

AbstractID: 5582 Title: Dual projection imaging system for small animal research

Purpose: The use of small mammals as models of human diseases has increased in the last several years. These models provide a valuable research tool to characterize these diseases and to evaluate new therapies. Dedicated imaging systems, with the resolution and sensitivity to allow in vivo studies in small animals, reduce the number of animals required for a given study and offer the possibility of serial studies in the same animal. A dual two-dimensional imaging system has been developed to monitor tumor development in mice and other small animals.

Method and Materials: This imaging system combines functional information gained from projection nuclear emission imaging with the anatomical context provided by an x-ray transmission image. The system captures a nuclear image in one side of a single computed radiography detector (CR plate) and then the plate is moved to acquire an x-ray image in the opposite side. The nuclear image is formed by using a parallel hole collimator. Four fiducial markers, that are visible in both images, are attached to the system. A transformation algorithm uses the information from the fiducial markers to align the images. The nuclear emission image is color coded and overlaid onto the gray-scale x-ray image.

Results: For the assessment of the imaging system, a tissue-equivalent phantom was manufactured. Initial investigations used I-125. The spatial resolution, contrast, and detected scattered photon levels have been measured for both x-ray and nuclear imaging, and the sensitivity of the nuclear imaging system was also measured.

Conclusion: The lower radiation levels, faster throughput, and lower cost of this imaging system would allow the evaluation of functional activity more frequently in serial studies. This imaging system would complement tomographic systems by allowing rapid pre-screening of animals when a complete 3D volume data set is not necessary.