

Upright vs. supine

LVEF %	73 (70-83)	75 (70-83)	$P < 0.001$
Diastolic volume (mL)	72 (56-88)	78 (63-94)	$P < 0.001$
Peak filling rate (mL/sc)	251 (203-321)	283 (64-78)	$P < 0.001$
Bandwidth	30 (24-36)	24 (18-30)	$P < 0.001$

206-07

FMTVDM® PROVIDES THE FIRST NUCLEAR QUANTITATIVE METHOD FOR NUCLEAR CARDIOLOGY AND INTRODUCES A NEW ERA FOR NUCLEAR CARDIOLOGY R. M. Fleming*,¹ M. R. Fleming,¹ W. Dooley,² A. McKusick,¹ T. Chaudhuri³

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Introduction: The foundational work of nuclear cardiology and nuclear medicine began with Blumgart's 1925 study of circulation time. The method was actually quantitative yielding measurements of isotope over time. Unfortunately, the field of Nuclear Medicine and later Nuclear Cardiology would yield to an approach of qualitative image interpretation resulting in problems with sensitivity and specificity as do all qualitative methods, resulting in a 35% error rate, matching the limitations of anatomic assessment of disease, including but not limited to coronary angiography, mammography, CT/MRI, et cetera.

Methods: Three hundred men and women between ages 21 and 85 years of age were studied in five centers across the U.S. using a quantitative and enhanced method (FMTVDM®) designed to measure isotope (Sestamibi and Myoview) redistribution to define wash-in, washout, and normal redistribution. Results were compared to quantitative coronary angiography (QCA). Using FMTVDM redistribution measurements, percent diameter stenosis (%DS) was then calculated and the calculated %DS used to calculate a quantified/Fleming coronary flow reserve® (QCFR/FCFR) using proprietary equations. The result was then compared with the QCA-derived measurements using best fit regression analysis.

Results: FMTVDM measurements of Sestamibi and Myoview redistribution produced a parabolic relationship ($P < 0.01$) and showed that both Technetium 99-m isotopes redistribute beginning at 5-minute post-isotope infusion compared with the 60-minute distribution of isotope. Failure to correctly identify this timing of isotope redistribution had resulted in prior erroneous assumptions that Sestamibi and Myoview did not redistribute. Results from this redistribution were then used to calculate coronary artery narrowing (%DS) and QCFR/FCFR using the proprietary patent equations. The resulting "strong" relationship (Figure 1) for the coefficient of determination was 0.87582 ($P < 0.0001$).

Conclusion: Qualitative comparisons of nuclear imaging produce a diagnostic error rate of 35% comparable with angiographic errors in reader interpretation and the inability to satisfactorily unmask underlying vulnerable inflammatory plaques (VIPs) responsible for roughly 85% of all myocardial infarctions. FMTVDM® provides the first ever quantified and enhanced method for measuring coronary artery disease (CAD) beginning with the measurement of isotope redistribution and ending with the calculation of QCFR/FCFR® using the patented proprietary equations. This patented method is applicable to any device capable of measuring isotope activity over time including but not limited to handheld probes, planar, SPECT and PET. This provides the First quantitative and EVOLUTIONARY change for the fields of Nuclear Medicine and Nuclear Cardiology since its inception in 1925.

206-08

THE USE OF GATED SPECT DYSSYNCHRONY PARAMETERS TO DISTINGUISH SCAR FROM ATTENUATION ARTIFACT IN MYOCARDIAL PERFUSION IMAGING

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Introduction: Fixed perfusion defects on myocardial perfusion imaging (MPI) represent either soft tissue attenuation artifacts or myocardial scarring. Gated SPECT images and attenuation correction techniques can be used to distinguish them but are often inconclusive. We sought to evaluate the association of the degree of left ventricular regional dyssynchrony with the presence of scar and artifacts.

Methods: In a retrospective design, patients who had undergone coronary angiography within 90 days of a SPECT MPI with fixed perfusion defects of 2 or more segments in single coronary artery territory without any intraventricular conduction delay were included. The presence of scar was defined as having $> 70\%$ stenosis in the corresponding coronary artery while attenuation artifact was defined as having non-obstructive disease. Regional dyssynchrony parameters (time to peak contraction and time to peak thickening) and the abnormal (scar or attenuation) segments were then compared to the normal segments for each patient.

Results: Out of 26 patients that qualified for the study, 7 had scar and 19 had artifact. The mean number of abnormal segments was 5.4 ± 3.0 in the scar group and 3.6 ± 1.7 in the artifact group. In the scar group, there was no significant difference between the average dyssynchrony values in the normal and the abnormal segments. There was a consistently higher average difference from the mean2 value in the abnormal segments although it did not quite meet statistical significance ($P = 0.08$). In the attenuation artifact group, there was no statistical difference between average dyssynchrony values or average difference from the mean2 value between the abnormal and normal segments.

Conclusions: There was no significant difference between the attenuation artifact segments and the normal segments as would be expected. There was a non-significant trend for greater average difference from the mean2 values for scarred segments compared to normal segments. This lack of statistical significance may be due to the small scar cohort sample size and warrants further investigation.

	Scar Cohort		
	NORMAL	ABNORMAL	P VALUE
TPT 1			
Average	46.1 $\pm$ 3.8	47.5 $\pm$ 3.0	0.45
Difference from the Mean ²	5.2 $\pm$ 2.3	11.0 $\pm$ 7.7	0.08
TPT			
Average	43.7 $\pm$ 5.3	44.2 $\pm$ 4.8	0.86
Difference from the Mean ²	19.7 $\pm$ 12.1	51.8 $\pm$ 52.1	0.14
TPC			
Average	45 $\pm$ 4.7	47.1 $\pm$ 6.5	0.5
Difference from the Mean ²	29.8 $\pm$ 60.9	56.3 $\pm$ 123.7	0.62
	Attenuation Artifact Cohort		
	NORMAL	ABNORMAL	P VALUE
TPT 1			
Average	47.8 $\pm$ 9.1	47.7 $\pm$ 9.2	0.97
Difference from the Mean ²	5.4 $\pm$ 5.3	4.2 $\pm$ 4.2	0.46
TPT			
Average	45.8 $\pm$ 9.3	46.3 $\pm$ 9.5	0.87
Difference from the Mean ²	16.7 $\pm$ 12.9	12.3 $\pm$ 11.9	0.28
TPC			
Average	42.6 $\pm$ 7.4	43.8 $\pm$ 7.6	0.63
Difference from the Mean ²	10.1 $\pm$ 15.7	9.3 $\pm$ 8.2	0.85