

Fluoroscopy

Multiple Choice

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

- _____ 1. _____ imaging is accomplished with fluoroscopy as opposed to radiography.
- Static
 - Still
 - Dynamic
 - Colorized
- _____ 2. The _____ absorbs electrons and emits light.
- Input phosphor
 - Output phosphor
 - Photocathode
 - Accelerating anode
- _____ 3. This part of the image intensifier absorbs light and produces electrons.
- Input phosphor
 - Output phosphor
 - Photocathode
 - Electrostatic focusing lenses
- _____ 4. The gain related to the decrease in size from the input to the output phosphor is the:
- Brightness gain
 - Flux
 - Minification gain
 - Conversion factor
- _____ 5. The formula for brightness gain is:
- Brightness gain = minification gain – flux gain
 - Brightness gain = minification gain / flux gain
 - Brightness gain = minification gain \times flux gain
 - None of the above
- _____ 6. In reference to image intensification, the function that adjusts and maintains the overall image brightness and contrast during the fluoroscopic procedure is:
- DQE
 - APR
 - ABC
 - AEC
- _____ 7. The formula to determine the amount of magnification created when in magnification mode is:
- $MF = \text{full size input phosphor} / \text{selected input phosphor}$
 - $MF = \text{full size input phosphor}^2 / \text{selected input phosphor}^2$
 - $MF = \text{selected input phosphor} / \text{full size input phosphor}$
 - $MF = \text{selected input phosphor}^2 / \text{full size input phosphor}^2$
- _____ 8. Magnification of the fluoroscopic image results in improved:
- Brightness
 - Spatial resolution
 - Contrast

- d. Exposure
- ___ 9. Distortion of the fluoroscopic image that appears as unequal magnification is:
- a. Noise
 - b. Pincushion appearance
 - c. Vignetting
 - d. Magnification
- ___ 10. Increasing the mA is the way to correct a fluoroscopic image that has:
- a. Noise
 - b. Pincushion appearance
 - c. Vignetting
 - d. Magnification
- ___ 11. The CCD's electrical charge from the capacitors is sent to the:
- a. Output phosphor
 - b. Television monitor
 - c. X-ray tube
 - d. Image intensifier
- ___ 12. The purpose of a beam splitting mirror is to:
- a. Be able to view the fluoroscopic image on more than one television
 - b. Reduce the intensity of the image from the output phosphor
 - c. Allow spot filming to be done during fluoroscopy
 - d. None of the above
- ___ 13. Early versions of digital fluoroscopy used the standard system and added:
- a. A different camera
 - b. An ADC
 - c. Videotape
 - d. None of the above
- ___ 14. The analog to digital converter:
- a. Makes the electrical signal understandable to the computer
 - b. Determines the contrast resolution of the system
 - c. Determines the image matrix
 - d. All of the above
- ___ 15. Digital fluoroscopy is improved by using:
- a. A vidicon camera
 - b. Videotape
 - c. A beam splitting mirror
 - d. A CCD
- ___ 16. Which of the following is more light-sensitive?
- a. Tube-type camera
 - b. CCD
 - c. There is no difference between the two.
- ___ 17. Use of which of the following systems will result in less radiation dose to the patient?
- a. Tube-type camera
 - b. CCD
 - c. There is no difference between the two.

- ___ 18. The newest fluoroscopy systems use a flat-panel detector:
- To display the spot images during fluoroscopy
 - To record the overhead images following fluoroscopy
 - In place of the image intensifier
 - In addition to the image intensifier
- ___ 19. Flat-panel detectors for fluoroscopic imaging can be the:
- Amorphous silicon indirect capture type
 - Photostimulable phosphor plate type
 - Amorphous selenium direct capture type
 - A and C
- ___ 20. Which of the following has the possibility of demonstrating veiling glare and pincushion distortion?
- Conventional image intensifier
 - Flat-panel detector in place of image intensifier
 - There is no difference between the two.
- ___ 21. The x-ray beam used with a digital fluoroscopic unit uses _____ mA and a _____ beam.
- Low; constant
 - High; constant
 - Low; pulsed
 - High; pulsed

True/False

Indicate whether the statement is true or false.

- ___ 1. The ABC can be slow in responding, seen as a brief delay in the brightness adjustment.
- True
 - False
- ___ 2. When using magnification mode, the fluoroscopist needs to manually set the exposure factors higher to compensate for the reduced diameter input phosphor.
- True
 - False
- ___ 3. The purpose of a camera tube or CCD is to record the fluoroscopic image.
- True
 - False
- ___ 4. The beam splitting mirror is never used with fiber optics.
- True
 - False

Fluoroscopy Answer Section

MULTIPLE CHOICE

1. ANS: C
Fluoroscopy allows imaging of anatomy in motion, or dynamic imaging.

PTS: 1 OBJ: 1
2. ANS: B
The output phosphor absorbs electrons and emits light.

PTS: 1 OBJ: 2
3. ANS: C
The photocathode absorbs light and produces electrons.

PTS: 1 OBJ: 2
4. ANS: C
The image at the output phosphor is brighter in part because it is significantly smaller than the same image at the input phosphor.

PTS: 1 OBJ: 3
5. ANS: C
Brightness gain = minification gain \times flux gain

PTS: 1 OBJ: 3
6. ANS: C
ABC, or automatic brightness control, maintains the brightness and contrast of the fluoroscopic image during the procedure.

PTS: 1 OBJ: 4
7. ANS: A
The magnification factor during fluoroscopy is equal to the full size input phosphor divided by the selected input phosphor.

PTS: 1 OBJ: 5
8. ANS: B
Using the magnification mode improves spatial resolution of the fluoroscopic image.

PTS: 1 OBJ: 5
9. ANS: B
Pincushion appearance is the distortion of the fluoroscopic image that appears as unequal magnification.

PTS: 1 OBJ: 6
10. ANS: A
When a fluoroscopic image has noise, or is noisy, the quantity of radiation (mA) must be increased because the issue is too few photons being used to create the image.

- PTS: 1 OBJ: 6
11. ANS: B
After being briefly stored in the capacitor, the charge travels by wire to the television monitor.
- PTS: 1 OBJ: 7
12. ANS: C
The beam splitting mirror is used during fluoroscopy when a spot image is to be recorded on a photospot or cine camera.
- PTS: 1 OBJ: 7
13. ANS: B
Early digital fluoroscopy systems added an analog to digital converter between the camera and monitor.
- PTS: 1 OBJ: 9
14. ANS: D
The ADC converts analog data (electrical current) to digital data (1s and 0s). Each ADC has a set number of bits which determine image contrast resolution and the size of the image matrix.
- PTS: 1 OBJ: 9
15. ANS: D
A CCD used for converting the light image to an electronic image greatly improves digital imaging.
- PTS: 1 OBJ: 9
16. ANS: B
The charge-coupled device is more sensitive to the light from the output phosphor; it has a higher DQE.
- PTS: 1 OBJ: 7
17. ANS: B
Using a CCD device will require less radiation in order to produce a good image, thereby reducing patient exposure.
- PTS: 1 OBJ: 7
18. ANS: C
The newest fluoroscopy systems use a flat-panel detector in place of the image intensifier.
- PTS: 1 OBJ: 9
19. ANS: D
The indirect and direct capture detectors are suitable for fluoroscopy but the PSP plate is used only in recording static radiographic images.
- PTS: 1 OBJ: 9
20. ANS: A
The image intensifier may demonstrate veiling glare and pincushion distortion, negatively affecting the fluoroscopic image's spatial resolution.
- PTS: 1 OBJ: 9
21. ANS: D
The x-ray beam used in digital fluoroscopy uses a high mA (in the hundreds) and a pulsed beam.
- PTS: 1 OBJ: 9

TRUE/FALSE

1. ANS: T

The automatic brightness control can often be seen lagging behind changes in the intensity of the x-ray exposure to the image intensifier.

PTS: 1 OBJ: 4

2. ANS: F

The need for increased exposure to the input phosphor when using magnification mode is automatically addressed by the ABC.

PTS: 1 OBJ: 5

3. ANS: F

The purpose of a camera tube or CCD is to convert the output phosphor image to an electronic signal that can then travel to the television monitor for viewing.

PTS: 1 OBJ: 7

4. ANS: T

The beam splitting mirror can only be used with optical lenses because the fiber optics won't allow the mirror to be introduced.

PTS: 1 OBJ: 7