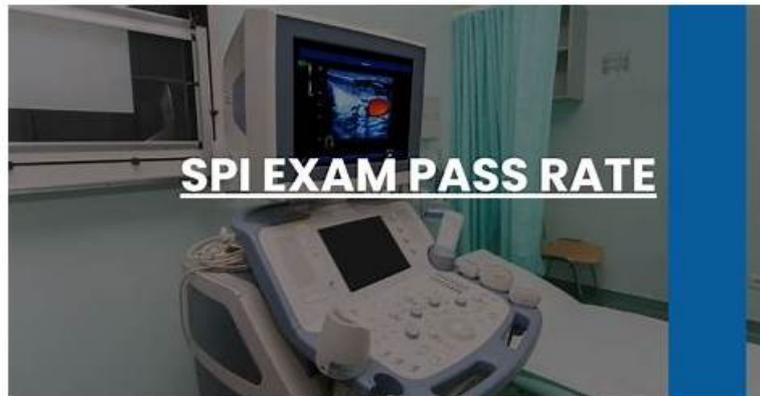


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ARDMS SPI Exam Syllabus Topics:

| 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 and 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"> • 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 3 | <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 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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ARDMS Sonography Principles and Instrumentation Sample Questions (Q45-Q50):

NEW QUESTION # 45

Which component of a contrast agent causes a marked mismatch in impedance between the agent and blood?

- A. Viscous liquid
- **B. Gas**
- C. Serous liquid
- D. Solid

Answer: B

Explanation:

Contrast agents used in ultrasound imaging typically consist of microbubbles filled with gas. The significant mismatch in acoustic impedance between the gas in the microbubbles and the surrounding blood creates strong reflectors of the ultrasound waves, enhancing the echogenicity of blood and improving the visibility of blood flow and tissue perfusion. The high contrast provided by the gas-filled microbubbles makes them particularly effective as ultrasound contrast agents.

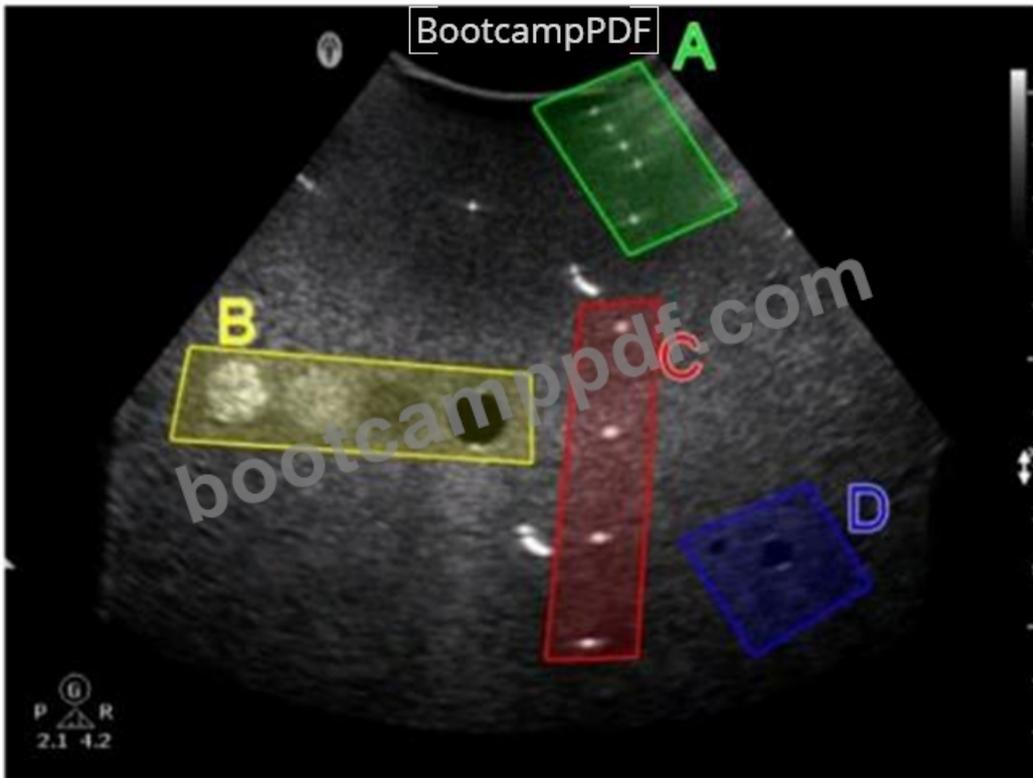
References:

ARDMS Sonography Principles & Instrumentation Guidelines

Kremkau FW. Sonography Principles and Instruments. 9th ed. Philadelphia, PA: Elsevier; 2016.

NEW QUESTION # 46

Which target group in this image of a tissue-mimicking phantom is used for gray-scale evaluation?



- A. Option D
- B. Option A
- C. Option C
- D. Option B

Answer: C

Explanation:

Gray-scale evaluation in a tissue-mimicking phantom involves assessing the uniformity and accuracy of the gray-scale representation of the tissues.

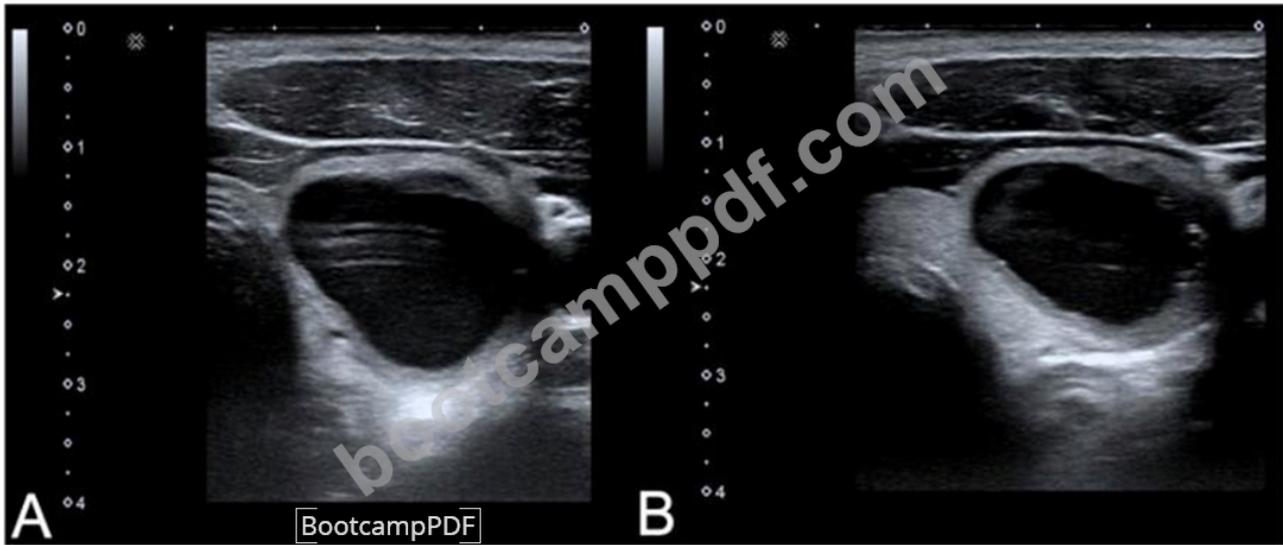
Option C typically contains structures designed to test the machine's ability to accurately depict varying levels of echogenicity, which is essential for proper gray-scale evaluation.

This area will have a range of echo intensities that help in determining the contrast resolution and the ability of the system to distinguish between different tissue types based on their gray-scale values. Reference:

ARDMS Sonography Principles and Instrumentation guidelines on tissue-mimicking phantoms and image quality evaluation.

NEW QUESTION # 47

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.

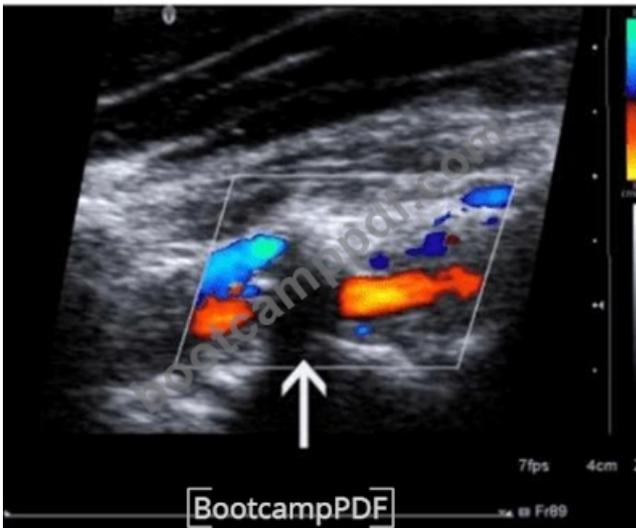
This adjustment reduces the artifact within the cystic lesion by emphasizing the differences in the adjacent tissue interfaces, thus improving the overall image quality. Reference:

American Registry for Diagnostic Medical Sonography (ARDMS) Sonography Principles and Instrumentation guidelines on image optimization techniques.

NEW QUESTION # 48

Which artifact is demonstrated by the arrow in this image?

A close-up of an ultrasound Description automatically generated



- A. Mirroring
- B. Noise
- C. Shadowing
- D. Enhancement

Answer: C

Explanation:

Comprehensive and Detailed Explanation From Exact Extract:

The image shows an area of signal dropout directly deep to the strongly reflecting structure (likely a vessel wall or calcification), indicated by the arrow. This is a classic example of shadowing artifact.

According to sonography Principles and Instrumentation:

"Shadowing occurs when a highly attenuating or reflective structure blocks the ultrasound beam, resulting in absence of signal distal to the object."

* Mirroring (A) produces duplicated structures.

* Noise (B) appears as random speckles.

* Enhancement (D) produces increased echogenicity distal to an anechoic structure.

Therefore, the correct answer is C: Shadowing.

-

NEW QUESTION # 49

"Sensitivity represents the proportion of actual positive cases correctly identified by the test." Therefore, the correct answer is B: 32/35.

At what Doppler angle to flow is the maximum Doppler shift frequency acquired?

- A. 90 degrees
- B. 60 degrees
- C. 0 degrees
- D. 30 degrees

Answer: C

Explanation:

Comprehensive and Detailed Explanation From Exact Extract:

The Doppler equation shows that the frequency shift is proportional to the cosine of the Doppler angle. The maximum value of cosine ($\cos 0^\circ = 1$) occurs at 0 degrees - meaning the beam is parallel to flow. At this angle, the full velocity component is measured.

According to sonography instrumentation reference:

"The maximum Doppler shift is obtained when the ultrasound beam is parallel (0 degrees) to blood flow." Therefore, the correct answer is D: 0 degrees.

NEW QUESTION # 50

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