

Introduction to Digital Imaging - Part I: Digital Detectors

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📁 Radiology

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Examination

1. Digitally acquired x-ray images are now being interpreted on computer monitors, referred to as ____ interpretation.
 - a. screen
 - b. hard-copy
 - c. film-copy
 - d. pixel detection
 - e. soft-copy
2. Screen-film imaging is performed by having x-rays that penetrate through the patient that then interact with a ____ material within the cassette, which converts x-rays to visible light.
 - a. selenium
 - b. sodium
 - c. phosphor
 - d. silicon
 - e. cesium iodide
3. The conversion of x-ray photon to ____ photon occurs due to the film being much more sensitive to ____ radiation than to x-ray radiation.
 - a. delta
 - b. gamma
 - c. light
 - d. infrared
 - e. ultraviolet
4. The speed of the screen-film is primarily determined by the ____ of the phosphor material.
 - a. thickness
 - b. layering
 - c. granular aspect
 - d. freshness
 - e. texture
5. Following exposure of the film to visible light, an invisible image exists in the film called a ____ image.
 - a. pre-final
 - b. cesium iodide
 - c. grayscale
 - d. latent
 - e. pixel value
6. The optical density determines the ____ in the image obtained on x-ray film.
 - a. pixel value
 - b. shades of gray
 - c. toe portion of the H&D curve
 - d. color application

- e. shoulder portion of the H&D curve
7. **The H&D curve sets the allowed range of radiation exposures the screen-film requires for an acceptable image. Which of the following statements is true?**
- Too low of an exposure will result in an image that is light in gray values but low in noise known as the toe of the curve.
 - Too high an exposure results in images being too dark and is near the shoulder of the curve.
 - Too low of an exposure will result in an image that is dark in gray values with excessive noise known as the toe of the curve.
 - Too low of an exposure will result in an image that is dark in gray values but low in noise known as the toe of the curve.
 - Too high an exposure results in images being too light and is near the shoulder of the curve.
8. **With direct capture digital imaging, x-rays that penetrate the body are converted into a digital signal for display on a computer monitor**
- following temporary storage
 - without temporary storage but following conversion of x-ray energy into light energy
 - following temporary storage and conversion of x-ray energy into light energy
 - without temporary storage or conversion of x-ray energy into light energy
 - that will allow for a diagnostically acceptable image that never needs any post-processing manipulation
9. **The photostimulable phosphor (PSP) detector is commonly referred to as a(an)**
- pixel manipulator
 - laser unit
 - CR reader
 - photomultiplier tube
 - imaging plate
10. **The CR laser reader causes the photostimulable phosphor material to emit _____ light.**
- blue
 - red
 - green
 - white
 - gray
11. **Charge-coupling device (CCD) chips can be tiled together to form a larger size detector, but typically no more than _____ CCD chips are tiled in this fashion.**
- 3
 - 4
 - 5
 - 6
 - 7
12. **In charge-coupling device technology, the number of shades of gray required for diagnostic application typically range between**
- 64 to 256
 - 256 to 1024
 - 1024 to 4096
 - 4096 to 100,000
 - 16.8 million
13. **All of the following statements regarding cesium iodide (CsI) phosphor are true EXCEPT**
- It is not used for screen-film phosphors due to its hygroscopic nature
 - It is used in amorphous silicon (a-Si) detectors

- c. It degrades when exposed to air
 - d. It is used in amorphous selenium (a-Se) detectors
 - e. It easily absorbs water
14. In amorphous silicon detectors, a _____ detects the number of electrons emitted by the photocathode and converts this to a signal for digitization to the computer.
- a. photomultiplier
 - b. CR plate
 - c. photodiode
 - d. thin film transistor
 - e. photostimulable phosphor detector
15. The difference between a direct capture a-Se flat-panel detector compared to that of the indirect a-Si detector, is that the a-Se flat-panel detector
- a. lacks a data readout device
 - b. lacks a scintillator
 - c. converts the x-rays to visible light
 - d. lacks a thin film transistor
 - e. converts the x-rays to red light instead of blue light
16. When an a-Se detector captures an x-ray, an electron is produced, commonly referred to as an
- a. photocathode
 - b. pixel
 - c. photodiode
 - d. quantum mottle
 - e. electron hole
17. The primary differences between indirect and direct capture flat-panel detectors include all of the following EXCEPT
- a. the use of thin film transistors
 - b. number of x-rays captured by the detector
 - c. ability to construct large area detectors for general radiographic imaging
 - d. cost to manufacture
 - e. relative resolution or visualization of small objects
18. The concept of optical density as used with film is replaced with _____ for digital imaging.
- a. pixel value
 - b. quantum mottle
 - c. color modulation
 - d. modulation transfer function
 - e. a scintillator
19. In general, a-Si detectors have a greater sensitivity to x-ray energy as compared to a-Se but can result in less resolution capability due to
- a. the use of a scintillator
 - b. modulation transfer function
 - c. some light spread within the CsI phosphor
 - d. its direct capture technique
 - e. the use of a thin film transistor
20. Mammographic imaging pixel sizes typically range from _____ microns in size to permit better visibility of microcalcifications.
- a. 350 - 450

- b. 250 - 400
- c. 150 - 250
- d. 100 - 200
- e. 50 - 100



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