Chapter 01: Introduction to Radiation Protection
Sherer: Radiation Protection in Medical Radiography, 8th Edition

MULTIPLE CHOICE

1. Consequences of ionization in human cells include
   1. creation of unstable atoms.
   2. production of free electrons.
   3. creation of highly reactive free radicals capable of producing substances poisonous to the cell.
   4. creation of new biologic molecules detrimental to the living cell.
   5. injury to the cell that may manifest itself as abnormal function or loss of function.
   a. 1, 2, and 3 only
   b. 2, 3, and 4 only
   c. 3, 4, and 5 only
   d. 1, 2, 3, 4, and 5

   ANS: D

2. Which of the following is a form of radiation that is capable of creating electrically charged particles by removing orbital electrons from the atom of normal matter through which it passes?
   a. Ionizing radiation
   b. Nonionizing radiation
   c. Subatomic radiation
   d. Ultrasonic radiation

   ANS: A

3. Regarding exposure to ionizing radiation, patients who are educated to understand the medical benefit of an imaging procedure are more likely to
   a. assume a small chance of biologic damage but not suppress any radiation phobia they may have.
   b. cancel their scheduled procedure because they are not willing to assume a small chance of biologic damage.
   c. suppress any radiation phobia but not risk a small chance of possible biologic damage.
   d. suppress any radiation phobia and be willing to assume a small chance of possible biologic damage.

   ANS: D

4. The millisievert (mSv) is equal to
   a. 1/10 of a sievert.
   b. 1/100 of a sievert.
   c. 1/1000 of a sievert.
   d. 1/10,000 of a sievert.

   ANS: C

5. The advantages of the BERT method are
   1. it does not imply radiation risk; it is simply a means for comparison.
   2. it emphasizes that radiation is an innate part of our environment.
   3. it provides an answer that is easy for the patient to comprehend.
   a. 1 and 2 only
   b. 1 and 3 only
   c. 2 and 3 only
   d. 1, 2, and 3

   ANS: D

6. If a patient asks a radiographer a question about how much radiation he or she will receive from a specific x-ray procedure, the radiographer can
   a. respond by using an estimation based on the comparison of radiation received from the x-ray to natural background radiation received.
   b. avoid the patient's question by changing the subject.
   c. tell the patient that it is unethical to discuss such concerns.
   d. refuse to answer the question and recommend that he or she speak with the referring physician.

   ANS: A

7. Why should the selection of technical exposure factors for all medical imaging procedures always follow ALARA?
   a. So that referring physicians ordering imaging procedures do not have to accept responsibility for patient radiation safety.
   b. So that radiographers and radiologists do not have to accept responsibility for patient radiation safety.
   c. Because radiation-induced cancer does not appear to have a dose level below which individuals would have no chance of developing this disease.
   d. Because radiation-induced cancer does have a dose level at which individuals would have a chance of developing this disease.

   ANS: C

8. The cardinal principles of radiation protection include which of the following?
   1. Time
   2. Distance
   3. Shielding
   a. 1 only
   b. 2 only
   c. 3 only
   d. 1, 2, and 3

   ANS: D

9. In a hospital setting, which of the following professionals is expressly charged by the hospital administration with being directly responsible for the execution, enforcement, and maintenance of the ALARA program?
   a. Assistant administrator of the facility
   b. Chief of staff

c. Radiation Safety Officer
d. Student radiologic technologist

ANS: C

10. Why is a question concerning the amount of radiation a patient will receive during a specific x-ray procedure difficult to answer?
1. Because the received dose is specified in a number of different units of measure
2. Because the scientific units for radiation dose are normally not comprehensible by a patient
3. Because the patient should not receive any information about radiation dose
a. 1 and 2 only
b. 1 and 3 only
c. 2 and 3 only
d. 1, 2, and 3

ANS: A

11. X-rays are a form of which of the following kinds of radiation?
a. Environmental
b. Ionizing
c. Internal
d. Nonionizing

ANS: B

12. What unit is used to measure radiation exposure in the metric International System of Units?
a. Coulomb per kilogram
b. Milligray
c. Millisievert
d. Sievert

ANS: A

13. What organization was founded in 2007 that continues their pursuit to raise awareness of the need for dose reduction protocols by promoting pediatric-specified scan protocols to be used for both radiology and nonradiology users of CT?
a. U.S. Food and Drug Administration
b. Alliance for Radiation Safety in Pediatric Imaging.
c. American Registry of Radiologic Technologists
d. The Joint Commission

ANS: B

14. Which of the following provides the basis for determining whether an imaging procedure or practice is justified?
a. ALARA concept
b. BERT method
c. Diagnostic efficacy
d. NEXT program

ANS: C

15. Which of the following is a method of explaining radiation to the public?
    a. ALARA
    b. BERT
    c. ORP
    d. NEXT

    ANS: B

16. Radiology departments or individual radiologic technologists can "pledge" to image gently. The pledge includes which of the following?
    1. Make the image gently message a priority in staff communications each year.
    2. Review the protocol recommendations and, when necessary, implement adjustments to practice processes.
    3. Communicate openly with parents.
    a. 1 only
    b. 2 only
    c. 3 only
    d. 1, 2, and 3

    ANS: D

17. In a team approach to patient care, various participants
    1. assume responsibility for their areas of expertise.
    2. emphasize the importance of communication throughout the team
    3. rotate as the person in charge of the team
    a. 1 and 2 only
    b. 1 and 3 only
    c. 2 and 3 only
    d. 1, 2, and 3

    ANS: A

18. Which of the following radiation quantities is intended to be the best overall measure of the biologic effects of ionizing radiation?
    a. Exposure
    b. Effective dose
    c. Absorbed dose
    d. There is no radiation quantity that is intended to be the best overall measure of the biologic effects of ionizing radiation.

    ANS: B

19. Typically, people are more willing to accept a risk if they perceive that the potential benefit to be obtained is
    a. greater than the risk involved.
    b. equal to the risk involved.
    c. less than the risk involved.
    d. typically, people are not willing to accept risk no matter how great the benefit may be.

ANS: A

20. Which of the following statements below is true?
    a. It appears that no safe dose level exists for radiation-induced malignant disease.
    b. The ALARA principle establishes a dose level for radiation-induced malignancy.
    c. The BERT method establishes a dose level for radiation-induced malignancy.
    d. The NEXT program and reference values establish a dose level for radiation-induced malignancy.

    ANS: A

21. The ALARA principle provides a method for comparing the amount of radiation used in various health care facilities in a particular area for specific imaging procedures. This information may be helpful to many
    a. accrediting bodies.
    b. advisory groups.
    c. radiation standards organizations.
    d. regulatory agencies.

    ANS: D

22. The term as low as reasonable achievable (ALARA) is synonymous with the term
    a. background equivalent radiation time (BERT).
    b. equivalent dose (EqD).
    c. diagnostic efficacy.
    d. optimization for radiation protection (ORP).

    ANS: D

23. Diagnostic efficacy includes
    1. determining if an imaging procedure is justified.
    2. obtaining images with minimal radiation exposure.
    3. adhering to radiation safety guidelines.
    4. revealing the presence or absence of disease in a patient.
    a. 1, 2, and 3 only
    b. 1, 2, and 4 only
    c. 2, 3, and 4 only
    d. 1, 2, 3, and 4

    ANS: D

24. Which of the following are required by The Joint Commission for CT?
    1. Annual education of staff in dose reduction techniques
    2. Minimum qualifications for medical physicists
    3. Documentation of CT radiation doses
    4. Management of CT protocols to minimize radiation dose
    a. 1 and 2 only
    b. 1 and 3 only
    c. 2 and 4 only
    d. 1, 2, 3, and 4

    ANS: D

25. Effective protective measures take into consideration
    1. both human and environmental physical determinants.
    2. technical elements.
    3. procedural factors.
    a. 1 and 2 only
    b. 1 and 3 only
    c. 2 and 3 only
    d. 1, 2, and 3

    ANS: D