

Chapter 01: Introduction to Digital Radiography and Picture Archiving and Communication Systems
Carter: Digital Radiography and PACS, 3rd Edition

MULTIPLE CHOICE

1. Film and intensifying screens are primarily used in
 - a. computed radiography (CR).
 - b. digital radiography (DR).
 - c. conventional radiography.
 - d. picture archival and communication systems.

ANS: C OBJ: Explain latent image formation for conventional radiography.

2. Intensifying screens
 - a. absorb light.
 - b. emit light.
 - c. absorb scatter.
 - d. emit positive electrons.

ANS: B OBJ: Explain latent image formation for conventional radiography.

3. Which modality was the first to use the principle of digital imaging?
 - a. Computed tomography (CT)
 - b. Magnetic resonance imaging (MRI)
 - c. Ultrasonography
 - d. Cardiac catheterization

ANS: A OBJ: Define the term digital imaging.

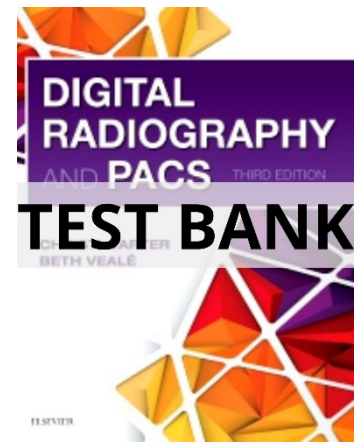
4. Who was the first to incorporate digital imaging with the CT scanner?
 - a. Paul Lauterbur
 - b. Godfrey Hounsfield
 - c. Sol Nudelman
 - d. M. Paul Capp

ANS: B OBJ: Define the term digital imaging.

5. Teleradiology, moving images via telephone lines to and from remote locations, was first conceptualized by
 - a. Paul Lauterbur.
 - b. M. Paul Capp.
 - c. Albert Jutras.
 - d. Sol Nudelman.

ANS: C OBJ: Define digital imaging and communications in medicine.

6. The invention of CT is heralded as
 - a. the advanced use of three-dimensional computation in medical imaging.



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- b. one of the greatest milestones in medical imaging.
- c. the stepping stone for the development of MRI.
- d. the first modality to use PACS.

ANS: B OBJ: Define the term digital imaging.

7. Early reconstruction of raw CT data took a few _____ to form a recognizable image.
- a. minutes
 - b. hours
 - c. days

ANS: C OBJ: Define the term digital imaging.

8. The first commercial CT scanners could image the
- a. abdomen only.
 - b. head only.
 - c. head and abdomen.
 - d. total body.

ANS: B OBJ: Define the term digital imaging.

9. In which decade was MRI first introduced?
- a. 1950s
 - b. 1960s
 - c. 1970s
 - d. 1980s

ANS: D OBJ: Define the term digital imaging.

10. Which two modalities could easily be converted to digital imaging properties?
- a. CT and ultrasonography
 - b. CT and MRI
 - c. Ultrasonography and nuclear medicine
 - d. Nuclear medicine and CT

ANS: C OBJ: Define the term digital imaging.

11. Early picture archival and communication systems were first developed
- a. in Canada.
 - b. by the U.S. military.
 - c. by Albert Jutras.
 - d. by NASA.

ANS: B OBJ: Explain what a PACS is and how it is used.

12. Teleradiography incorporated _____ to produce radiographic images.
- a. satellite feeds
 - b. cable lines
 - c. T1 cables
 - d. telephone lines

ANS: D OBJ: Explain what a PACS is and how it is used.

13. One of the early goals related to the development of PACS was to

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- a. reduce costs related to overstaffing.
- b. allow radiologists to read stat films from a hospital while at home.
- c. provide a means to move battlefield images to an established hospital.
- d. eliminate the need for chemical processing.

ANS: C OBJ: Explain what a PACS is and how it is used.

14. CR acquires an image through
- a. conventional film/screen processing using a digital scanner.
 - b. the heating of a thermoluminescent device.
 - c. an electrically charged cassette.
 - d. the use of a storage phosphor plate.

ANS: D OBJ: Describe the latent image formation process for PSP image capture.

15. Storage phosphor plates are similar to
- a. intensifying screens.
 - b. xeromammography cassettes.
 - c. flat panel detectors.
 - d. cardboard cassettes.

ANS: A OBJ: Describe the latent image formation process for PSP image capture.

16. In a DR system, which of the following are needed to produce a radiographic image?
- a. X-ray absorber and a CCD
 - b. Intensifying screen and a TFT
 - c. Storage phosphor plate and a CCD
 - d. Storage phosphor plate and a TFT

ANS: A OBJ: Compare and contrast the latent image formation processes.

17. The two elements needed to convert light signals into an electrical signal while using indirect capture DR are TFT and
- a. photodiodes.
 - b. photoconductors.
 - c. phototransistors.
 - d. photostators.

ANS: A OBJ: Compare and contrast the latent image formation processes.

18. The x-ray absorber typically used in direct capture DR is a
- a. photodiode.
 - b. phototransistor.
 - c. photoconductor.
 - d. photoelectron.

ANS: C OBJ: Compare and contrast the latent image formation processes.

19. Technologist efficiency ratings are generally the same when comparing conventional radiography with _____ radiography.
- a. computed
 - b. digital

ANS: A OBJ: Compare and contrast the latent image formation processes.

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20. Compared with a 90-second processing time found in conventional radiography, image acquisition with DR has now been reduced to
- instantaneous acquisition.
 - 1–2 seconds.
 - 3–5 seconds.
 - 6–8 seconds.

ANS: C OBJ: Compare and contrast the latent image formation processes.

21. The active element in a storage phosphor is
- lithium.
 - glutaraldehyde.
 - europium.
 - barium fluorohalide.

ANS: D OBJ: Compare and contrast the latent image formation processes.

22. In reference to PSP image capture, to release the latent image, which of the following devices is scanned over the phosphor plate?
- Photomultiplier tube
 - Fluorescent light
 - Focused laser light
 - Lithium crystal

ANS: C OBJ: Describe the latent image formation process for PSP image capture.

23. Which of the following best describes the sequence for PSP image capture?
- Phosphor plate, focused laser light scanner, photomultiplier, digital-analog converter, review station
 - Phosphor plate, focused laser light scanner, photodensitometer, digital-analog converter, review station
 - Phosphor plate, focused laser light scanner, photodensitometer, analog-digital converter, review station
 - Phosphor plate, focused laser light scanner, photomultiplier, analog-digital converter, review station

ANS: D OBJ: Compare and contrast the latent image formation processes.

24. X-ray energy related to direct capture DR will stimulate a _____, which eventually is changed into an electrical signal.
- photodensitometer
 - scintillator
 - TFT array
 - charge-coupled device

ANS: B OBJ: Compare and contrast the latent image formation processes.

25. The _____ converts x-ray energy directly to a digital electrical signal.
- photoconductor
 - photomultiplier
 - scintillator
 - TLD

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ANS: A OBJ: Compare and contrast the latent image formation processes.

26. Exposure latitude is to conventional radiography as _____ is to DR.
- characteristic response
 - linear manner
 - subject contrast
 - dynamic range

ANS: D OBJ: Compare and contrast the latent image formation processes.

27. A look-up table maps
- latent images.
 - subject contrasts.
 - image grayscale values.
 - optical density.

ANS: C OBJ: Compare and contrast the latent image formation processes.

28. With conventional radiography, optical density is primarily controlled by
- kilovoltage.
 - milliamperage.
 - line voltage.
 - milliampere-seconds.

ANS: D OBJ: Compare and contrast the latent image formation processes.

29. Preset image annotation controls include all of the following except
- arrows.
 - position indicators.
 - date and time stamps.
 - image acquisition markers.

ANS: C OBJ: Explain what a PACS is and how it is used.

30. The first full-scale PACS was installed in 1993 in
- Boston.
 - Philadelphia.
 - New York.
 - Baltimore.

ANS: D OBJ: Explain what a PACS is and how it is used.

31. All of the following are components of a PACS except
- independent kilovoltage peak and milliampere-second stations.
 - web access.
 - multiple interfaces.
 - reading stations.

ANS: A OBJ: Explain what a PACS is and how it is used.

TRUE/FALSE

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1. Light exposing the film is in direct proportion to the amount and energy of the incident photon upon the screen.

ANS: T OBJ: Explain latent image formation for conventional radiography.

2. The earliest CT of the head took several hours to acquire a single slice of information.

ANS: T OBJ: Define the term digital imaging.

3. When switching from a conventional diagnostic radiography room to one that incorporates CR, major equipment changes are to be expected.

ANS: F OBJ: Describe the latent image formation process for PSP image capture.

4. Similar to CR, DR can use the existing diagnostic equipment found in today's imaging departments.

ANS: F OBJ: Compare and contrast the latent image formation processes.

5. Indirect capture DR converts absorbed x-ray energy into visible light.

ANS: T OBJ: Compare and contrast the latent image formation processes.

6. A Bucky apparatus is required for DR.

ANS: F OBJ: Compare and contrast the latent image formation processes.

7. Many PACS reading stations also have image-processing capabilities.

ANS: T OBJ: Explain what a PACS is and how it is used.

8. DICOM is a standard that allows imaging modalities and PACS to communicate in the same language.

ANS: T OBJ: Explain what a PACS is and how it is used.

Chapter 02: Digital Imaging Characteristics

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MULTIPLE CHOICE

1. Multiple numeric values divided into an array of small elements capable of being processed is the definition of _____ images.
 - a. analog
 - b. digital
 - c. medical
 - d. radiographic

ANS: B OBJ: Differentiate between analog and digital images.

2. The continuous and varying levels of brightness and colors describe _____ images.
 - a. analog
 - b. digital