INTRODUCTION OF A LIFETIME MEASUREABLE DOSE OF ^{41}CA INTO BONE AND MEASUREMENT OF TURNOVER.

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The use of 41Ca is particularly attractive as a tracer for human calcium metabolism because it is long lived ($t_{1/2}$ = 10^5 yr), decays with the release of soft x rays , so rare (natural Ca is only 10^{-15} ^{41}Ca) and in principle plentiful (produced by neutron activation of ^{40}Ca). The isotope's properties lend it to use for studies of human Ca metabolism and bone kinetics and ^{41}Ca can be employed as a tracer when the other isotopes are precluded.The feasibility of determining physiological parameters of bone turnover by measuring "steady state" values of a lifetime dose of tracer were investigated. Bones of a 53 yr old surgically menopausal female subject were labelled by feeding ^{41}Ca with meals over a 15 day period in 45 equal doses at a total dose of about 40nCi. Dietary Ca was maintained constant for this period at 1200 mg/d. A stable Ca isotope dilution determination of bone physiological parameters was performed in parallel beginning on day 10 of the ^{41}Ca feeding. After stable isotope administration, samples of blood, (1st 3 h) , urine (complete for 24 h, daily day 11-15, weekly for 2 wk, daily for day 26-28 and 57-60) and feces (complete day 10-15, 26-27 and 57-60) were obtained. ^{41}Ca was measured by accelerator (AMS) and other isotopes by thermal ionization mass spect. Using a steady state model of Ca distribution, the values of ^{41}Ca at the 15 day plateau was 1.22 e-8 in urine and 2.24e-9 in feces, fract. abs. of diet, by stable isotopes, was 0.09, turnover was calculated at 199 mg/d, comparable to 220 mg/d by stable isotope methods. By day 160, ^{41}Ca levels declined to 7.21e-11 and 8.07e-12 respectively in urine and feces.

(This work was performed under the auspices of the Department of Energy at the Lawrence Livermore National Laboratory under contract W-7405-Eng-48.)