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 skin's 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

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**Exam Completed**

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

Melanie Payne, RSO
Radiation Safety (50R)