BONE METASTASES IN WELL-DIFFERENTIATED NEUROENDOCRINE TUMOURS – A dual study comparing Ga-68 SSTR AND F-18 Fluoride PET/CT

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Aim:

The early detection of metastatic bone disease in neuroendocrine tumours (NET) is clinically relevant as they are considered a negative prognostic factor.
The purpose of the present study was to compare the new gold standard for imaging somatostatin receptors (SSTR) namely Ga68-DOTATOC or -DOTATATE PET/CT and F18-NaF PET/CT for the detection of bone involvement in NET.

Method:

Searching our database between Sept. 2009 and Sept. 2011, we found 62 patients of histologically verified NET (29 female, 33 male; mean age 62.3 years) who had been investigated by both F18-NaF PET/CT and Ga68-SSTR PET/CT within an interval of 30 days.
Each patient underwent PET/CT using 250-300 MBq F18-NaF and 100-150 MBq Ga68-DOTATOC or -DOTATATE on a dedicated PET/CT scanner (Biograph duo; Siemens) following EANM guidelines.

Results:

9 patients (14.5%) had extensive bone metastatic involvement with innumerable lesions on both scans. Concordant results between the two imaging modalities were found in only 13 patients (21.0%). A mismatched pattern between the two imaging modalities was found in 33 patients (53.2%). In 7 cases (11.3%) there was a gross discrepancy – none of the bone metastases detected by Ga68-SSTR PET/CT was visualized on the F18-NaF PET/CT and viceversa or only one common lesion was detected on both scans, all the others were mismatched lesions. Overall, F18-NaF PET/CT detected more osteoblastic changes in both the axial and the appendicular skeleton, interpreted as metastases.

Conclusions:

Surprisingly, a large discrepancy between F18-NaF PET/CT and Ga68-SSTR PET/CT for detection of bone metastases of well-differentiated NET was noted when the studies were performed within a short time interval.
The “mismatch pattern” of bone lesions is probably related to different pathophysiological mechanisms that co-exist in NET – increased blood flow and osteoblastic activity leading to F18-NaF avid metastases and increased SSTR expression, a prerequisite for binding of Ga68-SSTR analogues. Further studies will concentrate on the consequences of the dual-study concerning prognosis and therapeutic management.