(S)-4-(3-18F-fluoropropyl)-L-glutamic acid: an 18F-labeled tumor-specific probe for PET/CT imaging--dosimetry.

The glutamic acid derivative (S)-4-(3-(18)F-Fluoropropyl)-L-glutamic acid ((18)F-FSPG, alias BAY 94-9392), a new PET tracer for the detection of malignant diseases, displayed promising results in non-small cell lung cancer patients. The aim of this study was to provide dosimetry estimates for (18)F-FSPG based on human whole-body PET/CT measurements. (18)F-FSPG was prepared by a fully automated 2-step procedure and purified by a solid-phase extraction method. PET/CT scans were obtained for 5 healthy volunteers (mean age, 59 y; age range, 51-64 y; 2 men, 3 women). Human subjects were imaged for up to 240 min using a PET/CT scanner after intravenous injection of 299 ± 22.5 MBq of (18)F-FSPG. Image quantification, time-activity data modeling, estimation of normalized number of disintegrations, and production of dosimetry estimates were performed using the RADAR (RAdiation Dose Assessment Resource) method for internal dosimetry and in general concordance with the methodology and principles as presented in the MIRD 16 document. Because of the renal excretion of the tracer, the absorbed dose was highest in the urinary bladder wall and kidneys, followed by the pancreas and uterus. The individual organ doses (mSv/MBq) were 0.40 ± 0.058 for the urinary bladder wall, 0.11 ± 0.011 for the...
kidneys, 0.077 ± 0.020 for the pancreas, and 0.030 ± 0.0034 for the uterus. The calculated effective
dose was 0.032 ± 0.0034 mSv/MBq. Absorbed dose to the bladder and the effective dose can be
reduced significantly by frequent bladder-voiding intervals. For a 0.75-h voiding interval, the bladder
dose was reduced to 0.10 ± 0.012 mSv/MBq, and the effective dose was reduced to 0.015 ± 0.0010
mSv/MBq. On the basis of the distribution and biokinetic data, the determined radiation dose for
(18)F-FSPG was calculated to be 9.5 ± 1.0 mSv at a patient dose of 300 MBq, which is of similar
magnitude to that of (18)F-FDG (5.7 mSv). The effective dose can be reduced to 4.5 ± 0.30 mSv (at
300 MBq), with a bladder-voiding interval of 0.75 h.