

FastSPECT I: A Stationary Small-Animal SPECT System

FastSPECT I is a stationary SPECT imager with a complement of 24 modular scintillation cameras all oriented towards the center of the system field of view. Although originally conceived as a brain imager in the mid-1990s, the system has been adapted to small-animal imaging [Kastis et al., 1998; Kastis, 2002]. The system implements ML position estimation via fast pre-computed lookup tables that make the system capable of forming image frames in 50-ms intervals. In work with a torso phantom built around a cardio-west artificial heart, it was possible to demonstrate first-pass tomographic imaging of the passage of a bolus of a ctivity through the right ventricle.

FastSPECT I was converted to a microSPECT scanner via construction of a new aperture, demonstrating that the difference between SPECT and microSPECT is a matter of optical design if the detector technology employed in the system has sufficient space-bandwidth product. The tradeoff is a smaller field of view as a result of the higher magnification. As a result of continuing development work on calibration techniques and statistical data processing, FastSPECT I continues to yield very good small-animal SPECT images that contribute to significant publications.

One manuscript, entitled “Quantitative Analysis of Acute Myocardial Infarction in Rat Hearts with Ischemia-Reperfusion Using a High-Resolution Stationary SPECT System” [Z. Liu et al., 2002], was awarded second place for best contribution in basic science by the editors of the *Journal of Nuclear Medicine*.

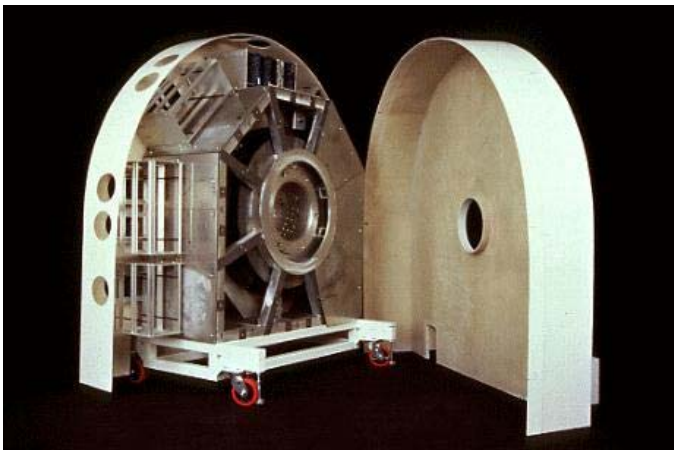


Figure 1. The FastSPECT I stationary SPECT system with 24 modular scintillation cameras and exchangeable cast aperture.

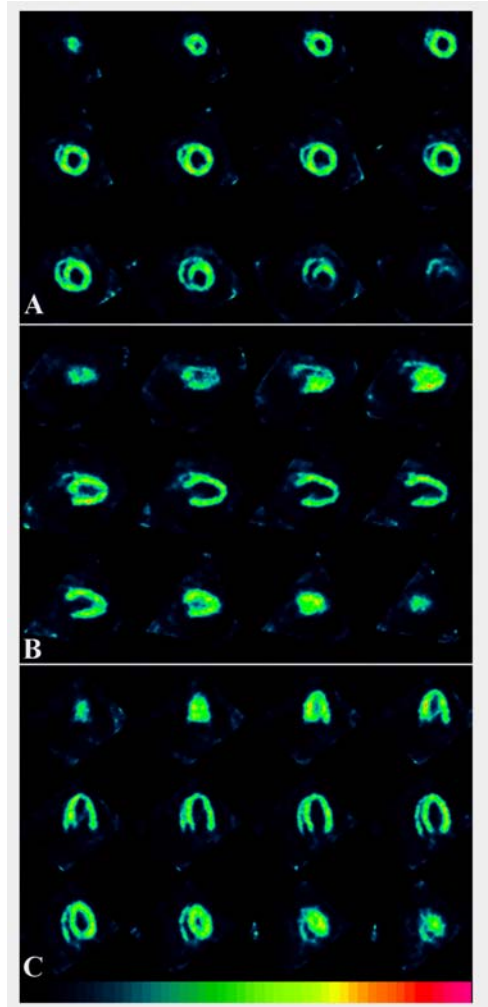


Figure 2. FastSPECT I ^{99m}Tc -sestamibi images in normal rat heart. A: short-axis slices. B: vertical-length axis slices. C: horizontal-axis slices

Z. Liu, G.A. Kastis, G. Stevenson, H.H. Barrett, L.R. Furenlid, M.A. Kupinski, D.D. Patton and D.W. Wilson, Quantitative analysis of acute myocardial infarction in rat hearts with ischemia-reperfusion using a high-resolution stationary SPECT system, *J. Nuc. Med.*, 43(7), 933-939, 2002.

G.A. Kastis, H.B. Barber, H.H. Barrett, H.C. Gifford, I.W. Pang, D.D. Patton, G. Stevenson, and D.W. Wilson, High-resolution SPECT imager for three-dimensional imaging of small animals, *J. Nucl. Med.*, 39, 9, 1998.

G.A. Kastis, Multi-modality imaging of small animals, Ph.D. Dissertation, University of Arizona, 2002.