

Multi choice quiz with motivation on X-ray Imaging

This quiz is intended to test your knowledge on topics that could be part of the exam. It is possible that the exam will include 1-2 multi-choice quizzes where you also have to explain your choice.

(Solutions will be provided 2 weeks before the end of the teaching semester)

1) In x-ray imaging, quantum noise is determined by

- a. Energy of x-rays hitting the detector
- b. Number of x-rays hitting the detector
- c. Tissue contrast
- d. Amount of scatter hitting the detector

2) Tissue contrast is generated by what type of interaction

- a. Coherent (Rayleigh) scatter
- b. Incoherent (Compton) scatter
- c. Photoelectric effect
- d. Overall attenuation
- e. Beam hardening effect

3) Larger patients require higher tube currents (more radiation, increased air kerma) in order to improve image

- a. Contrast
- b. Noise
- c. Resolution
- d. Dose

4) Iodine is an effective contrast agent because

- a. It has a high likelihood of photoelectric interaction at diagnostic x-ray energies
- b. It has a high likelihood of Compton interaction at diagnostic x-ray energies
- c. It has a high electron density
- d. It has a high mass density

5) In order to distinguish cancer from glandular tissue, mammography relies on

- a. Intravenous contrast agents
- b. High tube currents (mA)
- c. High x-ray energies to increase photoelectric effect
- d. Low x-ray energies to increase Compton scattering
- e. Low x-ray energies to increase photoelectric effect

6) Molybdenum is traditionally used as an x-ray anode in mammography because of its

- a. Good heat capacity

- b. Characteristic x-rays
- c. Efficient Bremsstrahlung radiation
- d. Intrinsic filtration

7) In x-ray imaging, scatter:

- a. Contributes to better tissue contrast
- b. Degrades tissue contrast
- c. Has no effect on tissue contrast

8) The major disadvantage of using anti-scatter grids is

- a. Worse resolution
- b. Increased dose
- c. Worse contrast
- d. Longer imaging time

9) Collimation results in

- a. Increased radiation exposure to the patient
- b. Increased scatter within the patient
- c. Improved tissue contrast

10) Changing filters (aka kernels) in filtered backprojection results in

- a. Trade-off between image sharpness and noise
- b. Different window levels in CT images
- c. Different patient dose
- d. Different reconstructed field of view (FOV)

11) The main advantage of iterative reconstruction techniques versus filtered backprojection is

- a. Better depiction of bone detail
- b. Better handling of noisy images
- c. Faster reconstruction
- d. Lower pitch

12) In helical CT, a single coronal slice represents:

- a. A plane through the body perpendicular to the scan axis
- b. A plane through the body oblique to the scan axis
- c. A reconstruction made from projections at neighboring scan axis positions

13) High-pitch techniques are useful for

- a. Very small findings

- b. Gated cardiac CT
- c. Accurate multiplanar reconstructions
- d. Fast scans

14) In helical CT, a low-pitch technique might be most helpful for

- a. Scanning a tachypneic patient
- b. Detecting a non-displaced fracture
- c. Detecting a subtle liver lesion
- d. Scanning a child

15) The major technical challenge in 4DCT is

- a. Spatial resolution
- b. Acquiring a regular physiological signal for image re-binning
- c. Contrast resolution
- d. Three-dimensional reconstruction

16) The major determinant of temporal resolution in CT is

- a. Gantry rotation speed
- b. Reconstruction algorithm
- c. Fan-beam angle
- d. Detector collimation
- e. Computer processing power