PURPOSE: Hypoxia is an important negative prognostic factor for radiation treatment of head and neck cancer. This study was performed to evaluate the feasibility of use of (18)F-labelled fluoroazomycin arabinoside ([(18)F]FAZA) for clinical PET imaging of tumour hypoxia. METHODS: Eleven patients (age 59.6 +/- 9 years) with untreated advanced head and neck cancer were included. After injection of approximately 300 MBq of [(18)F]FAZA, a dynamic sequence up to 60 min was acquired on an ECAT HR+ PET scanner. In addition, approximately 2 and 4 h p.i., static whole-body PET (n = 5) or PET/CT (n = 6) imaging was performed. PET data were reconstructed iteratively (OSEM) and fused with CT images (either an external CT or the CT of integrated PET/CT). Standardised uptake values (SUVs) and tumour-to-muscle (T/M) ratios were calculated in tumour and normal tissues. Also, the tumour volume displaying a T/M ratio > 1.5 was determined. RESULTS: Within the first 60 min of the dynamic sequence, the T/M ratio generally decreased, while generally increasing at later time points. At 2 h p.i., the tumour SUV(max) and SUV(mean) were found to be 2.3 +/- 0.5 (range 1.5-3.4) and 1.4 +/- 0.3 (range 1.0-2.1), respectively. The mean T/M ratio at 2 h p.i. was 2.0 +/- 0.3 (range 1.6-2.4). The tumour volume displaying a T/M ratio above 1.5 was highly variable. At 2 h p.i., [(18)F]FAZA organ distribution...
was determined as follows: kidney > gallbladder > liver > tumour > muscle > bone > brain > lung.
CONCLUSION: [(18)F]FAZA PET imaging appears feasible in head and neck cancer patients, and
the achieved image quality is adequate for clinical purposes. Based on our initial results, [(18)F]FAZA
warrants further evaluation as a hypoxia PET tracer for imaging of cancer.

Zeitschriftentitel / Abkürzung:
Eur J Nucl Med Mol Imaging

Jahr:
2007

Band:
34

Heft / Issue:
10

Seiten:
1566-75

Sprache:
eng

Pubmed:

Print-ISSN:
1619-7070

TUM Einrichtung:
Nuklearmedizinische Klinik und Poliklinik; r Strahlentherapie und Radiologische Onkologie

Occurences:
· Einrichtungen > Fakultäten > Fakultät für Medizin > Kliniken und Institute > Klinik und Poliklinik für
  RadioOnkologie und Strahlentherapie > 2007
· Einrichtungen > Fakultäten > Fakultät für Medizin > Kliniken und Institute > Klinik und Poliklinik für
  Nuklearmedizin > 2007

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