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PRACTICE QUESTIONS

International Board of Magnetic Resonance Safety

MRSEU

Magnetic Resonance Safety Expert (Int'l)

EDITION	QUESTIONS	FORMAT
Demo	9	Limited Edition PDF

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Before you begin

What this is

9 practice questions for International Board of Magnetic Resonance Safety `MRSEU`, 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, `MRSEU`
- the question number
- the email address on your order

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

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QUESTION 1 SINGLE CHOICE

An MR Safety Expert is screening a patient with an implanted spinal cord stimulator (SCS) that the manufacturer has labeled 'MR Conditional.' According to the standard labeling terminology used by MR Safety Experts (derived from ASTM F2503 and recognized by the International Society for Magnetic Resonance in Medicine), what does 'MR Conditional' specifically require the user to verify before the scan?

A The implant has been tested and approved for ANY MRI scan, including all field strengths, coils, and SAR levels

B The implant has been demonstrated to pose no known hazards in a specific MR environment, with defined conditions of use that must be followed

C The implant has demonstrated no magnetic field interactions but may have thermal risks at any field strength

D The implant is safe only at 1.5 T and requires no further parameter verification

ANSWER B

WHY MR Conditional (per ASTM F2503) means the item has been demonstrated to pose no known hazards in a defined MR environment with specific conditions of use. The MR Safety Expert must verify that the scan parameters (field strength, maximum spatial gradient, B1+rms or SAR, scan duration, etc.) fall within those labeled conditions. Option A describes MR Safe (not Conditional). Option C describes an outdated 'MR Unsafe' concept. Option D incorrectly restricts to 1.5 T.

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QUESTION 2 SINGLE CHOICE

In a clinical MR facility, which of the following is the primary responsibility of the MR Medical Director (also referred to as the Level 2 MR personnel medical director)?

A Operating the MR scanner and acquiring clinical images for each patient

B **Ensuring that MR safety policies and procedures are established, implemented, and maintained for the safety of patients, staff, and visitors**

C Performing routine RF coil maintenance and phantom-based QC imaging

D Scheduling MRI appointments and verifying insurance authorization

ANSWER B

WHY The MR Medical Director is responsible for establishing, implementing, and maintaining MR safety policies and procedures, including oversight of the safety program. Operating the scanner (A) is the role of MR technologists (Level 2 personnel) under supervision. RF coil maintenance and QC (C) are operational/quality tasks typically delegated to technologists, physicists, or service engineers. Insurance/appointment scheduling (D) is administrative and not the medical director's safety responsibility.

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QUESTION 3 SINGLE CHOICE

A patient is referred for an MRI at 3 T and has a small ferromagnetic aneurysm clip of unknown composition. The MR Safety Expert is concerned primarily about which physical interaction when determining whether the scan can be performed?

A RF-induced heating of the clip leading to thermal burns at the implant site

B Gradient-induced peripheral nerve stimulation

C Magnetically induced displacement force (translational attraction) and torque of the ferromagnetic clip

D Acoustic noise exposure to the patient

ANSWER C

WHY A ferromagnetic aneurysm clip poses two main risks: (1) translational force (projectile/displacement) in the strong static field, and (2) rotational torque that can align or rotate the clip, which is particularly dangerous for intracranial aneurysm clips because movement could disrupt the aneurysm. RF heating (A) is more relevant for elongated conductive implants such as leads. Gradient PNS (B) is a patient sensation issue, not an implant risk. Acoustic noise (D) is a general scan consideration, not the primary concern with a ferromagnetic implant.

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QUESTION 4 SINGLE CHOICE

What is the direct physiological concern that the Specific Absorption Rate (SAR) limit is intended to prevent during an MRI exam?

A Magnetically induced vertigo and metallic taste caused by gradient switching

B Excessive conversion of RF energy to heat in the patient's tissues, leading to increased core body temperature and thermal stress

C Mechanical vibration of ferromagnetic implants within the patient

D Acoustic injury to the patient's cochlea

ANSWER B

WHY SAR quantifies the rate at which RF energy is absorbed per unit mass of tissue and is used to limit RF-induced tissue heating and the resulting rise in core body temperature. Magnetically induced vertigo/metallic taste (A) relates to gradient or movement in the static field. Mechanical vibration of implants (C) relates to gradient/field interactions. Acoustic injury (D) is mitigated via ear protection, not SAR.

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QUESTION 5 SINGLE CHOICE

An anesthetized patient requires continuous mechanical ventilation and invasive arterial pressure monitoring during an MRI at 1.5 T. Which statement best describes the MR Safety Expert's guidance regarding this equipment?

A Standard ICU ventilators and pressure transducers may be used in zone IV as long as the patient is monitored visually through the window

B **Only equipment explicitly labeled MR Safe or MR Conditional for the specific field strength and conditions may be brought into zone IV, with the conditional parameters verified**

C All battery-powered ICU equipment is automatically safe in the MR scanner room

D Equipment only needs to be tested for projectile risk; heating and functional interference are irrelevant once inside the room

ANSWER **B**

WHY Per MR safety guidelines (e.g., ACR Manual on MR Safety), equipment brought into Zone IV must be MR Safe or MR Conditional, and the conditional parameters (e.g., maximum field strength, SAR/spatial gradient limits) must be verified and adhered to. Standard ICU equipment is frequently NOT MR safe and can become projectiles or malfunction near the scanner. Battery power alone (C) does not ensure MR safety. Functional interference and heating (D) are critical concerns, not just projectile risk.

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QUESTION 6 SINGLE CHOICE

According to the widely used ACR/SAR zonal framework, which zone represents the area immediately surrounding the bore of the MR scanner, where the static magnetic field is strong enough to pose projectile risks and access is restricted to screened MR personnel only?

A Zone I

B Zone II

C Zone III

D Zone IV

ANSWER D

WHY Zone IV is the MR scanner room itself, where the static field is fully present and the highest-risk environment. Access is strictly limited to screened Level 2 personnel and properly screened patients/escorts. Zone I is the public area outside MR control. Zone II is the interface between public and MR-controlled areas. Zone III is the area immediately outside Zone IV where fringe fields may be significant and access is still restricted.

QUESTION 7 SINGLE CHOICE

Which of the following physiologic effects is directly attributable to the strong static magnetic field (B0) and is a recognized concern for patients undergoing MRI at 3 T?

A RF-induced heating of the lens of the eye

B Magnetohydrodynamic effects on the ECG (e.g., elevated T waves) and possible sensory effects such as vertigo or metallic taste with head movement

C Peripheral nerve stimulation from rapid gradient switching

D Acoustic noise from Lorentz forces on gradient coils

ANSWER B

WHY The strong static field (B0) causes magnetohydrodynamic effects on flowing blood, which can alter the ECG waveform (notably T-wave elevation), and is associated with sensory phenomena such as vertigo, nystagmus, and metallic taste, especially with head motion at higher field strengths. Lens heating (A) is an RF effect. PNS (C) and acoustic noise (D) are gradient-coil effects, not static-field effects.

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QUESTION 8 SINGLE CHOICE

A patient with a large permanent tattoo on the thigh is scheduled for a pelvic MRI at 3 T. From an MR Safety Expert perspective, which statement is most accurate regarding tattoo-related burn risk?

A Tattoos are uniformly contraindicated at any field strength due to guaranteed burns

B Only tattoos performed within the past 24 hours pose any risk

C **Older, healed tattoos can still concentrate RF current and have been associated with thermal injuries, and the area should be assessed and cooled/cold-packs applied or imaging parameters adjusted if the tattoo is in the transmit coil region**

D Tattoo risk only applies to eye makeup, not to skin tattoos

ANSWER C

WHY Healed tattoos can still act as conductive loops or RF current concentrators and have caused reported thermal injuries. Mitigation strategies include applying cold compresses, ensuring no conductive loops are formed, positioning tattoos away from the transmit coil's high-SAR regions, and possibly adjusting sequence parameters. They are not uniformly contraindicated (A). Recent tattoos are higher risk but not the only risk (B). Eye makeup (D) is also a concern but the question is about skin tattoos.

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QUESTION 9 MULTIPLE CHOICE

Which of the following items should appear on a comprehensive MR safety screening form for a patient prior to entering Zone IV? (Choose three.)

A **Presence of any implanted electronic or mechanical devices (e.g., pacemaker, neurostimulator, cochlear implant, programmable shunt)**

B **History of occupational exposure to metal working (e.g., grinding, welding) and possible intraocular or intracorporeal metal fragments**

C Patient's preferred music choice during the scan

D **History of tattoos, permanent makeup, medication patches, and external conductive objects that could form loops with skin contact**

ANSWER **A · B · D**

WHY Implanted devices (A) are central to MR safety screening due to projectile, heating, and electromagnetic interference risks. Occupational metal exposure and possible metallic foreign bodies (B) are screened because retained metallic fragments (e.g., in the eye) are a contraindication. Tattoos, permanent makeup, drug patches, and conductive loops (D) are thermal-burn hazards and must be documented. Music preference (C) is a comfort question, not a safety screening element.

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