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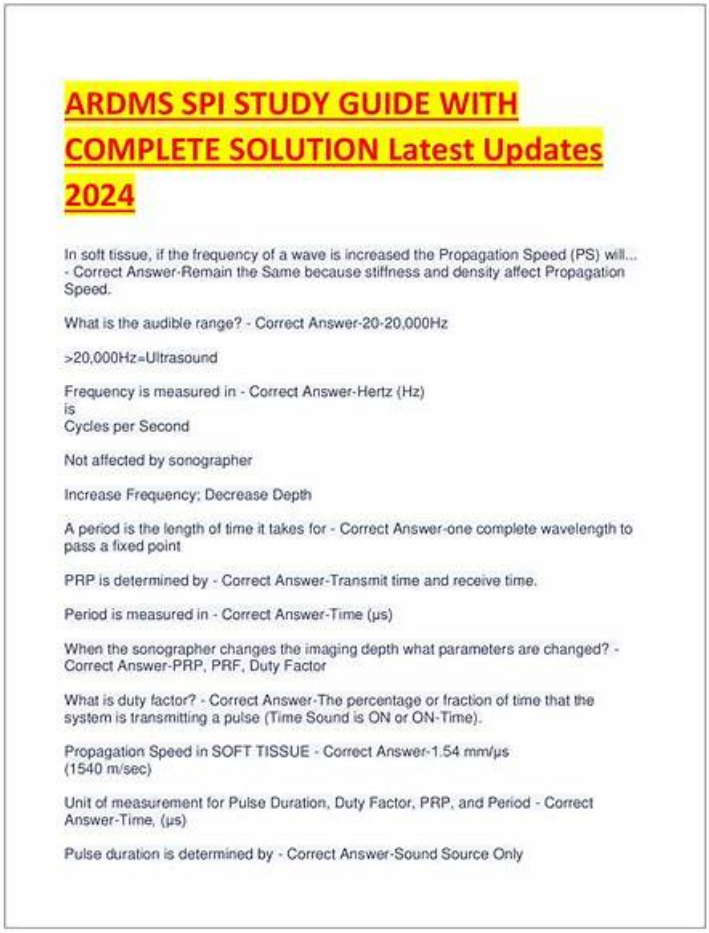
ARDMS SPI STUDY GUIDE WITH COMPLETE SOLUTION Latest Updates 2024

In soft tissue, if the frequency of a wave is increased the Propagation Speed (PS) will... - Correct Answer-Remain the Same because stiffness and density affect Propagation Speed.

What is the audible range? - Correct Answer-20-20,000Hz

>20,000Hz=Ultrasound

Frequency is measured in - Correct Answer-Hertz (Hz)
is
Cycles per Second

Not affected by sonographer

Increase Frequency; Decrease Depth

A period is the length of time it takes for - Correct Answer-one complete wavelength to pass a fixed point

PRP is determined by - Correct Answer-Transmit time and receive time.

Period is measured in - Correct Answer-Time (μs)

When the sonographer changes the imaging depth what parameters are changed? - Correct Answer-PRP, PRF, Duty Factor

What is duty factor? - Correct Answer-The percentage or fraction of time that the system is transmitting a pulse (Time Sound is ON or ON-Time).

Propagation Speed in SOFT TISSUE - Correct Answer-1.54 mm/μs
(1540 m/sec)

Unit of measurement for Pulse Duration, Duty Factor, PRP, and Period - Correct Answer-Time, (μs)

Pulse duration is determined by - Correct Answer-Sound Source Only

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ARDMS SPI Exam Syllabus Topics:

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

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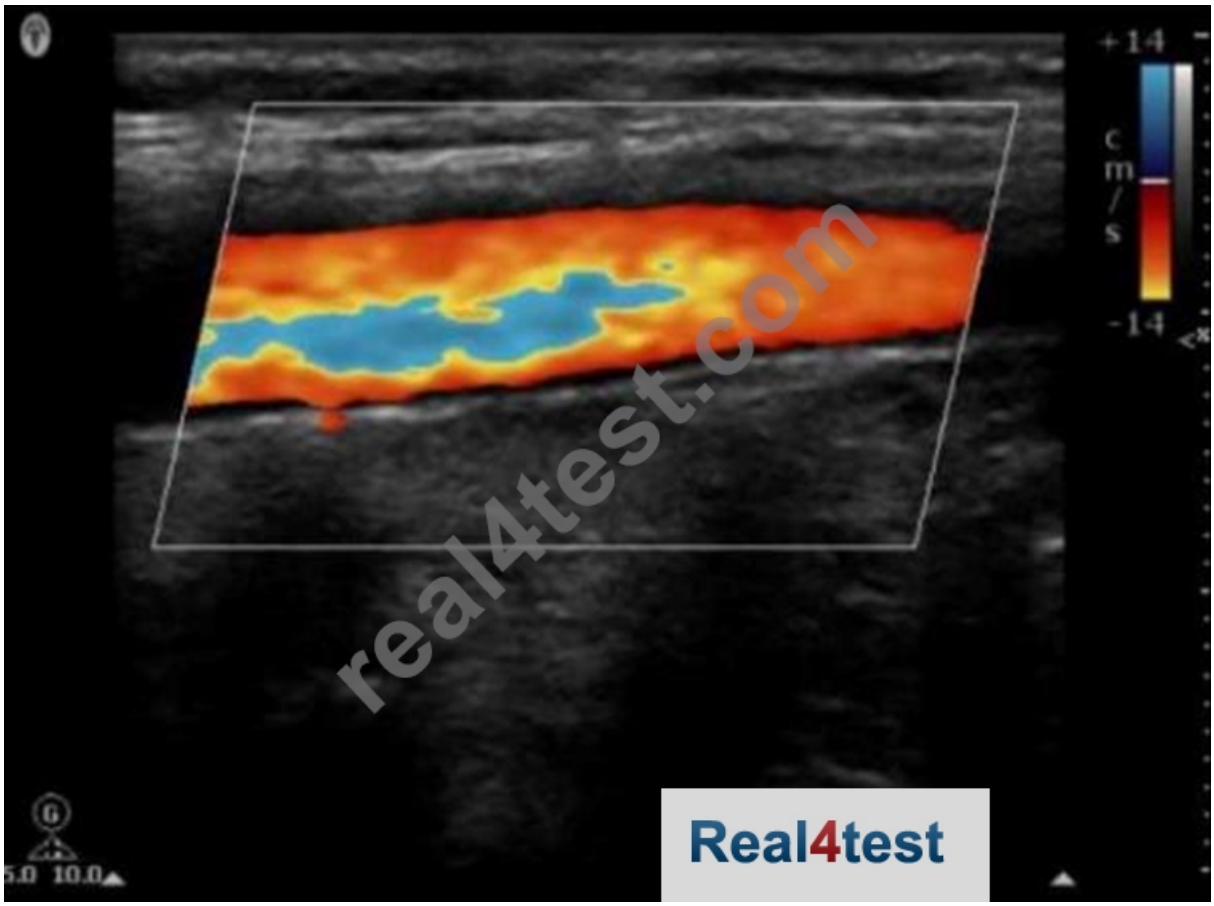
ARDMS Sonography Principles and Instrumentation Sample Questions (Q11-Q16):

NEW QUESTION # 11
Which pulsed-wave Doppler adjustment would be appropriate to correct the aliasing seen in this image?



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

Answer: B

Explanation:
Comprehensive and Detailed Explanation From Exact Extract:
Aliasing occurs in pulsed-wave Doppler imaging when the Doppler shift frequency exceeds the Nyquist limit (which is half the pulse repetition frequency, PRF). This results in a wrap-around of the Doppler signal, which appears as a reversal of flow direction (aliasing artifact).
According to standard Principles and Instrumentation references in sonography:
"To eliminate aliasing, the Doppler PRF (scale) should be increased. Increasing the PRF raises the Nyquist limit and therefore allows for higher measurable velocities without aliasing." The correct adjustment to correct this aliasing artifact is C: Increase the Doppler pulse repetition frequency. This effectively increases the Nyquist limit and resolves the wrap-around aliasing appearance.
Options A and B (adjusting the spectral Doppler gain) would only change the appearance of the Doppler waveform (i.e., its amplitude and brightness) but would not affect aliasing. Option D (decreasing the PRF) would actually worsen the aliasing by lowering the Nyquist limit.
Therefore, the correct choice is to increase the Doppler PRF.

NEW QUESTION # 12
Which artifact is caused by defects in the crystals of the transducer?

- A. Dropout
- B. Side lobe
- C. Ringdown
- D. Mirror image

Answer: A

Explanation:
Comprehensive and Detailed Explanation From Exact Extract:
Defects in transducer crystals result in missing or weakened signals along the beam path produced by those elements, creating dropout. In array transducers, dropout typically appears as vertical or horizontal dark zones depending on which elements are affected.
According to sonography instrumentation reference:
"Crystal failure results in areas of signal dropout directly beneath the defective elements due to loss of transmitted or received signals." Therefore, the correct answer is D: Dropout.
-

NEW QUESTION # 13
Which action would increase the frame rate?

- A. Increasing the number of lines per frame
- B. Decreasing the logarithmic compression
- C. Increasing the sector width
- D. Decreasing the number of focal zones

Answer: D

Explanation:
The frame rate in ultrasound imaging is influenced by several factors, including the number of focal zones. Each focal zone requires additional transmission and reception cycles, thus decreasing the frame rate. By decreasing the number of focal zones, the system requires fewer cycles per frame, which increases the frame rate. This enhances the temporal resolution, making it easier to capture fast-moving structures in real-time imaging.
Reference:
ARDMS Sonography Principles & Instrumentation Guidelines
Hagen-Ansert SL. Textbook of Diagnostic Ultrasonography. 8th ed. St. Louis, MO: Mosby; 2017.

NEW QUESTION # 14
In addition to velocity, which factor affects acoustic impedance?

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

Answer: D

Explanation:
Comprehensive and Detailed Explanation From Exact Extract:
Acoustic impedance (Z) is determined by the product of tissue density (#) and propagation speed (c), expressed as:
$Z = \# \times c$
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.
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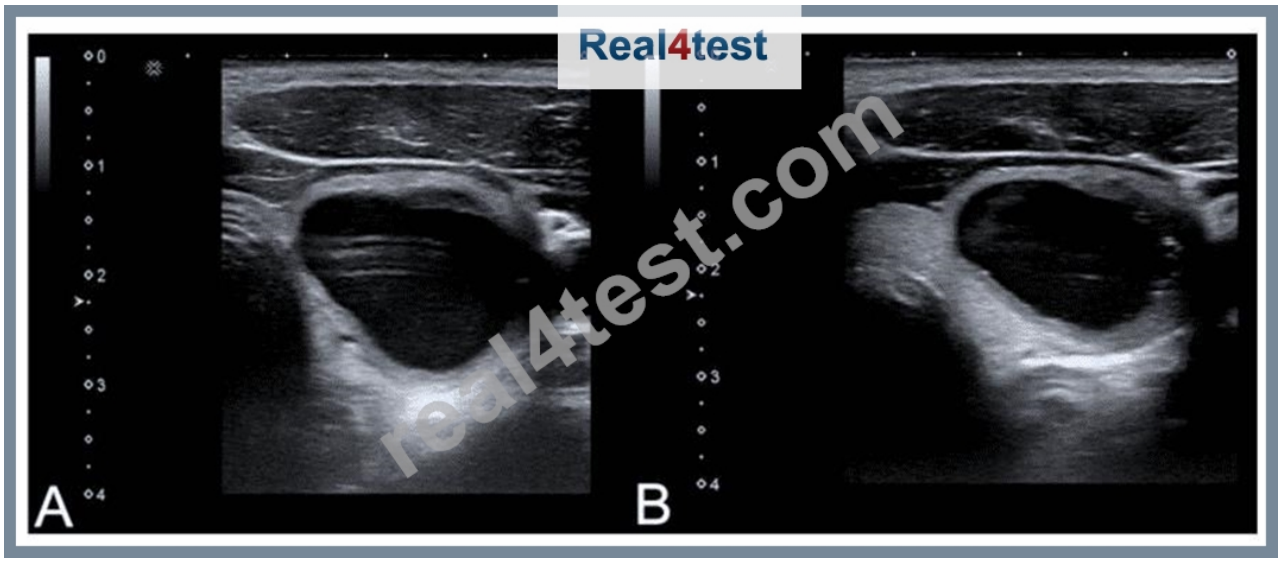
NEW QUESTION # 15
Which adjustment will reduce the artifact in the cystic lesion in image A resulting in image B?



- A. Increase dynamic range
- B. Turn off harmonics
- C. Turn on edge enhancement

Answer: C

Explanation:
* Edge enhancement is a processing technique used in ultrasound imaging to improve the visibility of the edges of structures.
* In image A, the borders of the cystic lesion might appear less defined due to a lack of edge enhancement.
* By turning on edge enhancement, the ultrasound system processes the image to accentuate the boundaries, leading to a clearer and more distinct outline of the cystic lesion as seen in image B.
* This adjustment reduces the artifact within the cystic lesion by emphasizing the differences in the adjacent tissue interfaces, thus improving the overall image quality.References:
* American Registry for Diagnostic Medical Sonography (ARDMS) Sonography Principles and Instrumentation guidelines on image optimization techniques.

NEW QUESTION # 16
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