Reproducibility of 3-D MSPECT for Quantitative Gated SPECT Sestamibi Perfusion Analysis.

JN Kritzman, EP Ficaro, JR Corbett.
University of Michigan Health System, Ann Arbor, MI.

Objective: The purpose of this study was to measure patient specific reproducibility of quantitative gated SPECT perfusion data acquired on different imaging systems and processed with 3-D MSPECT.

Methods: A total of 79 patients with no history of prior myocardial infarction were studied. 14 of these patients had angiographic data, all having confirmed coronary heart disease. All patients followed either a rest Tl-201/stress Tc-99m Sestamibi or one day rest/stress Sestamibi protocol. An average dose of 1.1GBq Tc-99m Sestamibi was administered for gated SPECT stress imaging. Imaging was performed 15-30 minutes post treadmill exercise or 60 minutes post pharmacologic stress. Gated SPECT Sestamibi perfusion data for all patients was acquired on the Siemens E.CAM and Picker 3000XP SPECT systems. Camera selection for the first image set was randomized to camera availability with a mean interval of 25 minutes prior to the second set of images. 180^{o} gated short axis data sets with matching 6.3 mm pixel size and slice thickness were generated from the 16 frame raw data on the ICON and Odyssey workstations. All data were for evaluated for left ventricular ejection fractions (LVEF), end diastolic volumes and end systolic volumes on an Odyssey FX workstation with 3-D MSPECT and QGS software. 3-D MSPECT's interactive user interface was used to optimize basal plane selection. The slice differences between end diastole and end systole were matched for each pair of studies to avoid operator influence on volumetric determination with MSPECT

Results: Ejection fraction values for the 3-D MSPECT user optimized and QGS auto-processed data sets were graphed and compared for reproducibility within the applications. Results from 3-D MSPECT yielded $y = 0.914x + 9.21$ and an r value of 0.886. The QGS automated results yielded $y = 0.905x + 9.935$ and an r value of 0.879.

Conclusions: 3-D MSPECT exhibits excellent patient specific reproducibility of quantitative gated SPECT perfusion data acquired on different imaging systems with slope values near unity for LVEF values.

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