

## Chapter 01: Radiation History

### Iannucci: Dental Radiography, 5th Edition

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#### MULTIPLE CHOICE

1. Radiation is defined as
  - a. a form of energy carried by waves or streams of particles.
  - b. a beam of energy that has the power to penetrate substances and record image shadows on a receptor.
  - c. a high-energy radiation produced by the collision of a beam of electrons with a metal target in an x-ray tube.
  - d. a branch of medicine that deals with the use of x-rays.

ANS: A

Radiation is a form of energy carried by waves or streams of particles. An x-ray is a beam of energy that has the power to penetrate substances and record image shadows on a receptor. X-radiation is a high-energy radiation produced by the collision of a beam of electrons with a metal target in an x-ray tube. Radiology is a branch of medicine that deals with the use of x-rays.

DIF: Recall            REF: Page 2            OBJ: 1  
TOP: CDA, RHS, III.B.2. Describe the characteristics of x-radiation  
MSC: NBDHE, 2.0 Obtaining and Interpreting Radiographs | NBDHE, 2.1 Principles of radiophysics and radiobiology

2. A radiograph is defined as
  - a. a beam of energy that has the power to penetrate substances and record image shadows on a receptor.
  - b. a picture on film produced by the passage of x-rays through an object or body.
  - c. the art and science of making radiographs by the exposure of an image receptor to x-rays.
  - d. a form of energy carried by waves or a stream of particles.

ANS: B

An x-ray is a beam of energy that has the power to penetrate substances and record image shadows on a receptor. A radiograph is a picture on film produced by the passage of x-rays through an object or body. Radiography is the art and science of making dental images by the exposure of a receptor to x-rays. Radiation is a form of energy carried by waves or streams of particles.

DIF: Comprehension            REF: Page 2            OBJ: 1  
TOP: CDA, RHS, III.B.2. Describe the characteristics of x-radiation  
MSC: NBDHE, 2.0 Obtaining and Interpreting Radiographs | NBDHE, 2.1 Principles of radiophysics and radiobiology

3. Your patient asked you why dental images are important. Which of the following is the correct response?
  - a. An oral examination with dental images limits the practitioner to what is seen clinically.
  - b. All dental diseases and conditions produce clinical signs and symptoms.

- c. Dental images are not a necessary component of comprehensive patient care.
- d. Many dental diseases are typically discovered only through the use of dental images.

ANS: D

An oral examination without dental images limits the practitioner to what is seen clinically. Many dental diseases and conditions produce no clinical signs and symptoms. Dental images are a necessary component of comprehensive patient care. Many dental diseases are typically discovered only through the use of dental images.

DIF: Application REF: Page 2 OBJ: 2  
TOP: CDA, RHS, III.B.2. Describe the characteristics of x-radiation  
MSC: NBDHE, 2.0 Obtaining and Interpreting Radiographs | NBDHE, 2.5 General

4. The x-ray was discovered by
- a. Heinrich Geissler
  - b. Wilhelm Roentgen
  - c. Johann Hittorf
  - d. William Crookes

ANS: B

Heinrich Geissler built the first vacuum tube in 1838. Wilhelm Roentgen discovered the x-ray on November 8, 1895. Johann Hittorf observed in 1870 that discharges emitted from the negative electrode of a vacuum tube traveled in straight lines, produced heat, and resulted in a greenish fluorescence. William Crookes discovered in the late 1870s that cathode rays were streams of charged particles.

DIF: Recall REF: Page 2 OBJ: 4  
TOP: CDA, RHS, III.B.2. Describe the characteristics of x-radiation  
MSC: NBDHE, 2.0 Obtaining and Interpreting Radiographs | NBDHE, 2.5 General

5. Who exposed the first dental radiograph in the United States using a live person?
- a. Otto Walkoff
  - b. Wilhelm Roentgen
  - c. Edmund Kells
  - d. Weston Price

ANS: C

Otto Walkoff was a German dentist who made the first dental radiograph. Wilhelm Roentgen was a Bavarian physicist who discovered the x-ray. Edmund Kells exposed the first dental radiograph in the United States using a live person. Price introduced the bisecting technique in 1904.

DIF: Recall REF: Page 4 OBJ: 5  
TOP: CDA, RHS, III.B.2. Describe the characteristics of x-radiation  
MSC: NBDHE, 2.0 Obtaining and Interpreting Radiographs | NBDHE, 2.5 General

6. Current fast radiographic film requires \_\_\_\_ % less exposure time than the initial exposure times used in 1920.
- a. 33
  - b. 98
  - c. 73

d. 2

ANS: D

Current fast radiographic film requires 98% less exposure time than the initial exposure times used in 1920.

DIF: Comprehension

REF: Page 5

OBJ: 6

TOP: CDA, RHS, III.B.2. Describe the characteristics of x-radiation

MSC: NBDHE, 2.0 Obtaining and Interpreting Radiographs | NBDHE, 2.5 General

7. Who modified the paralleling technique with the introduction of the long-cone technique?
- C. Edmund Kells
  - Franklin W. McCormack
  - F. Gordon Fitzgerald
  - Howard Riley Raper

ANS: C

C. Edmund Kells introduced the paralleling technique in 1896. Franklin W. McCormack reintroduced the paralleling technique in 1920. F. Gordon Fitzgerald modified the paralleling technique with the introduction of the long-cone technique. This is the technique currently used. Howard Riley Raper modified the bisecting technique and introduced the bite-wing technique in 1925.

DIF: Recall

REF: Page 4

OBJ: 7

TOP: CDA, RHS, III.B.2. Describe the characteristics of x-radiation

MSC: NBDHE, 2.0 Obtaining and Interpreting Radiographs | NBDHE, 2.5 General

8. Which of the following is an advantage of digital imaging?
- Increased patient radiation exposure
  - Increased patient comfort
  - Increased speed for viewing images
  - Increased chemical usage

ANS: C

Patient exposure is reduced with digital imaging. Digital sensors are more sensitive to x-rays than film. Digital sensors are rigid and bulky, causing decreased patient comfort. The image from digital sensors is uploaded directly to the computer and monitor without the need for chemical processing. This allows for immediate interpretation and evaluation. The image from digital sensors is uploaded directly to the computer and monitor without the need for chemical processing.

DIF: Comprehension

REF: Page 6

OBJ: 7

TOP: CDA, RHS, I.B.2. Demonstrate basic knowledge of digital radiography

MSC: NBDHE, 2.0 Obtaining and Interpreting Radiographs | NBDHE, 2.5 General

9. Which discovery was the precursor to the discovery of x-rays?
- Beta particles
  - Alpha particles
  - Cathode rays
  - Radioactive materials

ANS: C

Beta particles are fast moving electrons emitted from the nucleus of radioactive atoms and are not associated with x-rays. Alpha particles are emitted from the nuclei of heavy metals and are not associated with x-rays. Wilhelm Roentgen was experimenting with cathode rays when he discovered x-rays. Radioactive materials are certain unstable atoms or elements that are in the process of spontaneous disintegration or decay.

DIF: Comprehension

REF: Page 3

OBJ: 4

TOP: CDA, RHS, III.B.2. Describe the characteristics of x-radiation

MSC: NBDHE, 2.0 Obtaining and Interpreting Radiographs | NBDHE, 2.5 General

10. Which of the following would you place in the patient's mouth in order to take dental x-rays?
- Image
  - Image receptor
  - Radiograph
  - Dental radiograph

ANS: B

An image is a picture or likeness of an object. An image receptor is the recording medium (film, phosphor plate, or digital sensor) that is placed in the patient's mouth to record the image produced by the x-rays. A radiograph is an image of two-dimensional representation of a three-dimensional object. A dental radiograph is the dental image produced on a recording medium.

DIF: Application

REF: Page 2

OBJ: 1

TOP: CDA, RHS, III.B.2. Describe the characteristics of x-radiation

MSC: NBDHE, 2.0 Obtaining and Interpreting Radiographs | NBDHE, 2.5 General