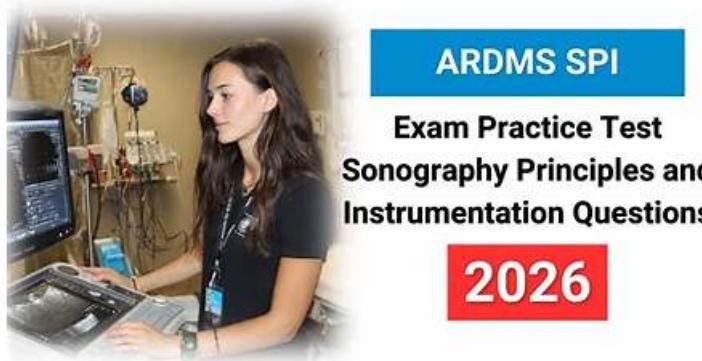


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ARDMS Sonography Principles and Instrumentation Sample Questions (Q54-Q59):

NEW QUESTION # 54

How is variable transmit focus with a linear phased array accomplished?

- A. Mechanically rotate array elements
- B. Modifying the impedance of the acoustic lens
- C. Adjusting relative delay times of the array elements
- D. Reshaping the matching layers

Answer: C

Explanation:

Comprehensive and Detailed Explanation From Exact Extract:

In phased arrays, transmit focus is electronically controlled by varying the timing (delays) of the activation of elements.

Principles and Instrumentation state:

"Electronic focusing is achieved by introducing varying time delays to individual elements, allowing beam focusing at different depths."

* Mechanical rotation (A) applies to older mechanical probes.

* Matching layers (B) and acoustic lens impedance (C) do not control focusing electronically.

Therefore, the correct answer is D: Adjusting relative delay times of the array elements.

NEW QUESTION # 55

Which factor affects lateral resolution in ultrasound?

- A. Beam width
- B. Depth of penetration
- C. Wavelength
- D. Propagation speed

Answer: A

Explanation:

Comprehensive and Detailed Explanation From Exact Extract:

Lateral resolution is the system's ability to distinguish two structures side-by-side. It is directly determined by the beam width - the narrower the beam, the better the lateral resolution.

Principles and Instrumentation:

"Lateral resolution depends on beam width at a given depth. Narrower beams provide better lateral resolution." Depth of penetration influences maximum imaging depth.

Propagation speed is largely constant in soft tissue.

Wavelength affects axial resolution.

Therefore, the correct answer is A: Beam width.

NEW QUESTION # 56

What does this image demonstrate?

A ultrasound of a fetus Description automatically generated

□

- A. Color inversion
- B. Direction of flow
- C. Presence of flow
- D. Color aliasing

Answer: D

Explanation:

Comprehensive and Detailed Explanation From Exact Extract:

In the provided image, the color Doppler display shows a mixture of colors (typically red, yellow, and shades shifting abruptly), indicating that velocities have exceeded the Nyquist limit - the maximum detectable Doppler shift for the given pulse repetition frequency (PRF). This creates a color aliasing artifact.

According to the official sonography Principles and Instrumentation documentation:

"Color aliasing occurs when flow velocities exceed the Nyquist limit, causing a wrap-around of the color scale. This results in abrupt changes in color hue that do not accurately represent flow direction or velocity."

* Presence of flow (A) is correct but too general.

* Direction of flow (B) refers to color assignment but not to the artifact seen.

* Color inversion (D) inverts the color map but does not cause the abrupt color changes seen here.

The alternating, banded colors are classic for color aliasing, confirming that the correct answer is C: Color aliasing.

NEW QUESTION # 57

In this image, which characteristics of flow are represented by the upper right side of a variance mode color map?

□

- A. Higher velocity, laminar with a negative Doppler shift

- B. Higher velocity, laminar with a positive Doppler shift
- C. Higher velocity, turbulent with a negative Doppler shift
- D. Higher velocity, turbulent with a positive Doppler shift

Answer: D

Explanation:

Comprehensive and Detailed Explanation From Exact Extract:

In variance mode color Doppler, colors are assigned based on both flow direction (Doppler shift polarity) and flow character (laminar vs turbulent). In the image:

The vertical color bar shows standard Doppler shifts: positive shifts (toward the transducer) are displayed at the top, and negative shifts (away from the transducer) at the bottom.

The variance mode adds horizontal color variation (from left to right), where the right side indicates increasing turbulence.

Thus, the upper right portion of the color bar indicates:

Positive Doppler shift (flow toward the transducer)

High velocity

Turbulent flow

According to sonography instrumentation reference:

"In variance mode, the vertical axis represents flow direction and velocity, while the horizontal axis represents flow variance (turbulence). The upper right corner indicates high-velocity turbulent flow toward the transducer." Therefore, the correct answer is C: Higher velocity, turbulent with a positive Doppler shift.

NEW QUESTION # 58

What is effected by increasing the color scale?

- A. The color box width decreases
- B. The Nyquist limit is increased
- C. More colors are displayed
- D. The color priority decreases

Answer: B

Explanation:

The Nyquist limit, which is the maximum detectable velocity before aliasing occurs, is directly related to the pulse repetition frequency (PRF). Increasing the color scale on the ultrasound machine effectively increases the PRF. When the PRF is increased, the Nyquist limit is also increased, allowing for the measurement of higher velocities without aliasing.

ARDMS Sonography Principles and Instrumentation guidelines

Kremkau, F. W. (2015). Diagnostic Ultrasound: Principles and Instruments. Elsevier.

NEW QUESTION # 59

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