

Name: _____ Date: _____

Circle One: **Staff Member** **Fellow** **Resident**

Activity/Place Where You Use X-rays: _____

Contact Phone: _____

1. Which statement is correct regarding radiation interactions?

- A. The majority of X-rays (99%) pass through the patient without interacting
- B. High density materials absorb more X-rays than lower
- C. Thin body portions will appear darker on the Video output compared to thick
- D. Increasing tube voltage reduces the probability of interaction, thereby increasing patient dose

2. Which is not correct regarding the Inverse-Square-Law?

- A. Halving the distance from the radiation source doubles the radiation dose
- B. Exposure reduction is due to the divergent nature of radiation
- C. Doubling the distance from the radiation source decreases dose rate by one fourth
- D. Tripling the distance from the radiation source decreases dose rate by one ninth

3. Which statement is incorrect regarding the use of collimators?

- A. Increased collimation increases the potential for scatter radiation production
- B. "Coning down" reduces patient risk since less tissue is being irradiated
- C. Operator exposure can be reduced when collimators are effectively used
- D. Scatter radiation increases image noise, thereby reducing image contrast

4. Regarding patient exposure, which statement is correct?

- A. Improved operator technique can reduce patient radiation dose by up to one-tenth
- B. Typical ESE dose rates at SLH are around 2 R/min
- C. The largest source of man-made radiation exposure to the public originates from medical use
- D. All of the above

5. Regarding the examination room environment, which statement is incorrect?

- A. Operator exposure is greatest when standing on the image intensifier side of the table
- B. Exposures are significantly greater below the table
- C. The highest exposures from scatter are found near the beam's entrance location on the patient
- D. Exposure levels are highest within the direct X-ray beam

6. Of the following, which statement is correct?

- A. The primary beam is the source of the majority of operator/staff radiation exposure
- B. The patient's body removes much of the scatter directed to areas above the table.
- C. Typically, the operator would receive 10 percent of the patient's ESE if lead aprons weren't worn.
- D. All of the above are correct

7. Biological damage results from?

- A. Ionization of atoms in tissue, causing them to be more reactive
- B. Development of free radicals that alter chemical bonds within cellular DNA
- C. Direct interaction of cellular DNA with radiation
- D. All of the above

8. Which of the following is not true about radiation deterministic effects

- A. They are not associated with a threshold dose below which no effect occurs
- B. Erythema and epilation are typical radiation-induced deterministic effects
- C. The severity of damage increases with increasing radiation dose
- D. Effects can be temporary at low dose and permanent at high dose

9. Which is untrue about stochastic radiation effects?

- A. Radiation-induced cancer has been observed in patients receiving radiation therapy
- B. Increasing dose corresponds to increasing risk for latent health effect
- C. Increasing dose corresponds to increasing incidence of cell mutation compared to their natural incidence
- D. All of the above are true

10. Which factors may lead to under-reporting of radiation-induced skin effects?

- A. Skin damage is often located in regions not visible to the patient
- B. Due to latency, skin injury expression can be weeks to months after the procedure
- C. Physicians are relatively unaware of the possibility of occurrence
- D. All of the above contribute to under-reporting of skin injury

11. Case studies indicate that all of the following occur except:

- A. Irradiation from prior procedures lowers the skins' tolerance for future irradiation
- B. Portable fluoroscopy systems are incapable of producing radiation effects
- C. Steep-angled fluoroscopy views enhance the possibility of skin damage
- D. Large patient's enhance the possibility of skin damage

12. **Steeply-angled fluoroscopic views are less likely to induce skin injury because:**
- A. X-ray beam must traverse thicker portions of the patient
 - B. The wider span of anatomy enhances inverse-square radiation decreases to the image intensifier
 - C. Rotating between steeper-angled views can cause large II - patient air gaps when not noticed
 - D. All of the above are more likely to induce skin injury
13. **The following factors can help reduce beam on-time except:**
- A. Operator awareness of 5-minute time notifications
 - B. Exposing patient while not viewing the video image
 - C. Judicial use of Last-Image-Hold features
 - D. Planning images before irradiation to reduce unnecessary panning
14. **Operator radiation dose is unaffected by:**
- A. Choice of approach (i.e., brachial versus femoral)
 - B. Small increases in distance from the patient
 - C. Procedures with the X-ray tube above the table
 - D. All of the above effects operator exposure
15. **All of the following are examples of good practice except:**
- A. Alerting nearby staff before energizing the X-ray tube, especially when using Cine modes
 - B. Replacing spacer cones on portable systems before fluoro use (should they be removed)
 - C. Keeping the collimators open so that scatter is reduced
 - D. Moving away from the patient when remote-operated contrast injectors are used
16. **All of the following reduce patient radiation dose except:**
- A. Limiting use of magnification modes to only situations where enhanced visualization is necessary
 - B. Always seeing "Round" images in the Video output
 - C. Avoiding tilted oblique images when similar information can be obtained using PA views
 - D. Selecting the highest tube voltage possible that provides suitable contrast for the procedure
17. **The following is true about radiation shields except:**
- A. Properly positioned shields can provide total protection from radiation
 - B. Ceiling-mounted shields are positioned correctly when irradiated body portion is viewed through the shield.
 - C. To maximize benefit, the shield should be placed as close to the patient as possible
 - D. Portable radiation shields are useful in protecting staff members who remain fairly stationary during the procedure.

18. Which statement is true regarding radiation regulations?

- A. The Food and Drug Agency (FDA) sets limits on the amount of radiation dose patient's can receive.
- B. The Nuclear Regulatory Commission (NRC) regulates all X-ray devices at SLH
- C. The Michigan Department of Health established radiation limits applicable to fluoroscopy users
- D. All of the above are correct

19. All of the following is true about radiation risk and ALARA except:

- A. The operator determines what constitutes reasonable techniques for reducing radiation exposure
- B. The risk to radiation workers receiving continuous dose at the regulatory limits is approximately 10 times the accidental death rate to unexposed workers in general industry.
- C. Operators need not be concerned about radiation unless they exceed regulatory limits.
- D. The ALARA goal is keeping radiation exposure "As Low As Reasonably Achievable"

20. Regarding radiation badges at Saint Luke's, which statement is incorrect?

- A. Radiation badges placed above lead aprons provide an estimate of eye exposure
- B. The dose recorded over estimates exposure since it does not consider the shielding effect of lead aprons worn
- C. Radiation badges are available upon request to any physician user of fluoroscopy
- D. Regulations require the monitoring of workers who exceed defined radiation exposure thresholds

Exam Completed

Please send this exam to the following address via VA inter-hospital mail:

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Radiation Safety (50R)