

Bone Scintigraphy and SPECT/CT in Bisphosphonate-Induced Osteonecrosis of the Jaw

TO THE EDITOR: Dore et al. have recently published an interesting study on the promising role of ^{99m}Tc -methylene diphosphonate (MDP) hybrid SPECT/CT to support the diagnosis of clinically suspected osteonecrosis of the jaw in 15 neoplastic patients, 4 of whom were affected by multiple myeloma and treated with bisphosphonates (1). As the authors clearly demonstrated, increased focal uptake of the radiocompound in the osteolytic areas identified by CT scans was significantly associated with histologically proven osteonecrosis of the jaw.

In hematology, almost all cases of osteonecrosis of the jaw occur in patients affected by multiple myeloma after exposure to bisphosphonates with or without chemotherapy; in this context, the most frequent diagnostic question is whether a painful area with radiographic signs of osteolysis in the maxillary region, be it swollen or not, is caused by a neoplastic focus or by an inflammatory or necrotic process. In this setting, ^{99m}Tc -MDP-based techniques of bone imaging are not helpful for the differential diagnosis. ^{99m}Tc -MDP binds to hydroxyapatite crystals in sites of active osteoblastic activity, which is erratic in osteolyses caused by neoplastic plasma cells (2). The comparison between an imaging technique based on a compound taken up by neoplastic cells and not by inflammatory ones, such as sestamibi scintigraphy (3), and an imaging procedure exploiting a tracer taken up also by inflammation, such as ^{18}F -FDG PET, has recently been shown to be helpful in differentiating osteonecrosis of the jaw from myeloma osteolysis (4). This differentiation is possible because sestamibi head SPECT does not show focal maxillary uptake in osteonecrosis of the jaw and ^{18}F -FDG PET does, whereas both sestamibi and ^{18}F -FDG are taken up by focal myeloma lesions. Thus, invasive and potentially harmful procedures to obtain histologic specimens could be avoided.

It should be worthwhile to investigate whether, in association with sestamibi head SPECT, ^{99m}Tc -MDP SPECT/CT is as informative as ^{18}F -FDG PET/CT in differentiating myeloma lesions from osteonecrosis of the jaw.

REFERENCES

1. Dore F, Filippi L, Biasotto M, Chiandussi S, Cavalli F, Di Lenarda R. Bone scintigraphy and SPECT/CT of bisphosphonate-induced osteonecrosis of the jaw. *J Nucl Med.* 2009;50:30–35.
2. Scutellari PN, Spanedda R, Feggi LM, Cervi PM. The value and limitation of total body scan in the diagnosis of multiple myeloma: a comparison with conventional skeletal radiography. *Haematologica.* 1985;70:136–142.
3. Fonti R, Del Vecchio S, Zanetti A, et al. Bone marrow uptake of ^{99m}Tc -MIBI in patients with multiple myeloma. *Eur J Nucl Med.* 2001;28:214–220.
4. Catalano L, Del Vecchio S, Petruzzello F, et al. Sestamibi and FDG-PET scans to support diagnosis of jaw osteonecrosis. *Ann Hematol.* 2007;86:415–423.

Rossella Fabbricini
Lucio Catalano
Leonardo Pace
Silvana Del Vecchio

Rosa Fonti
Marco Salvatore
Bruno Rotoli
University of Naples
Naples, Italy

DOI: 10.2967/jnumed.109.064568

REPLY: We thank Fabbricini and colleagues for their letter and appreciate their comments on our study (1).

The aim of our study was more to assess the possible clinical utility of hybrid SPECT/CT for ^{99m}Tc -methylene diphosphonate (MDP) imaging of osteonecrosis of the jaw than to differentiate between metastasis and osteonecrosis of the jaw.

Because of the well-known lack of specificity of bone scanning, all 15 patients underwent an accurate clinical evaluation, which, in every case, supported the suspicion of osteonecrosis of the jaw.

Fourteen patients had exposed bone (8 at the time of the scintigraphic study), and among these 14, 4 had multiple myeloma. Biopsy excluded metastatic involvement of the jaw and confirmed osteonecrosis of the jaw in all cases.

The hybrid SPECT/CT findings correlated with the clinical and histologic findings.

The 4 patients with multiple myeloma did not undergo bone scanning for staging, since ^{99m}Tc -MDP imaging is known to have poor sensitivity in this disease except when used to evaluate therapeutic response or to detect early osteosclerotic reactions.

SPECT/CT increased the accuracy of conventional imaging by allowing differentiation between the osteonecrotic core and viable bone in 8 patients. SPECT/CT also provided important information for treatment planning. Catalano et al. (2) showed that in differentiating osteonecrosis of the jaw from myeloma osteolysis, an imaging technique such as sestamibi scintigraphy, with a tracer taken up by neoplastic cells and not by inflammatory ones, may be more helpful than an imaging procedure such as ^{18}F -FDG PET, with a tracer taken up also by inflammation.

They raise the interesting question of whether ^{99m}Tc -sestamibi SPECT/CT coupled with ^{99m}Tc -MDP SPECT/CT is as accurate as ^{99m}Tc -sestamibi SPECT coupled with ^{18}F -FDG PET. Regarding this question, we fully agree with the paper by Pazianas et al. (3), who suggested that because our group obtained satisfying results using a basilar SPECT/CT technology, better results might be achieved using hybrid systems with higher resolution and greater diagnostic capability.

REFERENCES

1. Dore F, Filippi L, Biasotto M, Chiandussi S, Cavalli F, Di Lenarda R. Bone scintigraphy and SPECT/CT of bisphosphonate-induced osteonecrosis of the jaw. *J Nucl Med.* 2009;50:30–35.
2. Catalano L, Del Vecchio S, Petruzzello F, et al. Sestamibi and FDG-PET scans to support diagnosis of jaw osteonecrosis. *Ann Hematol.* 2007;86:415–423.
3. Pazianas M, Russell RG, Fogelman I. Osteonecrosis of the jaw: more heat than light. *J Nucl Med.* 2009;50:6–7.

Franca Dore
Luca Filippi
Azienda Ospedaliero-Universitaria
Trieste, Italy