TO THE EDITOR:

Strontium-87m has been shown to be of value in the diagnosis of occult bone tumors (1), and in the study of healing fractures (2), and bone growth (3). The isotope is supplied as an Yttrium-87/Strontium-87m generator by Brookhaven National Laboratories. Because of its short half-life (2.8 hours), calibration standards of Sr-87m are not available for radioassay. Our original assay method involved the determination of the counting efficiency of Sr-87m by interpolation on a curve of efficiency vs. photon energy, using 5 monoenergetic gamma emitters (Hg-203, Cr-51, Au-198, Sr-85, Cs-137) (1). This function is a straight line on semilogrithmic paper. Daily fluctuations in counting efficiency were corrected by reference to a Cs-137 calibration standard.

A direct radioassay is now posisble by use of Tin-113/Indium-113m as a calibration standard.

Strontium-87m decays by emission of a 388 keV photon in 99.35% of disintegrations and by electron capture of 0.65% of the time (4), 21.9% of the photons are internally converted. There are therefore $99.35 \times (1-.219) = 77.6$ usable photons per 100 disintegrations. Tin-113 decays exclusively by electron capture to Indium-113m, which in turn emits a photon of 392 keV to reach ground state (In-113). This photon is internally converted in 30.6% of disintegrations; that is, there are $100 \times (1-.306) = 69.4$ usable photons per 100 disintegrations of Tin-113.

Since the photons of Sr-87m (388 Kev) and In-113m (392 Kev) are indistinguishable in a medical spectrometer, known amounts of the latter may be used to assay the former. Tin-113 has a conveniently long half-life (119 days) and need be purchased only once every two years. In the quantities used for calibration purposes, an AEC license is not required. The half-life of the Indium-113m daughter is 104 minutes.

Ten microcuries of Sn-113/In-113m in approximately 2.5 ml is obtained as a calibrated stock solution from a commercial supplier (Tracerlab). The calibration standard is prepared by pipetting approximately 0.8 uC (0.2 ml) from the stock solution into a test tube, diluting to 2 ml, and sealing the top of the test tube. The generator eluate is assayed by pipetting 0.1 ml into a 100 ml volumetric flask and counting 2 ml of the diluted radiostrontium. Both the calibration standard and the diluted eluate are counted in the same window (330-450 Kev) on a pulse-height analyzer-scaler.

The radiostrontium concentration of the eluate in uc/ml is then:

$$\frac{\text{uc Sn-113 std/ml} \times \text{Sr-87m cpm} \times 0.894 \times 1000}{\text{Sn-113 cpm}}$$

where 0.894 is the ratio of the usable photon yields of Sn-113 (0.694) to Sr-87m (0.776) and 1000 is the dilution factor.

In a typical study, the following results were obtained:

$$\text{uc Sr-87m/ml} = \frac{0.323 \text{ uc/ml} \times 257862 \text{ cpm} \times 0.894 \times 1000}{198032 \text{ cpm}} = 377 \text{ uc/ml}$$

At the end of a year (3 half-lives) radioactive decay has so reduced the activity of the calibration standard that 2.0 ml (approximately 1 uC) of the stock

solution is pipetted into a test tube, sealed, and used as a new calibration standard. This source should prove satisfactory for at least another year.

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TO THE EDITOR

There is some variance in the current literature about what one should consider as a normal ^{51}Cr red cell survival time. It is generally held that the red cell surival time should be about 28 to 32 days; however, the range of standard deviation is not clear. Therefore, I thought that experience gained in normal subject from a recent study might be worthwhile information for other laboratories.

Radiochromate red blood cell survivals were carried out in 26 subjects over a five-week period of time. The study was planned to see if there was any gastrointestinal blood loss induced by the chronic administration of potassium citrate along with a diuretic. The patients selected had a mean age of 81 years and were in a county home. Most of them had diagnoses of arteriosclerosis, senility, and organic brain syndrome. The study included a 7 to 10 day baseline period and a four-week period of observation while on drugs. During this period of time, the patients were seen daily and all stool was collected. The samples for red cell survival and hematocrit were gathered three times a week and weekly, a complete blood count was performed, including red blood cell indices and platelet evaluation. Serum iron and total iron binding capacity was obtained in any patient where there was a mild degree of anemia. Three patients were eliminated from this study during the period of observation because one was found to have a bleeding gastric tumor and two, because of severe arthritis, were found to have shortened cell survival of 23 and 22 days respectively. The cells were labeled with 200 μC of radioactive chromium in 20 cc of fresh-drawn autologous blood in a low-glucose ACD solution incubated for 45 minutes.

Three two-ml aliquots on each Monday, Wednesday, and Friday were counted in a standard scintillation well counter with a pulsh height discriminator which was adjusted to daily accuracy using a cesium standard. All stools were counted for radioactivity and a guaiac test was run on each specimen which had been previously homonogenized in a Waring blender. None of the patients had any evidence of blood loss.