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39	A	B	C	D	E

PRACTICE QUESTIONS

International Board of Magnetic Resonance Safety

MRSOU

Magnetic Resonance Safety Officer (Int'l)

EDITION

Demo

QUESTIONS

9

FORMAT

Limited Edition PDF

Before you begin

What this is

9 practice questions for International Board of Magnetic Resonance Safety **MRSOU**, each with its answer key and an explanation. Answer a question before you read its key — the explanation is worth more once you have committed.

If something looks wrong

Send us three things and we will check it:

- the exam code, **MRSOU**
- the question number
- the email address on your order

Write to **support@mometrix.net**. We reply within one business day.

QUESTION 1

SINGLE CHOICE

Which of the following best describes why ferromagnetic objects can become projectiles in the MR environment?

- ☐ A The RF transmit field induces strong currents that heat metallic objects.
- ☒ B The static magnetic field exerts a translational force on ferromagnetic materials, attracting them toward the bore.
- ☐ C Gradient magnetic field switching causes eddy currents that physically pull metallic implants into the bore.
- ☐ D Cryogenic helium boil-off creates suction that draws loose objects into the magnet room.

ANSWER B

WHY Ferromagnetic objects experience a translational force (the missile effect) in the strong spatial gradient of the static magnetic field, pulling them toward the isocenter of the bore. RF heating, gradient eddy currents, and helium-related suction are unrelated mechanisms.

QUESTION 2

SINGLE CHOICE

Which implant-related labeling term provides the most useful information for an MR Safety Officer when determining scanning conditions for an active implanted device?

- ☐ A Manufacture date of the device.
- ☒ B MR Conditional, with the specific test conditions stated in the device labeling.
- ☐ C Latex-free construction.
- ☐ D Battery type and expected service life.

ANSWER B

WHY For MR Conditional devices, the manufacturer-supplied labeling specifies the exact static field strength, maximum spatial gradient, SAR limits, and other conditions under which scanning is safe. The other choices do not define the safe scanning envelope.

QUESTION 3

SINGLE CHOICE

Specific Absorption Rate (SAR) in MR refers to which quantity?

- ☒ **A** The rate at which RF energy is absorbed per unit mass of tissue, expressed in watts per kilogram.
- ☐ **B** The peak gradient slew rate, expressed in tesla per meter per second.
- ☐ **C** The static magnetic field homogeneity across the imaging volume, expressed in parts per million.
- ☐ **D** The acoustic noise level inside the bore, expressed in decibels.

ANSWER A

WHY SAR quantifies RF power absorbed per kilogram of tissue (W/kg) and is the principal metric used to limit RF-induced heating. The other options describe gradient performance, field homogeneity, and acoustic noise, respectively.

QUESTION 4

SINGLE CHOICE

During an unplanned quench of a superconducting MR system, what is the most immediate safety concern for personnel inside the scan room?

- ☐ **A** Damage to the gradient amplifiers from the induced eddy currents.
- ☒ **B** Asphyxiation and cold burn risk from the rapid release of cryogenic helium gas.
- ☐ **C** Permanent magnetization of nearby ferrous tools.
- ☐ **D** Loss of all patient images stored on the console.

ANSWER B

WHY An unplanned quench releases large volumes of cold helium vapor that displace oxygen and can cause cold burns; immediate evacuation and ventilation are required. Gradient hardware, tool magnetization, and image storage are not the primary life-safety hazards.

QUESTION 5

SINGLE CHOICE

The loud knocking sounds produced during an MR scan are primarily caused by which mechanism?

- ☐ A Cooling fans circulating cryogenic helium.
- ☒ B Rapid switching of gradient magnetic fields within the static field (Lorentz forces).
- ☐ C Patient respiration coupled to microphone preamps.
- ☐ D RF coil detuning during transmit.

ANSWER B

WHY Gradient coils experience Lorentz forces when current flows through them inside the static magnetic field; rapid switching produces vibrations and acoustic noise. Hearing protection is therefore required for patients and any personnel remaining in the room during scanning.

QUESTION 6

SINGLE CHOICE

In the four-zone model used for MR site safety, Zone IV is best described as:

- ☐ A The publicly accessible waiting area outside the MR suite.
- ☐ B The control room and reception area where screening is initiated.
- ☐ C The area immediately outside the scan room door, where fringe fields may still be significant.
- ☒ D The MR scan room itself, where the static field is always present.

ANSWER D

WHY Zone IV is the scan room containing the magnet; access is restricted to screened individuals and trained personnel because the static magnetic field is always on. Zone III is the area just outside the scan room, Zone II is reception/screening, and Zone I is freely accessible public space.

QUESTION 7

SINGLE CHOICE

According to published MR safety guidance, what is the recommended practice for a pregnant MR Technologist working in the scan room during her first trimester?

- ☐ A Continue all duties without restriction because occupational MR exposure is unregulated.
- ☒ B Remove herself from the scan room during scanning and from Zone III during the remainder of pregnancy, per the conservative ALARA practice.
- ☐ C Wear a lead apron inside the scan room to shield the fetus from RF energy.
- ☐ D Only avoid scanning patients labeled as MR Unsafe; otherwise normal duties are permitted.

ANSWER B

WHY Current MR safety guidelines advise pregnant MR personnel to remain outside Zone III (and especially Zone IV) for the remainder of pregnancy as a conservative ALARA measure. A lead apron does not protect against the static or gradient fields, and occupational exposure is not formally regulated by numeric limits.

QUESTION 8

SINGLE CHOICE

An implant labeled 'MR Conditional' means which of the following?

- ☐ A The implant poses no known hazards in any MR environment.
- ☒ B The implant has been demonstrated to pose no known hazards in a specified MR environment with defined conditions of use.
- ☐ C The implant is safe only at field strengths below 0.5 T.
- ☐ D The implant is unsafe in all MR environments and scanning is contraindicated.

ANSWER B

WHY Per the ASTM terminology referenced by the MRSO curriculum, 'MR Conditional' indicates safety only under documented conditions (field strength, gradient, SAR, etc.). 'MR Safe' means no known hazards in any MR environment, and 'MR Unsafe' means a contraindication to the MR environment.

QUESTION 9

SINGLE CHOICE

Which of the following patient findings is most relevant when screening for risk of nephrogenic systemic fibrosis (NSF) prior to administering a gadolinium-based contrast agent?

- ☐ A History of prior CT with iodinated contrast.
- ☒ B Severe or end-stage renal impairment (low eGFR), particularly in patients on dialysis.
- ☐ C Documented shellfish allergy.
- ☐ D Patient weight exceeding 150 kg.

ANSWER B

WHY NSF risk is strongly associated with impaired renal function (especially eGFR < 30 mL/min/1.73 m² and dialysis-dependent patients) and the type/stability of the GBCA. Shellfish allergy, prior iodinated contrast, and body habitus are not established NSF risk factors.