AbstractID: 10805 Title: Activity Quantification of Micro PET Imaging Using Hollow Spheres in a Small ECT Phantom

Purpose: To evaluate quantification of F-18 activity distribution in Micro PET images of a set of hollow spheres inserted in a small ECT phantom. **Method:** Six hollow spheres (Data Spectrum Micro Spheres: diameter: 12.43, 9.89, 7.86, 6.23, 4.95 and 3.95 mm) in a cylindrical phantom (net volume: 110 mL with cold rods insert) were injected with F-18 and imaged using a Micro PET scanner (Rodent R4. Concorde Microsystems). Hollow sphere activities were prepared in one syringe for the same activity concentration and measured with a dose calibrator as 153, 102, 52, 22, 19 and 7 uCi respectively. Two sets of images were acquired using the same protocol. Second imaging started 65 minutes after completion of the first scan to compare dead time effect. Each 20-minute scan was set to reduce statistical fluctuation. Image reconstruction used a 3-D reprojection method with Fourier rebinning. Region of interests of the hollow spheres were defined manually on the 1st scan and then copied to the 2nd image for consistency. **Result:** True count rate dropped from 445 kcps, 44% dead time (1st scan) to 280 kcps, 27% dead time (2nd scan). About 5.5% decrease was due to dead time. Significant partial volume effect appeared for spheres with diameter less than 6 mm. Recovery coefficient curve was generated for quantification of brain image of rats. Total activities in the spheres were consistent with both images, and agreed with readings from the dose calibrator. **Conclusion:** Phantom imaging could be used to generate recovery curve and calibration factors that are necessary for quantification of small animal scans. Partial volume effect starts when the object size is much greater than the camera spatial resolution that is measured with point or line source in air.