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**Sonography Principles &
Instrumentation Examination (ARDMS
SPI) | Latest Update 2026/2027 |
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A+!!!!|**

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

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ARDMS SPI Exam Syllabus Topics:

Section	Weight	Objectives

Topic 1: Physical Principles	20%	- Sound Interactions with Tissue • 1. Attenuation • 2. Absorption • 3. Reflection • 4. Scattering • 5. Refraction - Sound Wave Characteristics • 1. Wavelength, frequency, period • 2. Amplitude and intensity • 3. Propagation speed - Acoustic Variables • 1. Pressure, density, distance
Topic 2: Ultrasound Transducers	20%	- Beam Properties • 1. Near zone (Fresnel zone) • 2. Focusing • 3. Far zone (Fraunhofer zone) - Transducer Construction • 1. Backing material • 2. Piezoelectric elements • 3. Matching layer • 4. Acoustic lens - Transducer Types • 1. Phased array • 2. Curved/convex array • 3. Linear array • 4. Endocavitary transducers
Topic 3: Quality Assurance and Safety	20%	- Quality Assurance Testing • 1. System performance evaluation • 2. Phantom testing • 3. Preventive maintenance - Patient and Operator Safety • 1. Ergonomics • 2. Electrical safety • 3. Infection control - ALARA Principle • 1. As Low As Reasonably Achievable • 2. Output display standards - Bioeffects • 1. Thermal effects • 2. Mechanical effects (cavitation, MI, TI)

Topic 4: Pulse-Echo Instrumentation	20%	- System Controls • 1. Dynamic range • 2. Reject • 3. Gain (TGC, overall gain) • 4. Output power - Display and Storage • 1. Monitor display • 2. Image storage formats • 3. Cineloop - Image Formation • 1. Frame rate • 2. Scan lines • 3. Pre-processing and post-processing
Topic 5: Doppler Instrumentation	20%	- Doppler Modalities • 1. Power Doppler • 2. Pulsed wave Doppler • 3. Continuous wave Doppler • 4. Color flow imaging - Doppler Parameters and Artifacts • 1. Wall filter • 2. Doppler artifacts (aliasing, flash artifact) • 3. PRF, Nyquist limit - Doppler Physics • 1. Angle dependence (Doppler angle) • 2. Doppler equation • 3. Doppler effect and frequency shift

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ARDMS Sonography Principles and Instrumentation Sample Questions (Q163-Q168):

NEW QUESTION # 163

Which type of resolution will be improved by decreasing the depth of field?

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

Answer: B

Explanation:

Lateral resolution refers to the ability to distinguish two structures that are side by side. It is dependent on the width of the ultrasound beam. By decreasing the depth of field, the beam width is reduced at any given point along the depth, which improves the lateral resolution. This is because a narrower beam can better distinguish between objects that are close together laterally.

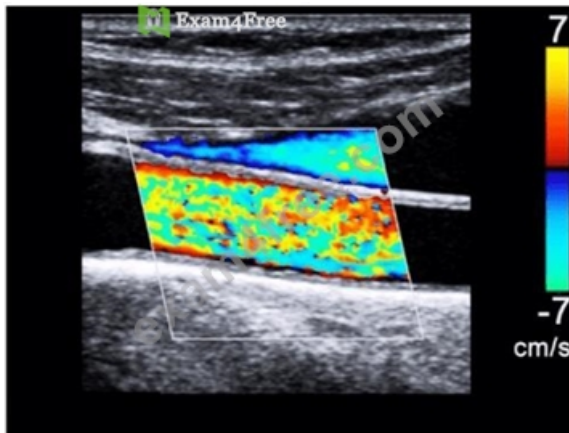
Reference:

ARDMS Sonography Principles and Instrumentation guidelines

Krenkau, F. W. (2015). Diagnostic Ultrasound: Principles and Instruments.

NEW QUESTION # 164

What adjustment is needed to optimize the color in the image below?



- A. Decrease persistence
- **B. Increase pulse repetition frequency**
- C. Decrease gain
- D. Increase wall filter

Answer: B

Explanation:

* Increasing the pulse repetition frequency (PRF) helps to optimize the color Doppler imaging by reducing aliasing.

* Aliasing occurs when the PRF is too low to accurately sample the rapid blood flow velocities, leading to incorrect color representation.

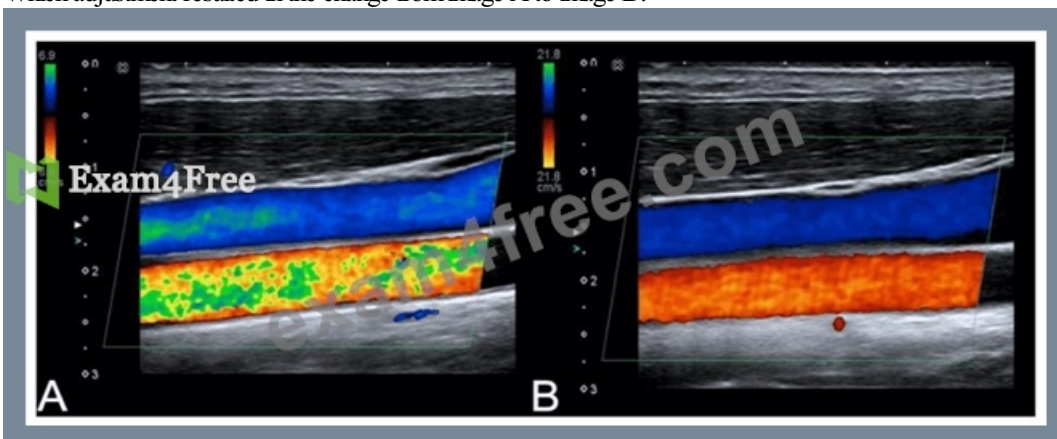
* By increasing the PRF, the system can more accurately measure higher velocities without distortion, improving the overall quality of the color Doppler image.

References:

* ARDMS Sonography Principles and Instrumentation guidelines on Doppler imaging and techniques to reduce aliasing.

NEW QUESTION # 165

Which adjustment resulted in the change from image A to image B?



- A. Increased transmit frequency
- **B. Increased scale**

- C. Decreased acoustic power
- **D. Decreased color gain**

Answer: D

Explanation:

* Increased Transmit Frequency: This would generally improve the resolution of the image but does not directly correlate to the changes seen in the provided image link.

* Increased Scale: Adjusting the scale changes the velocity range displayed but does not directly affect the speckle or noise reduction.

* Decreased Color Gain: Reducing the color gain can decrease the amount of color noise, making the blood flow regions more defined, which aligns with the change observed from image A to image B.

* Decreased Acoustic Power: This reduces the overall intensity of the ultrasound beam, affecting penetration depth and overall brightness but is less likely to result in the specific improvements seen.

References:

"Understanding Ultrasound Physics" by Sidney K. Edelman

ARDMS Sonography Principles and Instrumentation study materials

NEW QUESTION # 166

Which describes the reflected frequency when a reflector is moving toward the sound source?

- A. Attenuated
- B. Decreased
- **C. Increased**
- D. Unchanged

Answer: C

Explanation:

When a reflector (such as red blood cells) is moving toward the sound source, the frequency of the reflected sound waves increases. This phenomenon is known as the Doppler effect. The frequency shift occurs because the motion of the reflector compresses the sound waves, leading to a higher frequency than the emitted frequency. This increased frequency is what the Doppler ultrasound system detects and uses to calculate the velocity of the moving reflector.

ARDMS Sonography Principles and Instrumentation guidelines

Hoskins, P. R., Thrush, A., Martin, K., & Whittingham, T. A. (2010). Diagnostic Ultrasound: Physics and Equipment.

NEW QUESTION # 167

Which change improves temporal resolution during color flow imaging?

- A. Decrease transmit frequency
- B. Increase line density
- C. Increase field of view
- **D. Decrease packet size**

Answer: D

Explanation:

Temporal resolution is improved by increasing the frame rate. One way to increase the frame rate is by decreasing the packet size (also known as ensemble length) in color Doppler imaging. The packet size refers to the number of pulses used to determine the Doppler shift at each location. A smaller packet size means fewer pulses are required, which allows for quicker data acquisition and thus a higher frame rate. Increasing the field of view, decreasing transmit frequency, and increasing line density would all decrease the frame rate and thus degrade temporal resolution.

References:

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

NEW QUESTION # 168

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