



## Myocardial Imaging with Molecular Imaging

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### Disclosures

Speaker/Consultant/Research Support:  
GE Healthcare, Inc., and Auribus

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## ACC/AHA/ASNC RADIONUCLIDE IMAGING GUIDELINES

### Techniques to Assess Myocardial Viability

Class/Evidence				Test	Indication
I	IIa	IIb	III		
B	B	B	C	• Stress/redistribution/reinjection Tl-201	Predicting improvement in regional and global LV function after revascularization
				• Rest-redistribution imaging	
				• Perfusion plus PET FDG imaging	
				• Resting sestamibi imaging	
				• Gated-SPECT sestamibi imaging	
				• Stress/late Tl-201 redistribution imaging	
				• Dobutamine RNA	
				• Post-exercise RNA	
				• Post-nitroglycerin RNA	
	B			• Perfusion plus PET FDG imaging	Predicting improvement in heart failure symptoms after revascularization
B				• Tl-201 imaging (rest-redistribution and stress/redistribution/reinjection)	Predicting improvement in natural history after revascularization
B				• Perfusion plus PET FDG imaging	

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## Hibernating Myocardium

- Chronic Reduction of Blood Flow
- Impairment of Contractile Function
  - “New steady state between supply and demand at lower level” associated with increased utilization of the more oxygen efficient glucose
- Recovery of Contractile Function after interventional restoration of blood flow

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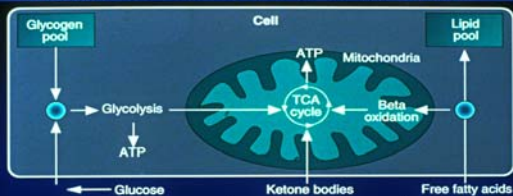
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## Metabolic Tracers in PET Imaging



Tracer	F-18 Deoxyglucose	C-11 Palmitate	C-11 Acetate
Half-life	117 mins	20 mins	10 mins
Characteristics	<ul style="list-style-type: none"><li>Glucose analog</li><li>Trapped in myocardium as FDG-6-phosphate</li><li>Unidirectional</li></ul>	<ul style="list-style-type: none"><li>Readily extracted</li><li>Biexponential clearance</li><li>Early phase linked to FA oxidation</li></ul>	<ul style="list-style-type: none"><li>Close coupling with TCA cycle</li><li>Good marker of oxidative phosphorylation</li></ul>

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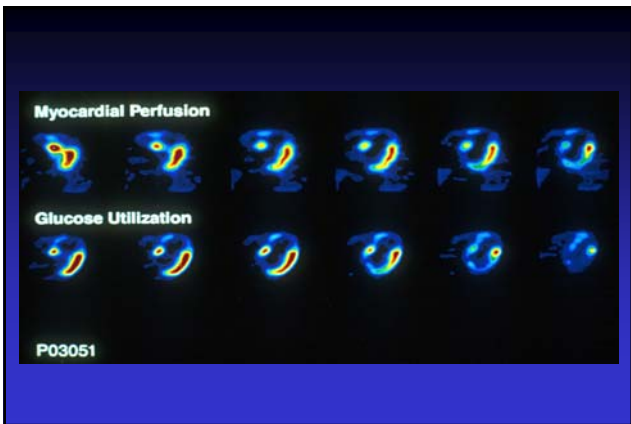
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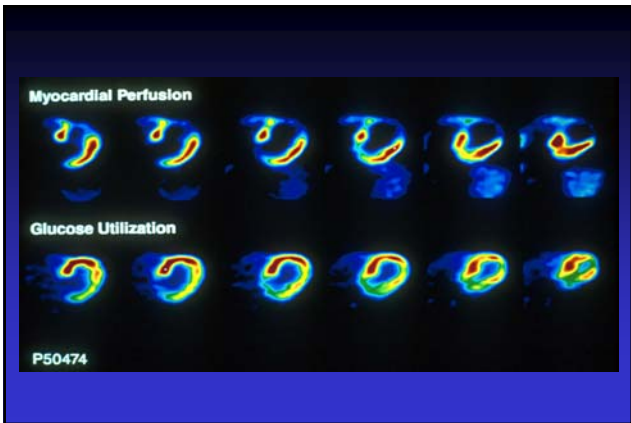
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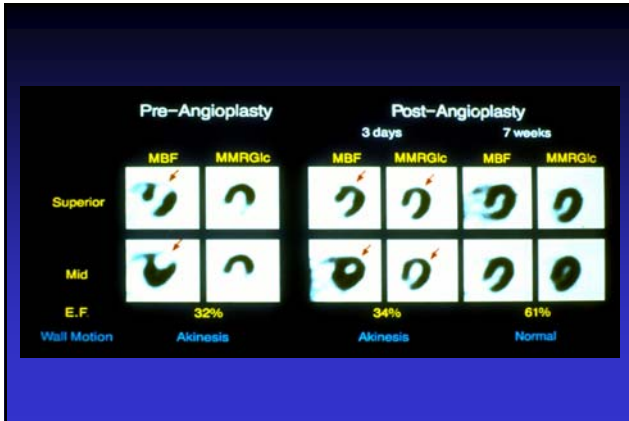
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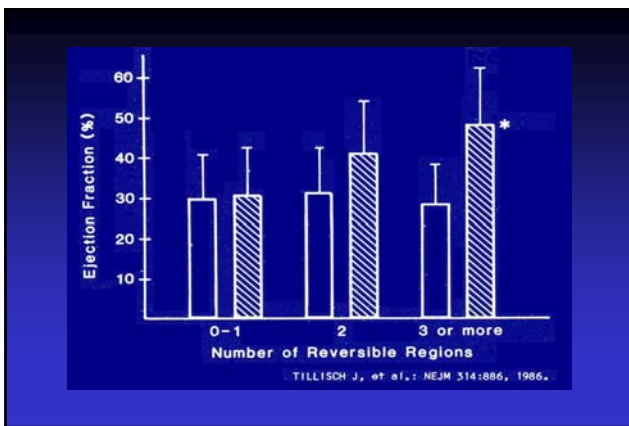
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### MYOCARDIAL VIABILITY

*Contractile Reserve with Low-Dose Dobutamine*

From: Yamagishi H, Akioka K, Hirata K, et al. Dobutamine stress electrocardiography-gated Tc-99m tetrofosmin SPECT for detection of viable but dysfunctional myocardium. *J Nucl Cardiol.* 2001 Jan-Feb;8(1):58-67.

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## MYOCARDIAL VIABILITY

Contractile Reserve with Low-Dose Dobutamine

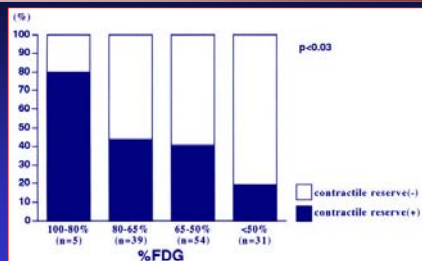


Fig. 2. Relationship between %FDG and the incidence of the presence of contractile reserve in dysfunctional segments. The incidence was closely related to the magnitude of %FDG ( $P < .03$ ) and rose with increasing magnitude of %FDG. From: Yamagishi H, Akioka K, Hirata K, et al. Dobutamine stress electrocardiography-gated Tc-99m tetrofosmin SPECT for detection of viable but dysfunctional myocardium. *J Nucl Cardiol*. 2001 Jan-Feb;8(1):58-67.

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## MYOCARDIAL VIABILITY

Contractile Reserve with Low-Dose Dobutamine

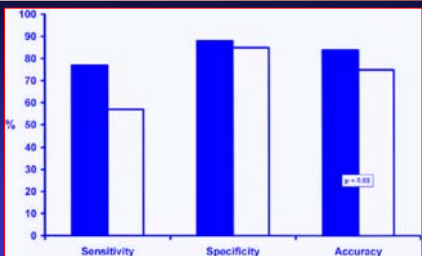


Fig. 1. Histogram comparing the results of LDD gated sestamibi SPECT (blue bars) versus LDD echocardiography (white bars) for the prediction of reversible dysfunction. From: Leoncini M, Sciagra R, Bellandi F, et al. Low-dose dobutamine nitrate-enhanced technetium 99m sestamibi gated SPECT versus low-dose dobutamine echocardiography for detecting reversible dysfunction in ischemic cardiomyopathy. *J Nucl Cardiol*. 2002 Jul-Aug;9(4):402-6.

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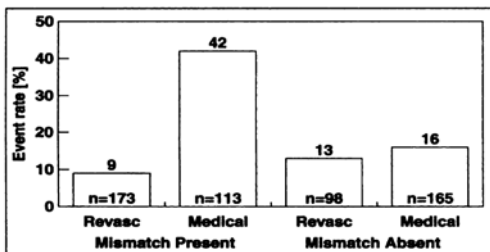


FIGURE 1. Pooled data from five FDG PET (549 patients) studies (10-14) evaluating prognostic value of technique. Revasc = revascularization.

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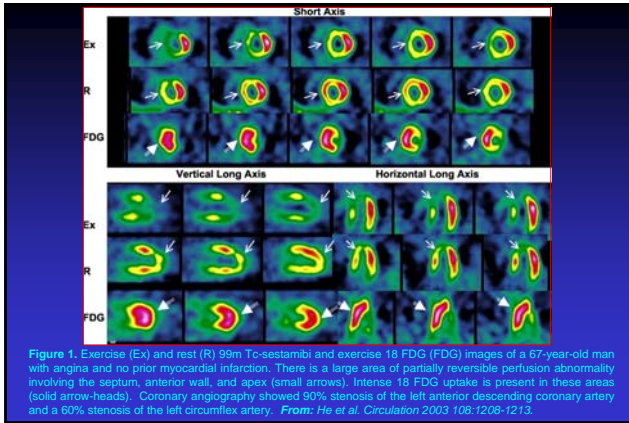
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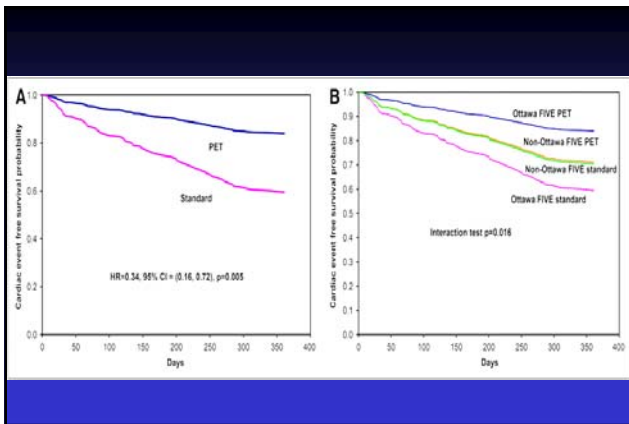
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IMAGING GUIDELINES – PARR 2 Update				
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B	B	B	C	Predicting improvement in regional and global LV function after revascularization
		C	C	
A	B			Predicting improvement in heart failure symptoms after revascularization
B				Predicting improvement in natural history after revascularization
B				

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