PROSTATE CANCER

Combined FEC-PET/MRI improves diagnostic accuracy

New data show that combined [18F]fluoroethylcholine-(FEC)-PET/MRI improves the accuracy of prostate cancer detection compared with PET or MRI alone, and has a very high sensitivity (95%) for detecting the dominant malignant lesion of the prostate.

In a study of 128 prostate lesions, patients with positive needle biopsy findings were assessed by FEC-PET and MRI in identical positioning, prior to radical prostatectomy. After surgery, these imaging results were compared with histological whole-mount sections, and PET/MRI lesion-based semiquantitative FEC uptake was compared with Gleason scores and postoperative histology.

A main aim of the study was to improve metabolic imaging with FEC-PET by adding only morphological information from MRI, substantially reducing the total scanning time of patients, as well as the number of false positive findings. A second aim was to improve the assessment of tumour aggressiveness by studying semiquantitative FEC-uptake.

Data analysis revealed a sensitivity, specificity, positive predictive value (PPV), negative predictive value, and accuracy of 67%, 35%, 59%, 44%, and 54%, respectively, for MRI versus 85%, 45%, 68%, 69%, and 68%, respectively, for PET, which increased to 84%, 80%, 85%, 78%, and 82%, respectively, for combined FEC-PET/MRI of lesions >5 mm ($n=98$). The superiority of the combined approach for detecting lesions >5 mm is an important finding, as the clinical relevance of tumours below this threshold size has been called into question in recent years.

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For lesions in patients with Gleason >6 tumours ($n=43$), these values were 73%, 31%, 71%, 33%, and 60% for MRI, 90%, 62%, 84%, 73%, and 81% for PET, and 87%, 92%, 96%, 75%, and 88% for FEC-PET/MRI. By studying

semiquantitative FEC uptake in PET/MRI-defined lesions, cancers with Gleason scores >6 were distinguished from those with Gleason score ≤6 with a specificity of 90% and a PPV of 83%, compared with 71% and 60%, respectively, for needle biopsy, suggesting a potential role in patient selection for active surveillance and watchful waiting.

“This is the first registered prospective investigator-initiated diagnostic trial of the use of combined FEC-PET/MRI in men with prostate cancer,” says Markus Hartenbach, who led the study. “This approach promises to enhance the success rate of needle biopsies and could improve patient-and-risk adapted treatment, or ‘no treatment’ strategies in the future. FEC-PET/MRI should be part of further randomized clinical trials.”

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Original article Hartenbach, M. et al. Combined PET/MRI improves diagnostic accuracy in patients with prostate cancer: A prospective diagnostic trial. *Clin. Cancer Res.* doi:10.1158/1078-0432.CCR-13-2653