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SPI MOCK EXAM

When the ELASTICITY of a medium is HIGH, the _____ is HIGH

- stiffness
- prop. speed
- compressibility
- reflectivity - ANScompressibility

What term describes the # of cycles that an acoustic variable completes in a second?

- period
- freq.
- PRP
- variable rate - ANSfreq.

What happens to venous flow return to the HEART when a person INHALES? -
ANSincreases

What establishes the freq. of an US wave?

- transducer
- medium through which sound travels
- both
- neither - ANStransducer

Which of the following tasks is NOT performed by the receiver of an US sx?

- rectification
- smoothing
- compression
- degaussing - ANSdegaussing

Which of the following is NOT a potential mechanism for the production of bioeffects from US exposure to the body?

- temp. elevation
- fractionation
- cavitation
- vibration - ANSfractionation

Which of the following terms does NOT belong with the others?

- increased DOV
- increased DF

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ARDMS SPI Exam Syllabus Topics:

Topic	Details
Topic 1	<ul style="list-style-type: none">• Optimize Sonographic Images: This section of the exam measures skills of Diagnostic Medical Sonographers and assesses their ability to enhance image quality using advanced optimization techniques. It includes understanding axial, lateral, elevational, and temporal resolution, as well as manipulating gain, depth, magnification, and dynamic range. Examinees are expected to apply harmonic imaging, spatial compounding, and gray-scale techniques to produce clear, accurate diagnostic images.

Topic 2	<ul style="list-style-type: none"> Provide Clinical Safety and Quality Assurance: This section of the exam measures skills of Clinical Ultrasound Supervisors and focuses on maintaining safety and quality standards in ultrasound practice. It includes infection control protocols, transducer and machine integrity checks, and quality assurance testing using tissue-mimicking phantoms. The section also requires familiarity with statistical parameters like sensitivity and specificity to evaluate diagnostic performance and ensure consistent, reliable imaging outcomes.
Topic 3	<ul style="list-style-type: none"> Perform Ultrasound Examinations: This section of the exam measures skills of Sonographers and covers how to conduct ultrasound procedures while ensuring patient safety and diagnostic accuracy. It includes understanding of imaging protocols, ergonomics, patient care, and the interaction between sound and tissue. Candidates are expected to demonstrate abilities to manage patient encounters, apply 3D 4D and contrast imaging concepts, identify and correct artifacts, and follow confidentiality and privacy standards throughout the scanning process.
Topic 4	<ul style="list-style-type: none"> Manage Ultrasound Transducers: This section of the exam measures skills of Ultrasound Technicians and focuses on the management and proper use of different types of transducers. It evaluates knowledge of transducer components, frequency selection, and application of various 2D, 3D, 4D, and nonimaging transducer concepts. Candidates must show they can choose the appropriate transducer for specific examinations and make necessary frequency adjustments to ensure image quality.
Topic 5	<ul style="list-style-type: none"> Apply Doppler Concepts: This section of the exam measures skills of Vascular Sonographers and evaluates understanding and application of Doppler ultrasound principles. It includes knowledge of Doppler angle, flow dynamics, and color and spectral Doppler imaging. The section also covers eliminating aliasing, interpreting waveforms, applying continuous and pulsed wave Doppler, and optimizing Doppler gain and scale to accurately measure blood flow and velocity within vessels.

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ARDMS Sonography Principles and Instrumentation Sample Questions (Q108-Q113):

NEW QUESTION # 108

In addition to velocity, which factor affects acoustic impedance?

- A. Attenuation coefficient
- B. Transducer frequency
- C. Tissue density**
- D. Penetration depth

Answer: C

Explanation:

Comprehensive and Detailed Explanation From Exact Extract:

Acoustic impedance (Z) is determined by the product of tissue density (ρ) and propagation speed (c), expressed as:

$$Z = \rho \times c$$

According to Principles and Instrumentation:

"Acoustic impedance is a property of the tissue, determined by its density and the speed of sound through it." Penetration depth (A)

does not affect impedance directly.

Attenuation coefficient (B) affects signal loss, not impedance.

Transducer frequency (D) is independent of tissue impedance.

Therefore, the correct answer is C: Tissue density.

NEW QUESTION # 109

Which artifact causes a reflector to be improperly positioned on the display?

- A. Speckle
- B. Acoustic shadowing
- C. Enhancement
- D. Range ambiguity

Answer: D

Explanation:

* Acoustic Shadowing: This artifact occurs when a structure absorbs or reflects most of the ultrasound waves, causing a shadow behind the structure. It does not cause improper positioning of a reflector on the display.

* Speckle: This is a form of noise in ultrasound imaging that appears as granular texture. It can affect image quality but does not lead to improper positioning of reflectors.

* Enhancement: This artifact occurs when the area behind a weakly attenuating structure appears brighter.

It affects the brightness of the image but does not affect the position of reflectors.

* Range Ambiguity: This occurs when an echo is received after the next pulse has been sent out, causing the reflector to be placed at an incorrect depth on the display. This is because the system assumes the echo came from the most recent pulse.

References:

"Ultrasound Physics and Instrumentation" by Frank Miele

ARDMS Sonography Principles and Instrumentation study materials

NEW QUESTION # 110

What does this image demonstrate?



- A. Direction of flow

- B. Color inversion
- 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 # 111

Which resolution is improved by focusing?

- A. Contrast
- B. Temporal
- C. Lateral
- D. Axial

Answer: C

Explanation:

Focusing improves lateral resolution in ultrasound imaging. Lateral resolution refers to the system's ability to distinguish between two points that are side by side (perpendicular to the sound beam's path). By focusing the ultrasound beam, the width of the beam is narrowed at the focal point, enhancing the system's ability to resolve structures that are close together in the lateral plane. This results in clearer, more detailed images of the anatomical structures.

American Registry for Diagnostic Medical Sonography (ARDMS) Sonography Principles and Instrumentation study materials.

Diagnostic Ultrasound: Principles and Instruments by Kremkau, F. W. (latest edition).

NEW QUESTION # 112

Which artifact may be caused by incorrect color Dopplergain setting?

- A. Clutter/Haze
- B. Twinkle
- C. Aliasing
- D. Bleed/Blossoming

Answer: D

Explanation:

Incorrect color Doppler gain settings can cause the artifact known as bleed or blossoming. When the color Doppler gain is set too high, it can cause the color signal to "bleed" outside the actual boundaries of the blood vessel, leading to an overestimation of the area of flow. This artifact makes it appear as though the blood flow extends beyond the true vessel walls, which can obscure the accurate interpretation of the Doppler image.

Reference:

ARDMS Sonography Principles and Instrumentation (SPI) Exam Study Guide

"Diagnostic Ultrasound: Principles and Instruments" by Frederick W. Kremkau

NEW QUESTION # 113

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