

CR

Multiple Choice

Identify the choice that best completes the statement or answers the question.

- _____ 1. The front or tube side of radiographic cassettes should be made of a material that:
- Absorbs most of the x-ray beam
 - Reduces scatter production
 - Filters the beam
 - Absorbs very little of the x-ray beam
- _____ 2. The CR latent image consists of:
- Electrons trapped in the phosphor layer
 - Clumps of metallic silver in the emulsion
 - Light trapped in the phosphor layer
 - The image as seen on the display monitor
- _____ 3. The emission of light when stimulated by a high intensity laser beam is:
- Luminescence
 - Photostimulable phosphor
 - Photostimulable luminescence
 - None of the above
- _____ 4. This material is composed of barium fluorohalide and makes up the primary component of the CR IP.
- Luminescence
 - Photostimulable phosphor
 - Photostimulable luminescence
 - None of the above
- _____ 5. Which of the following is not a component of the CR IP?
- Emulsion layer
 - Support layer
 - Phosphor layer
 - Protective layer
- _____ 6. With CR, when the x-ray photons are absorbed by the phosphor, the _____ atoms become ionized.
- Barium fluorohalide
 - Tungsten
 - Europium
 - Silver halide
- _____ 7. With CR, trapped electrons are:
- Proportional in number to the tissue's x-ray absorption
 - In a lower energy state
 - Released during the readout stage
 - A and C
- _____ 8. The _____ collects, amplifies and converts visible light to an electrical signal.
- ADC
 - PMT
 - PSP
 - PSST

- ___ 9. In the CR reader unit, the IP is scanned with a(n):
- PMT
 - Electron gun
 - Helium-neon laser beam
 - PSP
- ___ 10. Which of the following is the sequence of events, from beginning to end, of what happens in the CR reader unit?
- Analog electrical signal is sampled and digitized.
 - Stored energy is released as visible light.
 - PMT converts light to electrical signal.
- 1, 2, 3
 - 2, 3, 1
 - 1, 3, 2
 - 2, 1, 3
- ___ 11. With CR, a higher sampling frequency results in _____ pixel density and _____ spatial resolution.
- Increased; increased
 - Increased; decreased
 - Decreased; increased
 - Decreased; decreased
- ___ 12. With a fixed matrix CR reader system, changing to a larger IP, for the same FOV, will result in:
- Larger pixels
 - Smaller pixels
 - Improved spatial resolution
 - B and C
- ___ 13. The CR system's ability to display a range of shades of gray is determined by its:
- Pixel pitch
 - Pixel size
 - Pixel depth
 - Matrix
- ___ 14. Pixel bit depth is determined by the:
- ADC
 - FOV
 - Matrix
 - Tissue type
- ___ 15. Immediately before leaving the CR reader unit, the IP is exposed to:
- The laser light
 - Developer chemicals
 - Intense white light
 - X-rays
- ___ 16. Which of the following imaging systems uses a cassette, a photostimulable phosphor plate, a plate reader, and a computer workstation?
- Computed radiography.
 - Computed tomography.
 - Direct radiography.

d. A and C.

- ___ 17. The type of phosphor found in the PSP plate for computed radiography is
- plastic
 - amorphous selenium
 - barium fluorohalide
 - cesium iodide
- ___ 18. This part of the plate reflects light released during the reading phase toward the photodetector
- protective layer
 - reflective layer
 - phosphor layer
 - conductive layer
- ___ 19. The part of a PSP plate that gives some rigidity to the plate is the
- conductive layer
 - structured phosphor layer
 - turbid phosphor layer
 - support layer
- ___ 20. Europium serves as
- an activator for the phosphor
 - the protective layer
 - the reflective part of the PSP plate
 - the conductive layer
- ___ 21. The trapped electrons in the conduction band of the PSP form the
- latent image
 - manifest image
 - visible image
 - A and C
- ___ 22. At the time of processing, the energy of the trapped electrons is released by exposure to a laser in a process called
- photodetector
 - scintillation
 - phosphorescence
 - photostimulable luminescence
- ___ 23. This part of the reader moves the PSP plate through the reader
- Photodetector
 - Optical system
 - Drive mechanism
 - Photostimulable luminescence
- ___ 24. Following the detection of the light released from the phosphor layer, the amplified signal is sent to the _____ to convert it to a digital electronic signal for the display computer
- digital-to-analog converter (DAC)
 - analog-to-digital converter (ADC)

- c. light-to-computer device (LTC)
- d. none of the above

True/False

Indicate whether the statement is true or false.

- ___ 1. With digital imaging, mAs does not control image brightness

CR Answer Section

MULTIPLE CHOICE

1. ANS: D
The side of the cassette that faces the tube should absorb as little radiation as possible.

PTS: 1 OBJ: 2
2. ANS: A
The CR latent (invisible) image is formed by electrons trapped in the phosphor layer.

PTS: 1 OBJ: 2
3. ANS: C
Photostimulable luminescence is the emission of light as a result of stimulation by a light source (in this case the laser beam).

PTS: 1 OBJ: 2
4. ANS: B
The photostimulable phosphor, made of barium fluorohalide, is the major part of the CR imaging plate.

PTS: 1 OBJ: 2
5. ANS: A
The emulsion layer is part of radiographic film, not the CR imaging plate.

PTS: 1 OBJ: 2
6. ANS: C
The atoms of europium become ionized after the barium fluorohalide phosphor absorbs the exit radiation.

PTS: 1 OBJ: 2
7. ANS: D
Trapped electrons, in a higher-energy state, are produced in proportion to the tissue's absorption and are released during the CR readout stage.

PTS: 1 OBJ: 2
8. ANS: B
The photomultiplier tube (PMT) collects, amplifies, and converts visible light to an electrical signal.

PTS: 1 OBJ: 3
9. ANS: C
A helium-neon laser beam scans the imaging plate in the CR reader unit.

PTS: 1 OBJ: 3
10. ANS: B
Upon entering the CR reader unit, the stored energy in the phosphor layer is released as visible light (following laser beam scanning), the PMT converts the light energy to an electrical signal, and the signal is digitized.

- PTS: 1 OBJ: 3
11. ANS: A
With CR, a higher sampling frequency results in increased pixel density and increased spatial resolution.
- PTS: 1 OBJ: 4
12. ANS: A
For the same field of view, spreading the fixed matrix out over a larger IP will result in the pixels being larger and therefore decreased spatial resolution.
- PTS: 1 OBJ: 5
13. ANS: C
Pixel depth determines the number of gray levels that could be assigned to a pixel; the greater the pixel depth, the greater the number of shades of gray from which to choose.
- PTS: 1 OBJ: 7
14. ANS: A
The analog to digital converter (ADC) determines the pixel depth.
- PTS: 1 OBJ: 7
15. ANS: C
Just before leaving the CR reader unit, the IP is erased using intense white light exposure.
- PTS: 1 OBJ: 3
16. ANS: A
The primary parts of a CR system are the cassette, *photostimulable phosphor (PSP) plate* that goes inside the cassette, the *plate reader*, and a computer workstation.
- PTS: 1 REF: 157 OBJ: 1
17. ANS: C
Barium fluorohalide is the active material in the phosphor layer of the PSP plate.
- PTS: 1 REF: 158 OBJ: 1
18. ANS: B
The reflective layer is a layer that reflects light released during the reading phase toward the photodetector.
- PTS: 1 REF: 158 OBJ: 1
19. ANS: D
The support layer provides some rigidity to the plate to keep it from being too floppy.
- PTS: 1 REF: 158 OBJ: 1
20. ANS: A
Europium is a silvery rare earth metal that captures some of the energy as the phosphors respond to the x-ray photons.
- PTS: 1 REF: 158 OBJ: 1
21. ANS: A
The trapped electrons in the conduction band of the PSP form the latent or invisible image.

PTS: 1 REF: 158 OBJ: 1
22. ANS: D
Photostimulable luminescence is the term for light (luminescence) produced as a result of stimulation by light (in this case, laser light).

PTS: 1 REF: 158 OBJ: 1
23. ANS: C
The drive mechanism moves the plate through the reader and scanning process.

PTS: 1 REF: 158 OBJ: 1
24. ANS: B
The signal from the reader is sent to the ADC to convert the analog data to digital data, which is usable by the computer.

PTS: 1 REF: 158 OBJ: 1

TRUE/FALSE

1. ANS: T
Although mAs still controls the quantity of radiation produced, it no longer controls image density or brightness.

PTS: 1 REF: 166 OBJ: 7