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SPI PRACTICE questions exam 1

SPI PRACTICE questions exam 1 with correct answers 2024

- What best describes a sound wave? -answer- ✓A mechanical longitudinal wave
- What MUST be different on the two sides of an interface for refraction to occur? -answer- ✓Propagation speed of sound and oblique incidence
- The characteristic acoustic impedance of a medium equals the product of -answer- ✓density and speed of sound
- Ultrasonic attenuation is considered to consist of two parts scattering and absorption. Absorption is -answer- ✓local conversion of ultrasound energy to heat
- Which of the following has the greatest effect on the focal length of a single element transducer? -answer- ✓Doubling the element diameter
- Spatial pulse length is the product of the number of cycles in the pulse and the -answer- ✓wavelength
- Manipulating the output power control of an ultrasound instrument does NOT affect the -answer- ✓pulse repetition frequency
- What will be affected by the power? -answer- ✓echo amplitude
beam intensity
acoustic exposure to the patient
display dot brightness
- On pulse-echo equipment, the transducer actually transmits -answer- ✓under 1% of the time
- Ultrasonic intensity is measured in units of -answer- ✓energy per unit time per unit area (Watt)
- watt= -answer- ✓joules/second
- What fraction of ultrasonic energy is typically reflected at soft tissue interfaces? -answer- ✓1%
- If the reflected signal intensity from Object 1 is ten times greater than Object 2, what is the dB difference in reflected intensity between Object 1 and Object 2? -answer- ✓10 dB

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ARDMS SPI Exam Syllabus Topics:

Topic	Details
Topic 1	<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 2	<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 3	<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 4	<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.
Topic 5	<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.

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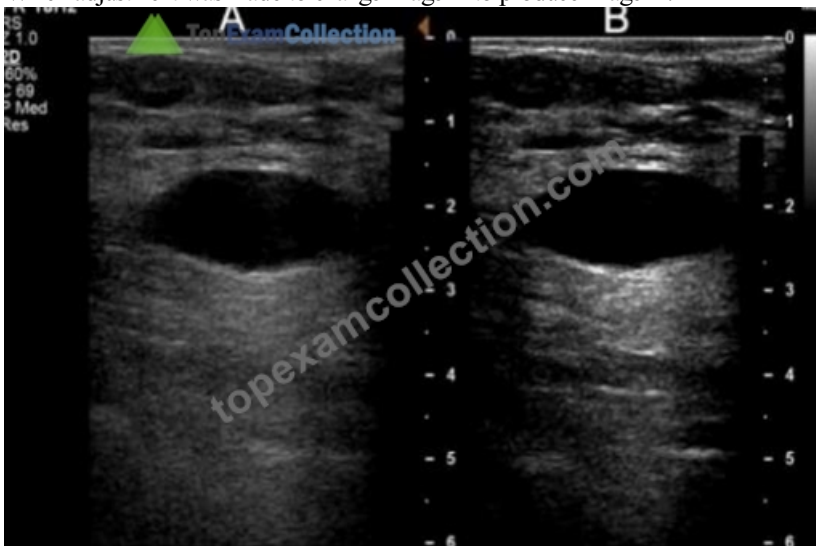
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ARDMS Sonography Principles and Instrumentation Sample Questions (Q21-Q26):

NEW QUESTION # 21

Which adjustment was made to change image A to produce image B?



- A. Decreased overall gain
- B. Increased overall gain
- C. Decreased dynamic range
- D. Increased dynamic range

Answer: C

Explanation:

Comprehensive and Detailed Explanation From Exact Extract:

In Image B, compared to Image A, you can observe a higher contrast image with darker darks and brighter brights, indicating that dynamic range has been reduced. Decreasing dynamic range results in less grey scale, creating a more black-and-white appearance and emphasizing contrast differences.

According to sonography instrumentation reference:

"Reducing dynamic range increases image contrast by narrowing the range of displayed echo intensities, making the image appear more black and white." Therefore, the correct answer is D: Decreased dynamic range.

-

NEW QUESTION # 22

What does changing the displayed depth control directly affect?

- A. Spatial pulse length
- B. Transducer transmit frequency
- C. Pulse repetition frequency
- D. Pulse duration

Answer: C

Explanation:

Changing the displayed depth control directly affects the pulse repetition frequency (PRF). When the depth setting is increased, the ultrasound system needs more time to send and receive echoes from deeper structures, resulting in a lower PRF. Conversely, decreasing the depth allows for a higher PRF since the time required for the sound waves to travel to and from the structures is shorter. PRF is crucial for determining the maximum detectable velocity in Doppler ultrasound without aliasing. Reference:

ARDMS Sonography Principles and Instrumentation guidelines

"Understanding Ultrasound Physics" by Sidney K. Edelman

NEW QUESTION # 23

What causes increased echogenicity distal to an anechoic structure?

- A. Increased attenuation within the structure
- B. Increased attenuation distal to the structure
- C. Reduced penetration through the structure
- D. Reduced attenuation through the structure

Answer: D

Explanation:

Comprehensive and Detailed Explanation From Exact Extract:

An anechoic structure (such as a cyst or fluid-filled space) allows ultrasound waves to pass through with minimal attenuation. As a result, more sound energy reaches tissues distal to the structure, producing a bright area known as posterior acoustic enhancement or increased echogenicity.

The sonography Principles and Instrumentation documents state:

"Posterior acoustic enhancement occurs distal to fluid-filled structures due to reduced attenuation through the anechoic medium, allowing increased beam intensity to reach deeper tissues."

* Reduced penetration (A) and increased attenuation (B or C) would not produce enhancement.

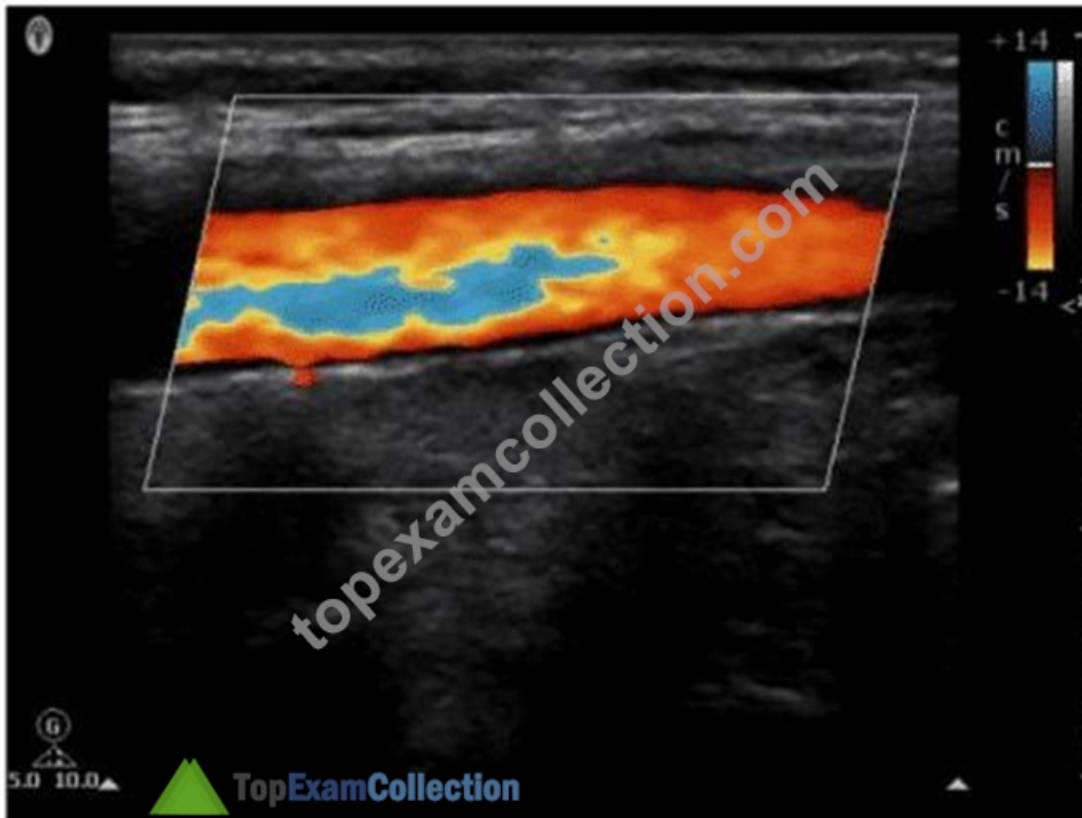
* Reduced attenuation (D) is the correct mechanism.

Therefore, the correct answer is D: Reduced attenuation through the structure.

-

NEW QUESTION # 24

Which pulsed-wave Doppler adjustment would be appropriate to correct the aliasing seen in this image?



- A. Decrease the spectral Doppler gain.
- B. Increase the spectral Doppler gain.
- C. Increase the Doppler pulse repetition frequency.
- D. Decrease the Doppler pulse repetition frequency.

Answer: C

Explanation:

Aliasing in pulsed-wave Doppler occurs when the sampled Doppler frequency exceeds the Nyquist limit, which is half of the pulse repetition frequency (PRF). This results in an incorrect representation of the blood flow velocities, causing the waveform to wrap around and appear on the opposite side of the baseline. To correct aliasing, the PRF should be increased, which raises the Nyquist limit and allows for accurate measurement of higher velocities without aliasing. Increasing the PRF effectively reduces the likelihood of aliasing artifacts in the Doppler signal.

American Registry for Diagnostic Medical Sonography (ARDMS). Sonography Principles and Instrumentation (SPI) Examination Review Guide.

NEW QUESTION # 25

Which factor affects temporal resolution?

- A. Display depth
- B. Time gain compensation
- C. Overall gain
- D. Log compression

Answer: A

Explanation:

Temporal resolution refers to the ability of an ultrasound system to distinguish between events occurring closely in time. It is primarily affected by the frame rate, which is the number of frames displayed per second. One of the main factors that influence the frame rate is the display depth. The deeper the imaging depth, the longer it takes for the ultrasound pulses to travel to the target and back, thus reducing the frame rate and temporal resolution. Shallower imaging depths allow for higher frame rates and better temporal

Reference:

NEW QUESTION # 26

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