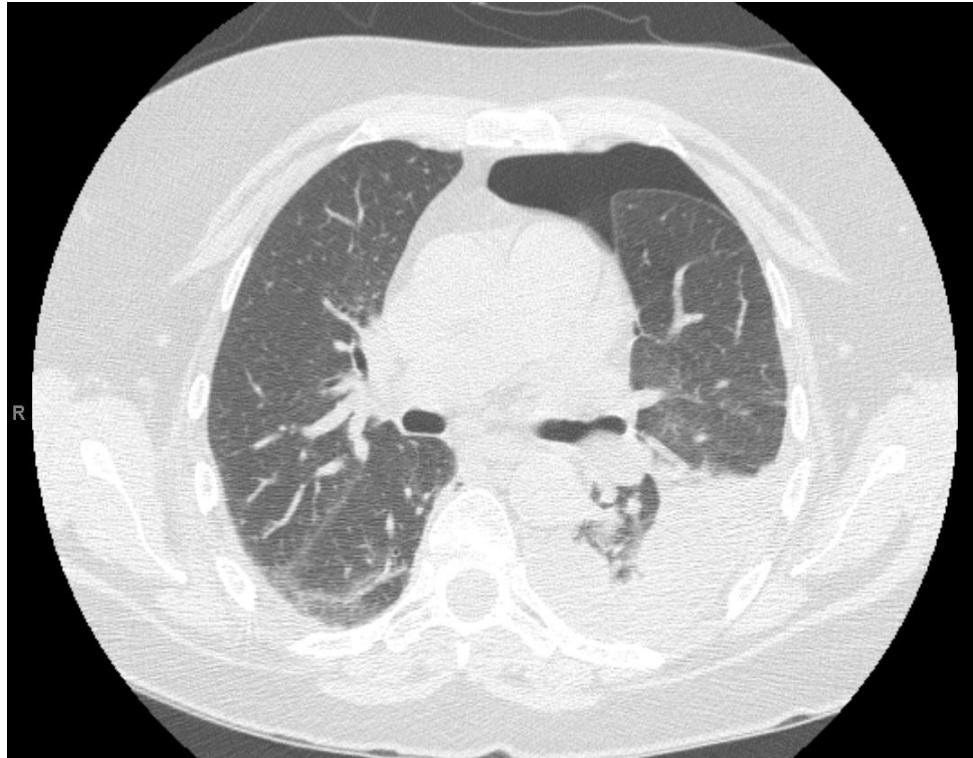


## Disorders of the Pleural Space



Howard J. Sachs, MD

[www.12daysinmarch.com](http://www.12daysinmarch.com)

Dyspnea

Cardiac

Pulmonary

Chest Wall

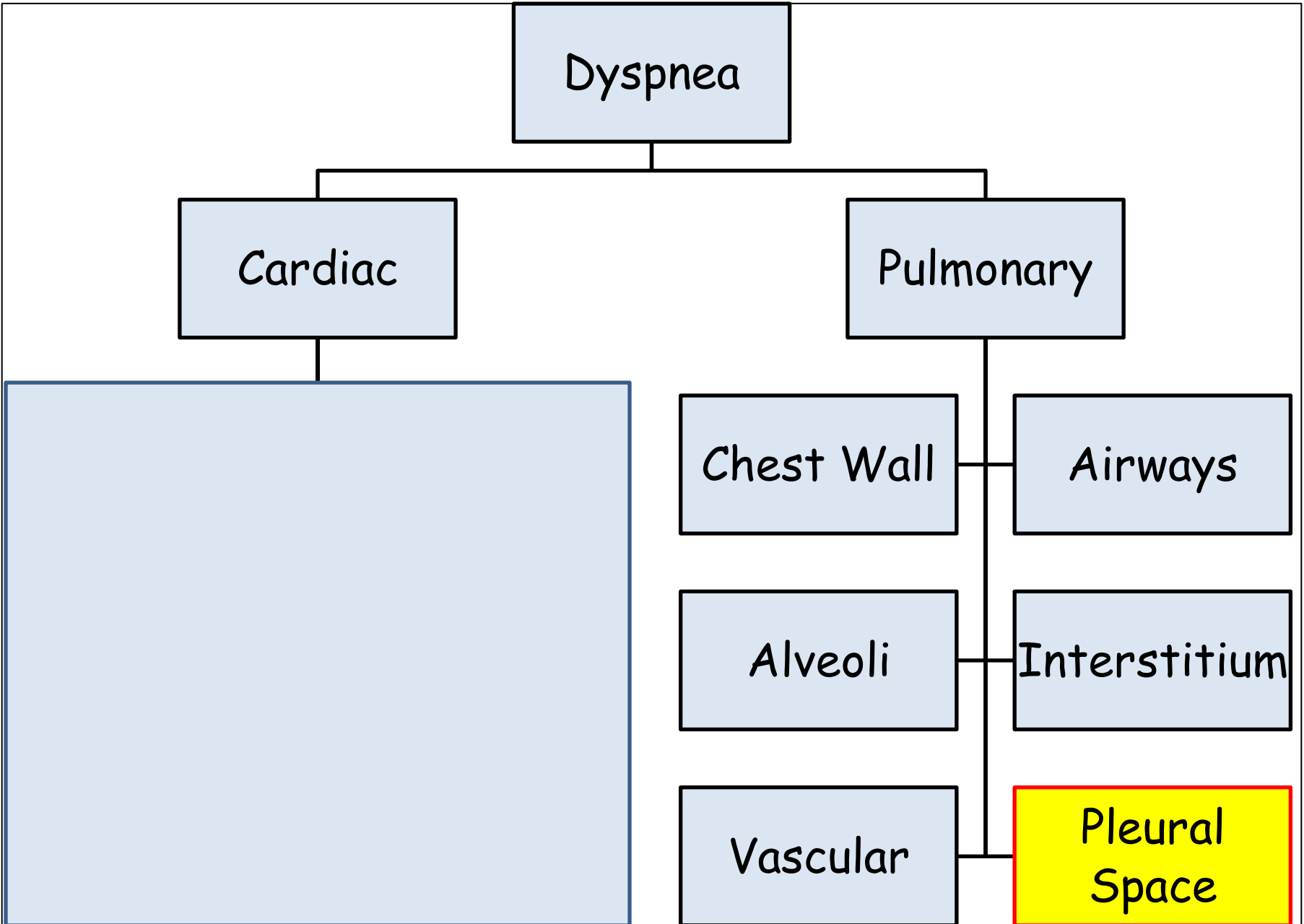
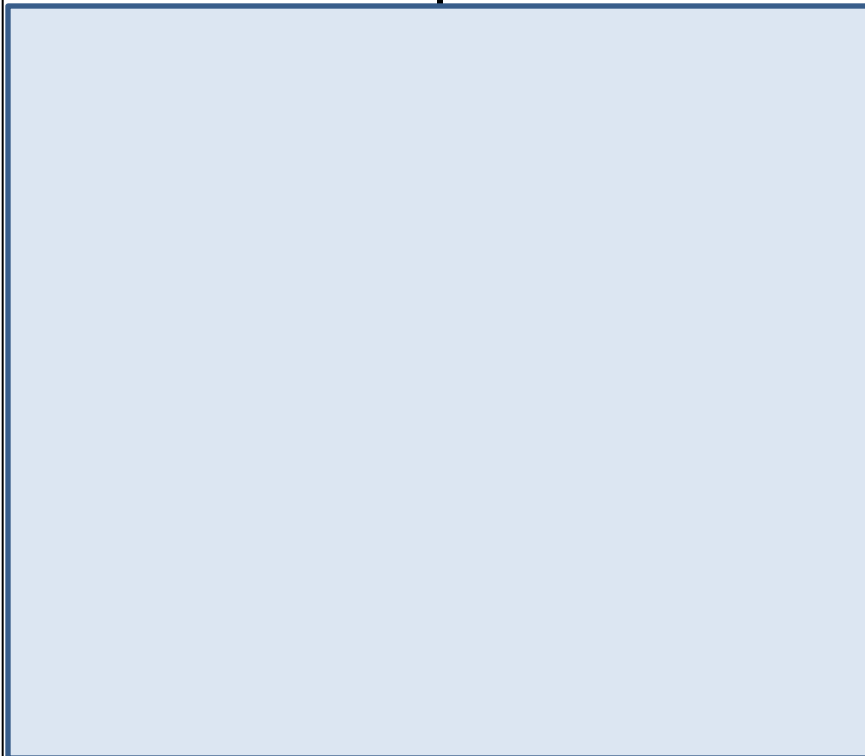
Airways

Alveoli

Interstitium

Vascular

Pleural  
Space



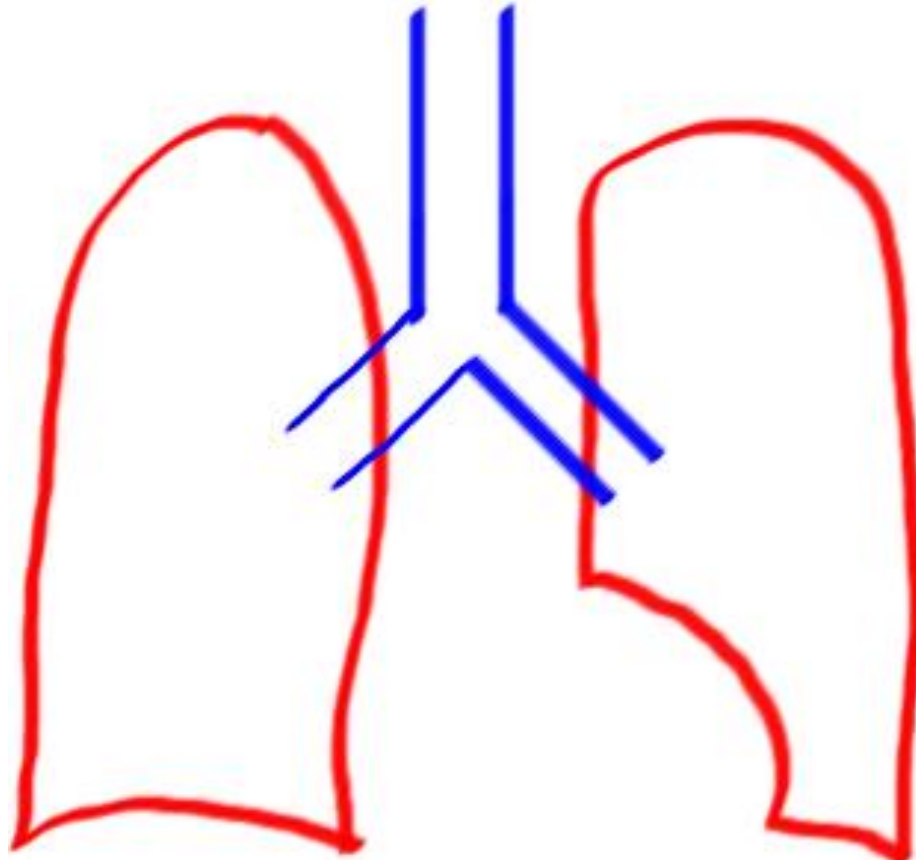
# The Pleural Space

(What You Need To Know For USLME Step One)

- Pleural Effusion
- Pneumothorax
- Derivatives
  - The Language of the Physical Exam
    - Auscultation
    - Percussion (resonance)
    - Trachea Position
- Key Non-Pleural Masqueraders



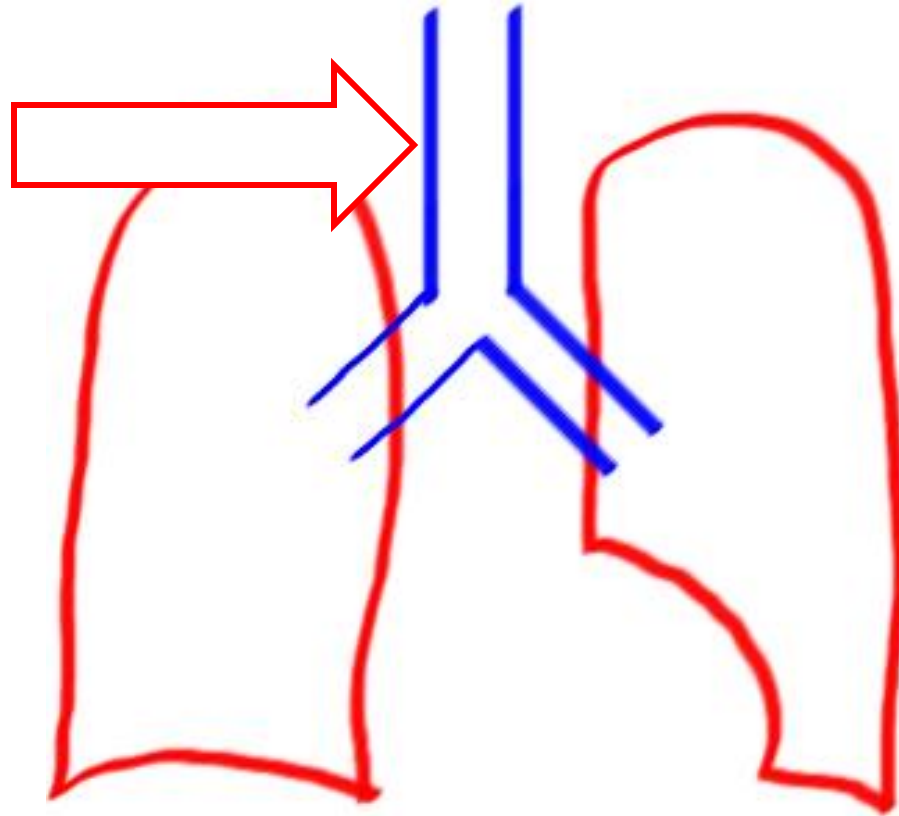
# The Physical Exam Descriptions



We will fill in the back stories, disease entities, clinical vignettes after reviewing the exam.

# The Physical Exam Descriptions

Trachea, midline

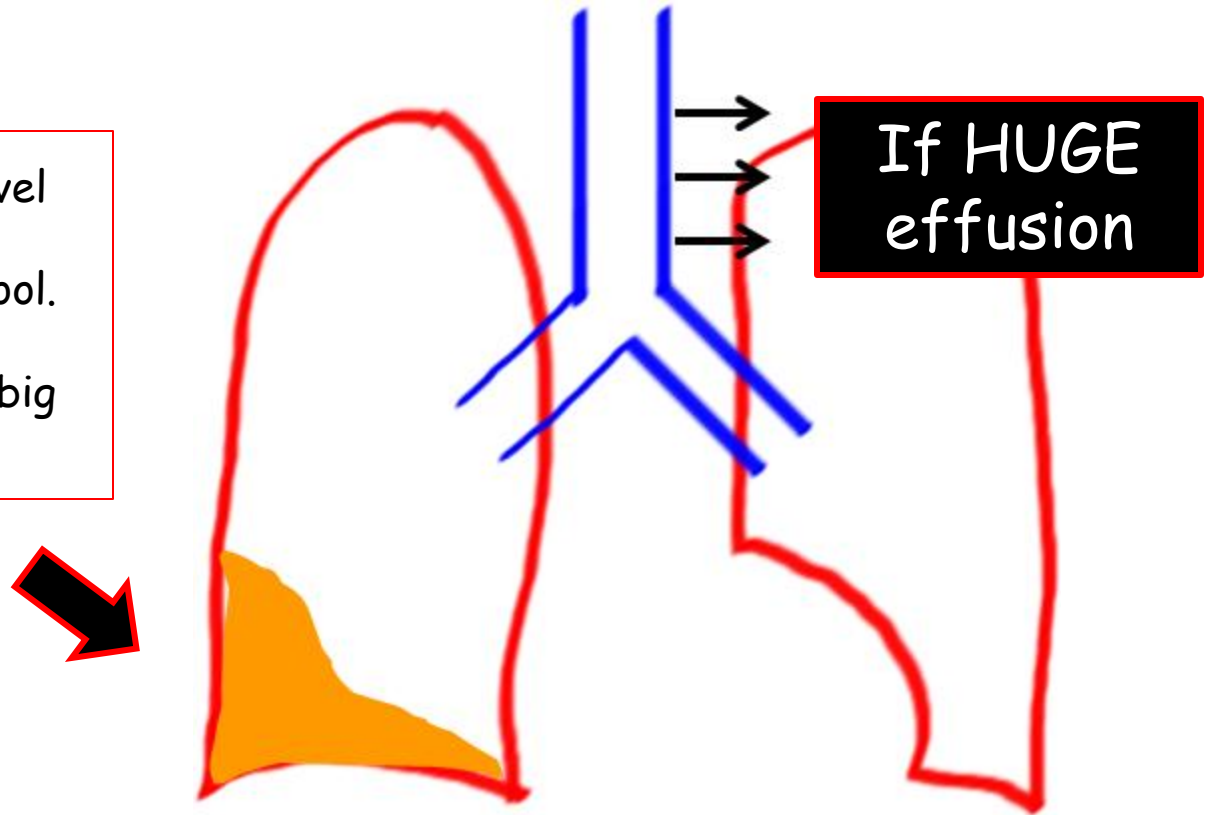


Healthy:

- Inspection, Trachea - midline
- Auscultation - clear breath sounds
- Percussion - normal

# The Physical Exam Descriptions

Air and Sound don't travel through fluid.  
Like trying to talk in a pool.  
Muffled; Distant  
Like heart sounds and a big pericardial effusion.



## Effusion

- Inspection, Trachea - midline; if large can push the trachea away
- **Auscultation** - decreased breath sounds
- Percussion - **dull**

# The Physical Exam Descriptions

## Language of Effusion:

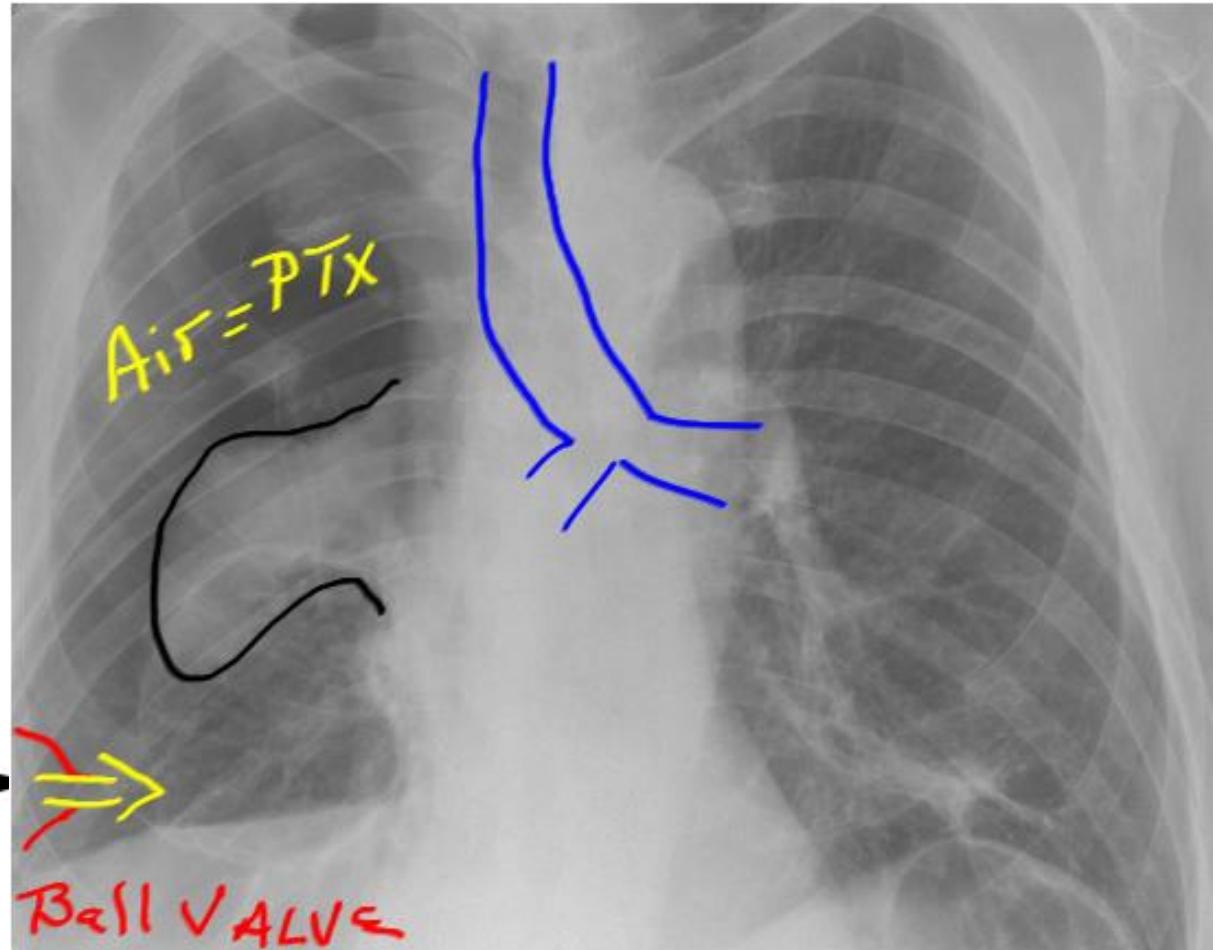
'Physical exam reveals dullness to percussion and decreased breath sounds. [No mention of trachea shift]'

When you see this sentence, **it means the patient has an effusion.** Then they ask you the derivative question: what is most likely cause?

## Effusion

- Inspection, Trachea - midline; if large can push the trachea away
- **Auscultation** - decreased breath sounds
- Percussion - **dull**

# The Physical Exam Descriptions



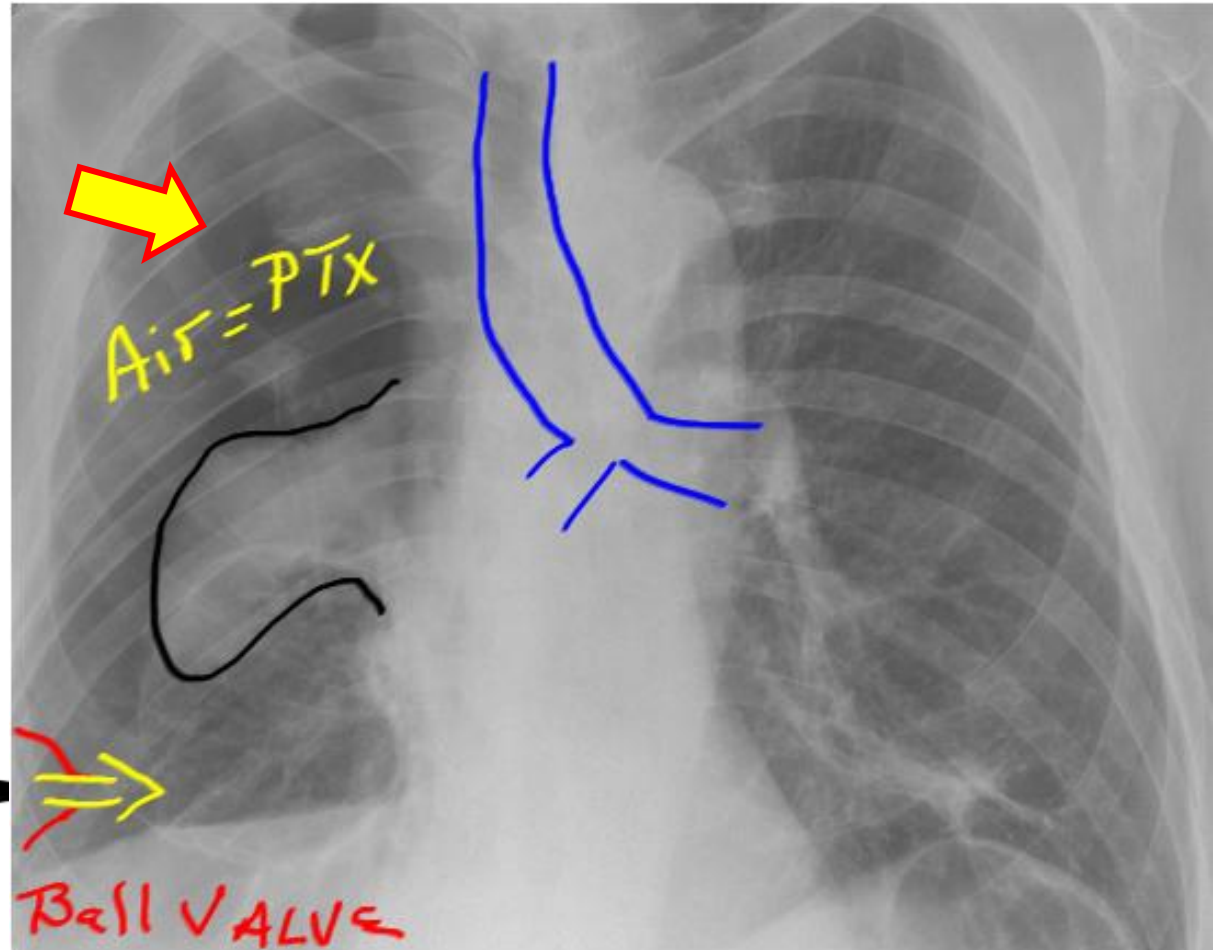
Tension Pneumothorax (PTX)



# The Physical Exam Descriptions

Ball valve effect creates a high pressure cavity.

High pressure pushes trachea away.



## Pneumothorax (PTX) - Tension:

- Inspection, Trachea - deviates away from high pressure 'tension' PTX
- **Auscultation** - decreased breath sounds (bronchioles are collapsed)
- Percussion - **hyperresonant** (like tapping on a drum)

Tension PTX → Shock

14296786  
Tech: M/V cs

ST: Chest without Cor  
4/30  
11:3  
Series  
Image #53

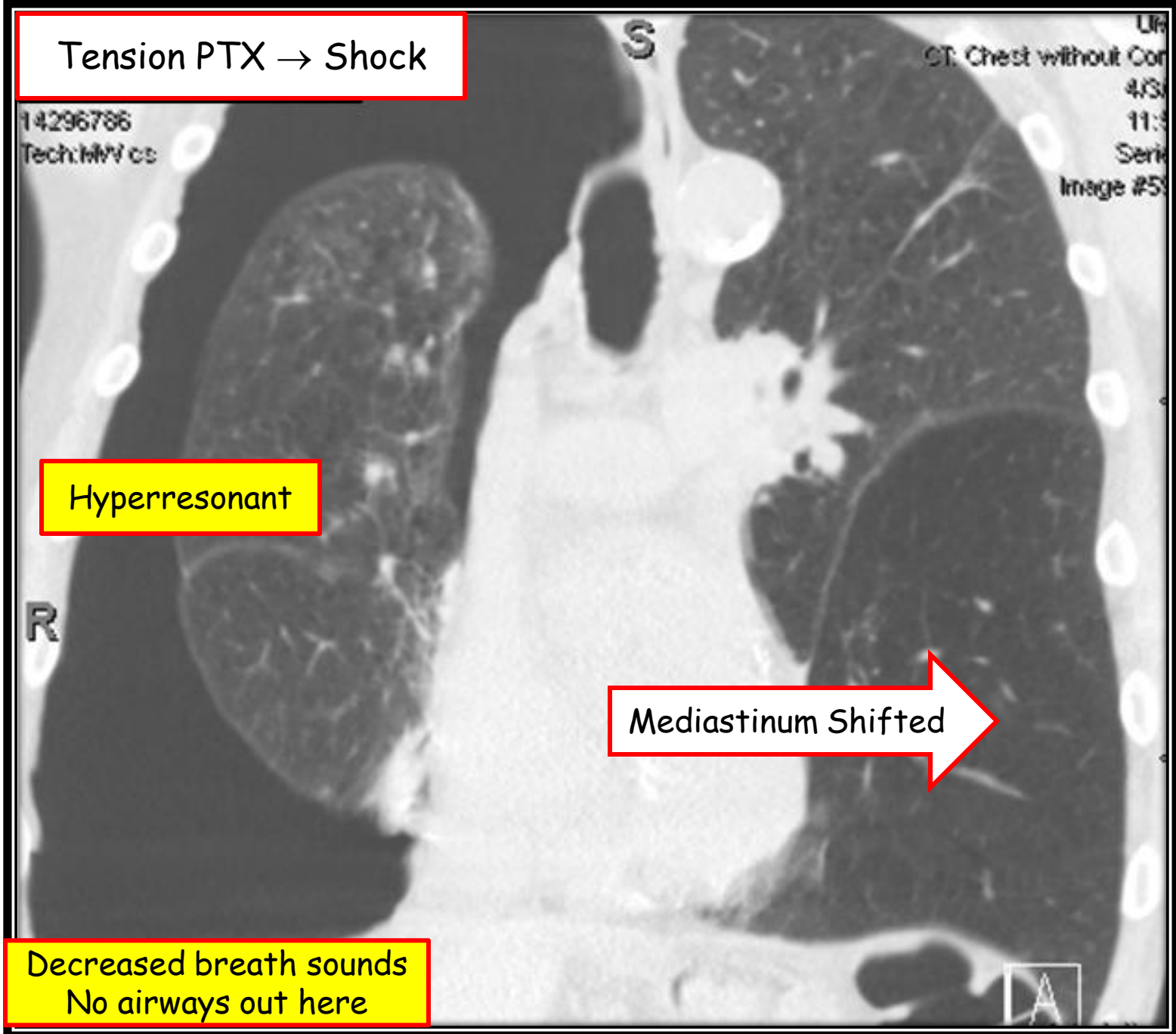
Hyperresonant

R

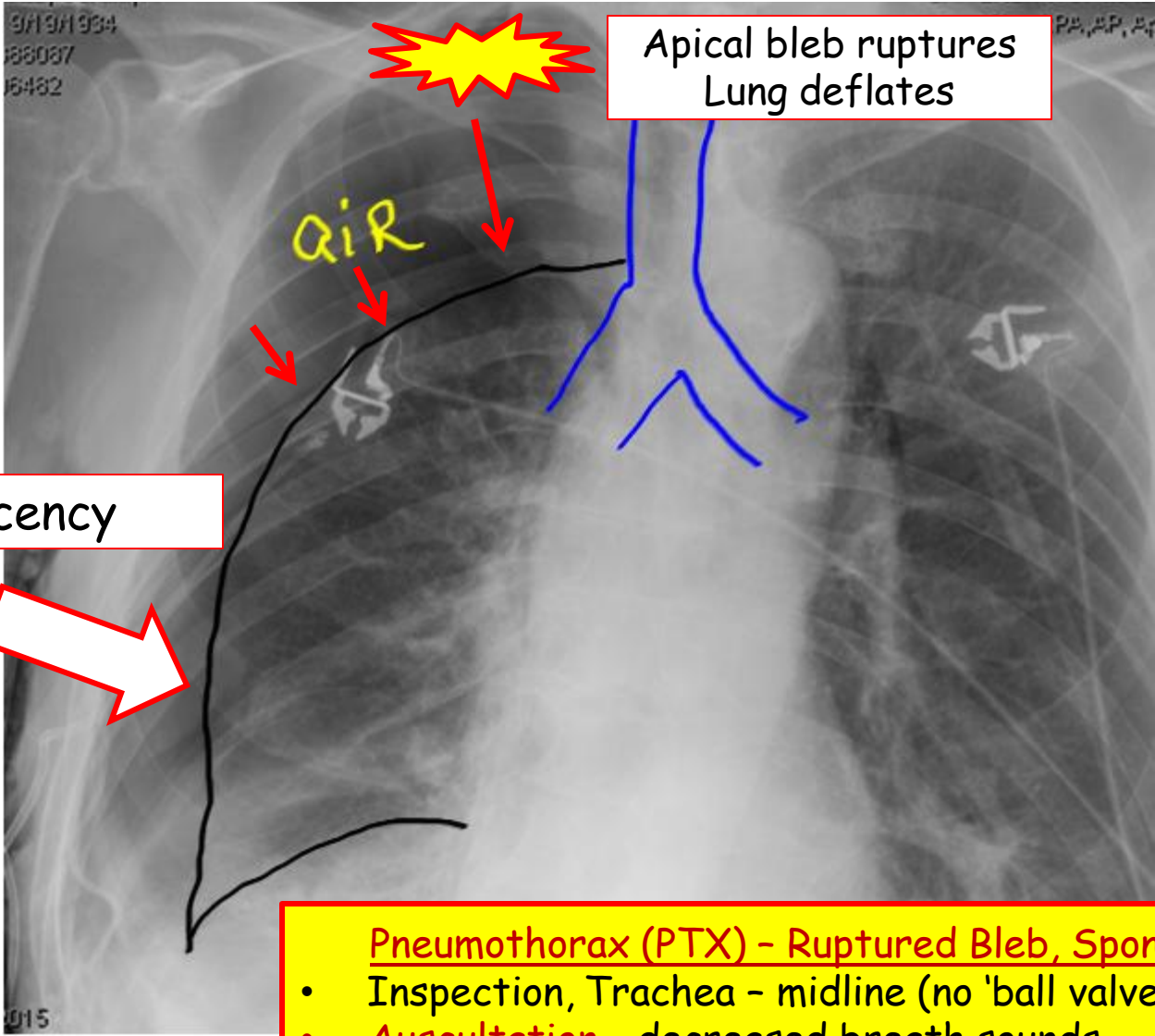
Mediastinum Shifted

Decreased breath sounds  
No airways out here

A



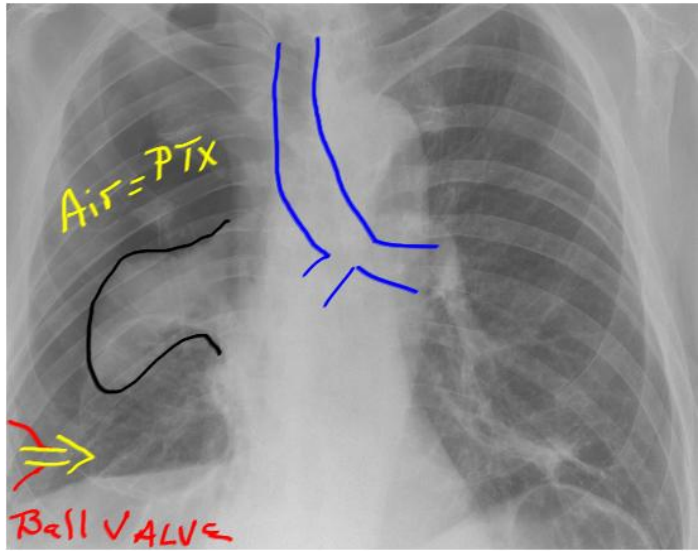
# The Physical Exam Descriptions



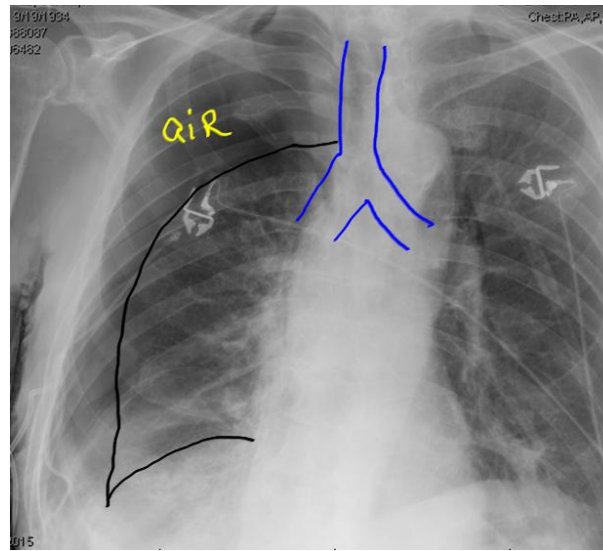
Apical bleb ruptures  
Lung deflates

Radiolucency

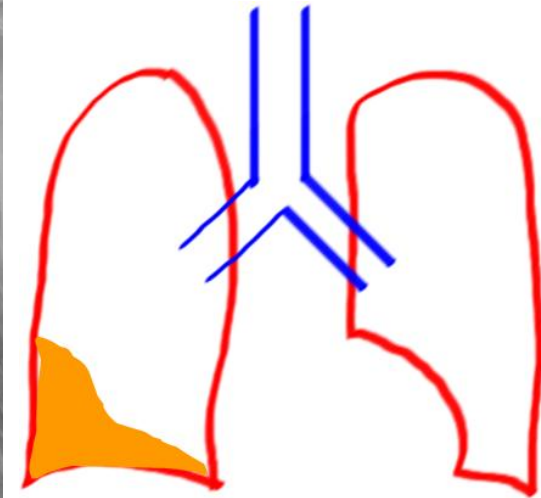
- Pneumothorax (PTX) - Ruptured Bleb, Spontaneous:
- Inspection, Trachea - midline (no 'ball valve')
  - Auscultation - decreased breath sounds
  - Percussion - hyperresonant



Tension, PTX

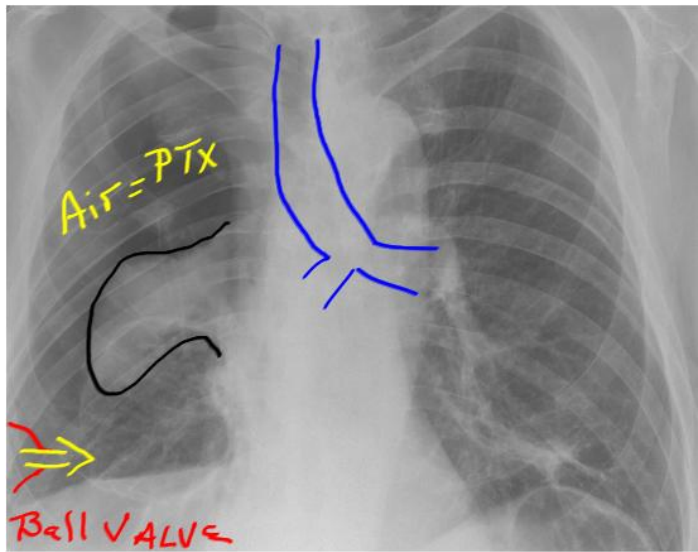


Ruptured Bleb, PTX

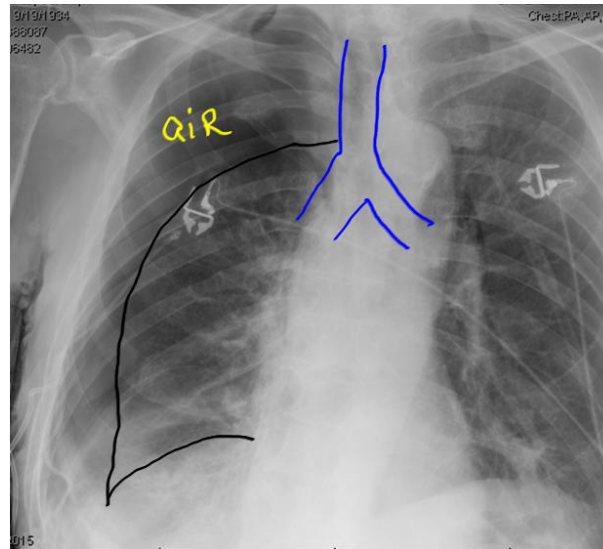


Pleural Effusion

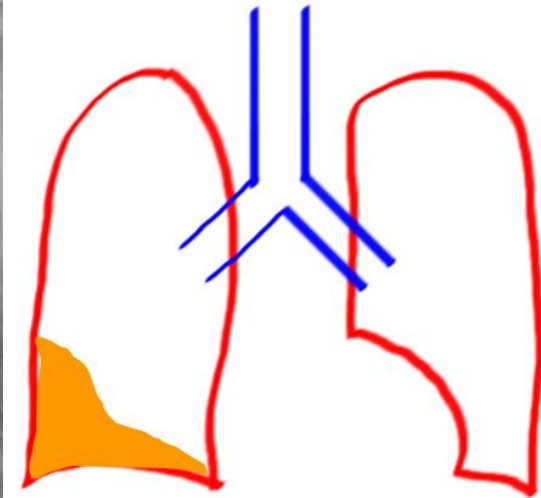
Auscultation: Decreased Breath Sounds



Tension, PTX



Ruptured Bleb, PTX

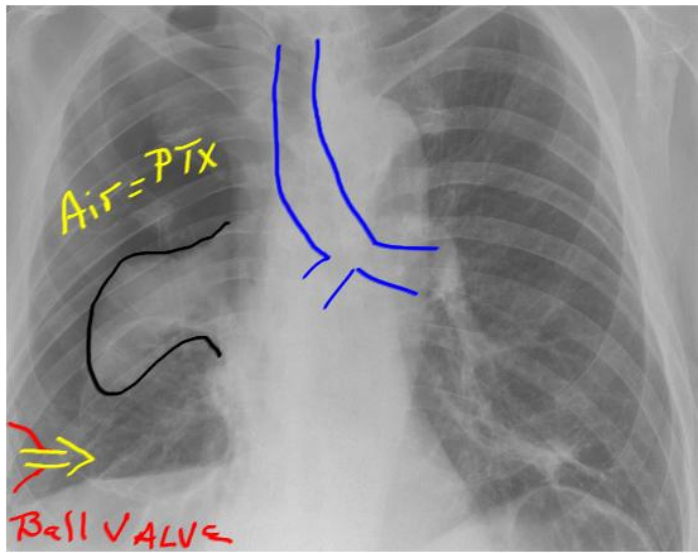


Pleural Effusion

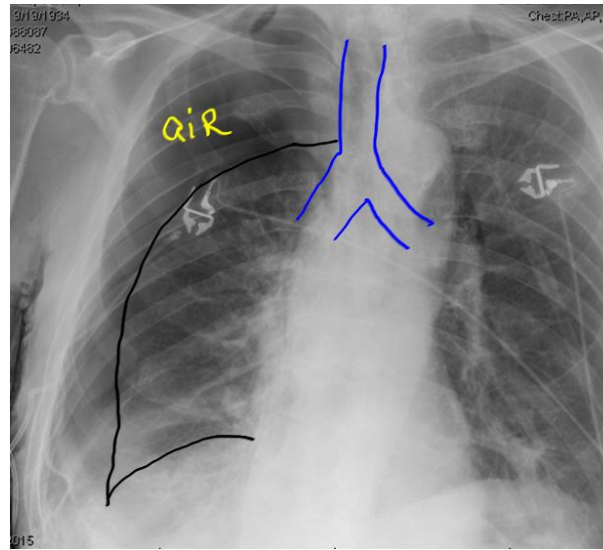
Auscultation: Decreased Breath Sounds

Percussion: Hyperresonant

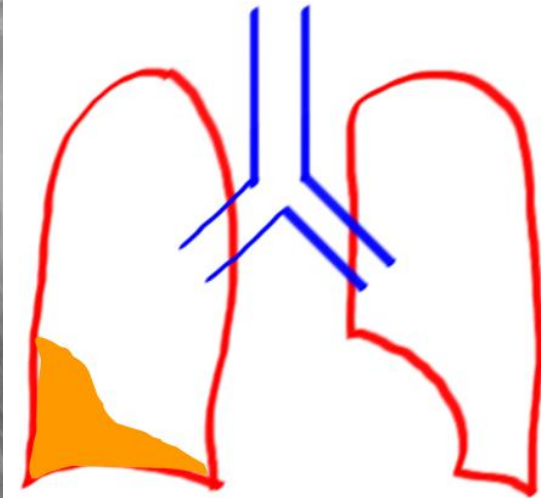
Percussion: Dull



Tension, PTX



Ruptured Bleb, PTX



Pleural Effusion

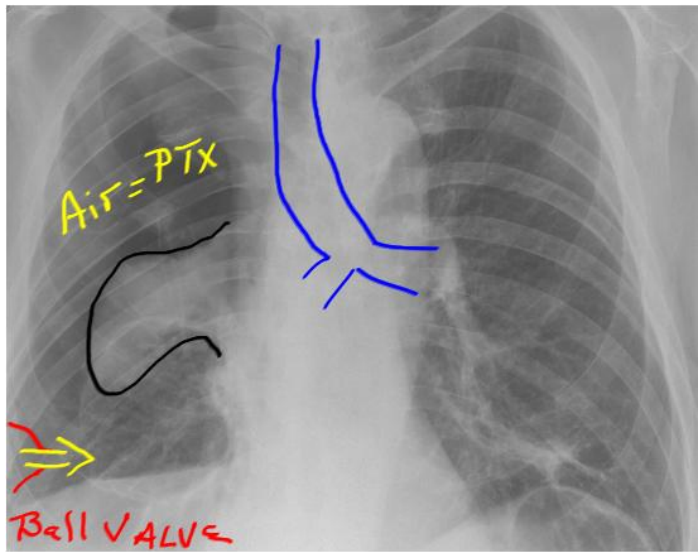
Auscultation: Decreased Breath Sounds

Percussion: Hyperresonant

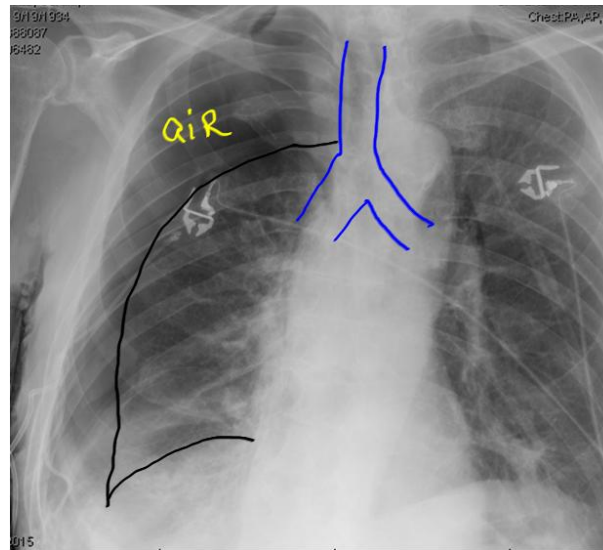
Percussion: Dull

Trachea Deviated, Away

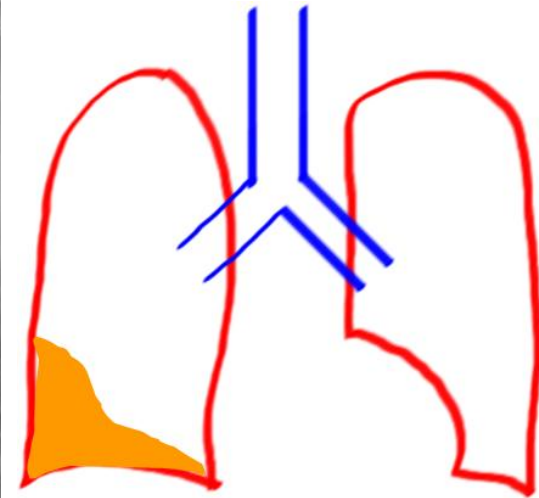
Trachea: Midline



Tension, PTX



Ruptured Bleb, PTX



Pleural Effusion

Auscultation: Decreased Breath Sounds

Percussion: Hyperresonant

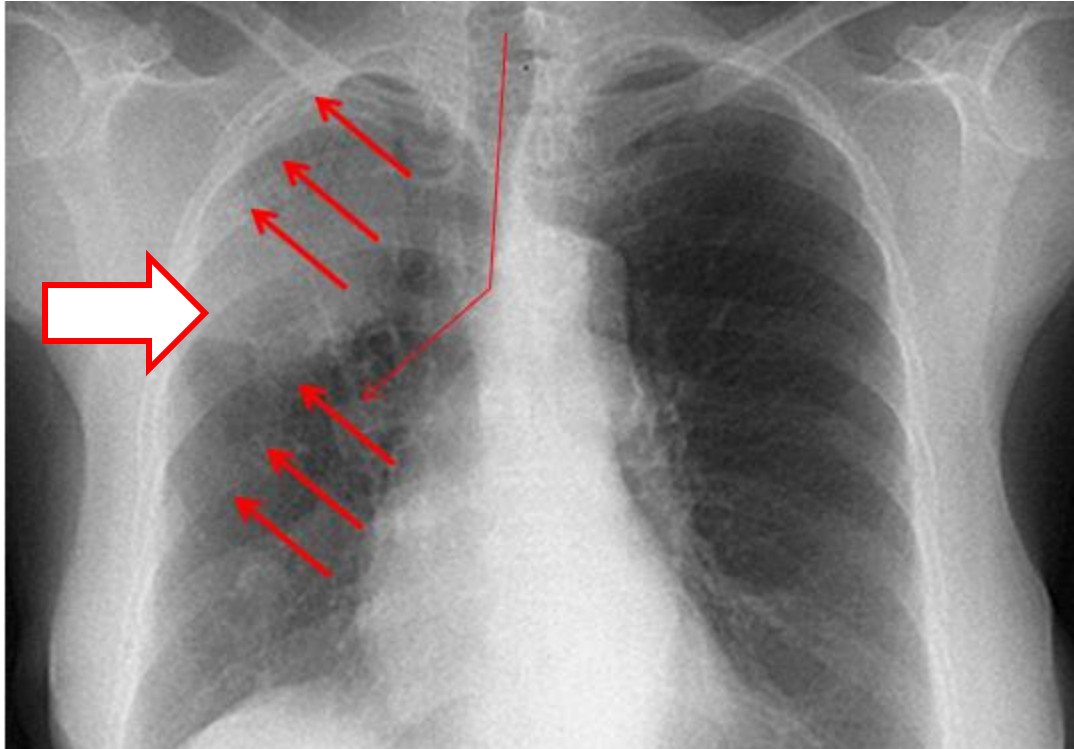
Percussion: Dull

Trachea Deviated, Away

Trachea: Midline

Part II: Non-Pleural Exam Confounders

# Non-Pleural Physical Exam Confounders: Trachea



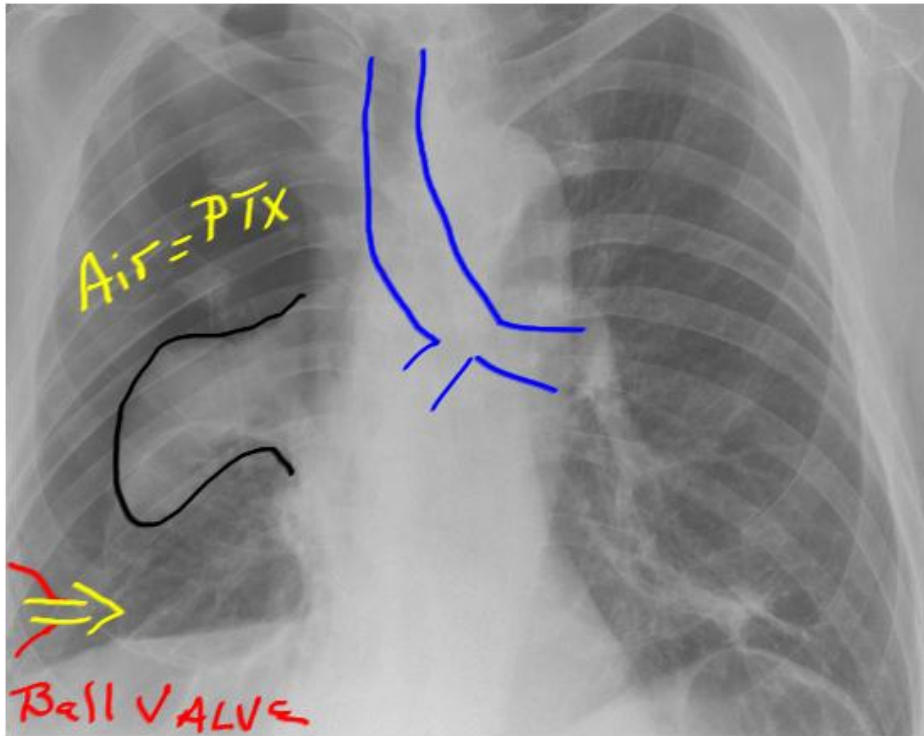
Opacification

## Traction Atelectasis:

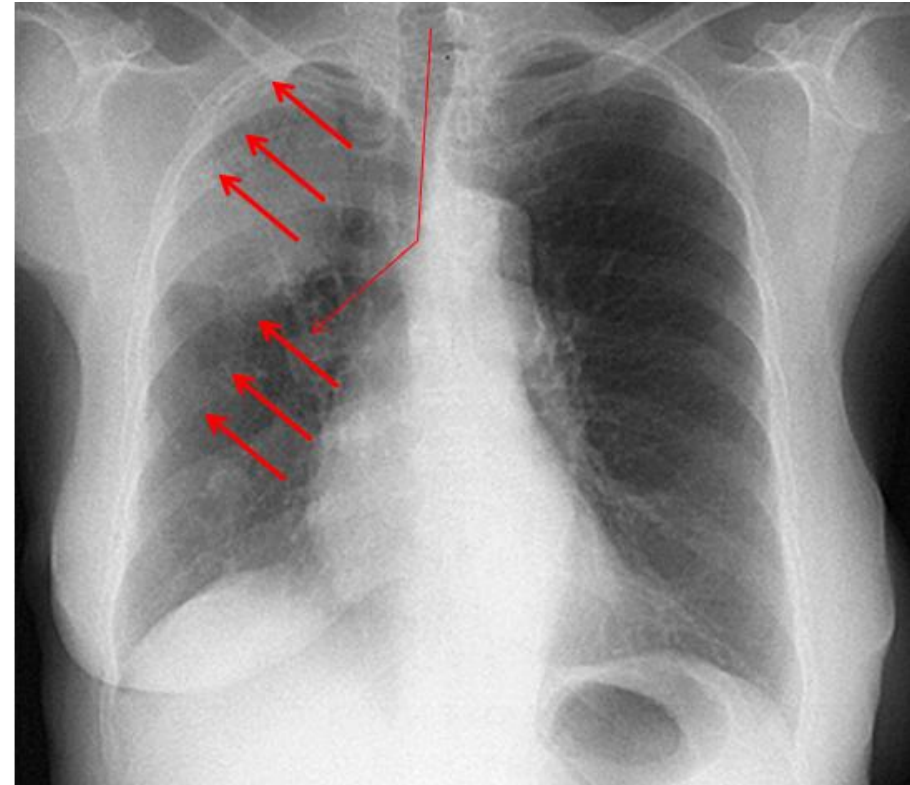
- **Etiology:** Mass Lesion in Bronchus
- Inspection, Trachea - Deviated (pulled) toward collapsed lung
- Auscultation - decreased breath sounds (due to lung collapse)
- Percussion - decreased (or normal); **no hyperresonance** (either side)



# Tracheal Deviation



Tension, PTX



Traction Atelectasis

Auscultation: Decreased Breath Sounds

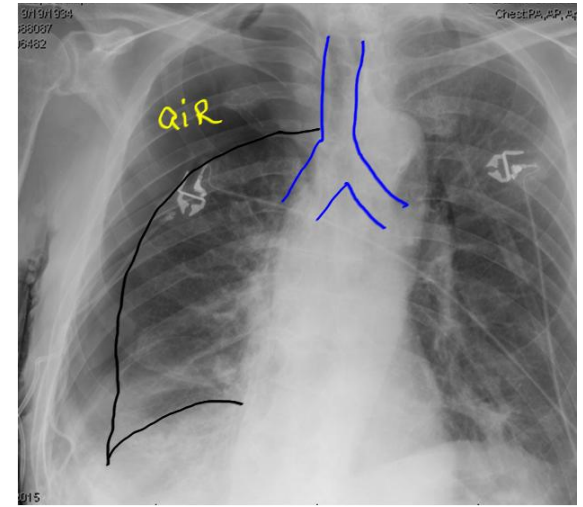
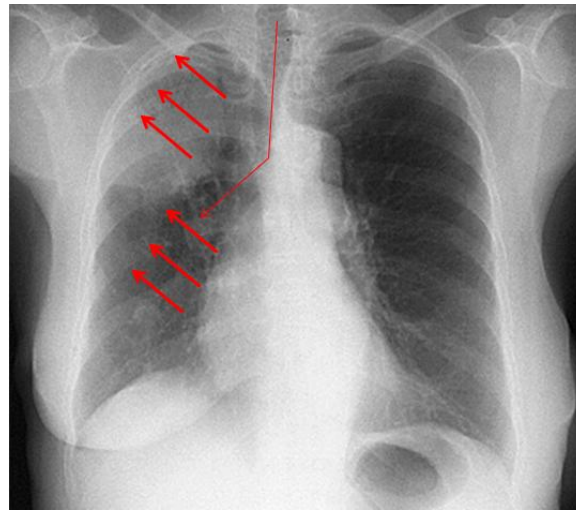
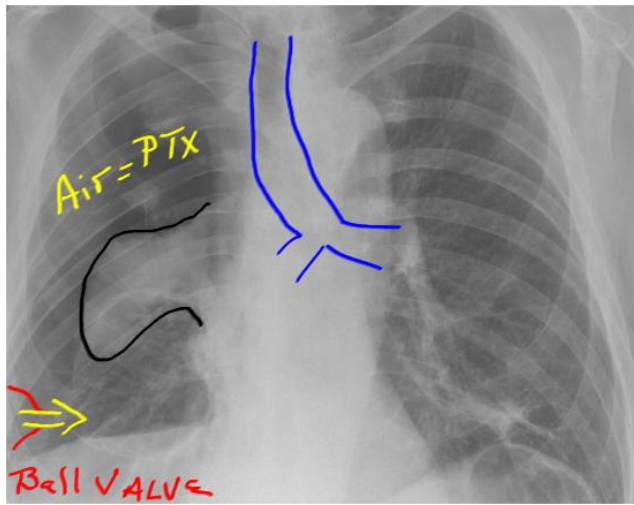
Hyperresonant

Percussion

Dull (or normal)

Trachea deviated away from 'ball valve'

Trachea pulled toward side of collapse



Tension, PTX

Traction Atelectasis

Ruptured Bleb, PTX

Vignettes

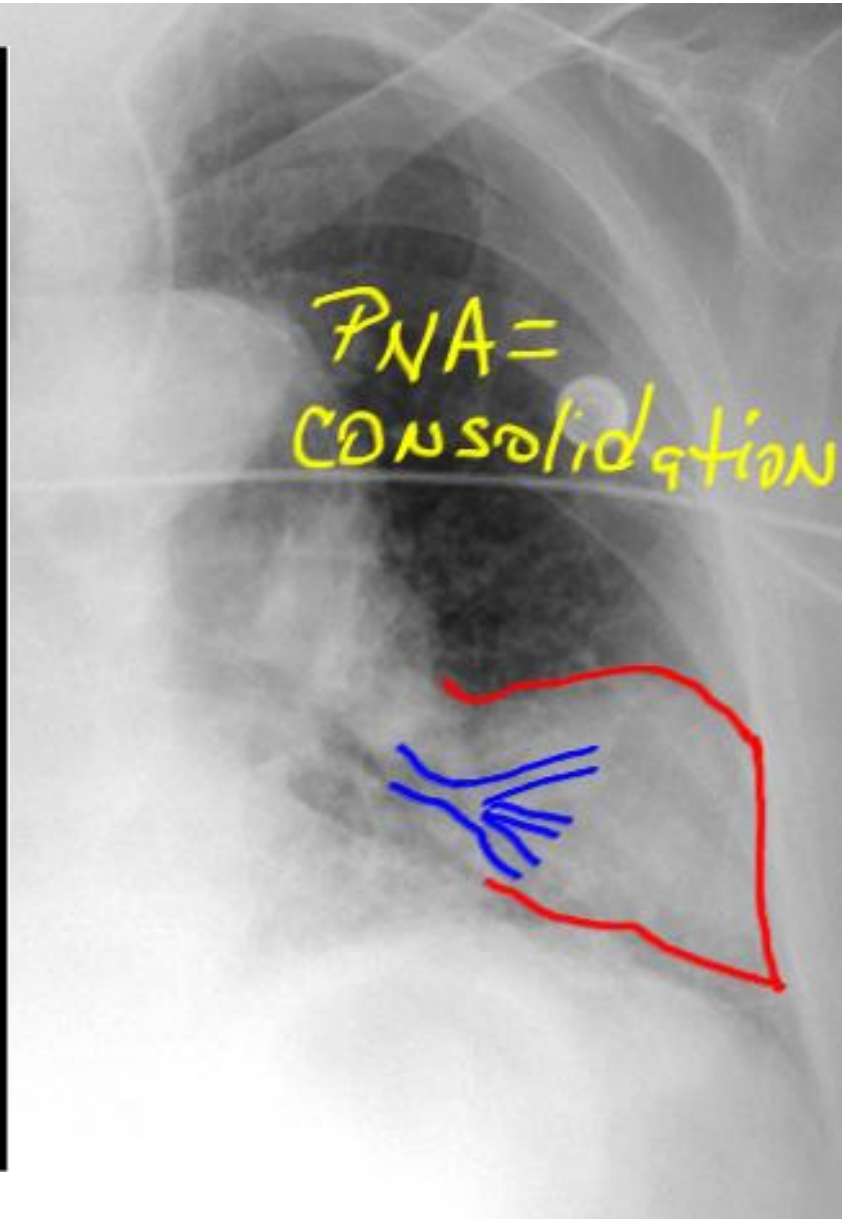
Knife Wound/MVA  
Shock  
Affected side:  
Decreased breath sounds  
Hyperresonance  
Trachea shift, away  
Be aware:  
Pulsus paradoxus

Smoker/Mainstem Lesion  
Dyspnea  
Affected side:  
Decreased breath sounds  
Dullness  
Trachea shift, toward  
Buzzword:  
CXR: opacification

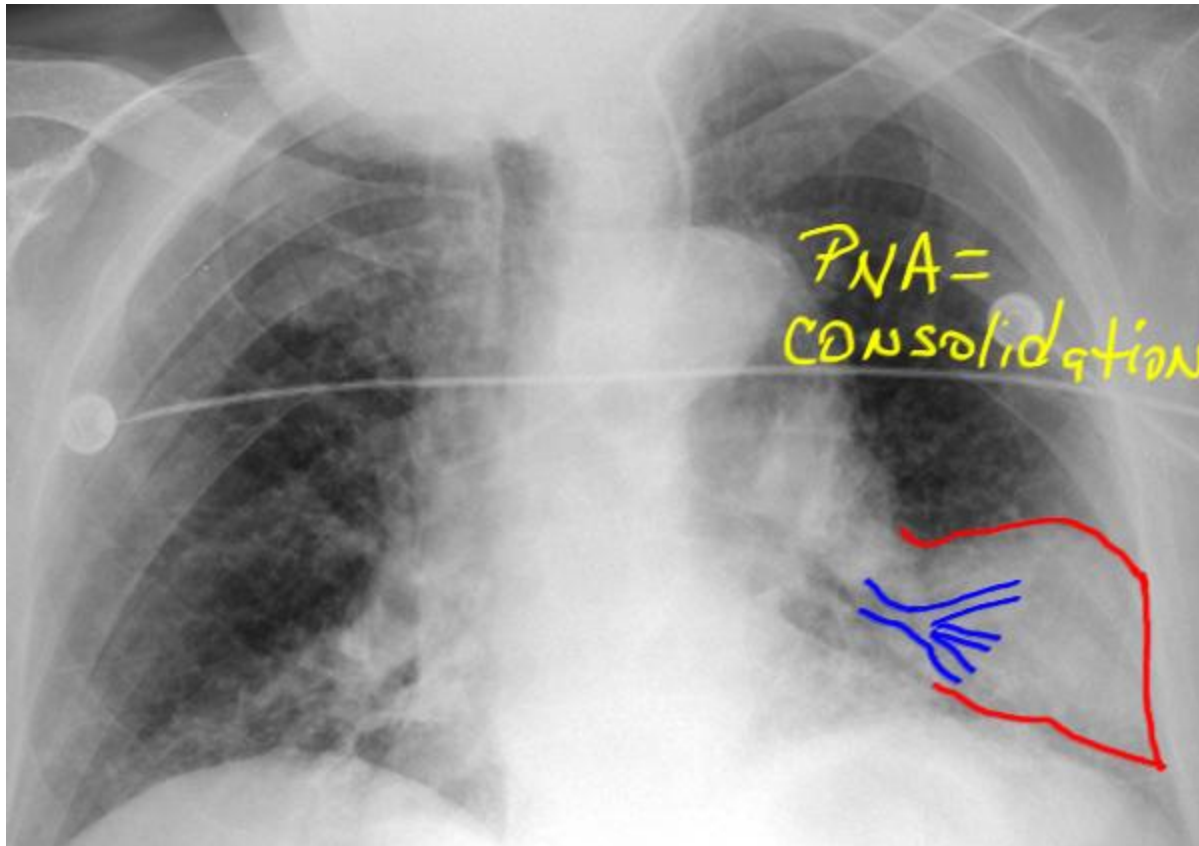
Young, tall, thin  
Sudden onset SOB/pleurisy  
Affected side:  
Decreased breath sounds  
Hyperresonance  
Trachea midline  
Buzzphrases:  
Subcutaneous emphysema  
CXR: radiolucency

# Non-Pleural Physical Exam Descriptions

Air Bronchogram



# Non-Pleural Physical Exam Descriptions



## Pneumonia I, Consolidation:

Auscultation: Crackles, Bronchophony, Egophony, Whispered pectoriloquy

Palpation: Tactile Fremitus

Percussion: Dull

Caution: If associated effusion, the patient with PNA may be described with decreased breath sounds.

# Non-Pleural Physical Exam Descriptions



## Pneumonia II, Infiltrate:

- Auscultation: **Crackles** (focal)
- Vignette: Fever, cough, sputum and modifier (demographics, etc)

# Pleural Effusion

# Pleural Effusion

Transudate

Exudate

Other

# Pleural Effusion

Transudate

Exudate

Other

## Chylothorax:

Fluid Appearance: Milky white

Evaluation: High Trigs

## Derivatives:

Anatomy: Thoracic duct - empties into left subclavian vein; travels through mediastinum

Etiology: Traumatic - Injury; Nontraumatic  
Obstruction - lymphoma, advanced

Blood

Chyle  
(Chylothorax)



# Pleural Effusion

Transudate

Exudate

Light's Criteria:

Protein

LDH



# Pleural Effusion

Transudate

Low Protein  
Low LDH

Exudate

High Protein  
High LDH

Light's Criteria:  
Protein  
LDH

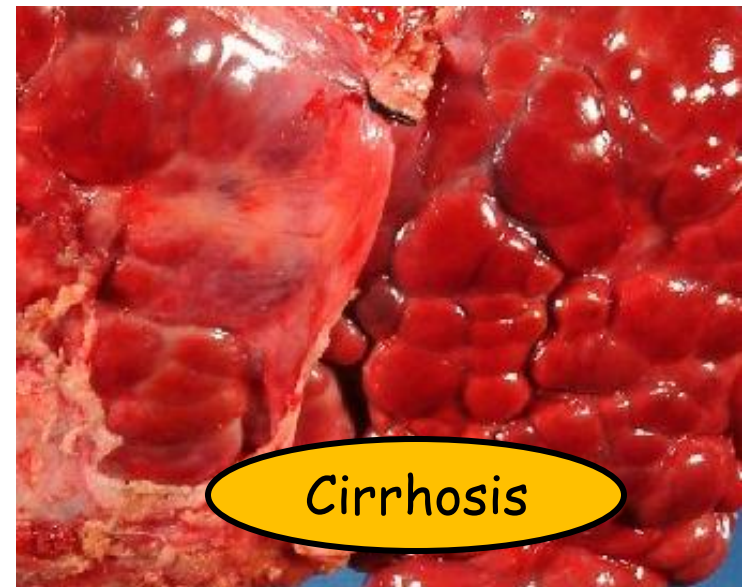
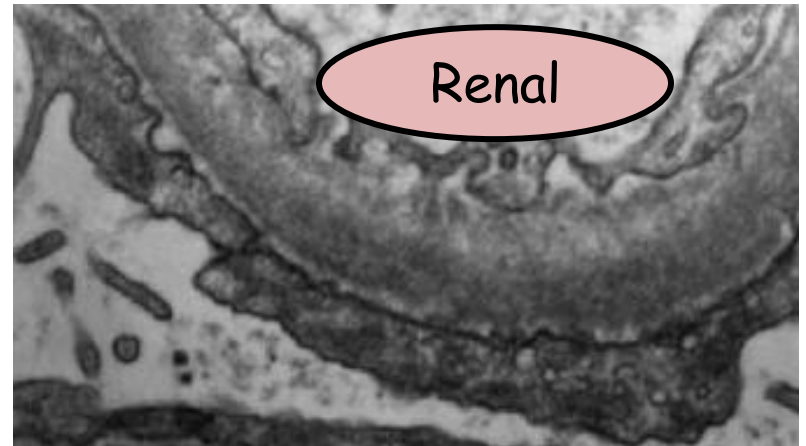
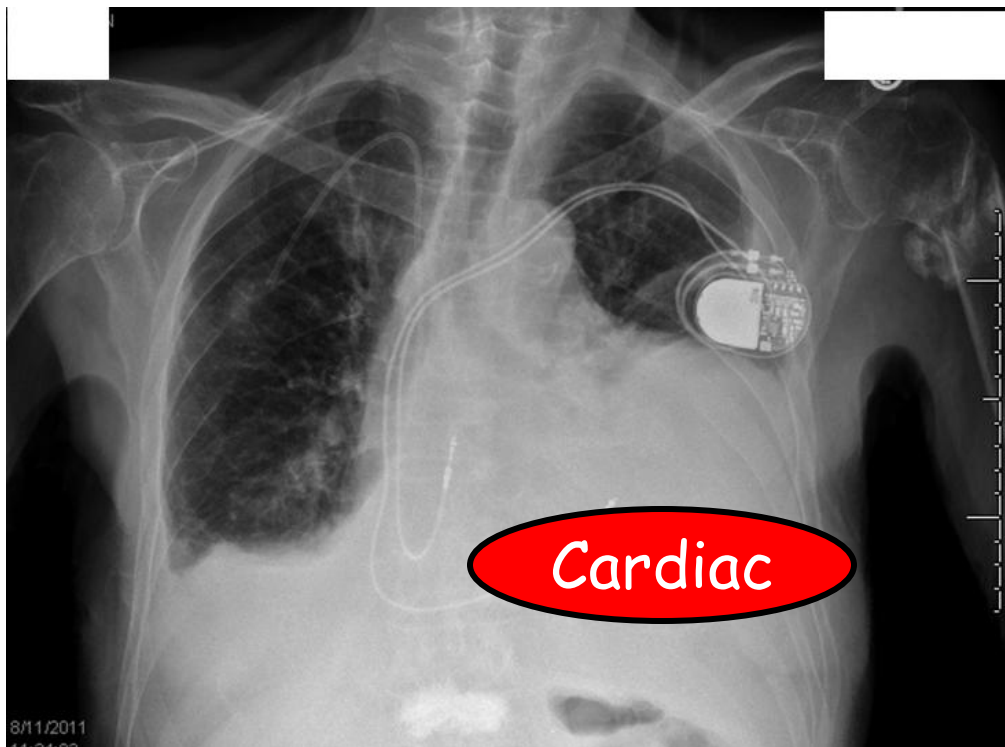


## Transudate

Pleural LDH  $< 200$

Pleural:Serum **LDH**  $< 0.6$

Pleural:Serum **Protein**  $< 0.5$



## Exudate

Pleural LDH > 200

Pleural:Serum LDH > 0.6

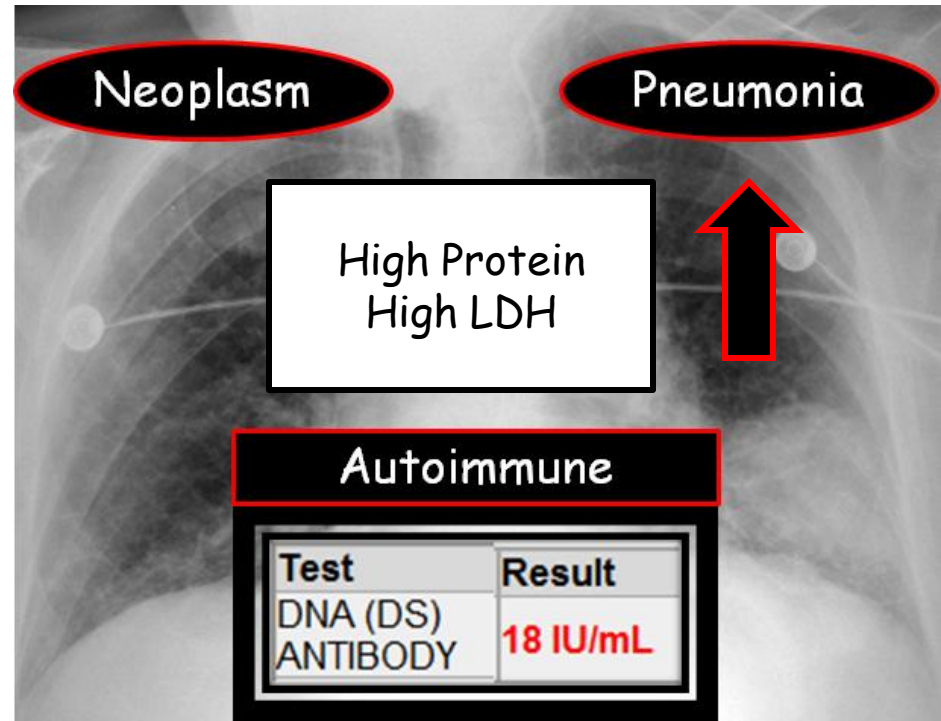
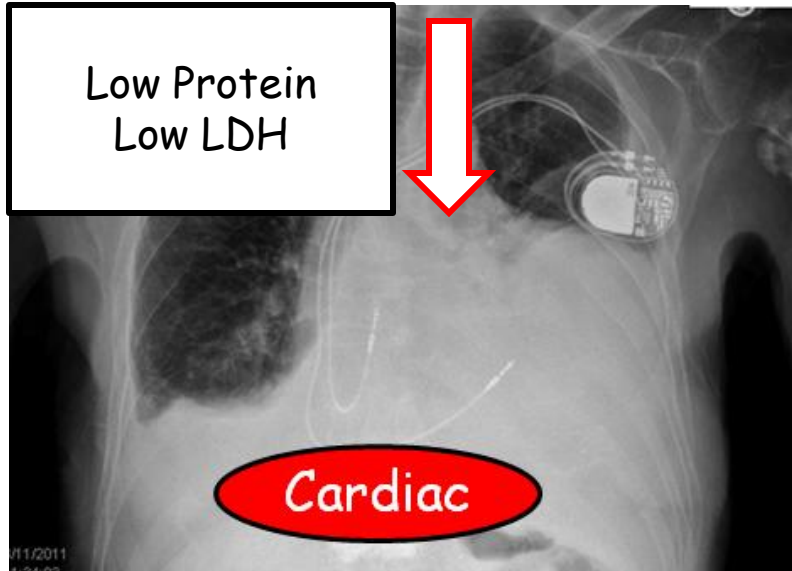
Pleural:Serum Protein > 0.5

Neoplasm

Pneumonia

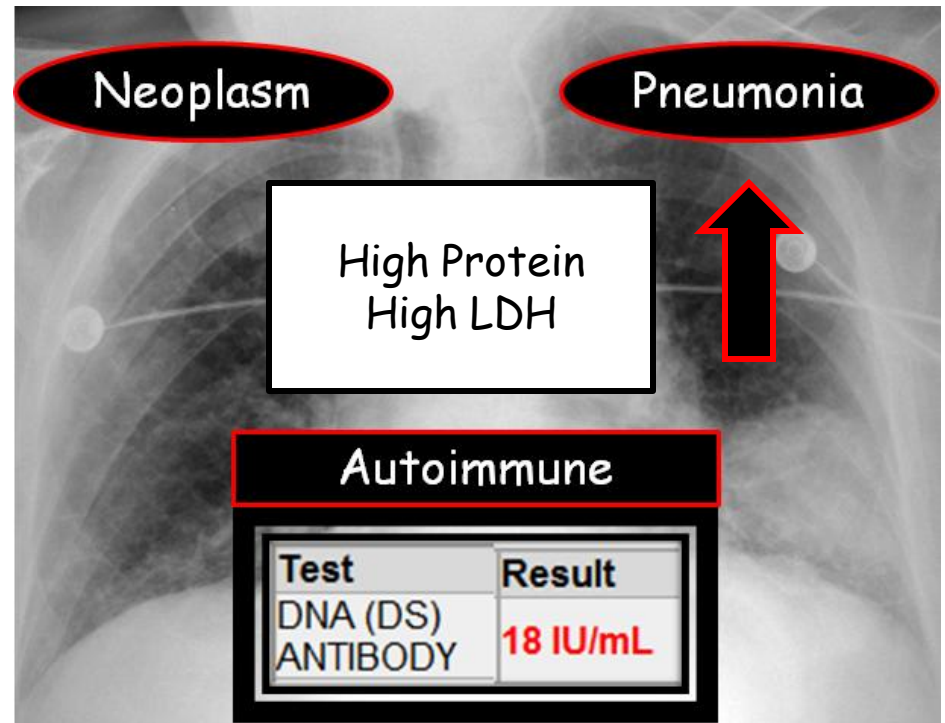
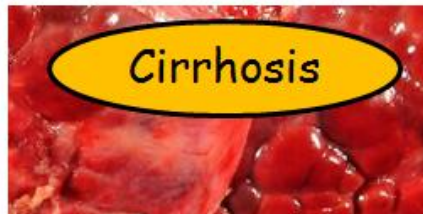
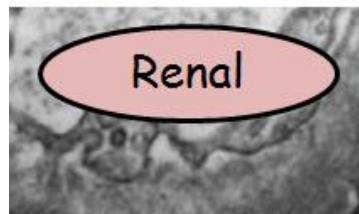
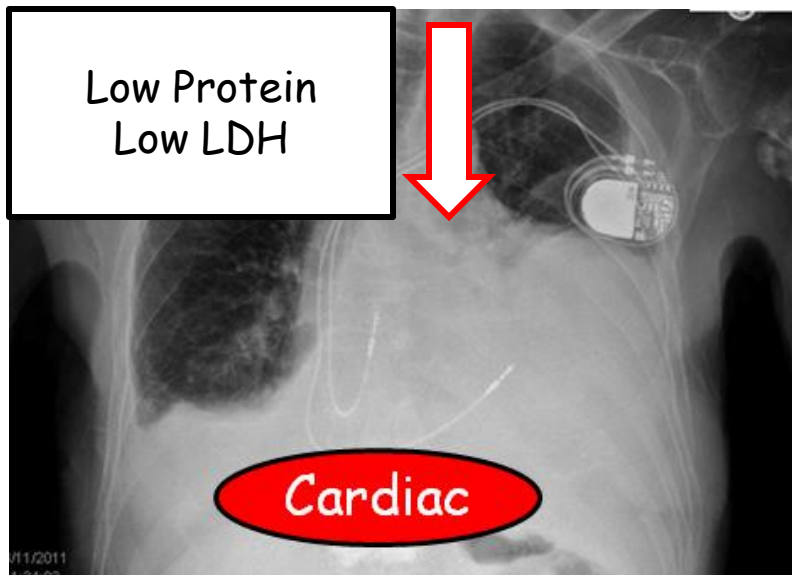
Autoimmune

Test	Result
DNA (DS) ANTIBODY	18 IU/mL



## Effusion

- Inspection, Trachea - midline; if large can push the trachea away
- **Auscultation** - decreased breath sounds
- Percussion - **dull**



### Derivative Question

Patient with decreased breath sounds and dullness to percussion.  
 CXR: pleural effusion. Fluid analysis reveals...  
 What is the most likely diagnosis?:

Transudate: CHF, Minimal Change Disease, Chronic Hepatitis C  
 Exudate: Tumor, Bacterial pleuritis, Rheumatoid arthritis

# The Pleural Space

(What You Need To Know For USLME Step One)

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- Pneumothorax
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  - The Language of the Physical Exam
    - Auscultation
    - Percussion (resonance)
    - Trachea Position
- Key Non-Pleural Masqueraders:
  - Pneumonia
  - Traction Atelectasis

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