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Estimation of internal dosimetry of 64Cu and 225Ac labeled PSMA-617

Purpose:
Evaluation of internal dosimetry should have performed before injection of theranostic radiopharmaceuticals. The aim of this study was to estimate the 64Cu-PSMA-617 biodistribution in mice and human absorbed dose of 64Cu and 225Ac-PSMA-617.

Materials and Methods:
The radiolabeling efficiency of 64Cu-PSMA-617 was showed over 95%, and stabilities of 64Cu-PSMA-617 has remained over 98% in both human and mouse serum for 48 h. 64Cu labeled PSMA-617 were used to calculate the biodistribution in mice (n = 4). Time-dependent biodistribution of 64Cu-PSMA-617 was measured at 2, 4, 6, 24, and 48 hours after injection. Biodistribution data from 64Cu-PSMA-617 in mice were used to calculate residence time and effective dose in human. Human absorbed dose of 64Cu and 225Ac-PSMA-617 was approximated by extrapolation data of 64Cu-PSMA-617 mice biodistribution. Absorbed dose and the effective dose were estimated by the OLINDA/EXM (Vanderbilt University, Nashville, TN) adult male model. Region residence time and absorbed dose have calculated the average with standard deviation (SD).

Results:
The highest uptake ratio was observed in the liver and kidney at 2 h. Rapid blood clearance was observed for 64Cu-PSMA-617. 64Cu-PSMA-617 residence time in liver and kidney were 3.23E+00 ± 3.69E-01 and 3.67E-01 ± 2.67E-02 MBq-h/MBq, respectively. Liver absorbed dose of 64Cu and 225Ac-PSMA-617 were 7.64E-03 ± 8.68E-04 and 2.82E+01 ± 3.24E+00 mGy/MBq, respectively. Kidney absorbed dose of 64Cu and 225Ac-PSMA-617 were 4.61E-04 ± 1.50E-04 and 2.04E+01 ± 1.50E+00 mGy/MBq, respectively. The effective dose of 64Cu and 225Ac-PSMA-617 were 1.77E-02 ± 5.07E-04 and 1.82E+00 ± 1.69E-01 mSv/MBq, respectively.

Conclusion:
We evaluated the human absorbed dose of 64Cu-PSMA-617 and 225Ac-PSMA-617. The 225Ac-PSMA-617 effective dose was 103 fold higher than 64Cu-PSMA-617. These result may help to a strategy of targeted alpha therapy calculate effective dose for metastatic castration-resistant prostate cancer (mCRPC) patients.

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Presentation Type

Poster

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