

SPECT-CT hybrid imaging in the evaluation of skeletal tumour lesions

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Planar bone scintigraphy (BS) with ^{99m}Tc -Methylene diphosphonate (MDP) is still the mainstream technique for detecting bony metastases, while primitive bone cancers often require specific radiological imaging (MRI, TC) for characterization. Sensitivity of BS is excellent for blastic or mixed types metastases, whereas it is less satisfactory for pure lytic or rapidly growing lesions.

Unfortunately, BS lacks specificity, therefore further radiological procedures are often required for diagnosis, especially in case of coexisting degenerative disease in the articulations, spine or pelvis. Operator's experience, accurate anamnesis and tomographic (SPECT) acquisitions add specificity to the final reports.

SPECT/CT hybrid cameras have recently become available, allowing for accurate correlative imaging.

A few studies were conducted in heterogeneous case series (1,2) and in the specific group of prostate cancer patients (3) to demonstrate the higher accuracy of hybrid imaging in differential diagnosis of unclear findings seen on bone SPECT. The diagnostic value added by SPECT and CT image fusion seems to be greater than the sum of their individual contributions, solving most cases of indeterminate foci of abnormal uptake. Unfortunately, no data about any therapeutic impact have been reported, and the employment of different methods of image registration renders the results not straightforwardly comparable.

Many technical aspects of combined SPECT/CT imaging would merit to be discussed. Above all, co-registration with CT not only provides precise anatomic landmarks, but also improves scintigraphic image quality allowing for attenuation correction (4). However, commercially available SPECT/CT hybrid cameras usually incorporate low-energy, non-conventional CT scanners in order to match the poor resolution of SPECT sharing the same image table. In view of this, it should be borne in mind that the relatively poor quality of CT may add artefacts to image reconstruction.

In addition to ^{99m}Tc -MDP, hybrid imaging can be successfully applied to cancer-specific tracers for detection of bone metastases. In the next future, accurate voxel-based dosimetry of radionuclide therapy with bone seeking radiopharmaceuticals (5), as well as with peptides, iodine, metaiodobenzylguanidine or antibodies, will require the employment of SPECT/CT cameras.

References

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