

Part 18: RADIOISOTOPE DOSE CALIBRATOR: FUNCTION AND QUALITY CONTROL

1. Dose calibrators detect radiation using
 - a. a NaI(Tl) scintillation crystal
 - b. a liquid scintillation detector
 - c. an ionization chamber
 - d. a solid state Germanium detector

2. Dose calibrators can accurately measure radioactivity levels between
 - a. 1 μ Ci and 1 mCi
 - b. 100 μ Ci and 5 Ci
 - c. 1 μ Ci and 1 Ci
 - d. 100 μ Ci and 100 Ci

3. According to the current NRC Regulations, all administered doses must be within ∇ _____% of the prescribed dose
 - a. 5
 - b. 10
 - c. 15
 - d. 20

4. For all required QC tests on a dose calibrator, the expected and measured readings must be within
 - a. $\pm 5\%$
 - b. $\pm 10\%$
 - c. $\pm 15\%$
 - d. $\pm 20\%$

5. How often should a dose calibrator be checked for accuracy?
 - a. Daily
 - b. Monthly
 - c. Quarterly
 - d. Annually

6. Is the following accuracy test a "Pass" or a "Fail"?

Standard	Energy (keV)	expected value (mCi)	measured value (mCi)
Co-57	122	2.48	2.51
Cs-137	662	3.38	3.29
Co-60	1,332	1.55	1.52

7. How often must a dose calibrator be checked for constancy?

- a. Daily
- b. Monthly
- c. Quarterly
- d. Annually

8. Is the following constancy test a "Pass" or a "Fail"?

Isotope Setting	<u>Reading (μCi)</u>				
	Mon	Tues	Wed	Thu	Fri
Cs-137	123	124	122	126	124
Ga-67	223	224	222	226	224
Tl-201	163	164	162	166	164
Tc-99m	243	244	242	246	244
I-131	313	314	312	316	314
I-123	193	194	192	196	194
In-111	283	284	282	286	284
Xe-133	433	434	432	436	434

9. How often must a dose calibrator be checked for linearity?

- a. Daily
- b. Monthly
- c. Quarterly
- d. Annually

10. Is the following linearity test a "Pass" or a "Fail"?

Elapsed time (hr)	expected value	measured value
0	300	300
1	267	230
2	238	201
3	212	135
6 (1 HL)	150	92
12 (2 HL)	75	36.4
24 (4 HL)	18.75	7.5

11. How often must a dose calibrator be checked for geometry?

- a. Daily
- b. Monthly
- c. Quarterly
- d. Annually
- e. At Installation

12. Is this geometry test a "Pass" or a "Fail"?

Sample Volume	Activity (mCi)
0.5 ml	25.5
1.0	25.3
2.0	25.0
3.0	24.8
4.0	24.7
5.0	24.5
6.0	24.4

13. Which ONE of the following radioisotopes would be the most difficult to calibrate in a dose calibrator?

- a. Tc-99m
- b. I-123
- c. Y-90
- d. I-131

14. Which ONE of the dose calibrator QC tests is designed to determine the reproducibility of the instrument day after day?

- a. Accuracy
- b. Constancy
- c. Linearity
- d. Geometry

15. Which one of the following procedures can be performed in the dose calibrator?
- a. Al^{3+} ion breakthrough test
 - b. Mo-99 breakthrough test
 - c. Counting of a wipe used for package survey
 - d. None of the above