

INTRODUCTION TO PRIMARY CARE ULTRASOUND

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OUTLINE

- Transducer selection
- Physics
- Process of image acquisition
- Ultrasound view terminology
- Basic ultrasound artifacts

ULTRASOUND PROBES

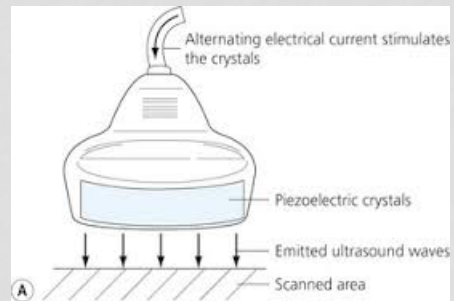
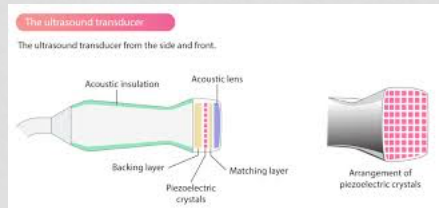


Image: quora.com

PROBE TYPES AND APPLICATIONS

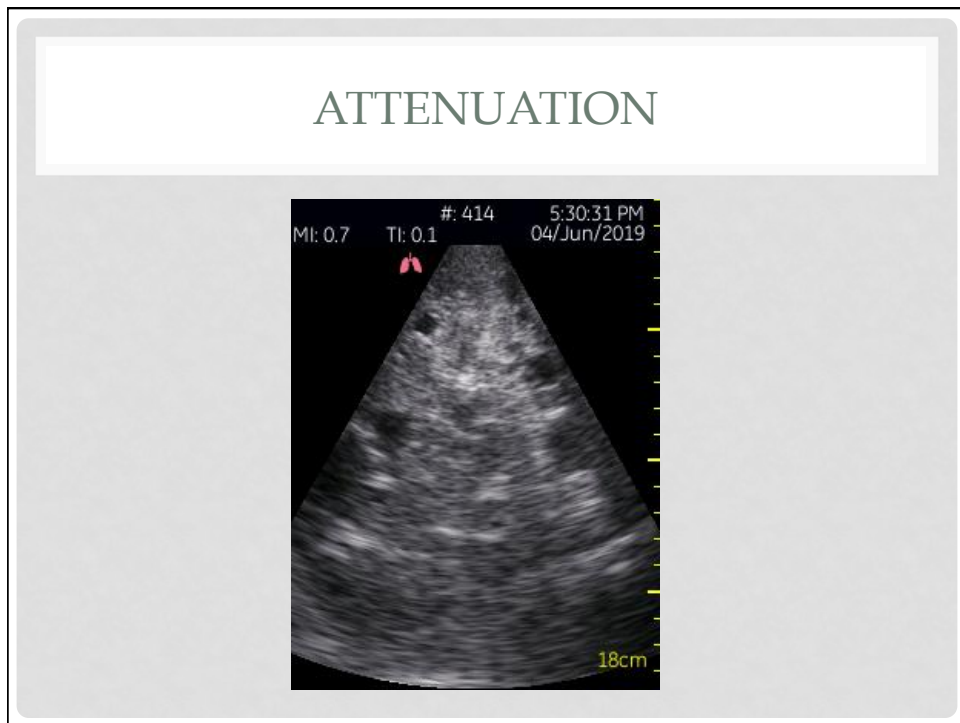
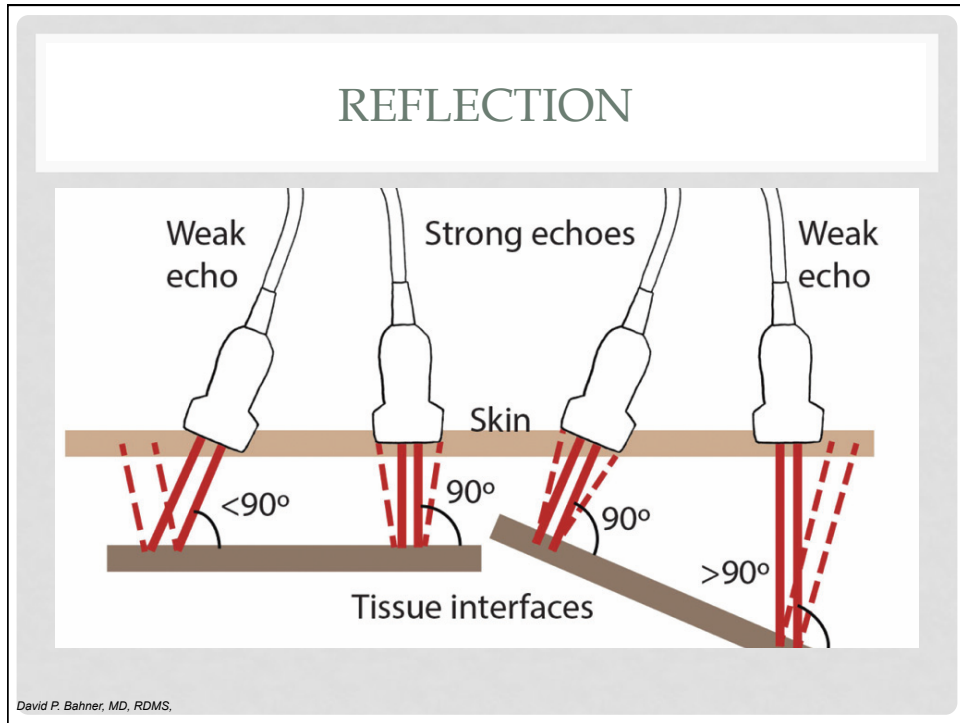
Probe Type	Frequency	Footprint	Idea to scan these structures
Curvilinear	1-5 MHz (low)	Large	Liver Bladder GB OB/GYN Kidneys Abd Aorta
Phased array	1-5 MHz (low)	Small	Cardiac IVC Lungs/pleura Abdomen
Linear	8-12 MHz (high)	Large	Skin/soft tissue MSK Blood vessels Pleura Testicles Eye

ULTRASOUND PHYSICS

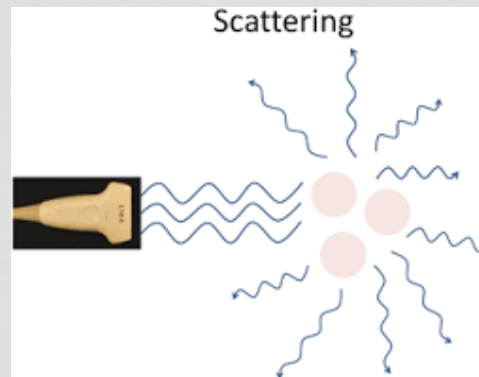


PRINCIPLES OF SOUND WAVES IN TISSUE

- Reflection
- Attenuation
- Scattering



SCATTERING



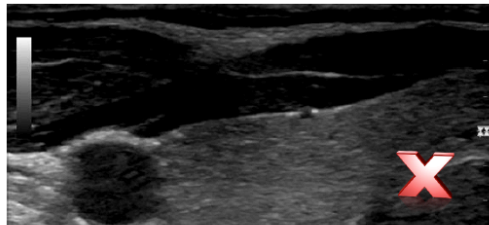
PROCESS OF IMAGE ACQUISITION

- Before scanning:
 - Choose correct probe
 - Choose correct preset
 - Apply gel
 - Keep probe perpendicular to object of interest
- While scanning:
 - Adjust cut
 - Adjust depth
 - Adjust gain

GEL

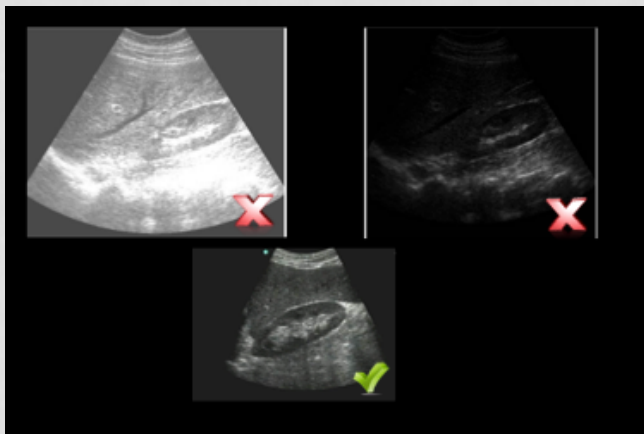
- Why do you think we need gel for ultrasound???

DEPTH



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GAIN



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ULTRASOUND MODES

- B-mode
- Color doppler mode
- M-mode
- Spectral doppler

B-MODE



Image: mayoclinic.org

ULTRASOUND DESCRIPTIVE TERMS



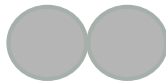
Hyperechoic (white)



Hypoechoic (gray)

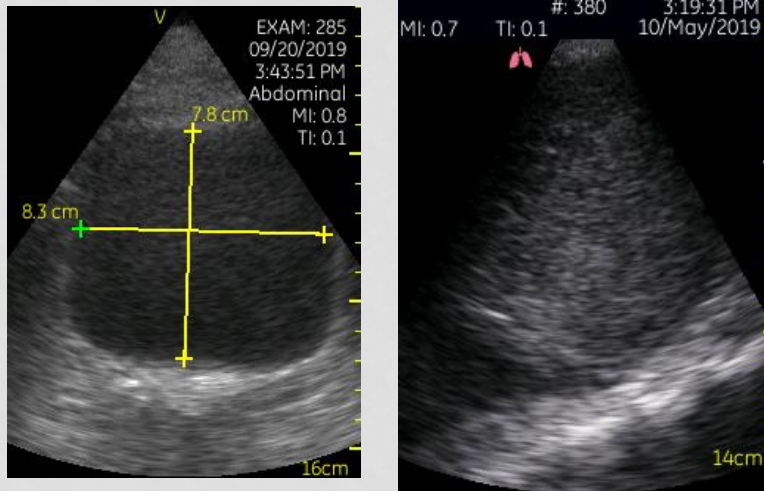


Anechoic (black)



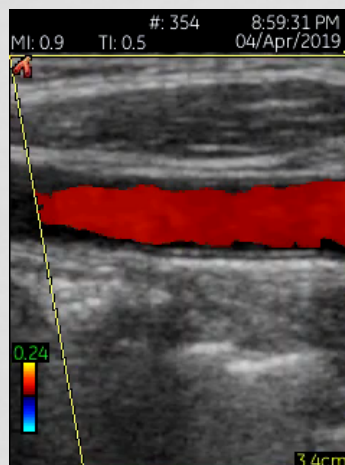
Isoechoic (same color as nearby object)

ULTRASOUND DESCRIPTIVE TERMS



Images: Matthew Haldeman, MD MPH

COLOR DOPPLER



M-MODE

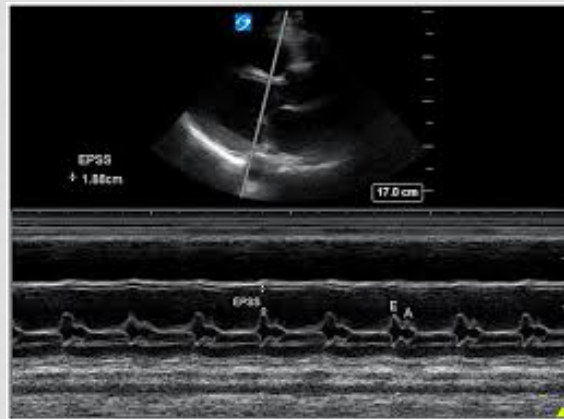


Image: researchgate.net

SPECTRAL DOPPLER

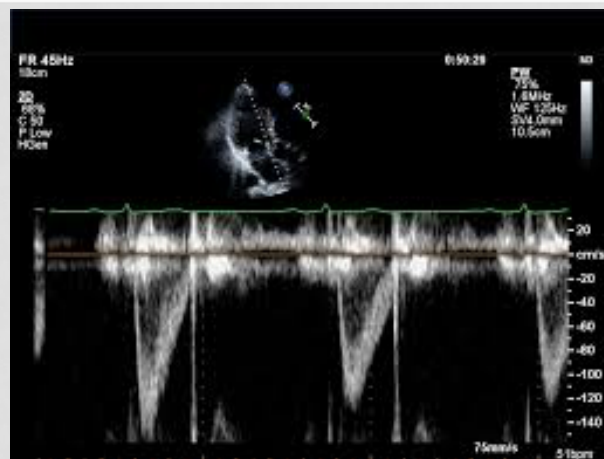
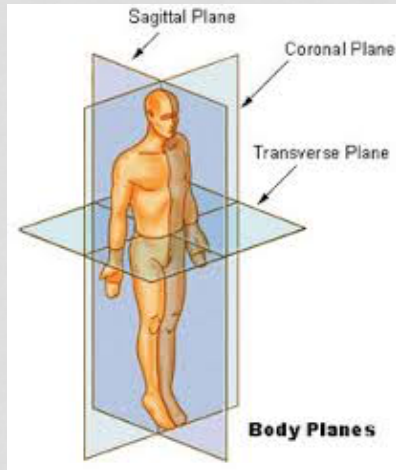


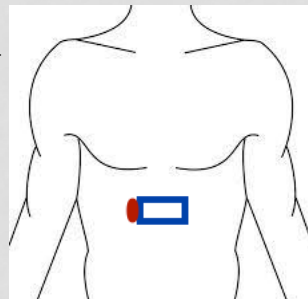
Image: echocardiographer.org

ULTRASOUND VIEW TERMINOLOGY: PLANES



TRANSVERSE VIEW

Right side of patient



Left side of patient

TRANSVERSE VIEW

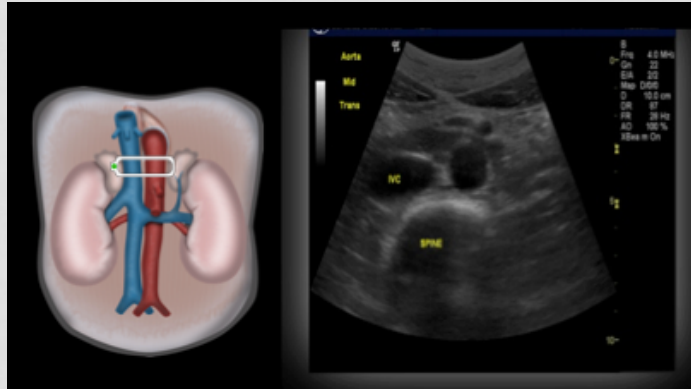
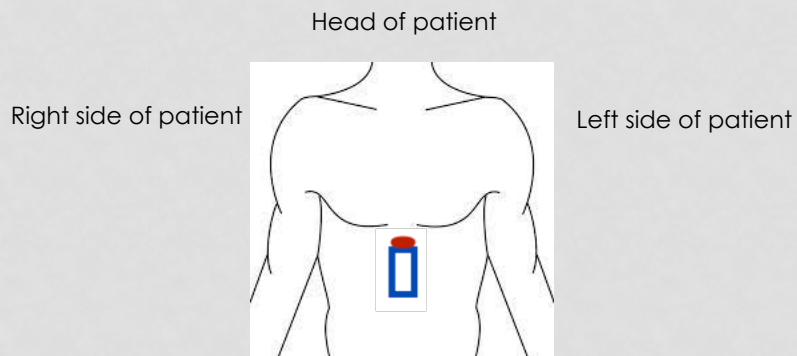


Image: University of South Carolina School of Medicine

LONGITUDINAL VIEW



ULTRASOUND VIEW TERMINOLOGY

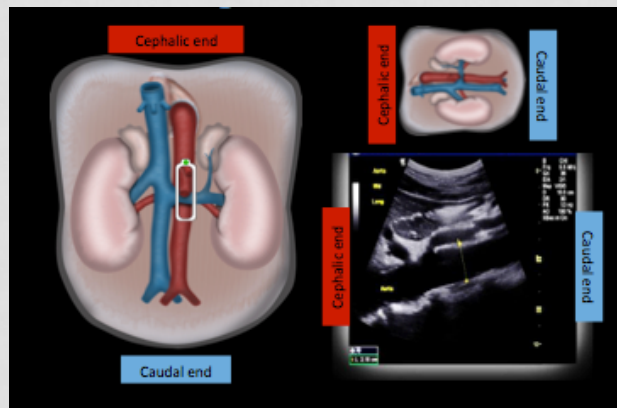


Image: University of South Carolina School of Medicine

SCANNING MOVEMENTS

- Rocking
- Fanning
- Rotate
- Press
- Slide—short axis
- Slide—long axis

COMMON ULTRASOUND ARTIFACTS

- Acoustic shadow
- Posterior acoustic enhancement
- Mirror image artifact

ACOUSTIC SHADOW



Image: quora.com

POSTERIOR ACOUSTIC ENHANCEMENT



Image: cambridge.org

MIRROR IMAGE ARTIFACT

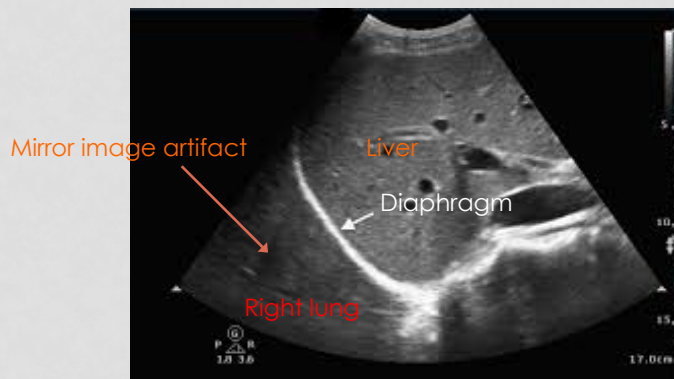


Image: Researchgate.net

OVERALL...

- Before scanning:
 - Choose correct probe
 - Choose correct preset
 - Apply gel
 - Keep probe perpendicular to object of interest
- While scanning:
 - Adjust cut
 - Adjust depth
 - Adjust gain