Lung POCUS for the Hematologist

Milla Kviatkovsky, DO, MPH

UCSD Division of Hospital Medicine

Lung Ultrasound Keys

- Purpose: To answer clinical question at the bedside
- Examples: Yes or no questions
  - Does my patient have a pleural effusion?
  - Is there pulmonary edema?
  - Is there a pneumothorax?
  - Does my patient have a pneumonia?
- Can be more sensitive than CXR

Probe Selection

- Phased Array Probe
- Low Frequency, High Penetration
- Small Footprint to Fit in between rib spaces
- Linear Probe can also be used for specific applications
  - when evaluating for pneumothorax

Patient Position

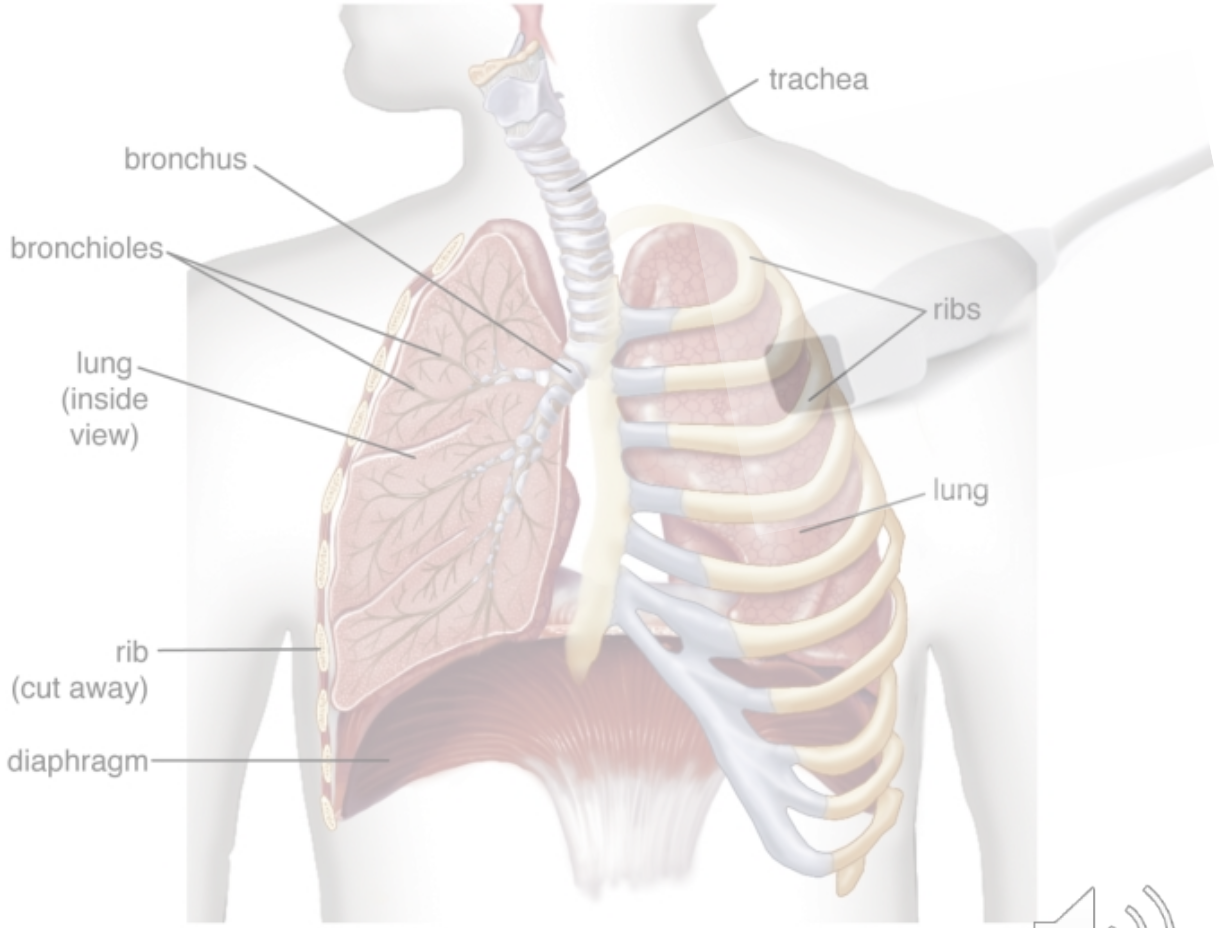
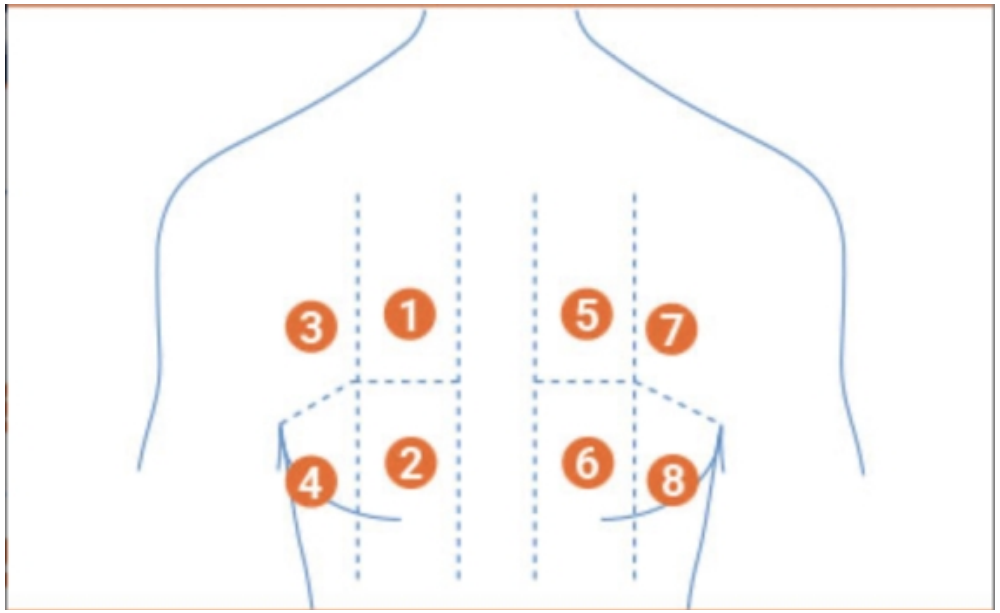
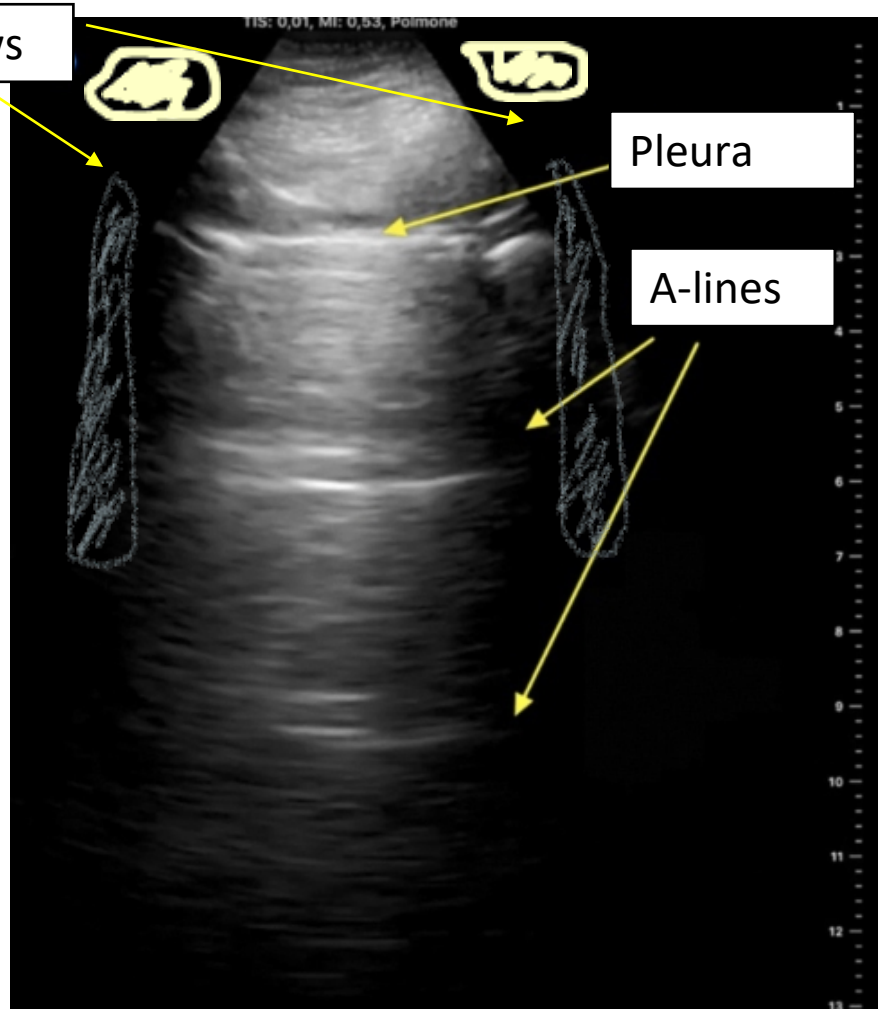


Image Acquisition

- Probe marker Orientation: patient's head
- Lung Zones:



Lung Anatomy



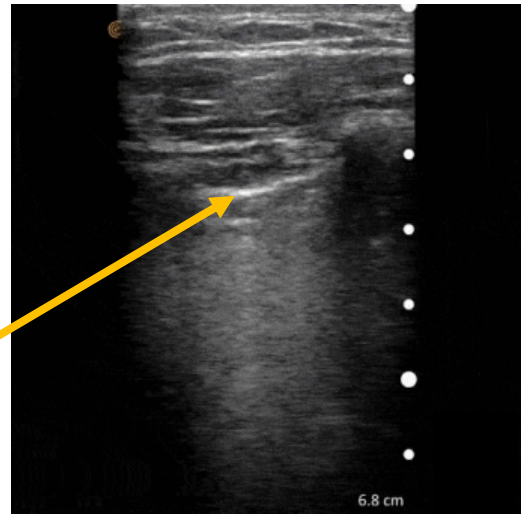
- Use ribs to ID pleural Line (will cast shadow)
- Identify Pleural Line (bright white line)
- Air does not transfer sound, so returns to probe in disorganized fashion

Normal Lung Slide

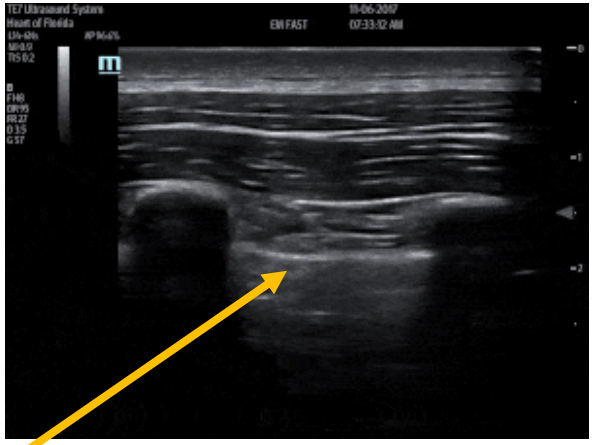
To assess for lung slide, look between the two ribs, here you can see the two layers of pleura as the hyperechoic “shimmering” line just under the subcutaneous tissue. Also known as “ants marching”.

Pneumothorax

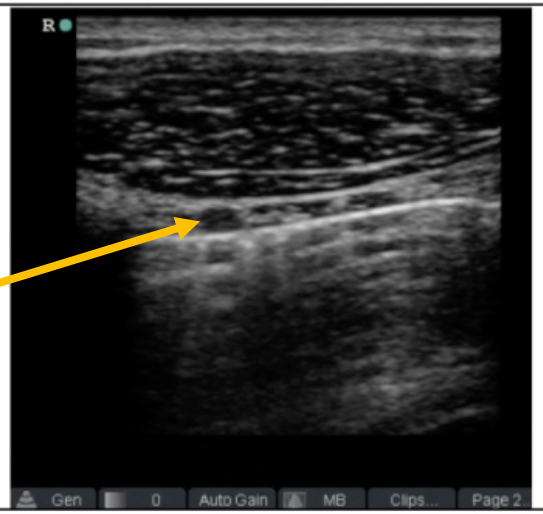
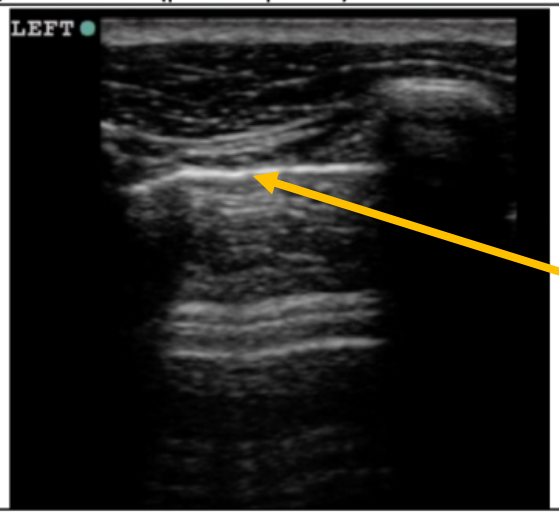
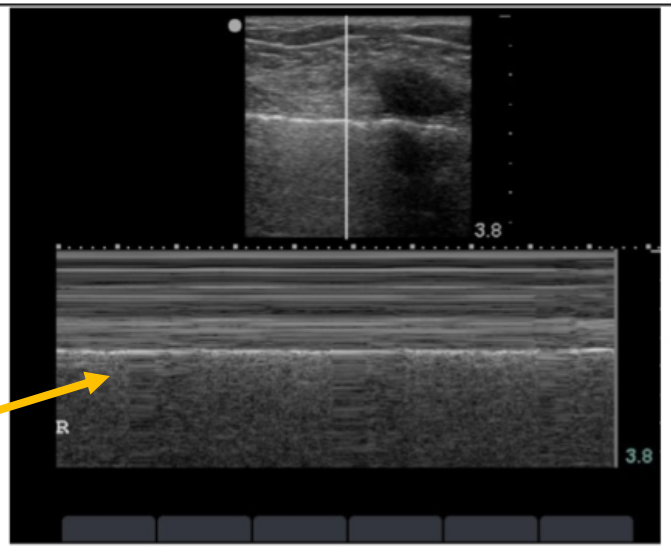
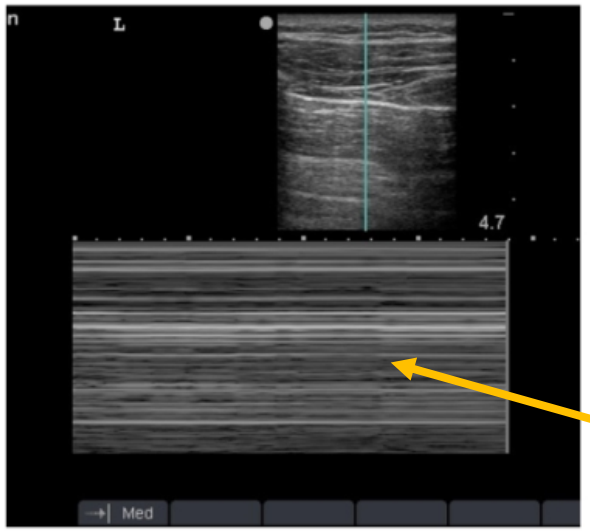
- Focus on pleural line
- Linear probe
- Shallow depth
- Absent lung slide
  - Or lung point –for pneumothorax
- Use M-mode



Lung Slide

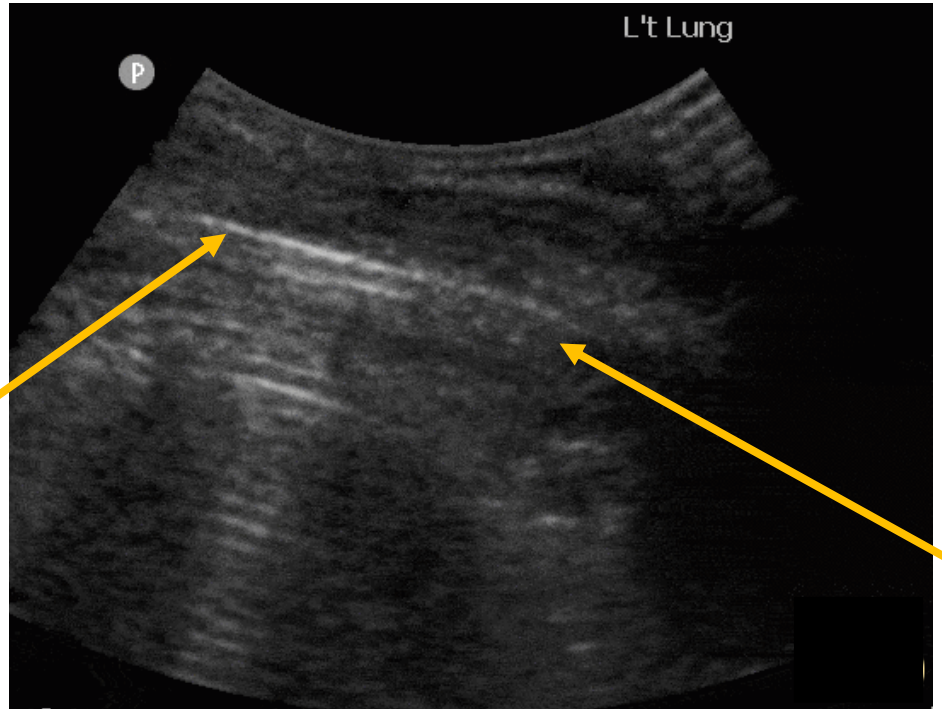


Absent Lung Slide

Pneumothorax	
Normal Lung: “lung slide” = visceral and parietal pleura sliding back and forth. Creates “comet tails”	Abnormal, lack of slide between visceral and parietal pleura. Just bright white line (parietal pleura)
	
On M- Mode: “Seashore Sign” if normal lung slide.	“Barcode Sign”, if lack of lung slide
	

Lung Point

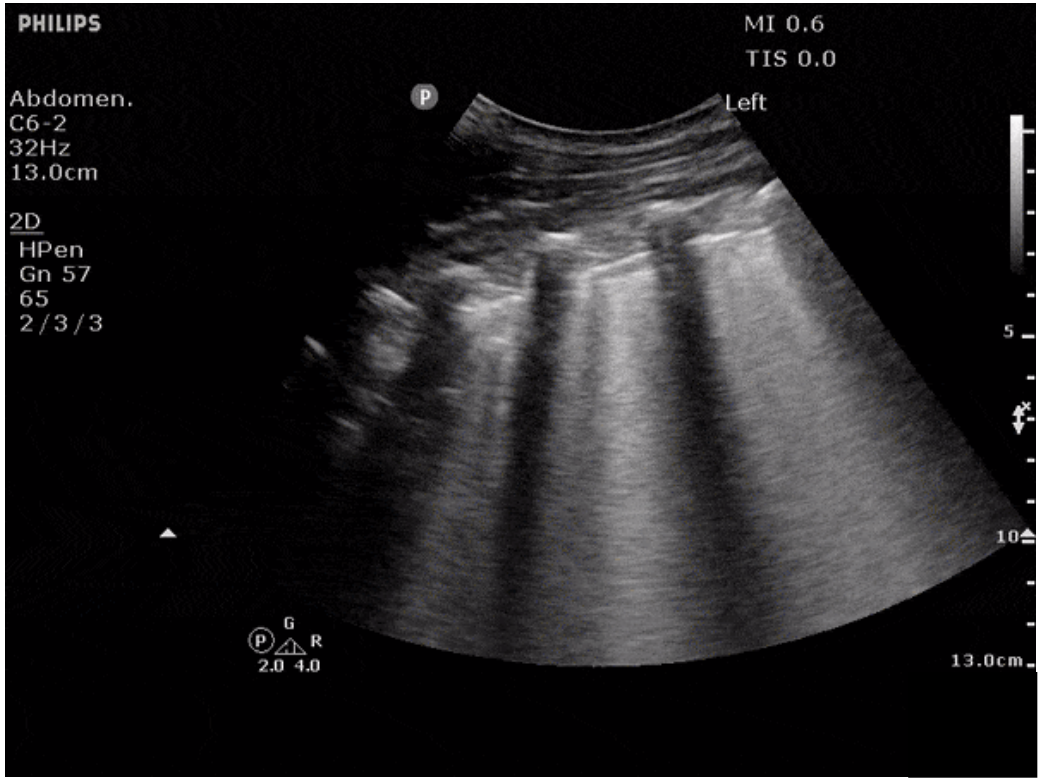
Pneumothorax



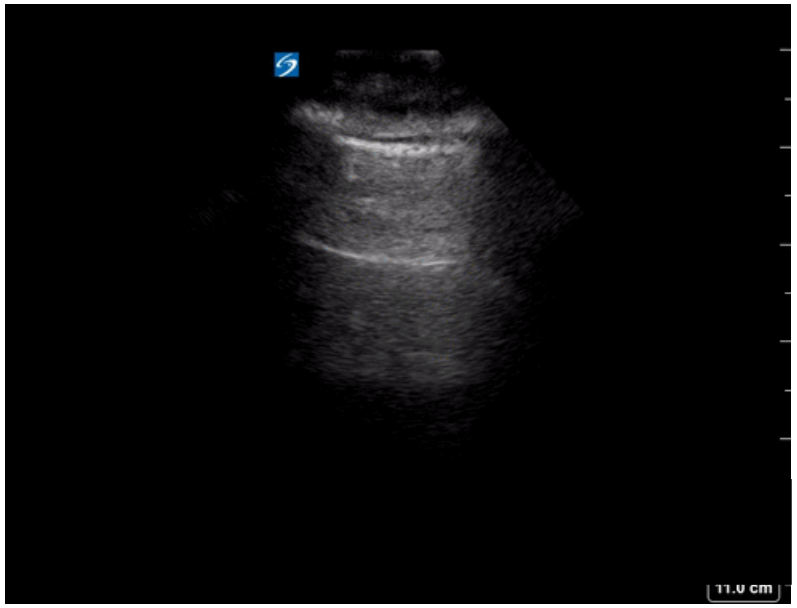
Normal Pleura

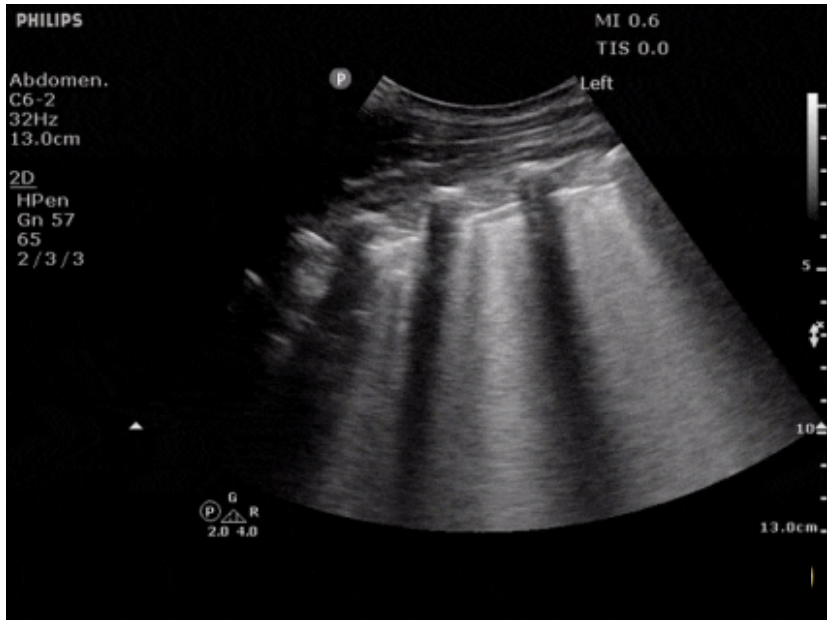
B-Lines

- Represent Fluid or thickening of Interstitial Tissue
- Vertical lines that originate at the pleural line
- Travel through the depth of the image (at least 12 cm)
- Move back forth with respiration
- Initially are thin, then begin to coalesce



A lines vs. B lines



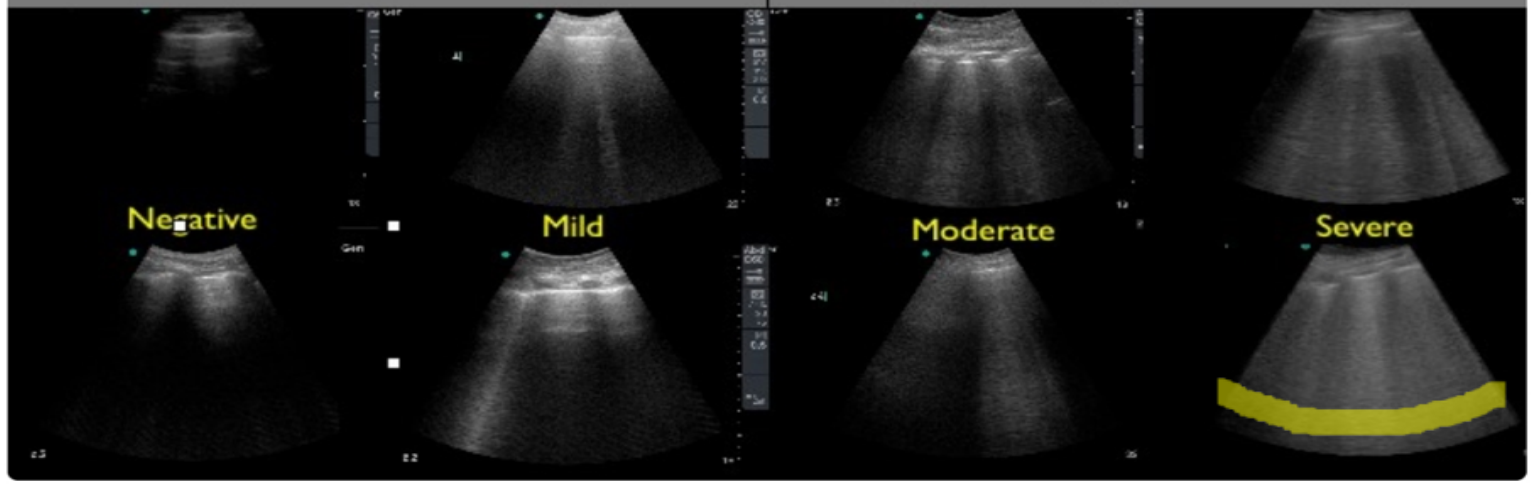


A Lines: Horizontal lines that represent sound waves bouncing off of highly echogenic pleura and back to probe

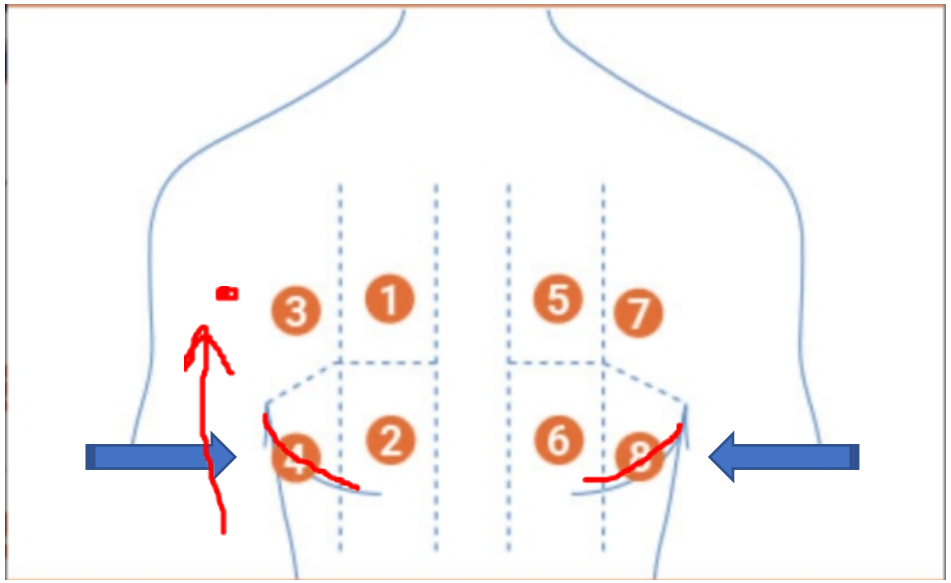
B Lines: Vertical artifacts that move with respiration. Represent fluid in alveolar space. If two are more regions with B lines is suggestive of pulmonary edema.

Severity of Pulmonary Edema

Severity Rating	Description
Negative	No B-lines or fewer than 3 discrete B lines seen at any time
Mild	At least 3 discrete B lines per rib space, few in number, intermittently present
Moderate	Many or partially discrete or partially-coalesced B lines, persistently present
Severe	Complete coalescence of B-lines, many in number, persistently present

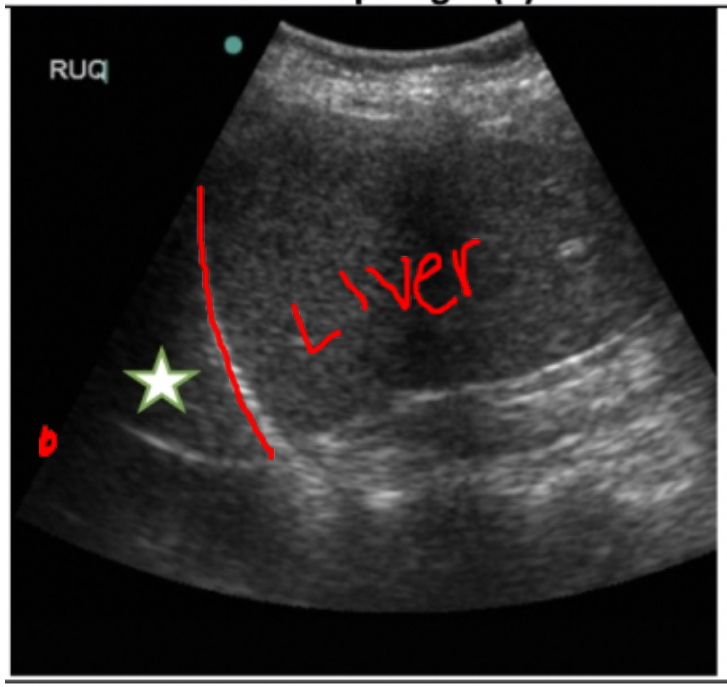
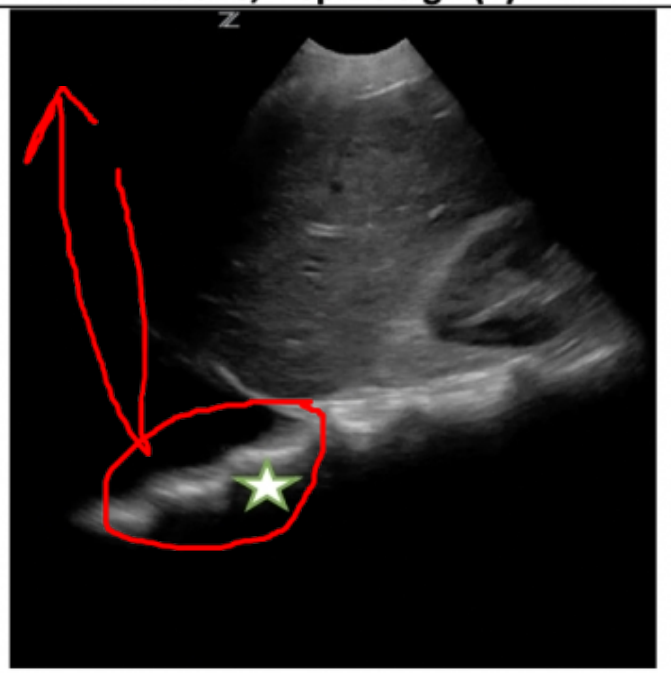
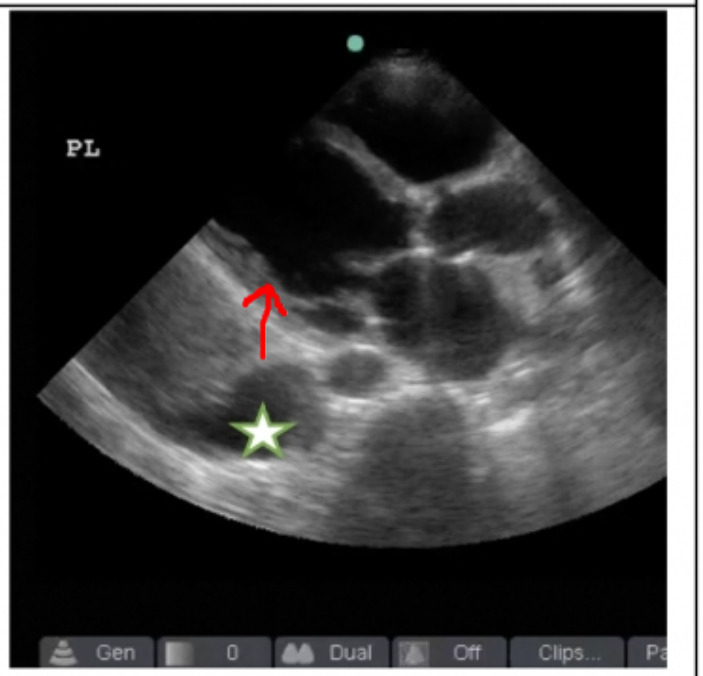


Pleural Effusion

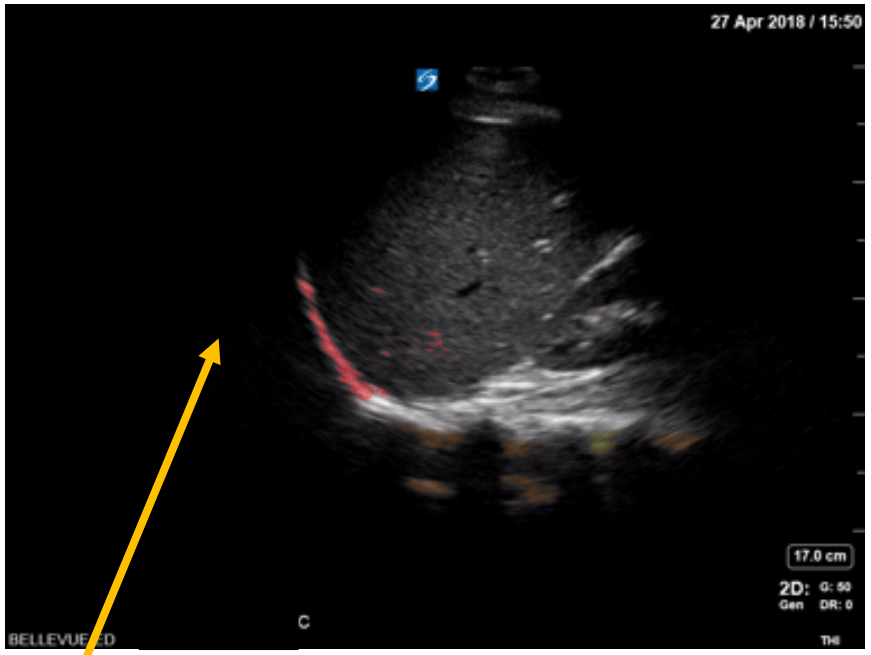


- Location: Lung Zone 4/8
- Identify the diaphragm
- Normal lung → Mirror artifact
- Fluid above diaphragm → no mirror imagine or spine sign

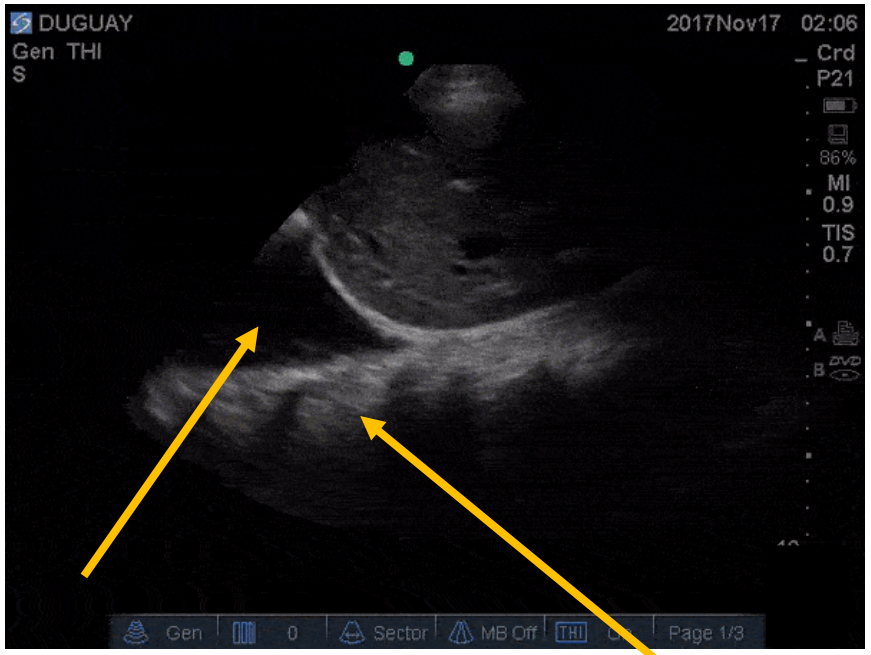
Pleural Effusion

No Effusion	Mid-Axillary view w/ Effusion	Parasternal Long View w/ Effusion
Note: Diaphragm with liver mirroring above diaphragm (*)	Diaphragm with anechoic structure above, + spine sign (*)	Fluid posterior to Thoracic Aorta (*)
		

Pleural Effusion vs. Normal Lung



Lung Curtain



Pleural Effusion

Spine Sign

In Summary: Lung POCUS

- Answer specific clinical questions
  - Pneumothorax, pulmonary edema, pleural effusion
- Can have improved sensitivity over CXR
- Serial Exams can be performed to monitor patient status
  - Response to diuresis
  - Pre and Post Procedure
    - Stability of pleural effusion
    - Evaluate for pneumothorax