centration decay corrected at the beginning of the acquisition. **Results:** The phantom reconstructed with the GE Xeleris Volumetrix resulted in a mean CF of 7.93 cpm/kBq (counts per minute per kilo Bequerel) for the 4 different acquisition protocols (CV: 0.04). Repeating this experiment resulted in a mean CF of 7.98 cpm/kBq (CV: 0.06) which only deviates 0.61% to the CF obtained during the first experiment. The phantom reconstructed with the GE Xeleris Volumetrix Evolution for Bone resulted in a mean CF of 40.51 cpm/kBq (counts per minute per kilo Bequerel) for the 4 different acquisition protocols (CV: 0.02). Repeating this experiment resulted in a mean CF of 41.29 cpm/kBq (CV: 0.02) which only deviates 1.93% to the CF obtained during the first experiment. **Conclusion:** The CF is not influenced by acquisition time, matrix size or zoom factor, but is highly influenced by the reconstruction parameters, more specifically resolution recovery (used in the GE Xeleris Volumetrix Evolution for Bone software). Therefore it is highly important when using a CF clinically to reconstruct the phantom data with the same reconstruction parameters as patient data.

E-PW033

Impact of the modelling of charge collection on the simulation of SPECT recordings from semiconductor CZT cameras

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Introduction: The DSPECT CZT-camera (Spectrum Dynamics®) had already been simulated with the GATE platform, but without considering the partial collection of charges within the CZT detectors. This partial collection leads to a low energy tailing effect and is likely to deteriorate image quality. The aim of our study was to improve the Monte-Carlo simulation of the SPECT camera by the additional modeling the partial collection of charges of the CZT detectors. **Methods:** We used the Hecht equation[1], putting in relation the amount of collected charges with the depth of interaction of the γ photon within the CZT crystal, in order to model the response of the 9216 pixelated cristals of the DSPECT camera. The collimator geometry, the location and movement of each detector were modeled. A comparison was planned between the simulated and actually recorded data from punctual and spherical sources of ^{99m}Tc setting in the air or in a diffusing environment. In addition, heart images provided by the simulation with anatomic data from cardiac MRI, were compared with actually recorded SPECT images from the same patient. **Results:** The additional modeling of partial collection led to enhance the concordance between simulated and actually recorded data: 1) for the energy spectra from punctual and spherical sources, especially for experiments planed in diffusing environments, and 2) for the human SPECT images. For these latter, the myocardial contrast-to-noise ratios were 3.0 and 2.3 for simulation planed without and with the modeling of partial collection respectively, as compared to 1.9 for the actual SPECT recording, and the corresponding sharpness indexes of myocardial walls (an index of spatial resolution) were 0.75 and 0.61 cm^{-1} respectively, as compared to 0.59 cm^{-1} for the actual SPECT recording. **Conclusion:** The additional modelling of the partial collection of charges leads to a great improvement in the simulation, through the Monte-Carlo GATE platform, of the SPECT recording from CZT-cameras, as evidenced by an enhanced agreement with actually recorded SPECT-data. *[1]Chen et al. Appl Radiat Isot 2008;66:1146-1150*

E-PW034

Simultaneous High-Sensitivity High-Resolution Molecular SPECT Imaging with Spinning Slit-Hole Collimator: A Monte Carlo Simulation Study

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Aim: Molecular SPECT imaging is always challenged by acquiring projection data with low statistics, leading to inferior image quality. In this study, we aim at comprehensively evaluating the performance of a novel collimation geometry, the slit-hole, using GATE Monte Carlo simulation. **Methods**: The slit-hole is a long narrow aperture embedded in tungsten body enabling high-sensitivity molecular SPECT. The collimator consists of a 0.6 mm knife-edge slit with 45 mm focal length. As the collimator measures planar projections, it spins at each regular SPECT angles, to ensure sufficient measurement of tomographic data. To assess the performance of this collimation system, a set of phantoms including a dedicated 5-point source and NEMA image quality (IQ) were simulated using the GATE Monte Carlo package. There were 16 spin angles as well as 16 SPECT angles. The planar projection data were also corrected for Compton scattering using a double-energy window method. The emission data acquired by the slit-hole were then reconstructed using an innovative 3D MLEM-based algorithm. Spatially varying system sensitivity was also molded in the reconstruction framework. **Results**: The slit-hole collimated scanner has a sensitivity of 335 cps/MBq at 30 mm distance, corrected for both scatter and background. The sensitivity of the proposed collimator shows a falling trend in field-of-view of the camera, weighted by distance from the aperture's center. A tomographic resolution of ~1.8 mm was gained at 30 mm radius-of-rotation. This spatial resolution is averaged for the 5 point sources distributed at different locations. Quantitative analyses demonstrated that 3 iterations of the developed algorithms leads to optimally reconstructed SPECT image by obtaining the highest signal-to-noise ratio. An 83% recovery of coefficient was observed for the largest rod in the NEMA IQ phantom. The slit-hole also gives rise to 4.8% image noise level for reconstruction of uniform part