



Professional Ultrasound Services

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Acoustic Properties

1. The piezoelectric effect was discovered by:
 - a. William Watt
 - b. Pierre and Jacques Curie
 - c. Marie Curie
 - d. Johann Hertz

2. Ultrasound waves are:
 - a. Mechanical; longitudinal
 - b. Mechanical; transverse
 - c. Electromagnetic; longitudinal
 - d. Radio-frequency; phasic

3. Which of the following statements most accurately describes a sonogram:
 - a. Actual and accurate image of the anatomical structure being examined
 - b. A sectional display of pathology
 - c. Display of physical interaction of sound energy and matter
 - d. Display of velocity changes that occur as sound travels through matter

4. The unit of measurement for frequency is the:
 - a. rayl
 - b. Decibel
 - c. Lambda
 - d. Hertz

5. Which of the following represents the wave formula?
 - a. $d = vt$
 - b. $v = d/t$
 - c. $v = fw$
 - d. $v = f/w$

6. A structure that produces more echoes than surrounding soft tissue is said to be:
 - a. Echogenic
 - b. Hypoechoic
 - c. Hyperechoic
 - d. Echopenic

7. The amount of energy present in a given place at a given time is called:
 - a. Spatial intensity
 - b. Amplitude
 - c. Temporal intensity
 - d. Period

8. The characteristic of a medium that MOST determines the velocity of sound through it is:
 - a. Temperature
 - b. Compressibility
 - c. Density
 - d. Thickness

9. The strength of a sound wave is best called its:
 - a. Amplitude
 - b. Frequency
 - c. Period
 - d. Intensity

10. As the frequency of an ultrasound wave increases, its _____ decreases:
 - a. Velocity
 - b. Amplitude
 - c. Intensity
 - d. Wavelength

11. The relative increase in echogenicity behind a hypoattenuating structure is called:
 - a. Posterior acoustic enhancement
 - b. Hyperattenuation
 - c. Posterior acoustic shadowing
 - d. Refractory shadow

12. The dissipation of ultrasound energy due to the re-direction of the beam in many different directions is called:
 - a. Diffraction
 - b. Divergence
 - c. Refraction
 - d. Scattering

13. The component of acoustic attenuation that is most responsible for loss of beam energy is:
 - a. Reflection
 - b. Absorption
 - c. Refraction
 - d. Scattering

14. Which of the following sonographic characteristic is not typical of a simple cystic structure?
 - a. Varied echo texture within the structure
 - b. Smooth borders
 - c. Anechoic structure
 - d. Posterior acoustic enhancement

15. Which of the following factors does not contribute to specular reflection of an ultrasound beam in human soft tissue?
 - a. Difference in acoustic impedance between media
 - b. Large, flat interfaces
 - c. Normal incidence of sound beam
 - d. Irregular surface

16. The primary imaging system control that a sonographer uses to balance the amplitude of echoes returning from various depths within the body is:
 - a. Volume
 - b. Transducer selection
 - c. Gain compensation
 - d. Dynamic range

17. Which of the following terms refers to regions of decreased particle density in an ultrasound wave?
- Refraction
 - Compression
 - Diffraction
 - Rarefaction
18. Which of the following sequences correctly arranges the materials according to the velocity of sound traveling through them, from lowest to highest?
- Air, fat, muscle, bone
 - Fat, muscle, bone, air
 - Bone, fat, muscle, air
 - Air, muscle, fat, bone
19. The reflection coefficient (the ratio of sound reflected to sound transmitted) at an interface is most closely related to:
- Difference in acoustic impedance at the interface
 - Difference in attenuation at the interface
 - Incident beam intensity
 - Average attenuation in the medium
20. The best definition for ultrasound intensity is:
- Mass/unit volume
 - Reciprocal of amplitude
 - Energy/unit volume
 - Velocity x frequency
21. The position of an echo on a sonographic image is determined primarily by measuring:
- Frequency
 - Amplitude
 - Temperature
 - Time
22. As the frequency of a sound beam increases, its wavelength:
- Increases
 - Decreases
 - Is raised to the second power
 - Stays the same
23. In order to be classified as ultrasound, a sound wave must have a frequency of at least:
- 20 Hz
 - 20 kHz
 - 1 MHz
 - 20 MHz
24. Which of the following represents the method of calculating reflection from an interface?

$$\text{a) } \frac{(Z_2 - Z_1)^2}{(Z_1 + Z_2)^2} \qquad \text{b) } \frac{(Z_2 + Z_1)^2}{(Z_2 - Z_1)^2}$$

$$\text{c) } Z = \rho V^2 \qquad \text{d) } \frac{\sin_i}{\sin_r} = \frac{V_1}{V_2}$$