

Lung POCUS for the Hematologist

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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

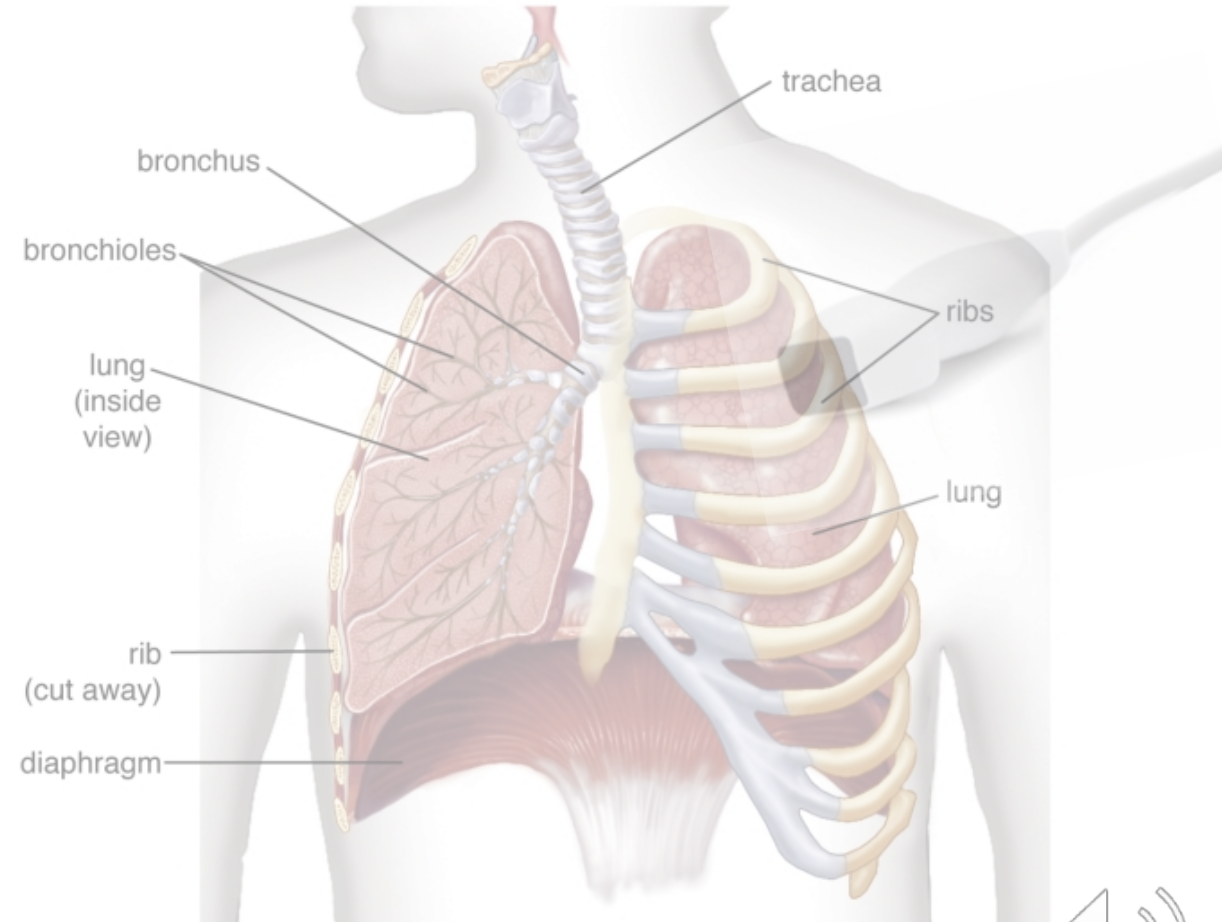
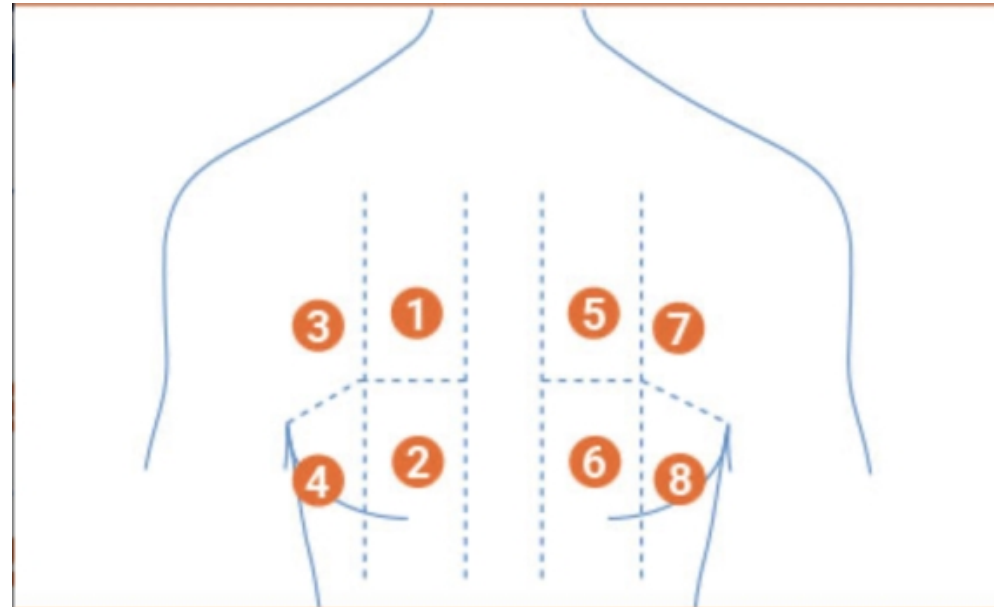


Image Acquisition

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



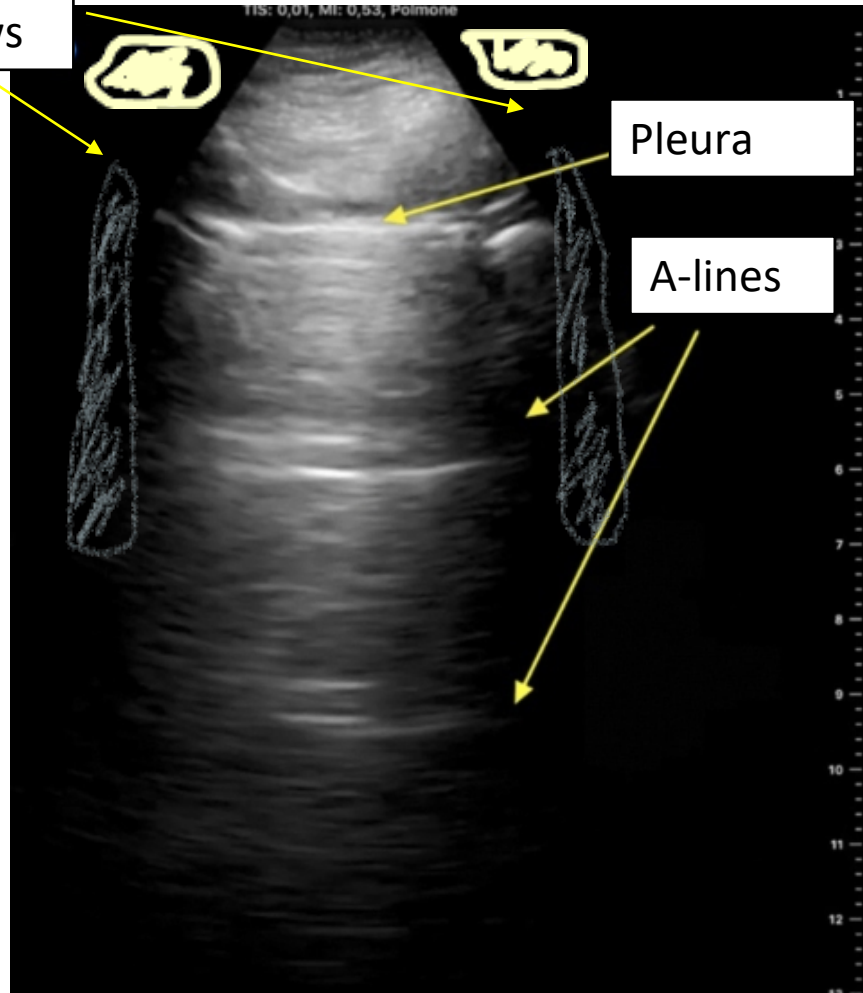
Lung Anatomy

Rib w/rib shadows

Pleura

A-lines

- 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



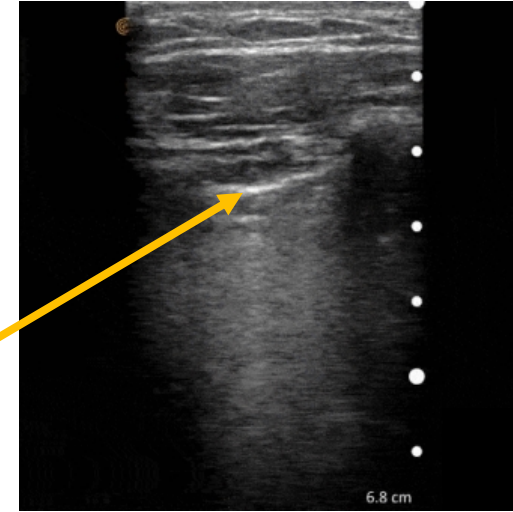
To assess for lung slide, look between the two ribs, here you can see the two layers of pleura as the hyperechoic “shimmering” line just under the subcutaneous tissue. Also known as “ants marching”.



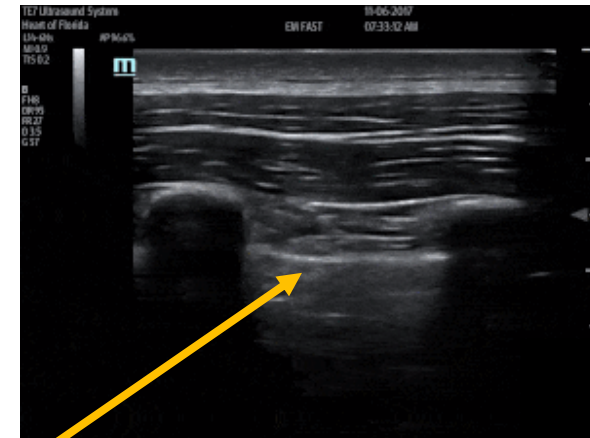
Pneumothorax

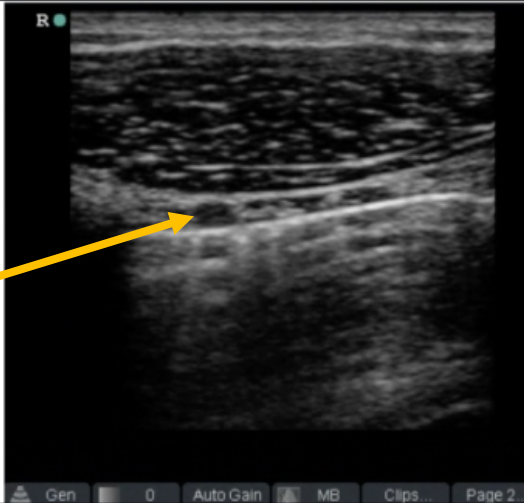
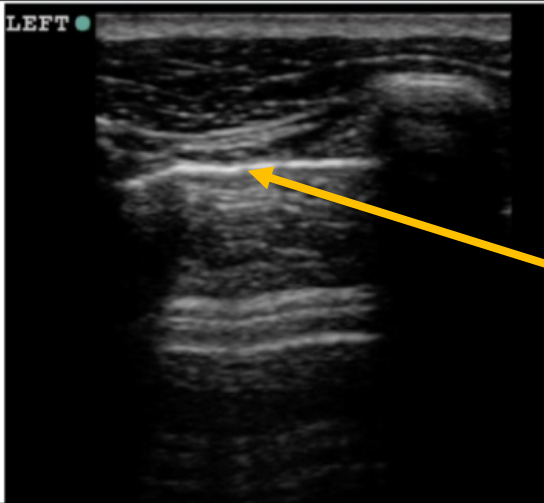
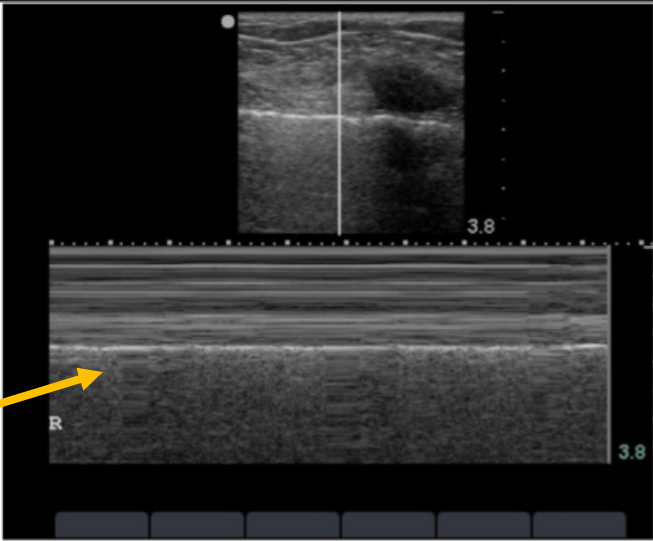
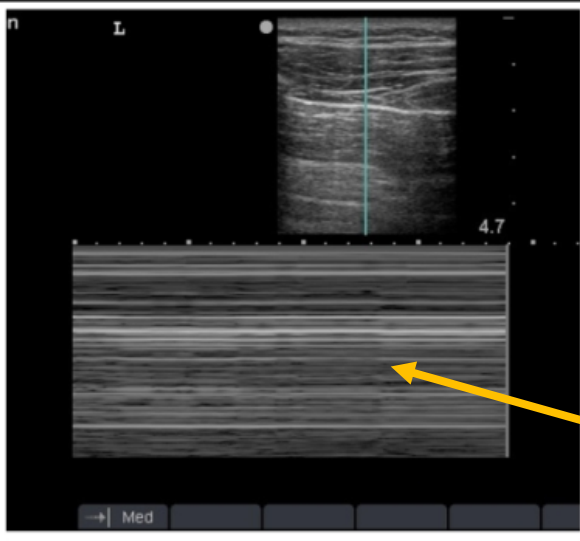
- Focus on pleural line
- Linear probe
- Shallow depth
- Absent lung slide
 - Or lung point –for pneumothorax
- Use M-mode

Lung Slide



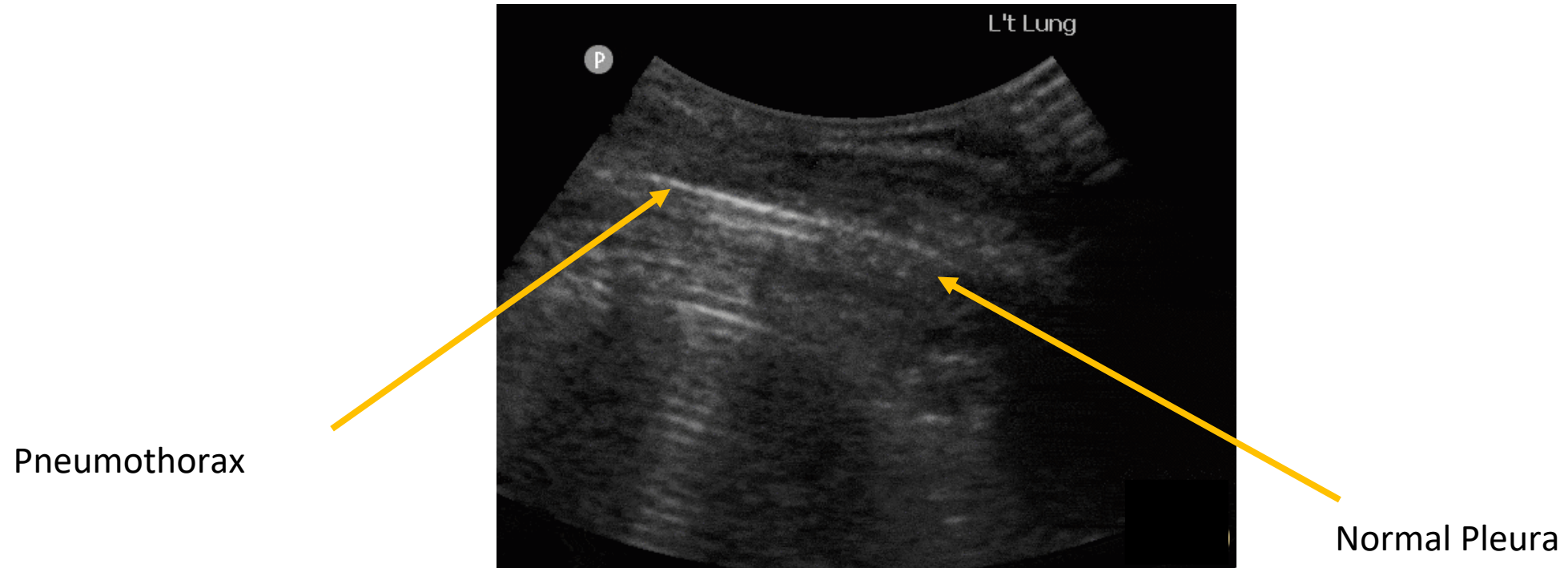
Absent Lung Slide



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)
 A B-mode ultrasound image of the right lung (labeled 'R'). A yellow arrow points to the visceral pleura, which is sliding against the parietal pleura, creating multiple comet tails (B-lines) that extend from the pleural line to the bottom of the screen.	 A B-mode ultrasound image of the left lung (labeled 'LEFT'). A yellow arrow points to a single, bright, continuous white line representing the parietal pleura. There is no visible sliding motion between the visceral and parietal pleura.
On M- Mode: "Seashore Sign" if normal lung slide.	"Barcode Sign", if lack of lung slide
 An M-mode ultrasound image of the right lung (labeled 'R'). A yellow arrow points to the Seashore Sign, which is a horizontal, granular texture on the M-mode trace, indicating normal lung sliding. The top part of the image shows a B-mode reference view with a depth marker of 3.8.	 An M-mode ultrasound image of the left lung (labeled 'L'). A yellow arrow points to the Barcode Sign, which is a vertical, barcode-like pattern on the M-mode trace, indicating a lack of lung sliding. The top part of the image shows a B-mode reference view with a depth marker of 4.7.

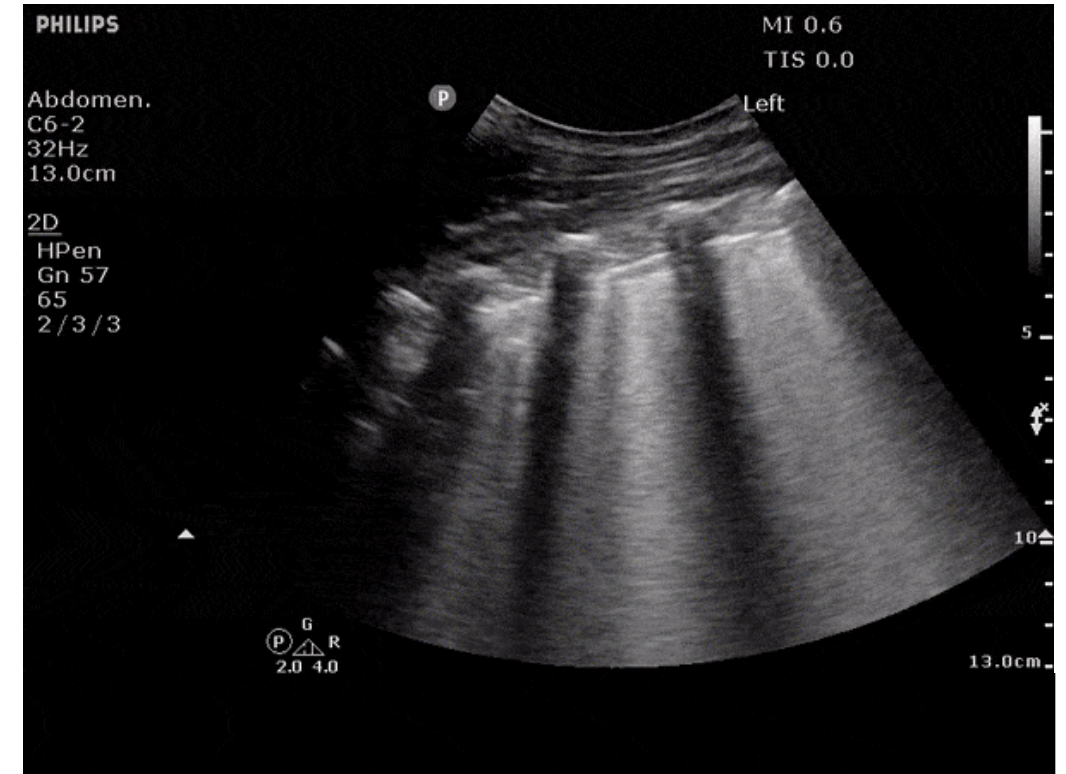


Lung Point

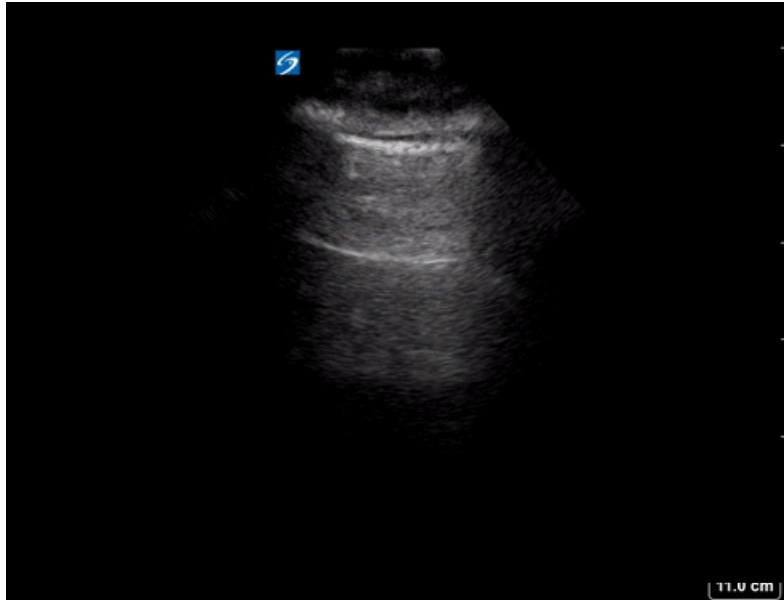


B-Lines

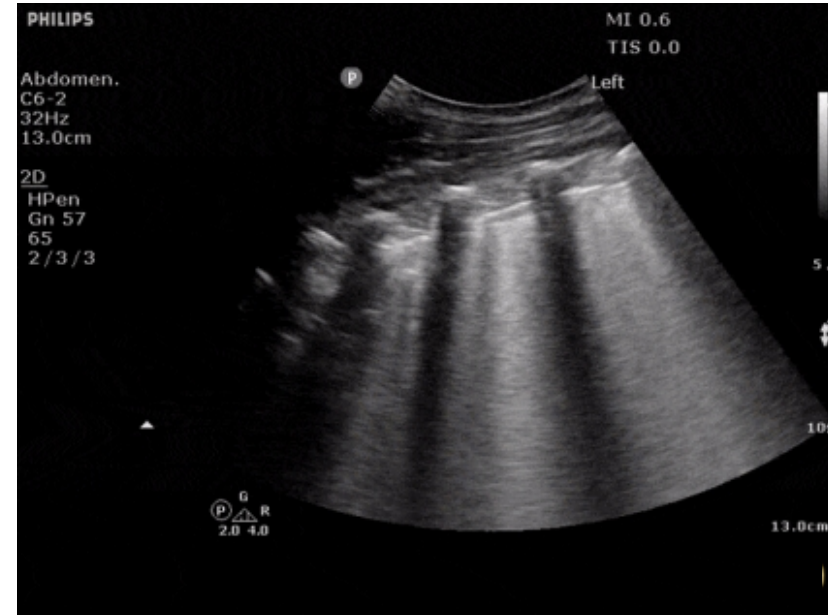
- Represent Fluid or thickening of Interstitial Tissue
- Vertical lines that originate at the pleural line
- Travel through the depth of the image (at least 12 cm)
- Move back forth with respiration
- Initially are thin, then begin to coalesce



A lines vs. B lines



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

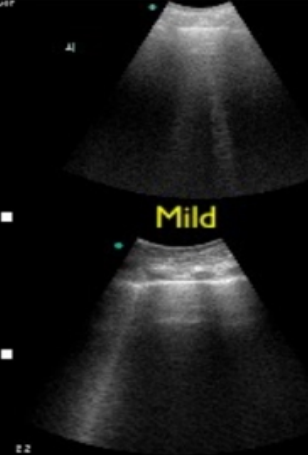


B Lines: Vertical artifacts that move with respiration. Represent fluid in alveolar space. If two or more regions with B lines is suggestive of pulmonary edema.



Severity of Pulmonary Edema

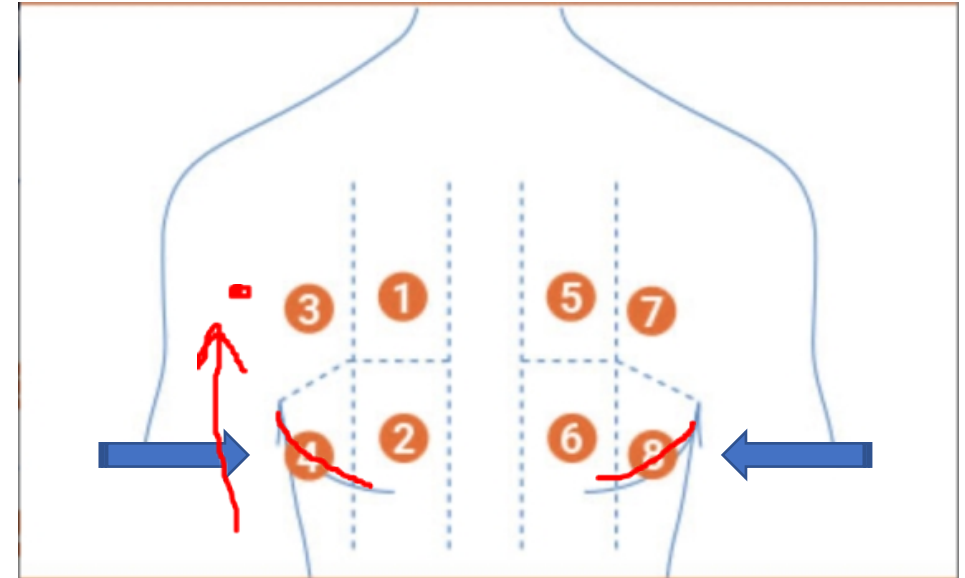
Severity Rating	Description
Negative	No B-lines or fewer than 3 discrete B lines seen at any time
Mild	At least 3 discrete B lines per rib space, few in number, intermittently present
Moderate	Many or partially discrete or partially-coalesced B lines, persistently present
Severe	Complete coalescence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

 Negative	 Mild	 Moderate	 Severe
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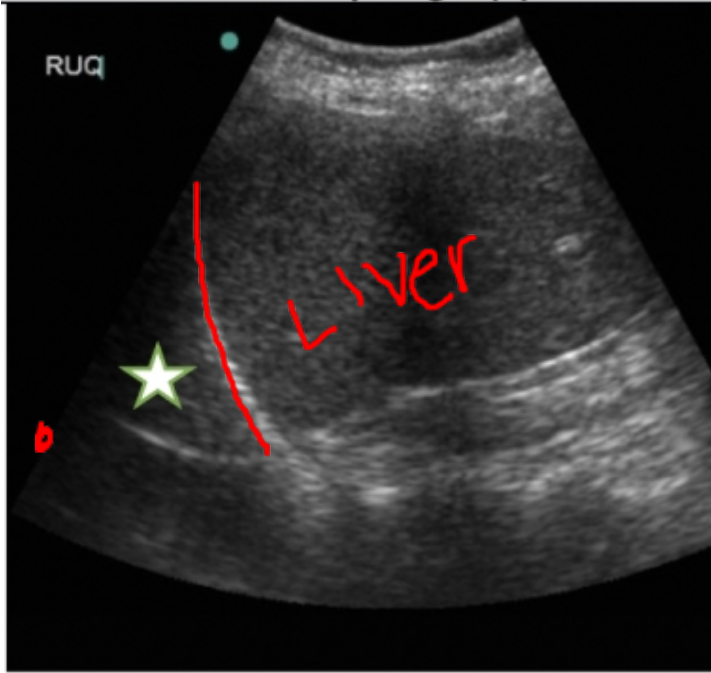
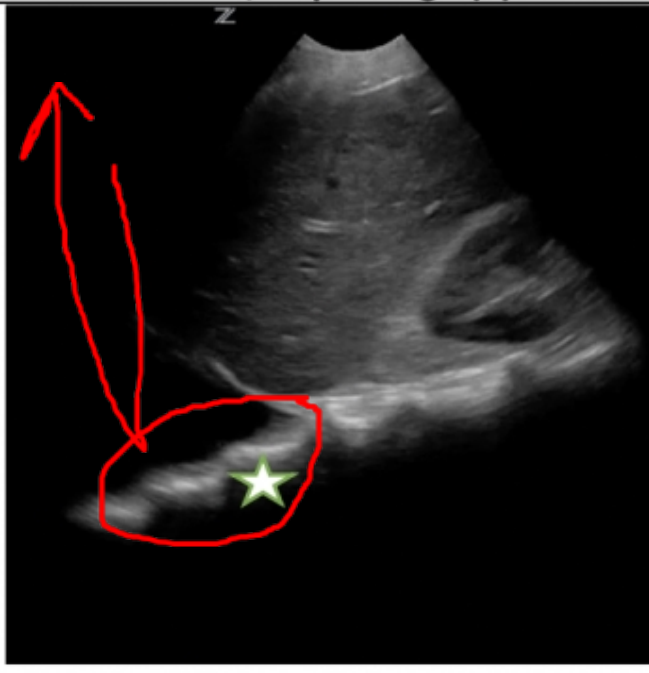
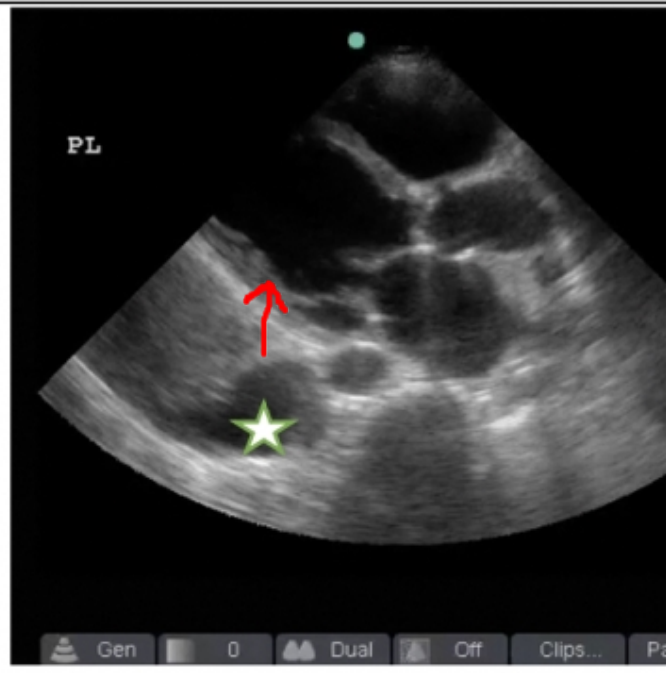


Pleural Effusion

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

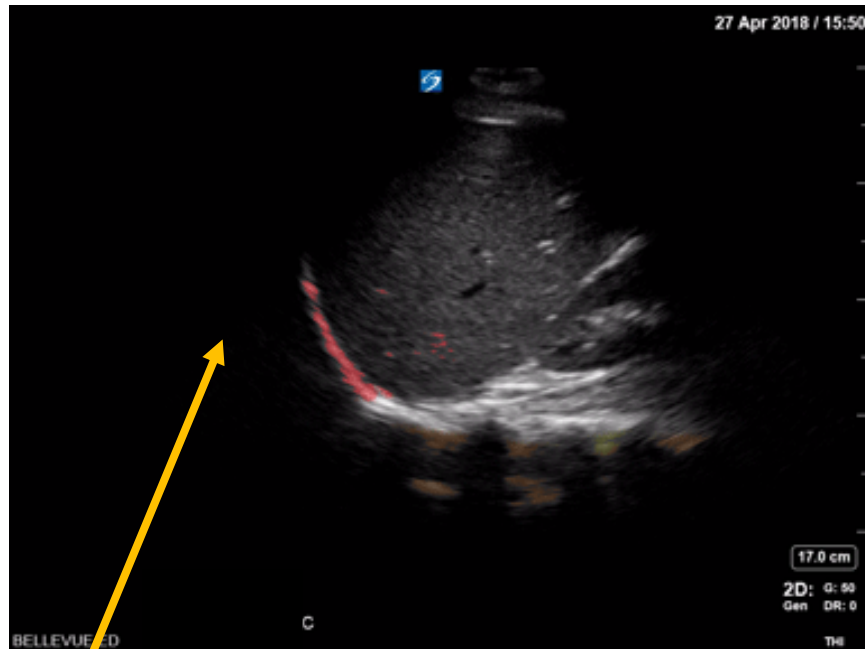


Pleural Effusion

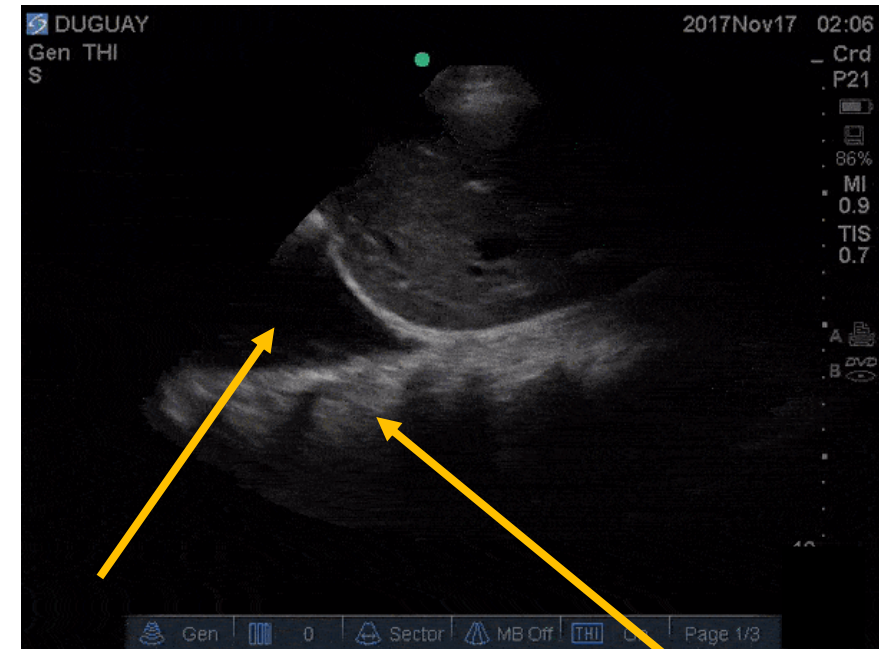
No Effusion	Mid-Axillary view w/ Effusion	Parasternal Long View w/ Effusion
Note: Diaphragm with liver mirroring above diaphragm (*)	Diaphragm with anechoic structure above, + spine sign (*)	Fluid posterior to Thoracic Aorta (*)
		



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

