Chapter 25

1. The ability of a whole image acquisition system or any of its components to detect and measure small amounts of radiation defines its:
   1. Sensitivity
   2. Dynamic range
   3. Brightness
   4. Contrast resolution
2. To produce adequate signal for a latent image to form, less exposure is required if the image receptor has:
   1. Lower sensitivity
   2. Higher sensitivity
   3. Lower dynamic range
   4. Higher dynamic range
3. Receptor exposure is dependent upon:
   1. mAs
   2. kVp
   3. both A and B
   4. Neither A nor B
4. Each type of image receptor has its own *inherent:*
   1. Sensitivity
   2. Dynamic range to reproduce subject contrast
   3. Spatial resolution
   4. All of the above
   5. None of the above
5. Which of the following best describes the ability of an entire imaging system to reproduce the differences between tissues within the body in the final displayed image:
   1. Sensitivity
   2. Dynamic range
   3. Spatial resolution
   4. Contrast resolution
6. The sensitivity of an image acquisition system depends upon:
   1. the inherent sensitivity of the image receptor
   2. the speed setting of the computer processing system
   3. both of the above
   4. neither of the above
7. The overall ability to bring out the maximum number of details in an image is the

definition of:

a. visibility factors

b. geometrical factors

c. sharpness of recorded detail

d. subject contrast

e. resolution

8. Beam-part-receptor alignment is the primary control for image:

a. magnification

b. shape distortion

c. spatial resolution (sharpness)

d. resolution

9. The ratio of SID to SOD is the primary control for:

a. magnification

b. shape distortion

c. exposure

d. subject contrast

10. All of the following are components of image penumbra *except*:

a. geometrical penumbra

b. absorption penumbra

c. scatter penumbra

d. all of these are components of penumbra

11. Density trace diagrams show how both sharpness and contrast in an image affect its:

a. edge gradient

b. acutance

c. brightness

d. gray scale

12. The overall resolution for an imaging system is measured by physicists as:

a. acutance

b. modulation transfer function

c. spatial frequency

d. quantum mottle

13. The ability to distinguish adjacent details as being separate and distinct depends upon:

a. visibility factors

b. geometric factors

c. both of these

d. all of these

14. Which of the following is *not* a form of image noise:

a. false images

b. mottle

c. artifacts

d. signal

15. Spatial frequency is measured in:

a. LP/mm

b. MTF

c. C/P

d. seconds

16. Which shape of object produces the worst case of absorption penumbra:

a. trapezoid

b. upright triangular

c. cuboid

d. spherical

17. An image with a steep edge gradient, and therefore a high contrast/penumbra ratio, will

present:

a. high spatial resolution (sharpness)

b. low visibility

c. low geometric integrity

d. low distortion

18. Graduated partial absorption of the x-ray beam as a function of the varying *thickness* of an

anatomical structure (independent of the focal spot) is referred to as:

1. the heel effect
2. detail contrast
3. geometrical penumbra
4. absorption penumbra
5. total penumbra

19. *Spatial resolution,* as defined by a physicist is also called the “line spread function” or “point

spread function,” and correlates only to the \_\_\_\_\_\_\_\_\_\_ dimension of an exposure trace

diagram:

1. vertical
2. horizontal
3. linear
4. third

20. The smallest object size that can be resolved in a radiographic image is inversely

proportional to one-half of the:

1. modulation transfer function
2. spatial frequency
3. focal spot
4. density trace

21. What size is the smallest object that can be resolved by an x-ray imaging system with a

spatial frequency of 2.5 LP/mm?

1. 0.2 mm
2. 0.4 mm
3. 2 mm
4. 2.5 mm
5. 5 mm

22. If the smallest object an imaging system can resolve is 0.167 mm in size, what is the spatial

frequency for this system?

1. 0.35 LP/mm
2. 0.7 LP/mm
3. 1.5 LP/mm
4. 3 LP/mm
5. 6 LP/mm

23. If the spatial frequency in the remnant x-ray beam is 5 LP/mm, and the hardware pixels of a

digital imaging receptor plate are 0.2 mm in size, what is the smallest object that can be

resolved by this system?

1. 0.05 mm
2. 0.1 mm
3. 0.2 mm
4. 0.5 mm
5. 1 mm

24. As the line pairs of a resolution test template become smaller and thus closer together, the

overlapping of their penumbra in a radiographic image causes a loss of at the

microscopic level:

1. width
2. umbra
3. contrast
4. noise
5. pixels

25. Mathematically, the ratio of an image’s recorded contrast to the real anatomical structure’s

subject contrast defines the for the imaging system:

1. detail
2. modulation transfer function
3. spatial resolution
4. minimum resolvable object size
5. absorption penumbra

26. If the measured contrast between two anatomical structures in an image is 2, and the subject

contrast between the two real structures has a relative value of 6, what is the modulation

transfer function for this image?

a. 300%

b. 200%

c. 33%

d. 16%

e. 3%

27. Which of the following is *not* a variable affecting subject contrast in the latent image?

1. Severe motion
2. Type of x-ray generator used
3. Field size
4. Focal spot
5. Thick compensating filters

28. Which of the following artifacts can be caused by the display monitor if when experiment is

done with a lead foil resolution template with the slits running horizontal in relation to

the display screen?

* 1. Halo effect
  2. Aliasing
  3. Grid lines
  4. Pixel drop-out