ARROW®
NEVER SETTLE™

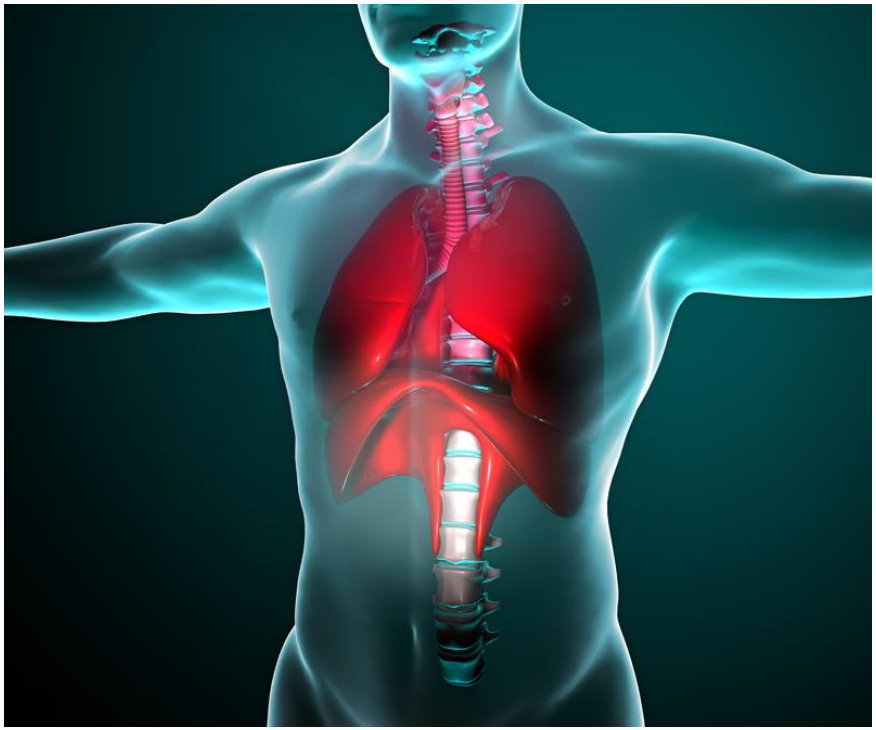
Bedside Ultrasound for Pneumothorax

The Sliding Lung Technique

Objectives

The clinician will:

- Have a basic understanding of the respiratory system
- Understand use of sliding lung technique after CVC insertion
- Be able to distinguish sliding lung on Ultrasound
- Be able to describe advantages of sliding lung versus chest X-ray



Lung Ultrasound

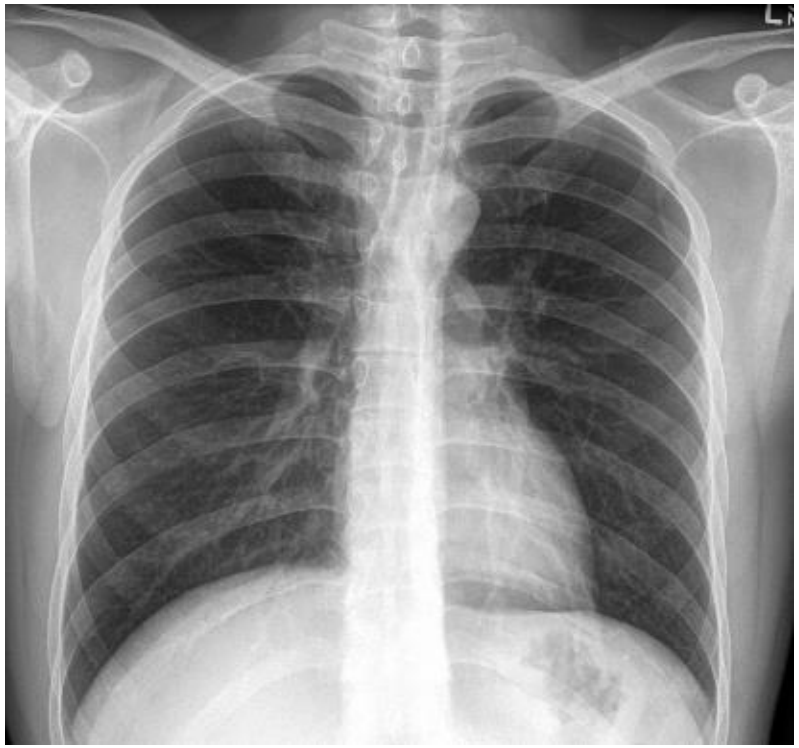
What is Lung Ultrasound?

Non-invasive procedure used to assess organs and structures
Allows quick visualization of the chest from the outside

Sliding Lung

More sensitive than chest X-ray
Able to detect even a small pneumothorax

Is quick and easy to learn
Able to rule out significant pneumothorax in an acutely dyspneic patient



Lung Ultrasound

- Lung Ultrasonography yields similar results as a chest CT for detection of pneumothorax, but with advantages

Advantages

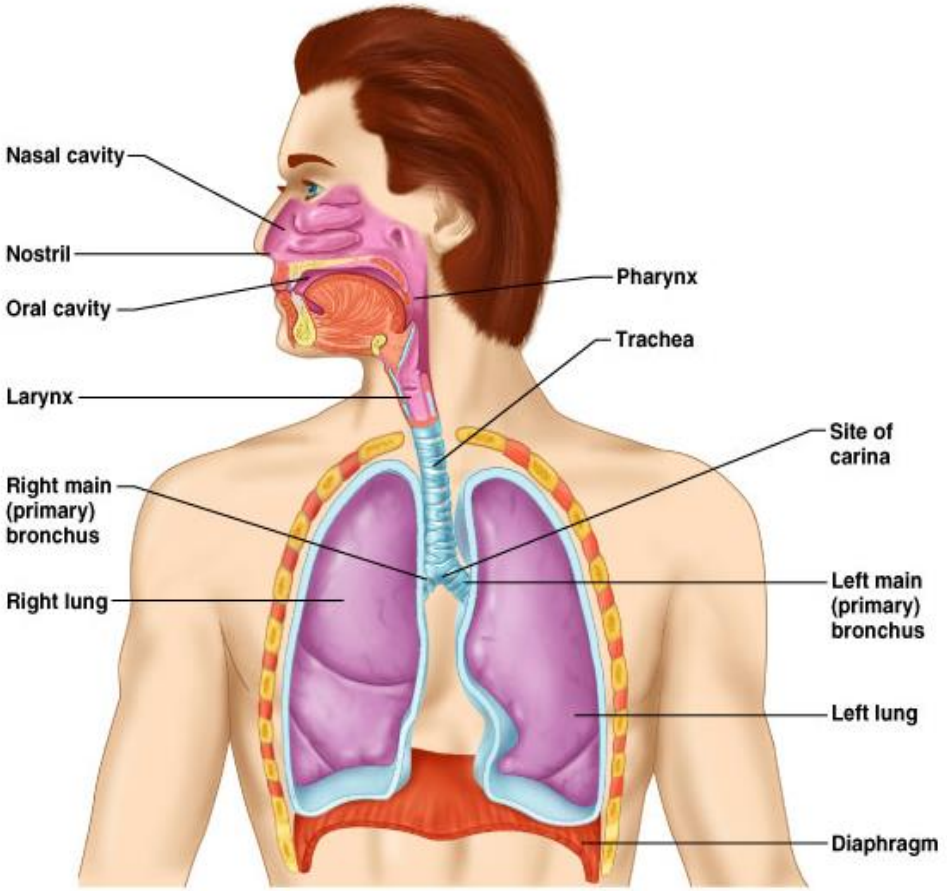
Immediate
Repeatable
Cost Effective
Reduced radiation exposure

Lichlenstein et al . Comparative diagnostic performances of auscultation, chest CT and ultrasonography in acute respiratory distress. *Anesthesiology* . 2004;1001:9-15.

The Respiratory System

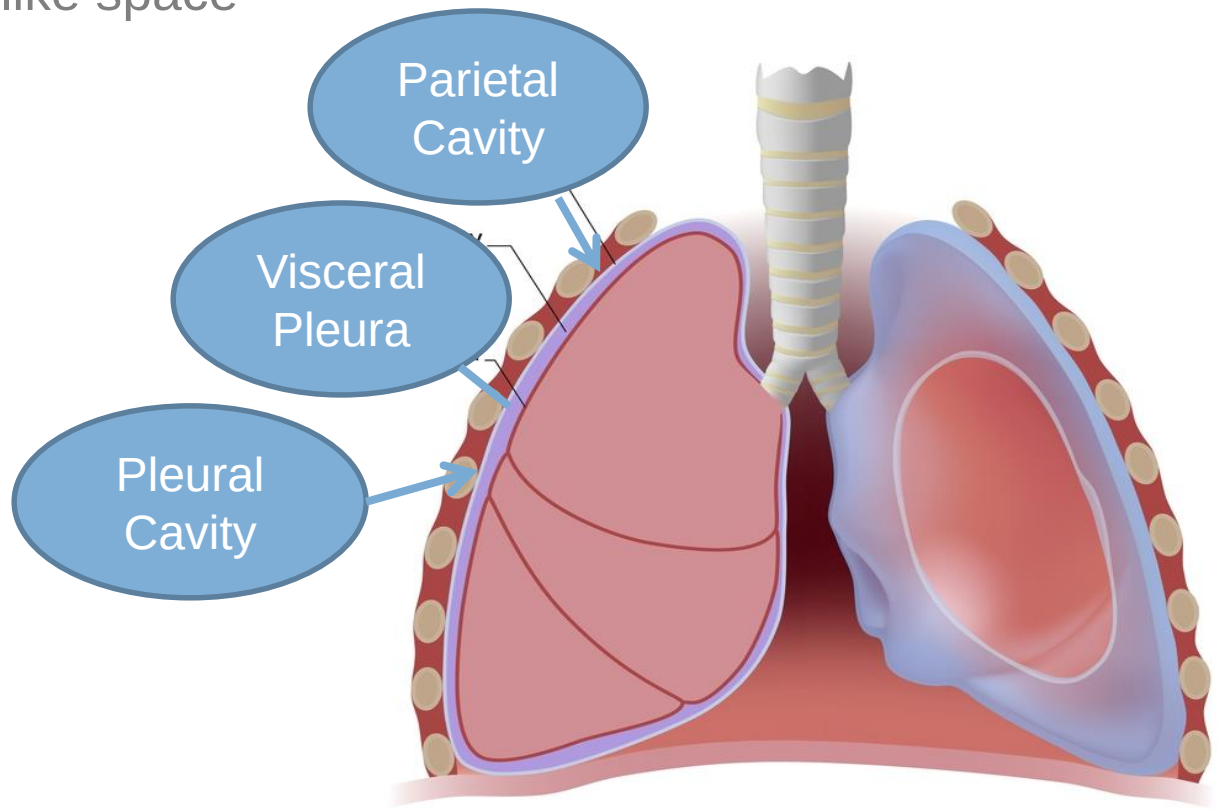
Necessary to Sustain Life

Primary function is to supply blood with oxygen
Blood delivers oxygen to all parts of the body
We inhale oxygen and exhale carbon dioxide



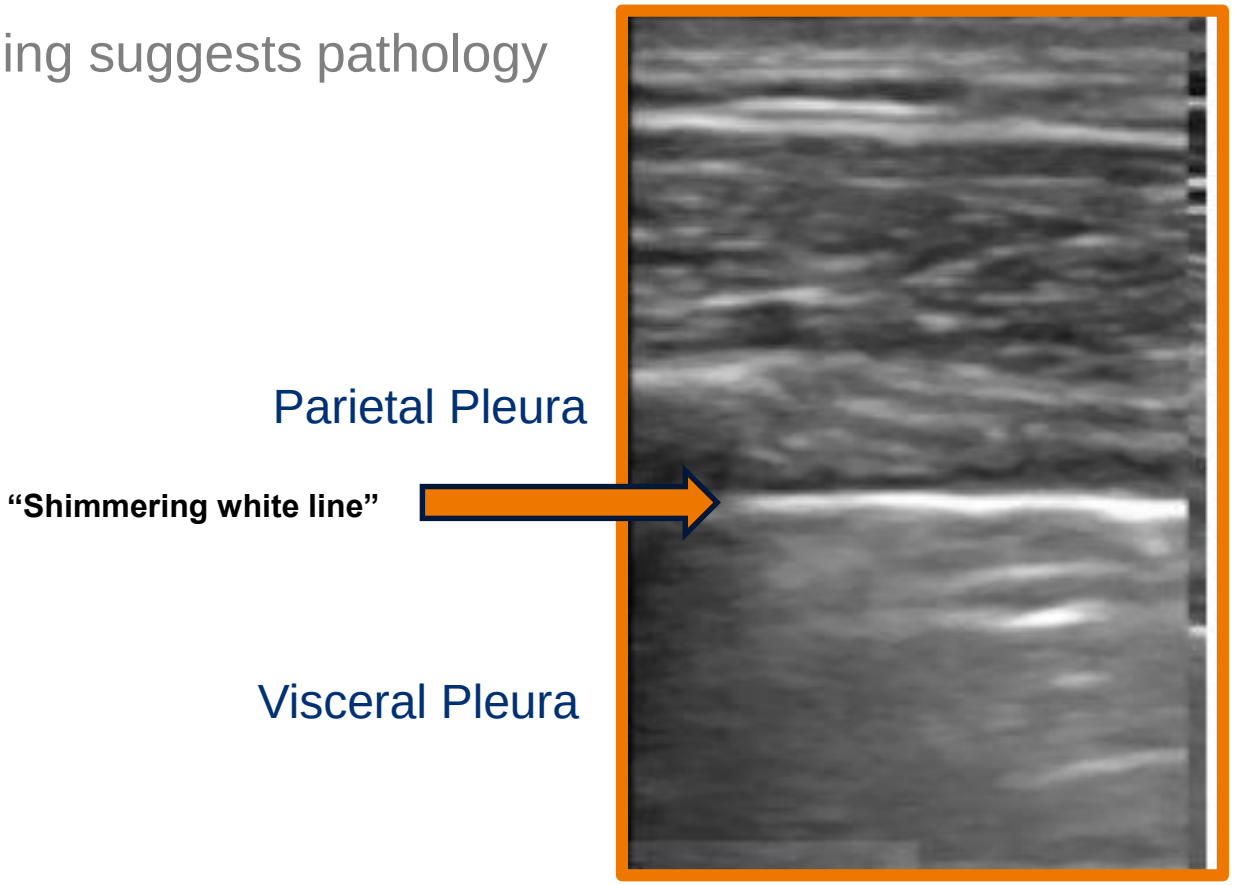
Lungs and Pleura

- Around each lung is a flattened sac called **pleura**
- Outer layer is the **parietal pleura**
- **Visceral pleura** lays directly on the lung
- **Pleural cavity** is a slit like space filled with pleural fluid

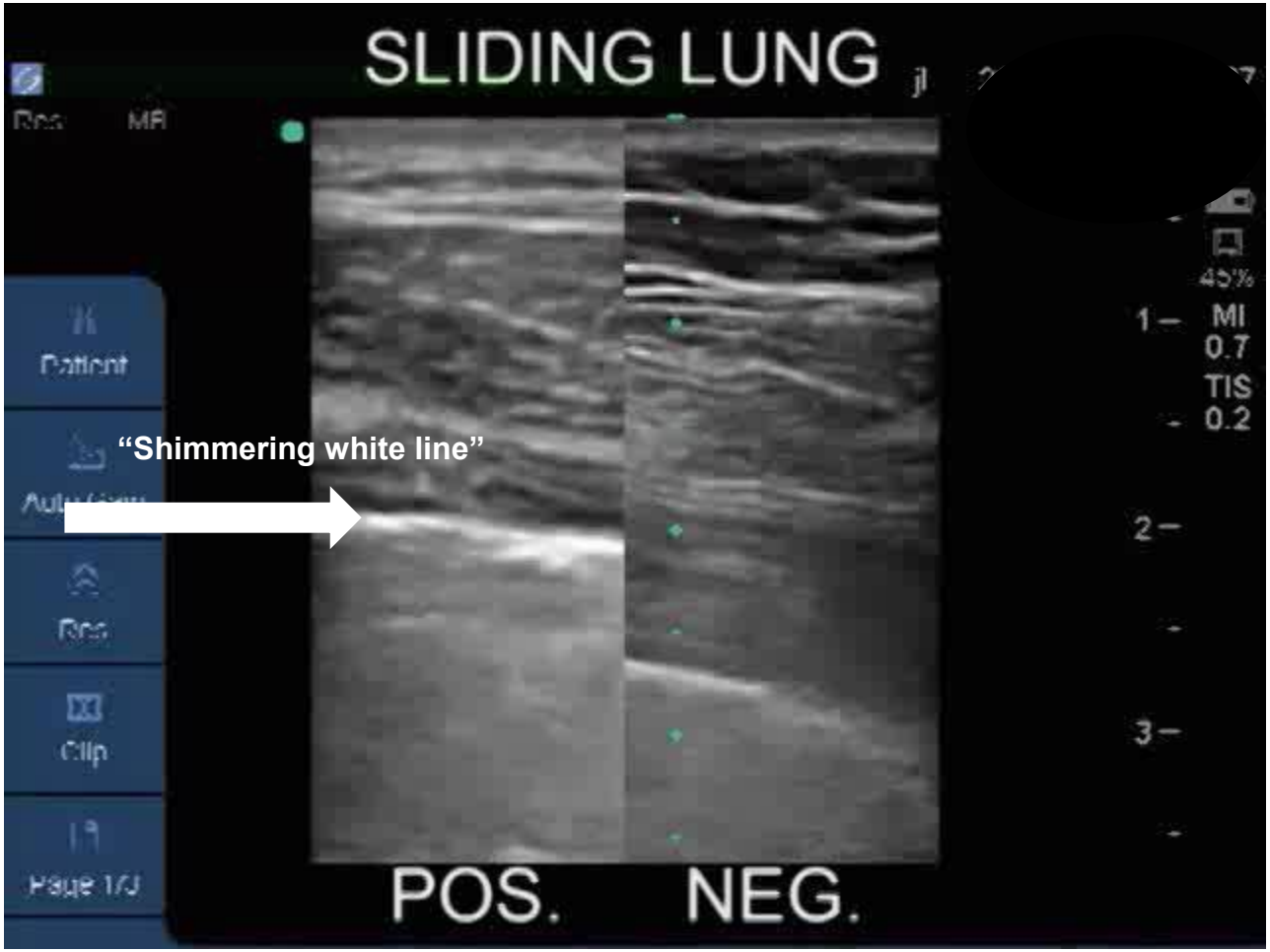


Sliding Lung

- Visceral and parietal pleurae “slide” by each other with respiration
  - Identified as a shimmering white line at the interface
- Presence of lung sliding strongly rules out pneumothorax at that rib space
- Lack of lung sliding suggests pathology



Sliding Lung



Equipment requirements

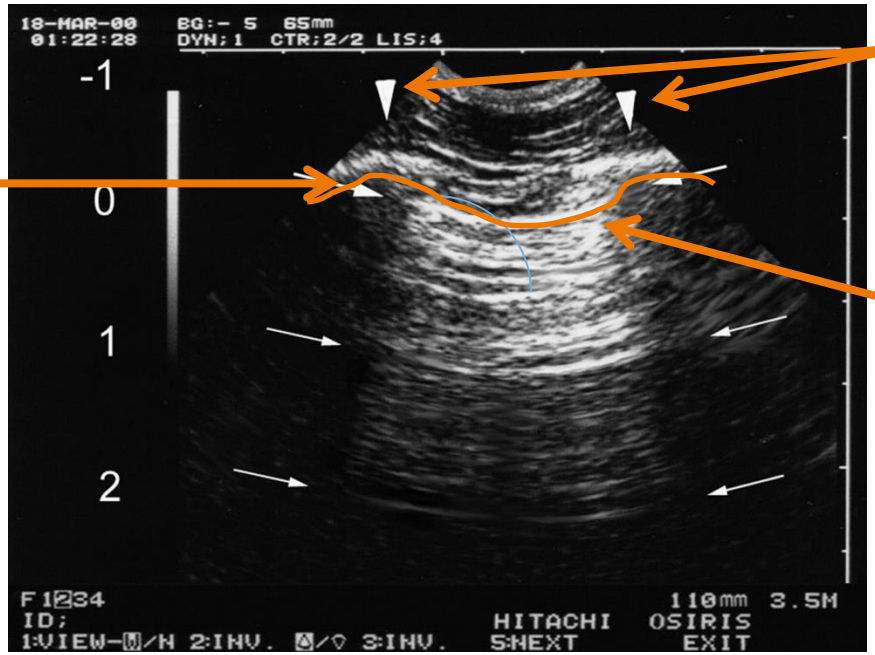
- Linear probe
- 3.5 -5.0 MHz transducer
- Cardiac probe is very effective
  - Has small footprint to fit into intercostal spaces

Technique to Visualize Sliding Lung Sign

- Patient is supine with arms abducted
- Probe placement
  - On the anterior chest between the 3rd and 4th intercostal space at midclavicular line
    - Air rises to the anterior chest wall
    - It is possible to detect pneumothorax very rapidly
  - In a longitudinal position with the marker position pointed cephalic

Pleural Line

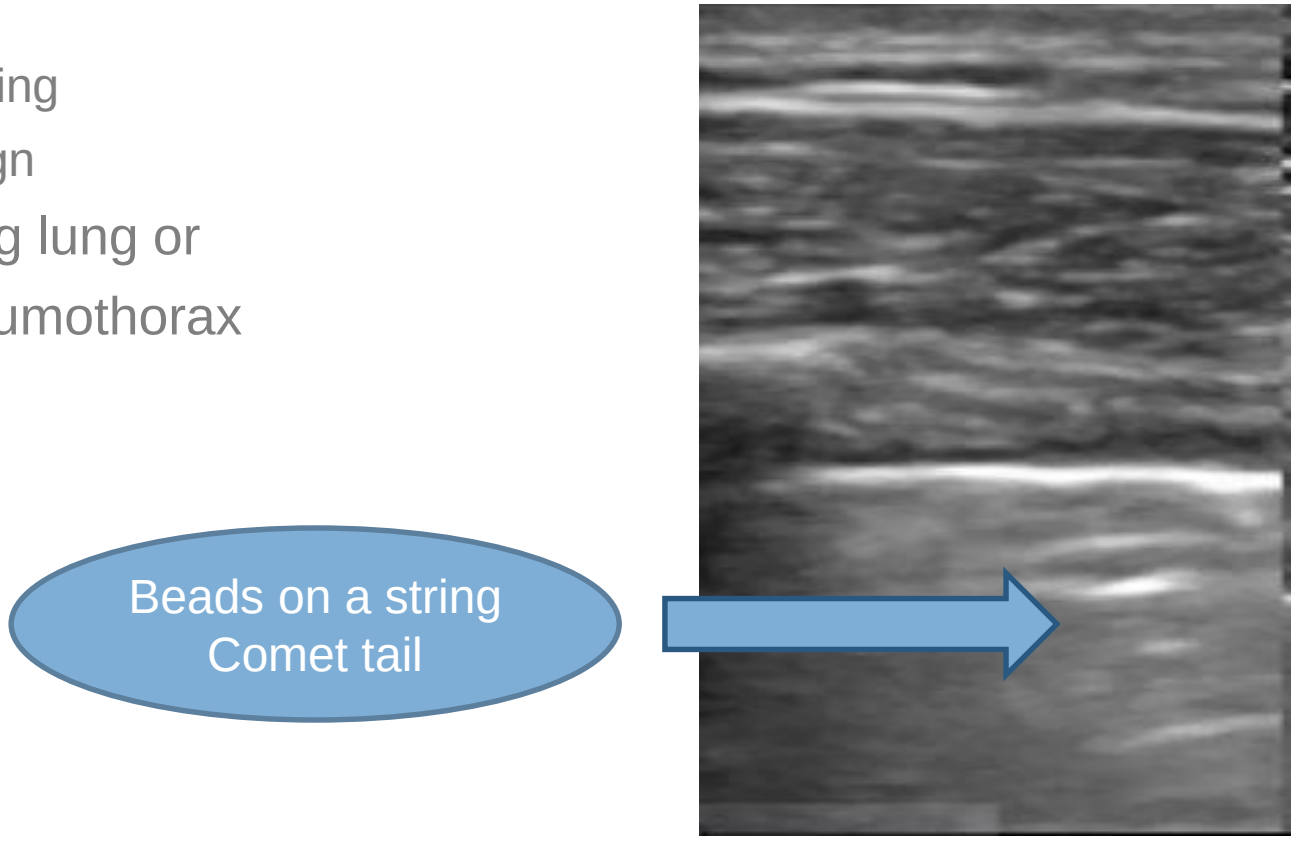
- Located 0.5 cm below the rib line
- It's visible length between two ribs in the longitudinal scan is approximately 2 cm
- The upper rib, pleural line, and lower rib outline a characteristic pattern called the "bat sign"



Chest. 2009;136(4):1014-1020. doi:10.1378/chest.09-0001

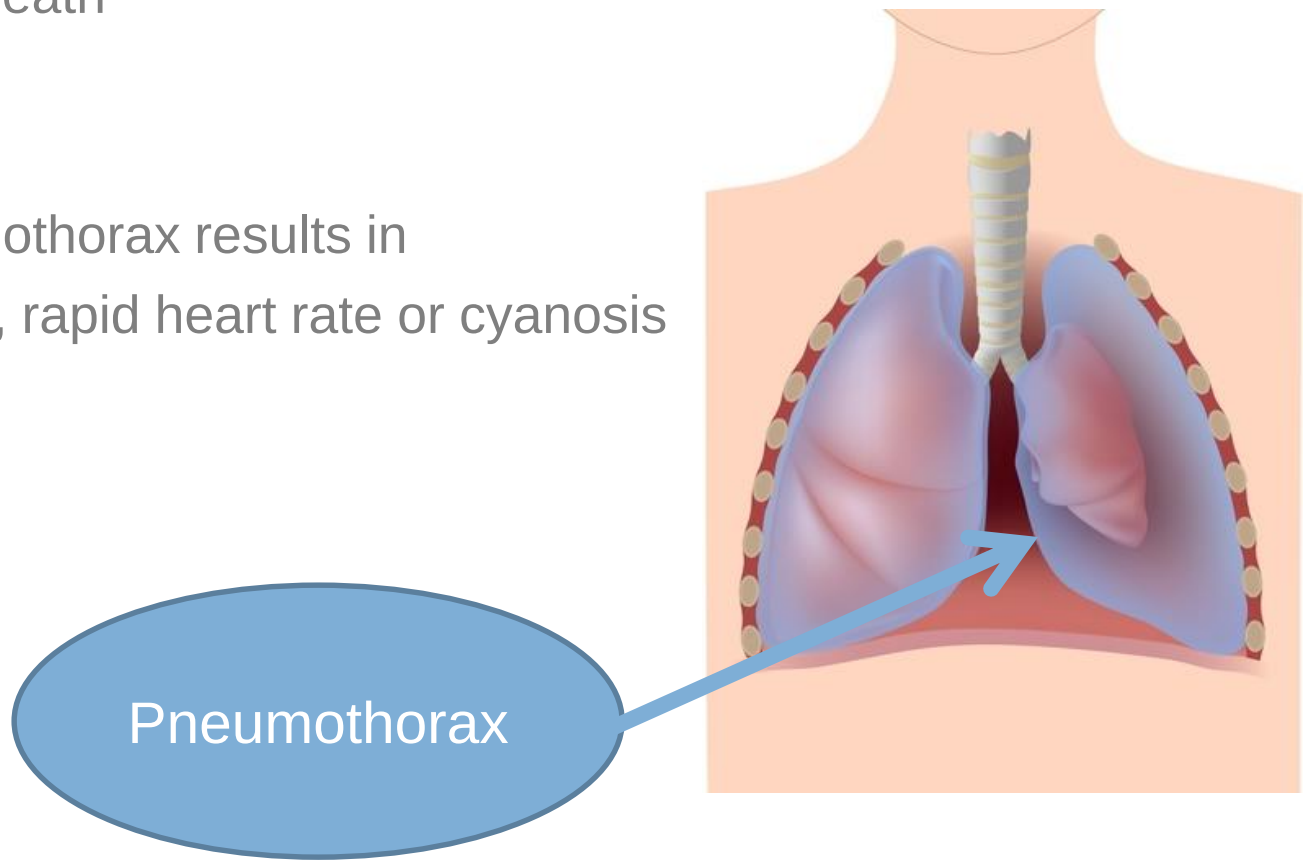
Learning to Assess for the Sliding Lung Sign

- Identify rib shadows
- Pleura is bright white, with a shimmering white line at the interface
  - Pleural sliding (normal)
    - Comet tails
    - Beads on a string
    - Sliding lung sign
- Absence of sliding lung or comet tails = pneumothorax



Learning Sliding Lung

- **Symptoms of pneumothorax include:**
- Sharp chest pain, made worse by a deep breath or cough
- Shortness of breath
- Nasal flaring
- Hypotension
- A larger pneumothorax results in chest tightness, rapid heart rate or cyanosis

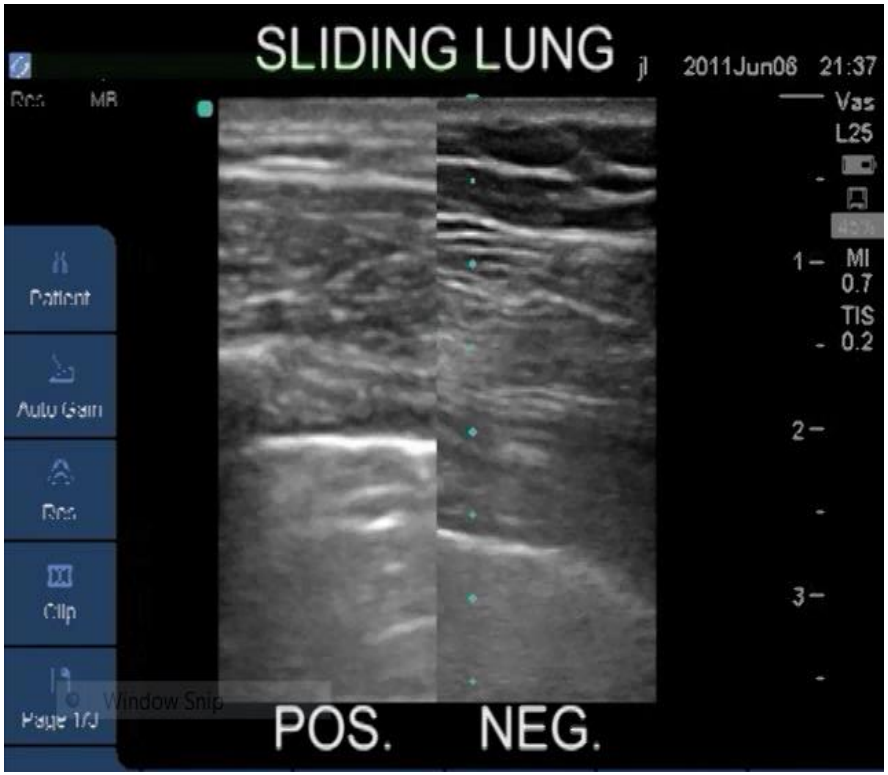


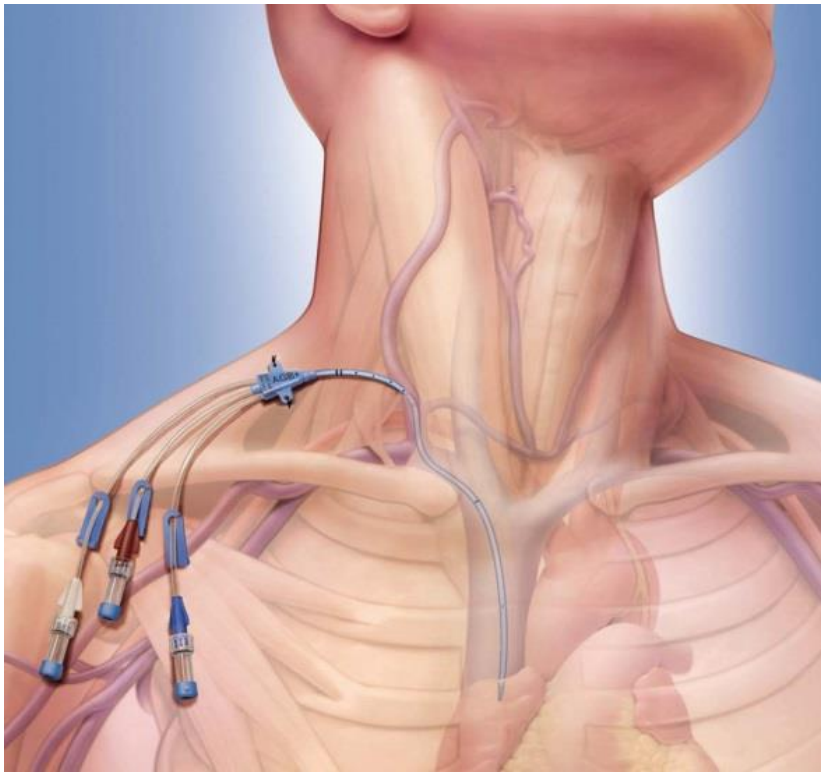
False Positives

- Mainstem intubation
- Blebs (irregular bulge in the plasma membrane)
- Severe COPD (Chronic Obstructive Pulmonary Disease)
- ARDS (Acute Respiratory Distress Syndrome)
- Pleurodesis (medical procedure in which the pleural space is obliterated)

Sliding Lung Sign

Assess for Sliding Lung Sign for all your CVC insertions





ARROW®
NEVER SETTLE™

Thank you