Examination # 8

FLUOROSCOPY USERS MANUAL FOR PHYSICIANS - EXAMINATION

Physician Name (Print): ___________________________________________         Date: _______________

Answer all the questions by circling the correct answer. You must correctly answer 24 of the 30 questions. (80%)

1. **Which statement is correct regarding radiation interactions?**
   A. 99% of the x-ray is either absorbed within the patient or scattered throughout the exam room
   B. High density materials such as bone absorb less x-rays than low density material such as lung tissue.
   C. Low density material appear darker on x-ray images compared to high density materials
   D. Increasing tube voltage creates x-rays that interact with tissue thereby increasing patient dose

2. **Most of the energy imparted by the decelerating electrons in the x-ray tube is converted into:**
   A. X-ray production
   B. Heat
   C. Scatter radiation
   D. Visible light

3. **If you double your distance from the source you decrease your exposure by a factor of:**
   A. Two
   B. Eight
   C. Four
   D. One

4. **Which is CORRECT regarding the Inverse-Square-Law?**
   A. Doubling the distance from the radiation source results in one-fourth of the radiation dose.
   B. Increasing the distance from the radiation source doubles the radiation dose.
   C. The number of x-rays traveling through material increases with increasing distance
   D. Tripling the distance from the radiation source decreases dose rate by one eight

5. **Regarding patient exposure which statement is CORRECT?**
   A. Radiation exposure during fluoroscopy is directly proportional to the length of time it is used.
   B. New York State fluoroscopy equipment average output limit is less than that of the Federal limit.
   C. High Dose Rate mode can double patient radiation exposures
   D. All of the above

6. **Which statement is CORRECT regarding the use of collimators?**
   A. Decreased collimation increases the potential for additional scatter radiation production
   E. "Coning down" increases patient risk since less tissue is being irradiated
   F. Operator exposure can be reduced when collimators are not effectively used
   G. Using collimation increases scatter radiation causing increased image noise / quality

7. **Who may operate (set techniques, position to patient, turn on) a fluoroscopy unit?**
   A. Licensed Radiologic Technologist at the direction of the physician
   B. Anyone when requested by a physician
   C. Physician having hospital privileges for fluoroscopy
   D. A and C only

8. **Environmental radiation, which we are all exposed to all the time, is referred to as:**
   A. Natural Background radiation
   B. External radiation
   C. Internal radiation
   D. Scattered radiation
9. **Regarding the fluoroscopy room environment, which statement is NOT correct?**
   A. Exposure levels are the highest within the primary x-ray beam itself.
   B. The majority of dose received by the operator is due to scattered radiation from the patient.
   C. The patient is not considered an effective radiation beam stop.
   D. Radiation levels are significantly higher on the patient’s right-hand side vs. left side.

10. **Biological damage from radiation dose 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.

11. **Which of the following is NOT true about radiation deterministic-threshold 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 above a threshold.
    D. Effects can be temporary at low dose and permanent at high dose.

12. **Which of the following 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.
    C. Highest scatter radiation levels are often where the operator stands.
    D. All of the above are correct.

13. **Which is TRUE about stochastic – non threshold radiation effects?**
    A. Radiation induced second malignancies may occur in patients receiving radiation therapy.
    B. Increasing dose corresponds to increasing risk for incidence of radiation induced health effects.
    C. Increasing radiation dose increases cell mutations.
    D. All of the above are true.

14. **Which statement is NOT TRUE regarding case studies presented?**
    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. Hands of physicians have incurred physiological changes indicative of high cumulative doses of chronic low dose rate irradiations.

15. **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.

16. **Which statement is TRUE regarding steeply-angled fluoroscopic views inducing skin injuries?**
    A. X-ray beam must traverse thicker portions of the patient in steeply-angled fluoroscopic views.
    B. The skin of the patient is closer to the source because of the wider span of anatomy.
    C. Steep-angles often require penetration of large masses of tissue and dense bone creating situations which drive x-ray output to near or at maximum levels.
    D. All of the above are true.

17. **All these factors can help reduce beam “on-time” EXCEPT:**
    A. Planning images before irradiation to reduce unnecessary panning.
    B. Operator awareness of the 5-minute timer alarm notifications.
    C. Use of Last-Image-Hold feature so that static images can be viewed without using fluoroscopy.
    D. Exposing patient while not viewing the video image.

18. **All of the following are examples of good practice EXCEPT:**
    A. Alerting nearby staff before energizing the x-ray tube.
    B. Assuring the C-arm Cone (Skin Sparing Cone) is attached before fluoroing.
    C. Keeping the collimators wide open so that you fluoro as much tissue as possible.
    D. Moving away from the patient / x-ray when the contrast injector is injecting.
19. **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

20. **Where should the x-ray tube be placed to minimize skin entrance dose rate to the patient?**
   A. As far away from the patient as possible
   B. As close to the patient as possible
   C. Patient should be at isocenter between the x-ray tube and the image intensifier.
   D. It does not matter how far or close the x-ray tube is to the patient.

21. **All of the following reduce patient radiation dose EXCEPT:**
   A. Reduce the Air Gap, that is, the distance between the patient and the II.
   B. Always seeing "Round" collimation images in the x-ray / video output
   C. Avoiding steep / 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

22. **Which statement is TRUE regarding radiation regulations?**
   A. Both the Federal Food and Drug Agency (FDA) and New York State have regulations establishing limits on fluoroscopy radiation output
   B. The New York State Department of Health regulates all x-ray devices & uses at the hospital
   C. The New York State Department of Health has established occupational radiation exposure limits for the radiation worker including fluoroscopy physician operators
   D. All of the above are TRUE.

23. **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.

24. **If the FDA ESE fluoro maximum limit of 10 R / minute is used, how many minutes of fluoro of “on-time” would it take to reach the patient transient erythema threshold of 200 R?**
   A. 20 minutes
   B. 15 minutes
   C. 10 minutes
   D. 5 minutes

25. **Which of the following is NOT true about radiation risk and ALARA?**
   A. It is prudent to minimize radiation exposure whenever possible.
   B. The ALARA goal is to keep radiation exposures "As Low As Reasonably Achievable
   C. Radiation equipment operators should always be concerned about radiation exposures.
   D. The risk to the average radiation worker is 10 times greater than the annual risk of an accidental death of an unexposed worker in the general industry.

26. **If a physician operator is issued two dosimeters where must they be placed on the body?**
   A. One is placed outside of the apron at the collar, the other under the apron at the waist
   B. Both are placed outside the lead apron, one at the collar and the other at waist level.
   C. One badge underneath the lead apron on the collar, the other outside the apron at waist level
   D. Both are placed inside the lead apron one at the collar level and the other at the waist level.

27. **Which statement is NOT correct regarding radiation badge (dosimetry) use at St. Joseph’s?**
   A. To be accurate dosimeters and their controls should be analyzed in a timely manner.
   B. It is understood that the legal dose recorded by dosimetry over estimates exposures.
   C. When dosimetry is assigned to staff they must wear them whenever radiation is being used.
   D. State regulations require the monitoring of all workers who may receive a radiation exposure
28. Does the size of the patient have any effect on patient and staff radiation exposure? If so, why?
   A. No, the size of the patient has no effect on the radiation exposure to the patient and staff.
   B. Yes, the larger the patient the higher the radiation exposure to the patient and lower radiation exposure to staff because a larger amount of radiation is absorbed by the patient.
   C. Yes, the larger the patient the higher technique that is needed and greater the scatter resulting in an increased dose to patient and staff.

29. For radiation protection purposes which of the following should the fluoroscopy operator use?
   A. Use small field size by collimating to only the area you need to view
   B. Use lead aprons and shields
   C. Technique factors of low mA and high kVp
   D. All of the above

30. What is the proper location to store dosimeter(s) after a procedure?
   A. On a control board in a non-radiation area
   B. Leave it on a lead apron
   C. Bring it home with you
   D. Leave it on a lab coat in operating room

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