

MULTIPLE CHOICE

HARMONICS & CONTRAST - PRACTICE SET - ANSWER KEY

PROPOSED FOR REVIEW - questions are the author's verbatim Q&A; distractors are auto-selected from other answers in the same bank and must be checked by a subject-matter reviewer (a distractor could coincidentally be correct). Not authoritative assessment content.

1. Where do harmonic frequency sound waves arise from?

- A. Linear behavior
- B. Specular reflection only
- C. Digital scan conversion
- D. Nonlinear behavior**

2. How is the production of contrast harmonics estimated?

- A. Dynamic range
- B. Pulse repetition frequency (PRF)
- C. Thermal index (TI)
- D. Mechanical index (MI)**

3. Where are tissue harmonics primarily created?

- A. Shallow tissues
- B. Deep tissues**
- C. Inside the transducer
- D. Inside the scan converter

4. What is transmitted frequency called?

- A. Fundamental frequency**
- B. Resonant frequency
- C. Doppler frequency
- D. Harmonic frequency

5. What does the term linear mean?

- A. Random, scattered, or noisy
- B. Proportional, symmetrical, or even**
- C. Compressed, narrowed, or filtered
- D. Irregular, uneven, or disproportionate

6. True or False? Harmonic frequency is three times the transmitted frequency.

- A. True
- B. False**

7. What happens to microbubbles when they are exposed to high pressure?

- A. They remain the same size and pressure
- B. They shrink and internal pressure increases within the bubble**
- C. They expand and internal pressure decreases within the bubble
- D. They convert the sound wave into an electrical signal

8. What term describes the uneven changes in the size of microbubbles when exposed to a sound beam?

- A. Attenuation
- B. Resonance**
- C. Refraction
- D. Demodulation

9. What happens to mechanical index when pressure is lower and frequency is higher?

- A. Lower MI**

- B. Higher thermal index
- C. Unchanged MI
- D. Higher MI

10. What kind of reflections do contrast agents create?

- A. Only specular reflections
- B. Weak reflections
- C. No reflections
- D. Strong reflections**

11. Do harmonic frequency waves undergo more, less, or the same distortion as fundamental sound waves?

- A. More distortion
- B. Less distortion**
- C. The same distortion
- D. Complete distortion

12. What happens to mechanical index when pressure is higher and frequency is lower?

- A. Higher MI**
- B. Lower thermal index
- C. Lower MI
- D. Unchanged MI

13. What are the two forms of harmonics?

- A. Read and write harmonics
- B. Tissue and contrast harmonics**
- C. Analog and digital harmonics
- D. Axial and lateral harmonics

14. What is the creation of an image from sound reflections twice the frequency of the transmitted sound called?

- A. Pulse inversion
- B. Fundamental imaging
- C. Harmonic imaging**
- D. Contrast resolution

15. What happens to microbubbles when they are exposed to low pressure?

- A. They shrink
- B. They expand**
- C. They calcify
- D. They become piezoelectric

16. Compared with shrinking, how do microbubbles change size during nonlinear oscillation?

- A. They expand more than they shrink**
- B. They shrink more than they expand
- C. They do not change size
- D. They expand and shrink equally

17. What does the term nonlinear behavior mean?

- A. Binary, digital, or discrete
- B. Archived, stored, or displayed
- C. Proportional, symmetrical, or even
- D. Irregular, uneven, or disproportionate**

18. What are the five requirements contrast agents must meet?

- A. Long-lasting, safe, metabolically inert, strong reflectors of ultrasound, and small**
- B. Safe, metabolically inert, strong reflectors, large, and short-lasting
- C. Long-lasting, safe, metabolically active, weak reflectors, and large
- D. Short-lasting, toxic, metabolically active, weak reflectors, and large

19. What does the mechanical index depend upon?

- A. Image depth and sector width
- B. Frequency of transmitted sound and pressure of the sound wave**
- C. Receiver gain and dynamic range
- D. Pulse repetition frequency and wall filter

20. What are tissue harmonics created by?

- A. Specular reflection from a flat interface
- B. Linear attenuation of the sound beam
- C. Nonlinear behavior in the speed of sound**
- D. Aliasing of the Doppler signal

21. Does fundamental frequency have more, less, or the same frequency as transmitted sound?

- A. More frequency
- B. Same frequency**
- C. Less frequency
- D. Twice the frequency

22. When are contrast harmonics created?

- A. During PACS archiving
- B. During reflection**
- C. During digital storage
- D. During transmission only

23. Which mechanical index level is associated with bubble disruption?

- A. Low MI
- B. Zero MI
- C. Postprocessing MI
- D. High MI**

24. What is another term for contrast agents?

- A. Microbubbles**
- B. Harmonic mirrors
- C. Speckle reducers
- D. Digital pixels

25. What are gas bubbles trapped in a shell that can be ingested or injected intravenously?

- A. Contrast agents (microbubbles)**
- B. Piezoelectric crystals
- C. Tissue harmonics
- D. Reverberation artifacts