

Limited Medical Radiologic Technologists (LMRT) Board Practice Exam (Sample)

Study Guide



Everything you need from our exam experts!

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SAMPLE

Questions

SAMPLE

- 1. As tissue density decreases, photon attenuation will:**
 - A. Decrease**
 - B. Increase**
 - C. Remain the same**
 - D. Become unpredictable**
- 2. How does decreasing the primary beam field size affect scatter radiation reaching the image receptor?**
 - A. Increases amount of scatter radiation**
 - B. Decreases amount of scatter radiation**
 - C. No effect on scatter radiation**
 - D. Increases image quality**
- 3. Which of the following structures are best demonstrated on the lateral projection of the thoracic spine?**
 - A. Intervertebral foramina**
 - B. Zygapophyseal joints**
 - C. Transverse processes**
 - D. Laminae**
- 4. What is meant by "radiologic assessment"?**
 - A. The collection of patient demographic information**
 - B. The evaluation of imaging results to inform diagnosis and treatment**
 - C. The training of radiology interns and residents**
 - D. The procurement of new imaging equipment**
- 5. What is the significance of collimation in radiography?**
 - A. To increase image brightness**
 - B. To reduce patient exposure to radiation**
 - C. To provide better contrast in images**
 - D. To enhance spatial resolution**

- 6. If a generator has a capacity of 1000 milliamperes (mA) and a technique of 20 milliamperes-seconds (mAs), what is the shortest possible exposure time?**
- A. 0.02 seconds**
 - B. 0.2 seconds**
 - C. 50 seconds**
 - D. 5.0 seconds**
- 7. What type of personnel dosimeter uses aluminum oxide as the absorbing material?**
- A. Optically stimulable luminescent dosimeter (OSL)**
 - B. Film badge**
 - C. Thermoluminescent dosimeter (TLD)**
 - D. Pocket dosimeter**
- 8. What is the primary purpose of the aluminum filtration in x-ray tubes?**
- A. To increase image density**
 - B. To reduce scatter radiation**
 - C. To improve patient protection**
 - D. To enhance contrast in images**
- 9. Which anatomical structure is responsible for pumping oxygenated blood into the aorta?**
- A. Right ventricle**
 - B. Left ventricle**
 - C. Right atrium**
 - D. Left atrium**
- 10. What safety measure should be taken before performing an x-ray on a patient?**
- A. Ensure the patient has not eaten**
 - B. Confirm that the patient is not pregnant**
 - C. Assess the patient's history of allergies**
 - D. Verify that radiologic equipment is fully charged**

Answers

SAMPLE

- 1. A**
- 2. B**
- 3. A**
- 4. B**
- 5. B**
- 6. A**
- 7. A**
- 8. C**
- 9. B**
- 10. B**

SAMPLE

Explanations

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1. As tissue density decreases, photon attenuation will:

- A. Decrease**
- B. Increase**
- C. Remain the same**
- D. Become unpredictable**

As tissue density decreases, photon attenuation will decrease. This relationship is based on the concept that denser tissues contain more particles for the photons to interact with, leading to a higher likelihood of absorption or scattering of those photons. When the density of the tissue is lower, there are fewer particles available for these interactions, resulting in a lower rate of attenuation. Photon attenuation refers to the reduction in intensity of the radiation beam as it passes through a material, which can be caused by absorption or scattering. Thus, in tissues with lower density, such as fat compared to muscle or bone, there is less interaction with the photons, leading to decreased attenuation. Understanding this principle helps in comprehending how various tissues affect imaging and radiation dose in radiologic examinations.

2. How does decreasing the primary beam field size affect scatter radiation reaching the image receptor?

- A. Increases amount of scatter radiation**
- B. Decreases amount of scatter radiation**
- C. No effect on scatter radiation**
- D. Increases image quality**

Decreasing the primary beam field size reduces the area of tissue that is irradiated. This limitation on the irradiated area leads to a decrease in the amount of scatter radiation produced. Scatter radiation occurs when the primary beam interacts with matter and deflects off in various directions. When a smaller field size is used, there is less tissue volume for the radiation to penetrate, resulting in less scatter generated. Additionally, since less scatter radiation reaches the image receptor, this can improve image quality by reducing the amount of unwanted radiation that could contribute to fogging or decreased contrast on the image. Therefore, reducing the size of the primary beam effectively decreases the scatter radiation that reaches the image receptor.

3. Which of the following structures are best demonstrated on the lateral projection of the thoracic spine?

- A. Intervertebral foramina**
- B. Zygapophyseal joints**
- C. Transverse processes**
- D. Laminae**

The lateral projection of the thoracic spine is primarily used to visualize the intervertebral foramina, which are the openings between adjacent vertebrae that allow for the passage of spinal nerves. In this projection, the vertebral bodies are seen in profile, making the foramina clearly visible. Additionally, the orientation of the lumbosacral region facilitates the visualization of these openings, which appear as clear, linear spaces between the vertebrae. In a lateral view, the positioning allows for effective demonstration of the foramina because the structures are aligned in such a way that they can be seen without obstructions from adjacent bones. This aspect is critical for assessing any potential pathologies affecting the foramina, such as herniated discs or foraminal stenosis. While other structures like the zygapophyseal joints, transverse processes, and laminae are present in the lateral projection of the thoracic spine, they are not the primary or best demonstrated structures in this view. Understanding this projection's focus on intervertebral foramina helps radiologic technologists optimize their imaging protocols and tailor their views based on diagnostic needs.

4. What is meant by "radiologic assessment"?

- A. The collection of patient demographic information**
- B. The evaluation of imaging results to inform diagnosis and treatment**
- C. The training of radiology interns and residents**
- D. The procurement of new imaging equipment**

The term "radiologic assessment" refers specifically to the process of evaluating imaging results to inform diagnosis and treatment. This involves analyzing radiographic images, such as X-rays, CT scans, or MRIs, to identify any medical conditions or abnormalities that may be present. The radiologic assessment is crucial in the clinical setting because it helps healthcare providers make informed decisions about patient care based on the findings observed in the imaging studies. These evaluations guide further diagnostic procedures, treatment plans, and patient management, making it an integral component of patient medical care. The other options, while relevant to the field of radiology, do not capture the essence of radiologic assessment. Collecting patient demographic information primarily involves gathering basic data necessary for record-keeping and does not directly pertain to the evaluation of imaging results. Training interns and residents is crucial for developing future professionals but is not part of the assessment process itself. Finally, procuring new imaging equipment is related to the infrastructure of radiology services rather than the analytic aspect of assessing images for clinical purposes.

5. What is the significance of collimation in radiography?

- A. To increase image brightness
- B. To reduce patient exposure to radiation**
- C. To provide better contrast in images
- D. To enhance spatial resolution

Collimation is a critical aspect in radiography primarily because it serves to reduce patient exposure to radiation. By adjusting the x-ray beam to the specific area being imaged, collimation limits the amount of unnecessary radiation that reaches the surrounding tissues and organs. This targeted application of x-rays not only minimizes the overall dose the patient receives but also decreases the risk of potential radiation-related side effects that can arise from exposure to non-targeted areas. Additionally, effective collimation can improve image quality by reducing scatter radiation, thereby enhancing the sharpness and clarity of the images produced, though this is a secondary benefit compared to the primary goal of patient safety. It's essential for radiologic technologists to practice proper collimation techniques as part of their role in adhering to the principles of radiation protection and best practices in imaging.

6. If a generator has a capacity of 1000 milliamperere (mA) and a technique of 20 milliamperere-seconds (mAs), what is the shortest possible exposure time?

- A. 0.02 seconds**
- B. 0.2 seconds
- C. 50 seconds
- D. 5.0 seconds

To find the shortest possible exposure time, you can use the relationship between current, time, and milliamperere-seconds (mAs), which is expressed in the formula: $mAs = mA \times \text{time (seconds)}$. In this case, we have a generator with a capacity of 1000 milliamperere (mA) and the technique set to 20 milliamperere-seconds (mAs). To find the shortest exposure time, you can rearrange the formula to: $\text{time} = mAs / mA$. By substituting the values into this formula: $\text{time} = 20 \text{ mAs} / 1000 \text{ mA}$. This gives you: $\text{time} = 0.02 \text{ seconds}$. This indicates that the shortest possible exposure time, given the generator's output and the specified mAs, is indeed 0.02 seconds. This value aligns with practical applications in radiologic technology, where precise control of exposure times is essential for achieving optimal imaging results while minimizing patient exposure to radiation.

7. What type of personnel dosimeter uses aluminum oxide as the absorbing material?

- A. Optically stimulable luminescent dosimeter (OSL)**
- B. Film badge**
- C. Thermoluminescent dosimeter (TLD)**
- D. Pocket dosimeter**

The use of aluminum oxide as the absorbing material identifies the optically stimulable luminescent dosimeter (OSL) as the correct answer. OSLs function by trapping electrons in the aluminum oxide crystal lattice when exposed to ionizing radiation. When stimulated by light, these electrons are released, emitting luminescence that can be measured. This aspect of aluminum oxide makes OSLs highly sensitive and capable of monitoring low levels of radiation over extended periods. On the other hand, film badges utilize a film that darkens in response to radiation exposure, but they do not contain aluminum oxide; instead, their sensitivity is reliant on the characteristics of the film emulsion. Thermoluminescent dosimeters (TLDs) use lithium fluoride or calcium fluoride crystals, which release stored energy as light when heated, fundamentally differing from the operation principles of OSLs. Pocket dosimeters rely on ionization and do not include aluminum oxide material, providing a different means of measuring radiation exposure through immediate readings.

8. What is the primary purpose of the aluminum filtration in x-ray tubes?

- A. To increase image density**
- B. To reduce scatter radiation**
- C. To improve patient protection**
- D. To enhance contrast in images**

The primary purpose of aluminum filtration in x-ray tubes is to improve patient protection. Aluminum filters are used to absorb low-energy x-rays from the beam, which do not contribute to image formation but can increase the patient's exposure to radiation without providing any diagnostic benefit. By removing these less useful energies, the filtration process not only reduces the overall dose of radiation received by the patient but also improves the quality of the resulting image. This is crucial in maintaining a balance between obtaining a diagnostic image and minimizing radiation exposure, thereby enhancing patient safety during x-ray examinations. In the context of the other choices, increasing image density relates to the overall darkness of the film or digital image, which is not a direct function of the filtration process. Reducing scatter radiation pertains to aspects of image quality influenced by collimation and beam direction rather than filtration itself. Enhancing contrast in images typically relates to factors like exposure settings and receptor sensitivity. Thus, the focus of aluminum filtration is squarely on optimizing patient safety by filtering out unnecessary low-energy radiation.

9. Which anatomical structure is responsible for pumping oxygenated blood into the aorta?

- A. Right ventricle**
- B. Left ventricle**
- C. Right atrium**
- D. Left atrium**

The anatomical structure responsible for pumping oxygenated blood into the aorta is the left ventricle. This chamber of the heart takes in oxygen-rich blood that has been delivered from the lungs through the pulmonary veins. When the left ventricle contracts, it generates enough pressure to send this oxygenated blood into the aorta, which distributes it throughout the body. Understanding the flow of blood through the heart is essential for grasping cardiovascular physiology. The left ventricle's walls are thicker than those of the right ventricle, reflecting its important role in overcoming the higher pressure required to circulate blood through the systemic circulation. In contrast, the right ventricle pumps deoxygenated blood to the lungs for oxygenation, while the atria serve more as receiving chambers for blood returning to the heart. Thus, the left ventricle's primary function and anatomical characteristics confirm its crucial role in systemic circulation.

10. What safety measure should be taken before performing an x-ray on a patient?

- A. Ensure the patient has not eaten**
- B. Confirm that the patient is not pregnant**
- C. Assess the patient's history of allergies**
- D. Verify that radiologic equipment is fully charged**

Confirming that the patient is not pregnant is a crucial safety measure before performing an x-ray because exposure to ionizing radiation can pose significant risks to a developing fetus. Pregnant patients require careful consideration to minimize the potential for harm, as the radiation can lead to teratogenic effects, including developmental abnormalities and increased risk of cancer later in life for the child. Implementing this safety measure helps ensure that the health and safety of both the patient and the fetus are prioritized. Medical professionals often require patients of childbearing age to confirm their pregnancy status, and, if there is any doubt, additional steps may involve using pregnancy tests or alternative imaging methods that do not involve radiation. While it is also important to ensure that patients have not eaten in some cases (especially for certain diagnostic procedures) or to assess allergy history, these measures do not directly relate to radiation safety concerns that specifically affect potential pregnancy. Verifying that radiologic equipment is charged is a standard operational procedure and does not address patient safety in the context of radiation exposure.