PROPOSED ADMINISTRATION OF ^{85}Sr BY INTRAVENOUS INJECTION

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Background

1 This proposed study is intended to supplement existing data on alkaline earth metabolism in a single, healthy male volunteer, Subject , and in particular to establish whether changes occur in the pattern of clearance of strontium from the skeleton during late adult life. On four previous occasions, Subject was injected with nuclides of calcium or strontium of sufficient half-life to allow their retention in the body to be studied for 300 - 400 days (Table 1).

TABLE 1 DATA FROM PREVIOUS STUDIES WITH ^{45}Ca OR ^{85}Sr ADMINISTERED TO SUBJECT

Age	Nuclide	Duration of study (days)	C
53	^{85}Sr	336	0.16 ± 0.06
57	^{85}Sr	399	0.23 ± 0.02
60	^{85}Sr	388	0.17 ± 0.01
66	^{45}Ca	388	0.15 ± 0.01

PRIVACY ACT MATERIAL REMOVED

2 In Table 1, the parameter C is the exponent in the power function

$$R = Bt^{-C}$$

where R represents the retention at time t after intake; the parameters B and C were derived by analysis of the retention data obtained after the early clearance of activity from labile pools was judged to be complete. C is presumed to reflect, empirically, the rate at which tracer in a series of pools associated with bone is depleted; more details of these analyses are given elsewhere*.

3 Although C has no more specific metabolic significance, the trend of C with age may reasonably be used to indicate any age-related changes in the efficiency with which the tracer is removed from the skeleton. Unfortunately, the value (0.15) listed in Table 1 for age 66 does not bear legitimate comparison with the others, since it alone was derived following injection of radiocalcium, whereas the remainder emerged following intakes of strontium activity. Indications(1) are that the long-term treatment of the two elements by the skeleton is similar, but that calcium is less rapidly removed from the body because of the greater efficiency with which it is re-cycled into bone. Consequently, if the experiment at age 66 had involved strontium rather than calcium, it is likely that the value of C derived would have been > 0.15.

4 Overall therefore, the results in Table 1 suggest no important trend in the clearance pattern in this subject between ages 53 and 66, and this conclusion extends to the efficiency with which the tracer is initially deposited in the skeleton*. The study now proposed would indicate what, if any, differences are to be found at age 82.

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* AERE-R 12227

Proposal

5 The subject will receive an intravenous injection of 150 kBq ^{85}Sr in isotonic saline. Assessments of whole body retention will be made at intervals for as long as feasible - probably 500 days. Complete collections of excreta are envisaged during the first 3 - 4 weeks with probably about 12 blood samples (20 ml) analysed during this period.

Dosimetry

6 Weighted committed dose equivalents for each of the relevant organs listed in ICRP Publication 30 are given in Table 2, and are based on the metabolic model for strontium proposed in that document.

TABLE 2 WEIGHTED COMMITTED DOSE EQUIVALENTS (μSv) FOLLOWING INTRAVENOUS INJECTION OF 150 kBq ^{85}Sr

Organ	μSv
Red marrow	32
G I tract	30
Gonads	27
Lungs	11
Adrenals	10
Bone surfaces	9
Pancreas	6
Total	125

Summary

7 Approval is sought for the administration, by intravenous injection, of up to 150 kBq ^{85}Sr to a single, healthy male volunteer aged 82, in an investigation of age-related trends in strontium metabolism.

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Reference

(1) J Reeve et al. Calcif. Tissue Int. 35, 9-15 (1983).