

# Point of Care Ultrasound: Foundational Skills for Internists

## A Rapid Overview of the Basics

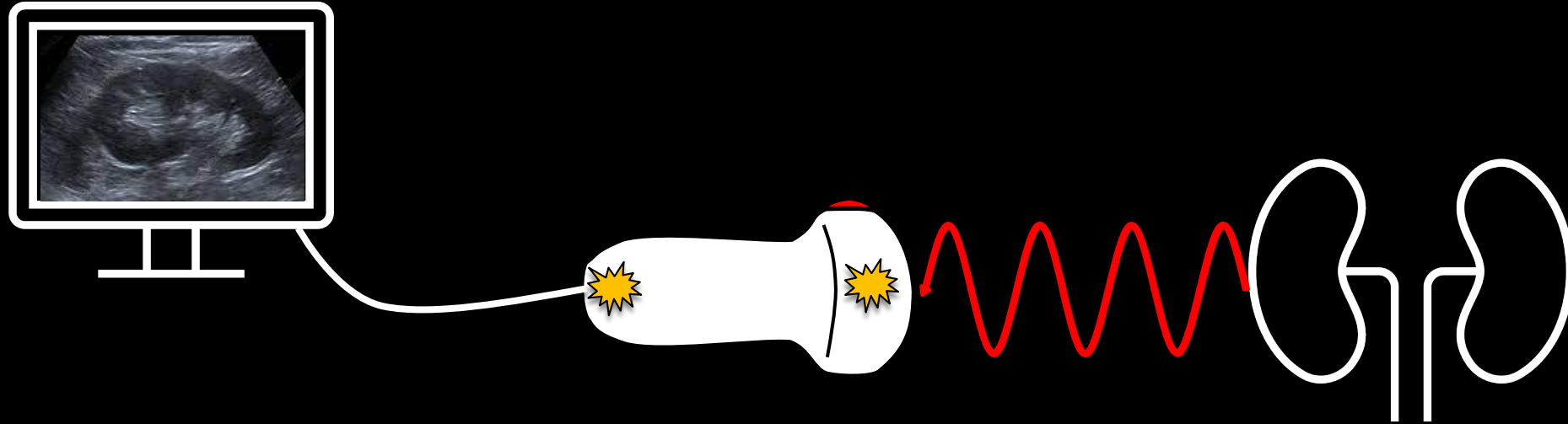
Christopher J. Smith, MD, FACP

Associate Professor, Director of POCUS Education

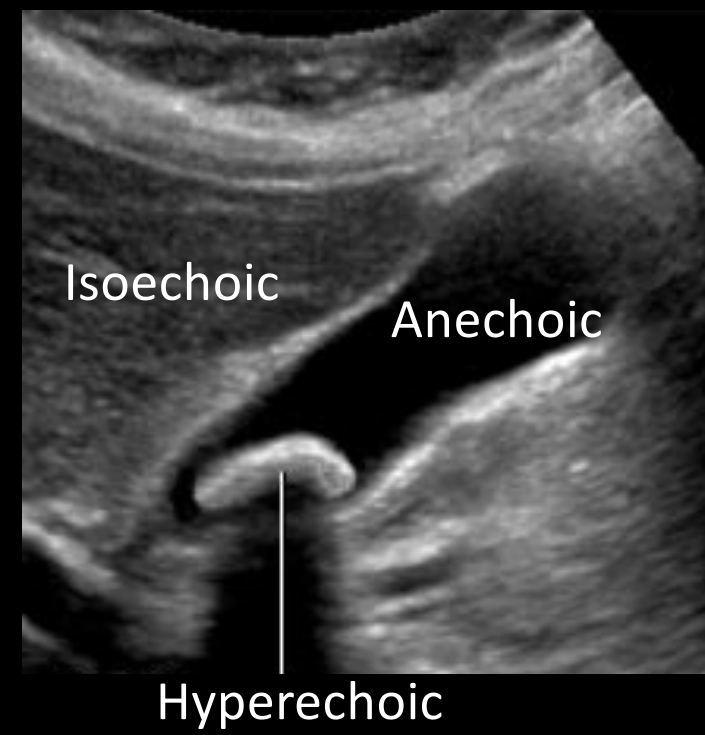
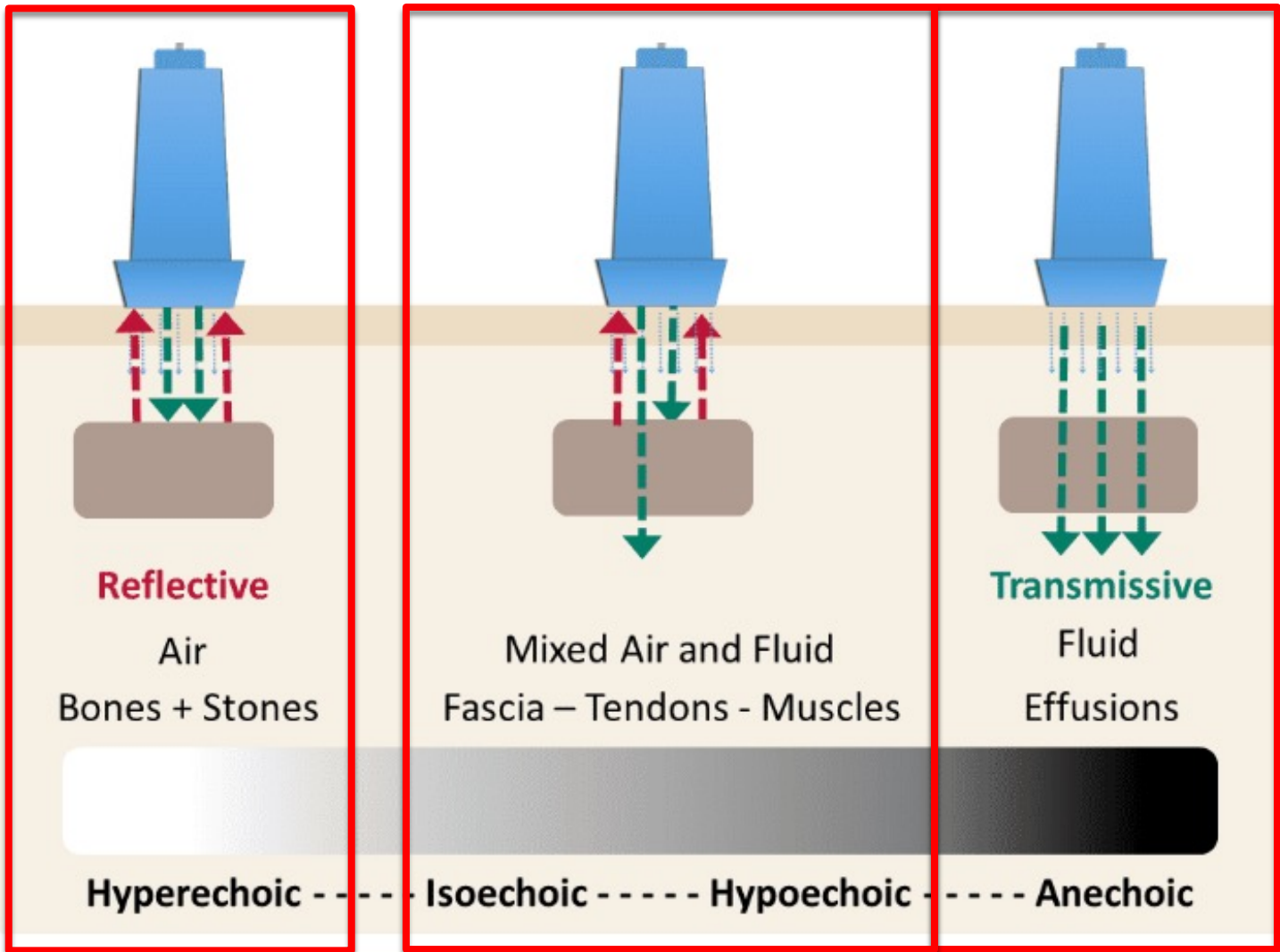
University of Nebraska Medical Center, Omaha, NE

Slide acknowledgement: Dr. Woo Moon

# Ultrasound Image Generation

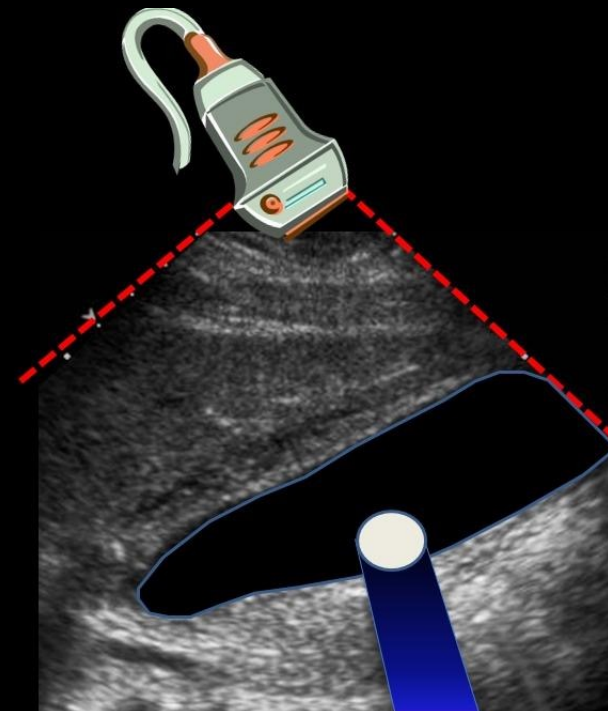


- Machine detects reflected beams to generate images
- More reflected beams = better image
- Maximum reflection occurs when beam is 90° to the target



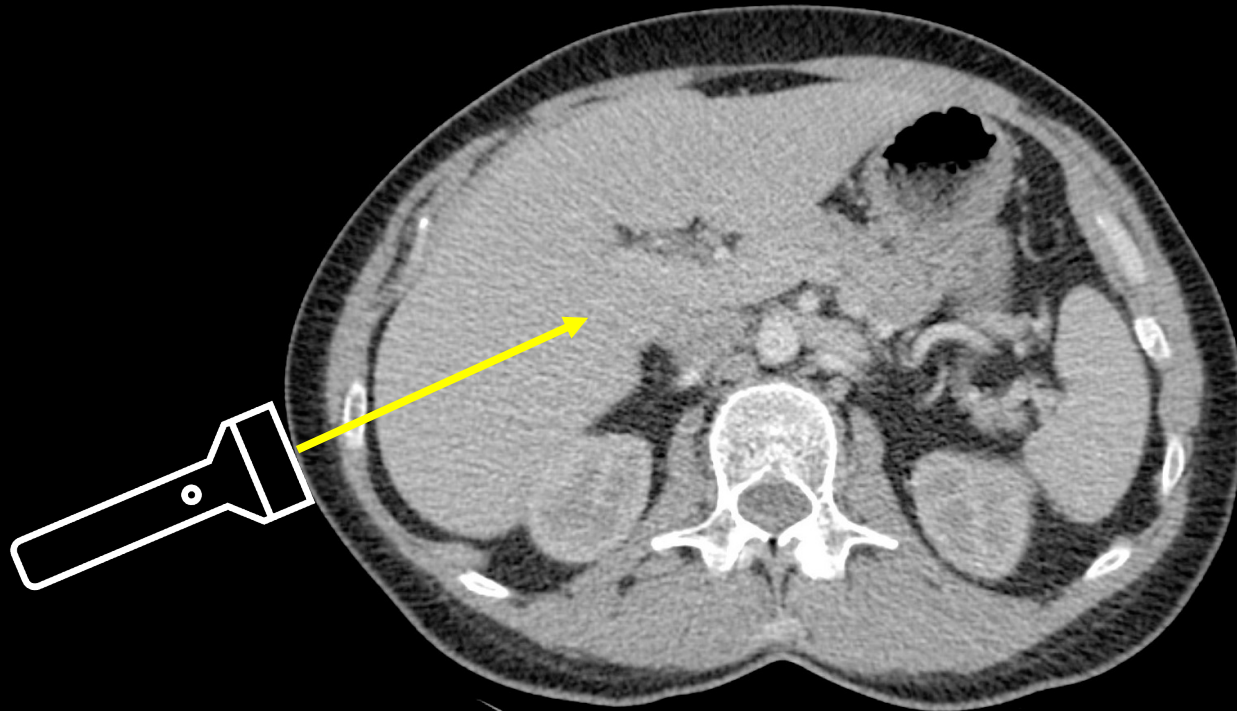
Think of the probe as a flashlight with a flat beam. When acquiring images, ask yourself 2 basic questions:

- Is my flashlight beam pointed at my target organ?
- What is the plane of my beam?



# Is the Beam Pointed at the Target?

Looking for the right kidney

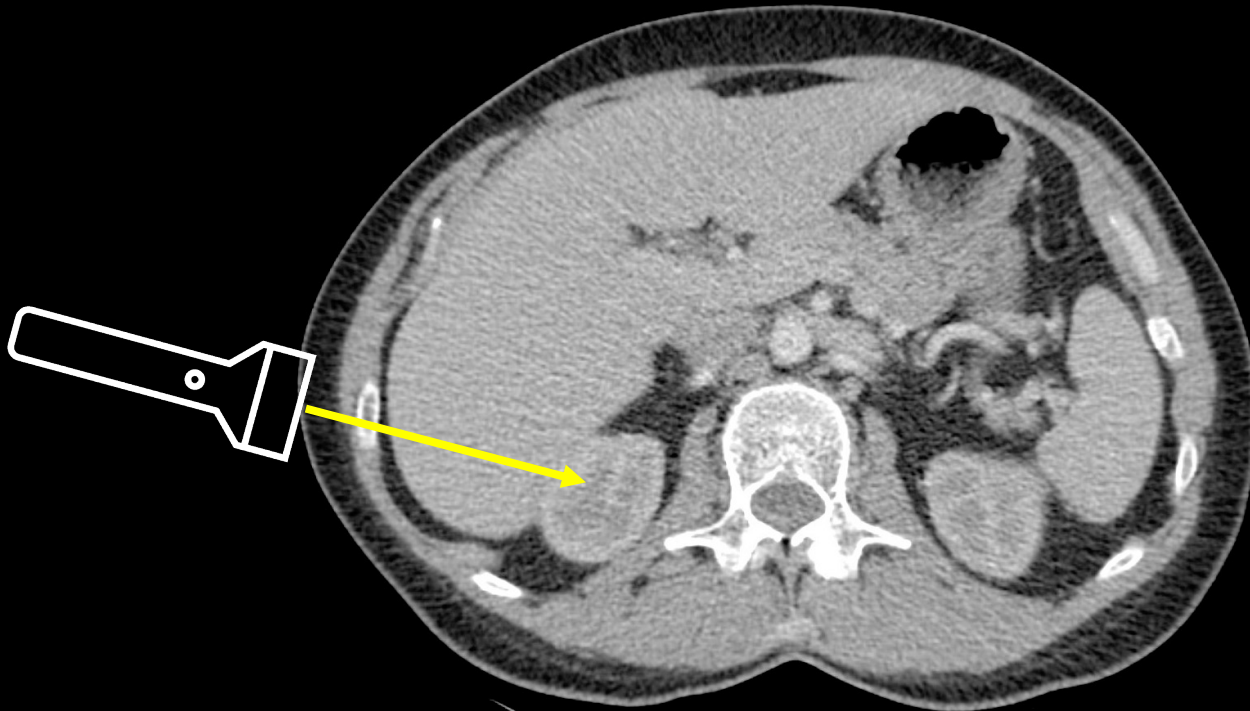


No



# Is the Beam Pointed at the Target?

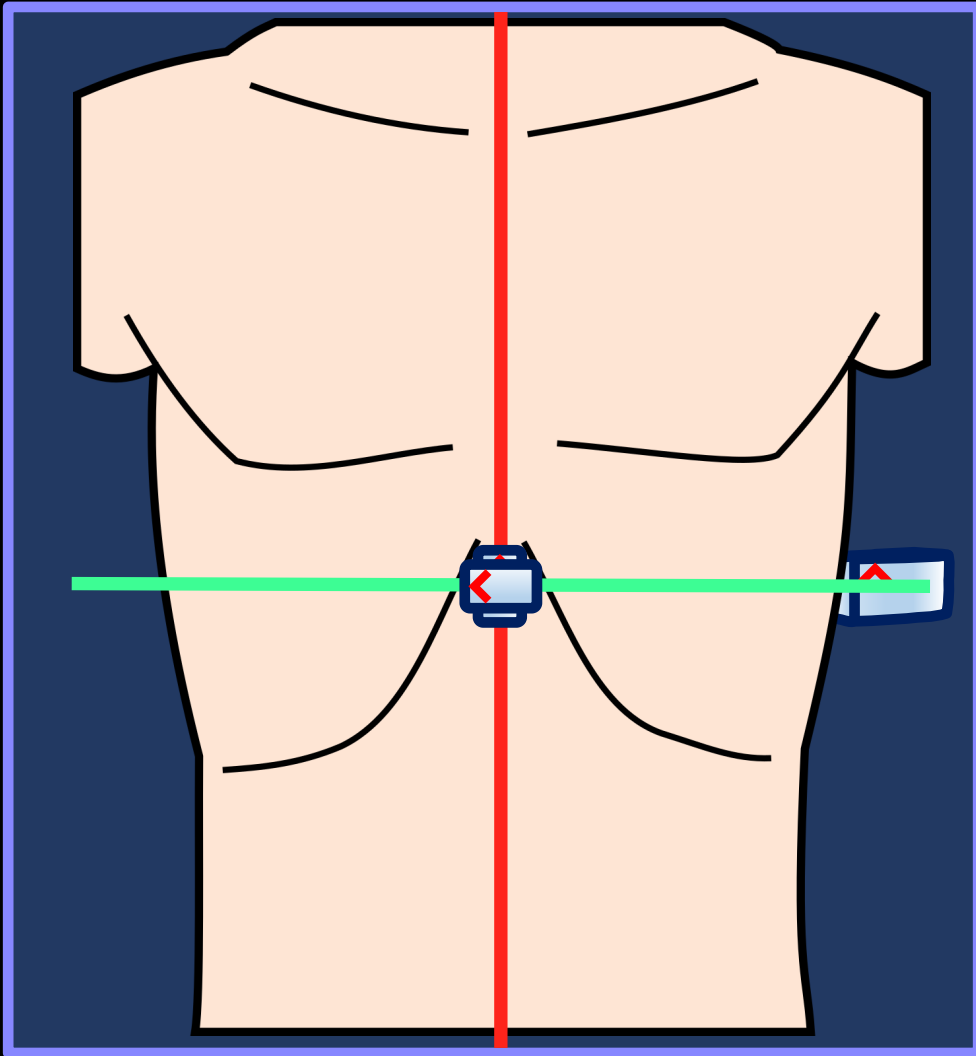
Looking for the right kidney



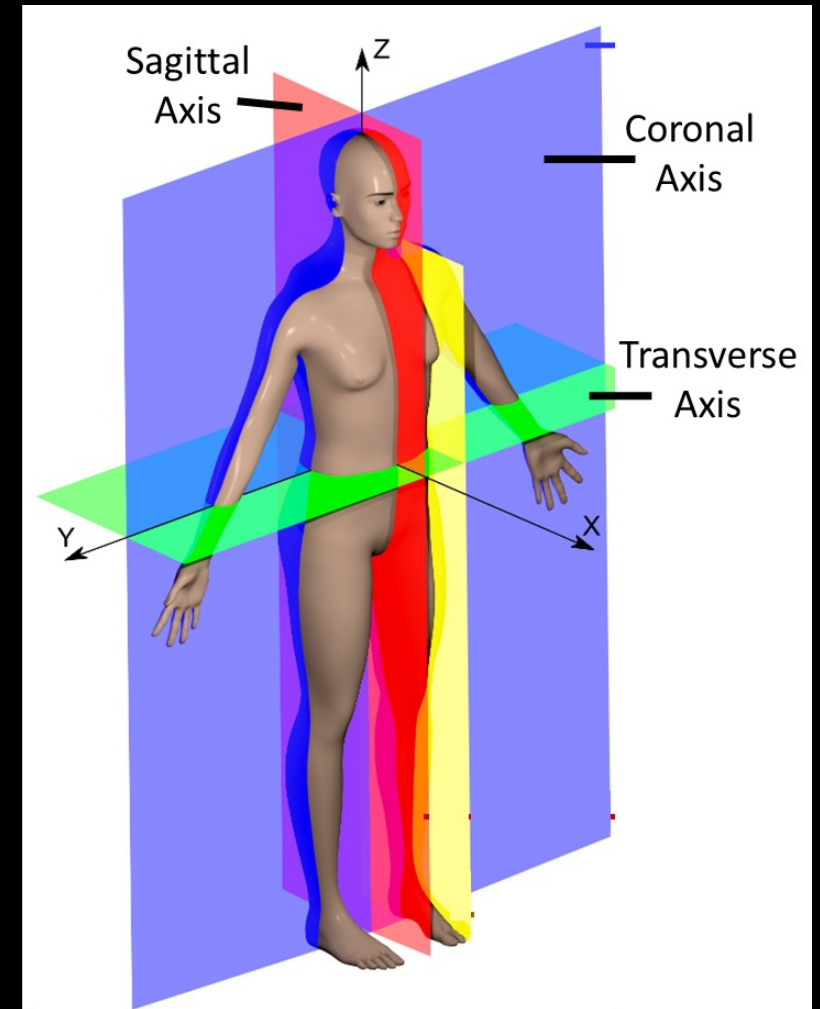
Yes!



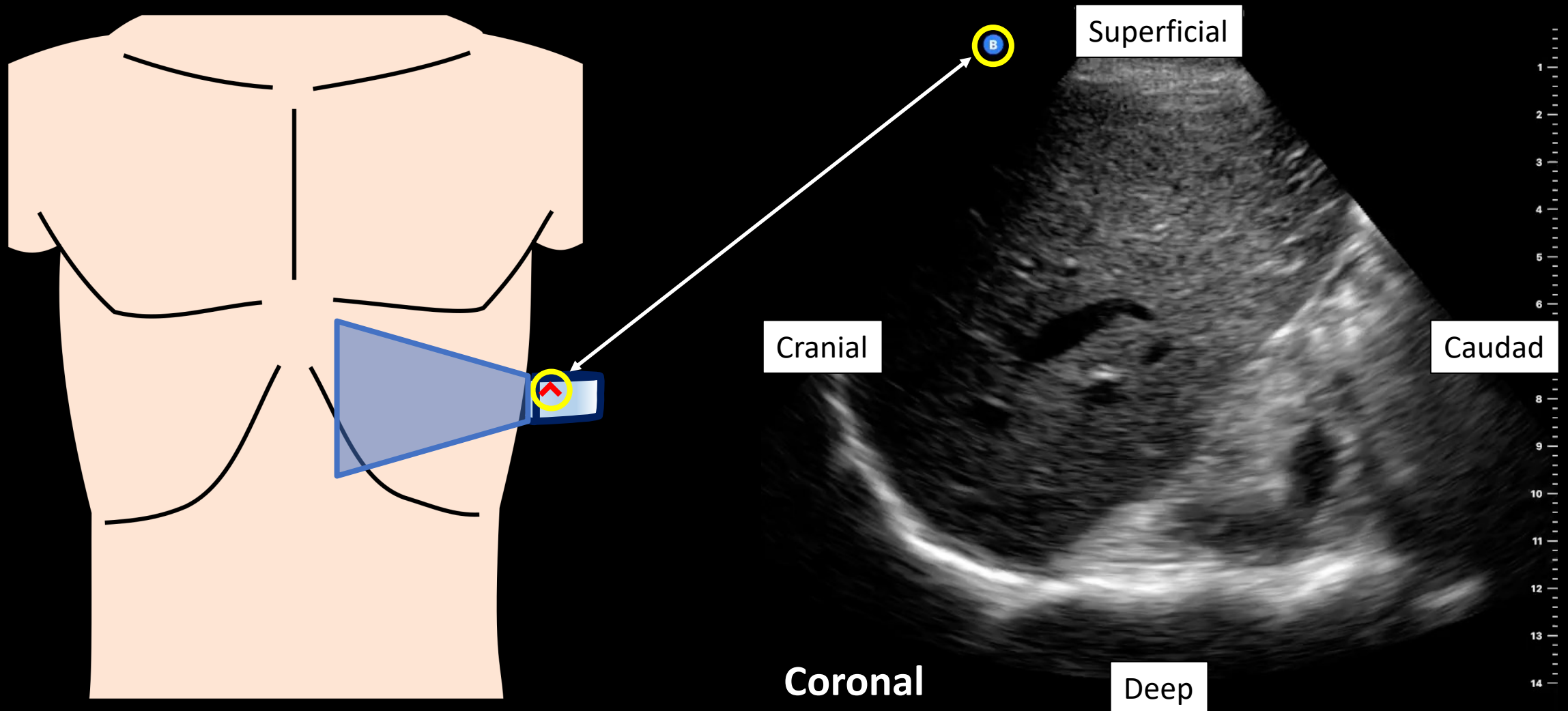
# Consider the Imaging Plane



**Sagittal**  
**Transverse**  
**Coronal**

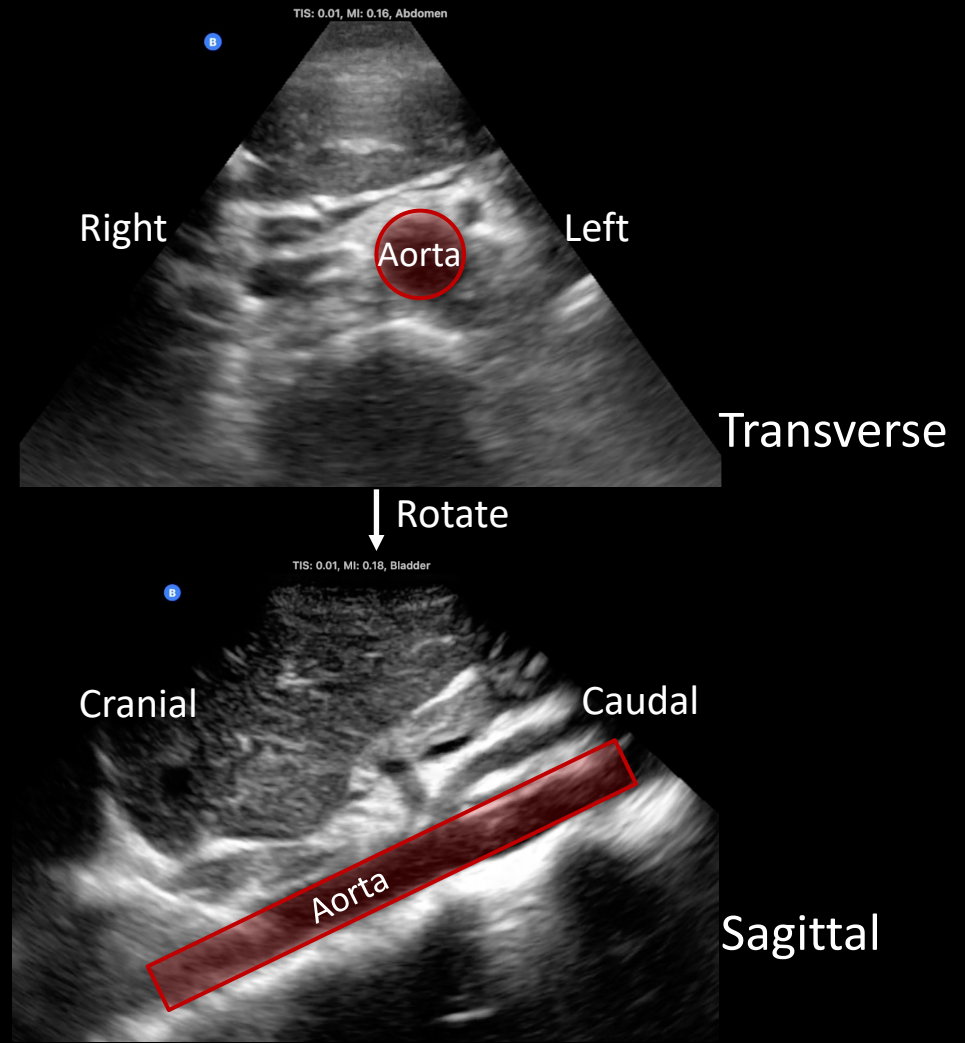
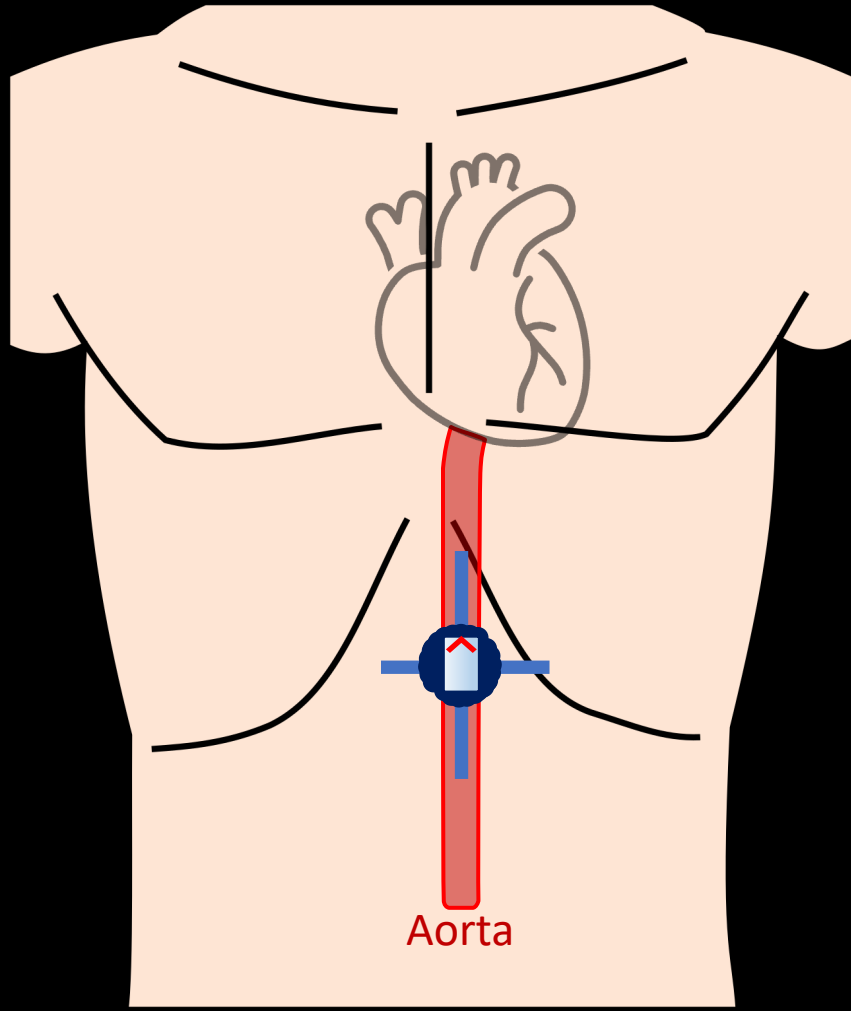


# Probe and Screen Orientation





# Consider the Imaging Plane

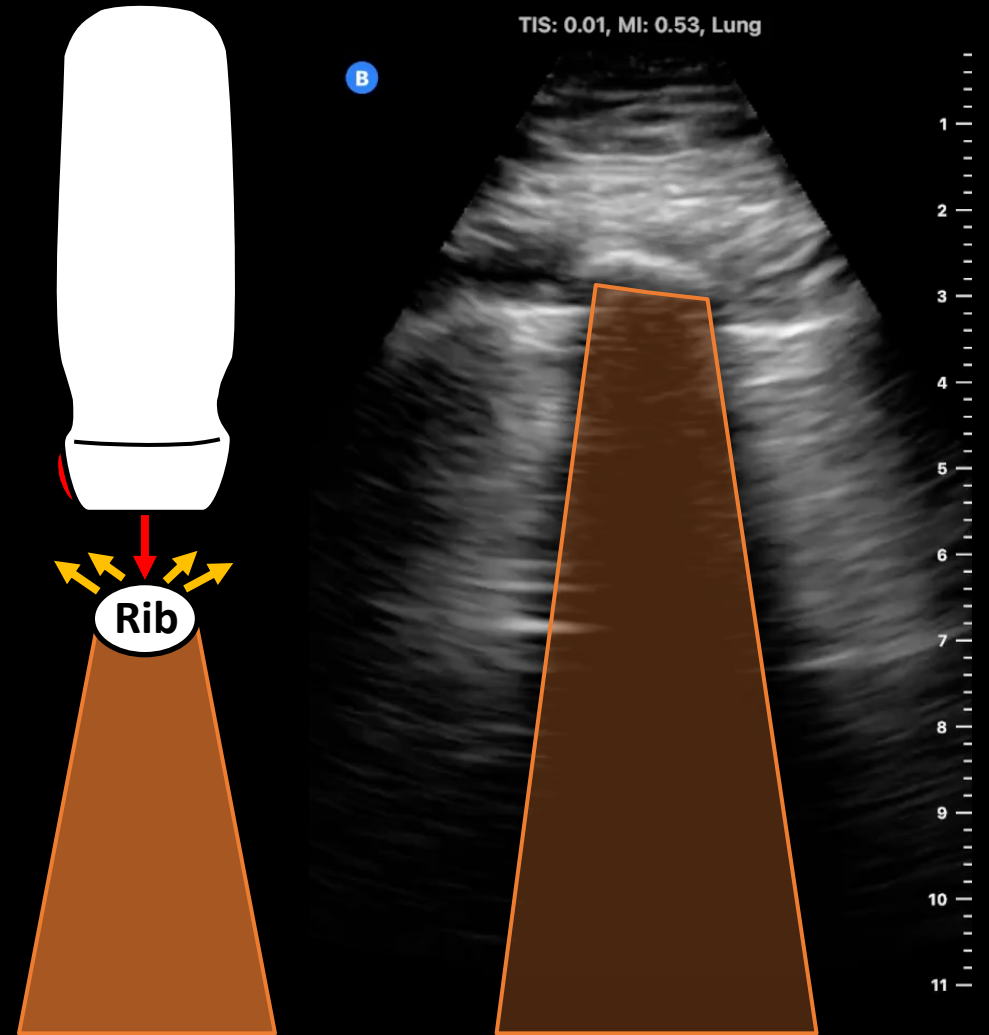


# Ultrasound Artifacts

- Part of images that are not true anatomic structure
- 5 common artifacts:
  - Shadowing
  - Reverberation
  - Mirror Image
  - Edge Refraction
  - Posterior enhancement

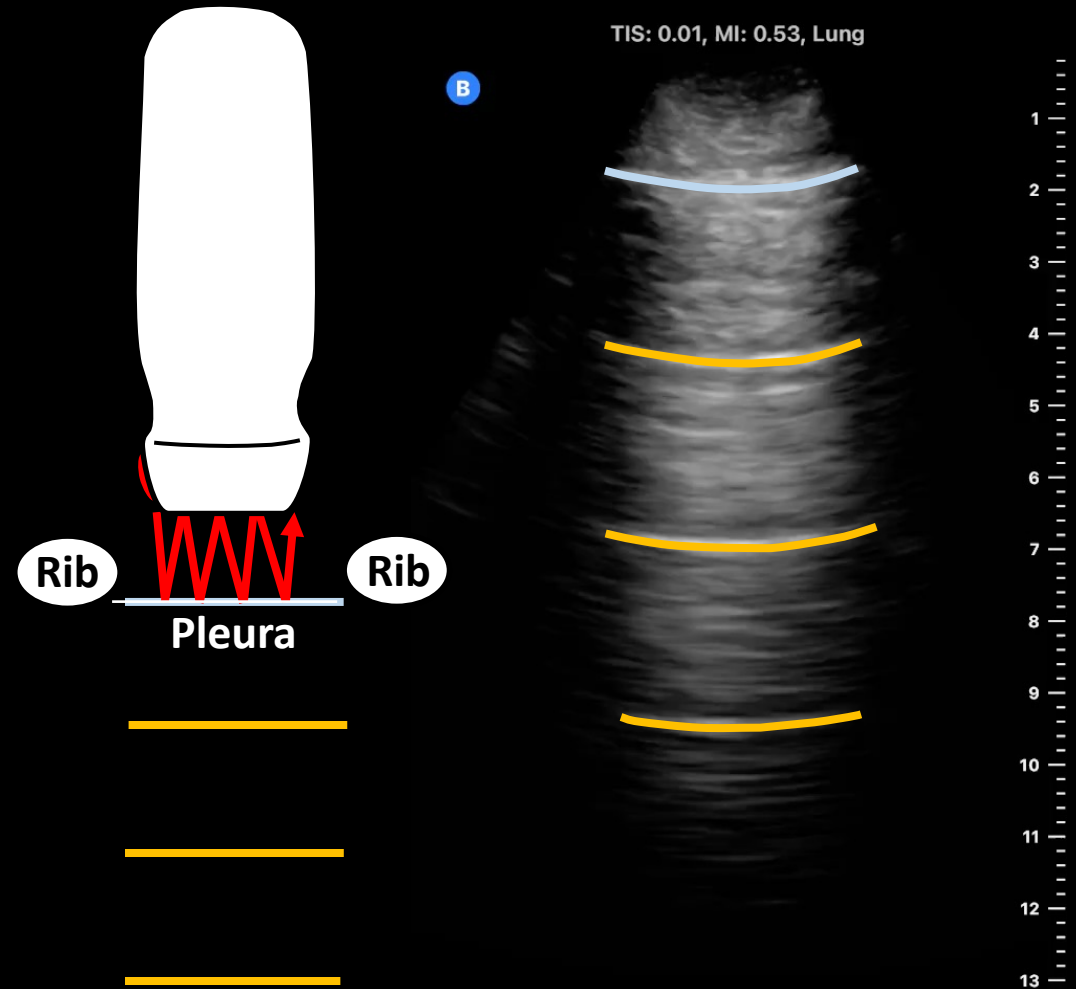
# Shadowing

- “High attenuating” structures reflect, scatter, or absorb most of the echoes
- Distal structures are obscured
- Stones, bones, air



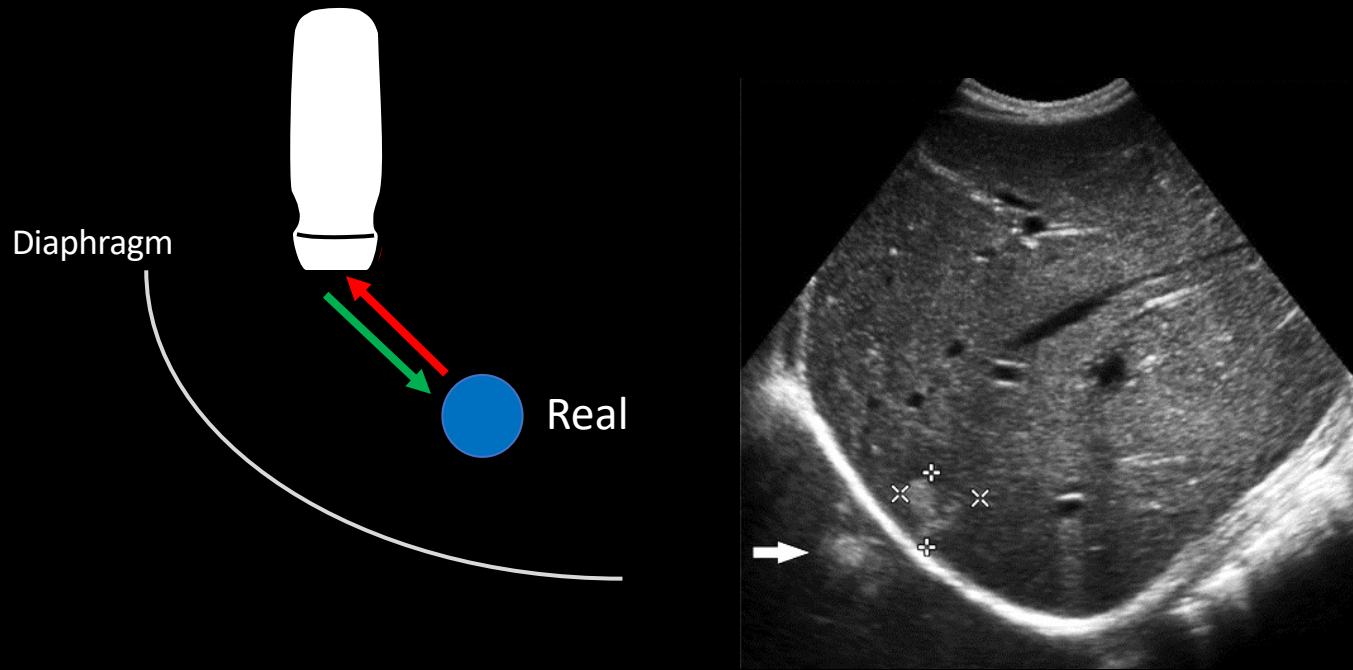
# Reverberation

- Strong reflectors parallel to each other, perpendicular to beam
- Ultrasound bounces back and forth multiple times
- Displayed as parallel lines repeating at regular intervals



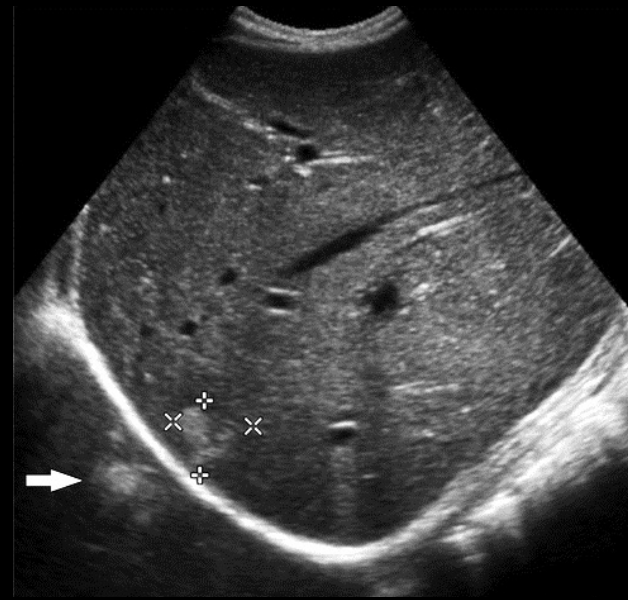
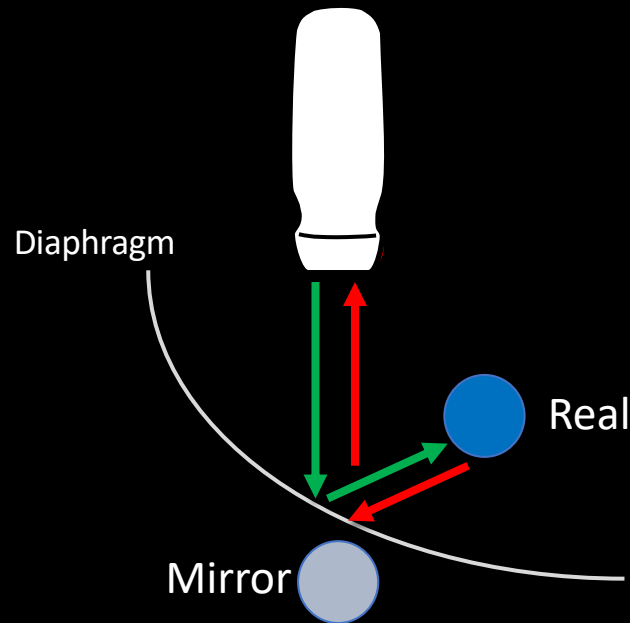
# Mirror Image

- False “copy” image seen deep to a strong reflector.
- Beam reflects off a strong reflector towards a second structure.
- Redirection causes a replica of the image deep to the real structure.



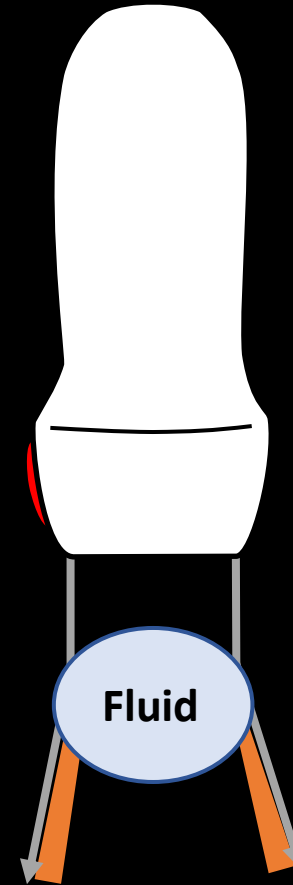
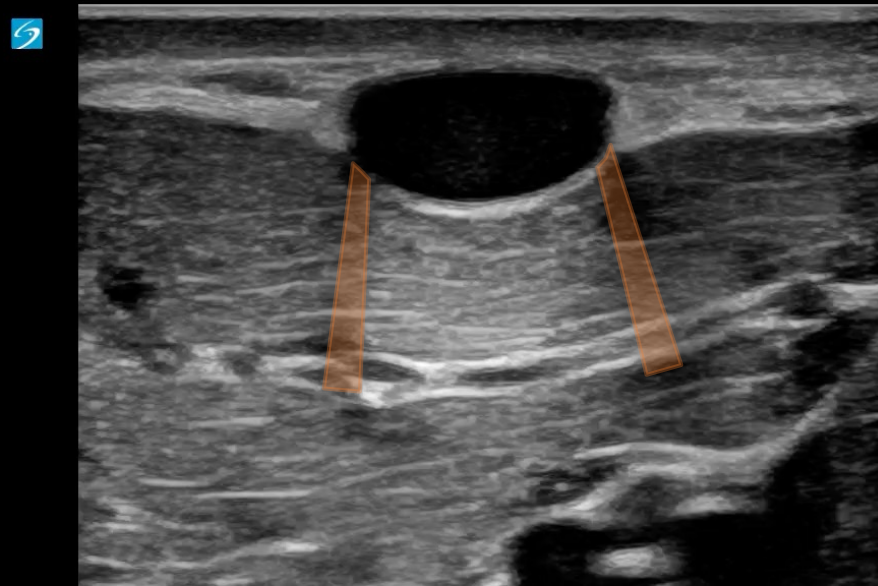
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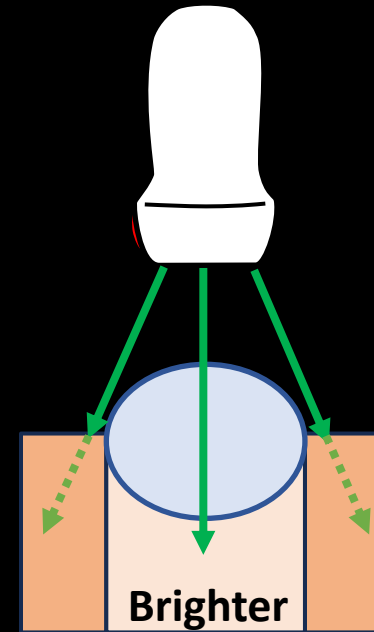
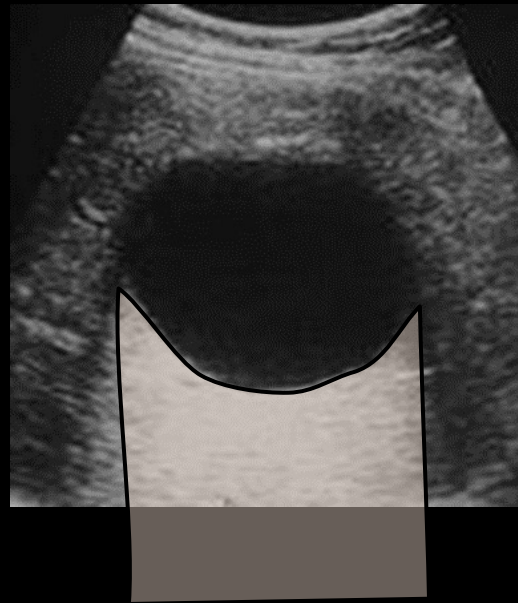
# Edge Refraction

- Refraction at the edge of a curved structure results in anechoic drop-out



# Posterior Enhancement

- Increased brightness posterior to a fluid-filled structure
- Sound travels through a low-attenuating structure and the intensity of the beam is preserved
- Helpful in clinical diagnosis of cystic vs. solid structures





Questions?

