

Mock exam Imaging Techniques in Radiology

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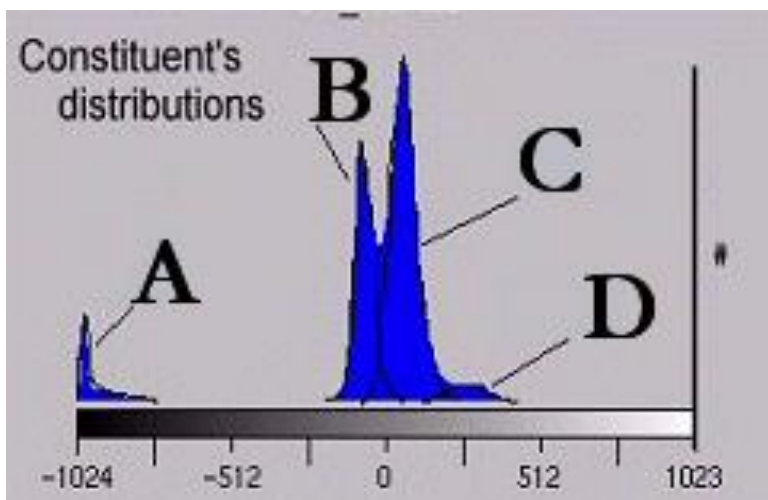
1. In a spin echo pulse sequence, the time between the middle of the first RF-pulse and the peak of the spin echo is?
 - a. TR
 - b. TE
 - c. TE/2
 - d. TI
2. A spin-echo sequence using a short TR and long TE produces?
 - a. A T1-weighted image
 - b. A T2-weighted image
 - c. A PD-weighted image
 - d. A noisy low contrast image
3. Which of the following is not a method for spatial localization of the MR signal?
 - a. Frequency encoding
 - b. Phase encoding
 - c. Location of receiver coils
 - d. Amplitude modulation
4. The Linear Energy Transfer (LET) is dependent on the ... of the incoming particle?
 - a. mass and charge
 - b. mass and kinetic energy
 - c. charge and kinetic energy
 - d. none of the above
5. The probability of production of Bremsstrahlung by an incoming particle (mass m_i , atomic number Z_i) on a target (mass m_t , atomic number Z_t) is...
 - a. Linear in Z_i over m_i
 - b. Linear in Z_t over m_t
 - c. Quadratic in Z_i over m_i
 - d. Quadratic in Z_t over m_t
 - e. None of the above
6. Broad beam geometry gives
 - a. overestimation of Half Value Layer and overestimation of attenuation
 - b. overestimation of Half Value Layer and underestimation of attenuation
 - c. underestimation of Half Value Layer and overestimation of attenuation
 - d. underestimation of Half Value Layer and underestimation of attenuation
7. As the number of x-rays emerging from the x-ray tube in x-ray imaging increases, noise, relative noise and signal-to-noise ratio
 - a. All increase
 - b. All decrease
 - c. Increase, decrease and increase
 - d. Decrease, increase and increase
 - e. Increase, decrease and decrease
 - f. decrease, increase and increase

8. What is true about the heel effect in an x-ray tube?
 - a. x-ray intensity and effective energy are increased at the anode side
 - b. x-ray intensity is increased and effective energy is decreased at the anode side
 - c. x-ray intensity and effective energy are decreased at the anode side
 - d. x-ray intensity is decreased and effective energy is increased at the anode side

9. A lower x-ray tube voltage in radiography gives...
 - a. More contrast because the attenuation differences are larger
 - b. Less contrast because the attenuation differences are larger
 - c. More contrast because the attenuation differences are smaller
 - d. Less contrast because the attenuation differences are smaller

10. The advantage of iterative reconstruction over filtered back projection in computed tomography is
 - a. Lower noise and lower dose
 - b. Lower noise or lower dose
 - c. Higher spatial resolution and lower dose
 - d. Higher spatial resolution or lower dose

11. Based on the CT Histogram below (x-axis = Hounsfield units, y-axis = number of voxels), which tissue composition would be valid for volume rendering:
 - a. A=Soft Tissue, B=Fat, C=Bone/Contrast, D=Air
 - b. A=Air, B=Fat, C=Soft Tissue, D=Bone/Contrast
 - c. A=Air, B=Soft Tissue, C=Fat, D=Bone/Contrast
 - d. A=Bone/Contrast, B=Soft Tissue, C=Fat, D=Air



12. Given the following voxel values that are traversed to produce a single pixel in the resulting image, which two techniques result in pixel values of -30 and 30.

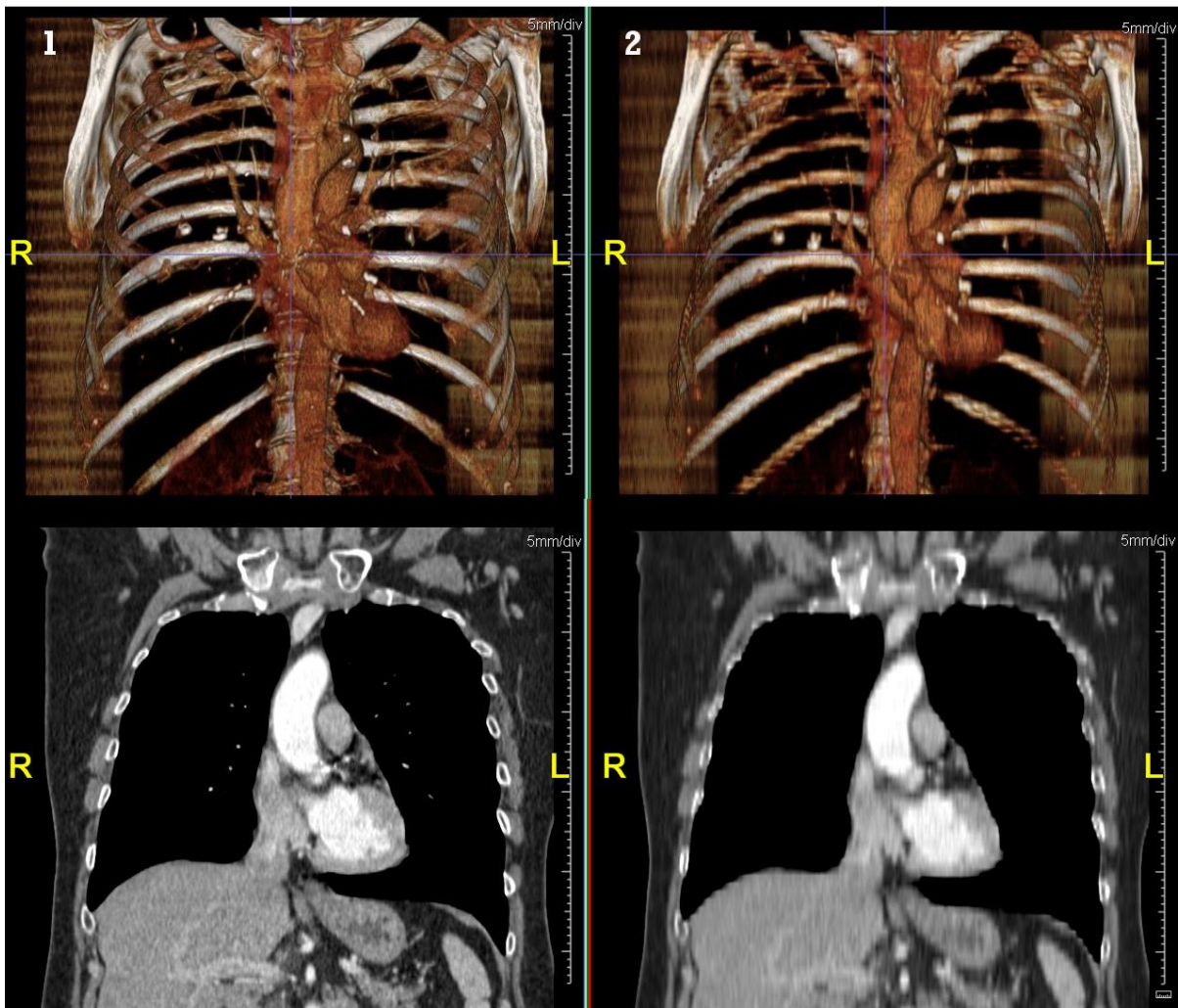
-20 | 0 | 0 | 20 | 10 | -30 | 40 | 10

 - a. AIP and MIP
 - b. MinIP and Ray Sum
 - c. MinIP and MIP

d. AIP and Ray Sum

13. The images below are two volume renderings and two MPR reconstructions. In each column the volume rendering and MPR are acquired from the same dataset. Please indicate what the most likely difference is between the two sets of images

- a. The images in column 1 and 2 are from different patients
- b. The images in column 1 have higher resolution in the z-direction
- c. The opacity curve settings are changes to enhance the contrast in column 1
- d. In column 2 a higher contrast was applied



14. Which scintillator is generally used in PET Scanners?

- a. Bismuth germanate (BGO)
- b. Lutetium oxyorthosilicate (LSO)
- c. Sodium Iodide (NaI)
- d. Caesium Fluoride (CsF)

15. The primary application of [^{18}F]NaF PET imaging is in:
- Atherosclerosis
 - Metastatic prostate cancer
 - Alzheimer's disease
 - Cardiac sarcoidosis
16. What is used to dope the crystal used in PET cameras to increase its performance?
- Yttrium (Y)
 - Thorium (Th)
 - Caesium (Cs)
 - Technetium (Tc)
17. Flat panel detectors used in fluoroscopy
- use a pentode system to accelerate electrons between the photocathode and the anode
 - allow for recording of fluoroscopy examinations, while systems with image intensifiers do not allow recording
 - have very small detector elements to allow for zooming
 - have higher quantum detection efficiency compared to image intensifiers
18. Digital radiography detectors have a different response to variations in relative exposure compared to screen-film. This has several implications in mammography. What is true?
- Screen-film has a linear response to exposure, resulting in better image quality than digital detectors
 - Digital detectors have an "S-curve" shaped response to exposure, resulting in better image quality than screen-film
 - Screen-film has an "S-curve" shaped response to exposure, resulting in a higher dynamic range than digital detectors
 - Digital detectors have linear response to exposure, resulting in a higher dynamic range than screen-film
19. Which of the statements about magnification mode of mammography is wrong?
- The larger focal spot is used for magnification to provide increased resolution
 - The smaller focal spot is used for magnification to reduce geometric blurring
 - The magnification view allows for better appreciation of fine structures but limits the field of view
 - In the magnification mode the anti-scatter grid is not necessary because the air gap provides geometric scatter rejection

Correct answers

1b 2d 3d 4c 5e 6b 7c 8d 9a 10b 11b 12b 13b 14b 15b 16a 17d 18d 19a