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ARDMS Sonography Principles and Instrumentation Sample Questions (Q112-Q117):

NEW QUESTION # 112

Which change can be made in order to avoid exceeding the Nyquist limit?

- A. Decrease output power
- B. Increase output power
- C. Decrease pulse repetition frequency
- **D. Increase pulse repetition frequency**

Answer: D

Explanation:

To avoid exceeding the Nyquist limit and prevent aliasing in Doppler ultrasound, the pulse repetition frequency (PRF) should be increased. The Nyquist limit is half of the PRF, so by increasing the PRF, the Nyquist limit is raised, allowing the system to accurately measure higher velocities without encountering aliasing artifacts.

ARDMS Sonography Principles and Instrumentation guidelines

Zwiebel, W. J., & Pellerito, J. S. (2017). Introduction to Vascular Ultrasonography. Elsevier.

NEW QUESTION # 113

A Doppler shift is 10,000 Hz at an angle of flow of 60 degrees. What is the Doppler shift at 0 degrees?

- A. 5,000 Hz
- B. 2,500 Hz
- C. 10,000 Hz
- D. 20,000 Hz

Answer: D

Explanation:

depends on the angle between the ultrasound beam and the direction of blood flow. The Doppler equation includes a cosine function of the angle of insonation (θ). At 60 degrees, the cosine is 0.5, and at 0 degrees (parallel to the flow), the cosine is 1. Thus, if the Doppler shift is 10,000 Hz at 60 degrees, it would double to 20,000 Hz at 0 degrees because the cosine of 0 degrees is 1 ($\cos(0^\circ) = 1$) and the cosine of 60 degrees is 0.5 ($\cos(60^\circ) = 0.5$). The formula is: Doppler shift at 0 degrees = Doppler shift at 60 degrees / $\cos(60 \text{ degrees}) = 10,000 \text{ Hz} / 0.5 = 20,000 \text{ Hz}$.

Reference: ARDMS Sonography Principles and Instrumentation (SPI) Review, Doppler Shift and Angle of Insonation section.

NEW QUESTION # 114

The calipers in this image measure which performance characteristic of a system?



- A. Lateral resolution
- B. Dynamic range
- C. Axial resolution
- D. Depth measurement accuracy

Answer: D

Explanation:

The calipers shown in the image are used to measure the depth of structures within the ultrasound image. This performance characteristic, known as depth measurement accuracy, assesses how accurately the ultrasound system can measure the distance from the transducer to a specific point within the body. Accurate depth measurements are crucial for diagnostic purposes, ensuring that anatomical and pathological structures are correctly identified and evaluated.

Reference:

American Registry for Diagnostic Medical Sonography (ARDMS) Sonography Principles and Instrumentation study materials.
Textbook of Diagnostic Sonography by Hagen-Ansert, S. L. (latest edition).

NEW QUESTION # 115

Which setting can be increased to correct for clutter artifact when using pulsed-wave Doppler?

- A. Doppler gain
- B. Sample volume
- C. Pulse repetition frequency (PRF)
- D. Wall filter

Answer: D

Explanation:

The wall filter, also known as the high-pass filter, is used in Doppler ultrasound to remove low-frequency signals, which are typically associated with clutter artifacts. Clutter artifacts can be caused by tissue motion or vessel wall movement, and they appear as low-frequency signals that can obscure the desired blood flow signals. By increasing the wall filter setting, these low-frequency signals are filtered out, thus reducing the clutter artifact and providing a clearer depiction of the blood flow.

Reference:

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

NEW QUESTION # 116

Which settings will lead to the highest temporal resolution?

- A. 45-degree sector width, 4 cm scan depth, color Doppler off
- B. 60-degree sector width, 5 cm scan depth, color Doppler off
- C. 60-degree sector width, 5 cm scan depth, color Doppler on
- D. 45-degree sector width, 4 cm scan depth, color Doppler on

Answer: A

Explanation:

The settings that lead to the highest temporal resolution are those that reduce the amount of information that the ultrasound system needs to process, allowing for a higher frame rate. A smaller sector width and shallower scan depth reduce the area that needs to be imaged, enabling faster data acquisition. Turning off color Doppler further reduces processing demands, as the system no longer needs to compute and display color flow information. Therefore, a 45-degree sector width, 4 cm scan depth, and color Doppler off will provide the highest temporal resolution.

References

* ARDMS Sonography Principles and Instrumentation (SPI) Exam Study Guide

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

NEW QUESTION # 117

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