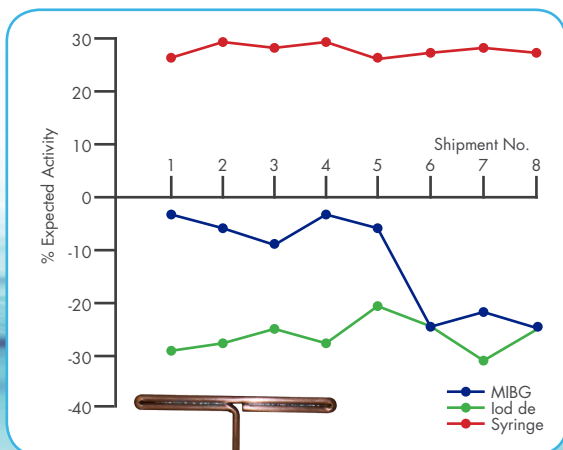


Activity measurements of ^{123}I in vials or syringes with an ionisation chamber often demonstrate large variations from expected values. The reason is that ^{123}I emits low energy X-rays in the range 27-32 keV, identical to those of ^{125}I , and the ionisation chamber is sensitive to these low energy emissions. Typically 62% of the activity reading of a Capintec ionisation chamber is due to the X-rays. Although most calibrators have a calibration factor for ^{123}I this is likely to be for a particular type of vial. However the varying attenuation of different manufacturers glass vials or of syringes leads to the observed variation in measurements, which have been highlighted in various national trials.

It is possible to use the measurements of a particular manufacturer's vials as a continuous check on subsequent deliveries. This is shown in figure 1 where it can be seen that the vials of iodine consistently measured about 25% less than the stated activity whereas syringes measure about 27% higher than expected. The vials of MIBG were generally about 7% less than expected until shipment number 6. The latter measurement was 20% less than expected, leading to uncertainty regarding the true activity. In fact the manufacturer had changed the type of vial which led to the reduced activity measurement. As seen in figure 1, further deliveries were consistent with the lower observed percentage value of the new vial type.

Ideally, the ionisation chamber measurement should be reliable no matter what type of vial or syringe is used. This can be achieved by filtering out the low energy X-rays [Harris et al (1), Thomson et al (2)]. A copper filter 0.5mm thick removes these X-rays but only reduces the 159 keV emissions by 14%. The ionisation chamber needs to have a new calibration factor for the measurement of ^{123}I with the copper filter, and Thomson et al. outlined a simple method for determining this factor using a measurement made on $^{99\text{-m}}\text{Tc}$ to determine the change in sensitivity when using the copper filter. With the copper filter, the variation of activity measurements when ^{123}I is in a syringe, compared to the activity in a vial, is reduced from 80% to 3%.

Using the copper filter allows the ^{123}I activity to be measured accurately in a wide range of syringes or vials without the need for a range of lookup correction factors.



REFERENCES:

Harris CC, Jaszczak RJ, Greer KL, Briner WH, Coleman RE. *Effect of characteristic X-rays on Assay of ^{123}I by Dose Calibrator.* J.Nucl Med 1984;25:1367-1370

Tomson WH, Hesslewood SR, Hepplewhite J, Parker K and Perrin B. *Ionisation Chamber Measurements of ^{123}I using a Copper Filter*

REPRINTED WITH THE KIND PERMISSION OF W.H. THOMSON ET AL. CITY HOSPITAL, BIRMINGHAM, B18 7OH, UK.

A complete copy of this paper is available upon request

