Equipment Quality Assurance Checks and Procedures in Nuclear Medicine

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I. <u>Hot-Lab Equipment</u>

A. Survey meters

- 1. calibrated at least annually
- 2. battery check
- 3. source check (put "out of service" sticker on meter if not operating properly)

B. Dose calibrators

- 1. annual test of accuracy, using 2-3 NIST-traceable sources covering energy range used in nuclear medicine; must be accurate within +/- 5%.
- 2. quarterly test of linearity; should cover range of activities used in your clinic. typically from 10 microCi up to a few hundred mCi.
 - can use decay method over ~4 days, or the "Cali-check" lead-sleeve method
 - measured activity values must be within +/- 5% of the expected values on the decay curve.
- 3. daily test of constancy, and check buttons on all settings used in the clinic
- 4. test of geometry independence. Must be done once after receiving a new dose calibrator, and/or after a dose calibrator has been serviced or repaired.
 - do the test for a standard vial size and a standard-size syringe (i.e., use the vial and syringe most commonly used in your clinic).
- C. Sodium-iodide well-counter
 - 1. Measure efficiency of 2-3 standard calibration "stick" sources at least annually to make sure efficiency has not changed significantly. The efficiency is usually expressed as detected counts per minute, divided by source activity (in decays per minute), i.e., cpm/dpm.
 - 2. Good idea to have annual preventive maintenance servicing on well-counters.

D. Other procedures

- 1. Mo-99 breakthrough test. Performed after Tc-99m generator is eluted. Place vial inside lead shield. (The lead absorbs the 140-keV photons from Tc-99m, but allows most of the 740-780 keV photons from Mo-99 to penetrate the lead and contribute to the dose-calibrator signal.) Read the vial on the Mo-99 setting and correct for the fraction of Mo-99 photons absorbed in the lead.
- Mo-99 breakthrough in injectate < 0.15 micro-Ci of Mo-99 per mCi of Tc-99m.
- 2. Aluminum breakthrough (chemical test kit), must be < 10 micrograms/mL.
- 3. daily area surveys (in all rooms of the clinic, at specified locations). exposure rate with survey meter must be < 0.02 mR/h, (or < 0.1 mR/h in the hot-lab).
- 4. weekly area wipe test to look for removable contamination at specified locations throughout the nuclear medicine clinic. Count all wipe samples in the well-counter. BWH action level: 2,000 dpm/100 sq. cm, for Tc-99m (200 dpm/100 sq. cm I-131)
- 5. radioactive package wipe test. Same limit (2,000 dpm/100 sq.cm)
- 6. sealed-sources: quarterly inventory, and leak tests every 6 months (only req'd for sources > 100 microCi of a beta or gamma emitter).