

METASTATIC CALCIFICATION AND BONE SCANNING

The case report by McLaughlin (1) brings to a total of five the number of patients in whom metastatic calcification has been detected through scanning after the intravenous injection of a technetium-phosphate complex. From these studies a few general conclusions may now be drawn. Although the patients had various underlying diseases, such as carcinoma (1-3), vitamin D intoxication (4), or multiple myeloma (3), the common denominator among them appears to have been renal failure accompanied by hypercalcemia and hyperphosphatemia. (McLaughlin does not give the serum phosphorus value for his patient but there can be little doubt that it was elevated.) In the presence of renal failure the kidneys' ability to excrete phosphorus is reduced. If hypercalcemia occurs, the solubility product for calcium and phosphorus may be exceeded and precipitation of these substances occurs in soft tissues. When a technetium-phosphate complex is injected intravenously it appears to enter into the metabolically active depositions in the soft tissues so that a diffuse uptake in these tissues is noted when scanning is attempted. Through this mechanism metastatic calcification of the lungs and stomach has now been strikingly demonstrated. Several of the patients described have also had metastatic calcification of the kidneys; this, of course, cannot be detected through scanning because even normal kidneys show up clearly during bone scanning as a result of their role in excreting phosphorus.

Some points of practical importance emerge from these observations. In a patient with renal failure, hypercalcemia, and hyperphosphatemia, increased uptake of a technetium-phosphate complex in the lungs or stomach may be accepted as a sign of metastatic calcification. Biopsy is probably no longer necessary to make the diagnosis, as it has been in the past. Since the scanning procedure may be repeated without hazard to the patient it may prove to be a useful guide to the progress of treatment. The heart is another organ that may be involved in metastatic calcification. This has not yet been demonstrated through scanning with a technetium-phosphate complex but, with special techniques to obviate the obscuring effect of the overlying ribs and sternum, it no doubt will be in time.

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REFERENCES

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BEHAVIOR OF ^{99m}Tc -LABELED DIPHOSPHONATE ON SEPHADEX AND BIO-GEL

Gel chromatography using Sephadex has proven to be a suitable analytical tool for the quality control of ^{99m}Tc -labeled radiopharmaceuticals because of its ability to separate ^{99m}Tc -labeled compounds, ^{99m}Tc -pertechnetate, and reduced uncomplexed ^{99m}Tc (hydrolyzed reduced technetium) (1).

As pointed out by Valk, et al (2) the results obtained from Sephadex G-25 gel chromatography are sometimes inconsistent with the in vivo biologic behavior of the radiopharmaceutical preparation

being tested. The authors assumed an interaction between weak ^{99m}Tc complexes and Sephadex (a cross-linked polysaccharide), which may act as a chelating agent because of the high density of hydroxyl groups. It was hypothesized that weak complexes of technetium in competition with Sephadex lost the radionuclide to the column.

This point of view was supported by the results obtained by Richards and Steigman (3,4) from studies on column stripping of reduced ^{99m}Tc by elution