BONE-SCANNING AGENTS: DISTRIBUTION AND SCANNING TIME

There has appeared a series of articles comparing various ^{99m}Tc bone-imaging compounds. These have included distribution data in animals and man as well as bone scans and comments on the scanning time and quality. A phrase has appeared in one of these articles (*1*) to the effect that the scans performed after injection of ^{99m}Tc-pyrophosphate are accomplished considerably faster than with ^{99m}Tc-polyphosphate. The localization data (Fig. 7, *1*) do not bear out this idea because both of these compounds are estimated to be present in the bone in equal amounts at the time of scanning. We should be interested in clarification of this dilemma.

BARBARA Y. HOWARD
C. DAVID TEATES
University of Virginia
Charlottesville, Virginia

THE AUTHORS' REPLY

We appreciate the interest shown by Drs. Howard and Teates in our work. The amount taken up by the bone and other tissues was identical for both ^{99m}Tc-polyphosphate and ^{99m}Tc-pyrophosphate (58.5% and 58.8%, respectively), but the time taken to accumulate an equal number of counts from the same region of the body was less with ^{99m}Tc-pyrophosphate. We do not have any tissue distribution levels in these patients and, therefore, can only speculate as to the reasons for this time difference. It should be noted that the blood background radioactivity was less with ^{99m}Tc-pyrophosphate (*1*). The decreased time taken with ^{99m}Tc-pyrophosphate may suggest, therefore, relatively increased bone uptake of pyrophosphate.

G. T. KRISHNAMURTHY
MANUEL TUBIS
W. H. BLAHD
VA Wadsworth Hospital Center and
UCLA School of Medicine
Los Angeles, California

REFERENCE

1. KRISHNAMURTHY GT, HUEBOTTER RJ, WALSH CF, et al: Kinetics of ^{99m}Tc-labeled pyrophosphate and polyphosphate in man. *J Nucl Med* 16: 109–115, 1975

EXPRESSION OF TISSUE ISOTOPE DISTRIBUTION

We have read with interest and approval the letters from Oldendorf (*1*) and Blau (*2*) proposing improvement in the methods of expressing tissue isotope distribution and should like to extend the discussion of the subject.

Both Oldendorf and Blau point out that if radionuclide retentions are expressed as percent of administered dose per gram of tissue it is impossible to make meaningful comparisons of the metabolic patterns in different species or even between individuals of the same species but of different sizes. A manifestly absurd example would be to postulate that the same dose of a radioactive particulate that is trapped quantitatively in the liver is administered to a mouse with a 1.7-gm liver and a man with a 1,700-gm liver. The uptake, expressed as percent of dose per gram, would be 59% for the mouse and 0.059% for the man. These results would differ by three orders of magnitude although the metabolic pattern is the same in the two species by definition. Less obvious is the fact that there can be a twofold difference between results in a 50-kg woman and a 100-kg man or a built-in source of error of 25% in results in a group of rats with the rather small weight range of 175–225 gm. Results expressed as percent of administered dose per gram are not valid for comparison of metabolic patterns between individuals of different sizes. One wonders how many of the apparent age-related metabolic differences that have been reported are due to this artefact. This difficulty was recognized as long ago as 1941 by G. Failla (*3*). It was at his suggestion that Kenney, Marinelli, and Woodward (*4*) used the term "differential absorption ratio". This was defined as:

$$\frac{\mu\text{Ci found per kg tissue}}{\mu\text{Ci administered per kg body weight}}$$

A similar term, but one based on retained dose rather than on administered dose, was used by Woodard and Kenney (*5*). One of us (HQW) has continued to use this or the similar term "differential retention" whenever appropriate. The term "percent mean body