

Chest Radiography

Lecture 12

Free Air

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www.foxvalleyradiology.com

FREE AIR

PNEUMOTHORAX

PNEUMOMEDIASTINUM

SUBCUTANEOUS EMPHYSEMA

PNEUMOPERITONEUM

INDICATIONS: dyspnea, chest pain, tachycardia, hypotension.

FINDINGS:

Pneumothorax: Gas in the pleural space with visualization of the pleural line.

Pneumomediastinum: Gas in the soft tissues of the mediastinum.

Subcutaneous emphysema: Gas in the chest or abdominal wall.

Pneumoperitoneum: Gas in the abdominal cavity outside the bowel lumen.

IMPRESSION: Pneumothorax, pneumomediastinum, pneumoperitoneum, or subcutaneous emphysema. Call critical results.

FREE AIR

PNEUMOTHORAX

PNEUMOMEDIASTINUM

SUBCUTANEOUS EMPHYSEMA

PNEUMOPERITONEUM

COMMENT: This category contains several findings/diagnoses, all of which have the common finding of gas in an abnormal location. While these terms are of a “diagnosis” they are also indicative of other diseases. Pneumothorax and pneumomediastinum have similar causes. Subcutaneous emphysema may be secondary to pneumothorax or the result of a chest wall wound. Pneumoperitoneum is usually the result of bowel perforation.

These findings are of critical importance (even when subtle) and generally require immediate notification of the ordering physician: a small pneumothorax may expand to a larger pneumothorax which compromises respiratory function, and pneumoperitoneum usually indicates bowel perforation which can result in peritonitis.

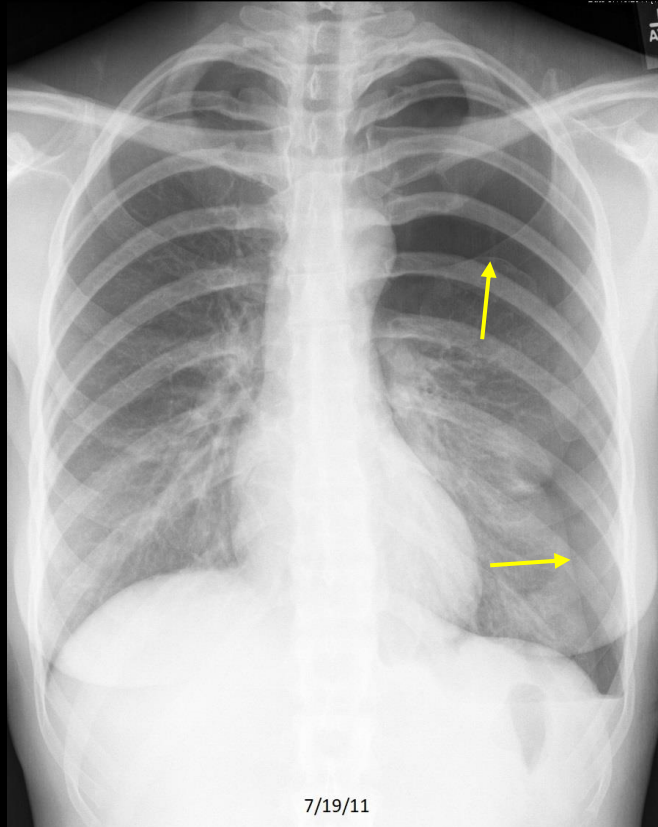
PNEUMOTHORAX



7/19/11

C667. 35 year old woman with acute chest pain and dyspnea. There is separation of the pleural stripe from the chest wall, with intervening absence of lung markings.

PNEUMOTHORAX

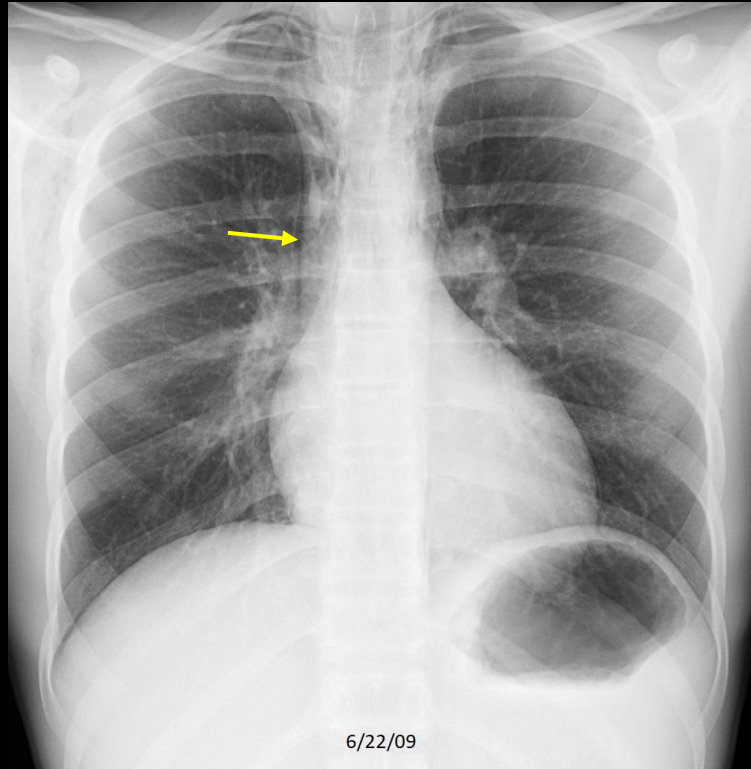
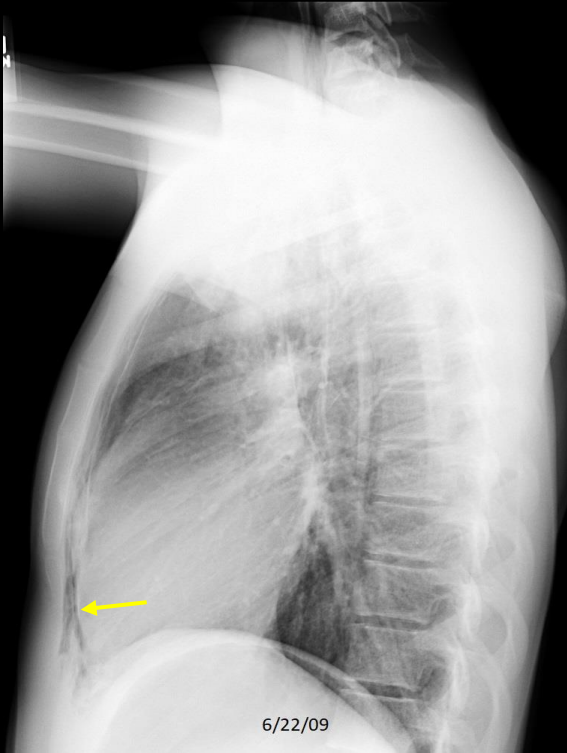


C667. 35 year old woman with acute chest pain and dyspnea. There is separation of the pleural stripe from the chest wall, with intervening absence of lung markings.

PNEUMOMEDIASTINUM



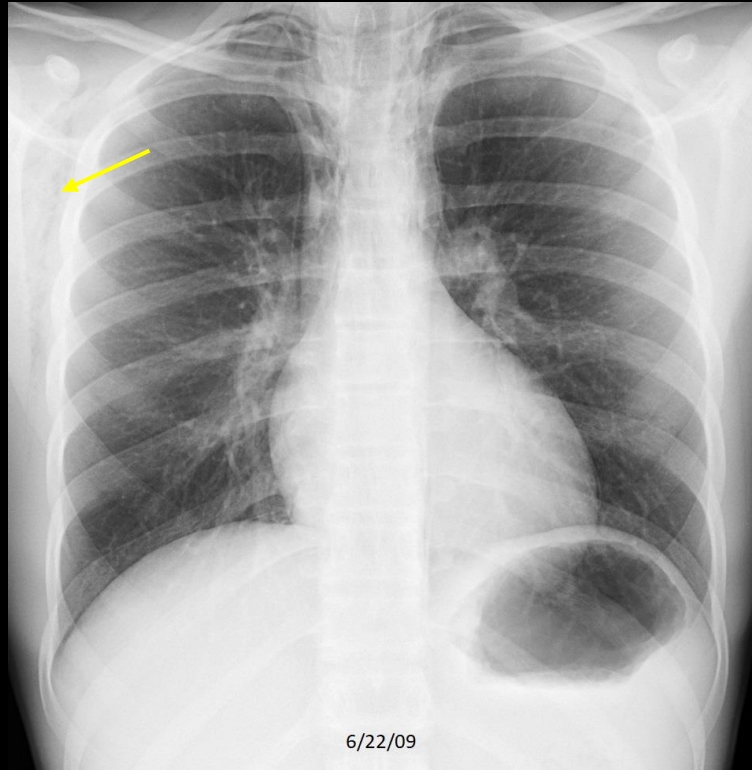
PNEUMOMEDIASTINUM

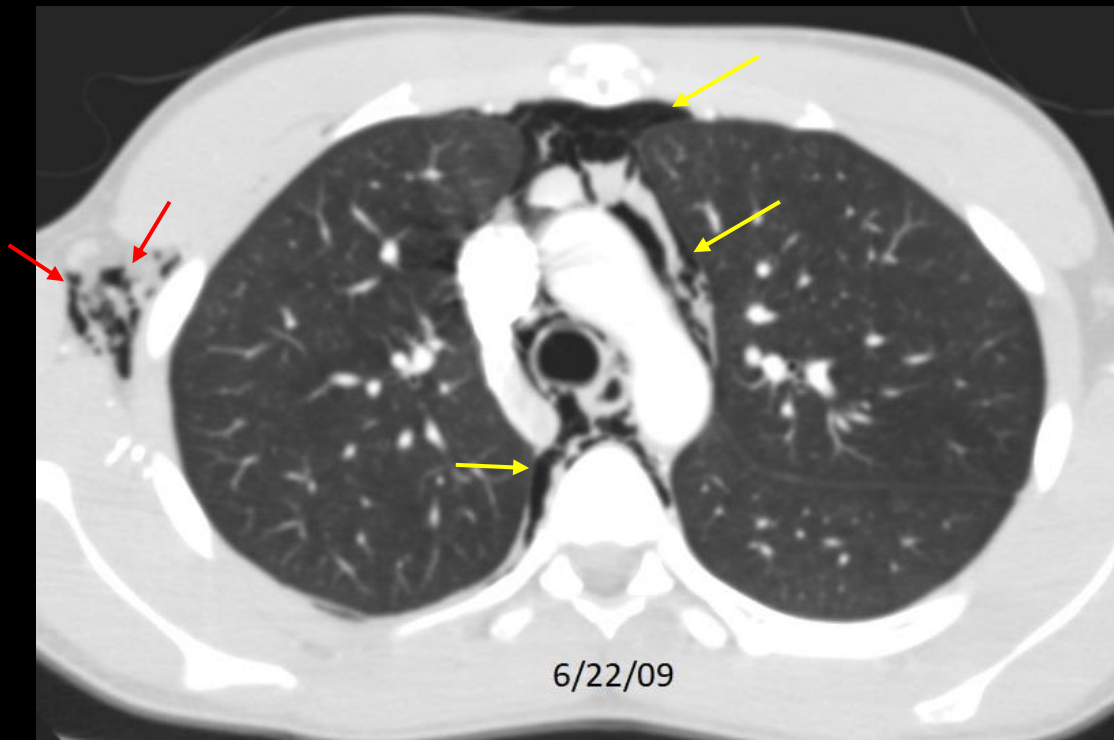


SUBCUTANEOUS EMPHYSEMA



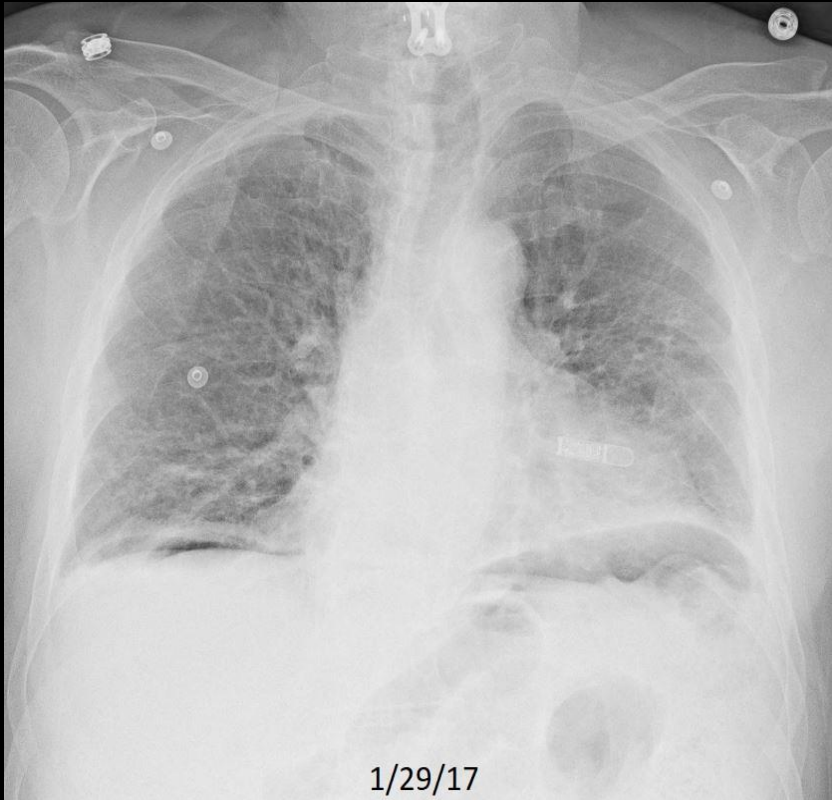
SUBCUTANEOUS EMPHYSEMA





C441. 7 year old with chest pain after playing soccer. Pneumomediastinum and subcutaneous emphysema.

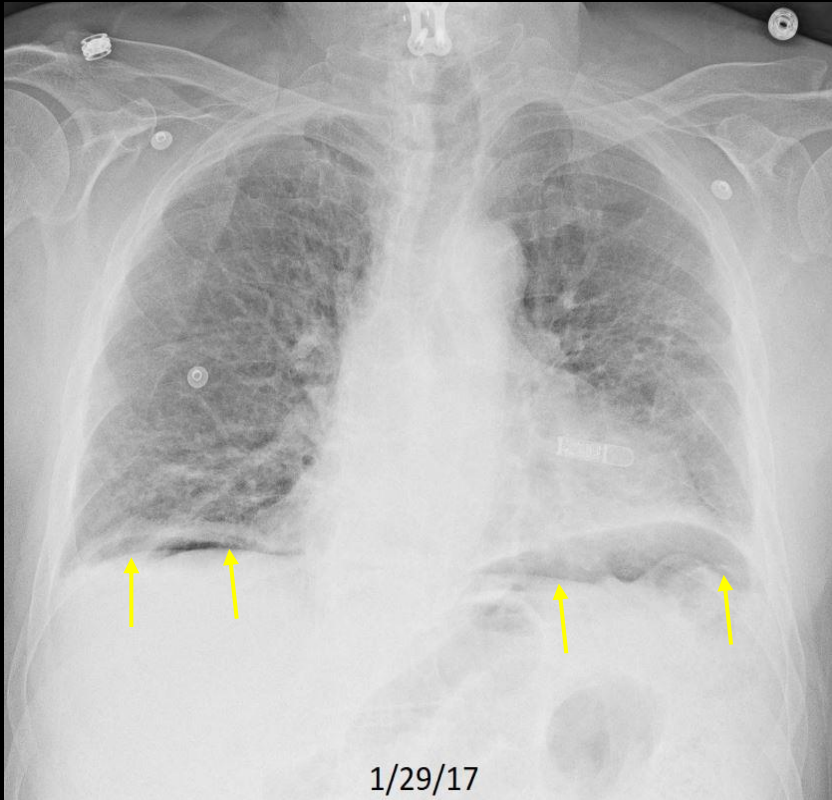
PNEUMOPERITNEUM



1/29/17

C647. Chest pain. Pneumoperitoneum from bowel perforation. Cardiomegaly, pulmonary vascular redistribution, and diffuse increase lung density from congestive heart failure. Cervical fusion plate.

PNEUMOPERITNEUM

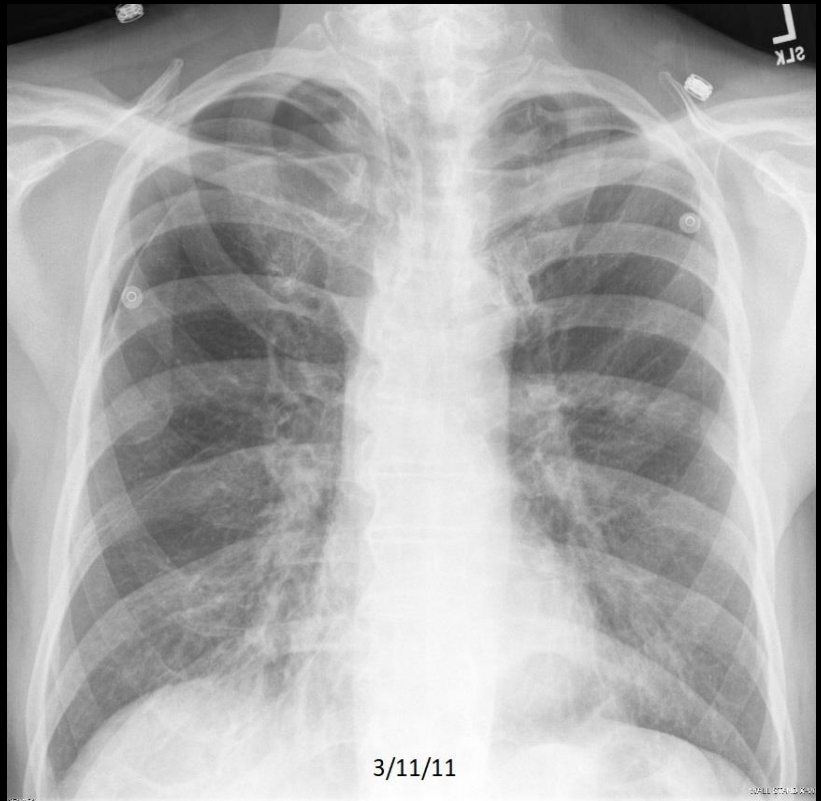


C647. Chest pain. **Pneumoperitoneum** from bowel perforation. Cardiomegaly, pulmonary vascular redistribution, and diffuse increase lung density from congestive heart failure. Cervical fusion plate.

PNEUMOTHORAX

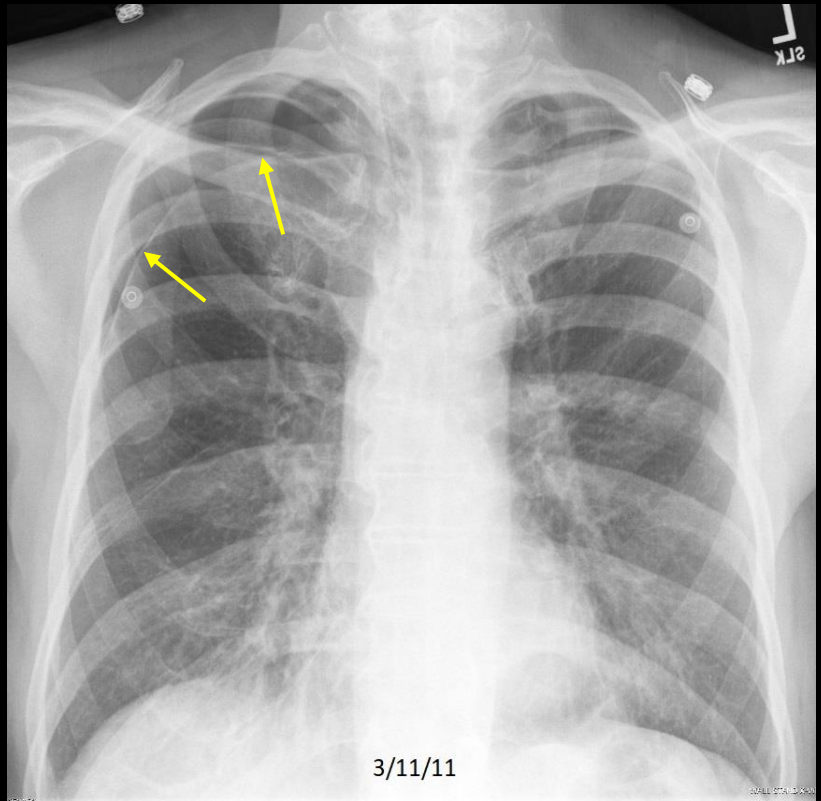
EXAMPLES

Example 1 of 5



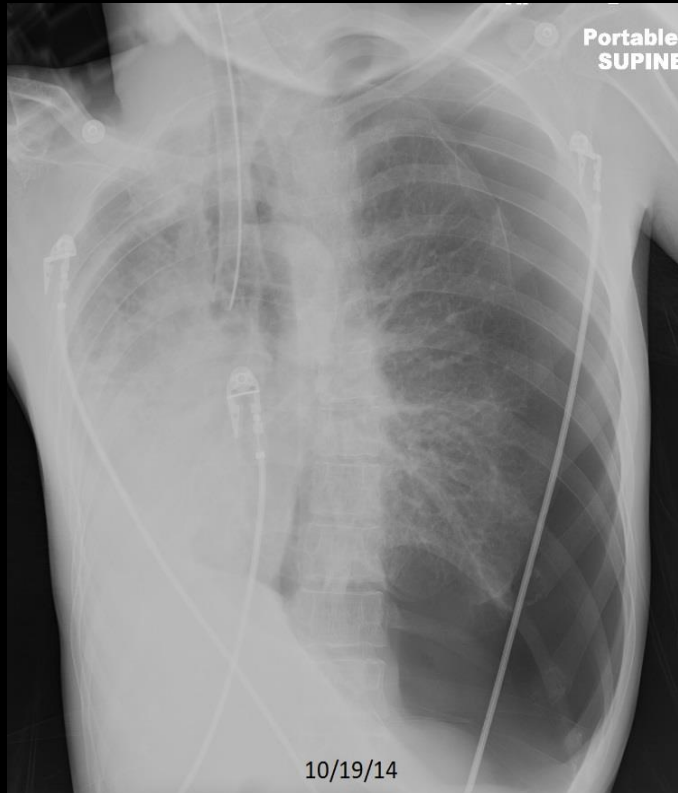
C112. 78 year old man with acute onset of dyspnea. There is a right pneumothorax.

Example 1 of 5



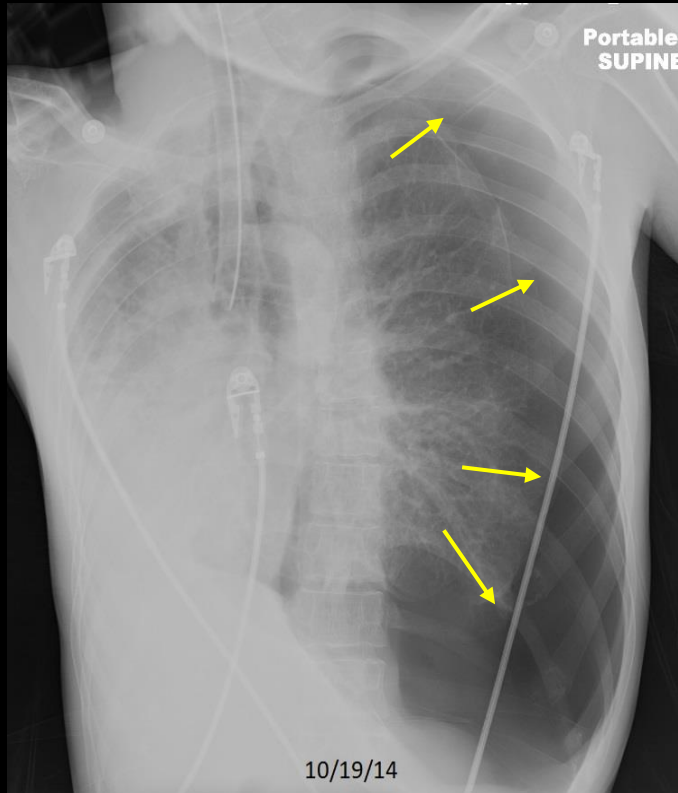
C112. 78 year old man with acute onset of dyspnea. There is a **right pneumothorax**.

Example 2 of 5



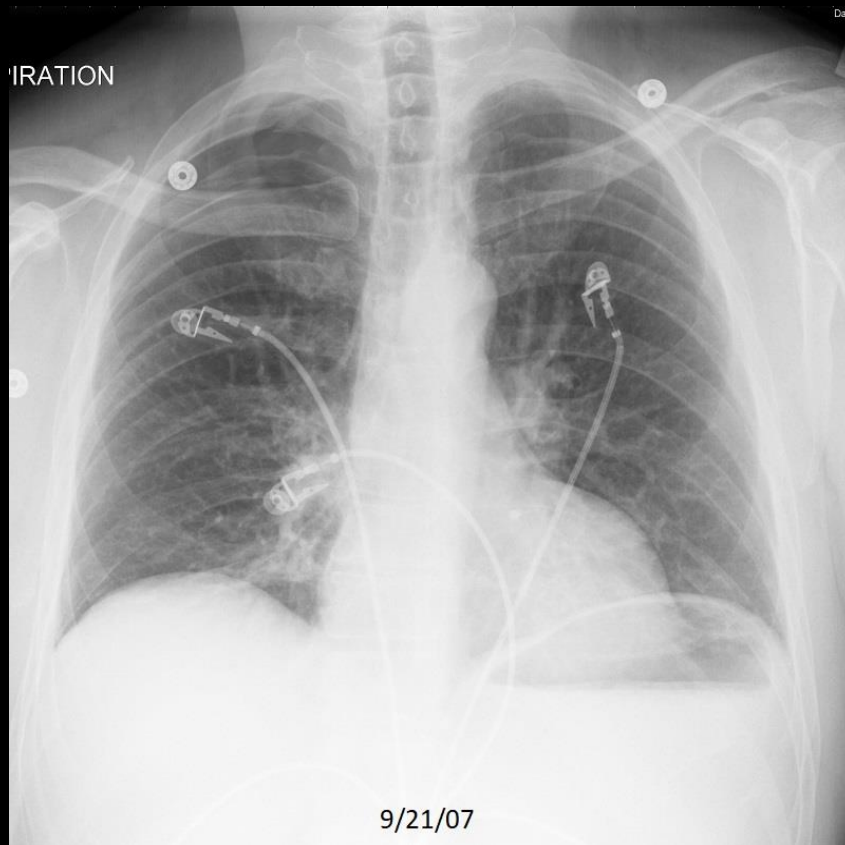
C116. 25 year old with acute onset shortness of breath and chest pain. There is a tension left pneumothorax.

Example 2 of 5



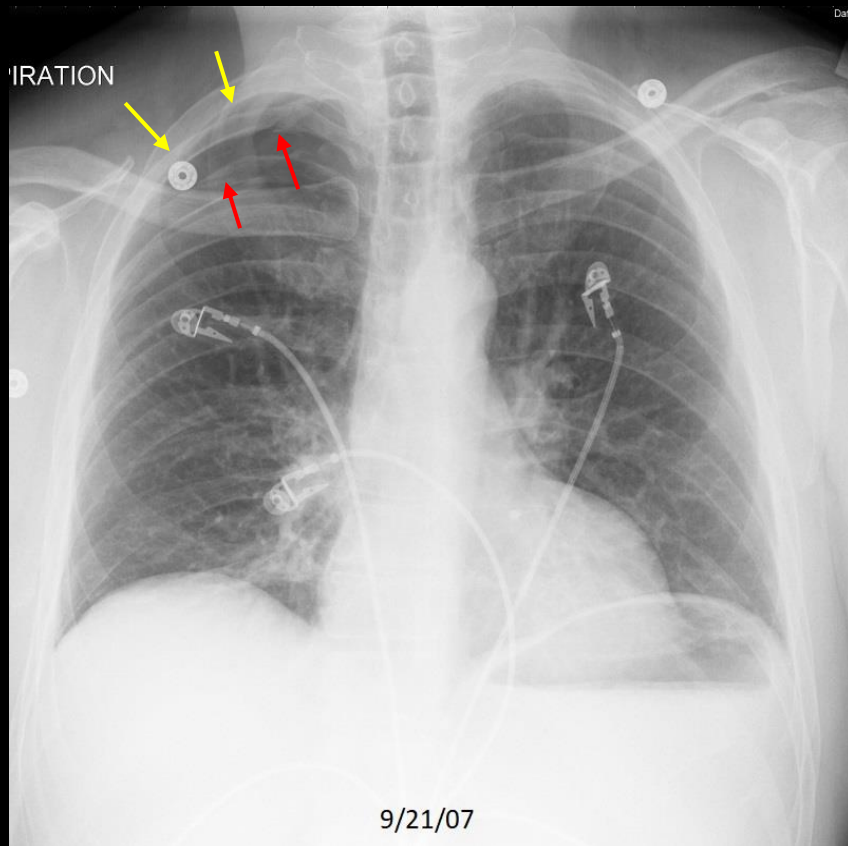
C116. 25 year old with acute onset shortness of breath and chest pain. There is **left tension pneumothorax**. ET tube.

Example 3 of 5



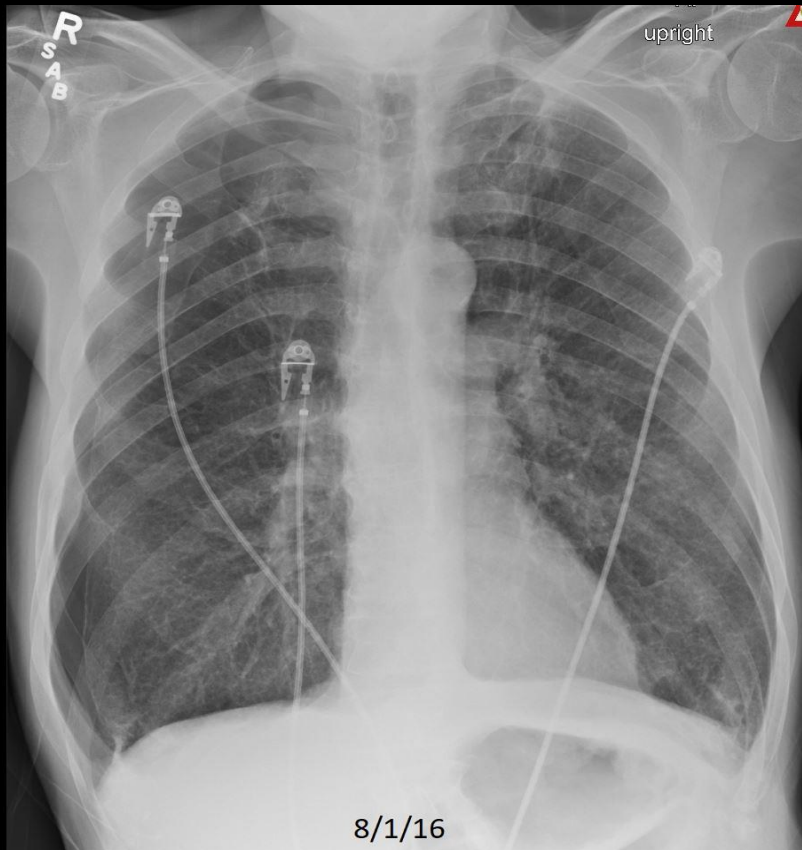
C181. 55 year old man with acute chest pain following injury. Pneumothorax (pleural stripe is not well seen but there is a paucity of lung markings in the right lung apex) and rib fractures.

Example 3 of 5

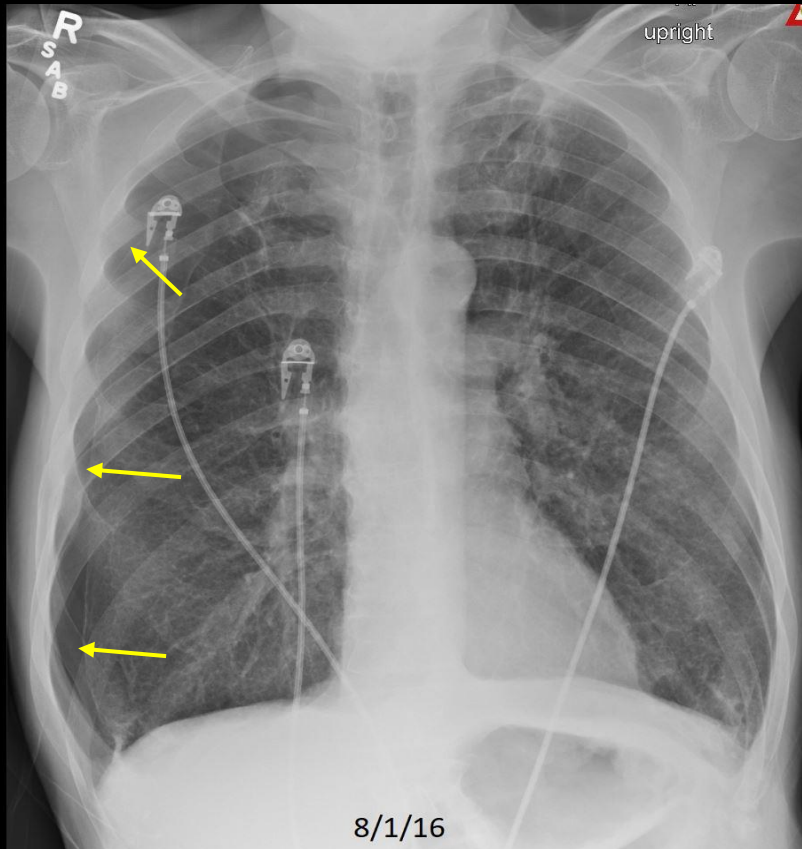


C181. 55 year old man with acute chest pain following injury. Pneumothorax (pleural stripe is not well seen but there is a **paucity of lung markings in the right lung apex**) and **rib fractures**.

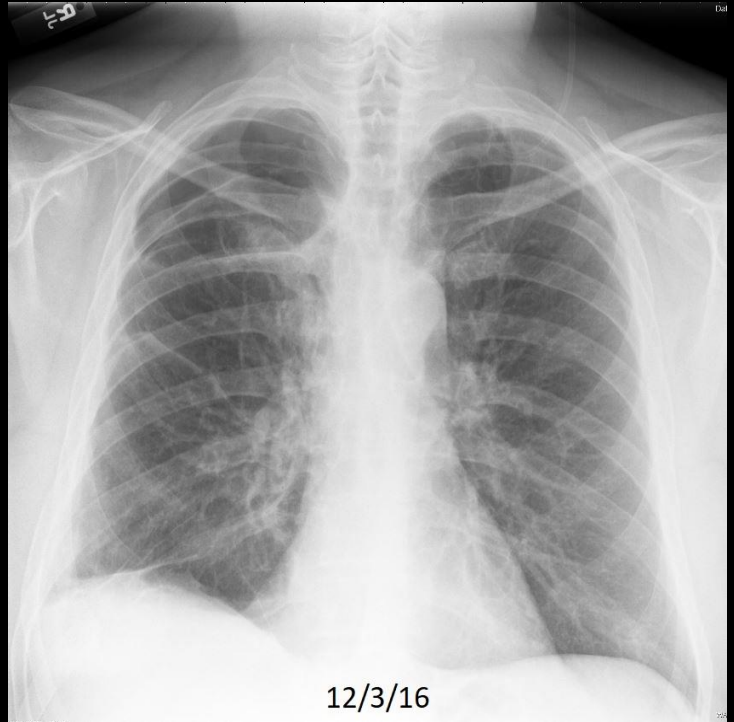
Example 4 of 5



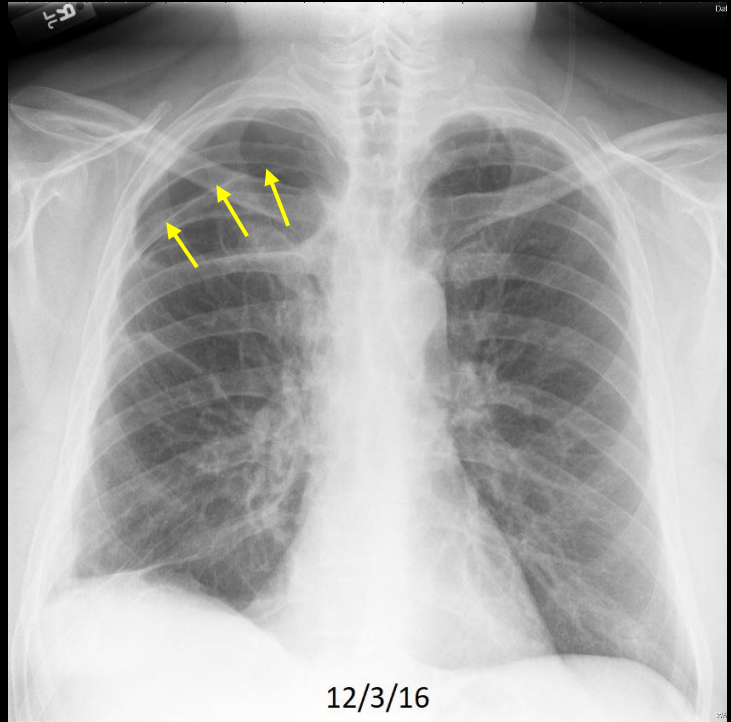
Example 4 of 5



Example 5 of 5



Example 5 of 5

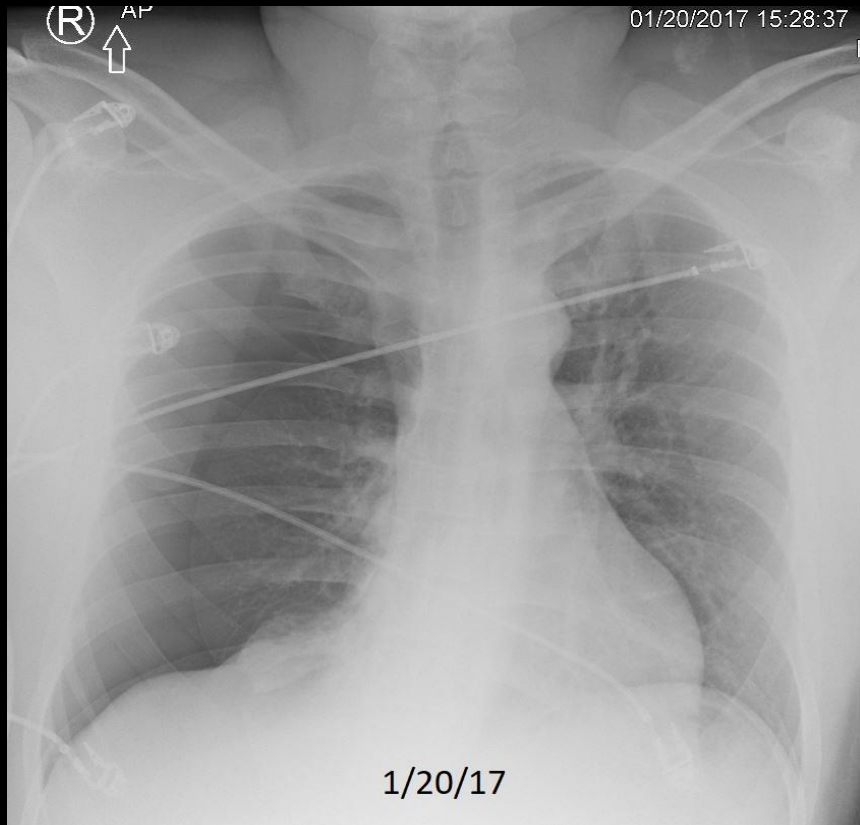


QUIZ

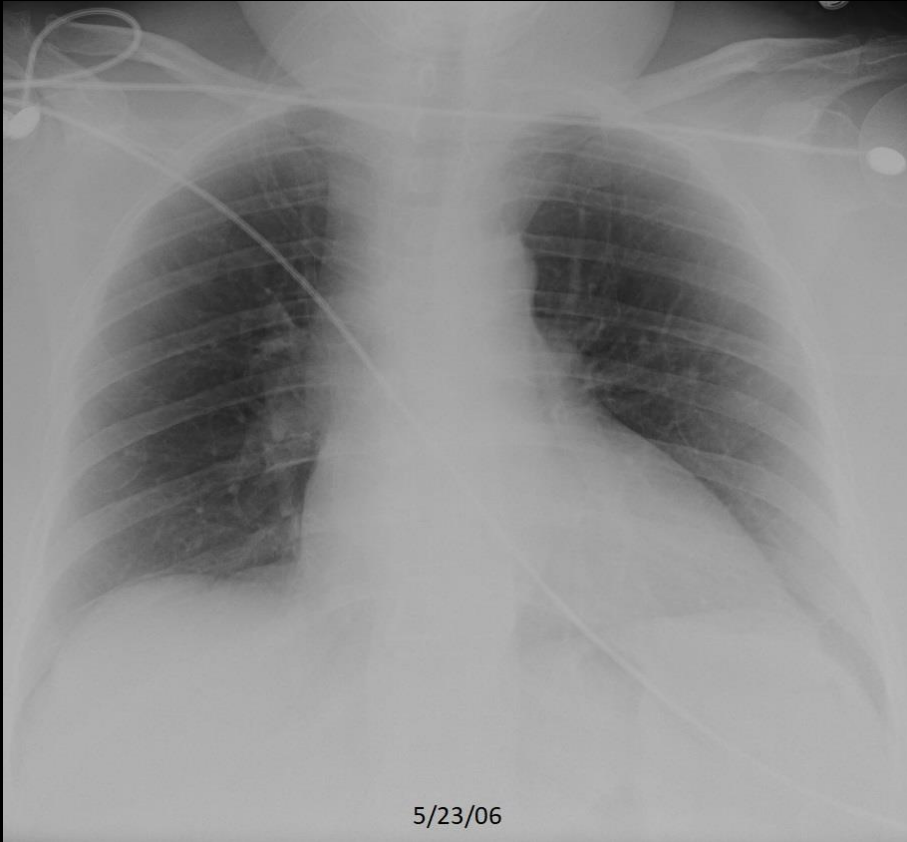
NORMAL VERSUS PNEUMOTHORAX

Select which CXR shows Pneumothorax
(a or b)
for the following 5 pairs of cases

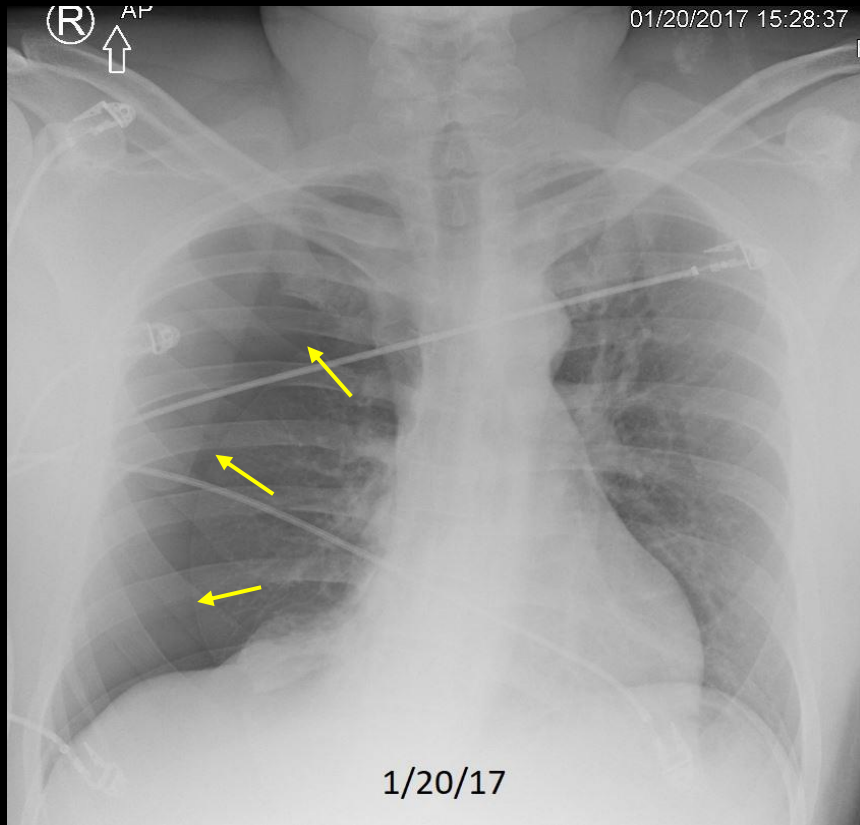
Quiz Case 1 of 5 - A



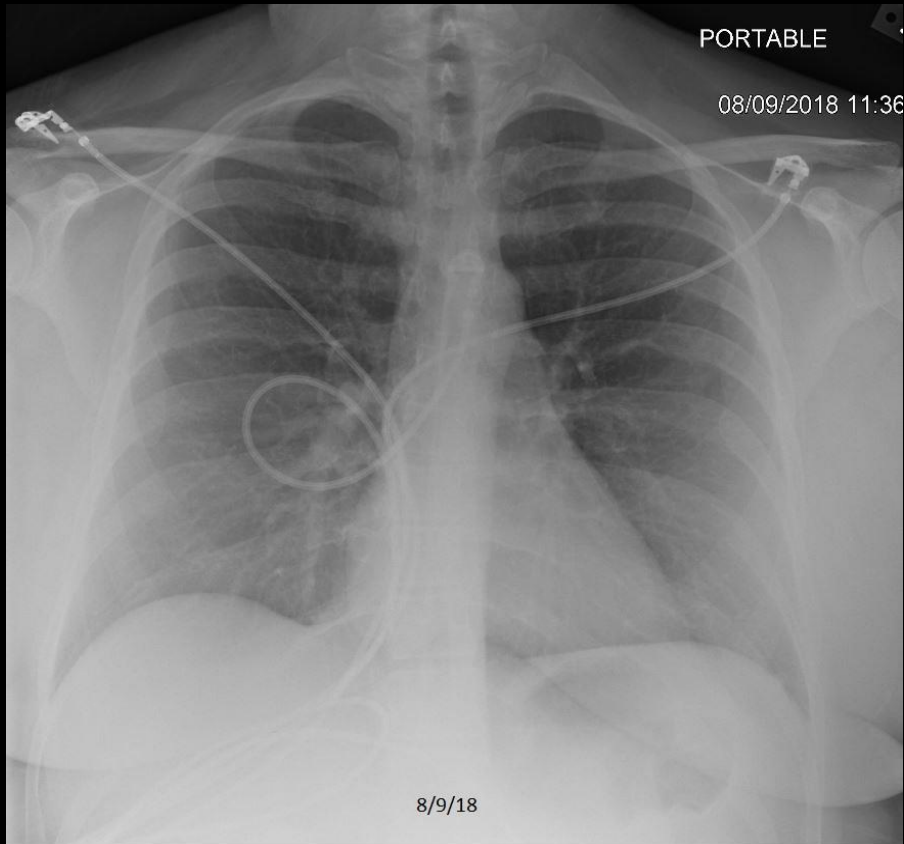
Quiz Case 1 of 5 - B



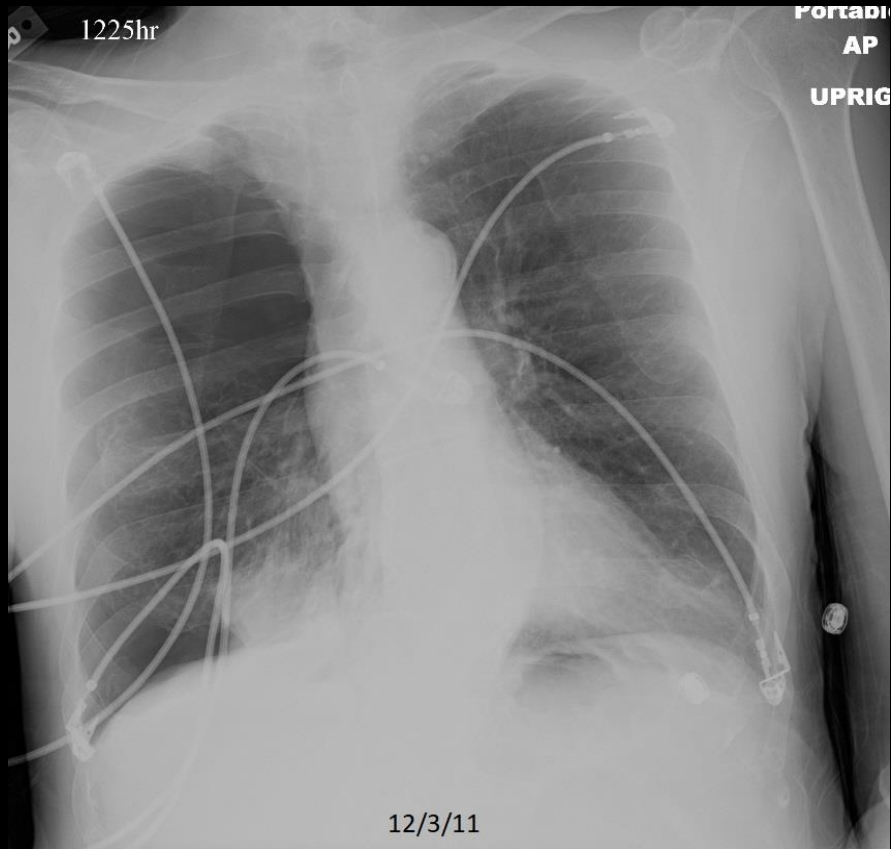
Quiz Case 1 of 5 – A shows Pneumothorax



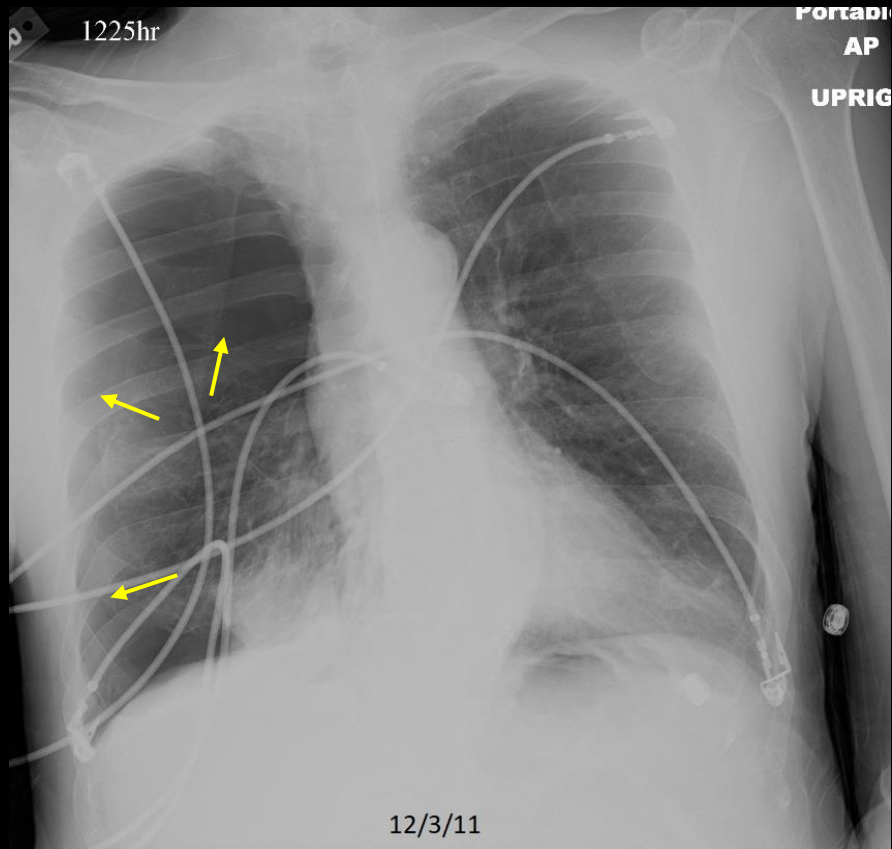
Quiz Case 2 of 5 - A



Quiz Case 2 of 5 - B

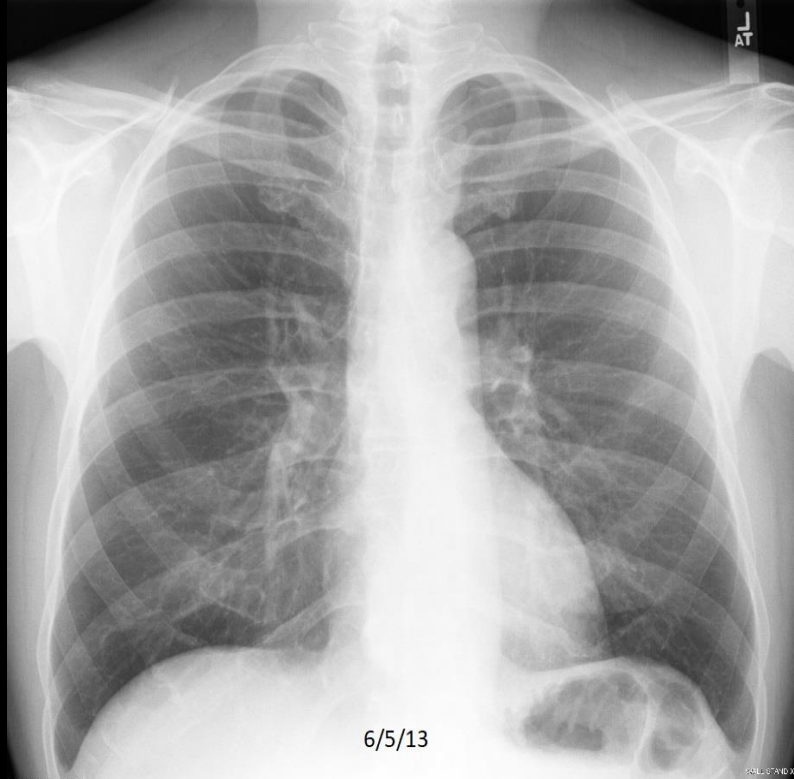


Quiz Case 2 of 5 - B

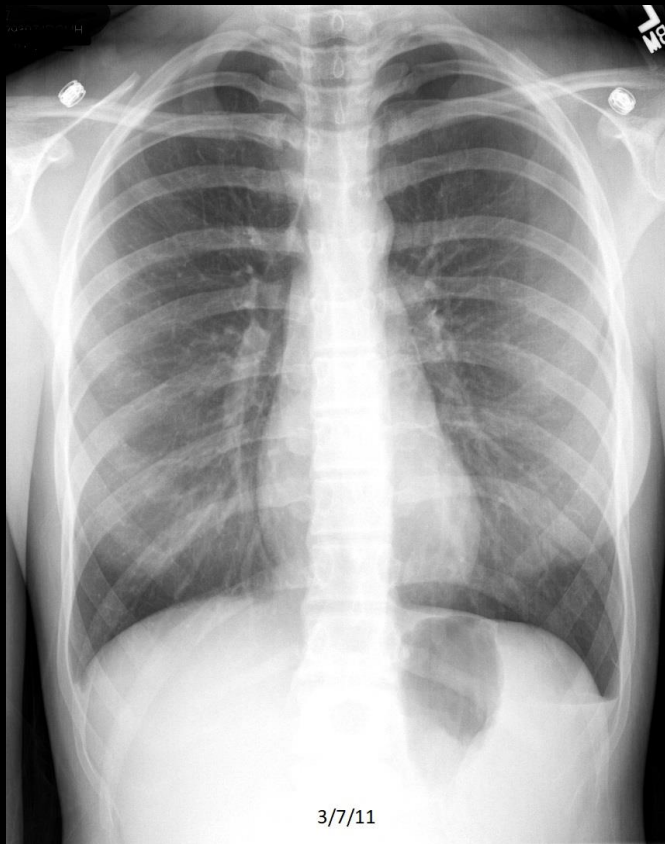


C327. 69 year old with acute dyspnea. There is a right pneumothorax.

Quiz Case 3 of 5 - A

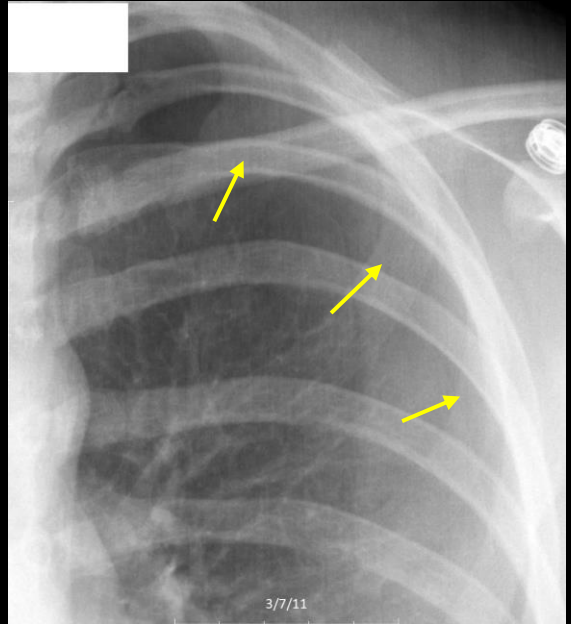
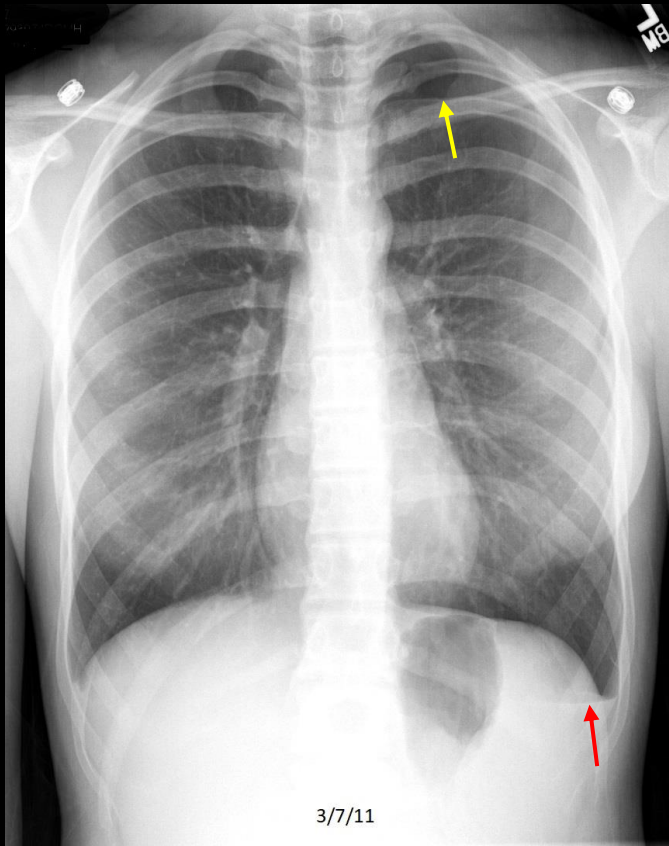


Quiz Case 3 of 5 - B



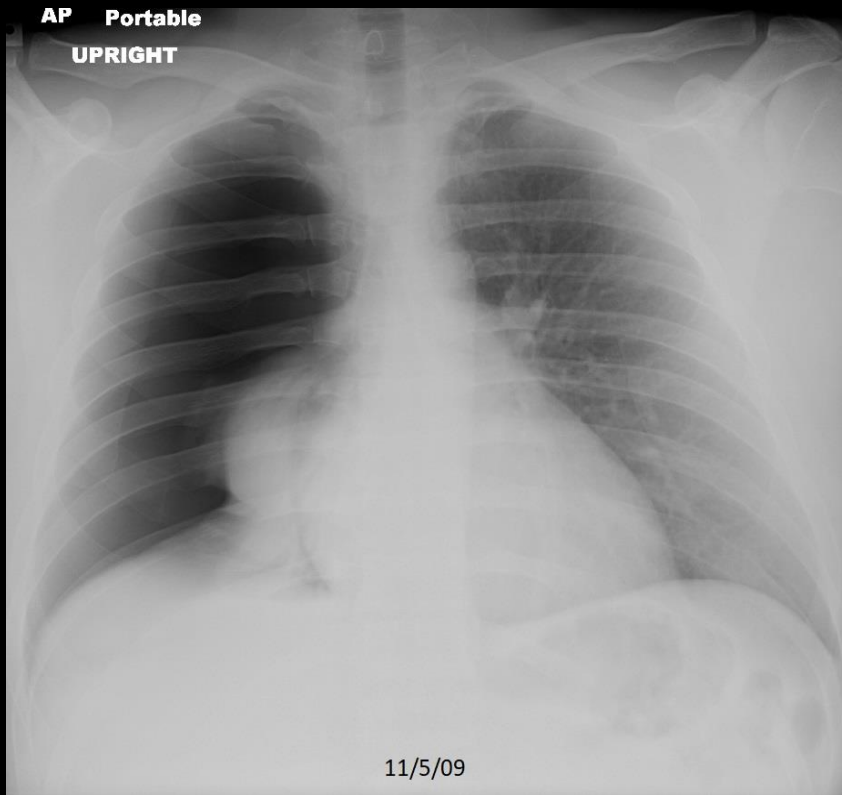
C328. 17 y/o woman with acute chest pain and dyspnea following swinging a bat.

Quiz Case 3 of 5 - B



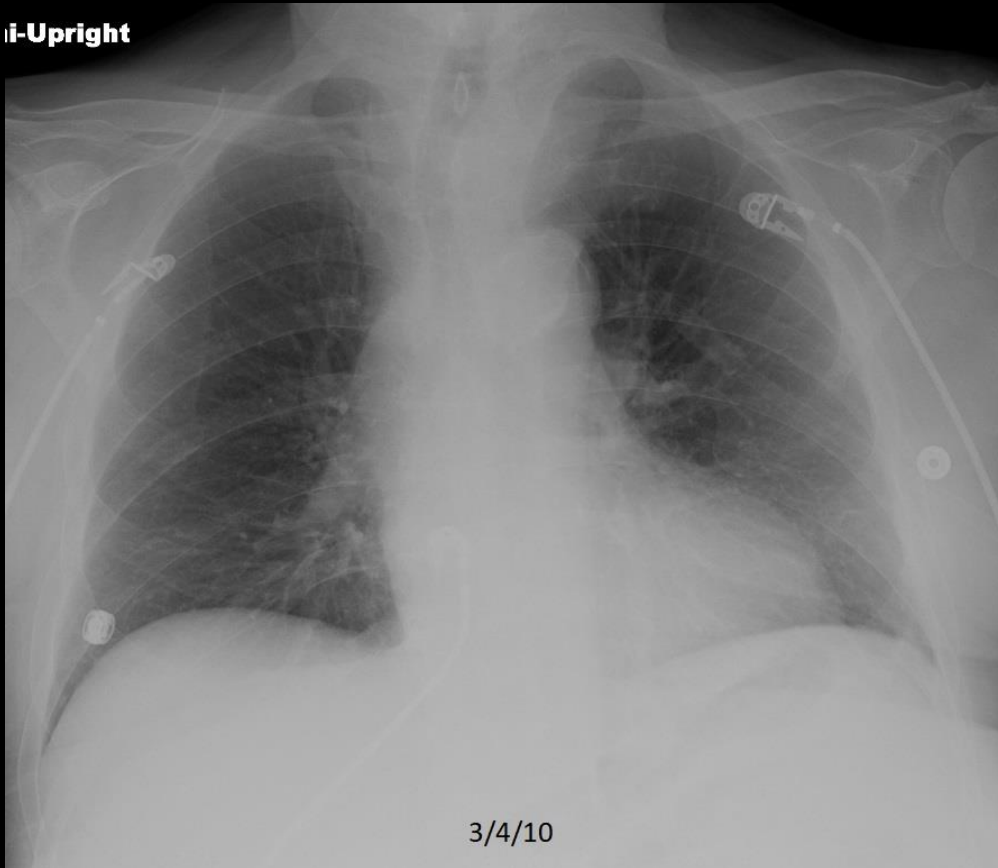
C328. 17 y/o woman with acute chest pain and dyspnea following swinging a bat. There is a subtle **left apical pneumothorax**, along with a fluid collection in the left lung with a **gas/fluid interface in the left base**.

Quiz Case 4 of 5 - A



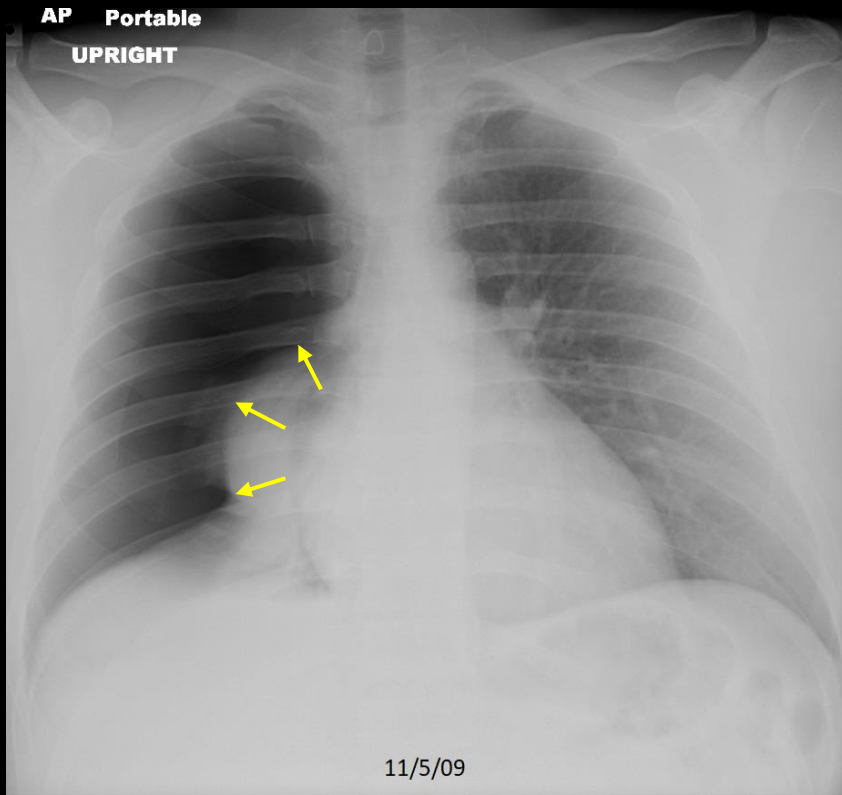
Quiz Case 4 of 5 - B

i-Upright



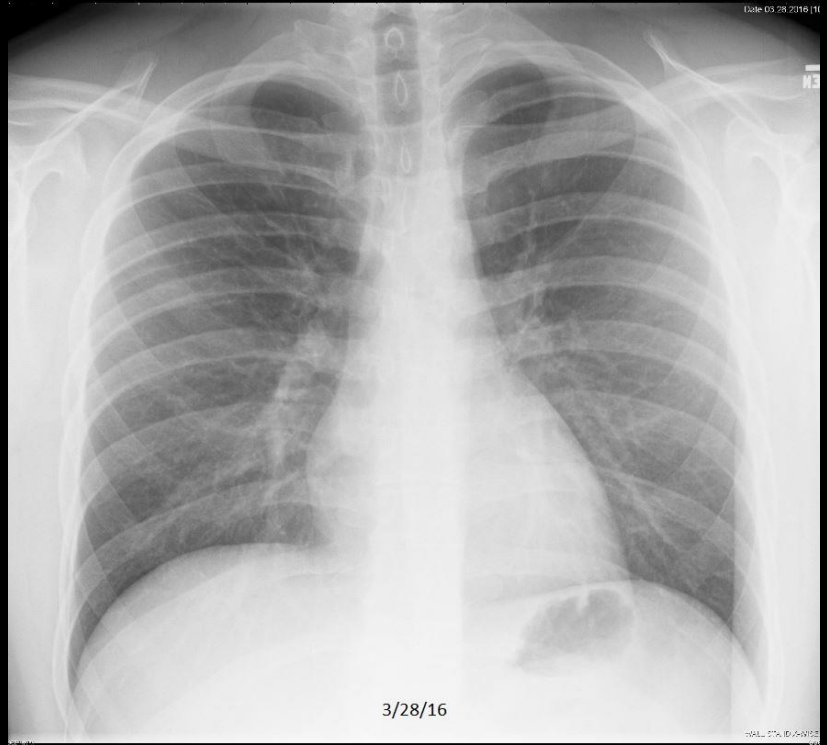
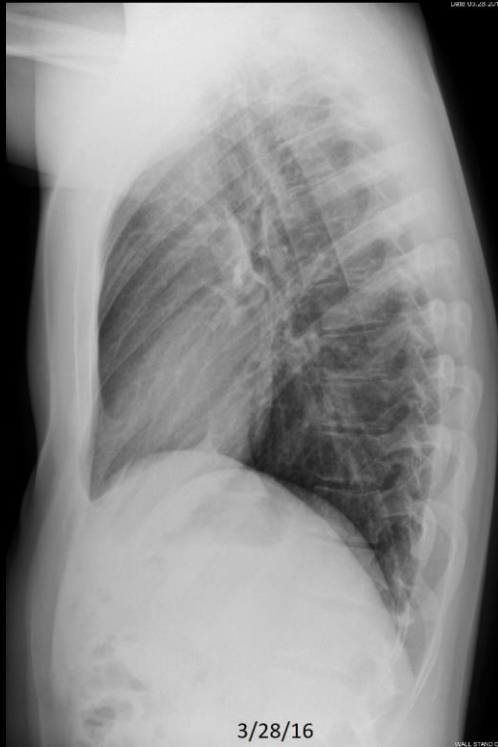
3/4/10

Quiz Case 4 of 5 - A

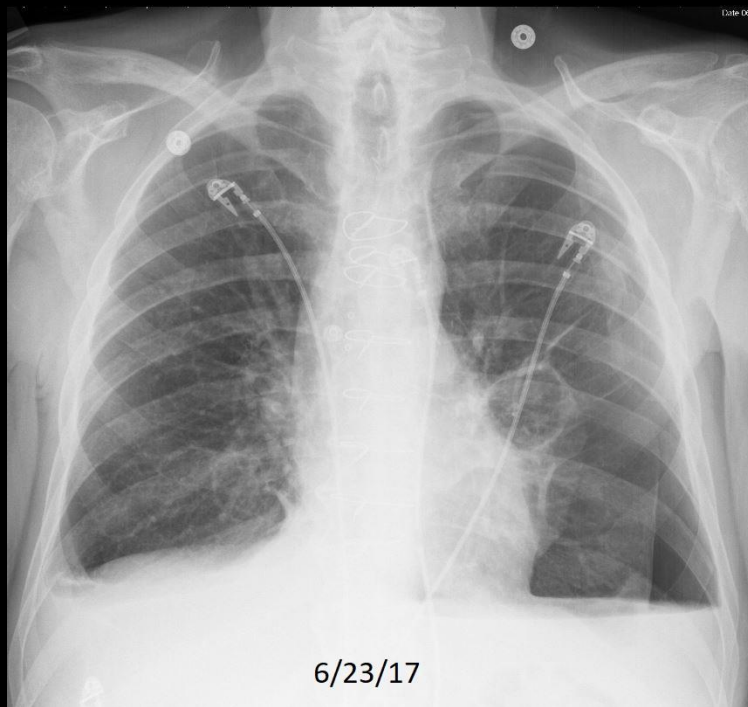


C331. 23 year old with acute dyspnea. There is a right pneumothorax.

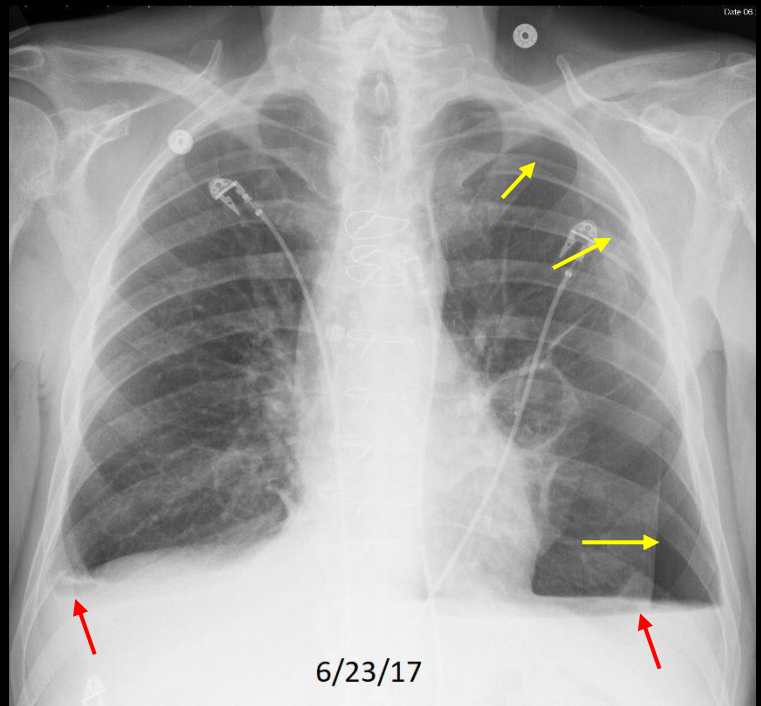
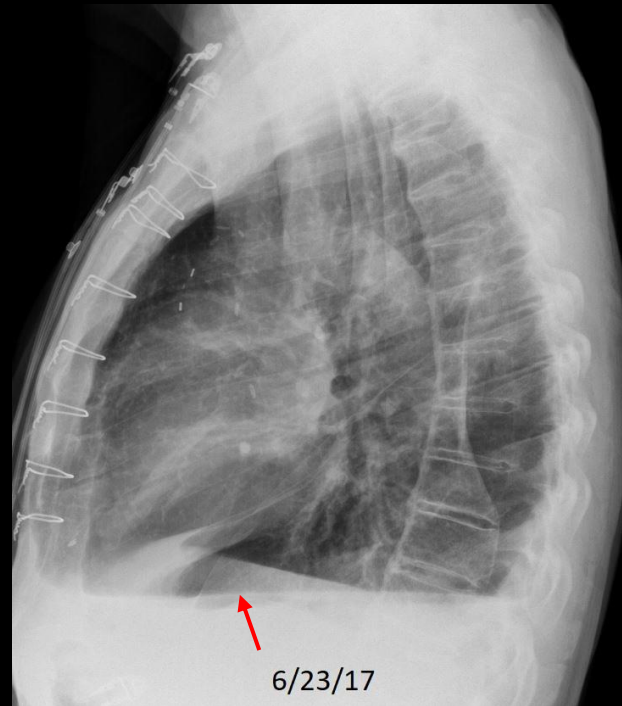
Quiz Case 5 of 5 - A



Quiz Case 5 of 5 - B



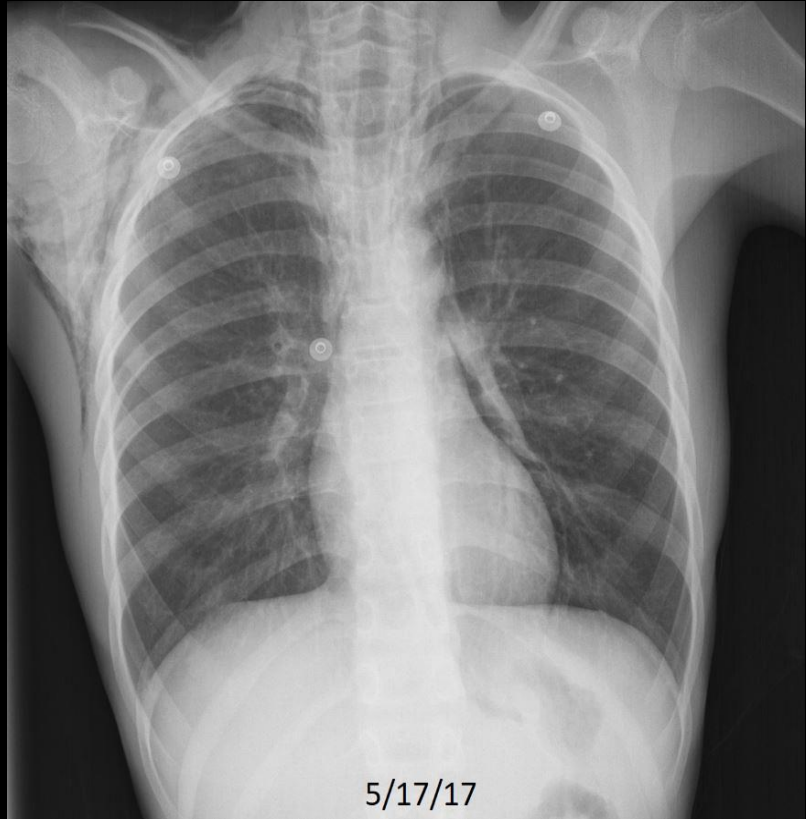
Quiz Case 5 of 5 - B



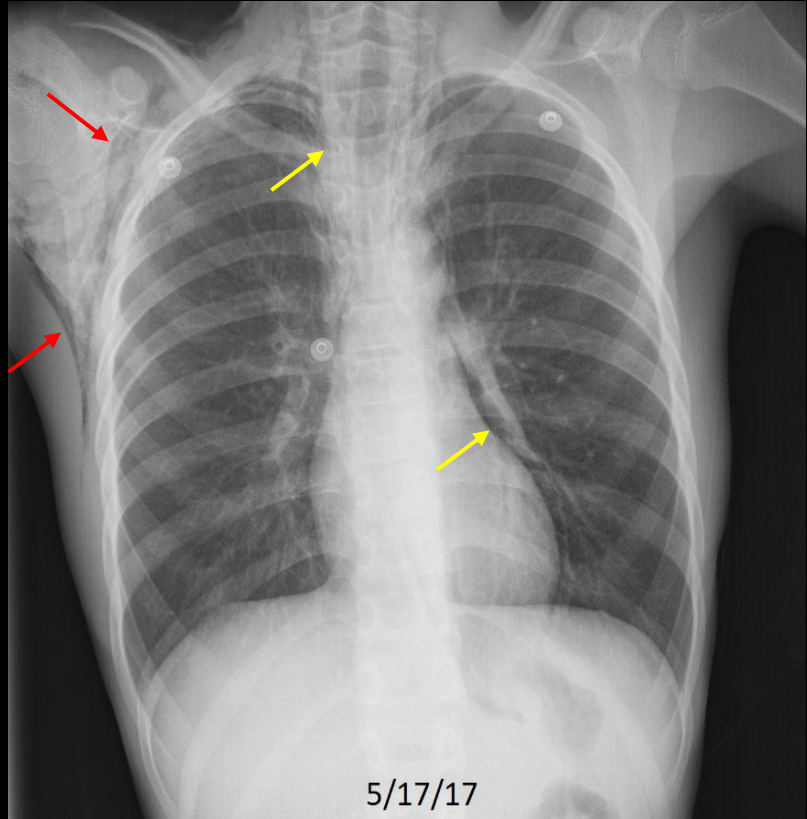
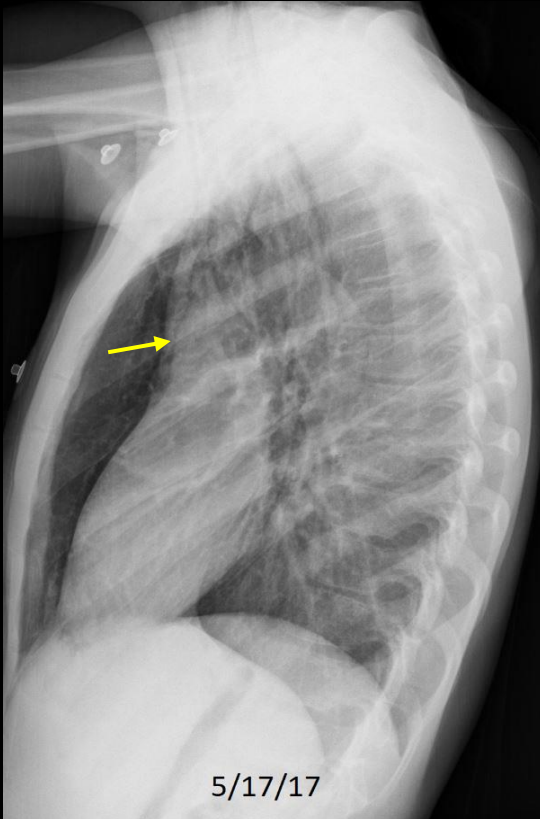
PNEUMOMEDIASTINUM
And
SUBCUTANEOUS EMPHYSEMA

EXAMPLES

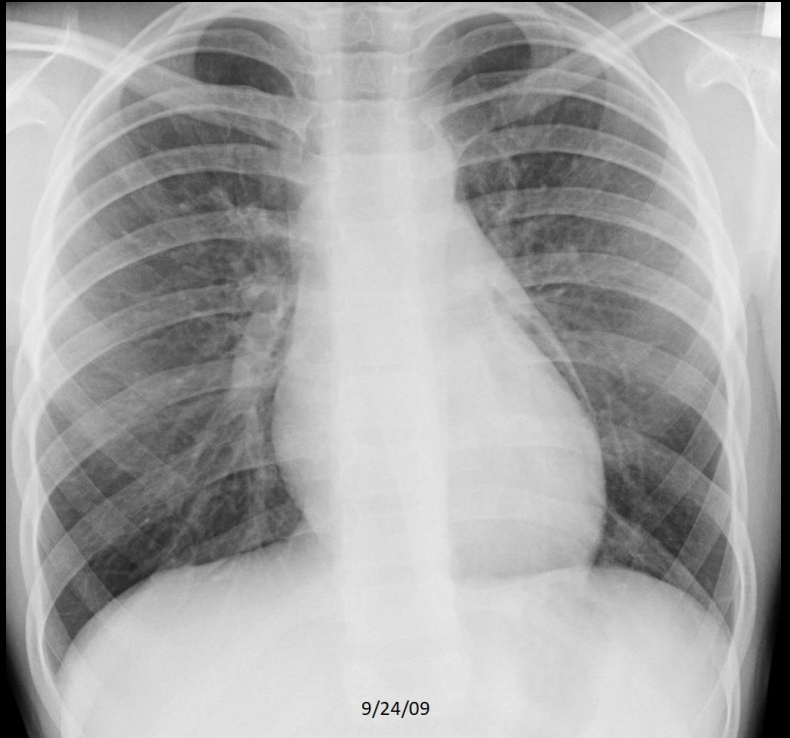
Example 1 of 4



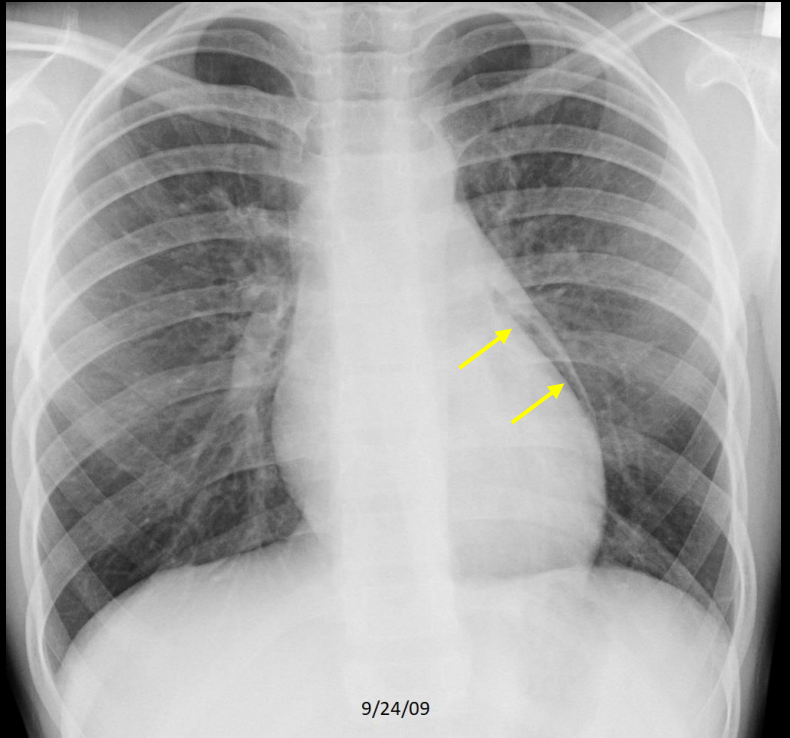
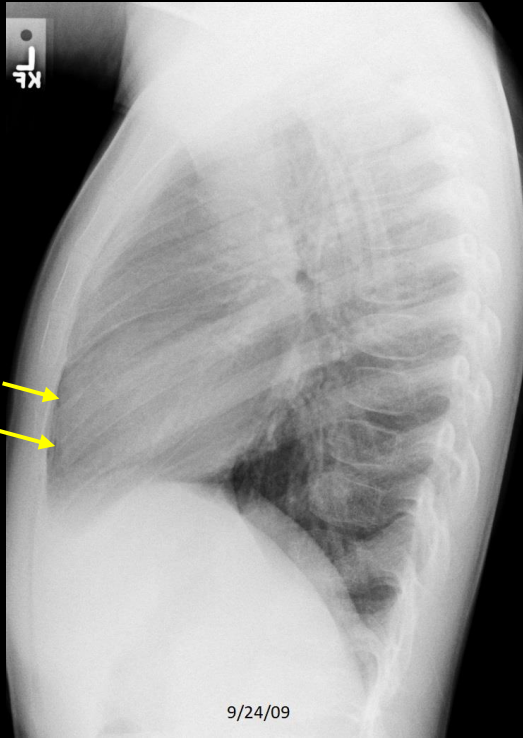
Example 1 of 4



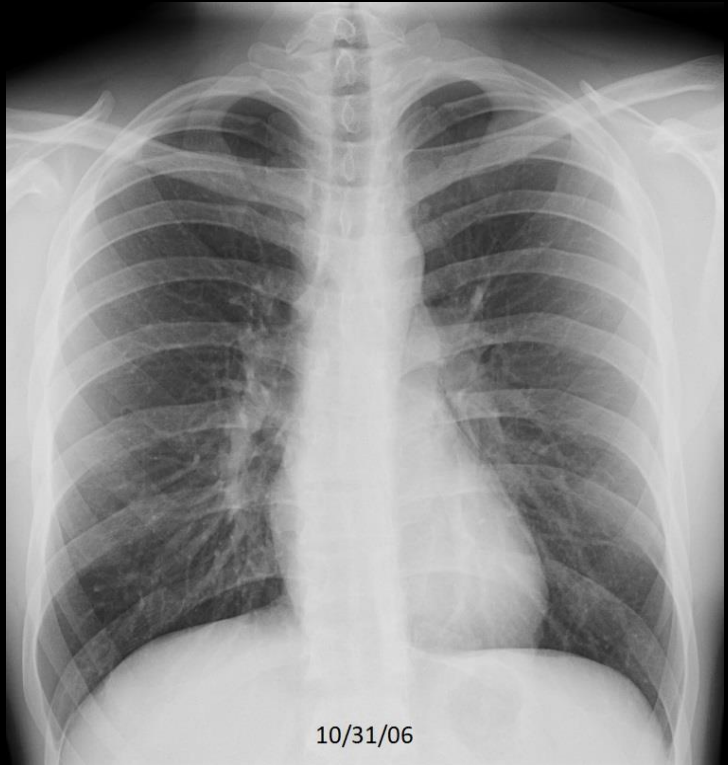
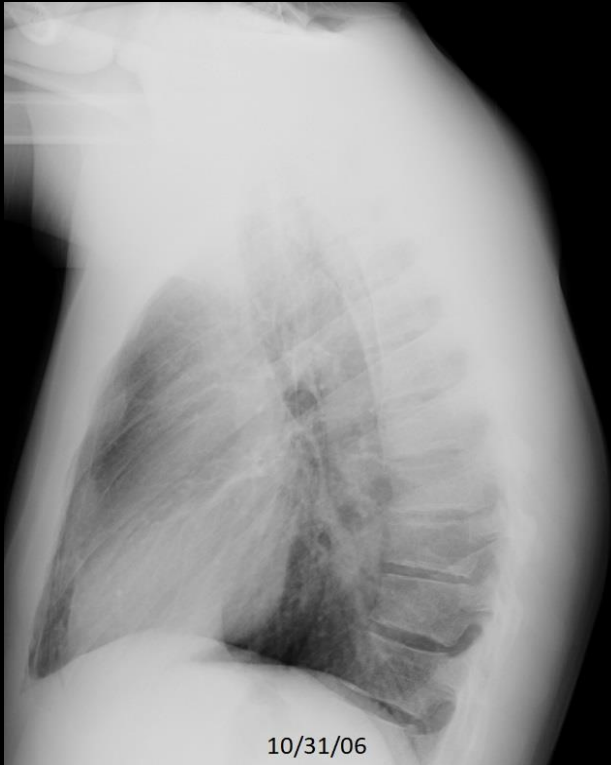
Example 2 of 4



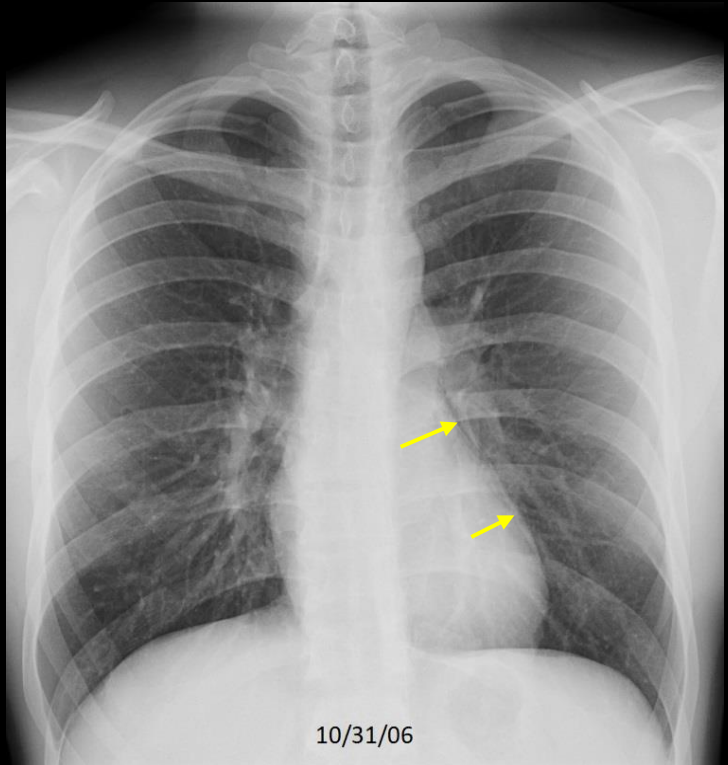
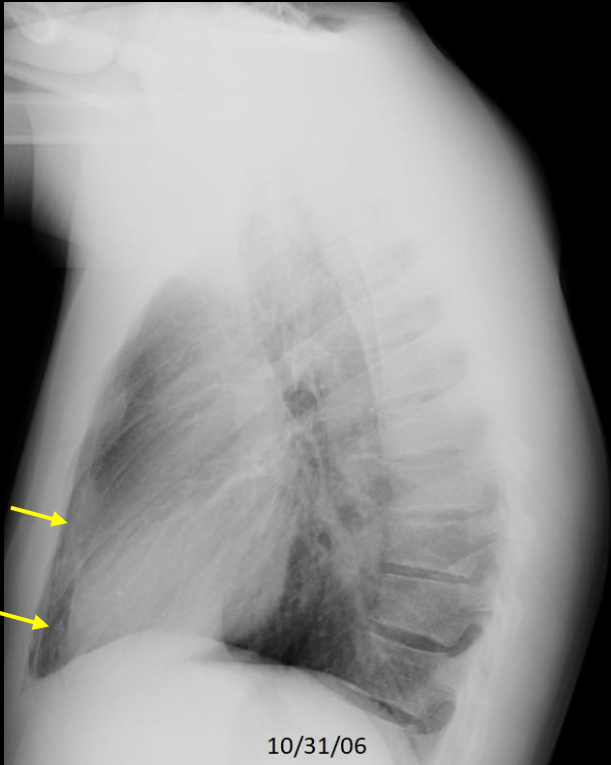
Example 2 of 4



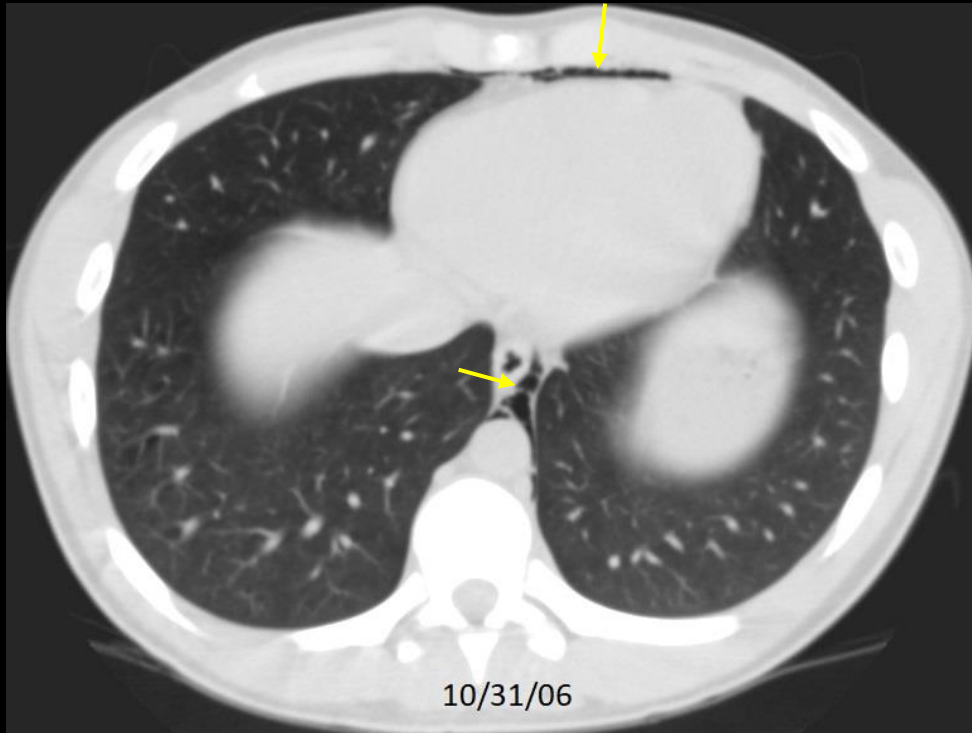
Example 3 of 4



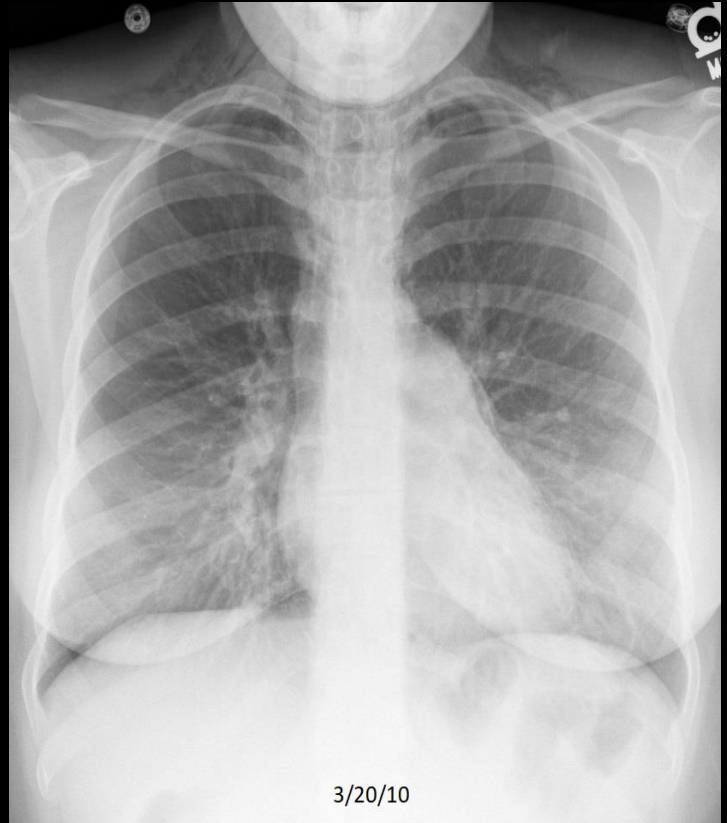
Example 3 of 4



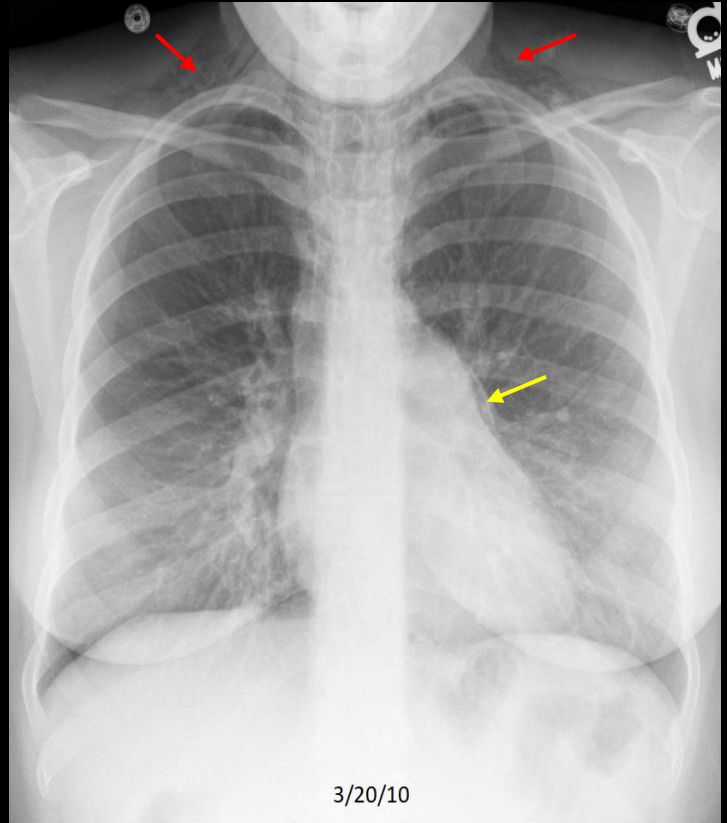
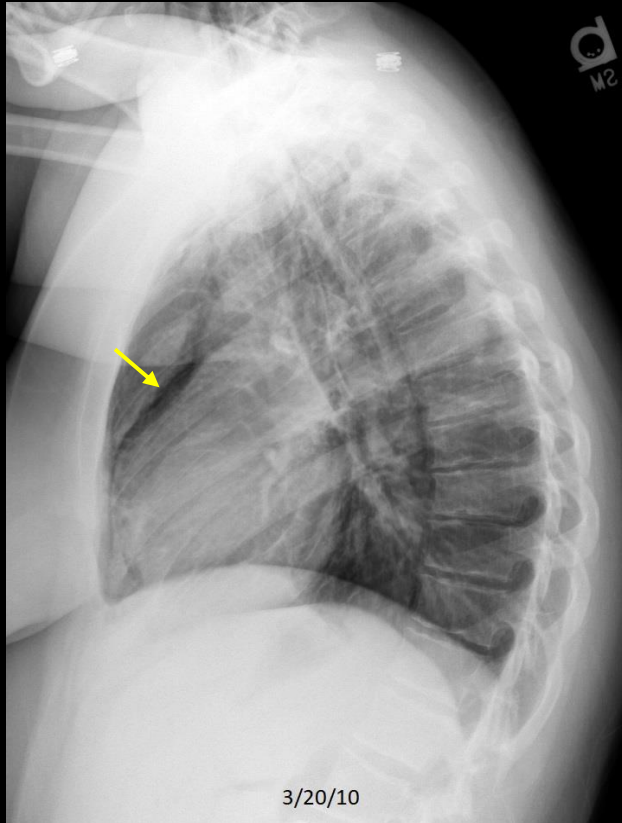
Example 3 of 4



Example 4 of 4



Example 4 of 4

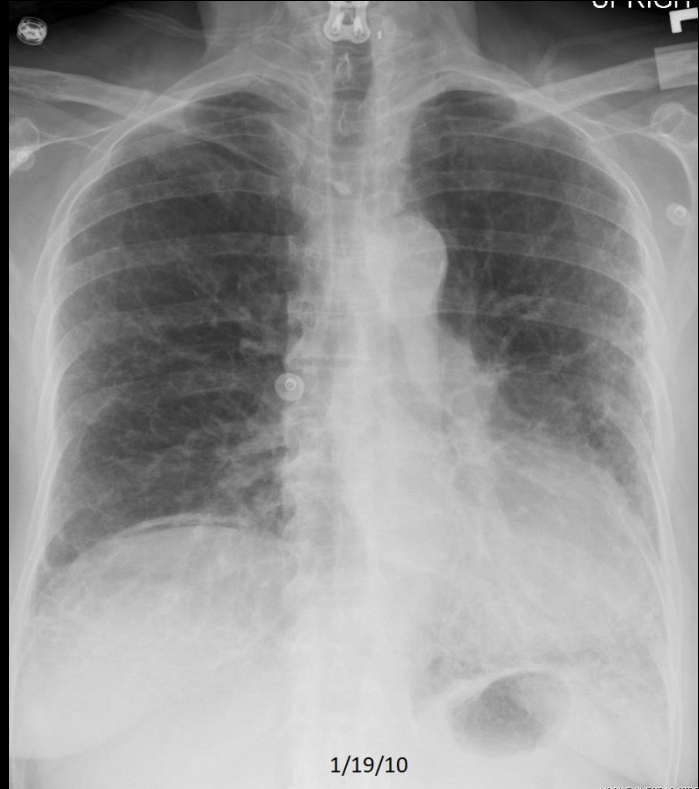


C993. 19 year old with acute onset dyspnea with a history of asthma. **Pneumomediastinum** and **subcutaneous emphysema**.

PNEUMOPERITONEUM

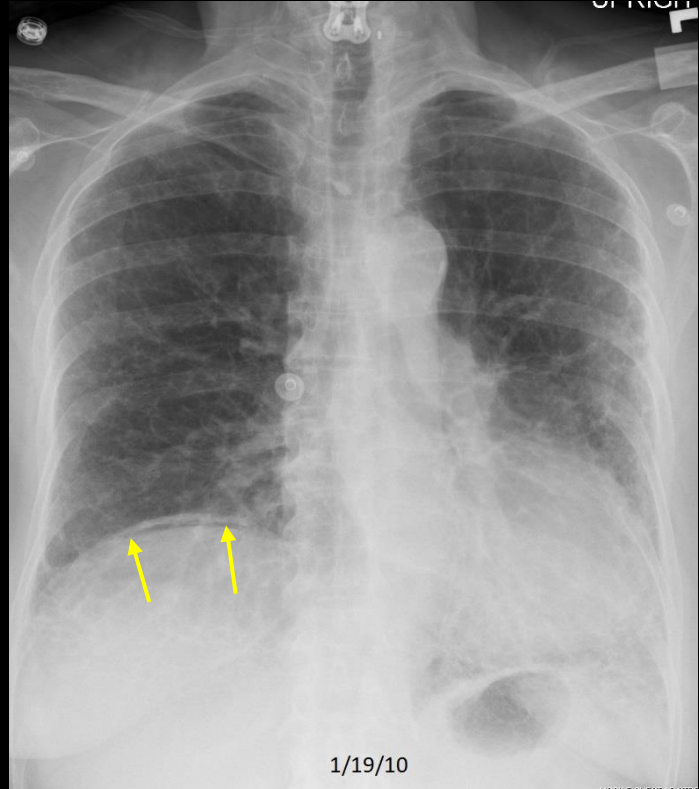
EXAMPLES

Example 1 of 5



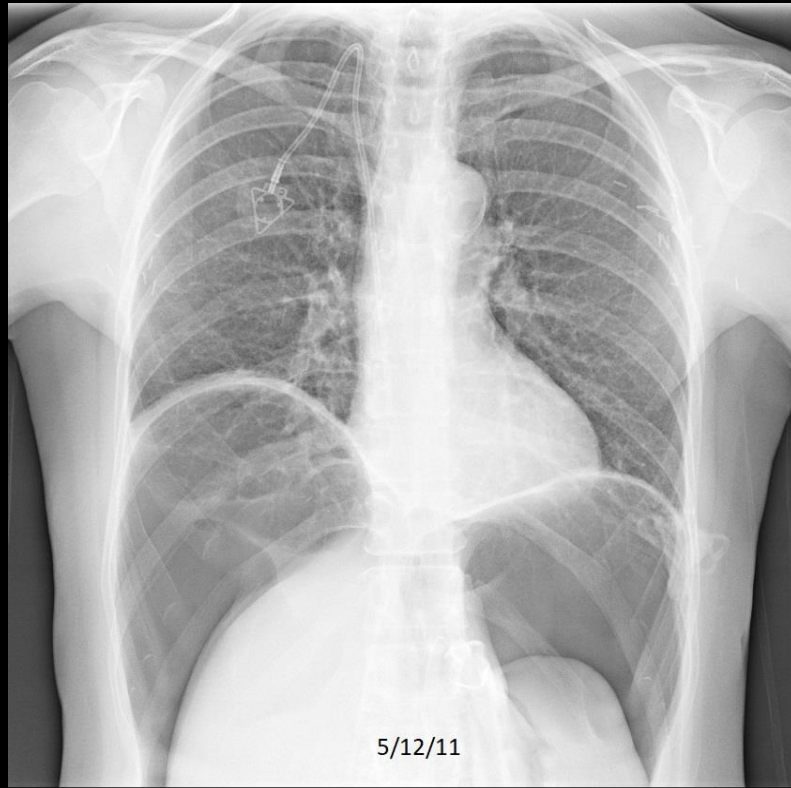
C123. 79 year old with chest and abdomen pain. Pneumoperitoneum from a perforated gastric ulcer. Chronic diffuse lung disease. Cervical fusion plate.

Example 1 of 5



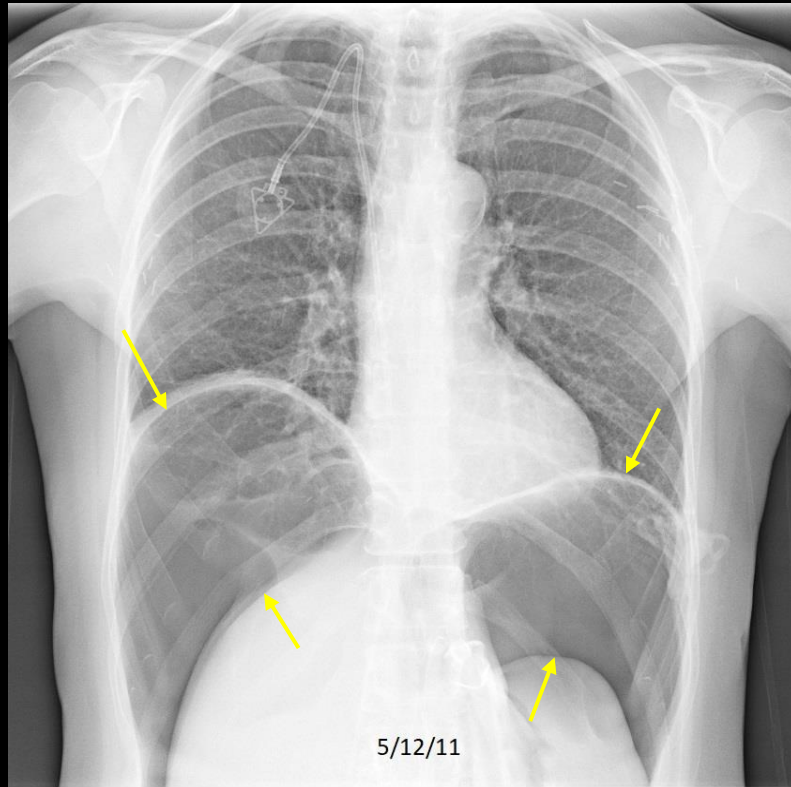
C123. 79 year old with chest and abdomen pain. **Pneumoperitoneum** from a perforated gastric ulcer. Chronic diffuse lung disease. Cervical fusion plate.

Example 2 of 5



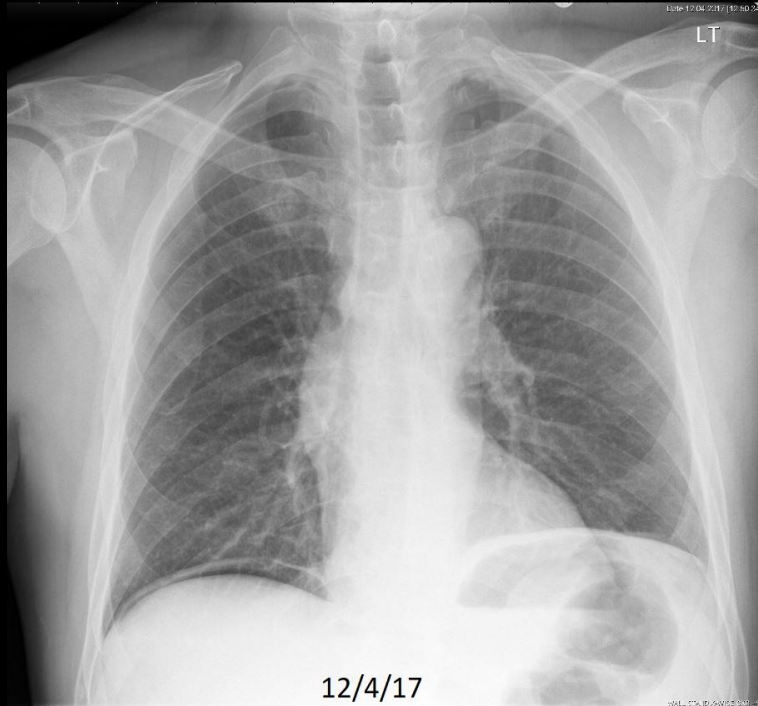
C134. 62 year old woman with pleuritic pain and a PEG tube. Pneumoperitoneum. PowerPort and left axillary clips.

Example 2 of 5

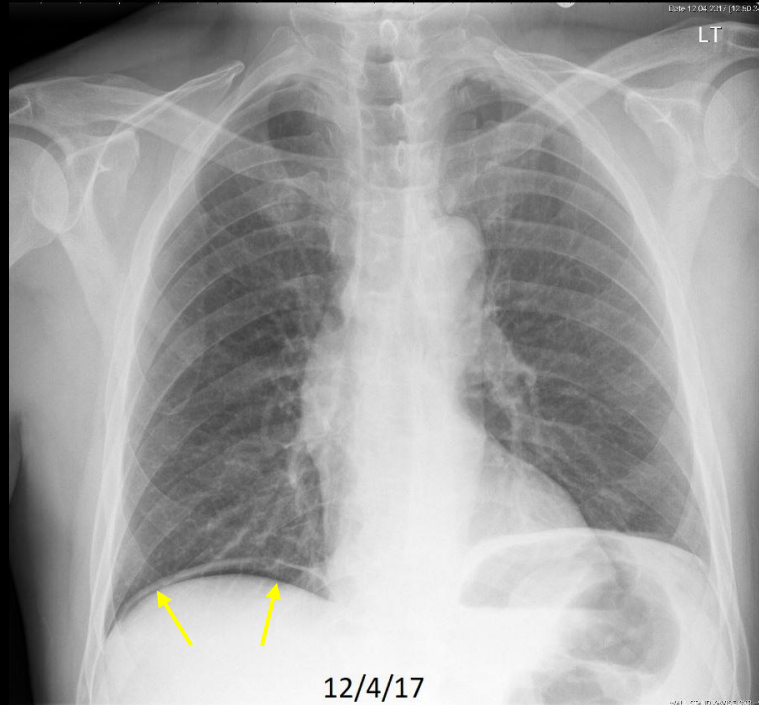
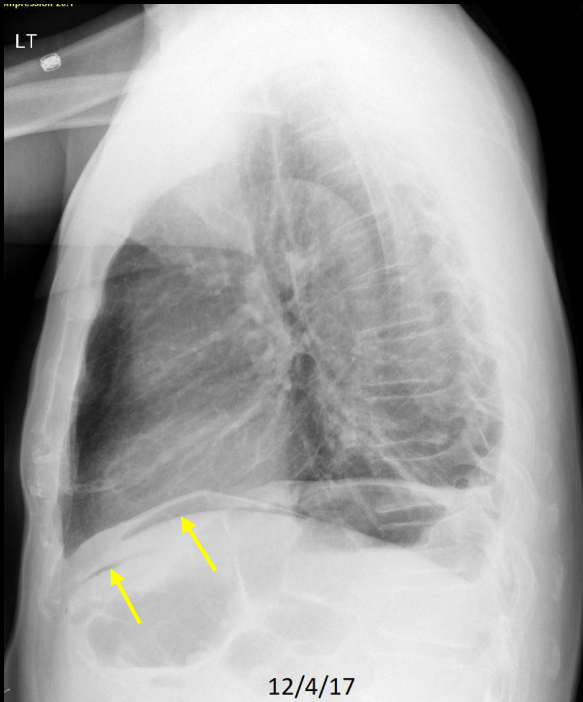


C134. 62 year old woman with pleuritic pain and a PEG tube. Pneumoperitoneum. PowerPort and left axillary clips.

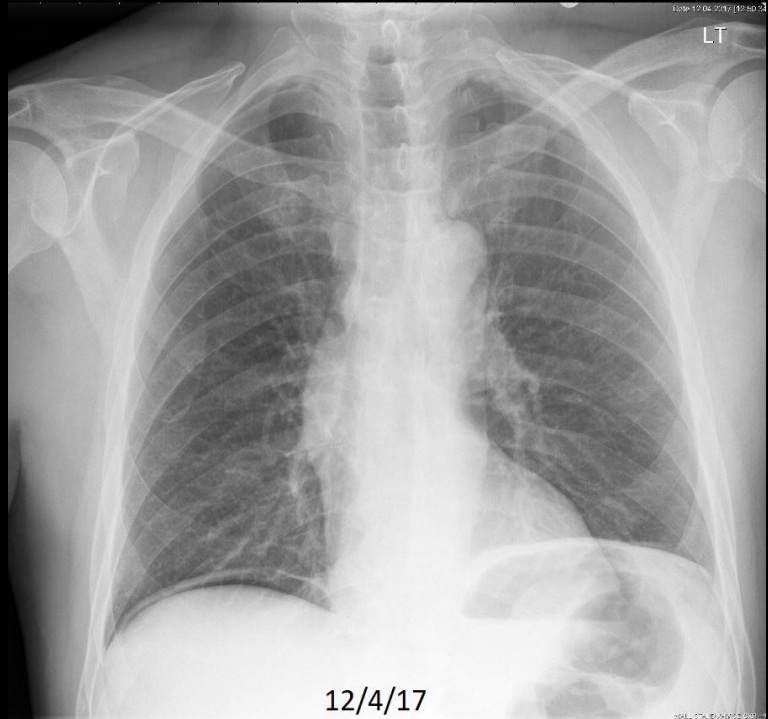
Example 3 of 5



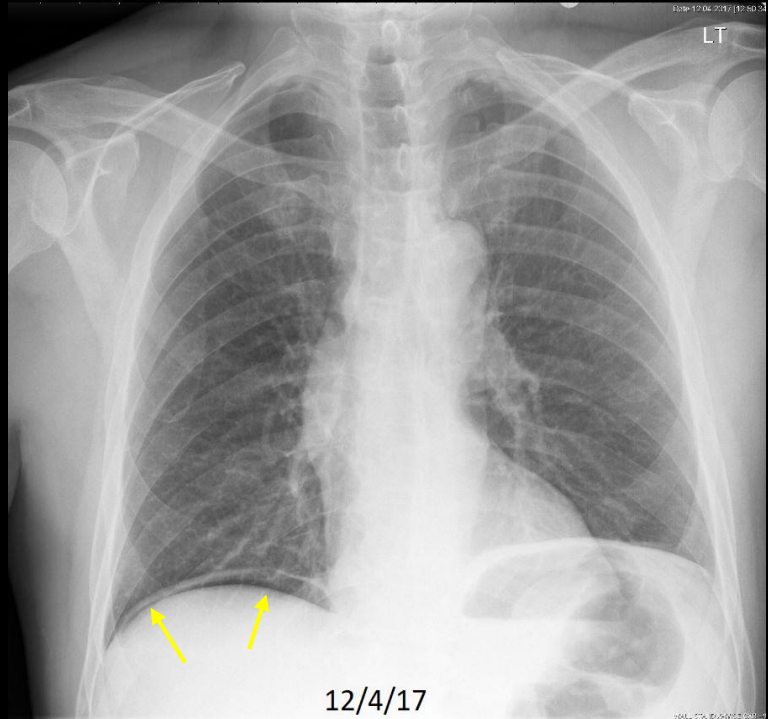
Example 3 of 5



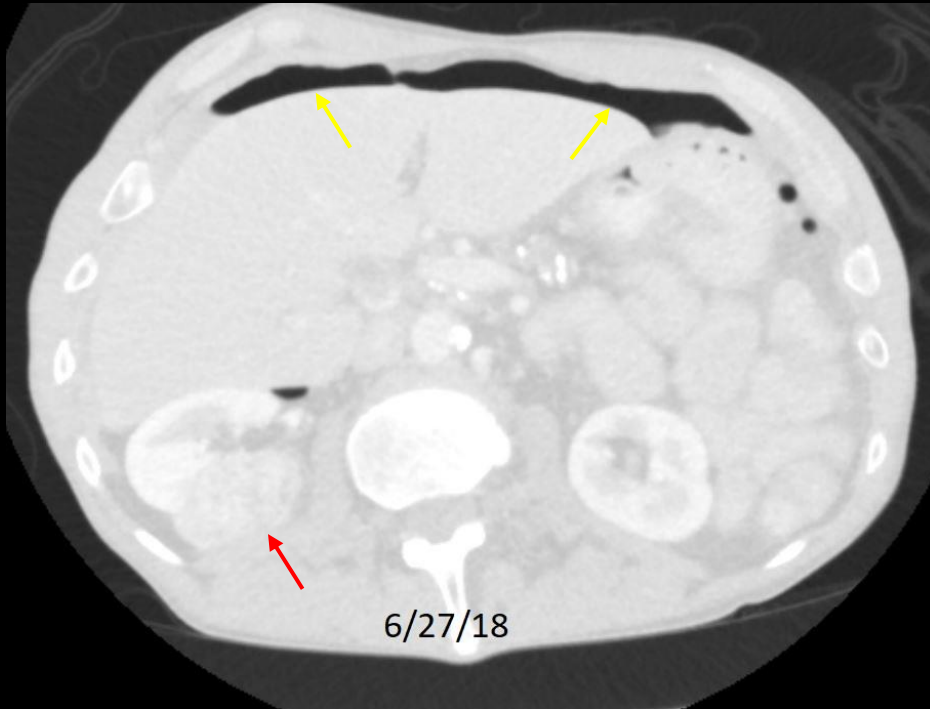
Example 4 of 5



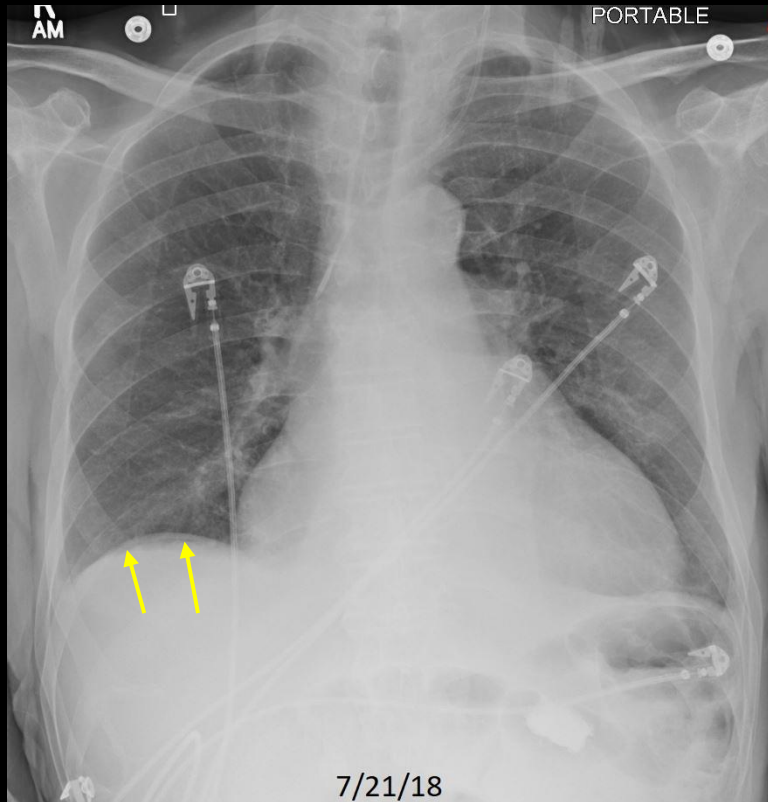
Example 4 of 5



Example 4 of 5



Example 5 of 5



C557. 81 year old with recent abdominal surgery. Right pneumoperitoneum. Cardiomegaly. Central line. Residual enteric contrast.

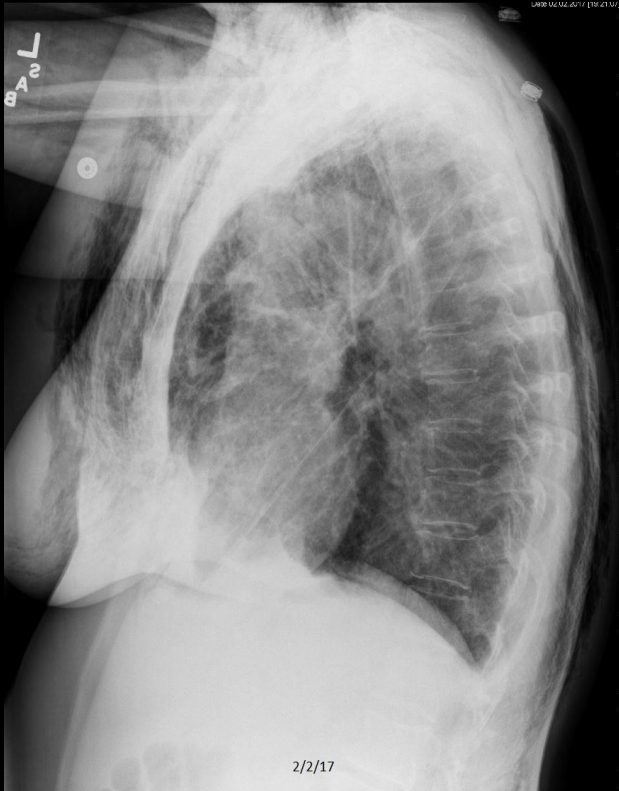
Review Quiz

Identify Each CXR as:

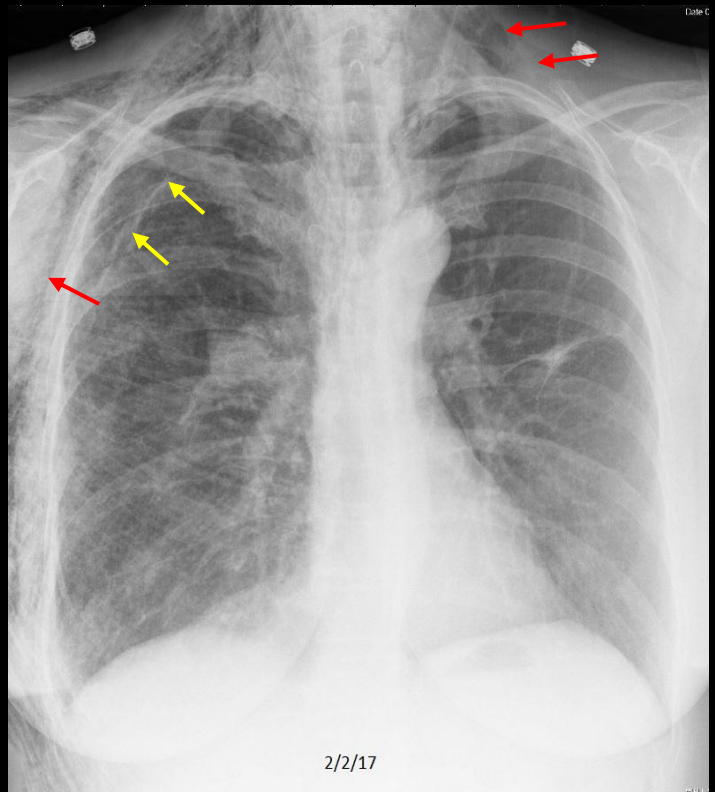
**Normal, CHF, Pneumonia,
Emphysema, Cardiomegaly without
CHF, Atelectasis/Scar, Focal Chest
Density, Pleural Effusion, Hiatal
Hernia, Fracture, Diffuse Lung
Density, Calcified Pleural Plaque, or
Free Air**

Review Quiz Case 1 of 10

Normal, CHF, Pneumonia, Emphysema, Cardiomegaly without Failure, Atelectasis/Scar, Focal Chest Density, Pleural Effusion, Hiatal Hernia, Fracture, Diffuse Lung Density, Calcified Pleural Plaque, or Free Air



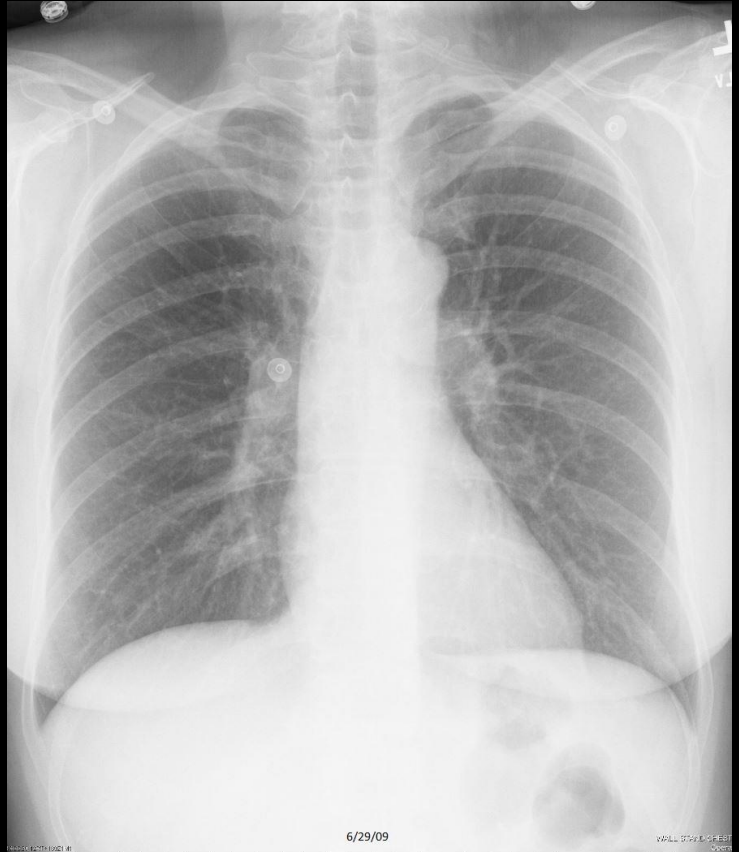
Review Quiz Case 1 of 10
Free Air



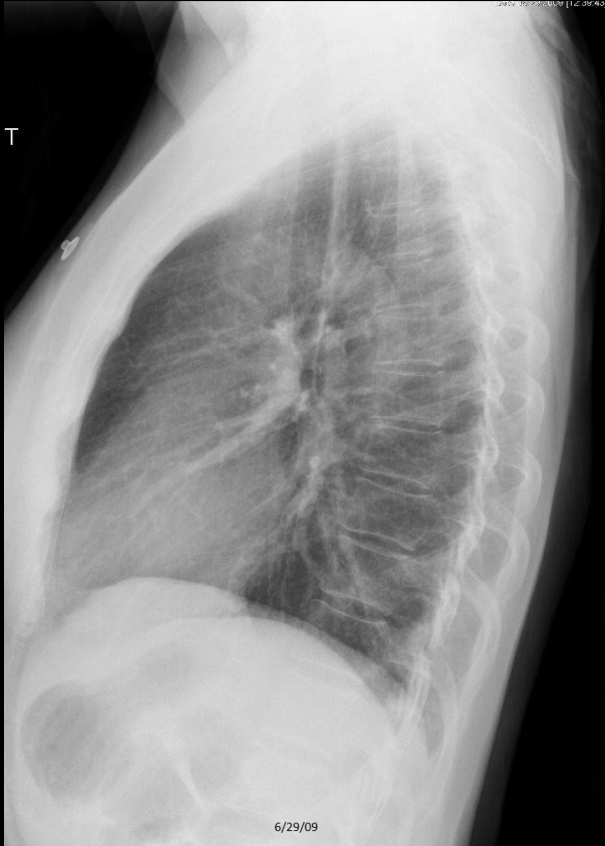
C324. 60 year old with crepitus following wedge resection. **Pneumothorax**. Extensive subcutaneous emphysema.

Review Quiz Case 2 of 10

Normal, CHF, Pneumonia, Emphysema, Cardiomegaly without Failure, Atelectasis/Scar, Focal Chest Density, Pleural Effusion, Hiatal Hernia, Fracture, Diffuse Lung Density, Calcified Pleural Plaque, or Free Air

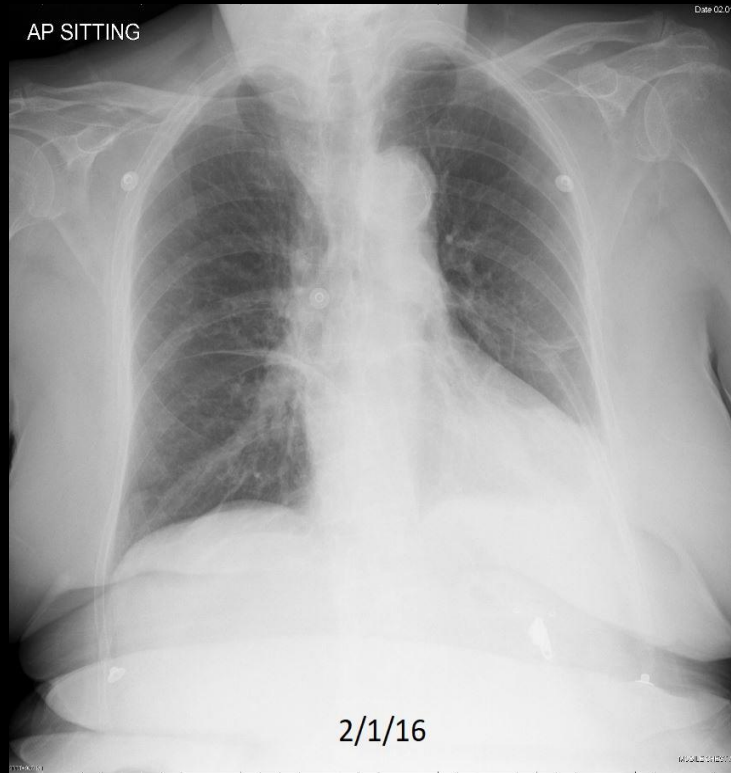


Review Quiz Case 2 of 10
Normal

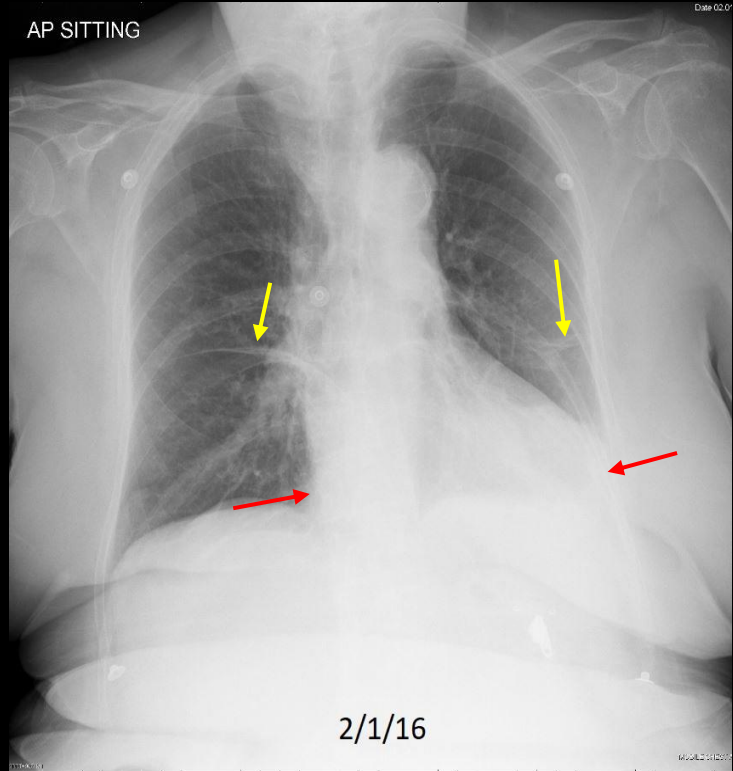
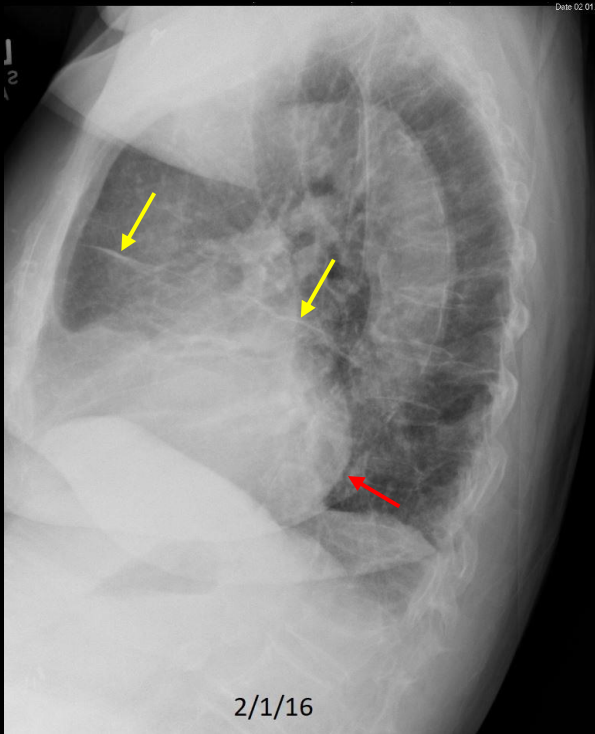


Review Quiz Case 3 of 10

Normal, CHF, Pneumonia, Emphysema, Cardiomegaly without Failure, Atelectasis/Scar, Focal Chest Density, Pleural Effusion, Hiatal Hernia, Fracture, Diffuse Lung Density, Calcified Pleural Plaque, or Free Air

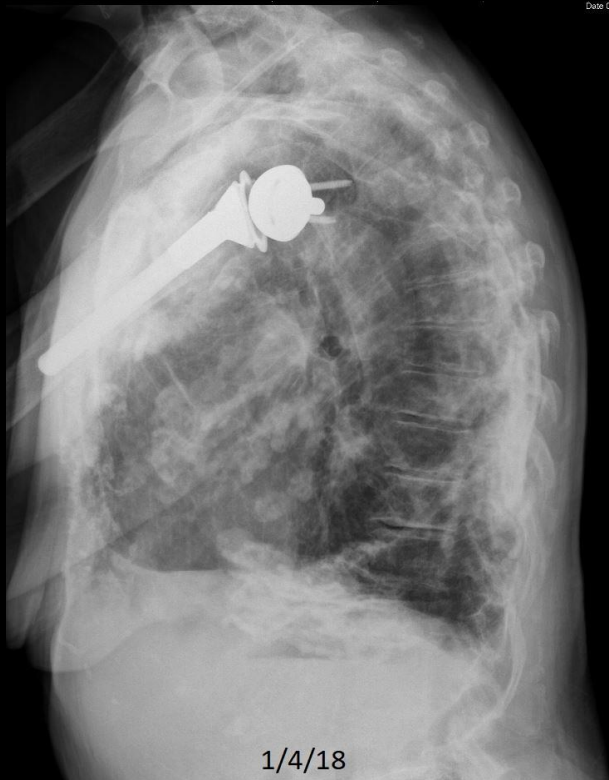


Review Quiz Case 3 of 10
Cardiomegaly and Atelectasis/Scar

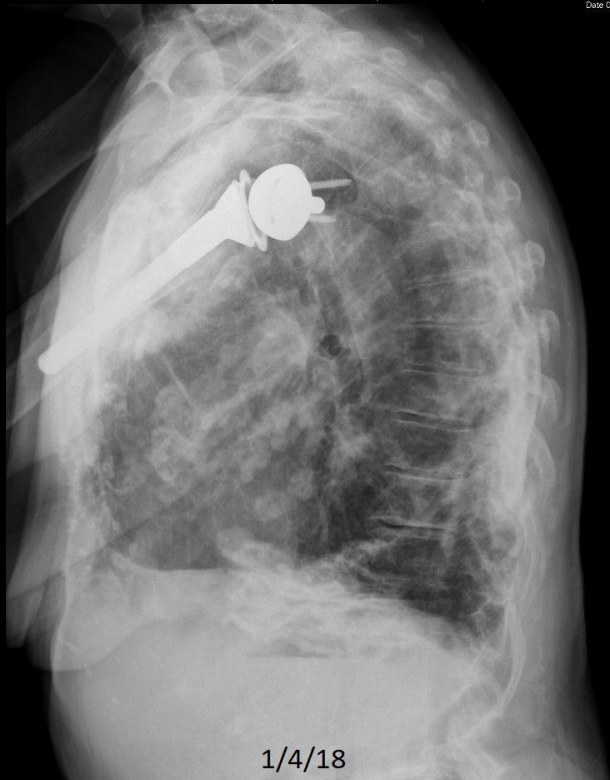


Review Quiz Case 4 of 10

Normal, CHF, Pneumonia, Emphysema, Cardiomegaly without Failure, Atelectasis/Scar, Focal Chest Density, Pleural Effusion, Hiatal Hernia, Fracture, Diffuse Lung Density, Calcified Pleural Plaque, or Free Air



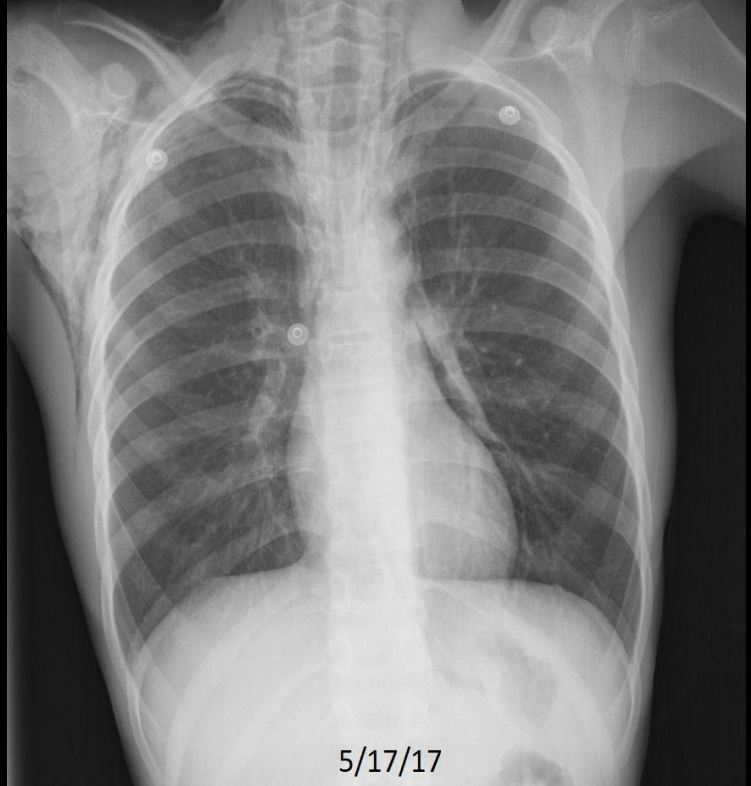
Review Quiz Case 4 of 10
Calcified Pleural Plaque



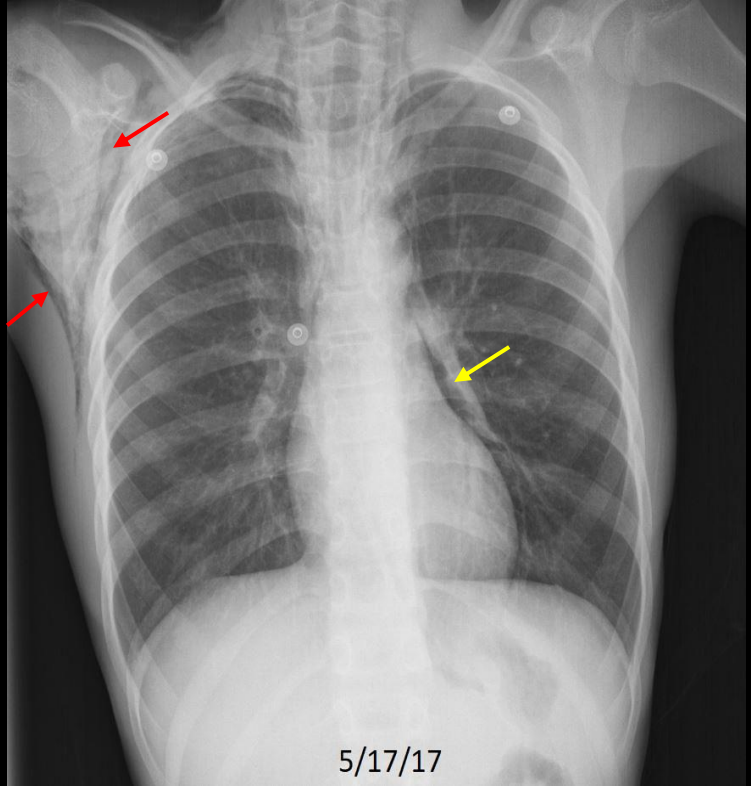
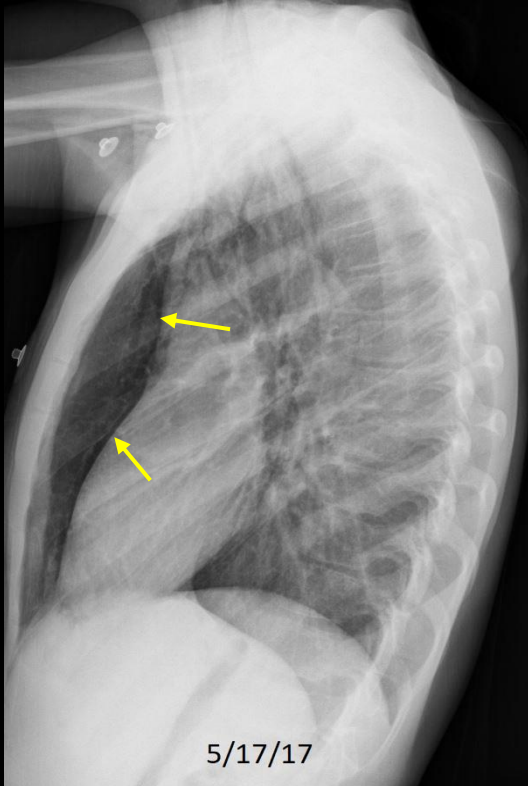
C521. 89 year old woman with dyspnea. **Calcified pleural plaque** (everywhere). Left shoulder prosthesis.

Review Quiz Case 5 of 10

Normal, CHF, Pneumonia, Emphysema, Cardiomegaly without Failure, Atelectasis/Scar, Focal Chest Density, Pleural Effusion, Hiatal Hernia, Fracture, Diffuse Lung Density, Calcified Pleural Plaque, or Free Air

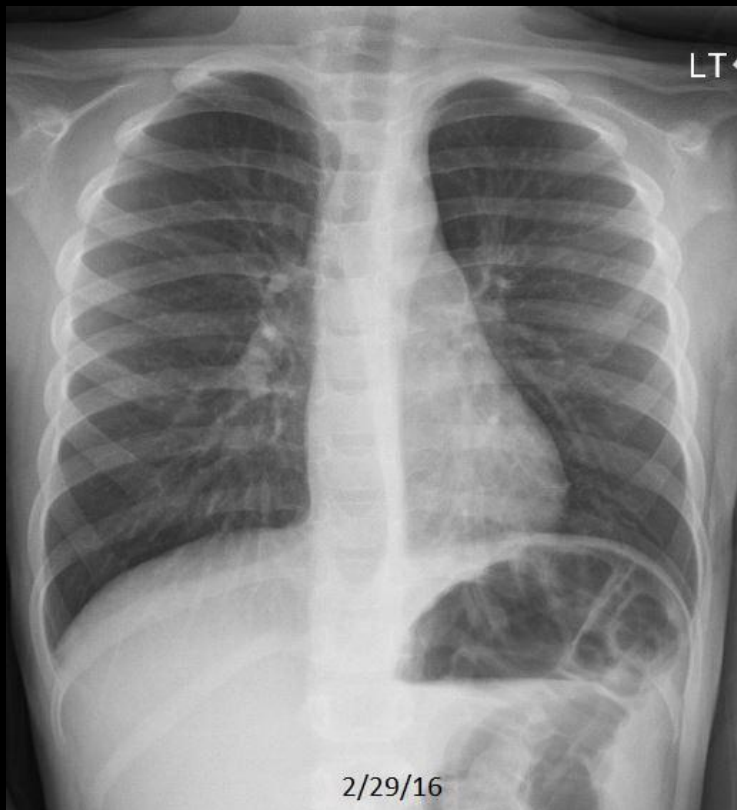


Review Quiz Case 5 of 10
Free Air

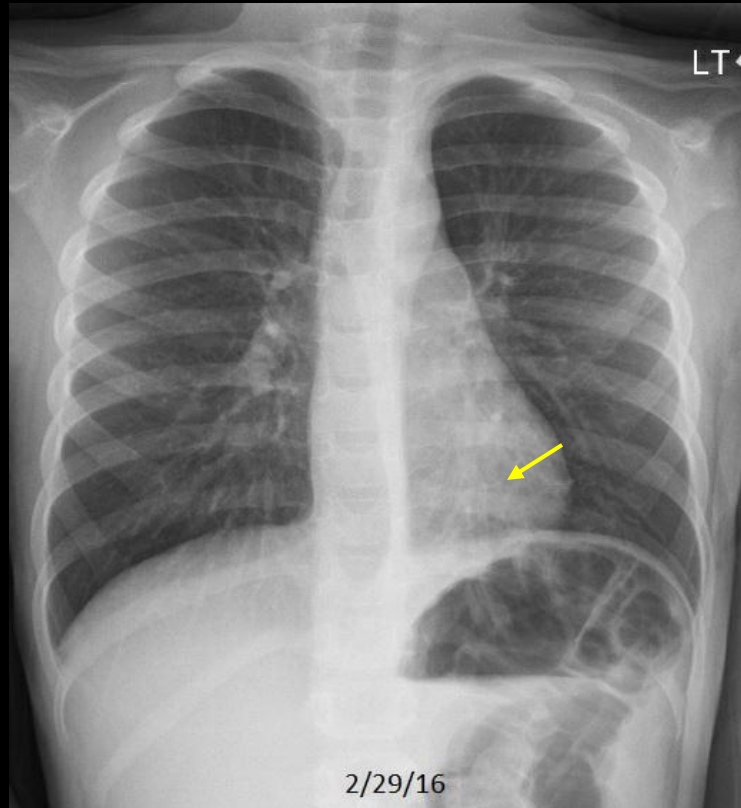
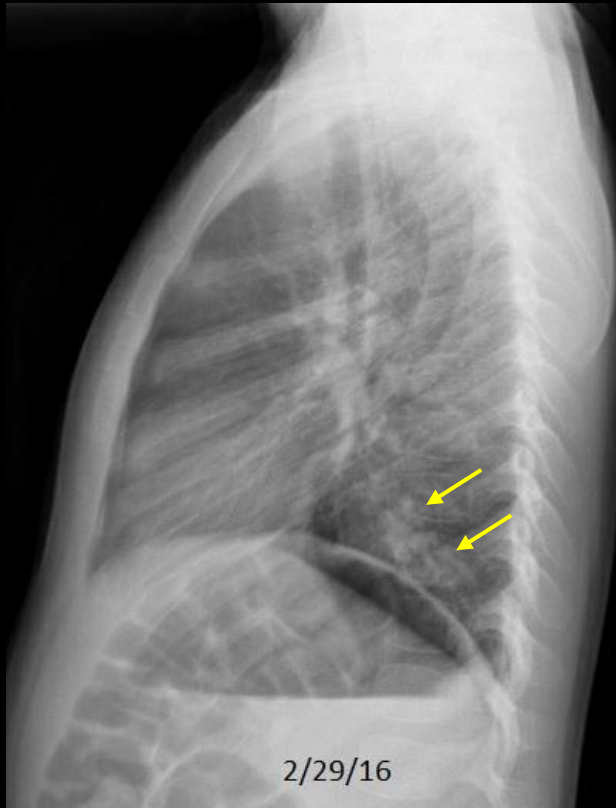


Review Quiz Case 6 of 10

Normal, CHF, Pneumonia, Emphysema, Cardiomegaly without Failure, Atelectasis/Scar, Focal Chest Density, Pleural Effusion, Hiatal Hernia, Fracture, Diffuse Lung Density, Calcified Pleural Plaque, or Free Air



Review Quiz Case 6 of 10
Pneumonia



C280. 8 year old with cough and fever. **Abnormal opacity of the left base best seen on the lateral examination.**

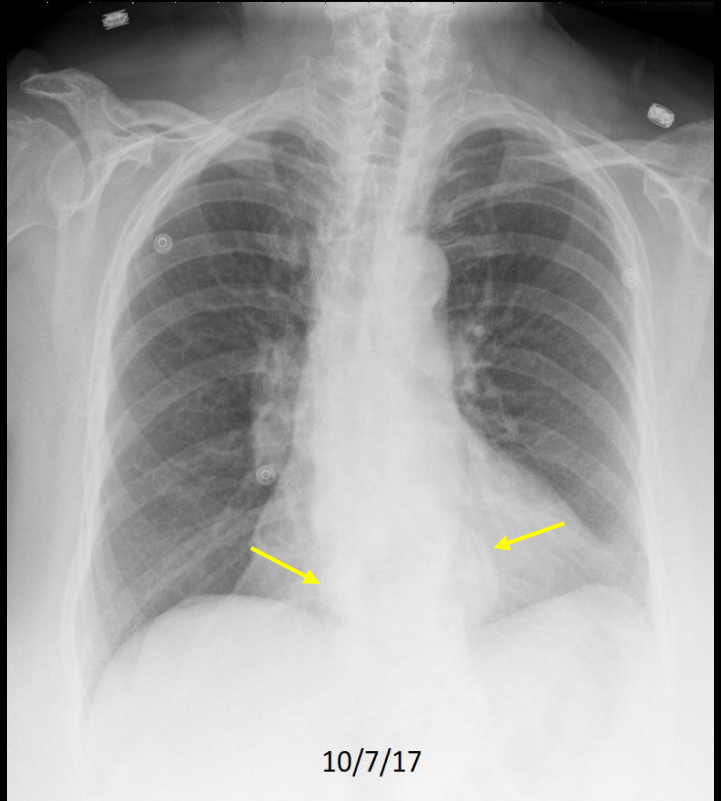
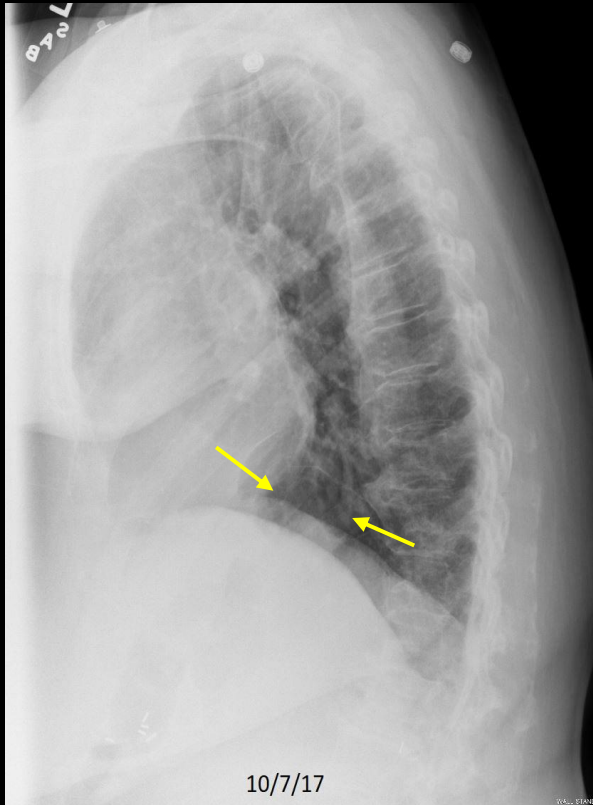
Review Quiz Case 7 of 10

Normal, CHF, Pneumonia, Emphysema, Cardiomegaly without Failure, Atelectasis/Scar, Focal Chest Density, Pleural Effusion, Hiatal Hernia, Fracture, Diffuse Lung Density, Calcified Pleural Plaque, or Free Air



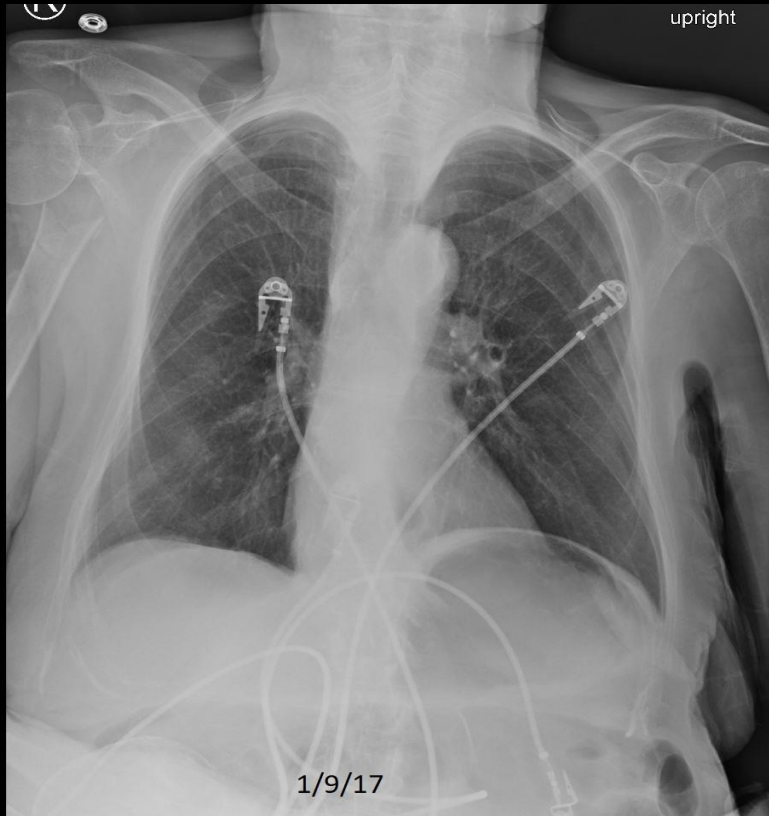
Review Quiz Case 7 of 10

Normal, CHF, Pneumonia, Emphysema, Cardiomegaly without Failure, Atelectasis/Scar, Focal Chest Density, Pleural Effusion, Hiatal Hernia, Fracture, Diffuse Lung Density, Calcified Pleural Plaque, or Free Air



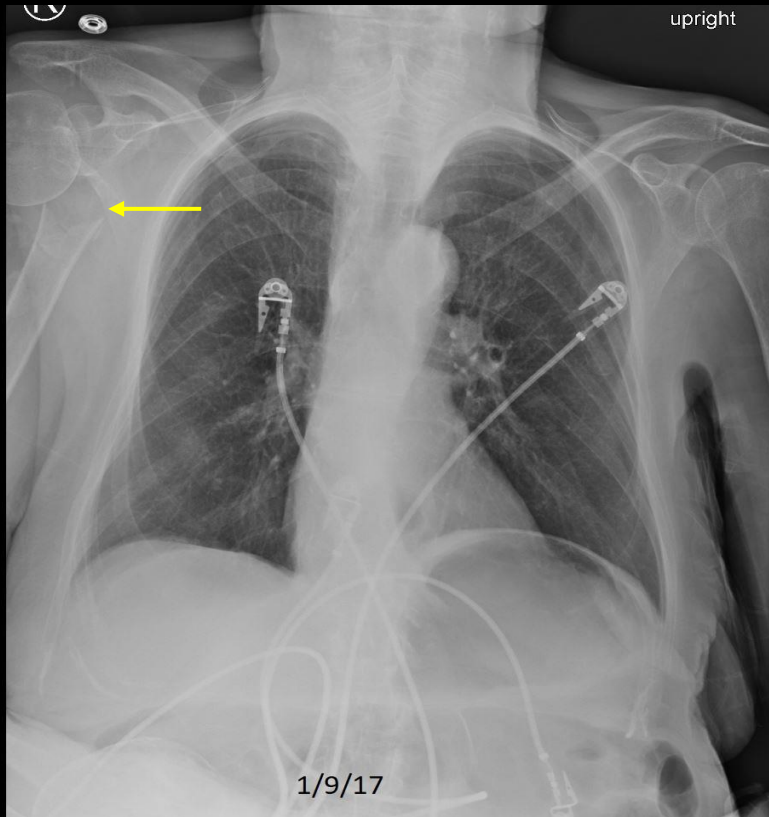
Review Quiz Case 8 of 10

Normal, CHF, Pneumonia, Emphysema, Cardiomegaly without Failure, Atelectasis/Scar, Focal Chest Density, Pleural Effusion, Hiatal Hernia, Fracture, Diffuse Lung Density, Calcified Pleural Plaque, or Free Air



C612. 82 year old woman with pain following injury.

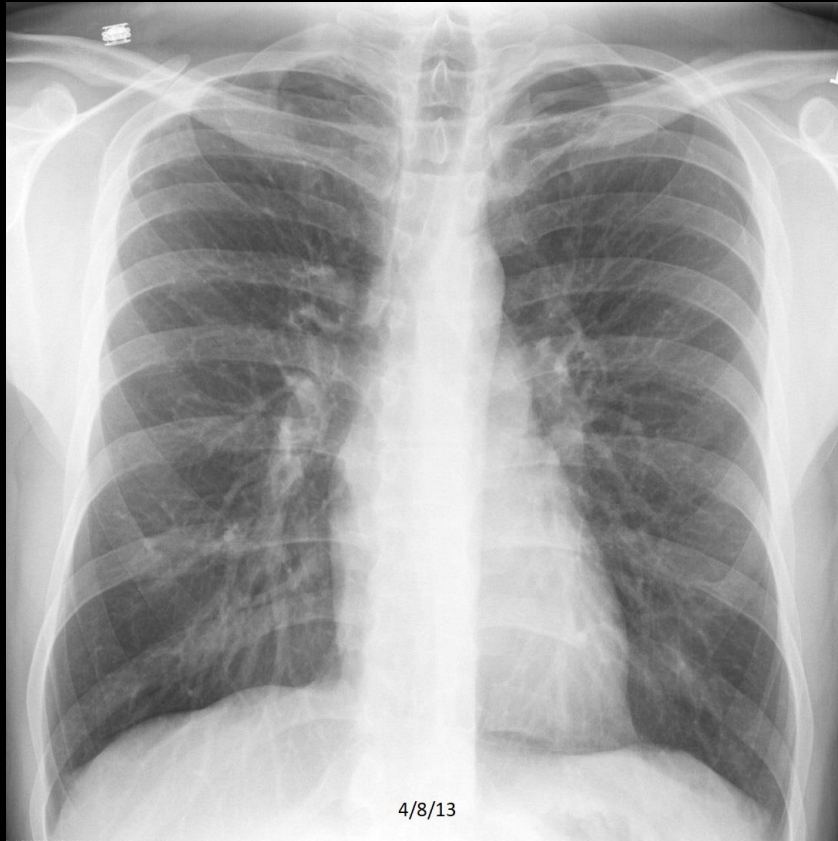
Review Quiz Case 8 of 10
Fracture



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

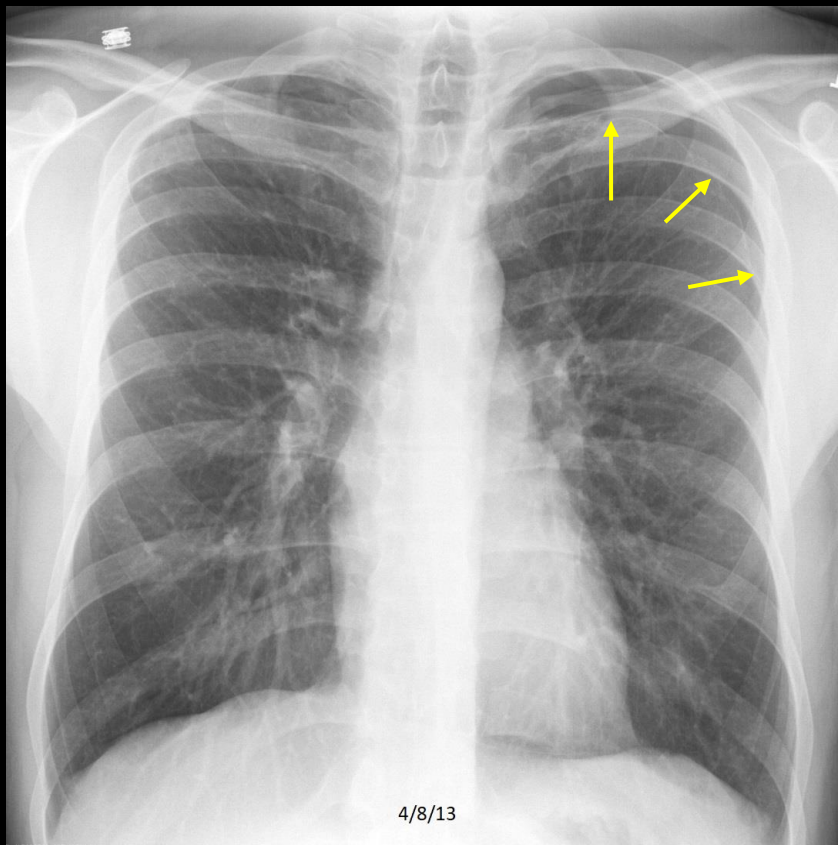
Review Quiz Case 9 of 10

Normal, CHF, Pneumonia, Emphysema, Cardiomegaly without Failure, Atelectasis/Scar, Focal Chest Density, Pleural Effusion, Hiatal Hernia, Fracture, Diffuse Lung Density, Calcified Pleural Plaque, or Free Air



C849. 24 year old man with acute onset dyspnea and chest pain.

Review Quiz Case 9 of 10
Free Air



C849. 24 year old man with acute onset dyspnea and chest pain. Left (spontaneous) pneumothorax.

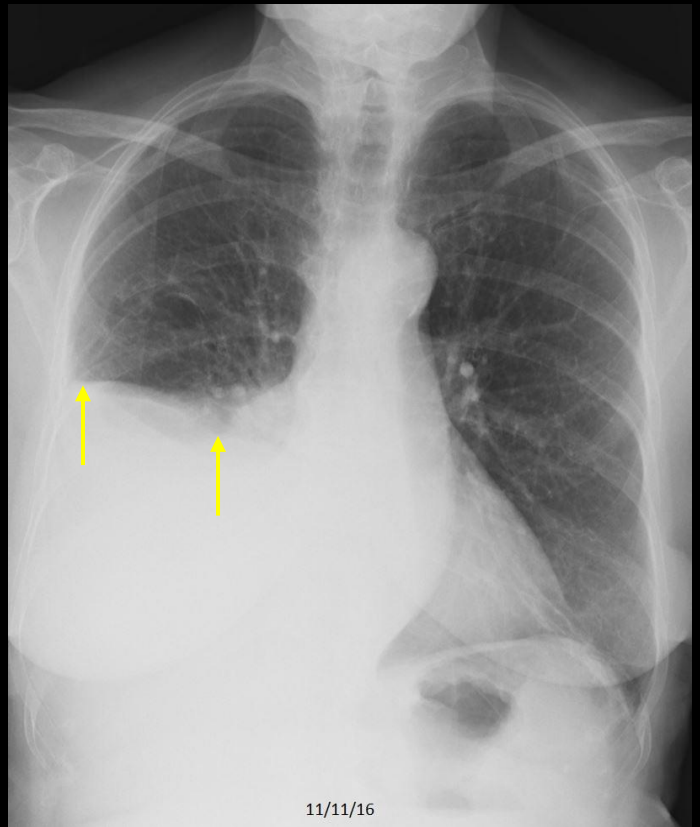
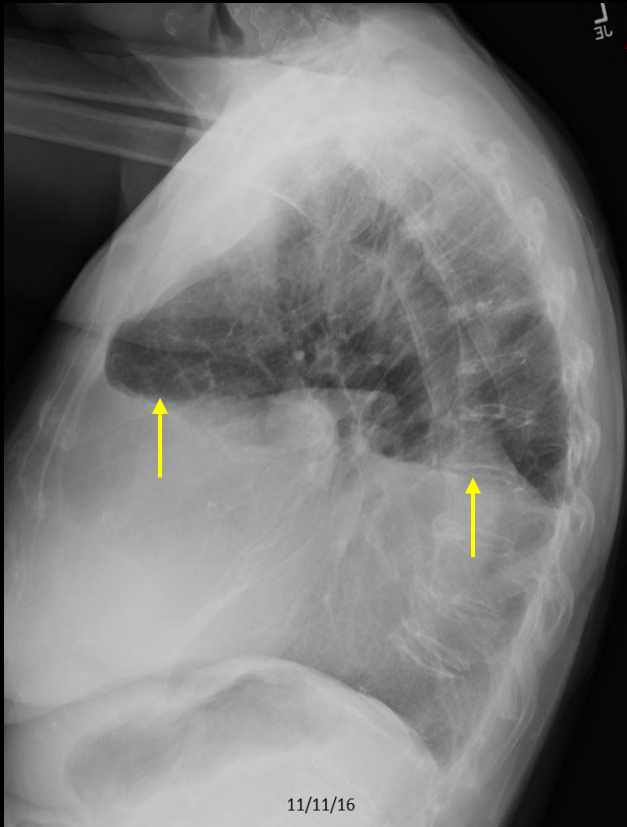
Review Quiz Case 10 of 10

Normal, CHF, Pneumonia, Emphysema, Cardiomegaly without Failure, Atelectasis/Scar, Focal Chest Density, Pleural Effusion, Hiatal Hernia, Fracture, Diffuse Lung Density, Calcified Pleural Plaque, or Free Air



C408. 90 year old with dyspnea. Right pleural effusion.

Review Quiz Case 10 of 10
Pleural Effusion



RECAPITULATION

FREE AIR

PNEUMOTHORAX

PNEUMOMEDIASTINUM

SUBCUTANEOUS EMPHYSEMA

PNEUMOPERITONEUM

COMMENT: This category contains several findings/diagnoses, all of which have the common finding of gas in an abnormal location. While these terms are of a "diagnosis" they are also indicative of other diseases. Pneumothorax and pneumomediastinum have similar causes. Subcutaneous emphysema may be secondary to pneumothorax or the result of a chest wall wound. Pneumoperitoneum is usually the result of bowel perforation.

These findings are of critical importance (even when subtle) and generally require immediate notification of the ordering physician: a small pneumothorax may expand to a larger pneumothorax which compromises respiratory function, and pneumoperitoneum usually indicates bowel perforation which can result in peritonitis.

RECAPITULATION

FREE AIR

PNEUMOTHORAX

PNEUMOMEDIASTINUM

SUBCUTANEOUS EMPHYSEMA

PNEUMOPERITONEUM

INDICATIONS: dyspnea, chest pain, tachycardia, hypotension.

FINDINGS:

Pneumothorax: Gas in the pleural space with visualization of the pleural line.

Pneumomediastinum: Gas in the soft tissues of the mediastinum.

Subcutaneous emphysema: Gas in the chest or abdominal wall.

Pneumoperitoneum: Gas in the abdominal cavity outside the bowel lumen.

IMPRESSION: Pneumothorax, pneumomediastinum, pneumoperitoneum, or subcutaneous emphysema. Call critical results.

Chest Radiography
End of Lecture 13
Free Air

Go to Lecture 14
Calcified Granuloma(s)