<1>

Unique Identifier
76026740

Authors
Subramanian G. McAfee JG. Blair RJ. Kallfelz FA. Thomas FD.

Title
Technetium-99m-methylene diphosphonate--a superior agent for skeletal imaging: comparison with other technetium complexes.

Source
Journal of Nuclear Medicine. 16(8):744-55, 1975 Aug.

Local Messages
BAMC

MeSH Subject Headings

Animal
*Bone and Bones
Comparative Study
Diphosphates/du [Diagnostic Use]
Diphosphates/me [Metabolism]
Dogs
Erythrocytes/me [Metabolism]
Etidronate Disodium/du [Diagnostic Use]
Etidronate Disodium/me [Metabolism]
Human
Male
Mice
*Organophosphorus Compounds/du [Diagnostic Use]
Pelvic Bones/me [Metabolism]
Phosphates/du [Diagnostic Use]
Phosphates/me [Metabolism]
Rabbits
Radiation Dosage
*Radionuclide Imaging
*Technetium/du [Diagnostic Use]

Abstract
Methylene diphosphonate (MDP) was formulated as a complex of 99mTc for skeletal imaging. This agent was compared with three other bone-seeking technetium agents: ethane-1-hydroxy-1, 1-diphosphonate (EHDP), pyrophosphate, and polyphosphate. In tissue radioassay experiments in rodents, the technetium complexes of MDP and EHDP were similar, but skeletal concentration with both of these agents was higher than that with pyrophosphate or polyphosphate. The total-body retention of MDP and EHDP complexed with 95mTc was studied in beagle dogs for 35 days by excretion measurements and total-body counting and compared with polyphosphate and pertechnetate. The long-term retention was greater for MDP. The 5-day cumulative fecal excretion of 95mTc was low when administered as EHDP or polyphosphate complexes and negligible when administered as MDP complex. In six human volunteers the blood clearance of 99mTc-mdp was similar to that of 18F and significantly faster than that of 99mTc-EHDP. Pyrophosphate cleared from the blood much faster than polyphosphate but slower than the diphosphonates. The urinary excretion of the MDP complex was greater than for EHDP within the first 2-3 hr after injection. The 24-hr urinary excretion of pyrophosphate and polyphosphate complexes was not as complete as for the diphosphonates. All four 99mTc complexes proved satisfactory for clinical imaging studies. The MDP complex produced images of superior quality as early as 2 hr after administration, attributable to its more rapid clearance from the blood and soft tissues. On the contrary, a longer interval of 3-4 hr after injection was usually needed for 99mTc-EHDP; pyrophosphate and polyphosphate complexes regularly required a waiting period of 4 hr. Comparitive radiation dose estimates were made based on the available biologic distribution data for these 99mTc skeletal-localizing agents.

<2>

Unique Identifier
76026690

Authors
Snow RM. Weber DA.

Title
Time-dependent image quality using 99mTc-pyrophosphate.

Source
Journal of Nuclear Medicine. 16(10):879-82, 1975 Oct.

Local Messages

BAMC

MeSH Subject Headings

*Bone Neoplasms/di [Diagnosis]
Diagnosis, Computer-Assisted
Diphosphates/bl [Blood]
*Diphosphates/du [Diagnostic Use]
Diphosphates/ur [Urine]
Human
Neoplasm Metastasis
*Radionuclide Imaging
Support, U.S. Gov't, Non-P.H.S.
Support, U.S. Gov't, P.H.S.
Technetium
Time Factors

Abstract

Technetium-99m-labeled pyrophosphate has proved to be a useful skeletal-imaging agent. In this study, specific areas of the skeleton were imaged at times ranging from 1/2 to 6 1/2 hr after injection of 99mTc-pyrophosphate. Count ratios between abnormal and normal bone with respect to adjacent soft tissue were obtained for selected regions of interest on computer-stored scintillation camera images. The results show that image quality improves most rapidly from 1/2 to 2 hr, but further modest gain in quality does occur on views recorded between 2 and 6 hr. All lesions detected on the later images were also observed on the early ones and the ratios of uptake between abnormal and normal bone from computer-processed scintillation camera images did not change appreciably with time after the 1/2-hr images. Our results confirm the clinical impression that overall image quality is better on views obtained at least 3 hr after injection. Further delays in imaging beyond 3-4 hr after injection probably will not result in any appreciable gain in diagnostic accuracy.

<3>

Unique Identifier

75078747

Authors

Rosenthall L. Kaye M.

Title

Technetium-99m-pyrophosphate kinetics and imaging in metabolic bone disease.

Source

Journal of Nuclear Medicine. 16(1):33-9, 1975 Jan.

Local Messages

BAMC

MeSH Subject Headings

Adenocarcinoma/co [Complications]
Adult
Aged
Anorexia Nervosa/co [Complications]
*Bone Diseases/di [Diagnosis]
Bone Diseases/et [Etiology]
*Diphosphates/du [Diagnostic Use]
Female
Hemodialysis/ae [Adverse Effects]
Human
Hyperparathyroidism/co [Complications]
Hyperparathyroidism, Secondary/co [Complications]
Middle Age
Osteitis Deformans/di [Diagnosis]
Osteitis Fibrosa Cystica/di [Diagnosis]
Osteomalacia/di [Diagnosis]
Parathyroid Neoplasms/co [Complications]
*Radionuclide Imaging
*Technetium

Abstract

A study was undertaken to investigate the behavior of 99mTc-Sn-pyrophosphate complex in metabolic bone disease. Of clinical importance was the generalized increased periarticular bone accumulation of the radiopharmaceutical in osteomalacia and in combined osteomalacia and osteitis fibrosa as found in patients with chronic renal failure. The pattern in primary hyperparathyroidism was variable. There was no correlation between the initial rates of accumulation of the radiophosphate complex or its bone to soft-tissue uptake ratio at 5 hr when compared with the degree of osteomalacia and osteitis fibrosa. It is postulated that the 99mTc-Sn-pyrophosphate complex has greater affinity for immature collagen than the crystal surface.

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Unique Identifier
75042594
Authors
Kelly JF. Cagle JD. Stevenson JS. Adler GJ.
Title
Technetium-99m radionuclide bone imaging for evaluating mandibular osseous allografts.
Source
Journal of Oral Surgery. 33(1):11-7, 1975 Jan.
Local Messages
CHECK HOLDINGS LISTS
MeSH Subject Headings
Animal
*Bone and Bones/tr [Transplantation]
Bone Marrow/cy [Cytology]
Bone Marrow/tr [Transplantation]
Bone Marrow Transplantation
Bone Regeneration
*Bone Transplantation
Comparative Study
Disease Models, Animal
Dogs
Femur/tr [Transplantation]
Gamma Rays
*Mandible/ra [Radiography]
Mandible/su [Surgery]
Osteotomy
Radiography/is [Instrumentation]
Radionuclide Imaging/st [Standards]
Scintillation Counting
Support, U.S. Gov't, Non-P.H.S.
*Technetium
Transplantation, Autologous
Transplantation, Homologous
Abstract
Sequential interpretation of osseous repair, more sensitive than with conventional radiography, is possible with a noninvasive, nondestructive radio-nuclide method. The method was used in the evaluation of the progress of osteogenic activity in mandibular bone grafts in 24 beagle dogs.

<5>
Unique Identifier
76071084
Authors
Subramanian G. McAfee JG. Blair RJ. Rosenstreich M. Coco M. Duxbury CE.
Title
Technetium-99m-labeled stannous imidodiphosphate, a new radiodiagnostic agent for bone scanning: comparison with other 99mTc complexes.
Source
Journal of Nuclear Medicine. 16(12):1137-43, 1975 Dec.
Local Messages
BAMC
MeSH Subject Headings
Adult
Animal
*Bone Diseases/di [Diagnosis]
Comparative Study
Dogs
Female
Human
Lethal Dose 50
Organophosphorus Compounds/du [Diagnostic Use]
*Phosphates/du [Diagnostic Use]
Phosphates/to [Toxicity]
Phosphonic Acids/du [Diagnostic Use]
Rabbits
*Radionuclide Imaging
Strontium Radioisotopes/du [Diagnostic Use]
*Technetium
Tin/du [Diagnostic Use]
Abstract
Imidodiphosphate (IDP) is an analog of pyrophosphate and diphosphonate, with a P-N-P bond instead of P-O-P or P-C-P. We have labeled IDP with 99mTc quantitatively (98%) using stannous ions as the reducing/complexing agent in a freeze-dried kit form. Radiobioassay of this compound was carried out in rabbits and the results were compared with those of eight other Tc-labeled bone-imaging agents, using the performance of simultaneously administered 85Sr as a reference standard. The 99mTc-IDP concentrated 20% higher in the bone, and its soft-tissue and blood levels

were lower than with 85Sr. By comparison, the concentrations in the bone of the other 99mTc agents were 20% less than that of 85Sr. Regarding blood levels, Tc-IDP performed worse than the Tc-diphosphonate but better than the pyrophosphate and the other technetium complexes. Scintillation camera images of 99mTc-IDP in both rabbits and dogs showed excellent details of the skeleton. In a preliminary human study, images with 99mTc-IDP were somewhat inferior to those comparably procured with 99Tc-methylene diphosphonate, but count rates with the IDP complex were about twice those with the MDP compound. Because of its better bone uptake, however, it is suggested that 99mTc-IDP may be clinically useful in spite of its relatively slow blood clearance.

<6>

Unique Identifier

75184649

Authors

Merrick MV.

Title

Review article-Bone scanning.

Source

British Journal of Radiology. 48(569):327-51, 1975 May.

Local Messages

BAMC

MeSH Subject Headings

Adolescence
Aged
*Bone and Bones/me [Metabolism]
*Bone Diseases/di [Diagnosis]
Bone Diseases/me [Metabolism]
Bone Neoplasms/di [Diagnosis]
Breast Neoplasms/di [Diagnosis]
Comparative Study
Female
Fluorine/me [Metabolism]
Half-Life
Human
Infection/di [Diagnosis]
Joint Diseases/di [Diagnosis]
Lymphoma/di [Diagnosis]
Male
Metabolic Clearance Rate
Middle Age
Neoplasm Metastasis
Osteitis Deformans/di [Diagnosis]
Phosphates/me [Metabolism]
Prostatic Neoplasms/di [Diagnosis]
Radiation Dosage
Radiation-Sensitizing Agents
Radionuclide Imaging/is [Instrumentation]
*Radionuclide Imaging
Technetium/me [Metabolism]
Wound Healing

Abstract

The discovery of a number of phosphate complexes labelled with 99-Tc-m that localize in bone has aroused wide-spread interest in bone scanning. The physiological properties of these and other clinically useful bone-seeking radiopharmaceuticals are compared, and their physical properties assessed in relation to the characteristics and limitations of avilable detector systems. A hypothesis is put forward to explain the behaviour of the technetium-labelled agents. It is concluded that although there are differences in biochemical behaviour between these agents, strontium and fluorine, all three may, under suitable conditions, give similar clinical information. The radiation dose received by the patients is least with the usual dose of 99-Tc-m and the blood clearance of the diphosphonate and pyrophosphate preparations is faster than that of strontium, although slower than fluorine. The psi-ray energy of technetium permits a much greater efficiency of detection than of fluorine. These factors, toghether with the general availability of 99-Tc-m and its relatively low cost make the technetium diphosphonate or pyrophosphate preparations the agents of choice for most skeletal radioisotope imaging. However, there are as yet insufficient follow-up studies to be able to assess the incidence of either false-negative or false-positive findings with these agents.