Evaluation of dual-time-point FDG-PET in pre- and posttherapeutic head and neck malignancies

Objectives:
Variable uptake of fluorine-18-fluorodeoxyglucose in the head-neck-region still poses a challenge in differentiating malignant from benign, e.g. inflammatory, lesions. The purpose of this retrospective study was to investigate the impact of dual-time-point FDG-PET in patients with suspected head and neck-cancer.

Methods:
137 patients (97 primary, 40 recurrent lesions) were enrolled in this retrospective study. FDG-PET was performed on an ECAT Accel 3D Scanner (Siemens, Erlangen). After injection of 4MBq/kg FDG, 20mg furosemide and 20mg butylscopolamine the head-neck-region was scanned at 45 min p.i., then a whole-body scan was performed at 75 min p.i. Image reconstruction parameters were: 2 iterations, 8 subsets, Gaussian kernel 6. Standardized uptake values (SUVs) for 237 lesions (176 primary, 61 recurrent, 191 malignant, 46 benign) were determined at both time points. PET was co-registered with CT or MRI for lesion assignment. Histopathology served as the standard of reference. ROC-analysis was processed as shown in Fig. 5 & 6.

Results:
Visual assessment had an overall sensitivity of 96.3% (specificity of 60.0%) (P<0.001). The sensitivity and specificity for primary lesions were 98.6%/61.3% (P<0.001) and 89.1%/57.1% for recurrent lesions (P<0.001). ROC analysis of dual-time-point SUVs was significant (P<0.001) for the first and second SUV/mean/max and the SUV/mean/max change over time. Results and cut-off values are shown in Figs. 5 & 6.

Conclusion:
The promising results of the initial feasibility study by Hustinx et al.1 are confirmed by this study in a statistically significant number of patients. Study protocol can be implemented in daily clinical routine. The observer independent dual-time point method is able to distinguish between malign and inflammatory lesions almost as sensitive as the visual method and even better than CT or MRI, especially in primary and recurrent lymph node assessment. The known pitfalls, e.g. very small, necrotic or cystic lesions, remain a challenge for both, visual and semiquantitative evaluation. Best results can be achieved by fusion with MRI/CT.

References: