

# Increased Accumulation of Hexakis (2-methoxyisobutylisonitrile)Technetium(I) in Osteosarcoma and Its Metastatic Lymph Nodes

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Scintigraphy using hexakis (2-methoxyisobutylisonitrile) technetium (I) [Tc-MIBI] was performed in a patient with osteosarcoma of the right tibia. Increased accumulation of Tc-MIBI was observed in the primary site of the tumor as well as in metastatic lesion of the right inguinal lymph nodes, which were later confirmed by biopsy.

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Hexakis (2-methoxyisobutylisonitrile) technetium (I) [Tc-MIBI] belongs to a class of  $^{99m}\text{Tc}$ -based lipophilic cationic agents. Tc-MIBI with its favorable gamma emission characteristics has been proposed as an alternative to  $^{201}\text{Tl}$  for myocardial perfusion imaging (1,2). Uptake in bone tumors has been previously reported with  $^{201}\text{Tl}$ -chloride (3). There have been a few reports of extracardiac clinical applications of Tc-MIBI (4-6). We present a case of osteosarcoma with metastatic inguinal lymph nodes that was successfully imaged using Tc-MIBI.

## CASE REPORT

A 13-yr-old boy was admitted to the Department of Orthopedics due to local pain and swelling of the right knee. On physical examination, the proximal portion of the right tibia was swollen and painful. Two lymph nodes, measuring  $2 \times 1$  cm and  $1 \times 1$  cm in the right inguinal area, were also found. There was no lesion documented elsewhere in the body. The patient underwent x-ray of the right knee (Fig. 1) and ultrasonography of right inguinal area (Fig. 2). A three-phase  $^{99m}\text{Tc}$ -MDP bone scan revealed a hypervascular mass with high uptake of MDP on late images at the upper portion of right tibia (not shown). Five days following the bone scan, a Tc-MIBI study was performed in which 370 MBq of Tc-MIBI were given to the patient intravenously. Anterior static images were acquired at 0.5 hr and 1.5 hr postinjection using a gamma camera and LEAP collimator (Siemens ZLC 75, Scintiview II). Figure 3A-B shows the Tc-MIBI images taken 1.5 hr postinjection. Note the areas of markedly increased activity at the proximal portion of right tibia and in the

right inguinal lymph nodes (arrow). By assigning regions of interest over the tibial lesion (T), contralateral normal tibial area (N) and abnormal accumulation in right inguinal area (L), ratios of T/N and L/N were calculated for both images taken at 0.5 hr and 1.5 hr postinjection. The T/N and L/N ratios were found to be 3.20 and 6.01 at 0.5 hr, respectively. The corresponding values of 3.32 and 6.04 were calculated for the images taken at 1.5 hr. No statistically significant difference was found between these values ( $p > 0.05$ ).

The patient was diagnosed as having osteosarcoma of the right tibia, which was later confirmed surgically. Biopsy of the lymph nodes in the right inguinal area revealed metastatic involvement.

## DISCUSSION

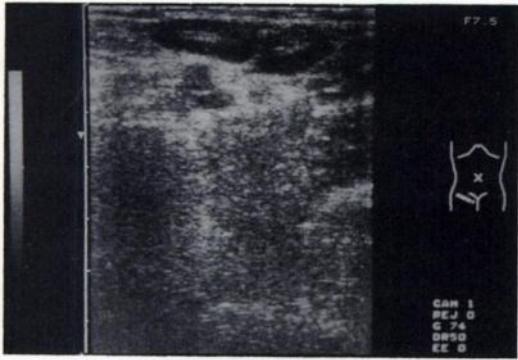
Tc-MIBI was originally introduced for myocardial perfusion studies (1,2). Recently, there have been reports describing the use of Tc-MIBI for visualization of benign and malignant lesions in the lung (4,5) and mediastinal and pulmonary metastasis from thyroid cancer (6). Ramanathan et al. (7) used hexakis (t-butyl isonitrile) technetium(I) [ $^{99m}\text{Tc}$ -TBI] for visualization of suppressed thyroid tissue.

In the case reported here, the intensity of uptake in the tumor was persistent between the period of 0.5 and 1.5 hr postinjection, as confirmed by statistical comparison of T/N and L/N ratios ( $p > 0.05$ ). This indicated that there was no significant washout from the primary tumor and metastatic lymph nodes during the study period. Although physical and ultrasonic examination revealed two lymph nodes side by side in the right inguinal region, the borders

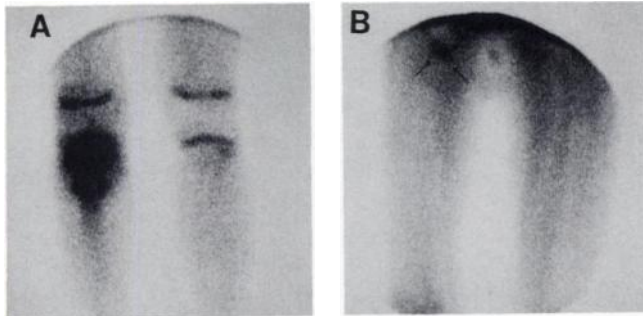


FIGURE 1. X-ray study of the right knee.

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**FIGURE 2.** Ultrasonographic image showing two lymph nodes, side by side, located at the right inguinal region.



**FIGURE 3.** (A-B) Tc-MIBI images taken at 1.5 hr postinjection. Note increased MIBI uptake at the proximal portion of tibia (A) and in the region of metastatic lymph nodes (B) (arrow).

of the nodes could not be distinguished by MIBI scintigraphy.

Osteosarcoma usually spreads to many organs, especially to the lungs, via the bloodstream. Lymphatic spread is rare. For patient management, it is important to know the presence of lymphatic spread. In the present case, metastatic lymph nodes and the primary tumor were successfully imaged using Tc-MIBI. The results of this study suggest that Tc-MIBI may have a potential role in evaluating patients with osteosarcoma.

## REFERENCES

1. Watson, Smith WH, Teates CD, et al. Quantitative myocardial imaging with Tc-99m-MIBI: comparison with  $^{201}\text{Tl}$  [Abstract]. *J Nucl Med* 1987;28:653.
2. Baillet GY, Mena IG, Kuperus JH, et al. Simultaneous technetium-99m-MIBI angiography and myocardial perfusion imaging. *J Nucl Med* 1989;30:38-44.
3. Ramanna L, Waxman A, Binney G, et al. Thallium-201 scintigraphy in bone sarcoma: comparison with gallium-67 and technetium-MDP in the evaluation of chemotherapeutic response. *J Nucl Med* 1990;31:567-572.
4. Hassan IM, Sahweil A, Constantinides C, et al. Uptake and kinetics of Tc-99m-hexakis 2-methoxy isobutyl isonitrile in benign and malignant lesions in the lungs. *Clin Nucl Med* 1989;14:333-340.
5. Muller SP, Reiner C, Paas M, et al. Tc-99m-MIBI and Tl-201 uptake in bronchial carcinoma [Abstract]. *J Nucl Med* 1989;30:845.
6. Muller ST, Guth-Tougelides B, Creutzig H. Imaging of malignant tumors with Tc-99m-MIBI SPECT [Abstract]. *J Nucl Med* 1987;28:562.
7. Ramanathan P, Patel RB, Subrahmanyam N, et al. Visualization of suppressed thyroid tissue by technetium-99m-tertiarybutyl isonitrile ( $^{99\text{m}}\text{Tc-TBI}$ ): an alternative to post-TSH stimulation scanning. *J Nucl Med* 1990;31:1163-1165.