

ULTRASOUND

LECTURE SERIES

Ultrasound: The Basics

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Objectives

At the conclusion of this presentation, students will be able to describe sonographic instruments and knobology and discuss basic principles of ultrasound physics.

Topics

1. Physics of ultrasound
2. Principles of real-time B-scanners
3. Types of real-time scanners
 - Linear array
 - Curved array
 - Phased array
4. 3D/4D ultrasound
5. Manual control of ultrasound sensitivity
 - Frequency
 - Output power and intensity
 - Gain (overall)
 - Time gain compensation gain
 - Focus

Review Questions

1. The propagation speed of ultrasound in soft tissue is:
 - A. 1540 km/s.
 - B. 1540 m/s.
 - C. 1540 cm/s.
 - D. 1.5 kHz.
 - E. None of the above.
2. Diagnostic ultrasound transducers are based on the physical principle of:
 - A. Murphy's law.
 - B. ALARA principle.
 - C. Doppler principle.
 - D. Piezoelectric effect.
 - E. None of the above.
3. Axial resolution of ultrasound is primarily dependent on the:
 - A. Transducer frequency.
 - B. Power.
 - C. Frame rate.
 - D. Beam width.
4. Compared with a 2-MHz transducer, a 5-MHz transducer will have:
 - A. A deeper tissue penetration.
 - B. A lower image resolution.
 - C. No difference in depth penetration or image resolution.
 - D. Both a better resolution image and a greater depth penetration.
 - E. A better image resolution and a lower depth penetration.
5. B mode ultrasound:
 - A. Is pulse echo ultrasound.
 - B. Is created by sweeping the ultrasound beam through the target area.
 - C. Produces real-time images.
 - D. All of the above.
 - E. None of the above.