OP502 High Resolution microSPECT imaging of Bi-213

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J. de Swart[1], M. Segbers[1], A. Morgenstern[2], F. van der Have[3,4], H. Chan[1], S. C. Berndsen[1], F. Bruchertseifer[2], M. de Jong[1], F. J. Beekman[3,4], M. W. Konijnenberg[1]

[1]Erasmus MC, Rotterdam, NETHERLANDS, [2]European Commission, Joint Research Centre, Institute for Transuranium Elements, Karlsruhe, GERMANY, [3]Delft University of Technology, Delft, NETHERLANDS, [4]MILabs, Utrecht, NETHERLANDS.

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Aim VECTor is an option to U-SPECT preclinical SPECT systems (MIIabs, NETHERLANDS) to perform high resolution imaging of high energy photons, including 511 keV photons (“pinhole PET”). Here we investigate the feasibility to use VECTor for quantitative high spatial resolution ^{213}Bi imaging in small animals. **Methods** The VECTor high resolution mouse collimator uses 162 clustered pinholes of 0.7 mm. Acquisition is performed in list mode. An energy window of 16% around 440.5 keV was applied with 20 keV scatter windows on each side. Data was reconstructed with pixel-based OSEM [Branderhorst, Phys. Med. Biol 2010]. The calibration factor for ^{213}Bi to perform absolute quantitative imaging was determined by scanning a 3 mL syringe containing 20.4 MBq ^{213}Bi. To test spatial resolution a Jaszczak phantom with fillable rods (0.7 to 1.5 mm) containing 119 MBq ^{213}Bi was scanned for 45 minutes. Dynamic scans, one with 15 frames of 30 minutes and one with 45 frames of 5 minutes, were made of a syringe containing respectively 7.8 MBq and 13.2 MBq. The syringe was placed inside a saline filled attenuator. The measured activity by the VECTor in each frame was then compared to the known amount of activity. As an in-vivo pilot experiment, 7 MBq ^{213}Bi-DTPA was administered i.v. to a mouse. The mouse was scanned for 45 minutes using frames of 5 minutes.**Results** In the resolution phantom images rods with a diameter of 0.8 mm could be resolved. On the the 30 minute dynamic series the syringe was still visible when it contained an activity of 0.1 MBq. Radioactivity measurements by the VECtor had an accuracy within 11% for activities > 0.1 MBq. For lower activities there was an increasing overestimation. On the second dynamic series the syringe was visible at the lowest activity as well (0.5 MBq). The accuracy was within 10% for activities > 1.0 MBq. Below this activity there was increasing overestimation. On the in vivo mouse SPECT using^{213}Bi-DTPA kidneys and the bladder were clearly visible. Using VOIs, time activity curves were obtained. **Conclusion** VECTor enables sub-mm resolution ^{213}Bi microSPECT in mouse sized objects. Absolute quantification was possible, but could be improved for low amounts of activities and/or short scan times. In vivo imaging of ^{213}Bi compounds was feasible and may have applications in preclinical research on ^{213}Bi therapy and dosimetry.