

**Purpose:** This study was to evaluate performance characteristics and to validate cardiac imaging of patients on a newly installed SPECT camera using CZT (Cadmium Zinc Telluride) solid state detector technology, and to compare the CZT camera with a NaI crystal based camera using both phantom data and patient studies.

**Methods:** An Anthropomorphic Torso Phantom (Data Spectrum, Inc.) with a Cardiac Insert with Solid Defect in myocardium region was prepared for SPECT imaging using a CZT camera with multipinhole collimator (GE Discovery 530C). Tl-201 and Tc-99m were used individually to test energy response and together to check crosstalk in SPECT imaging. Phantom preparation included: 650 uCi Tc-99m and 65 uCi Tl-201 were injected to the heart insert to simulate myocardium ratio of 1.82 for each isotope respectively; 4 mCi Tc-99m and 0.4 Tl-201 were added to the phantom as background activity; two 500 cc saline bags were installed on the phantom to simulate breast attenuation. Same phantom was scanned on a regular SPECT using NaI crystal for comparison. Then twenty two patients were imaged on the CZT and on the NaI cameras respectively for clinical validation. Standard image acquisition and processing protocols were used for both phantom and patient studies.

**Results:** Visual inspection on phantom images demonstrated that the CZT camera could provide same or better quality of images with lower dose and less time (half dose half time). Myocardium defect was clearly identified from Tc-99m imaging and from Tl-201 scan as well. There was no significant crosstalk when imaging Tc-99m with presence of Tl-201. Patient scans were consistent on both cameras. There were not different diagnoses using images from the two scanners.

**Conclusions:** SPECT camera with CZT detectors and multipinhole collimator demonstrated excellent performance characteristic especially on energy resolution and counting statistics. Those features allow lower dose and shorter acquisition time in clinical studies.