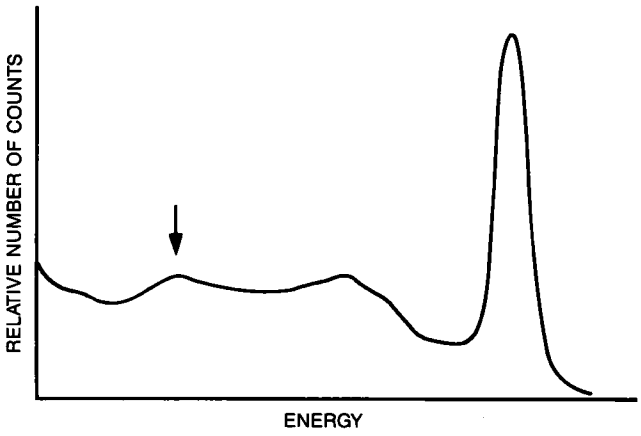
SELF-ASSESSMENT QUIZ: SCINTILLATION CAMERA

The Continuing Education Committee presents this quiz for self-evaluation on scintillation camera operation. Answers can be found on page 45. References are listed at the end of the quiz to assist you in your review of this topic. Please select the best answer for each question below.

1. *Which instrument is used for counting single pulses from the amplifier that fall within a selected voltage range?*
   a. Cutie pie
   b. Well counter
   c. Diverging collimator
   d. Single channel analyzer — Ref 1 p. 81

2. *Below is pictured a pulse height spectrum. Identify the region indicated by the arrow.*



   a. Photopeak
   b. Secondary
   c. Backscatter
   d. Compton edge — Ref 1 p. 195

3. *The purpose of a _____ is to amplify small signals produced by the radiation detector; match impedance levels between the detector and the system components; and shape the signal pulse for processing.*
   a. High voltage supply
   b. Pre-amplifier
   c. Single-channel analyzer
   d. None of the above — Ref 1 p. 74

4. *Name the collimator that enlarges the field of view:*
   a. Converging collimator
   b. High resolution collimator
   c. Diverging collimator
   d. Parallel hole collimator — Ref 2 p. 226

5. *Which of the following is not a multihole collimator?*
   a. Flat-field collimator
   b. Focused (converging) collimator
   c. Diverging collimator
   d. Slant (30 degree) collimator — Ref 2 p. 229

6. *Single channel analyzers count pulse heights:*
   a. that fall below a predetermined level
   b. that fall between two analyzer settings
   c. that fall above a predetermined level
   d. None of the above — Ref 2 pp. 222–225

7. *Resolution is the minimum distance between two radioactive objects that can still be distinguished as two distinct sources by a collimator. The degree of resolution varies with the:*
   a. Physical design of the collimator
   b. Material of the collimator
   c. Energy of the gamma rays being counted
   d. All of the above — Ref 2 p. 332

8. *Which of the following collimators would provide the best resolution through magnification?*
   a. Parallel hole
   b. Converging
   c. Diverging
   d. Pinhole — Ref 3 pp. 108–109

9. *Full width at half maximum (FWHM) is often a measurement of:*
   a. Uniformity
   b. Sensitivity
   c. Intensity
   d. Resolution — Ref 2 p. 99

10. *When a source is moved away from a diverging collimator the sensitivity and resolution:*
    a. Improves
    b. Stays the same
    c. Degrades
    d. Enlarges — Ref 2 p. 109

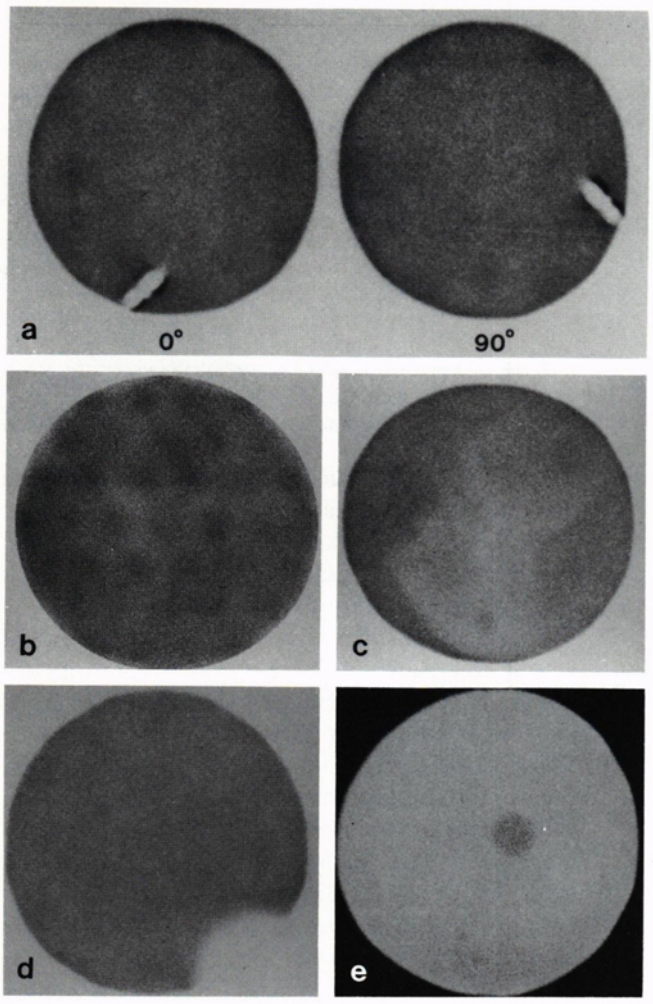
11. *Most important in maintaining the best resolution of a gamma camera as recorded on film is the:*
    a. Small dot size on CRT
    b. Type of CRT used
    c. Type of image recorded
    d. Aperture size of lens — Ref 4 p. 19

12. *Uniformity of a gamma camera may be measured as either intrinsic or extrinsic:*
    a. True
    b. False — Ref 4

13. *When testing the "temporal" resolution of a gamma camera you are checking:*
    a. Sensitivity
    b. Dead time
    c. Linearity
    d. Photopeak centering — Ref 2 pp. 290–292

14. *Flood field imaging should be performed:*
    a. Daily
    b. Weekly
    c. Monthly
    d. Yearly — Ref 4

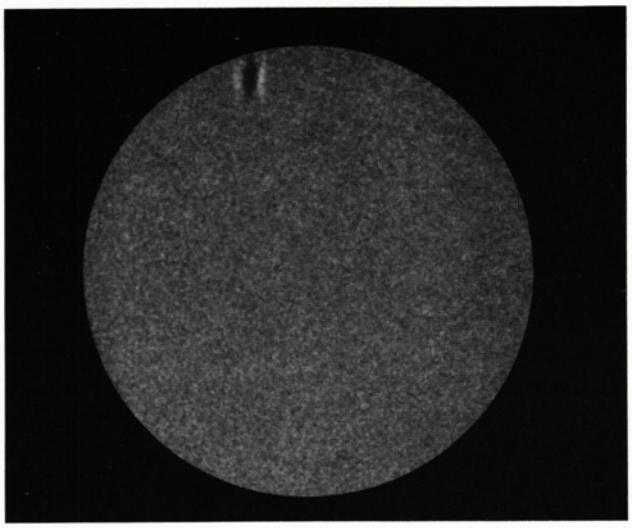
15. *Identify or match the following (refer to images below).*



_____a. 1. PM tube not functioning
_____b. 2. Liquid flood source not adequately mixed
_____c. 3. Cracked crystal
_____d. 4. Off peak
_____e. 5. Bubble in liquid flood source

Ref 5 pp. 336–367

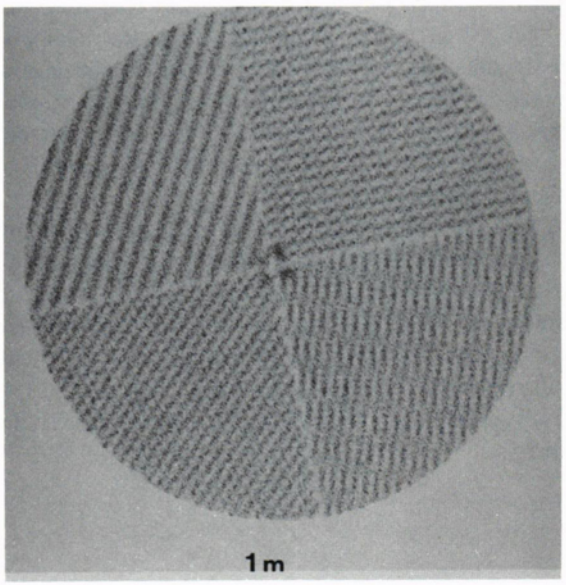
16. *This nonuniformity has rotated when the orientation was changed. What has been eliminated as the source of the nonuniformity (refer to image below)?*



a. The collimator
b. The crystal
c. The PM tubes
d. Improper PHA settings
e. The photographic system

Ref 3 p. 120

17. *This image is an example of moire patterns, which are caused by:*



a. Medium energy flood source with a low energy collimator
b. Moving the bar phantom during imaging
c. Using a low energy flood source with a medium energy collimator
d. A cracked crystal superimposed on a bar phantom
e. Superimposed bar phantom and collimator patterns

Ref 6 pp. 260–261

References

1. Sorenson JA, Phelps ME. Physics in nuclear medicine. Orlando, Fla.: Grune and Stratton, 1980.
2. Early PJ, Sodee DB. Principles and practice of nuclear medicine. St. Louis, Missouri: C.V. Mosby, 1985.
3. Bernier DR, Langan JK, Wells LD. Nuclear medicine: technology and techniques. St. Louis, Missouri: C.V. Mosby, 1981.
4. Workshop manual for Q.C. in nuclear medicine. Washington, D.C.: HEW Publication (FDA) 76-8039, 1976:19.
5. Rhodes BA. Quality control in nuclear medicine. St. Louis, Missouri: C.V. Mosby, 1977.
6. Yeh, EL. Distortion of bar-phantom image by collimator. *J Nucl Med* 1979;20:260–261.