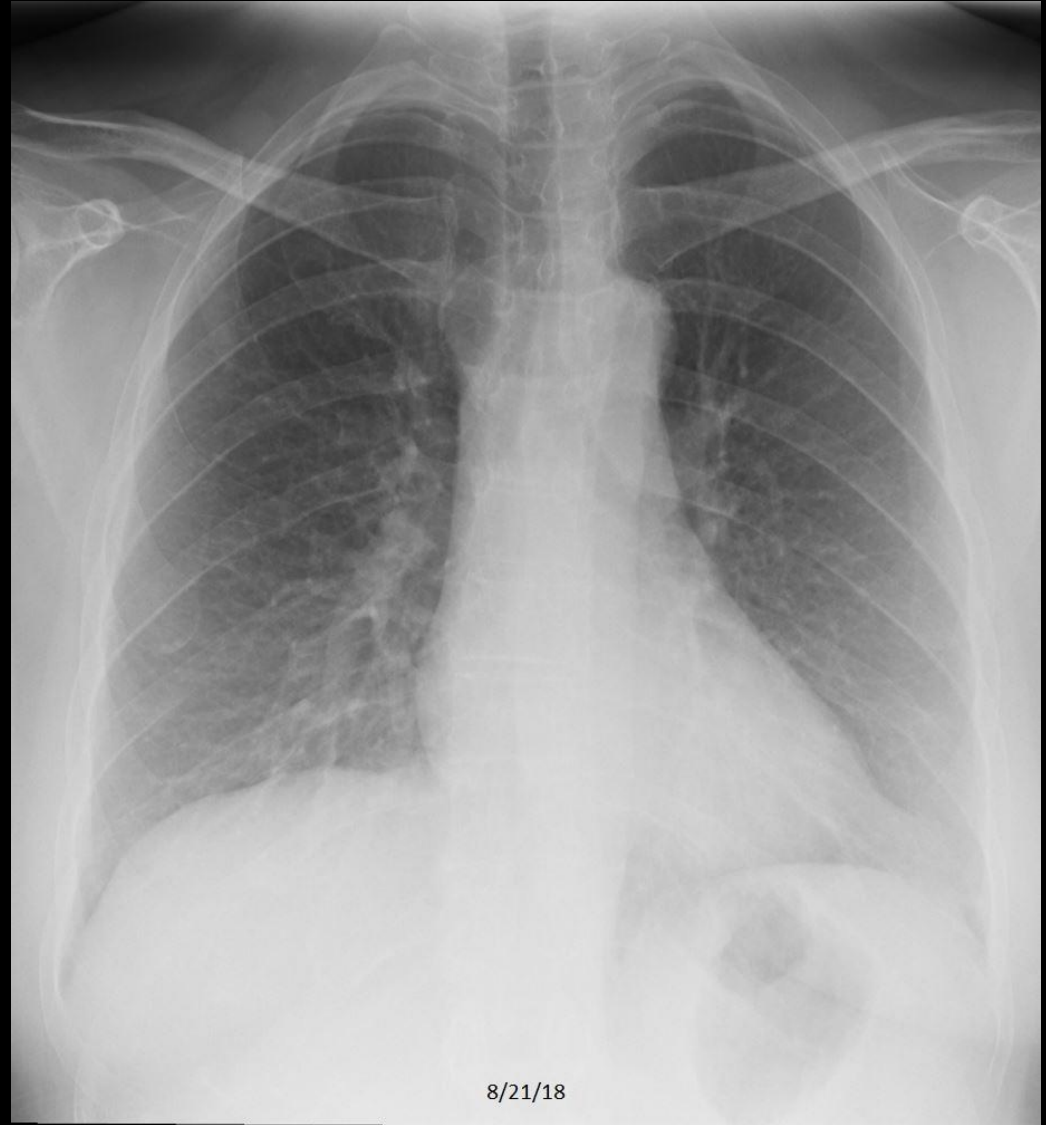
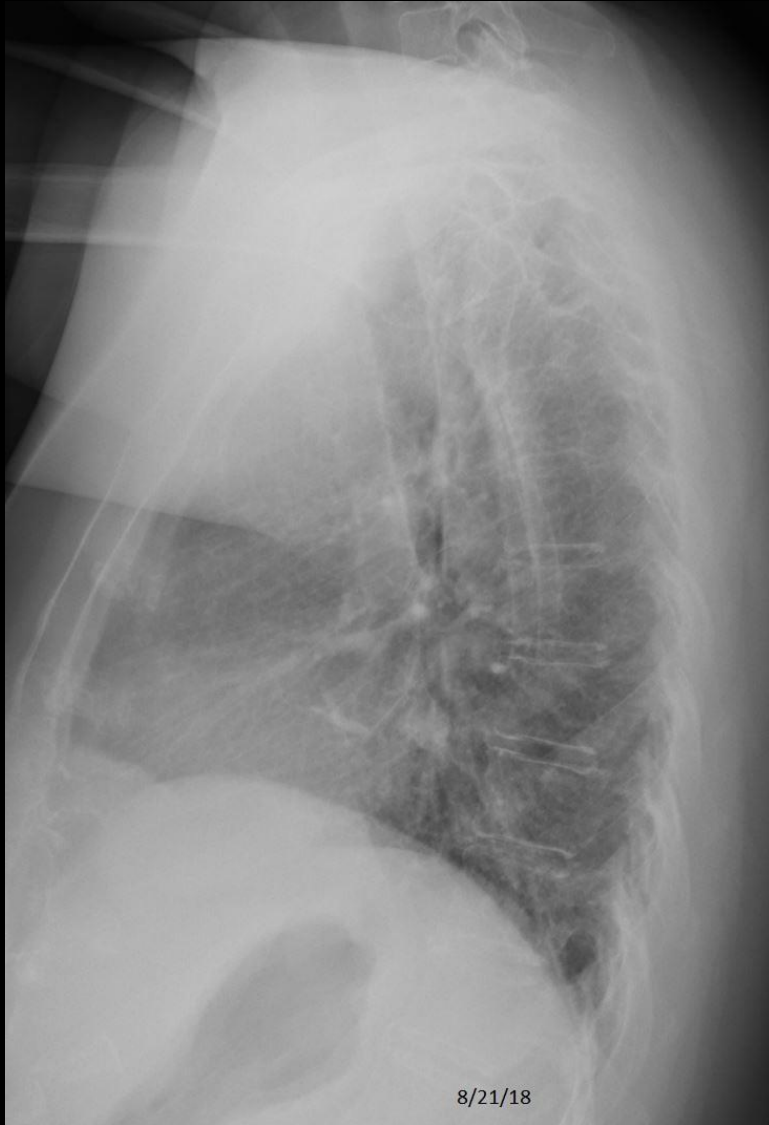
C130. 43 year old woman with chest pain.

## Quiz Case 5 of 10 – A shows emphysema



C409. 59 year old woman with dyspnea. Hyperinflated lungs with flattening of the diaphragm.

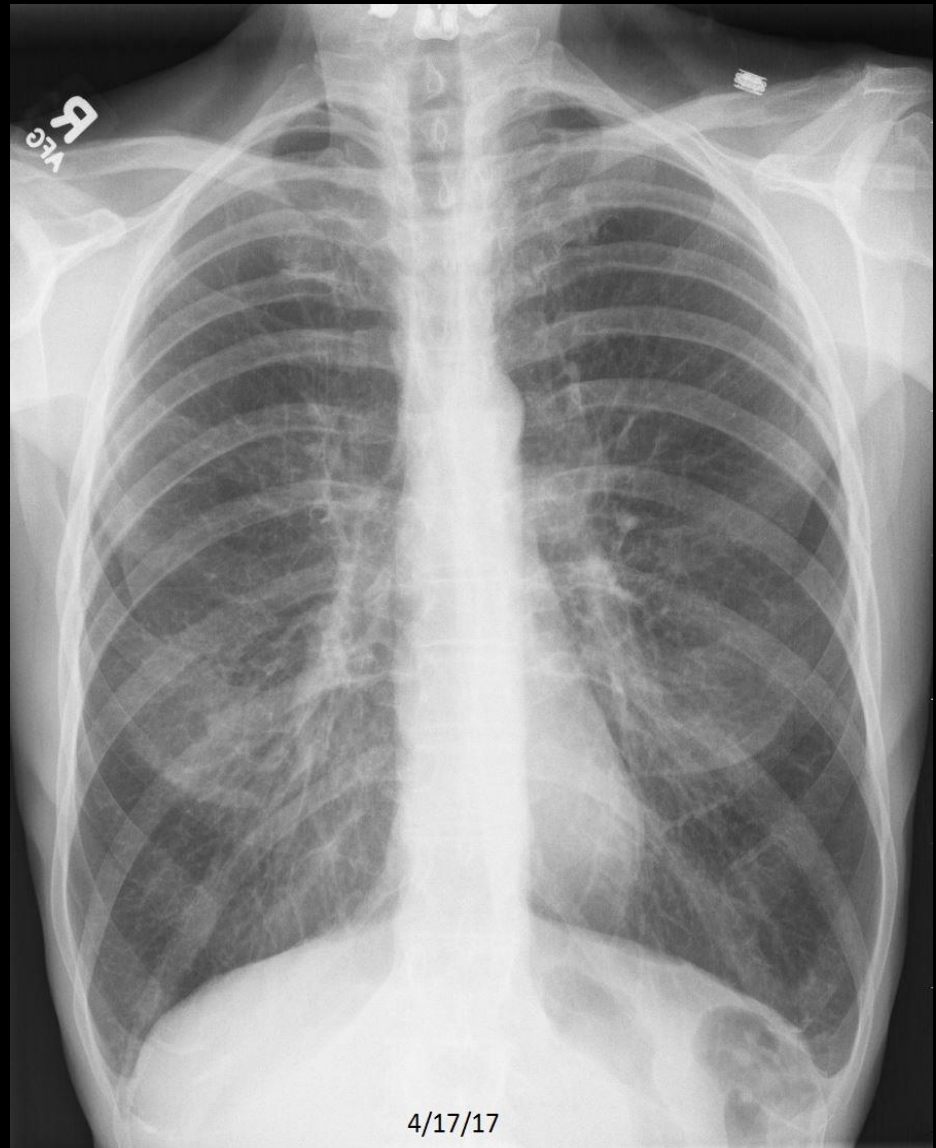
## Quiz Case 6 of 10 - A



C210. 50 year old woman with chest pain following injury.



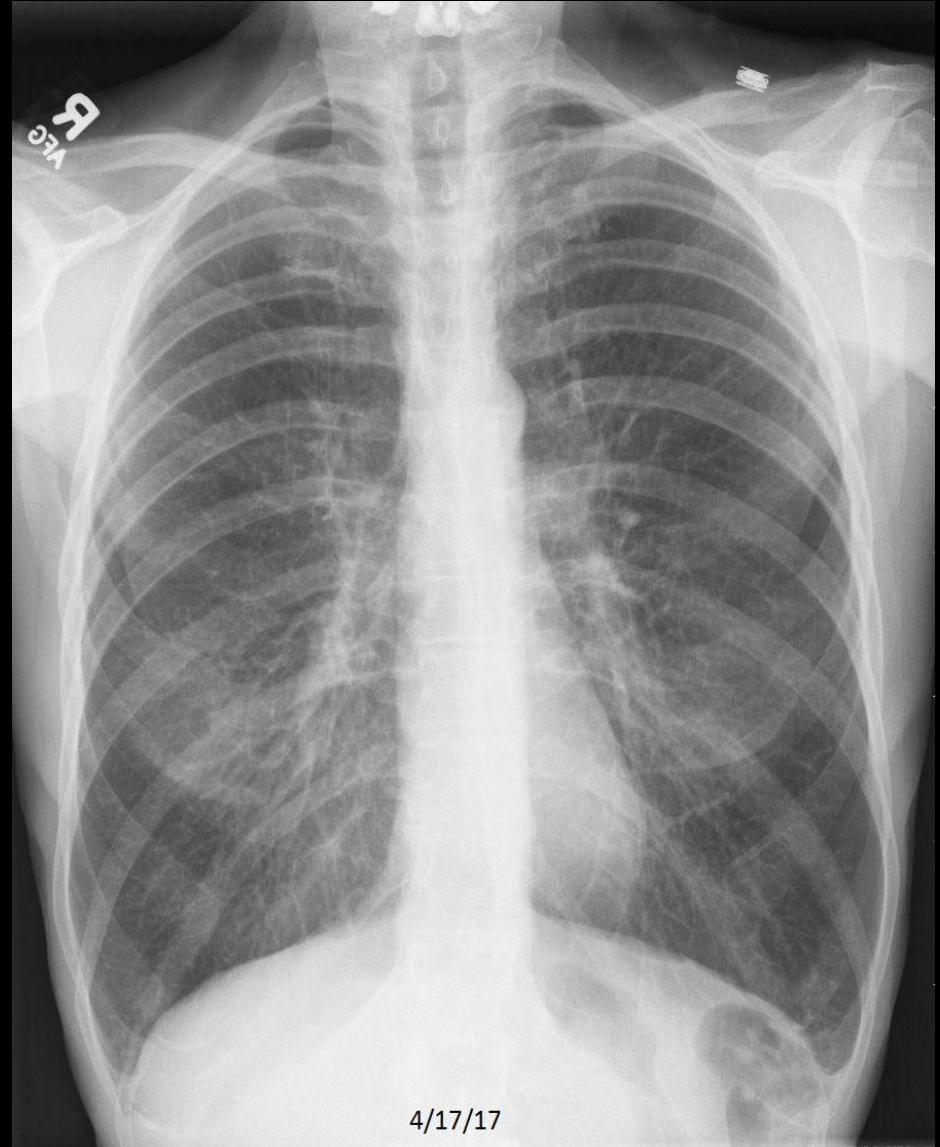
## Quiz Case 6 of 10 - B



C413. 65 year old woman with dyspnea.

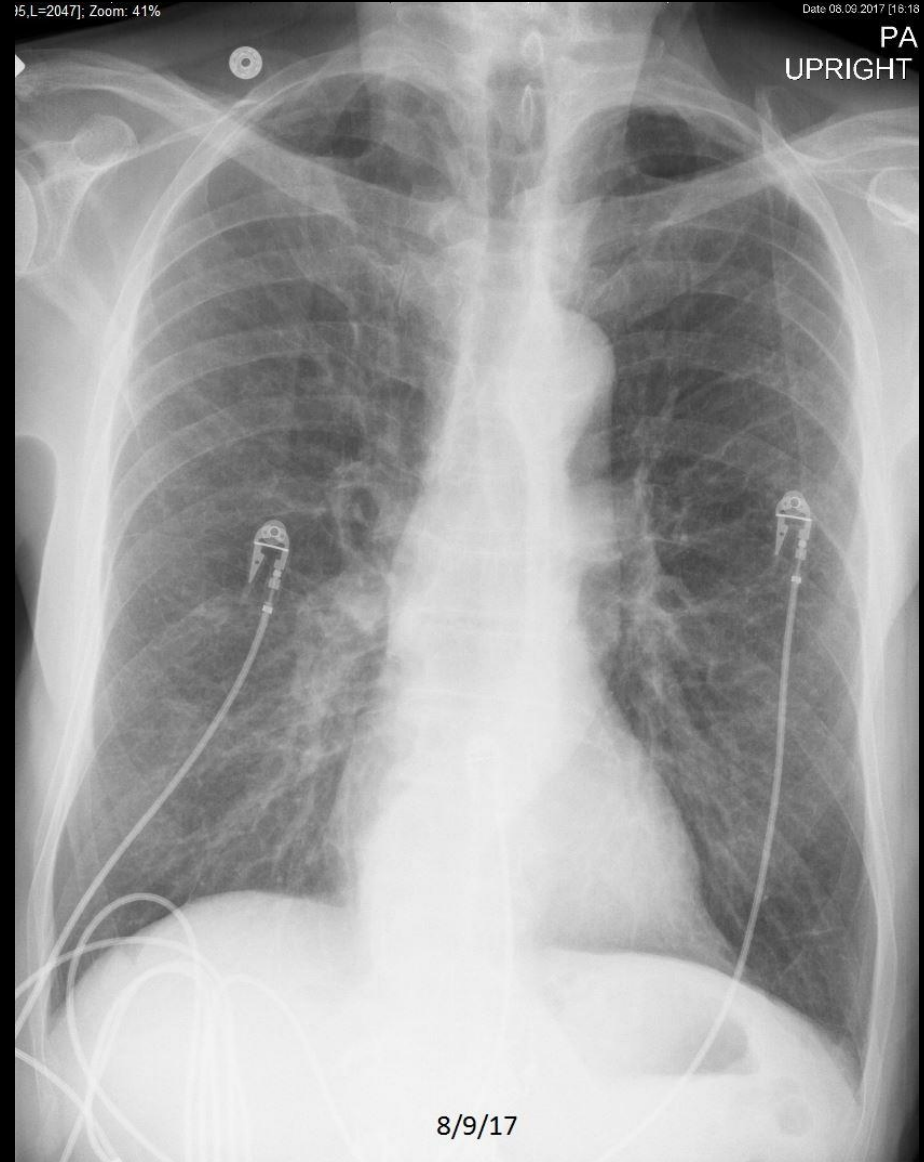


## Quiz Case 6 of 10 – B shows emphysema



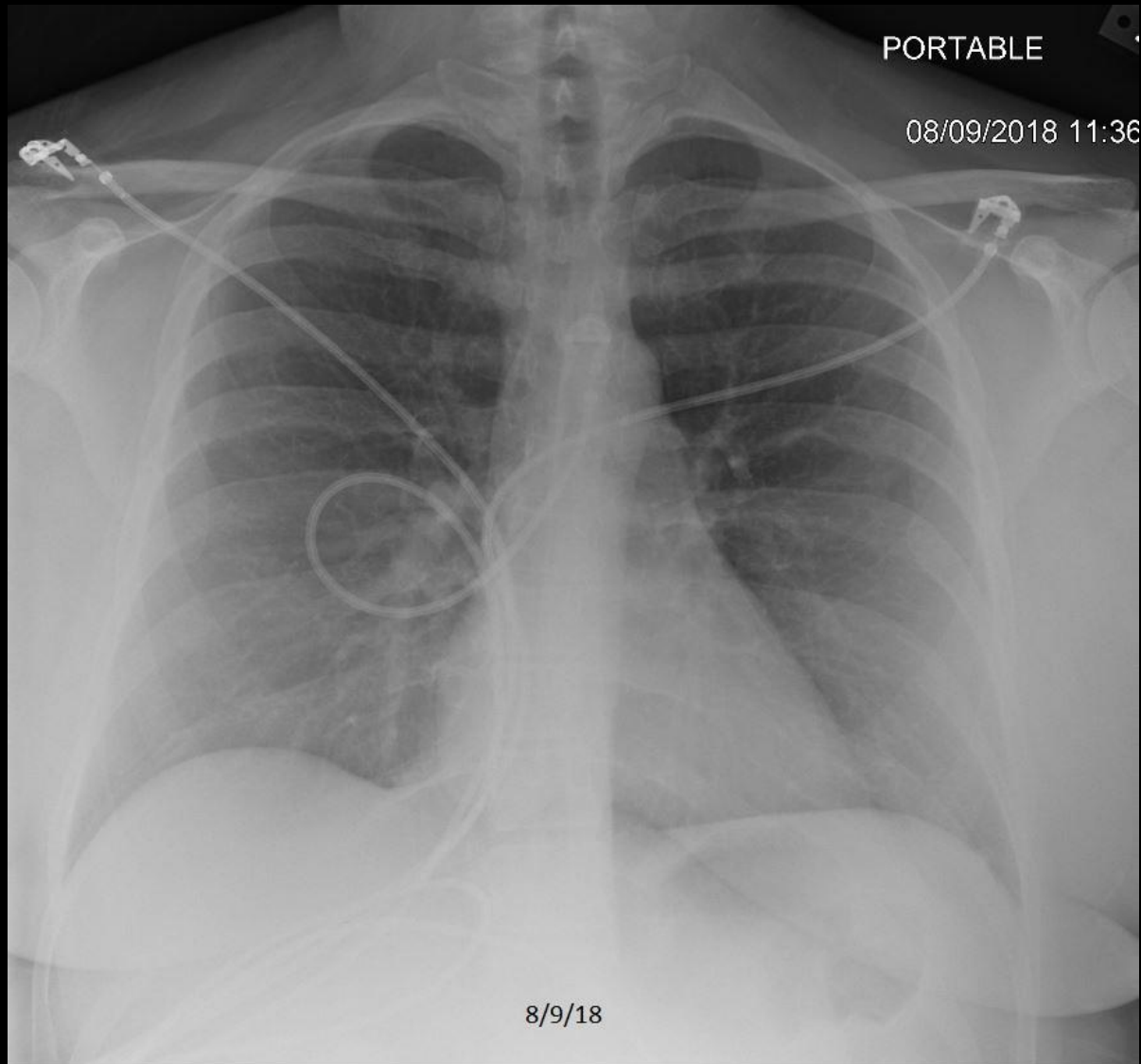
C413. 65 year old woman with dyspnea. Hyperinflated lungs with flattening of the diaphragm and increased anterior clear space.

## Quiz Case 7 of 10 - A



C414. 74 year old man with dyspnea.

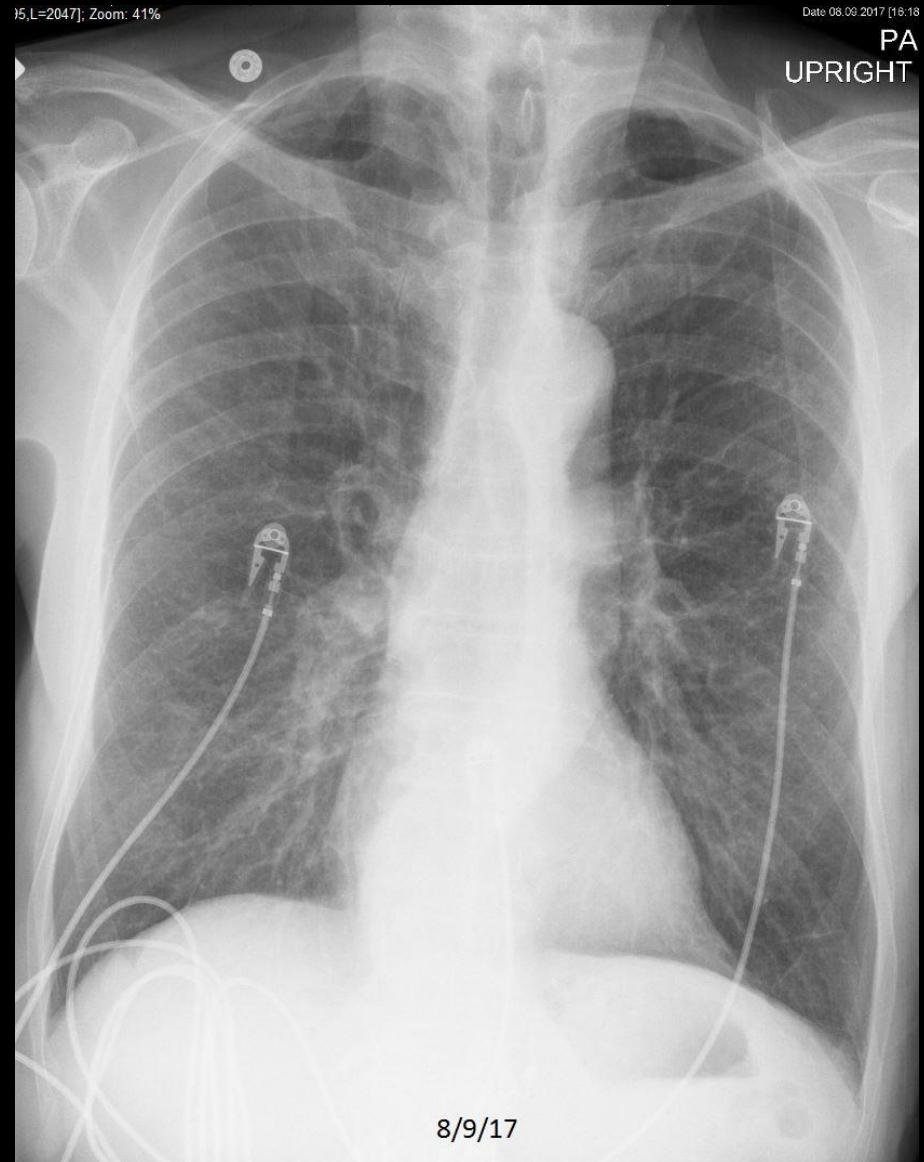
## Quiz Case 7 of 10 - B



C131. 43 year old woman with chest pain.



## Quiz Case 7 of 10 – A shows emphysema.



C414. 74 year old man with dyspnea. Hyperinflated lungs with flattening of the diaphragm and increased anterior clear space.

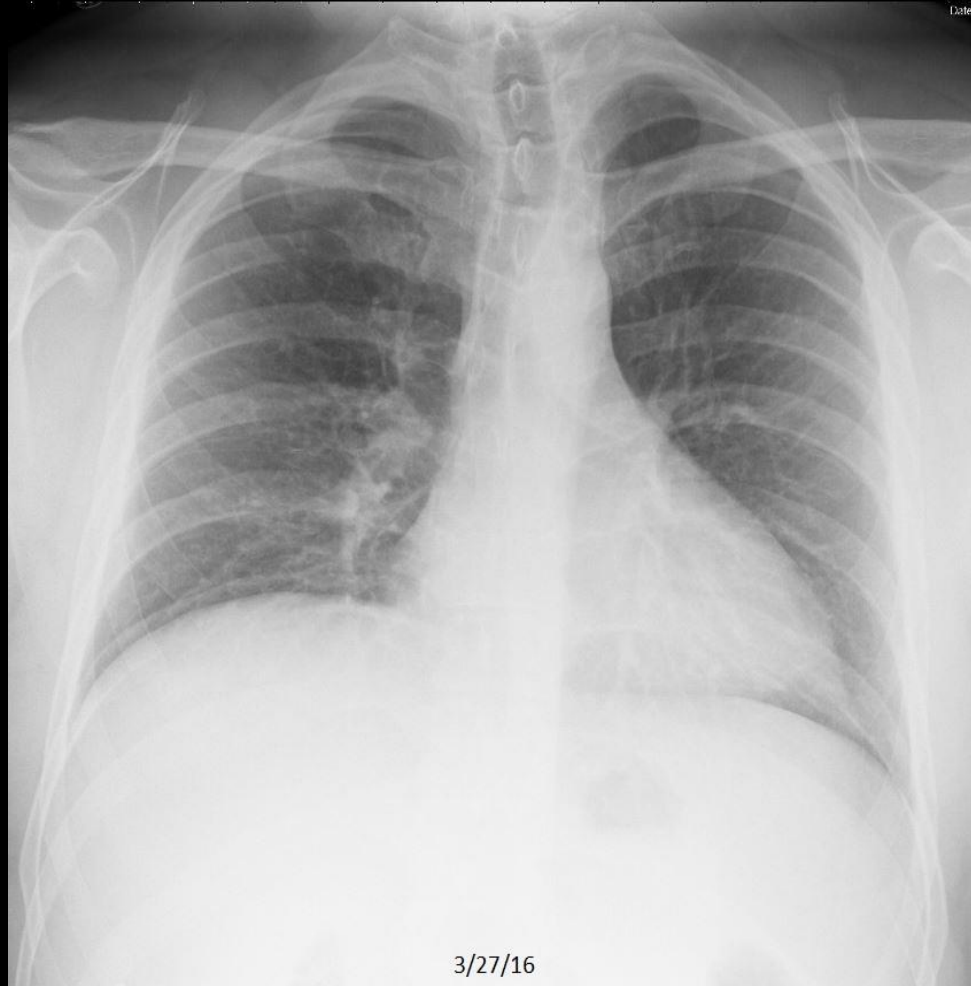
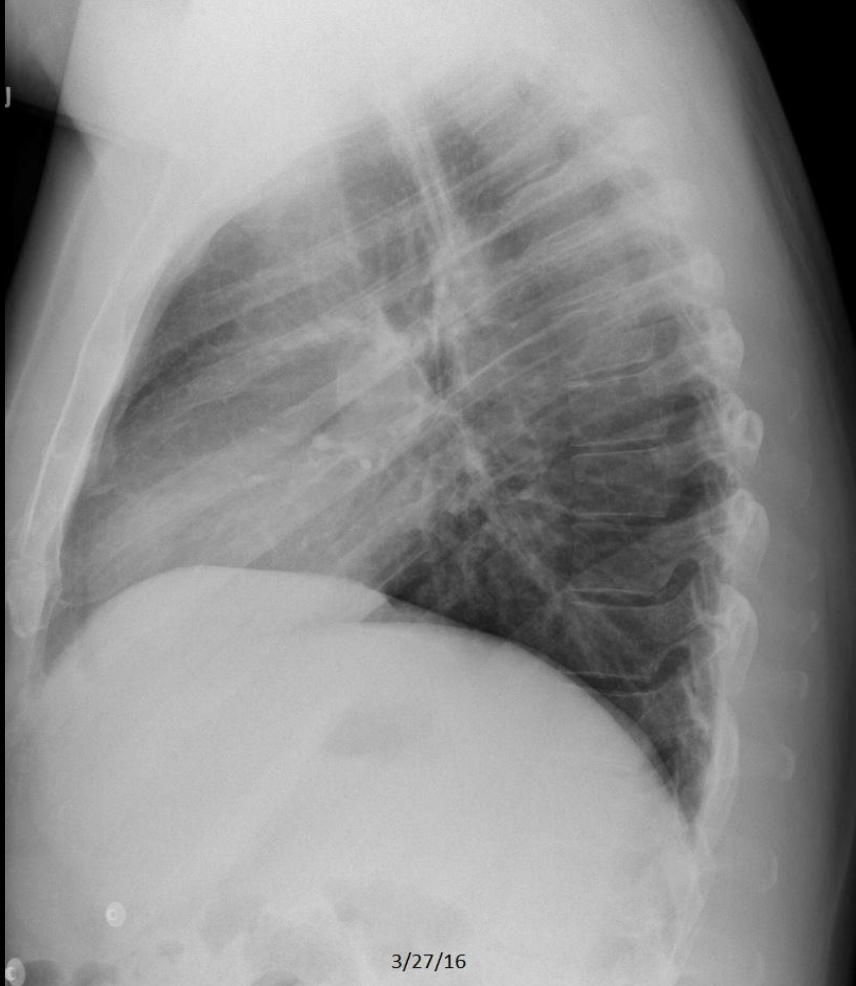


## Quiz Case 8 of 10 – A



C415. 57 year old man with dyspnea.

## Quiz Case 8 of 10 – B



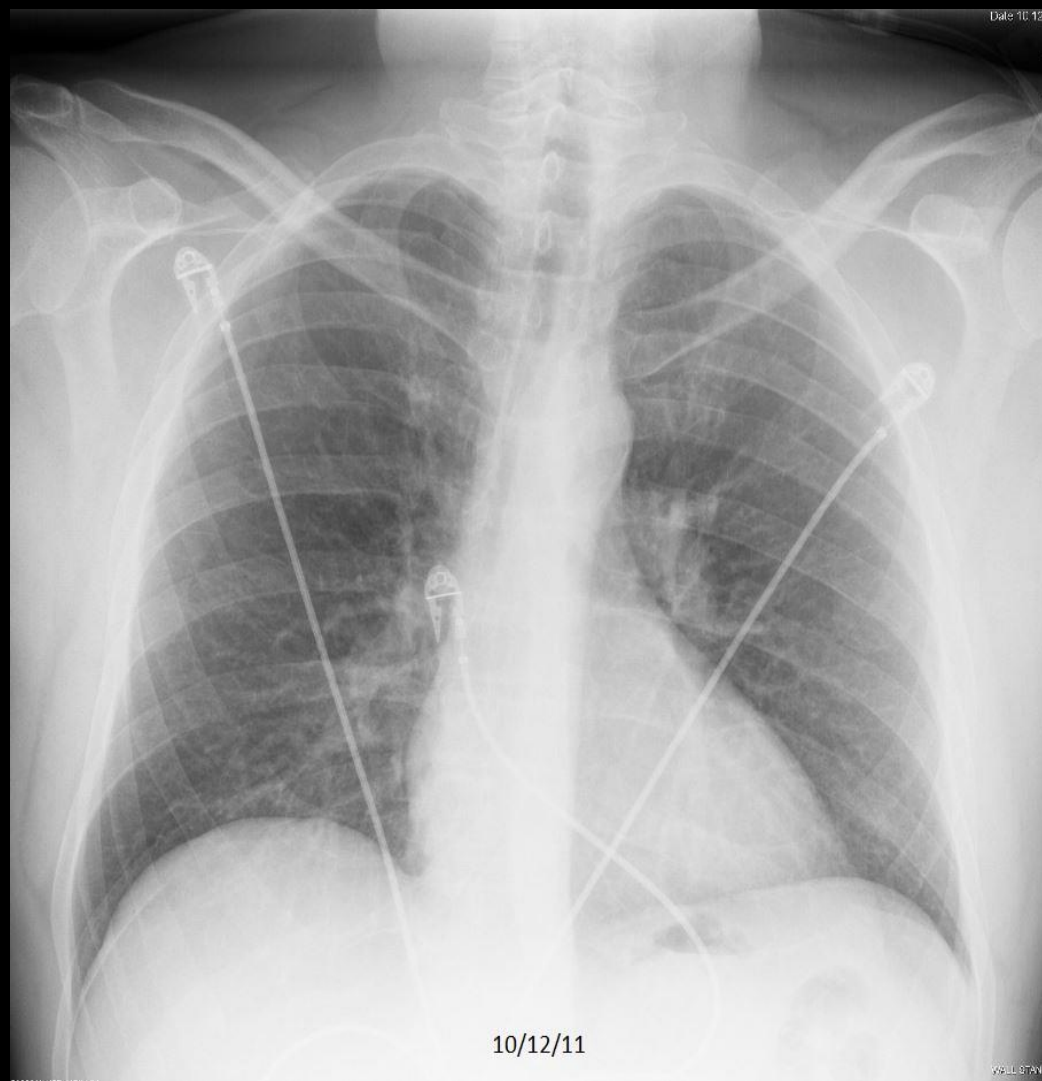
C249. 44 year old with chest pain..

## Quiz Case 8 of 10 – A shows emphysema



C415. 57 year old man with dyspnea. Hyperinflated lungs with flattening of the diaphragm.

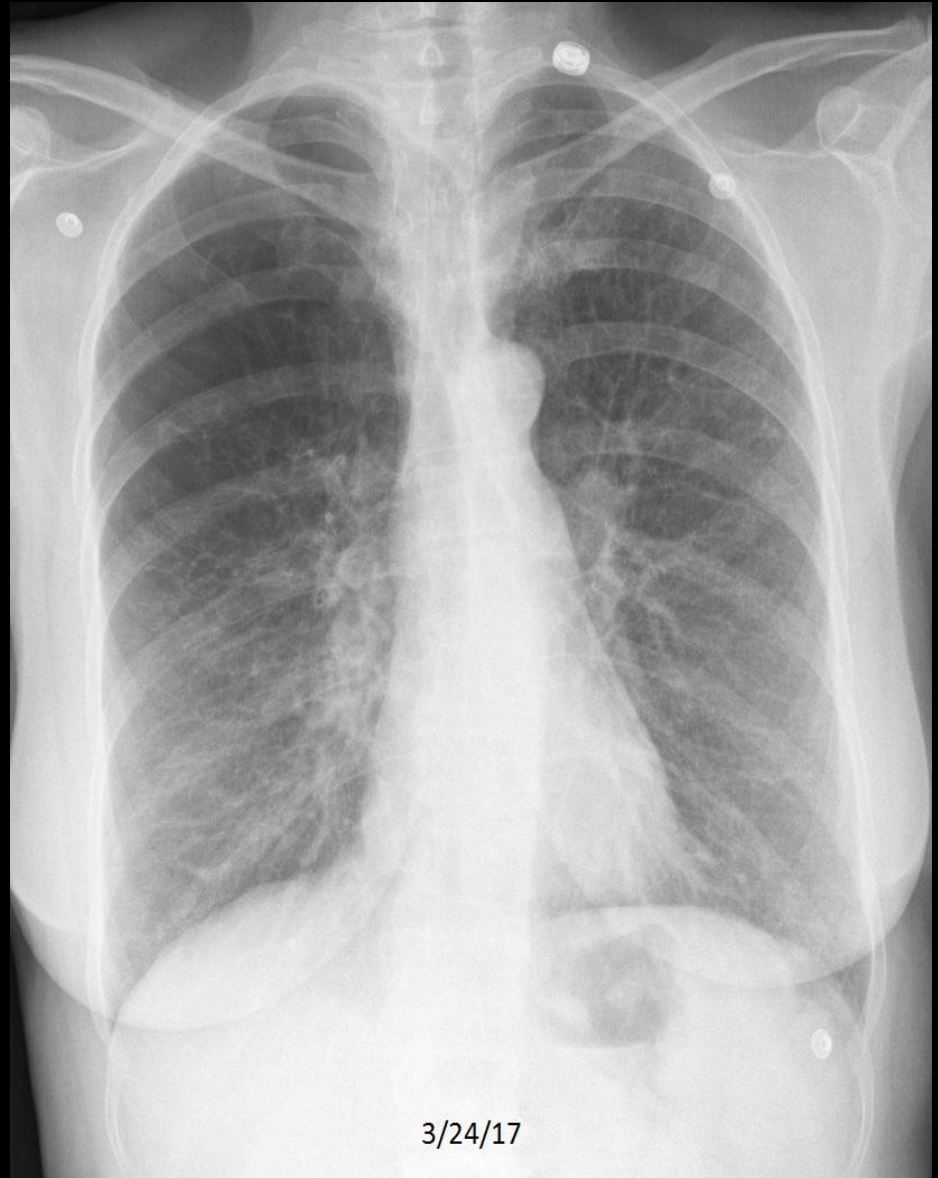
## Quiz Case 9 of 10 – A



C158. 67 year old with chest pain.

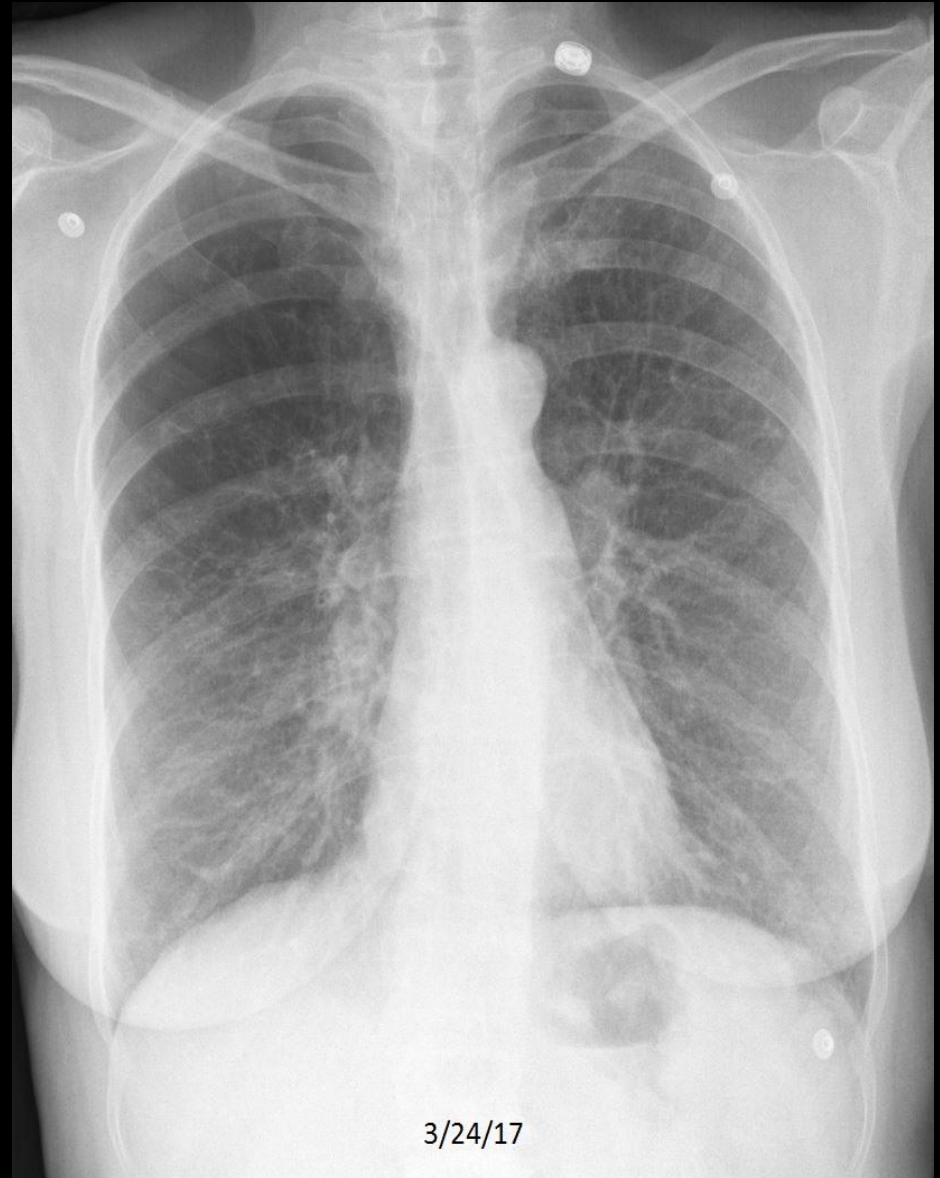


## Quiz Case 9 of 10 – B



C424. 60 year old woman with dyspnea.

## Quiz Case 9 of 10 – B shows emphysema



C424. 60 year old woman with dyspnea. Hyperinflated lungs with flattening of the diaphragm and increased anterior clear space.

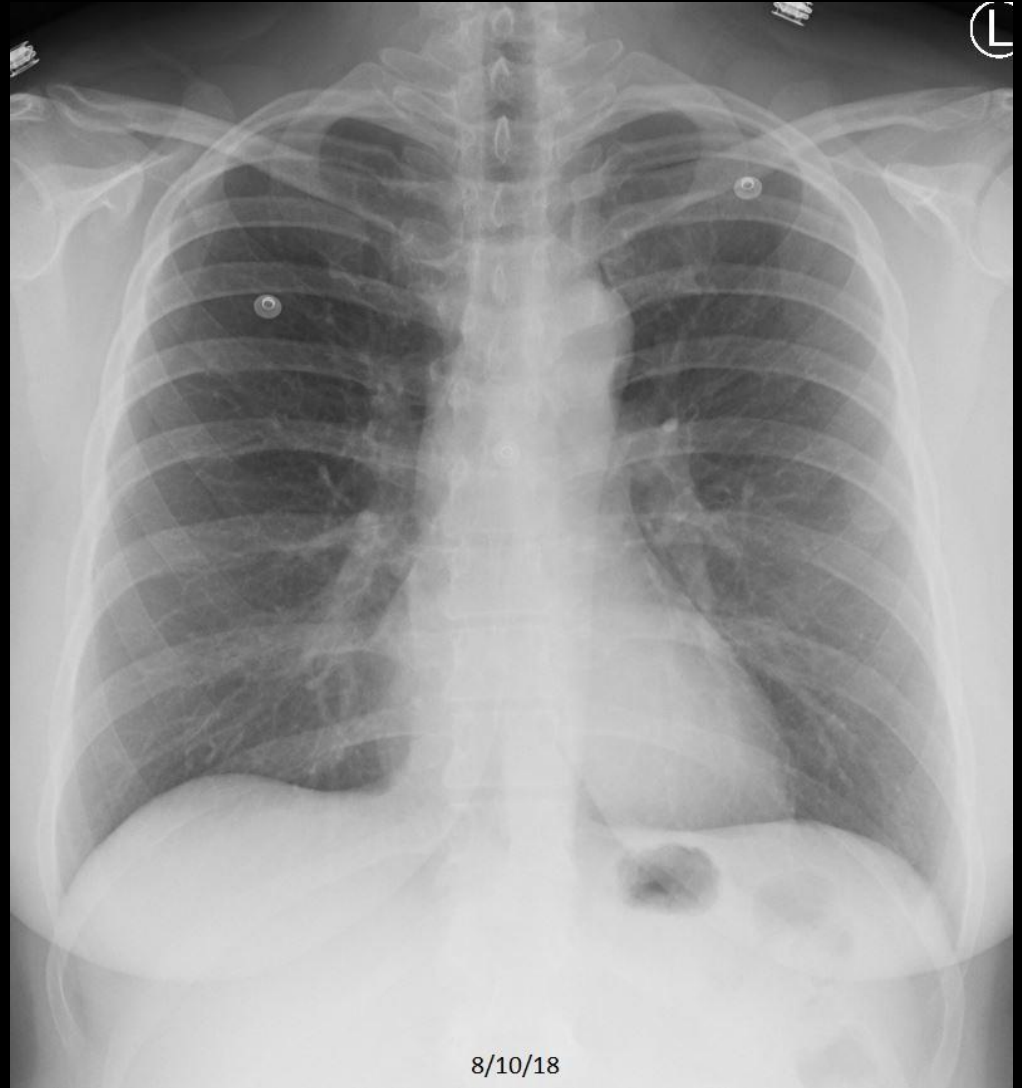
## Quiz Case 10 of 10 – A



C513. 69 year old with cough.



## Quiz Case 10 of 10 – B



C178. 55 year old woman with dyspnea.



## Quiz Case 10 of 10 – A shows emphysema



C513. 69 year old with cough. Hyperinflated lungs with flattened diaphragm and increased anterior clear space.

# **Review Quiz**

**Identify Each CXR as:  
Normal, CHF, Pneumonia, or  
Emphysema**

# Review Quiz Case 1 of 16

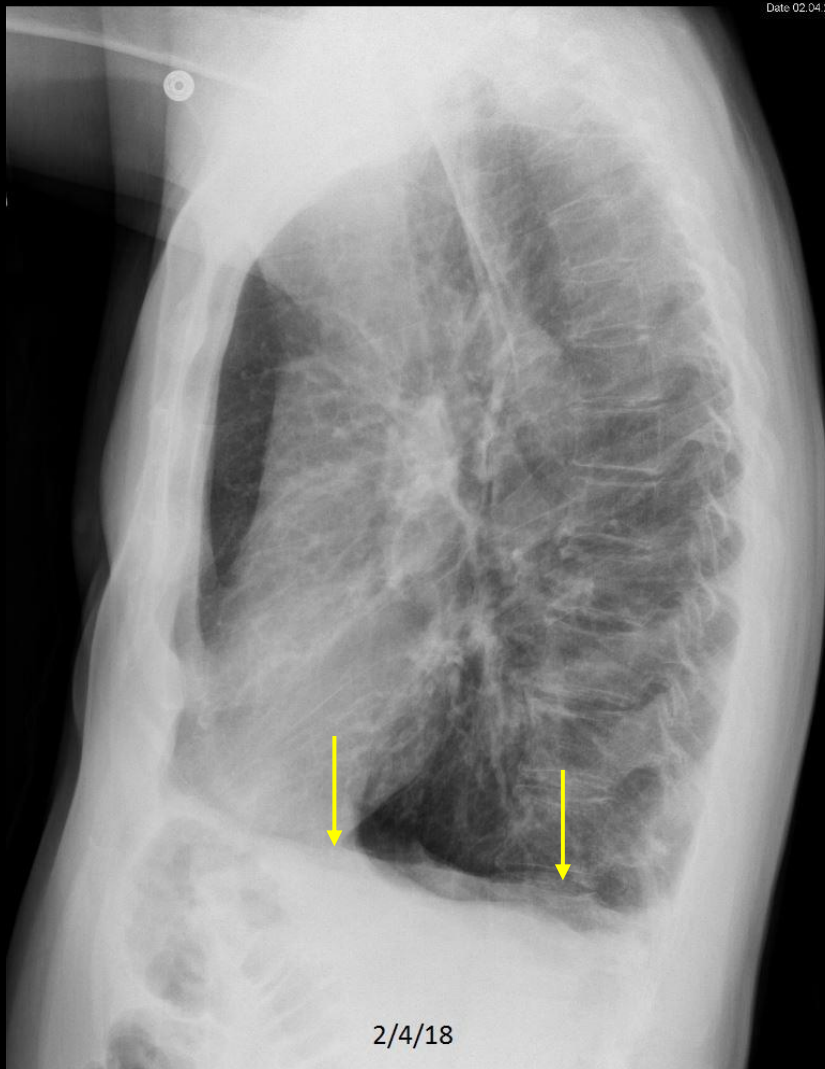
## Normal, CHF, Pneumonia, or Emphysema?



C541. 68 year old man with dyspnea.

# Review Quiz Case 1 of 16

## Emphysema.

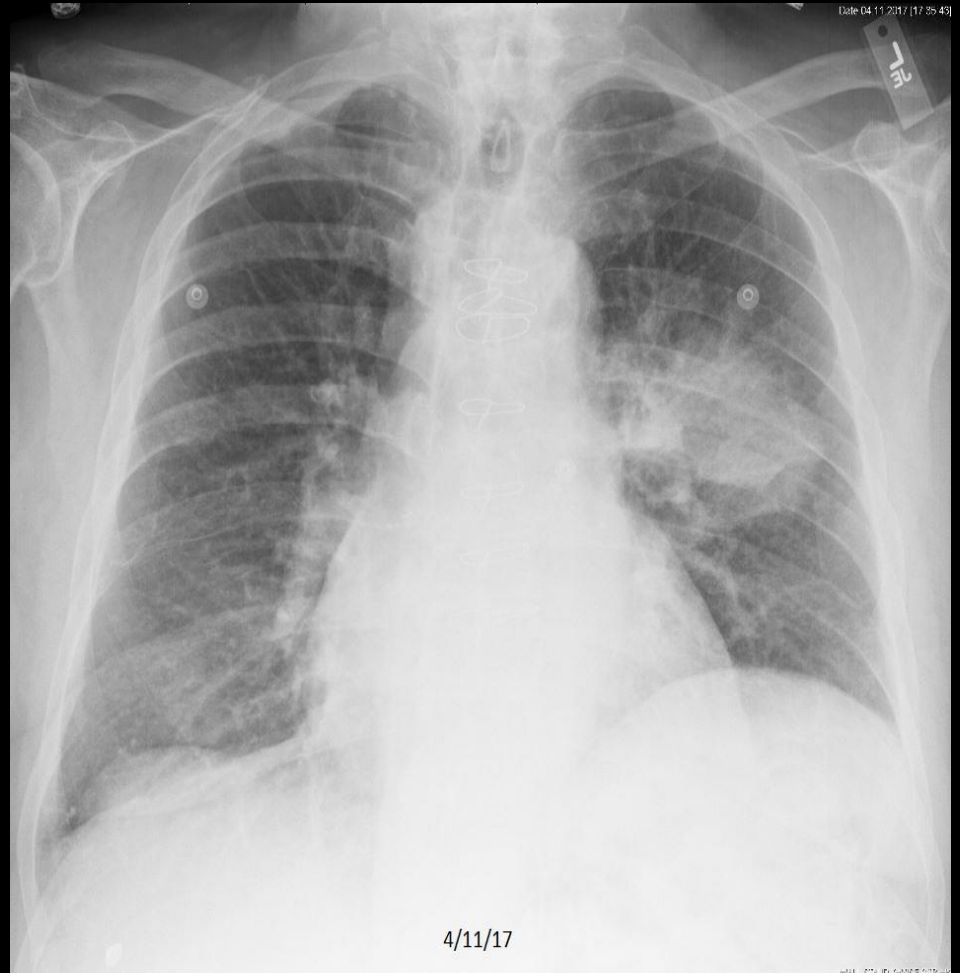


C541. 68 year old man with dyspnea. Hyperinflated lungs with flattened diaphragm.



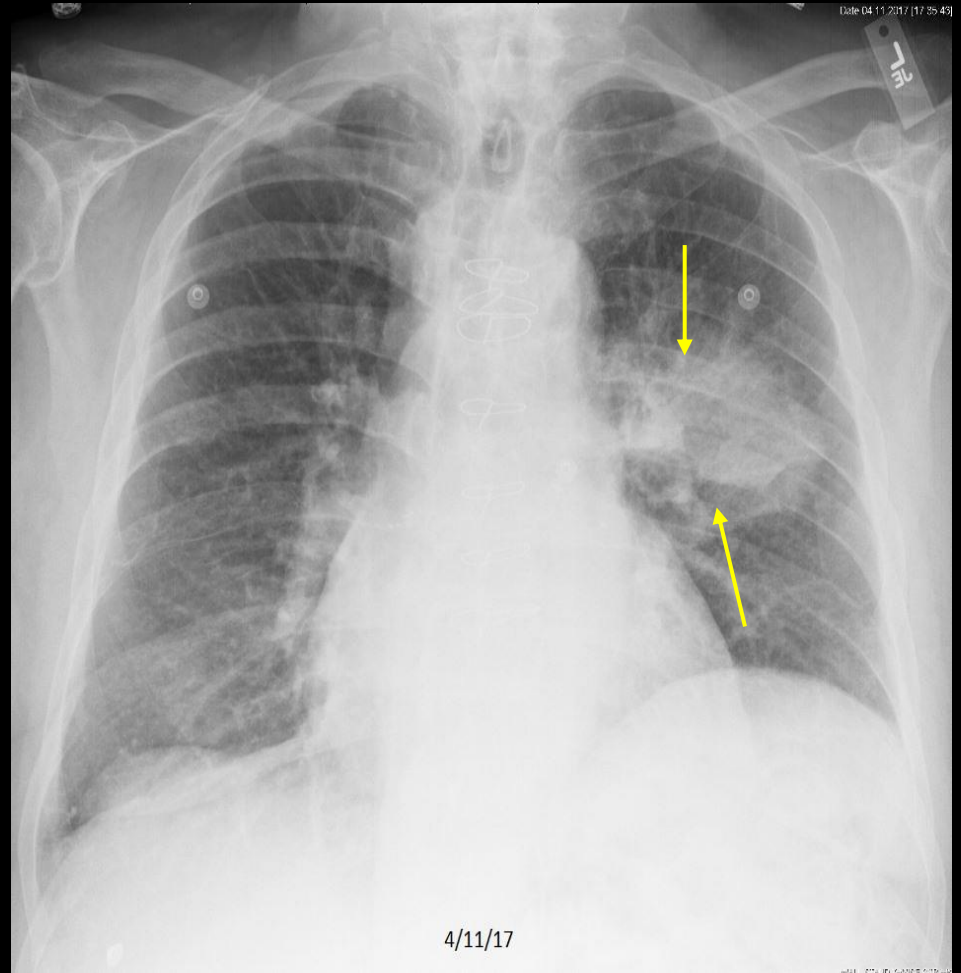
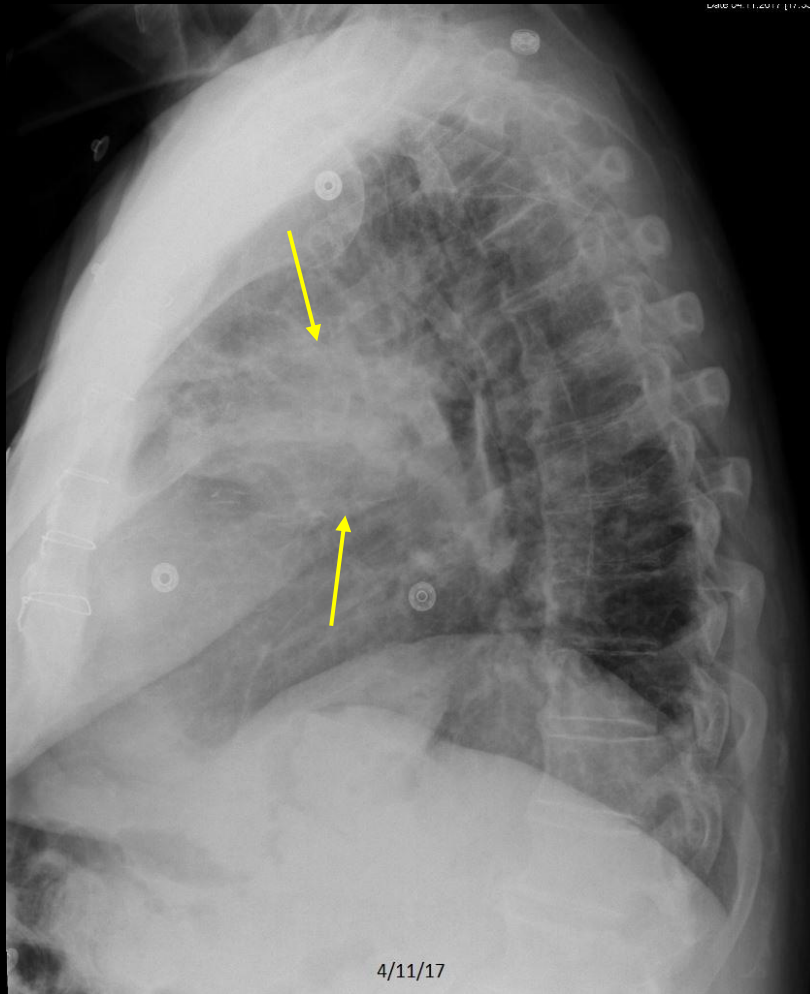
# Review Quiz Case 2 of 16

## Normal, CHF, Pneumonia, or Emphysema?



C404. 65 year old man with chest pain, cough, and fever.

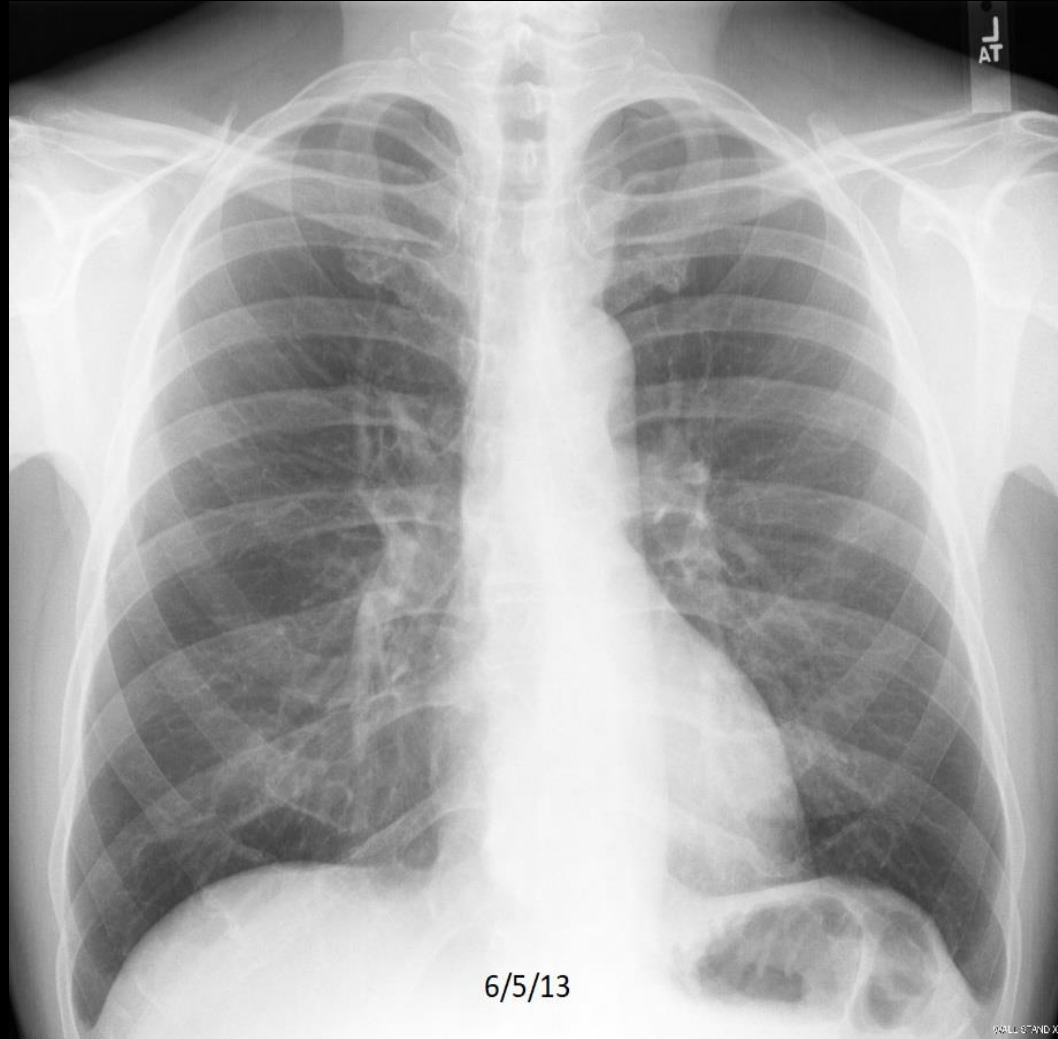
## Review Quiz Case 2 of 16 Pneumonia.



C404. 65 year old man with chest pain, cough, and fever. **Left lung opacity.**

# Review Quiz Case 3 of 16

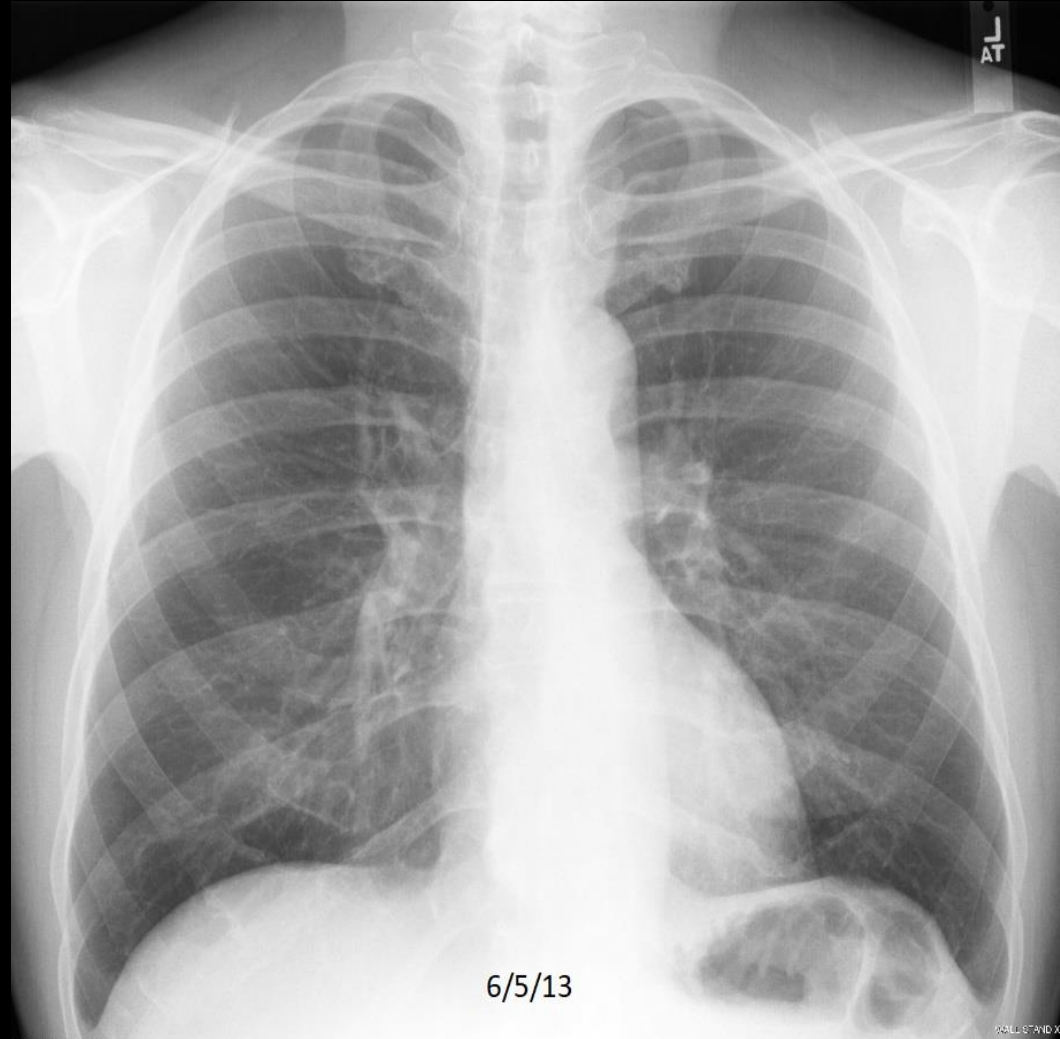
## Normal, CHF, Pneumonia, or Emphysema?



C135. 63 year old man with chest pain.

# Review Quiz Case 3 of 16

## Normal.

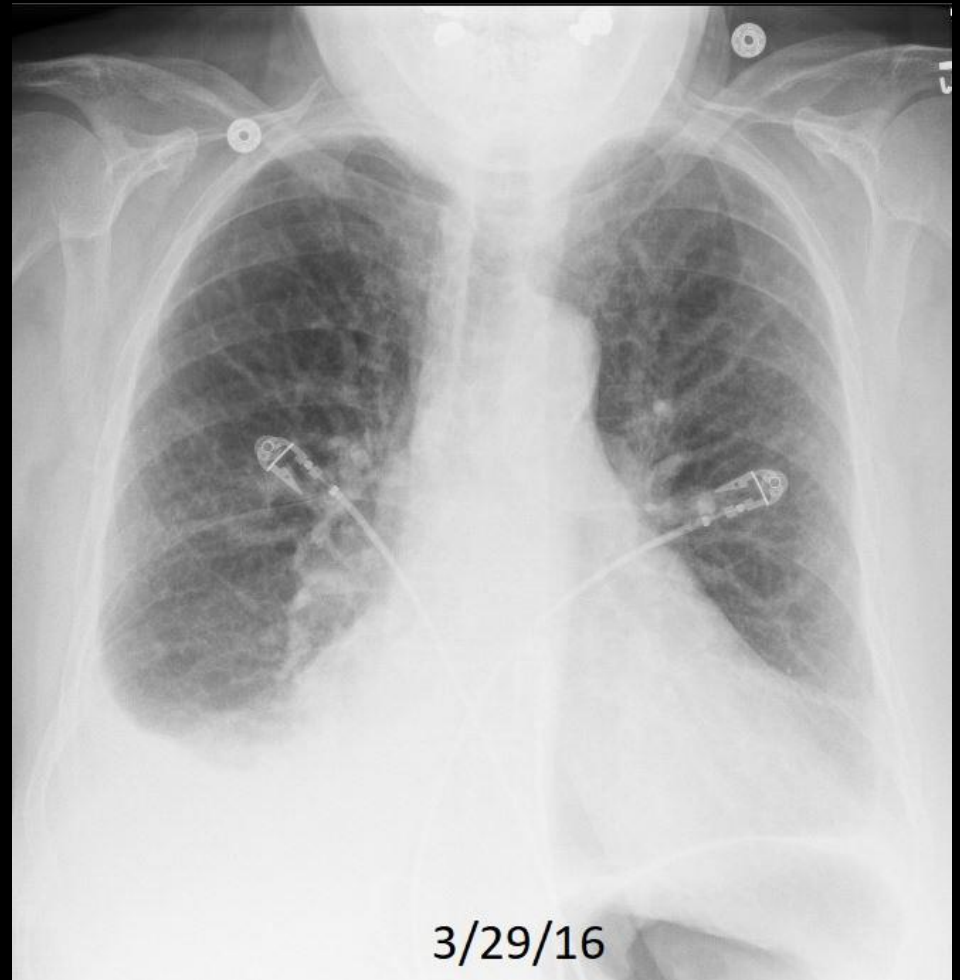
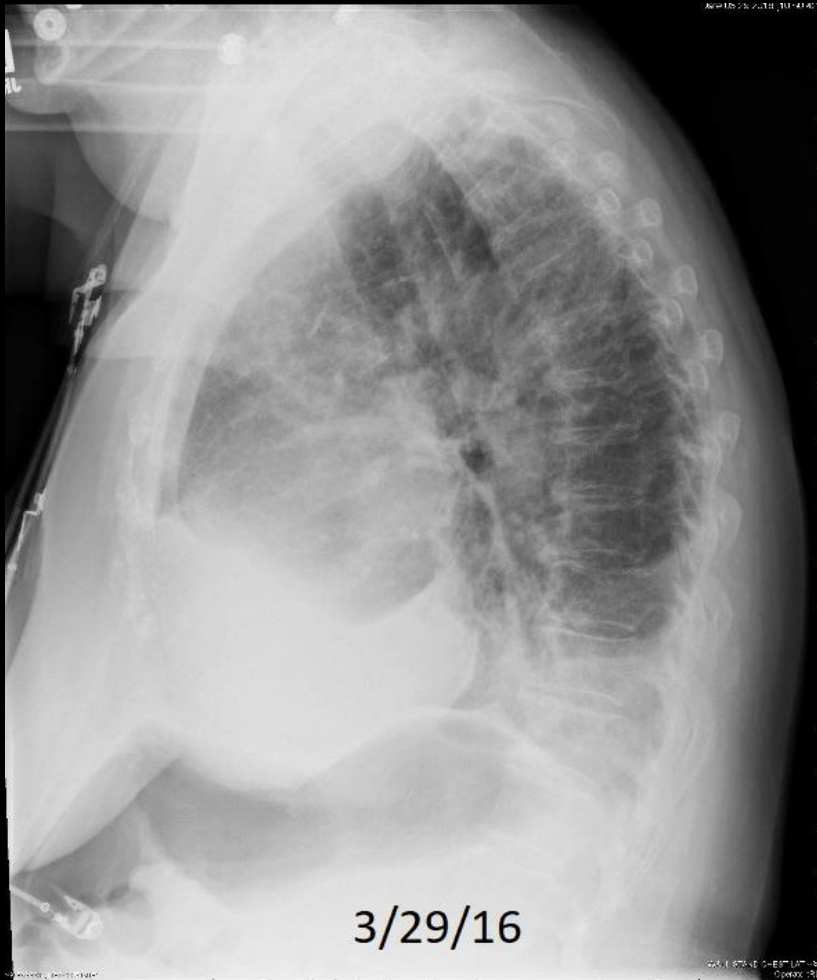


C135. 63 year old man with chest pain.



# Review Quiz Case 4 of 16

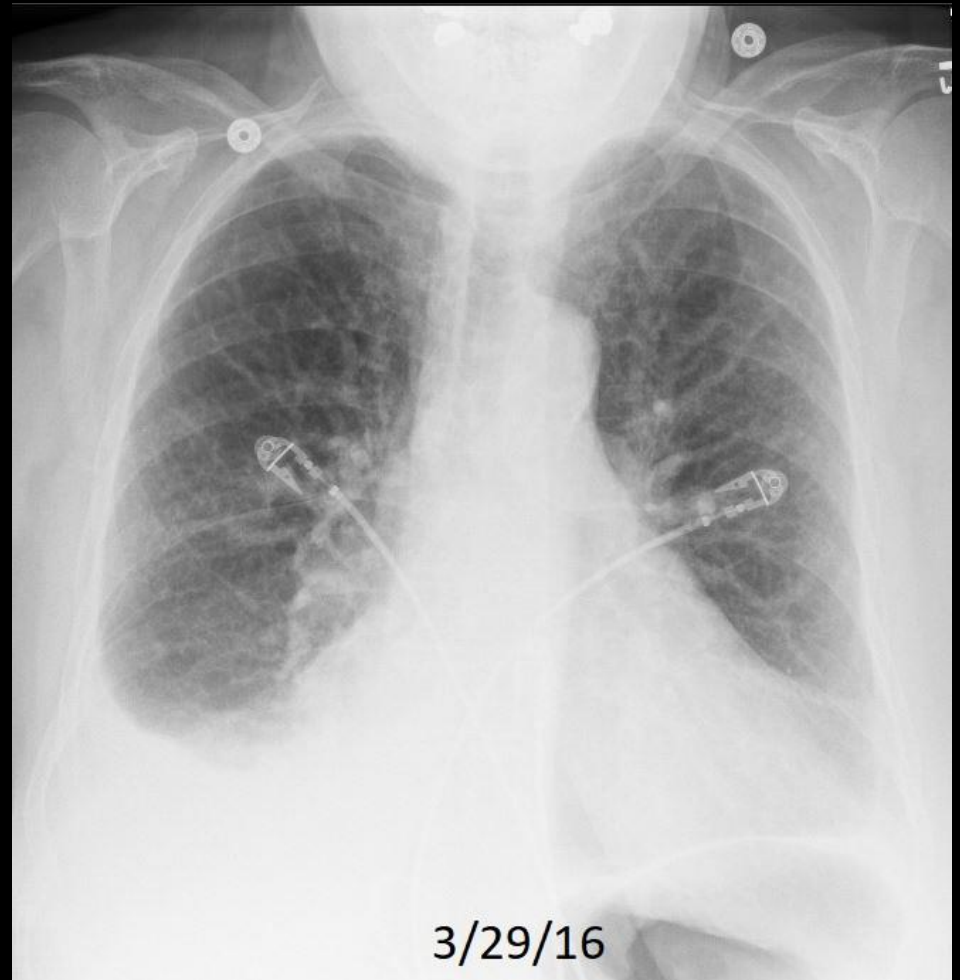
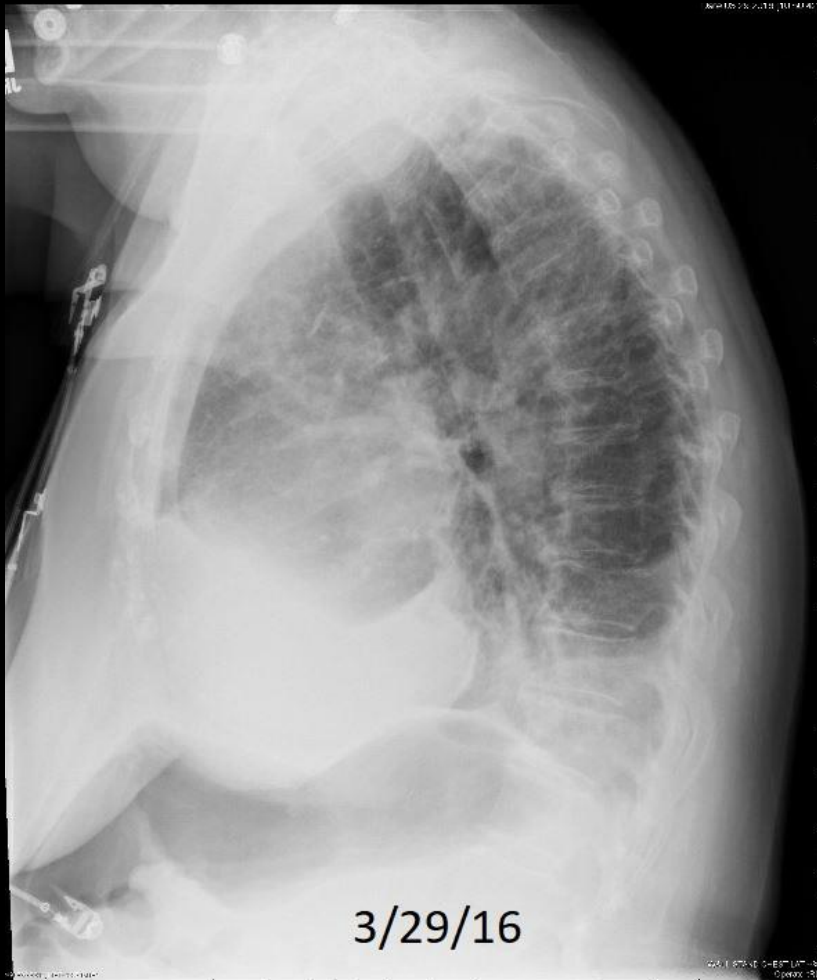
## Normal, CHF, Pneumonia, or Emphysema?



C255. 81 year old woman with dyspnea.

## Review Quiz Case 4 of 16

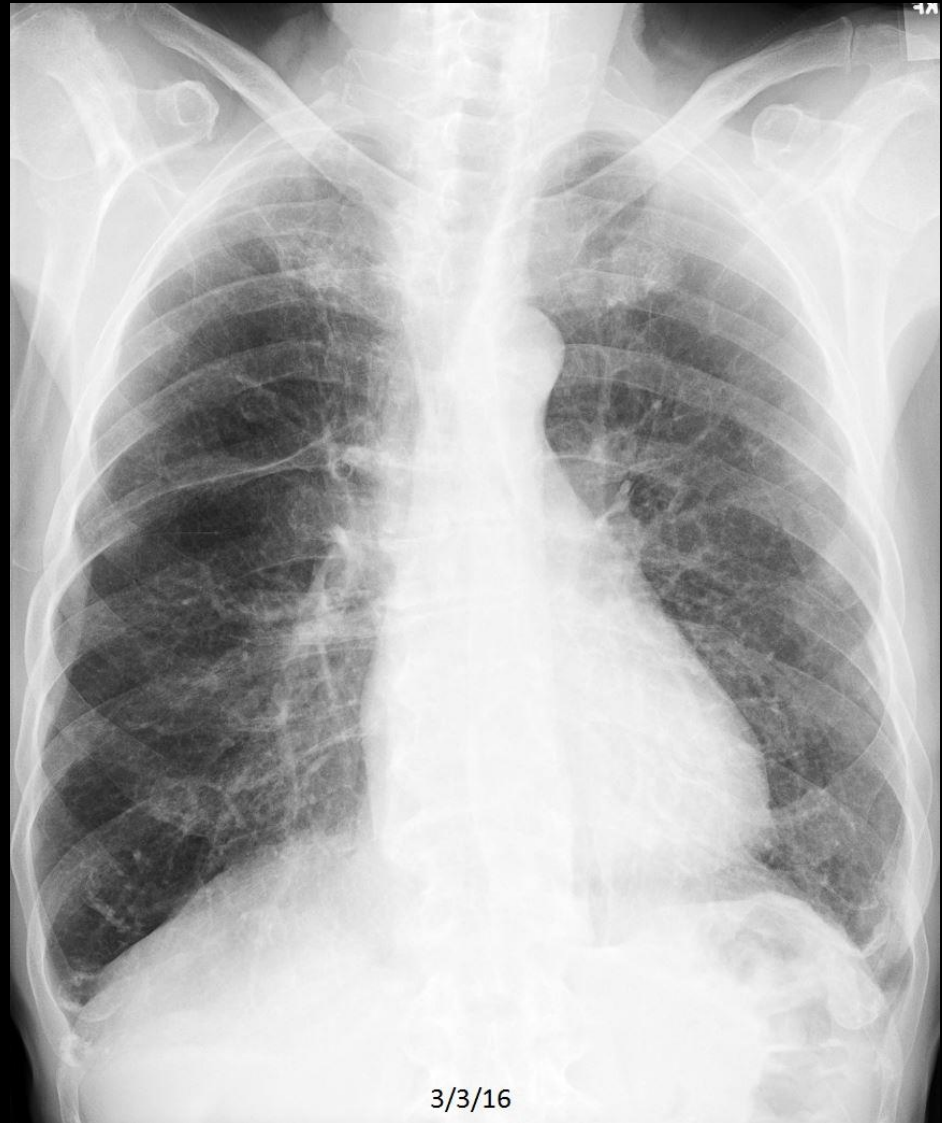
### CHF.



C255. 81 year old woman with dyspnea. Cardiomegaly, pleural effusions, diffuse increased lung density, and pulmonary vascular redistribution.

# Review Quiz Case 5 of 16

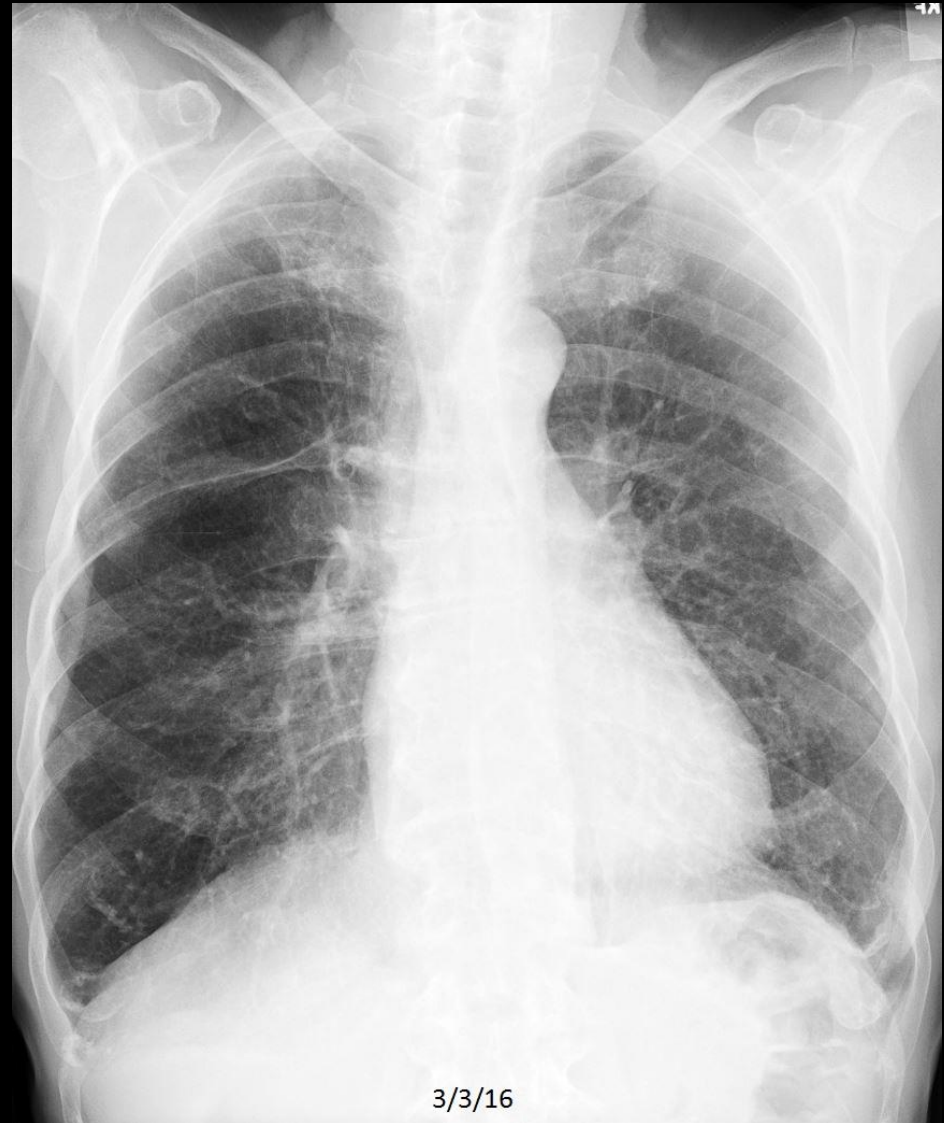
## Normal, CHF, Pneumonia, or Emphysema?



C547. 73 year old man with acute chest pain.

# Review Quiz Case 5 of 16

## Emphysema



C547. 73 year old man with acute chest pain. **Hyperinflated lungs with flattening of the diaphragm and increased retrosternal clear space.**



# Review Quiz Case 6 of 16

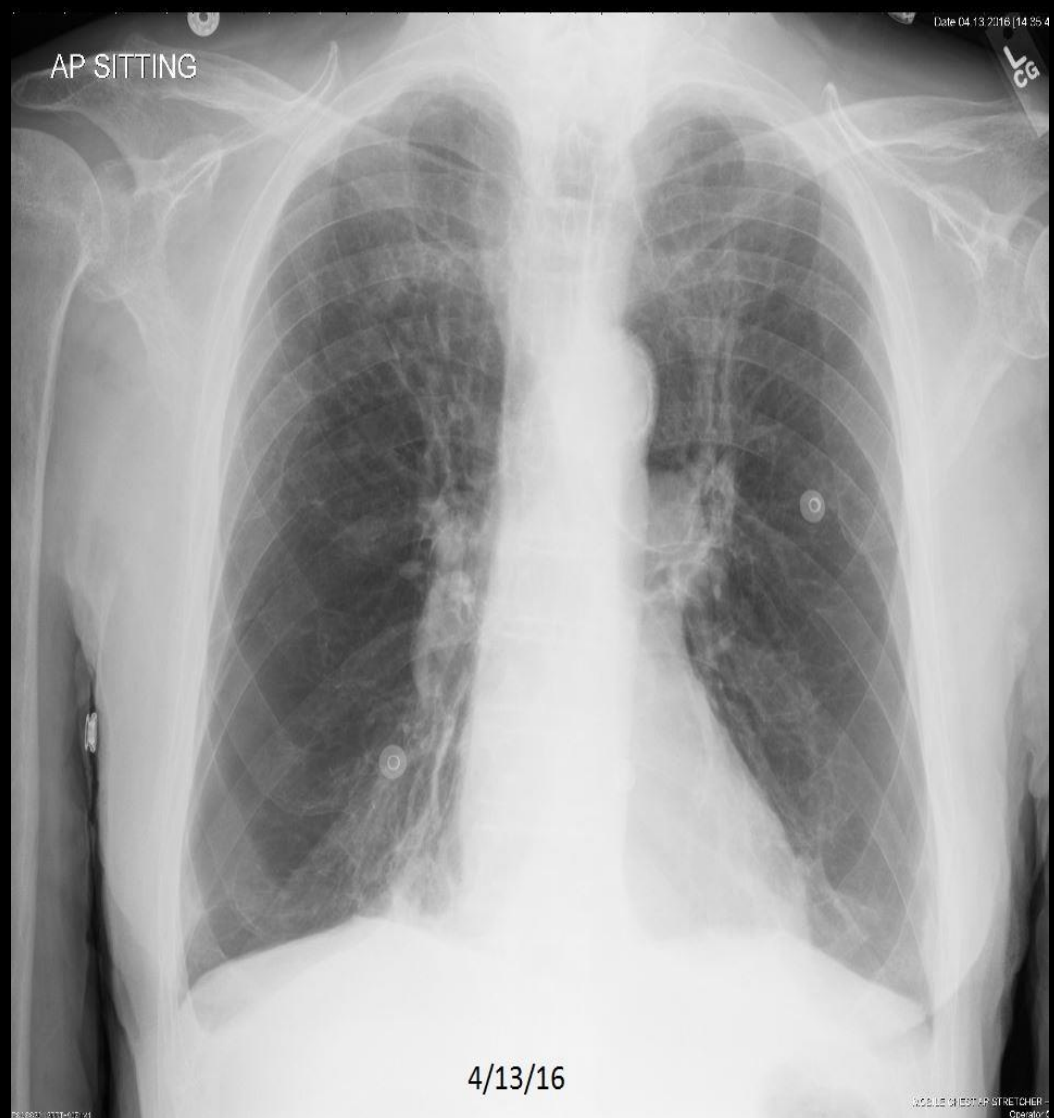
## Normal, CHF, Pneumonia, or Emphysema?



C585. 84 year old man with dyspnea.

# Review Quiz Case 6 of 16

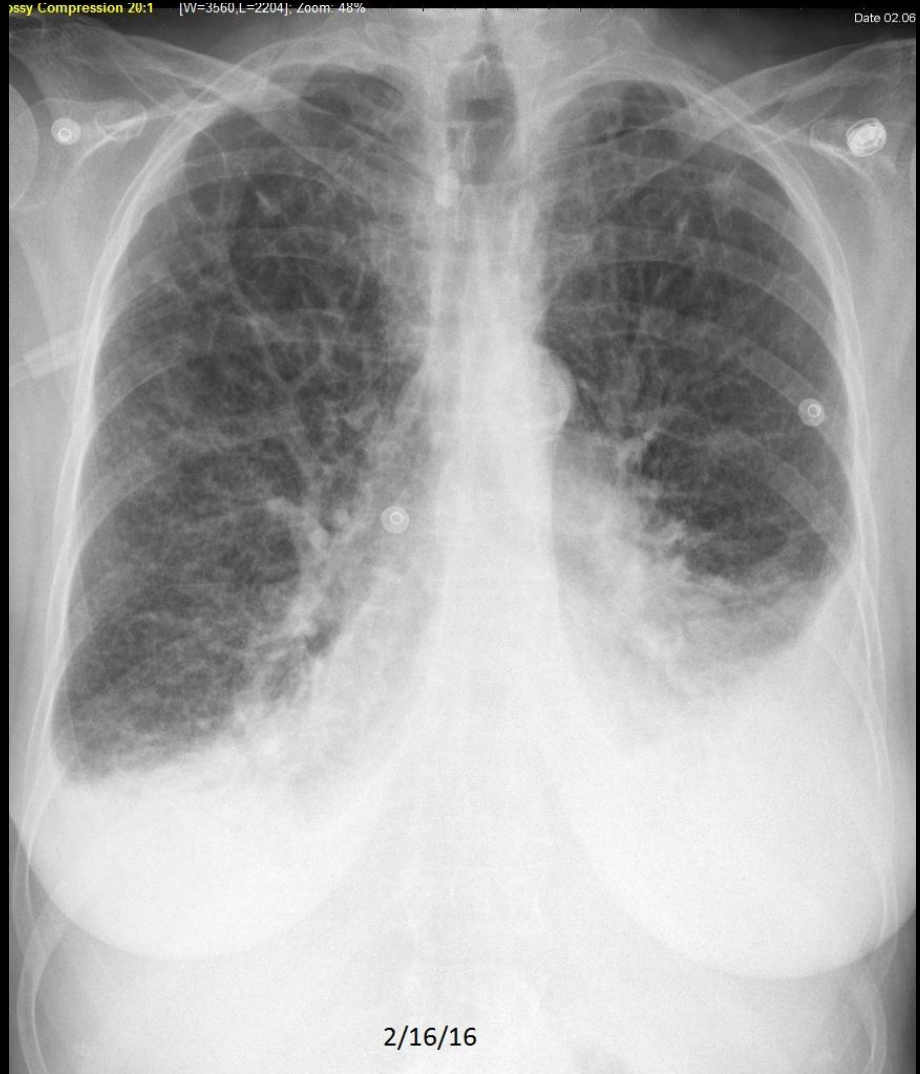
## Emphysema



C585. 84 year old man with dyspnea. Hyperinflated lungs with flattening of the diaphragm and increased retrosternal clear space.

# Review Quiz Case 7 of 16

## Normal, CHF, Pneumonia, or Emphysema?

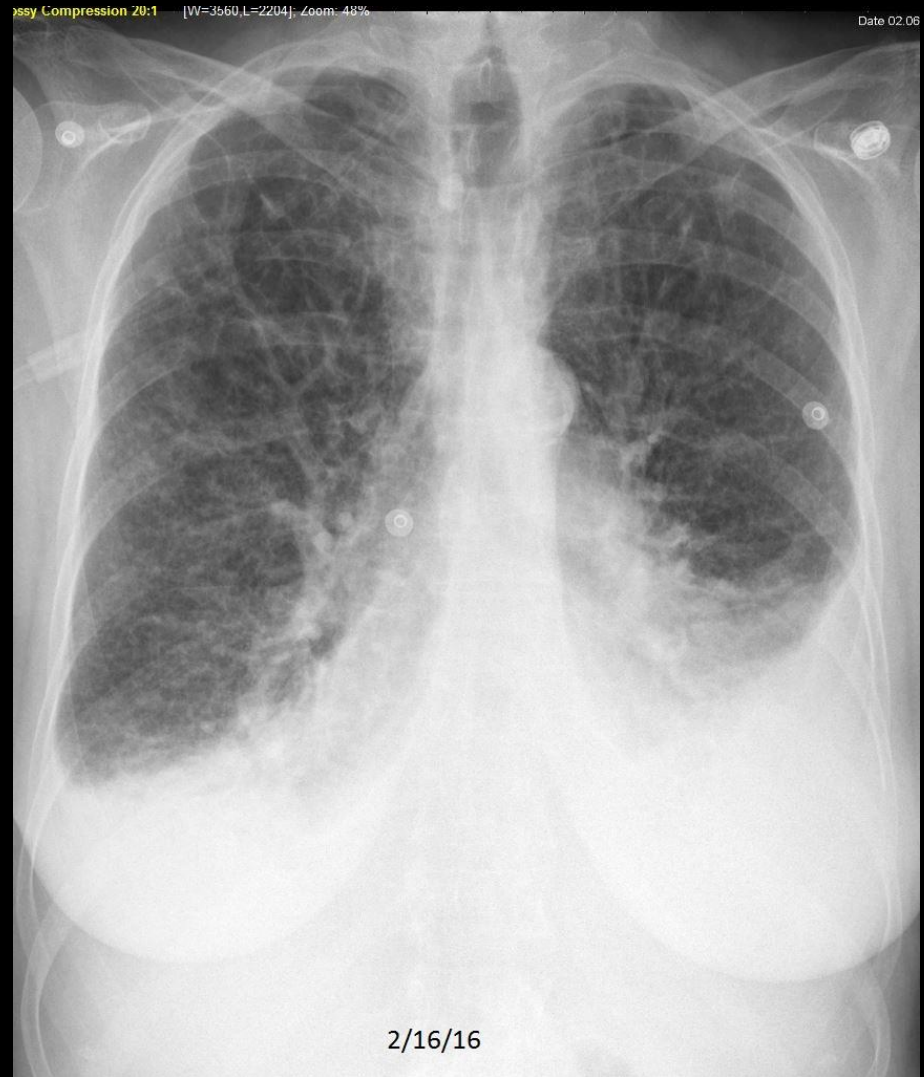


C274. 68 year old with dyspnea.



# Review Quiz Case 7 of 16

## CHF.

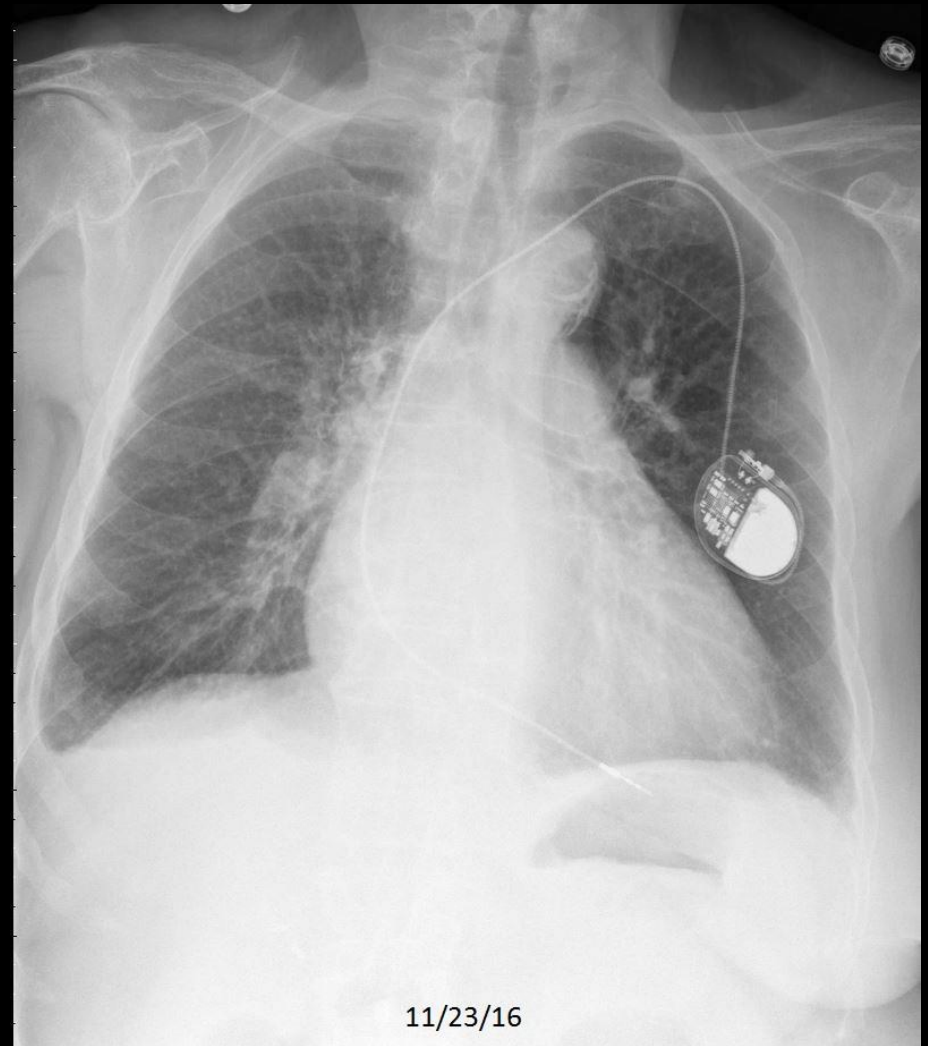
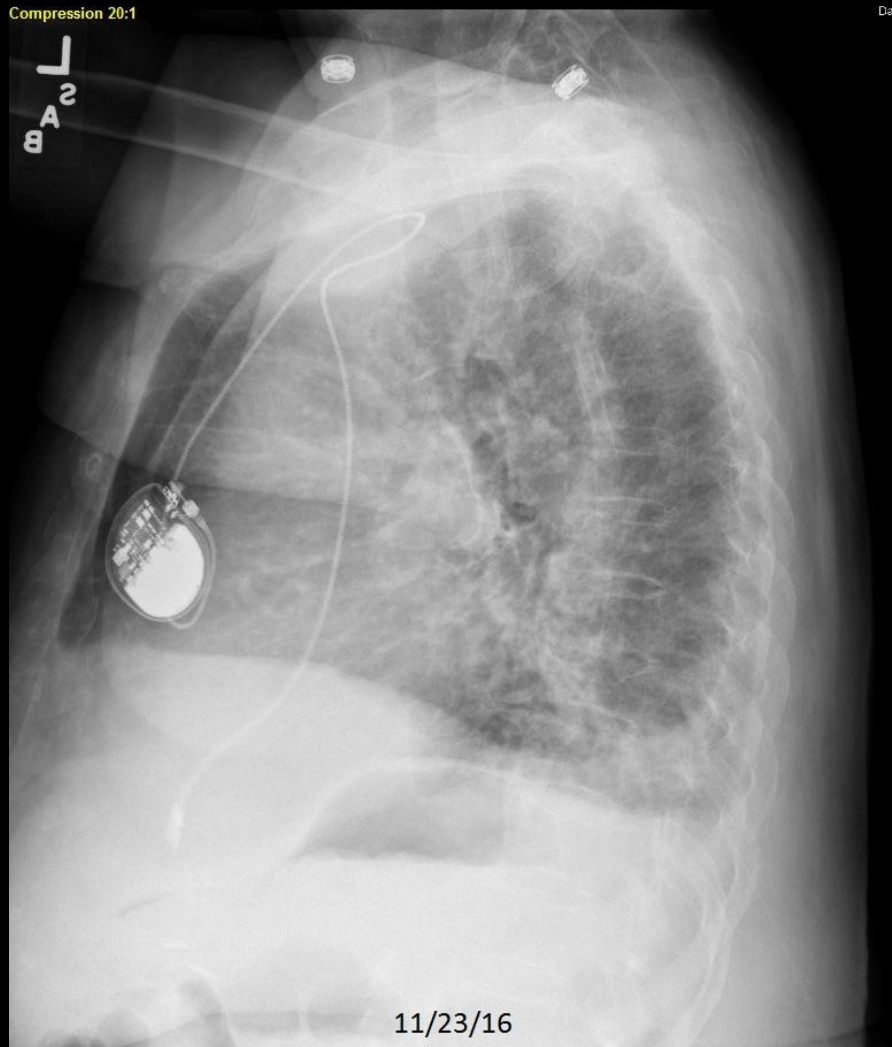


C274. 68 year old with dyspnea. Cardiomegaly, pleural effusions, diffuse increased lung density, and pulmonary vascular redistribution.



# Review Quiz Case 8 of 16

## Normal, CHF, Pneumonia, or Emphysema?

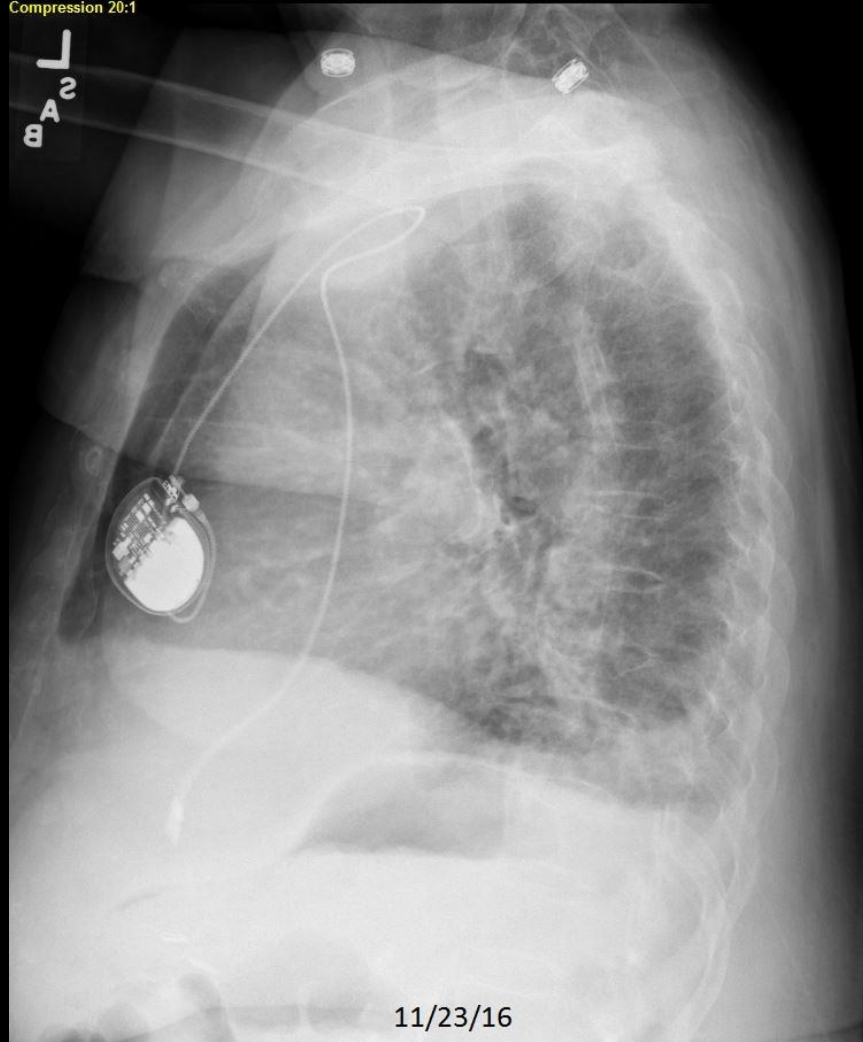


C295. 87 year old woman with dyspnea and cough.

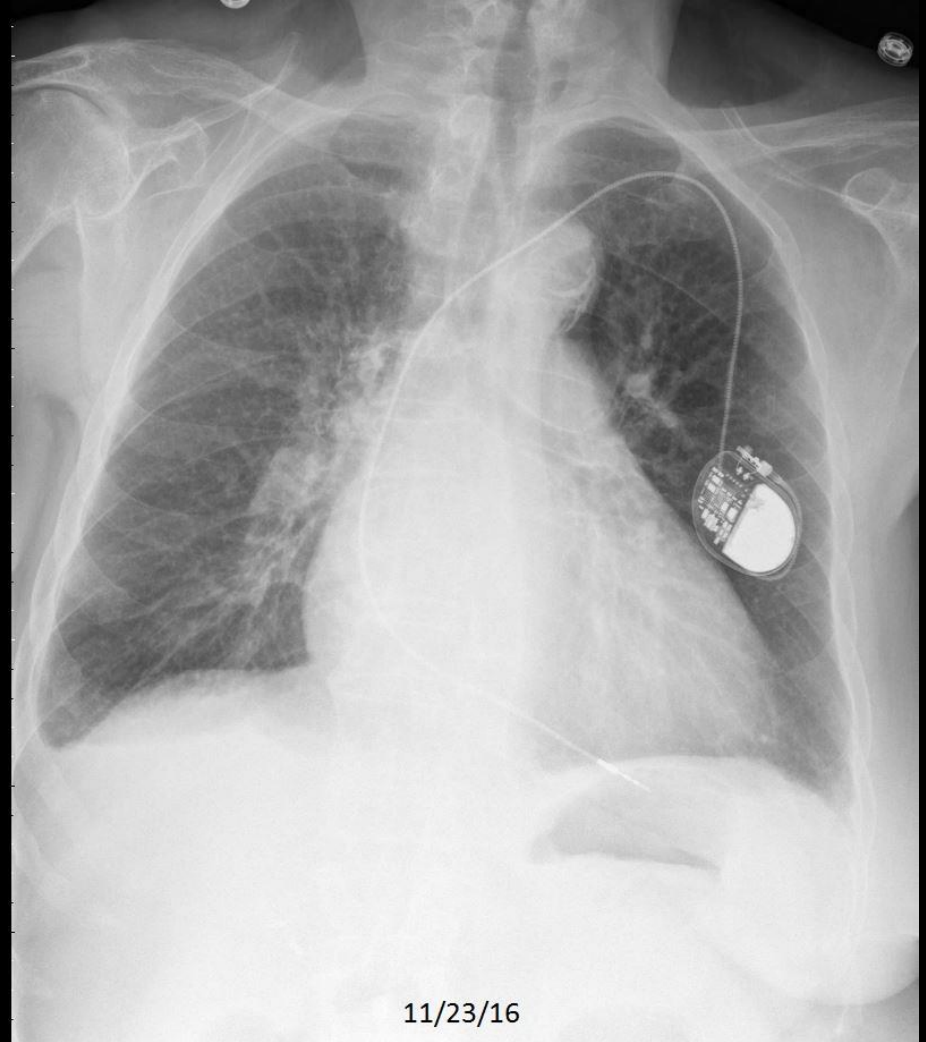
# Review Quiz Case 8 of 16

## CHF

Compression 20:1



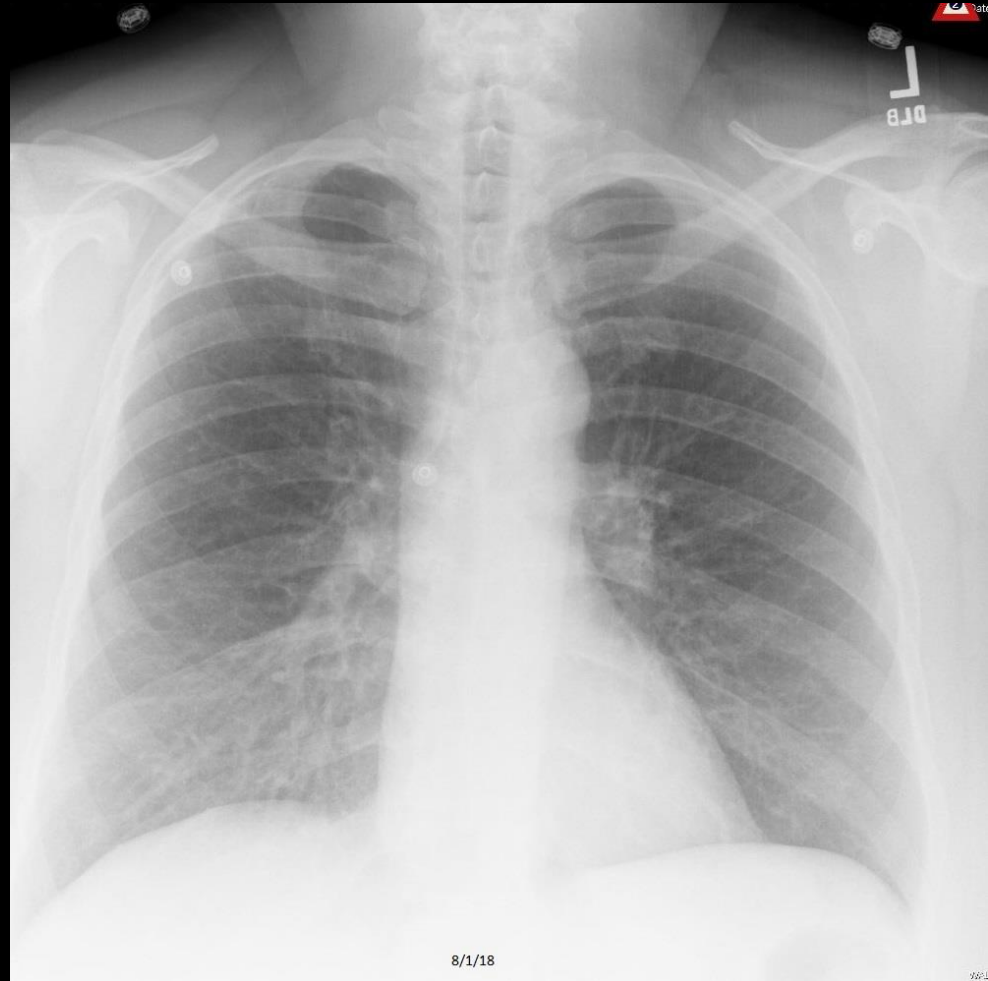
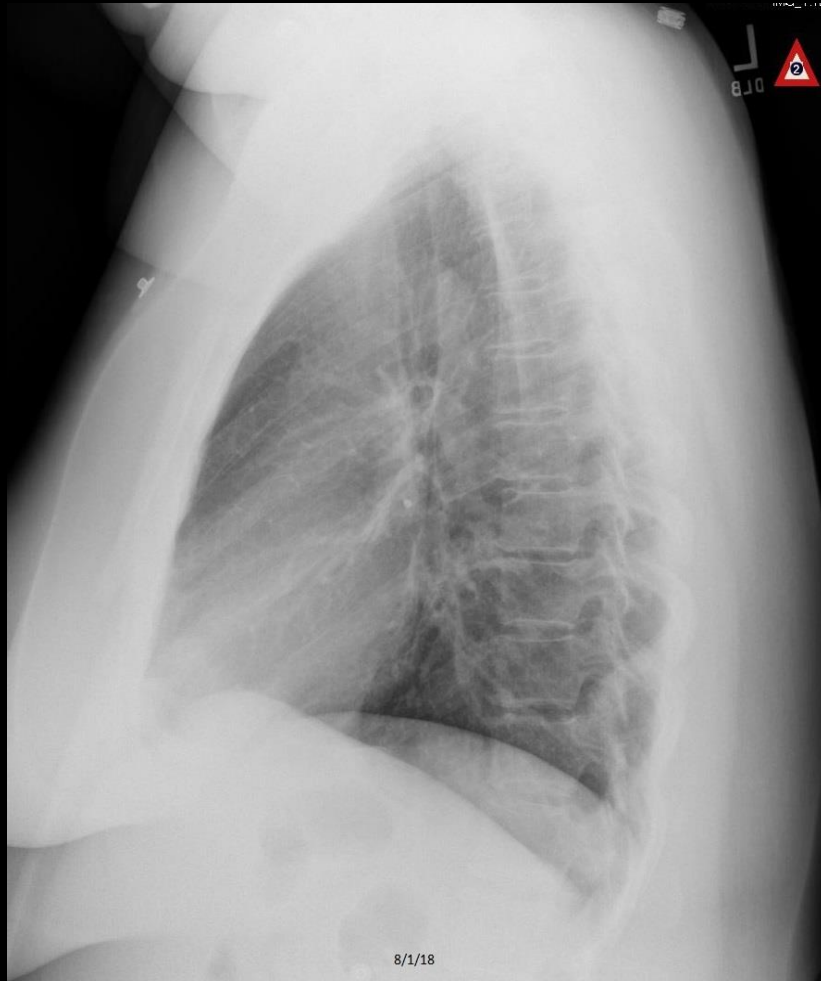
Ds



C295. 87 year old woman with dyspnea and cough. Cardiomegaly, pleural effusions, and increased lung density. Pacer.

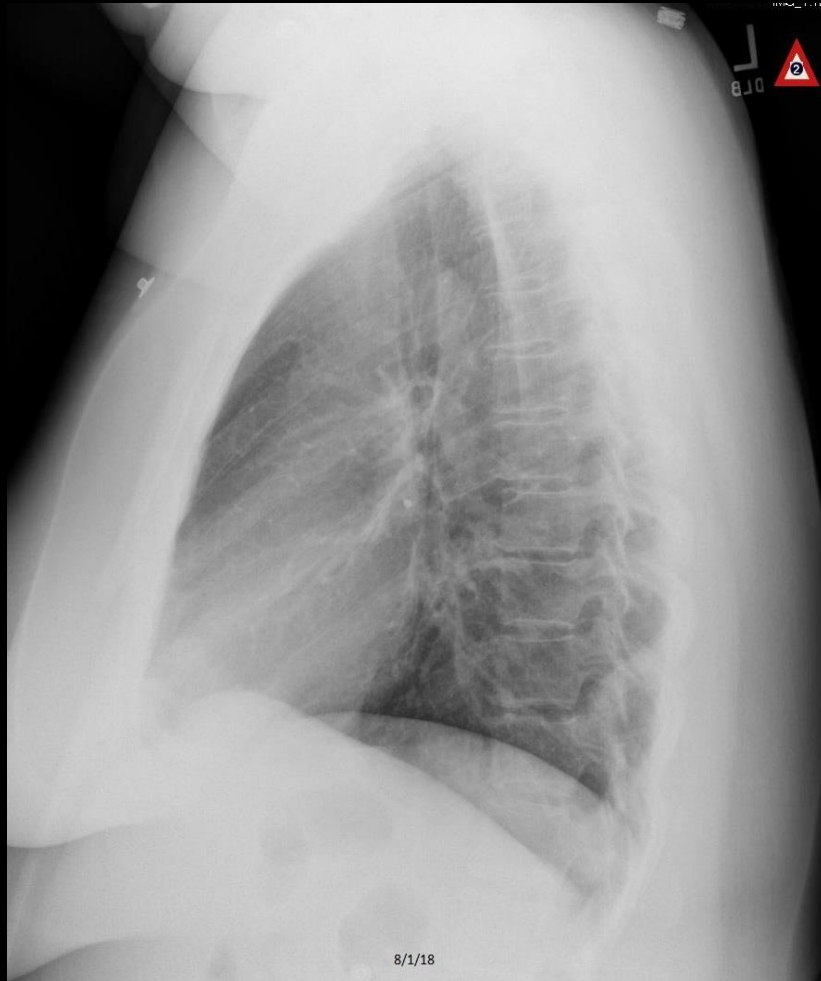
# Review Quiz Case 9 of 16

## Normal, CHF, Pneumonia, or Emphysema?



# Review Quiz Case 9 of 16

## Normal





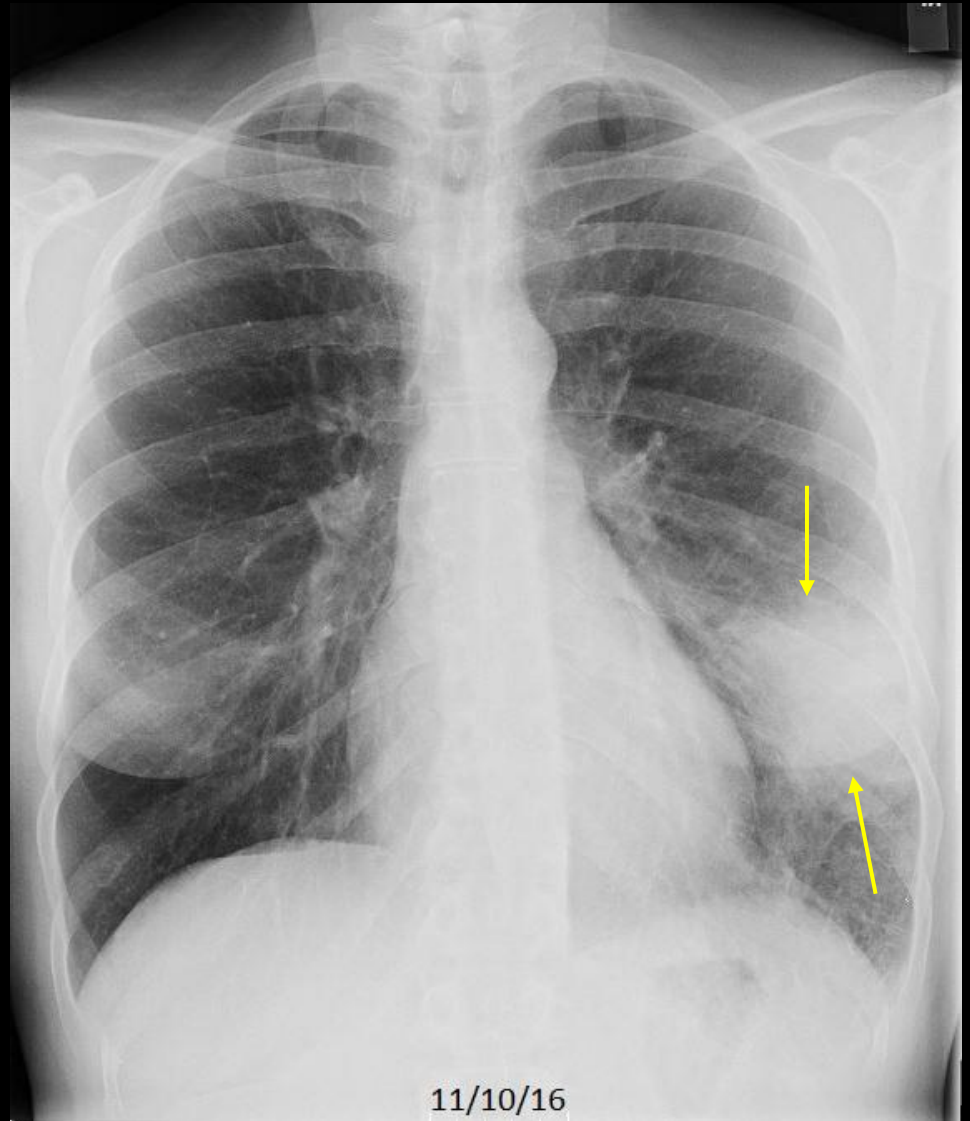
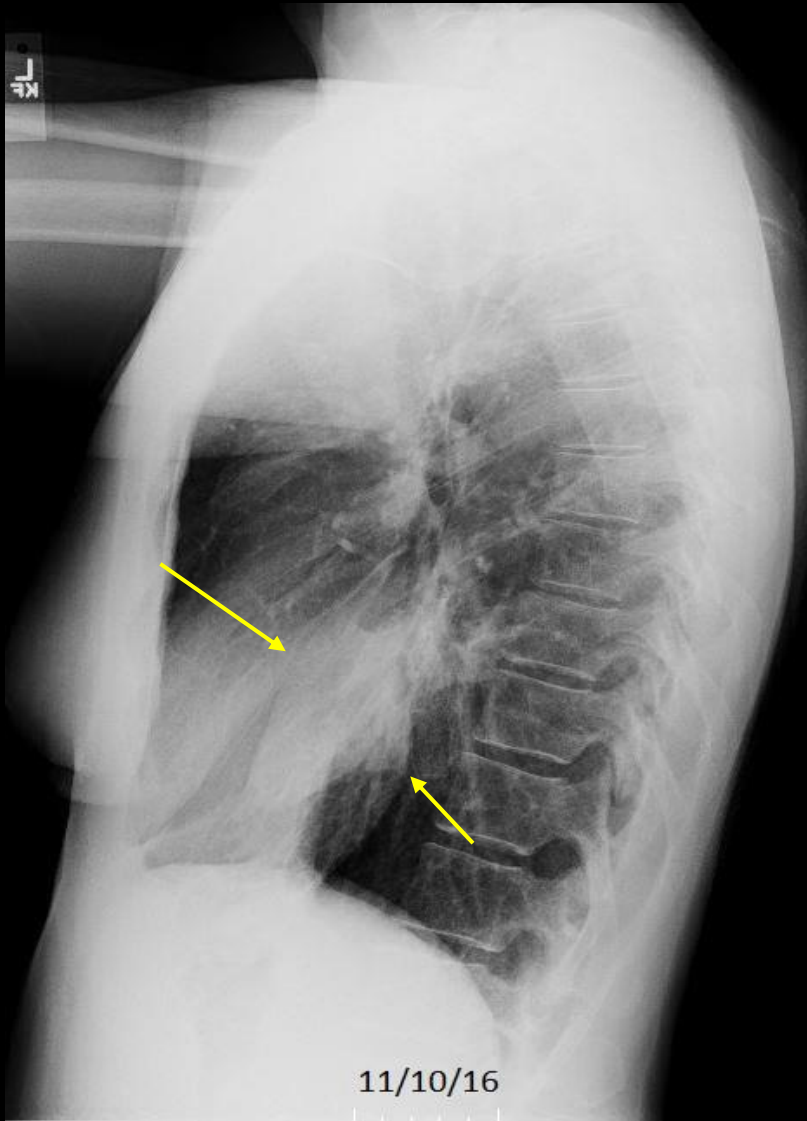
# Review Quiz Case 10 of 16

## Normal, CHF, Pneumonia, or Emphysema?



# Review Quiz Case 10 of 16

## Pneumonia



C268. 53 year old woman with cough, fever, and dyspnea. Focal opacity in the left lung.

# Review Quiz Case 11 of 16

## Normal, CHF, Pneumonia, or Emphysema?



C589. 52 year old with chest pain. Hyperinflated lungs with flattening of the diaphragm and increased retrosternal clear space.



# Review Quiz Case 11 of 16

## Emphysema



C589. 52 year old with chest pain. Hyperinflated lungs with flattening of the diaphragm and increased retrosternal clear space.



# Review Quiz Case 11 of 16

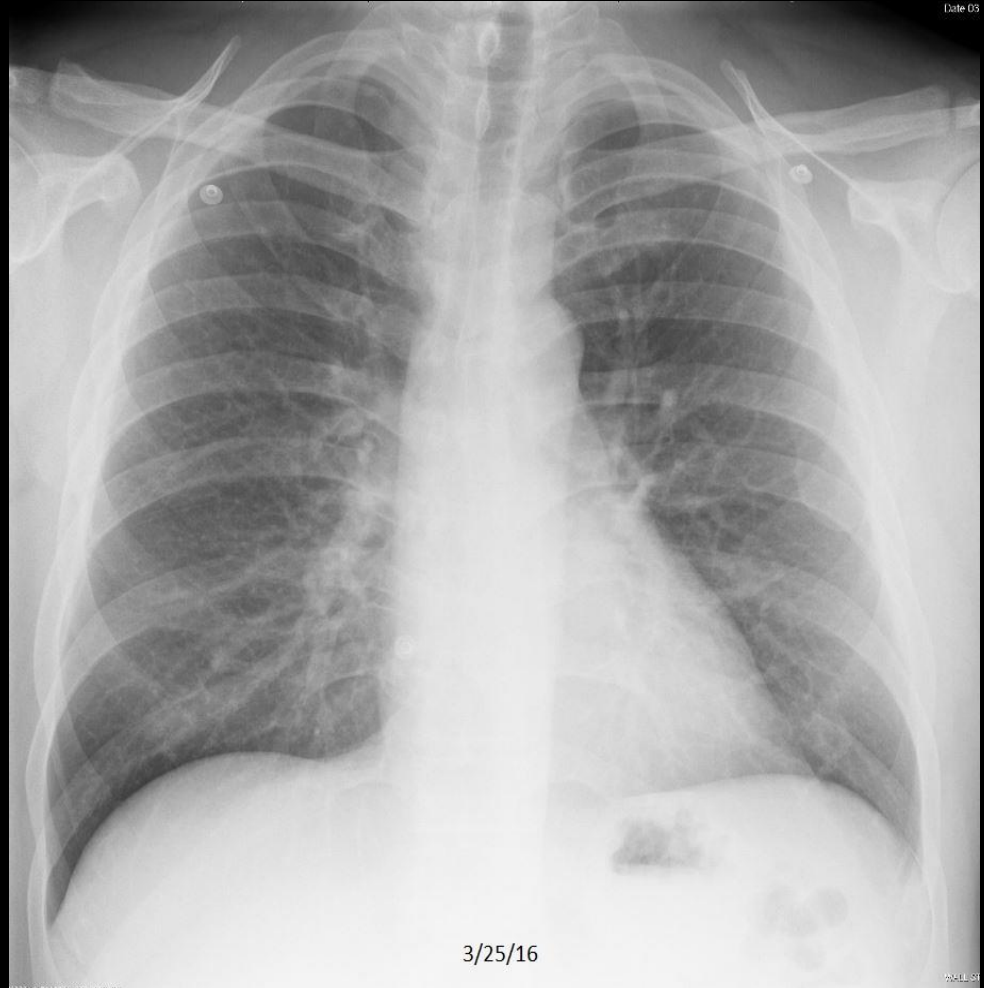
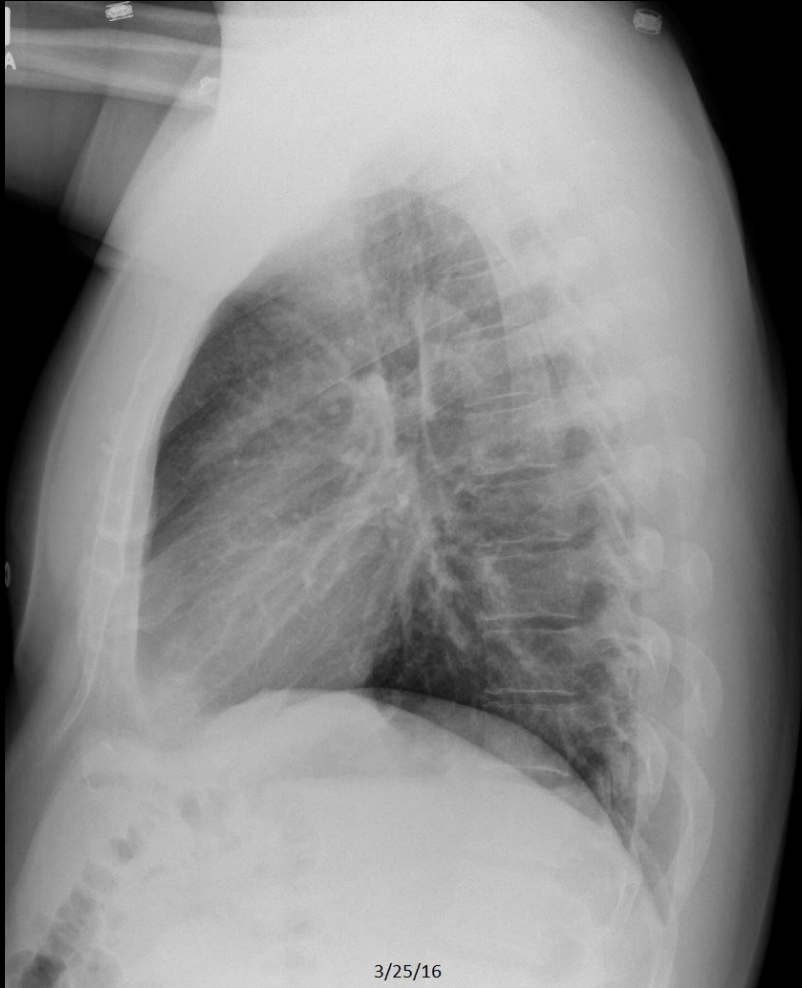
## Emphysema



C589. 52 year old with chest pain. CT shows biapical bullae.

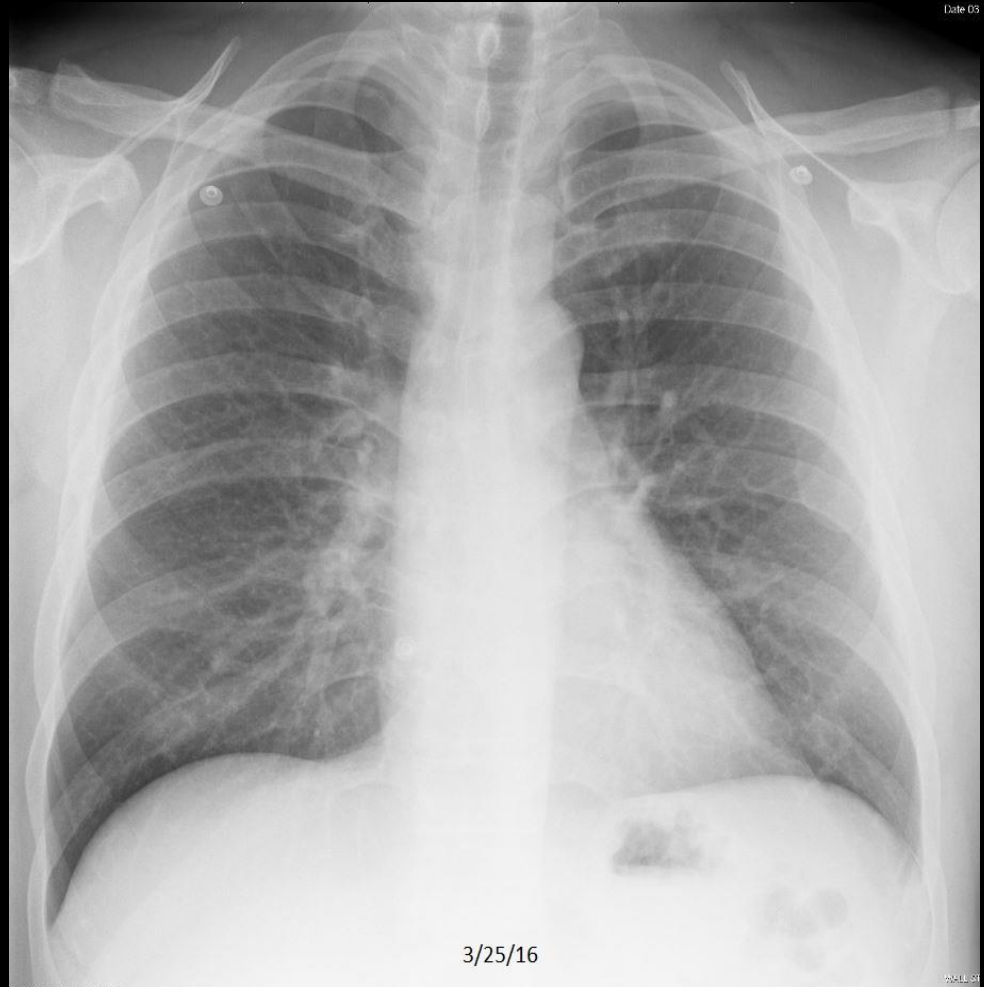
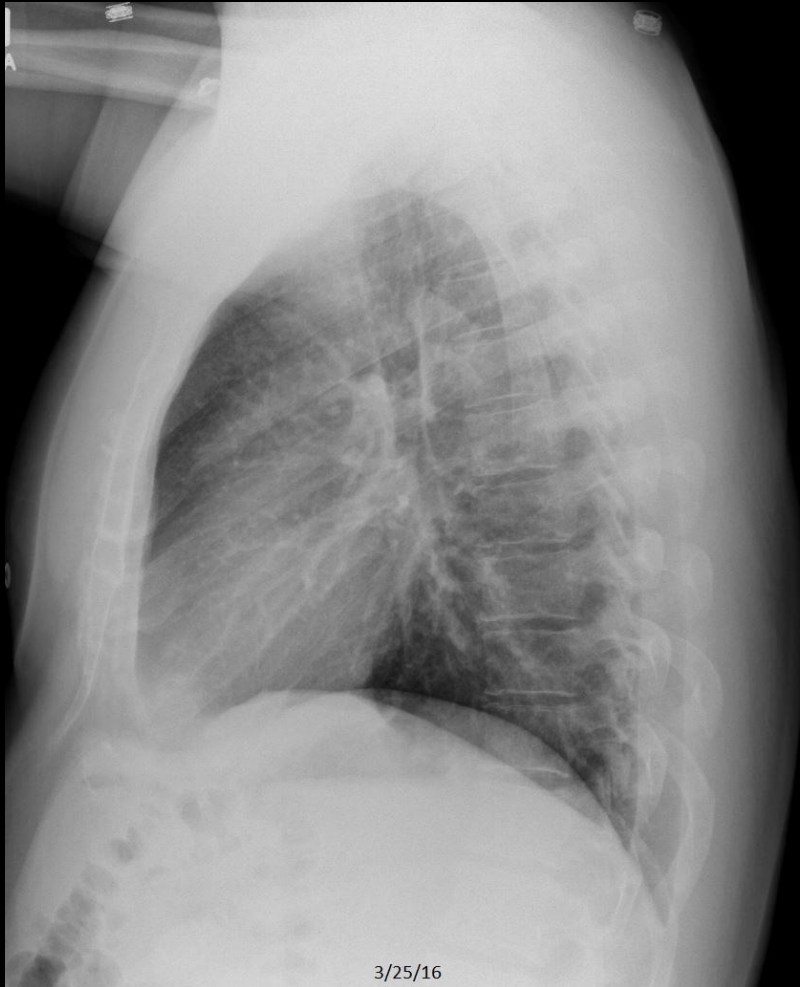
# Review Quiz Case 12 of 16

## Normal, CHF, Pneumonia, or Emphysema?



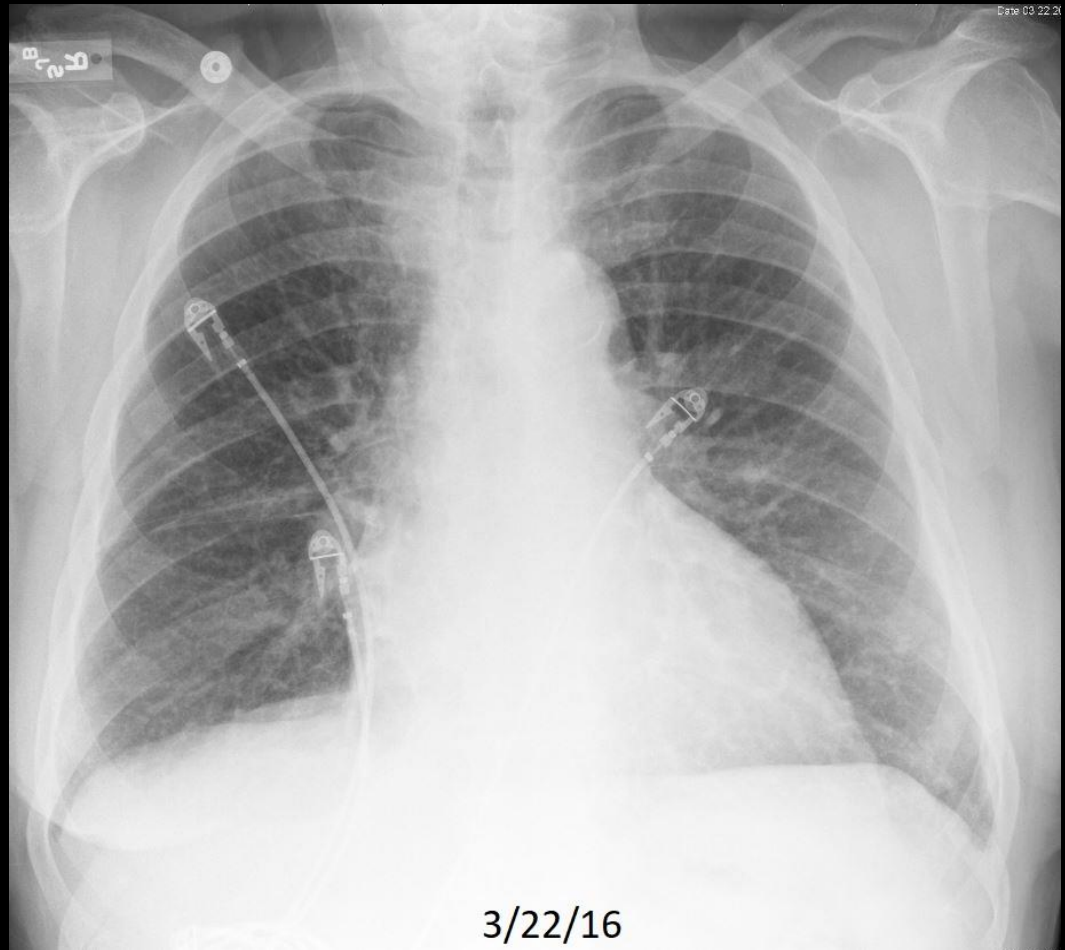
# Review Quiz Case 12 of 16

## Normal



# Review Quiz Case 13 of 16

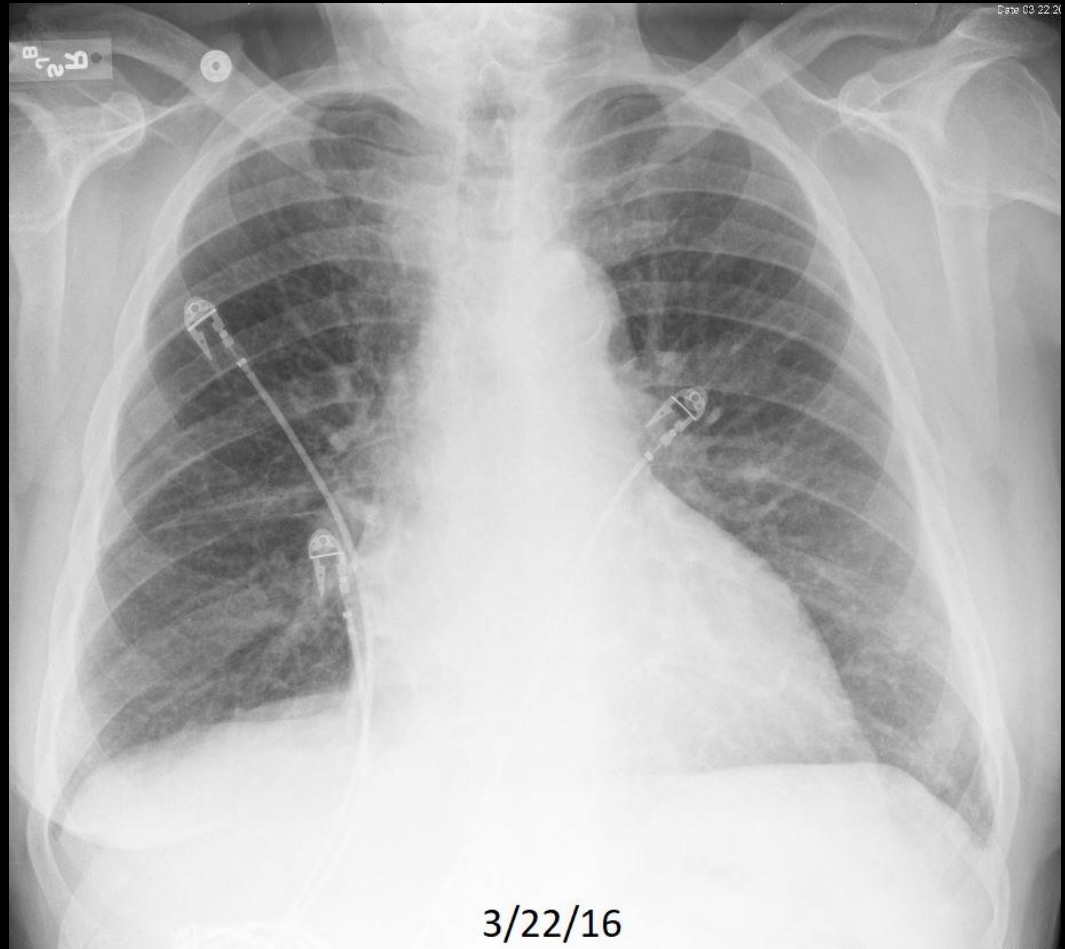
## Normal, CHF, Pneumonia, or Emphysema?





# Review Quiz Case 13 of 16

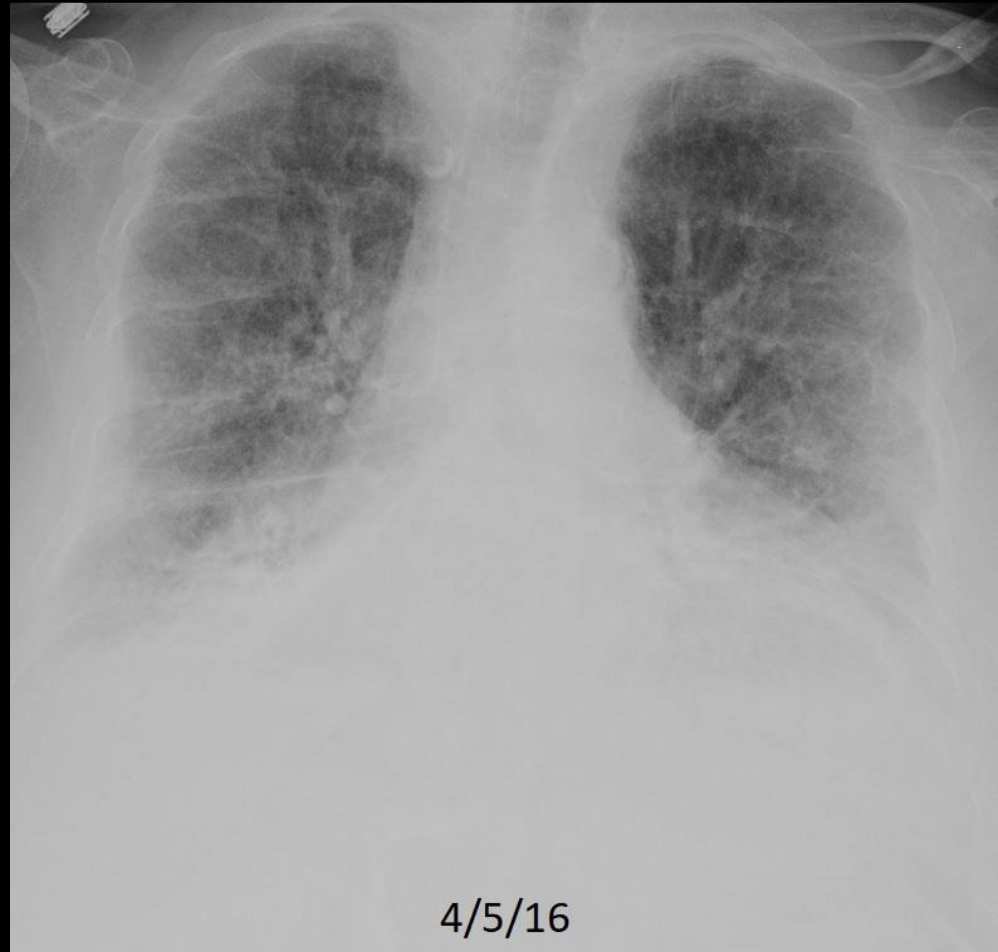
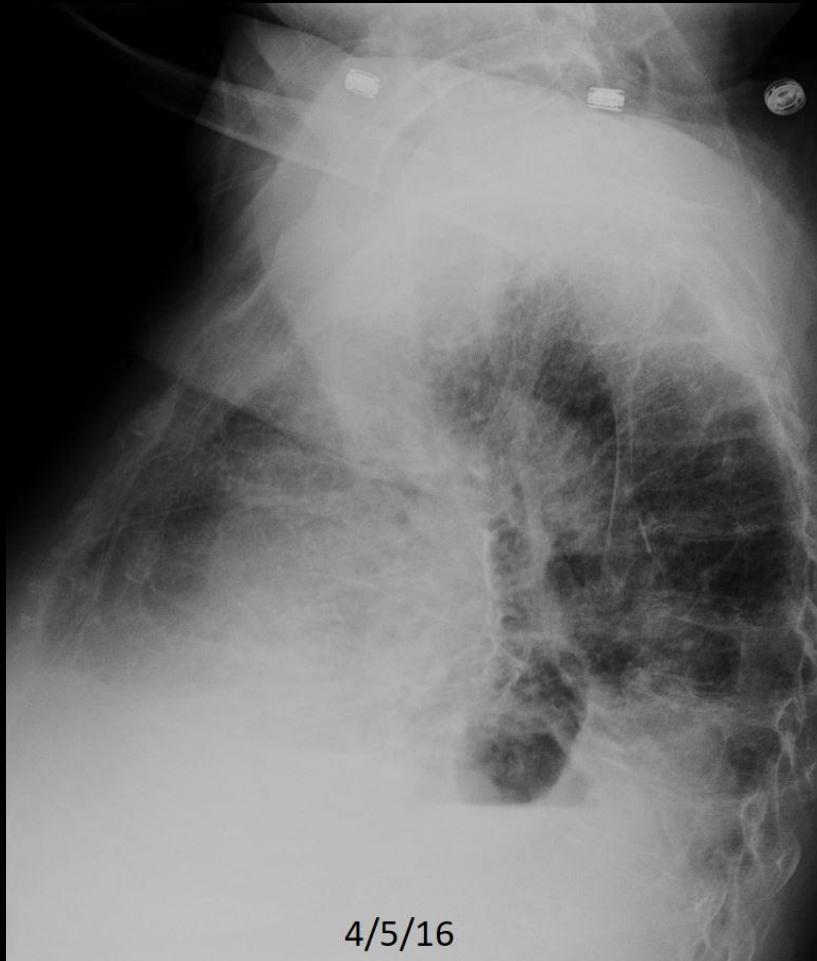
## CHF



C228. 80 year old with dyspnea. Cardiomegaly, diffuse increased lung density, and pleural effusions.

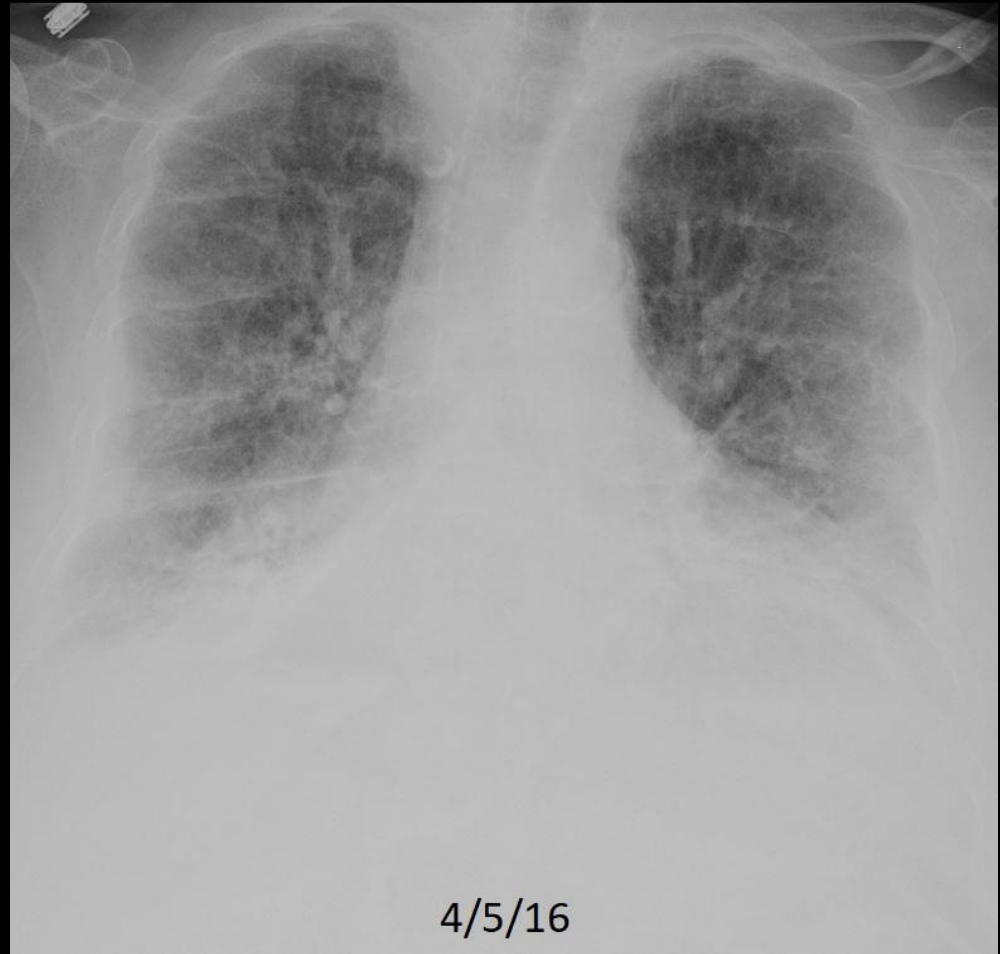
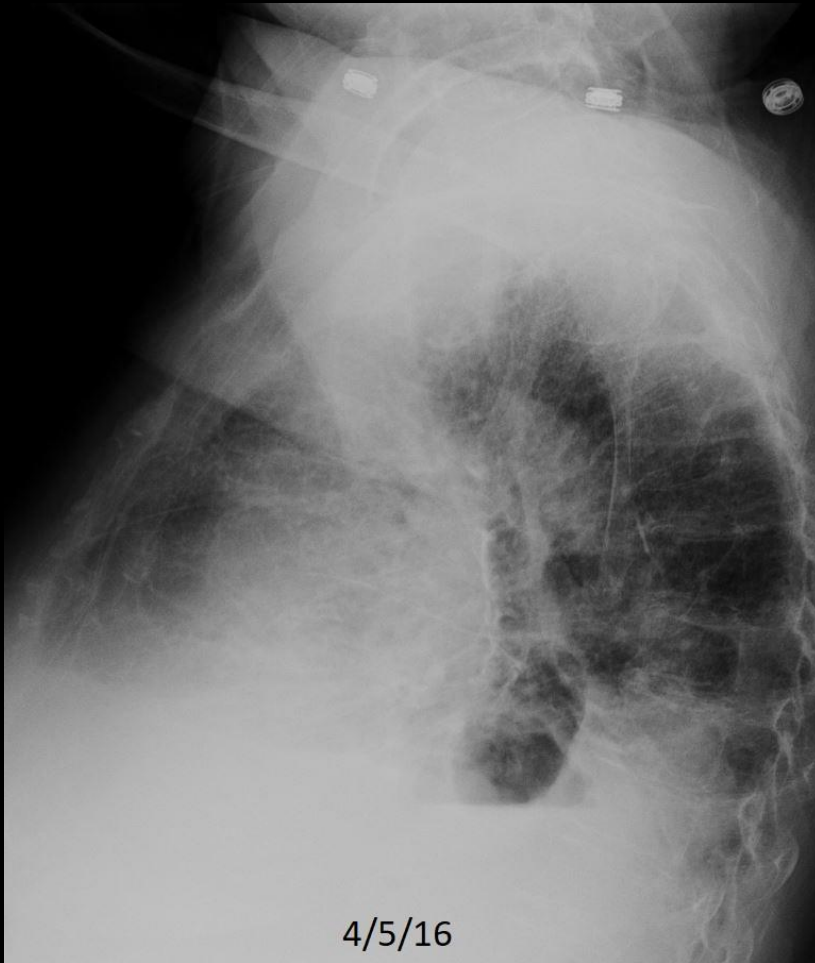
# Review Quiz Case 14 of 16

## Normal, CHF, Pneumonia, or Emphysema?



# Review Quiz Case 14 of 16

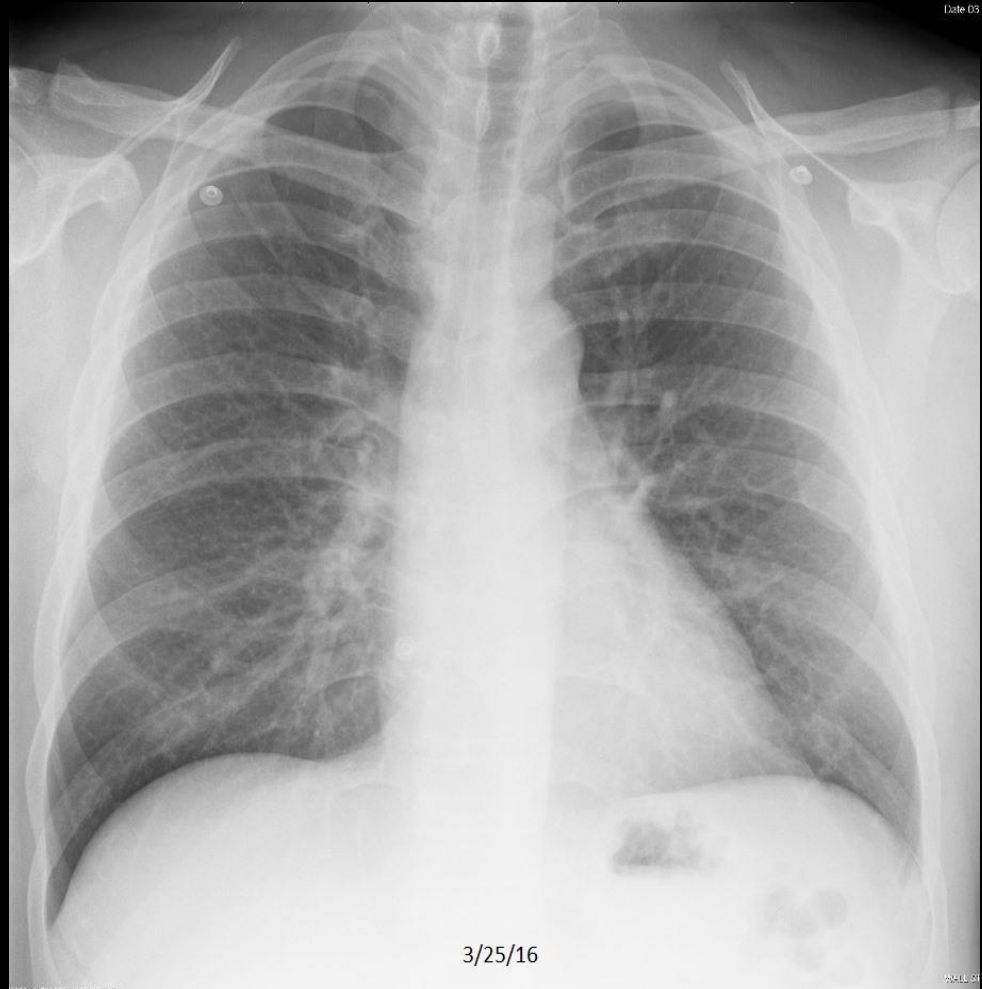
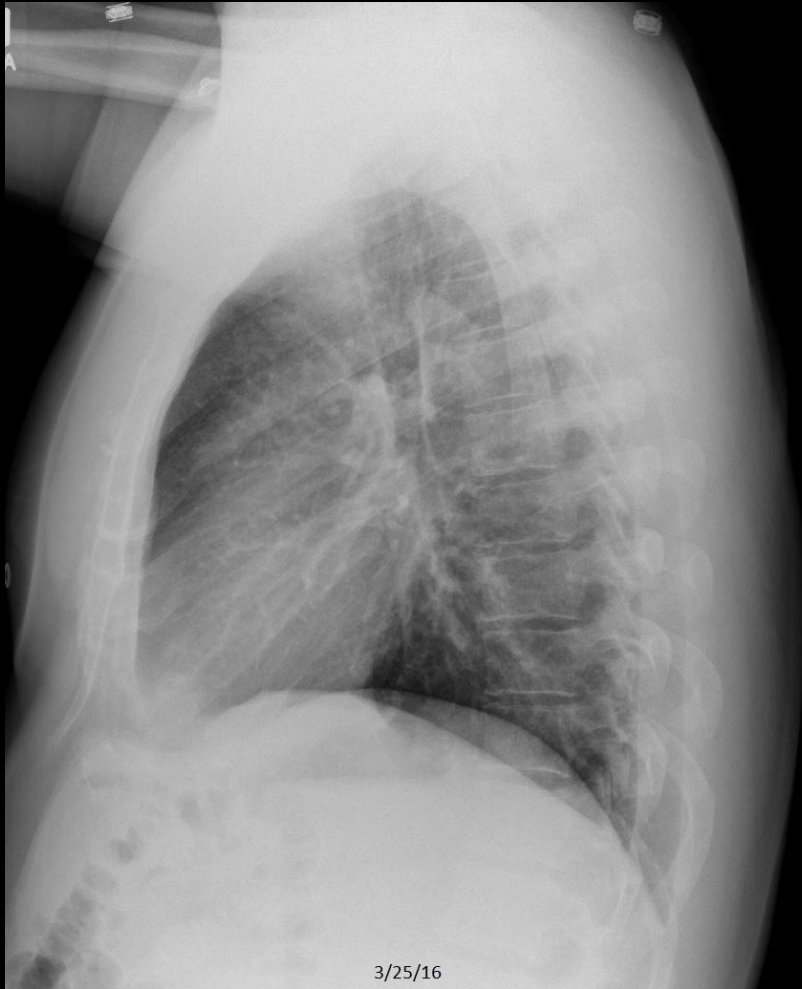
## CHF



C230. 91 year old with dyspnea. Cardiomegaly, diffuse increased lung density, pleural effusions, and pulmonary vascular redistribution. Hiatal hernia.

# Review Quiz Case 15 of 16

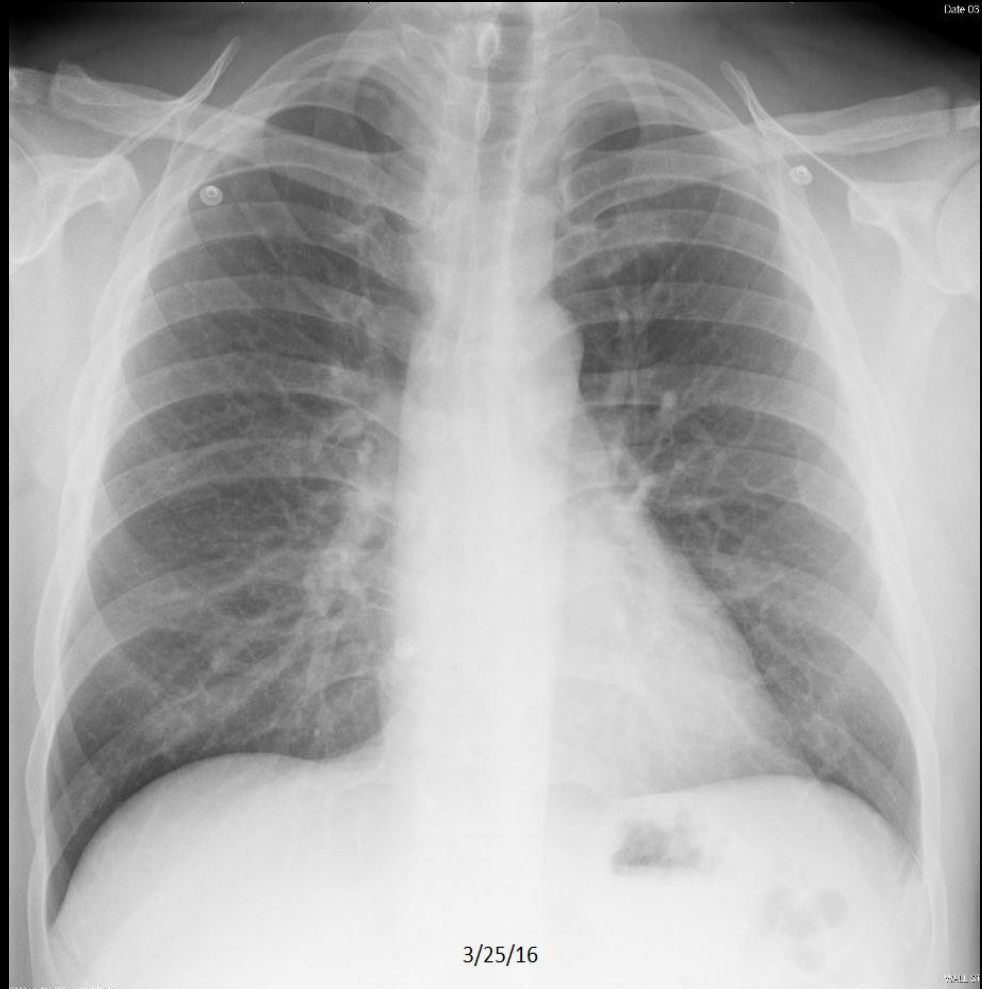
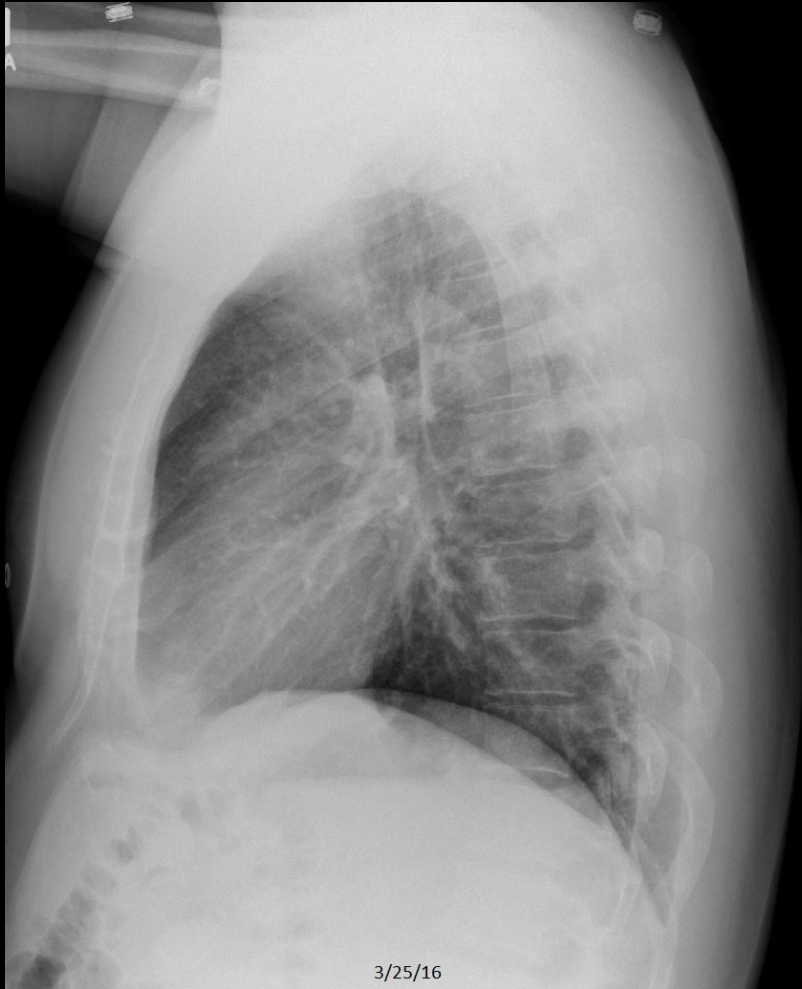
## Normal, CHF, Pneumonia, or Emphysema?





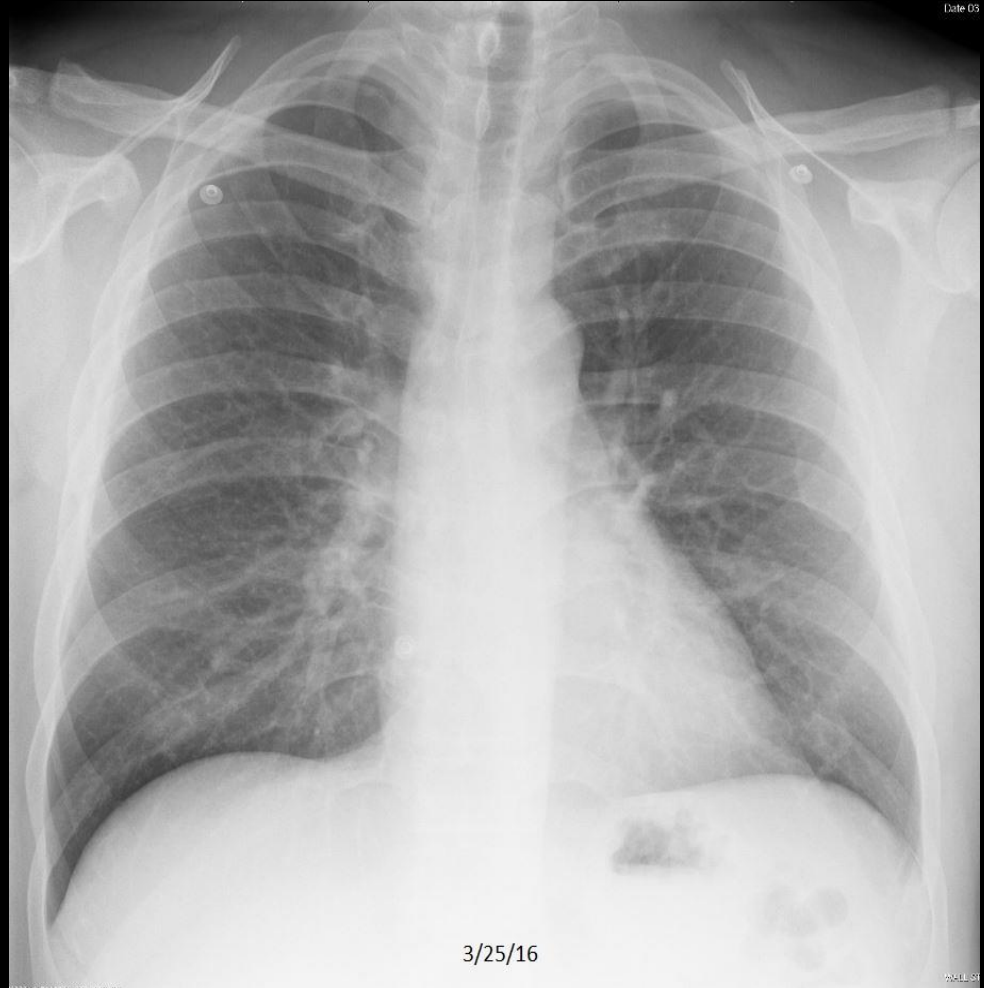
# Review Quiz Case 15 of 16

## Normal, CHF, Pneumonia, or Emphysema?



# Review Quiz Case 15 of 16

## Normal



# Review Quiz Case 16 of 16

## Normal, CHF, Pneumonia, or Emphysema?



C513. 69 year old with cough.



# Review Quiz Case 16 of 16

## Emphysema



C513. 69 year old with cough. Hyperinflated lungs with flattening of the diaphragm and increased anterior clear space. **Incidentally noted is a healed right 6<sup>th</sup> rib fracture.**



# RECAPITULATION

## EMPHYSEMA

INDICATIONS: dyspnea, cough, hyper-resonant lungs, history of smoking.

FINDINGS: hyperinflated lungs (flattened diaphragm, increased anterior clear space, reduced heart size), bullae.

# UpToDate Points

“Emphysema is a pathologic term that describes some of the structural changes sometimes associated with chronic obstructive pulmonary disease. These changes include abnormal and permanent enlargement of the airspaces distal to the terminal bronchioles that is accompanied by destruction of the airspace walls, without obvious fibrosis.”

“Chest radiography and computed tomography are typically performed in patients with COPD when the cause of dyspnea or sputum production is unclear and during acute exacerbations to exclude complicating processes (e.g., pneumonia, pneumothorax, heart failure).”

“Plain chest radiographs have a poor sensitivity for detecting COPD [50% sensitivity for COPD of moderate severity].”

Han MK, Dransfield MT, and Martinez FJ. Chronic obstructive pulmonary disease: definition, clinical manifestations, diagnosis, and staging. UpToDate, accessed 3/29/20 (last updated 3/25/20).

Chest Radiography  
End of Lecture 4  
Emphysema

Go to Lecture 5  
Cardiomegaly