Image Acquisition and Reconstruction Protocol

In brief, all subjects were first imaged at 60 minutes either after the administration of Tc-99m sestamibi at rest or during adenosine infusion with the patient at rest, and then additionally at 15 to 45 minutes after either radiopharmaceutical injection during treadmill testing or adenosine infusion with low-level exercise. MPS of each patient was acquired using Vertex, dual-detector scintillation cameras with low energy high-resolution collimators and the Vantage Pro attenuation correction hardware and software (Philips Medical Systems, Milpitas, CA), based on 2 gadolinium-153 scanning line sources; resulting in the simultaneous acquisition of ECG-gated emission and transmission images. All acquisitions were performed with a noncircular 180° orbit, from 45° right anterior oblique to the left posterior oblique, with a 64×64 matrix (pixel size = 0.64 cm) for emission images, a 128×128 matrix (pixel size = 0.32 cm) for transmission images, and energy windows of 140 keV $\pm$ 20% for Tc-99m, 118 keV $\pm$ 12% for scatter, and 100 keV $\pm$ 20% for Gd-153. At each of the 64 projection angles, the image data were recorded in 8 equal ECG-gated time bins. Before imaging, 5-seconds of transmission and scatter data were obtained over the patient's heart to determine the adequate time per projection in order to allow for a transmission count density resulting in a valid attenuation map. The time per projection used in this study was 45 to 50 seconds for rest MPS, and 30 to 40 seconds for stress MPS.

Tomographic reconstruction was performed by use of the AutoSPECT and Vantage Pro programs (Philips Medical Systems). All emission images were automatically corrected for non-uniformity, radioactive decay, and motion during acquisition, and subjected to 3-

point spatial smoothing. The mechanical center of rotation was determined by aligning the projection data to the reconstruction matrix. The NAC MPS studies were obtained with Butterworth filters, using an order of 10 and cutoff of 0.50 for rest MPS, and an order of 5 and cutoff of 0.66 for stress MPS. After logarithmic inversion, including normalization to a reference scan and the application of a Butterworth filter (order = 5; cutoff = 0.5), the attenuation maps, corrected for Tc-99m downscatter, were reconstructed with an iterative process using a Bayesian prior approach. The attenuation maps and the emission data were used to reconstruct the AC images with an iterative maximum likelihood algorithm (maximum-likelihood expectation maximization) and a uniform initial estimate. Scatter correction was also incorporated into this reconstruction to emit photopeak, along with non-stationary, depth-dependent resolution compensation.

Supplemental Table 1: Inter-observer agreement and display effect (A1 vs. A2) (Table 1A shows the Cohen kappa results; Table 1B includes p values for the comparisons of each classified evaluation). SE - standard error; CI - confidence interval; SG - gated; NG - non-gated; NS - not significant

Supplemental Table 1A:

	Cohen Kappa			
	Kappa	P	SE	CI (95%)
A1 vs. A2	0.63	< 0.0001	0.02	0.58 - 0.67
A2 vs. B	0.55	< 0.0001	0.02	0.52 - 0.60
A2 vs. C	0.52	< 0.0001	0.02	0.48 - 0.56
B vs. C	0.80	< 0.0001	0.01	0.77 - 0.82

Supplemental Table 1B:

	SS		Mask		VPU		VPO	
	NG	G	NG	G	NG	G	NG	G
A1 vs. A2	< 0.001	NS	NS	NS	0.04	NS	< 0.001	0.001
A2 vs. B	< 0.001	< 0.001	NS	NS	< 0.001	NS	< 0.001	< 0.001
A2 vs. C	< 0.001	0.02	NS	NS	< 0.001	0.005	NS	NS
B vs. C	NS	NS	NS	NS	< 0.001	NS	0.03	0.003

Note: Fleiss kappa results (3 raters): kappa = 0.63, p < 0.0001, SE = 0.01, CI (95%) – 0.61 to 0.66.

Supplemental Table 2: Thresholds, the ROC areas under the curve (ROC-AUC), sensitivities (Sen) and specificities (Spe) for all types of contour failures under the combined evaluation (A1&A2&B&C).

		AC-S	AC-R	NAC-S	NAC-R	Gated-S	Gated-R	Overall
Mask failure	SQC	3.92	3.83	3.97	5.06	6.37	7.11	3.83
	ROC-AUC	1.00±0.00	1.00±0.00	1.00±0.00	1.00±0.00	1.00±0.00	1.00±0.00	1.00±0.00
	Sen	100%	100%	100%	100%	100%	100%	100%
	Spe	98%	99%	98%	100%	100%	100%	98%
VPU failures	VQC	0.34	0.39	0.45	0.60	0.58	0.37	0.37
	ROC-AUC	0.95±0.05	0.89±0.04	0.97±0.01	0.98±0.01	1.0±0.00	0.90±0.02	0.96±0.01
	Sen	100%	100%	100%	100%	100%	100%	98%
	Spe	69%	66%	93%	95%	100%	65%	70%
VPO failures	VQC	0.27	0.25	0.28	0.28	0.27	N/A	0.28
	ROC-AUC	0.97±0.01	0.97±0.01	0.92±0.03	0.88±0.07	0.73±0.04	N/A	0.91±0.01
	Sen	100%	100%	100%	100%	100%	N/A	100%
	Spe	73%	90%	70%	70%	70%	N/A	70%