

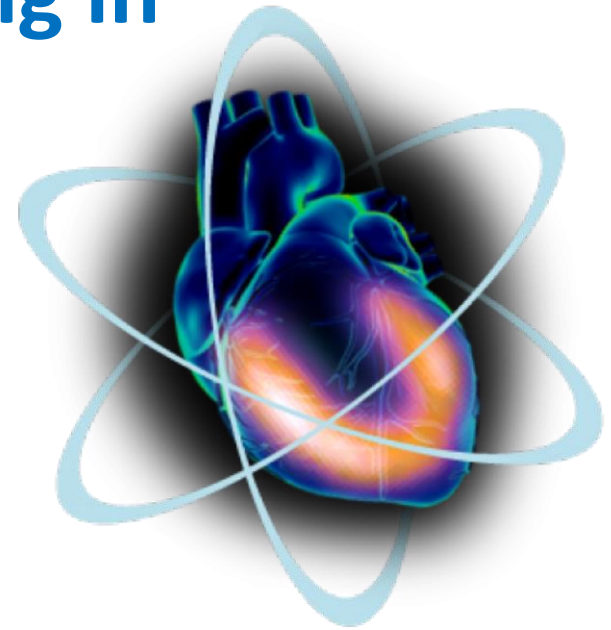


대한심장학회

The Korean Society of Cardiology

2017 춘계 심혈관통합학술대회 - Various aspects about MI management (16:40-17:00)

# Myocardial perfusion imaging in multivessel disease



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# The Korean Society of Cardiology

## COI Disclosure

*Sang-Geon Cho, MD*

The author has no financial conflicts of interest to disclose concerning the presentation



2017 Annual Spring Scientific Conference of the KSC  
in conjunction with KHRS, KSIC, KSE, and KSoLA

# CONTENTS

1. Intro: acute MI with multivessel disease
2. Role of MPI in STEMI with multivessel disease
  - 1) Ischemia-driven non-culprit revascularization
  - 2) Evaluating ischemic heart failure with MPI
  - 3) Conclusion

INTRO:

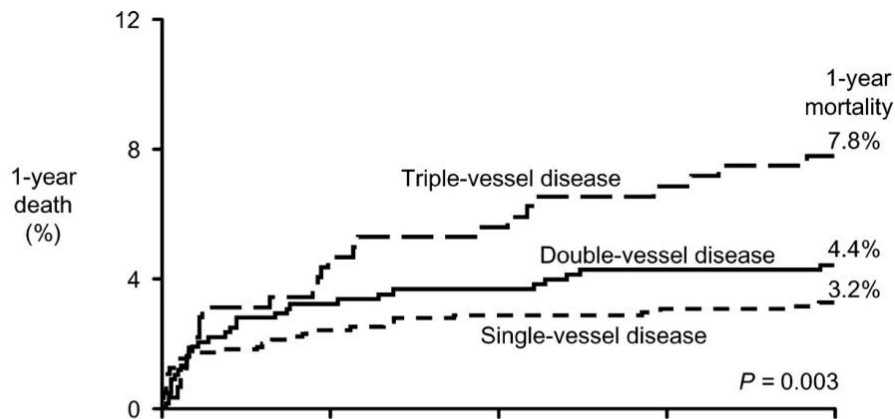
Acute MI with multivessel disease

# Acute MI with multivessel disease

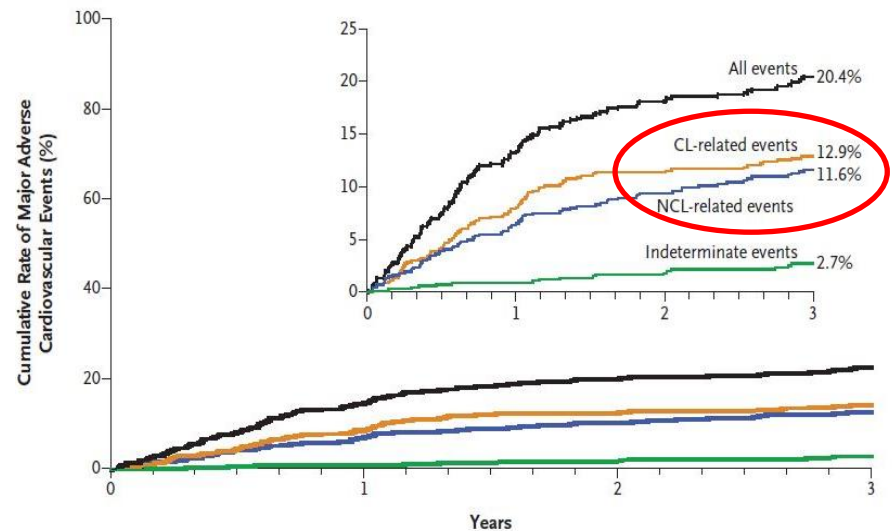


Multivessel disease is observed in ~30% of STEMI patients.

Am Heart J 1991;121:1042-9  
Eur Heart J 2010;31:1701-7



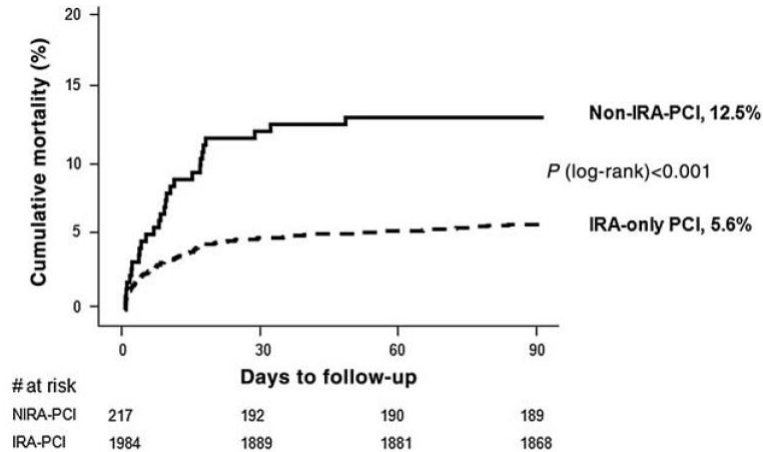
CADILLAC trial  
Sorajja et al. Eur Heart J 2007;28:1709-16



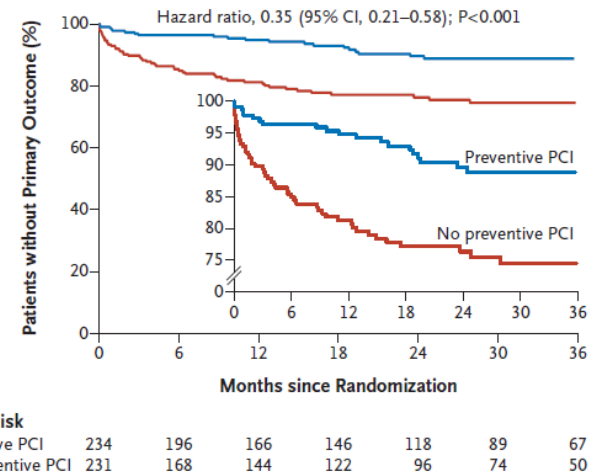
PROSPECT trial  
Stone et al. N Engl J Med 2011;364:226-35

# IRA-only vs. complete revascularization

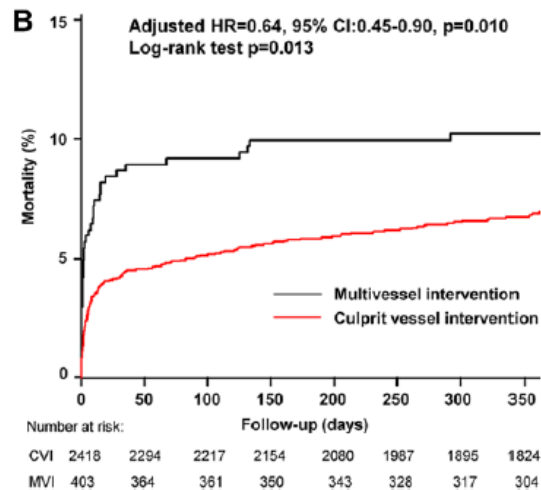
**APEX-AMI (Eur Heart J 2010)**



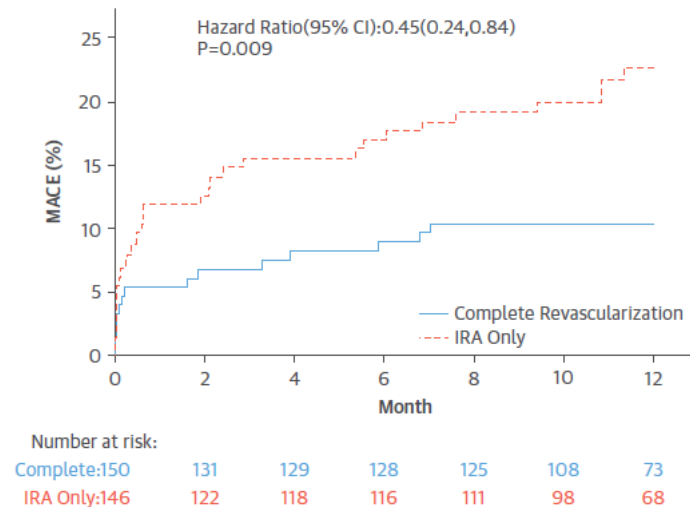
**PRAMI (NEJM 2013)**



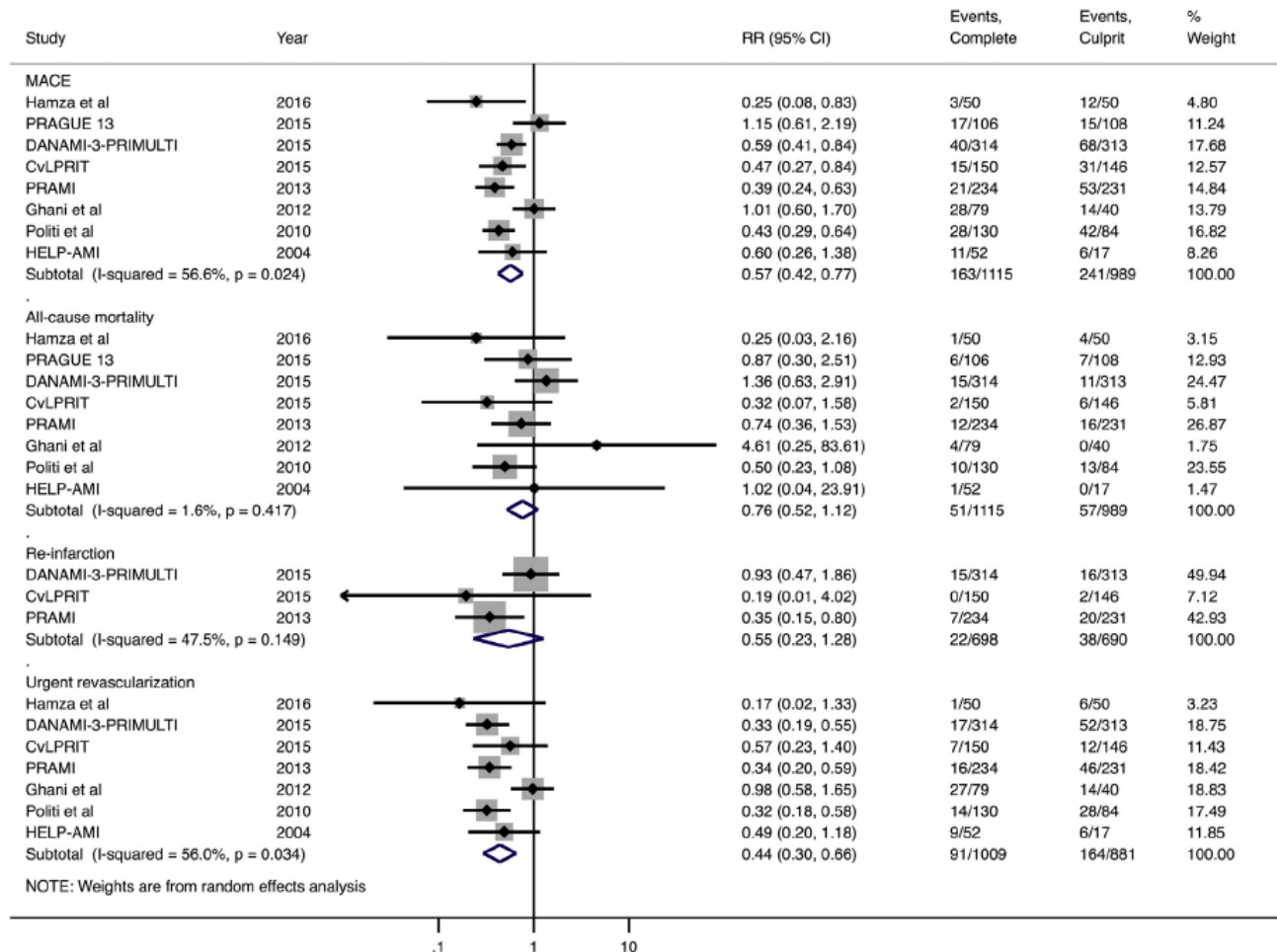
**Iqbal et al (Circ CQO 2014)**



**CvLPRIT (JACC 2015)**



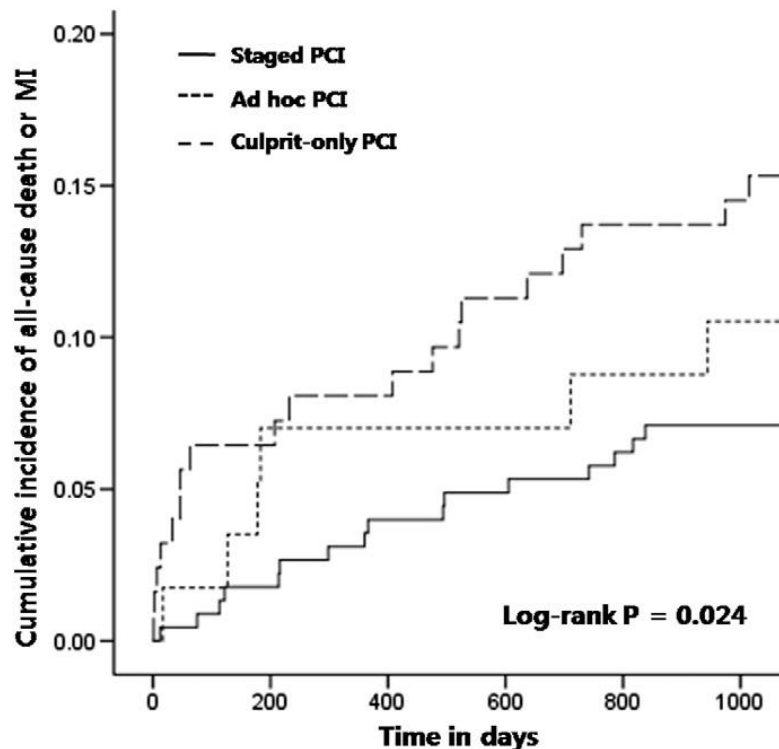
# IRA-only vs. complete revascularization



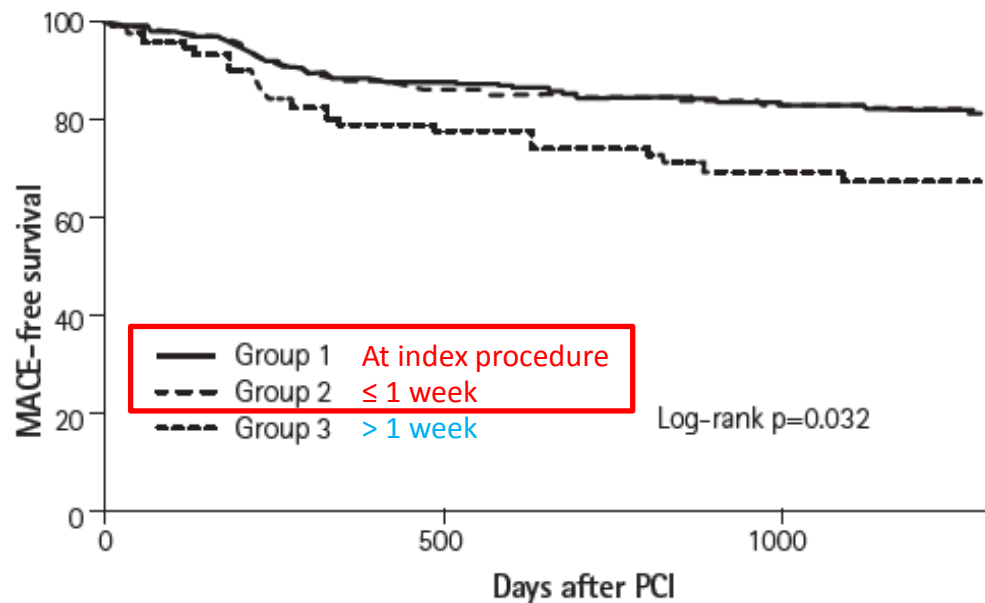
← Better outcome with complete revascularization

Worse outcome with complete revascularization →

# Staged, complete PCI for multivessel disease



Kim et al. Int J Cardiol 2014;176:505-7



Kim et al. Korean Circ J 2017;47:36-43



# STEMI with multivessel disease



Recommendations	Class <sup>a</sup>	Level <sup>b</sup>	Ref <sup>c</sup>
<b>Strategy</b>			
Primary PCI should be limited to the culprit vessel with the exception of cardiogenic shock and persistent ischaemia after PCI of the supposed culprit lesion.	<b>IIa</b>	<b>B</b>	234,264–266
<u>Staged revascularization of non-culprit lesions should be considered</u> in STEMI patients with multivessel disease in case of symptoms or ischaemia within days to weeks after primary PCI.	<b>IIa</b>	<b>B</b>	235
Immediate revascularization of significant non-culprit lesions during the same procedure as primary PCI of the culprit vessel may be considered in selected patients.	<b>IIb</b>	<b>B</b>	267

2013 Recommendation	2015 Focused Update Recommendation	Comment
<b>Class III: Harm</b> PCI should not be performed in a noninfarct artery at the time of primary PCI in patients with STEMI who are hemodynamically stable (11–13). (Level of Evidence: B)	<b>Class IIb</b> <u>PCI of a noninfarct artery may be considered</u> in selected patients with STEMI and multivessel disease who are hemodynamically stable, either at the time of primary PCI or as a planned staged procedure (11–24). (Level of Evidence: B-R)	Modified recommendation (changed class from “III: Harm” to “IIb” and expanded time frame in which multivessel PCI could be performed).

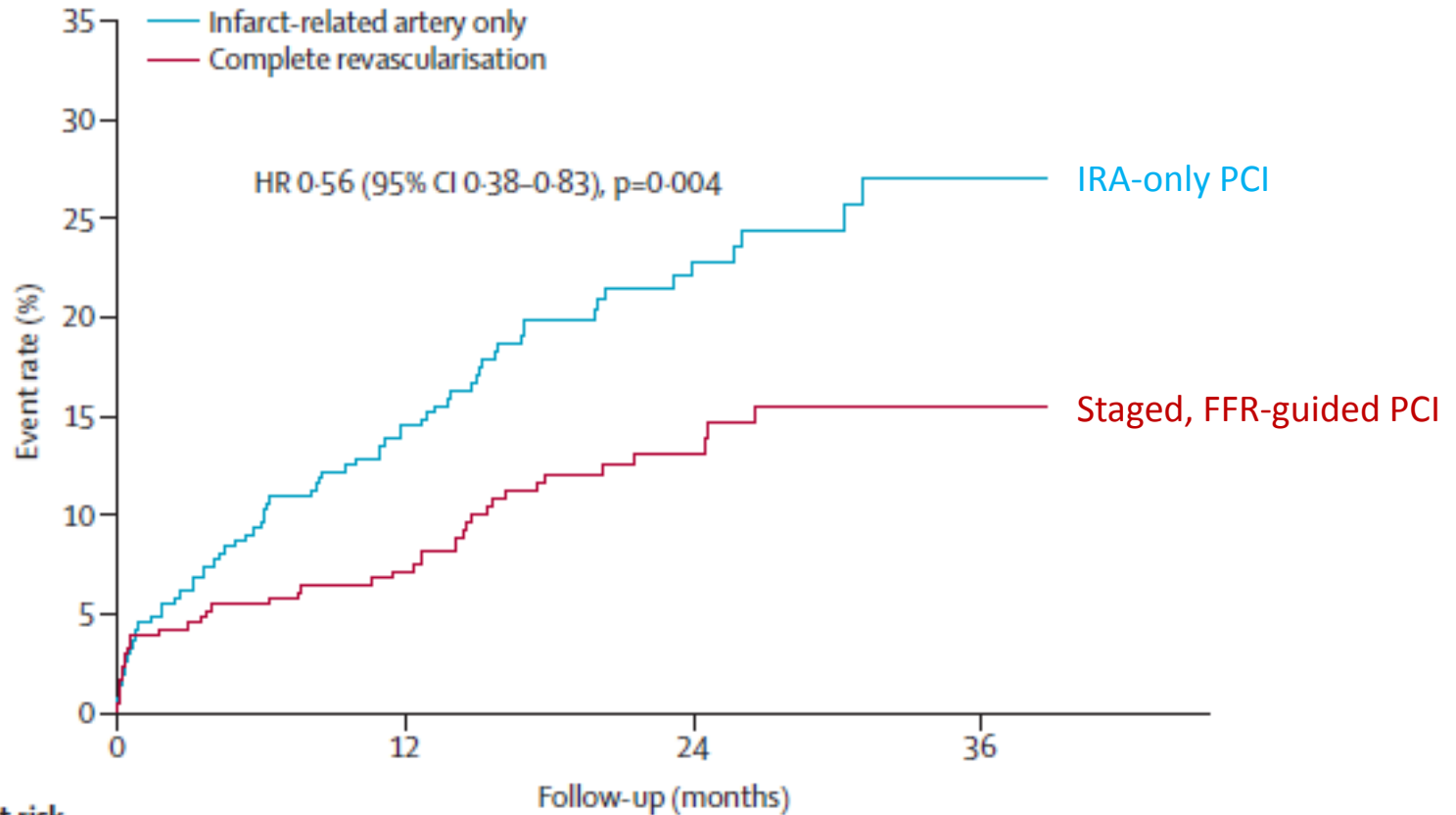
PCI indicates percutaneous coronary intervention; and STEMI, ST-elevation myocardial infarction.

ACCF AHA SCAI 2015 Focused update on STEMI PCI

**Role of MPI:**  
**Ischemia-driven non-culprit  
revascularization**

# Ischemia-driven non-culprit PCI

## DANAMI-3-PRIMULTI



Number at risk	
Infarct-related artery only	313
Complete revascularisation	314

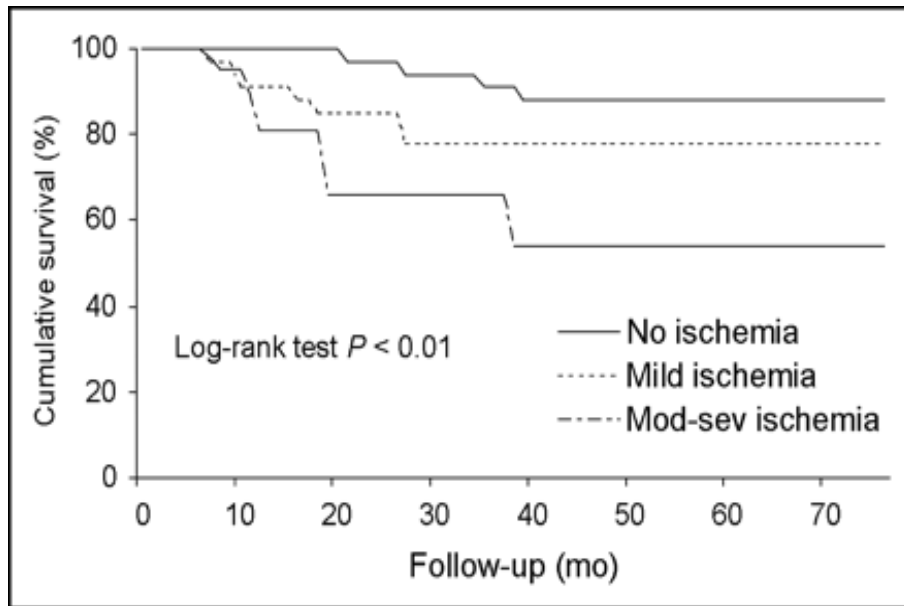
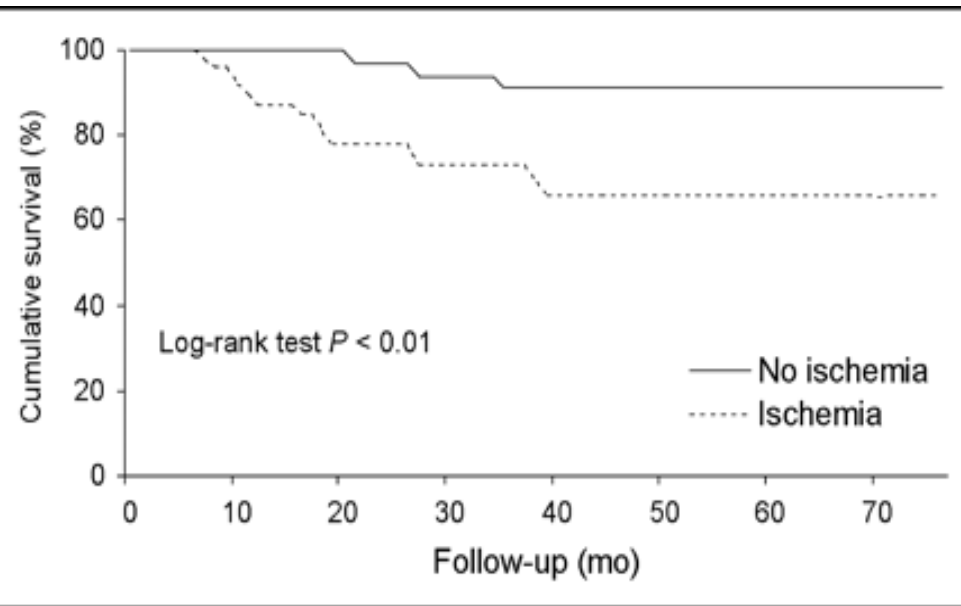
313	271	142	53
314	291	159	55

# Ischemia-driven non-culprit PCI

## Role of MPI



Pre-discharge MPI (6-7 days post-MI), S/P fibrinolysis



Residual ischemia on MPI → poor Px

# STEMI with multivessel disease



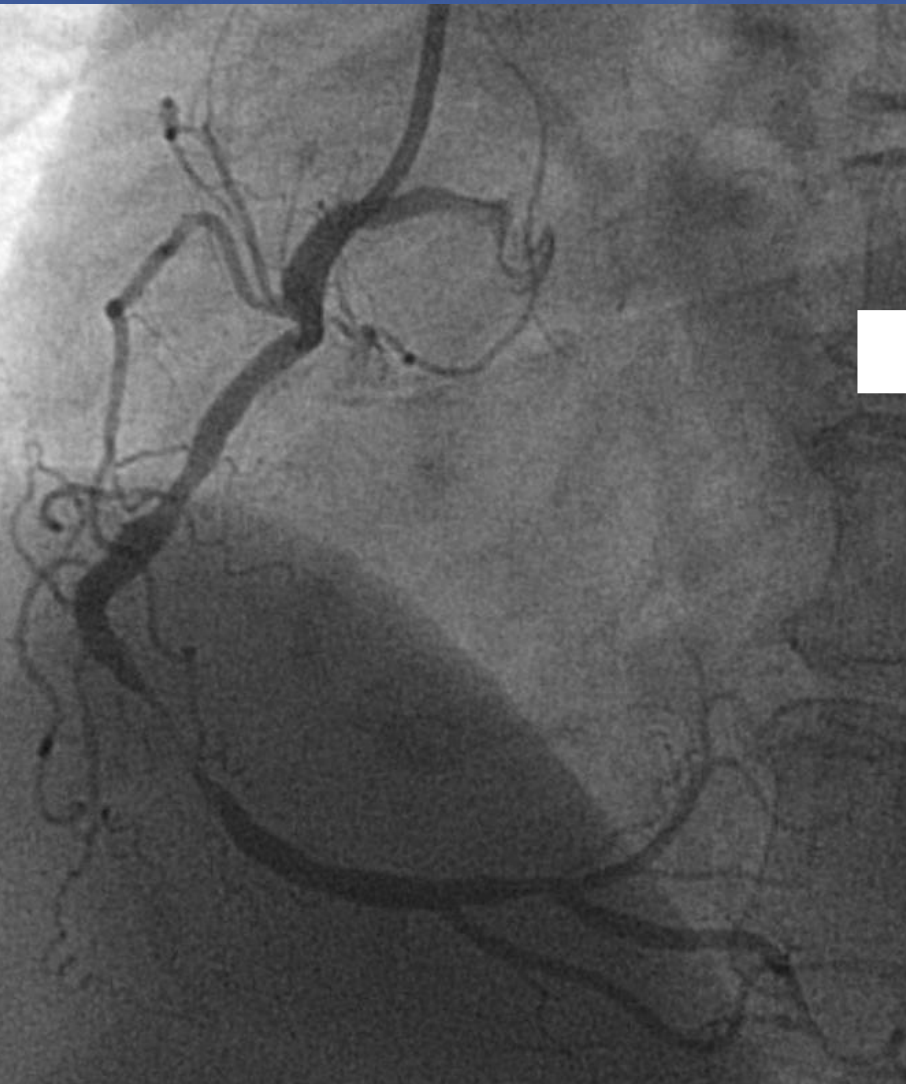
**TABLE 6.** STEMI—revascularization of nonculprit artery during the initial hospitalization

Indication	Appropriate use score (1–9)
Successful Treatment of the Culprit Artery by Primary PCI or Fibrinolysis Revascularization of 1 or More Nonculprit Arteries During the Same Hospitalization	
Revascularization by PCI or CABG	
10. ■ Spontaneous or easily provoked symptoms of myocardial ischemia ■ One or more additional severe stenoses	A (8)
11. ■ Asymptomatic ■ Findings of ischemia on noninvasive testing ■ One or more additional severe stenoses	A (7)
12. ■ Asymptomatic (no additional testing performed) ■ One or more additional severe stenoses	M (6)
13. ■ Asymptomatic (no additional testing performed) ■ One or more additional intermediate stenoses	R (3)
14. ■ Asymptomatic ■ One or more additional intermediate (50%–70%) stenoses ■ FFR performed and $\leq 0.80$	A (7)

The number in parenthesis next to the rating reflects the median score for that indication

A, appropriate; CABG, coronary artery bypass graft; FFR, fractional flow reserve; M, may be appropriate; PCI, percutaneous coronary intervention; R, rarely appropriate; STEMI, ST-segment elevation myocardial infarction

# 61/F STEMI, RCA



Primary PCI for mRCA



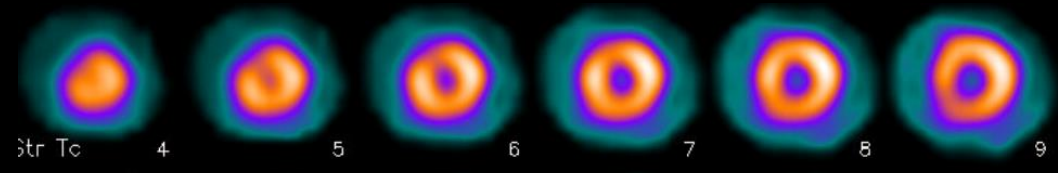
# 61/F STEMI, RCA



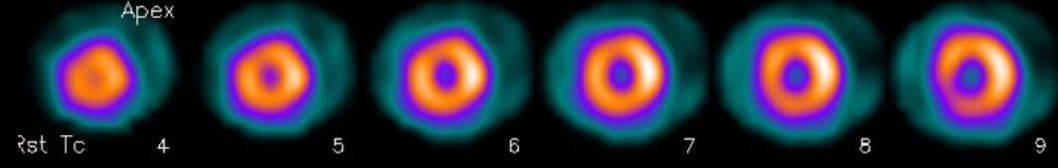
Multivessel stenoses in  
LAD and LCx

**Tc-99m MIBI MPI**  
**(D+3 after PPCI**  
**for mRCA)**

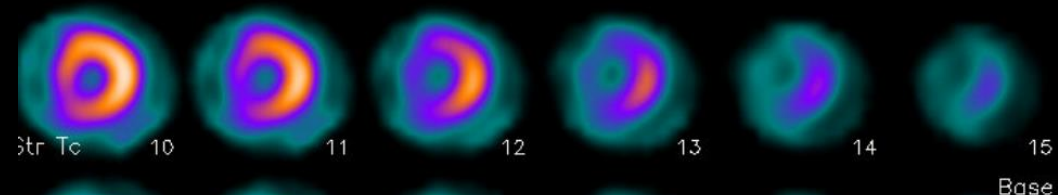
**Stress**



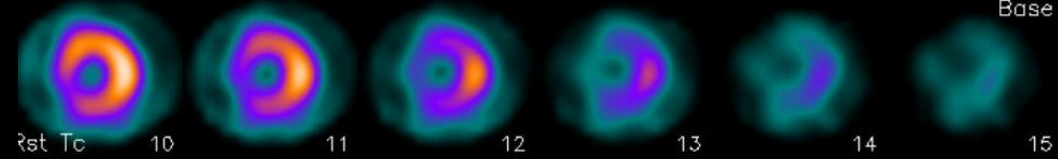
**Rest**



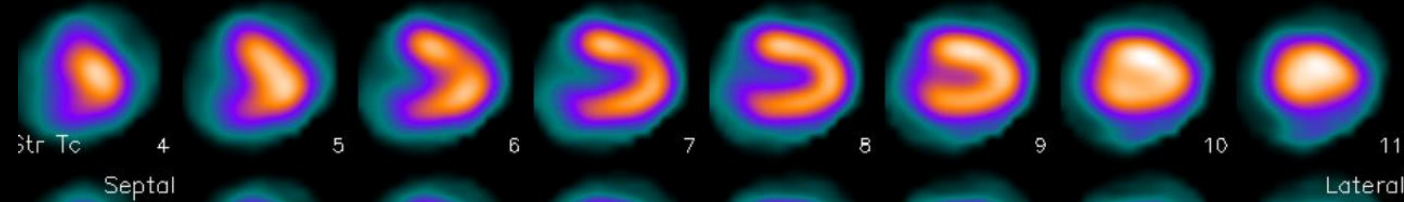
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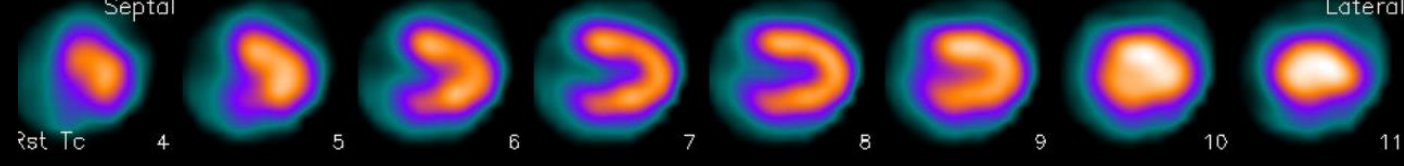
**Rest**



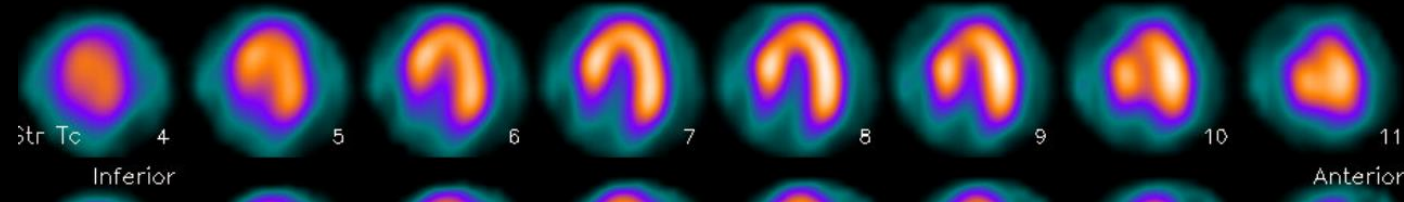
**Stress**



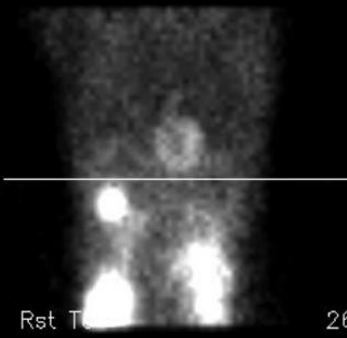
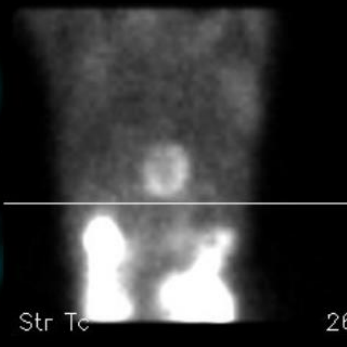
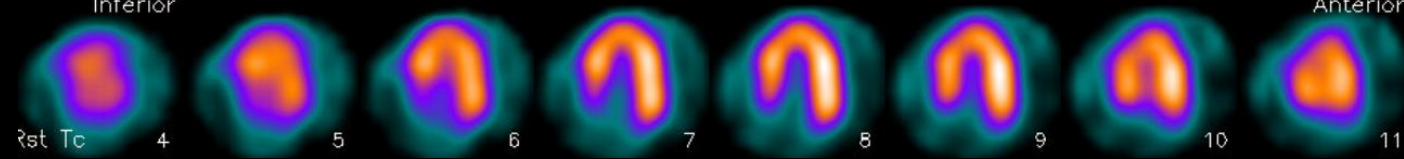
**Rest**



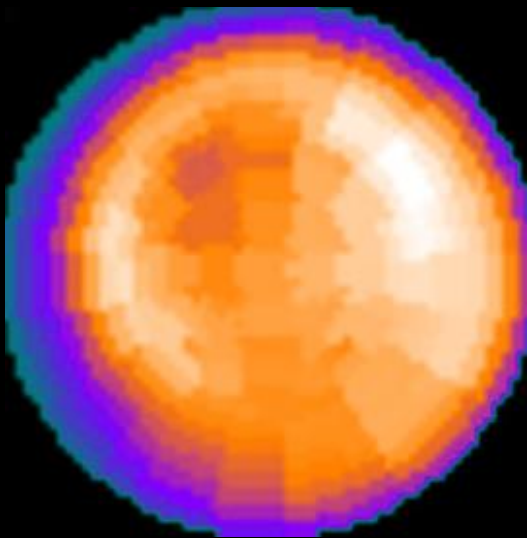
**Stress**



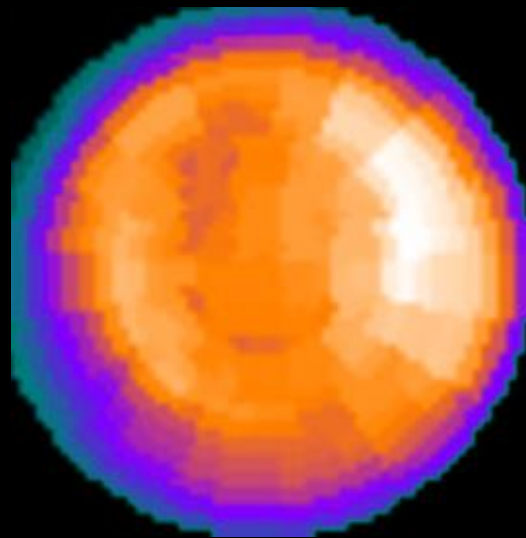
**Rest**



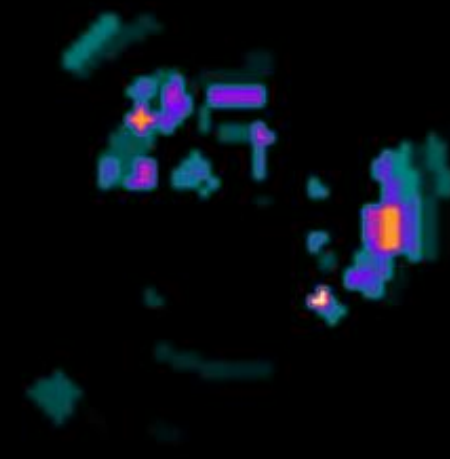




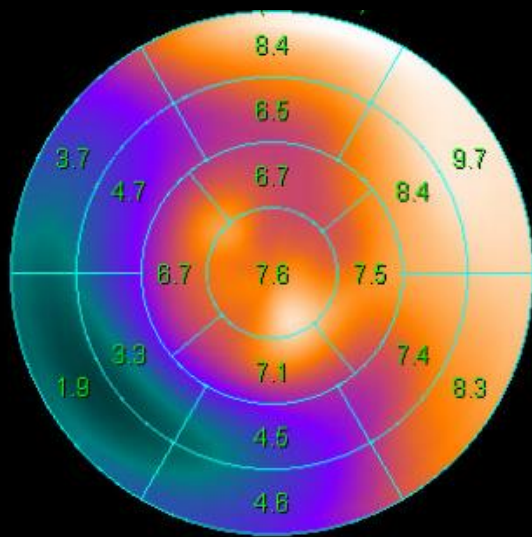
Stress



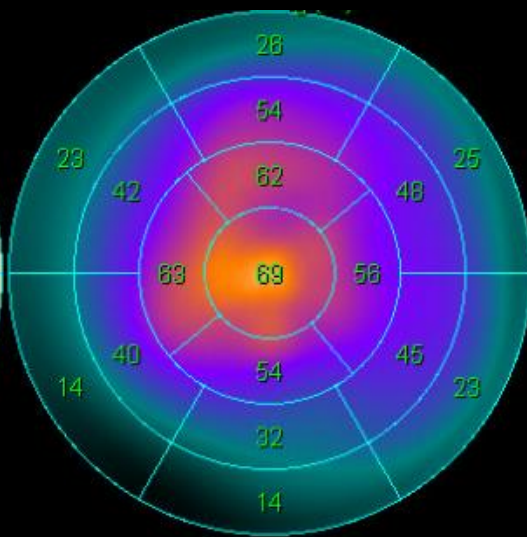
Rest



Reversibility map  
(ischemic burden)



Wall motion (mm)\*



Thickening (%)\*

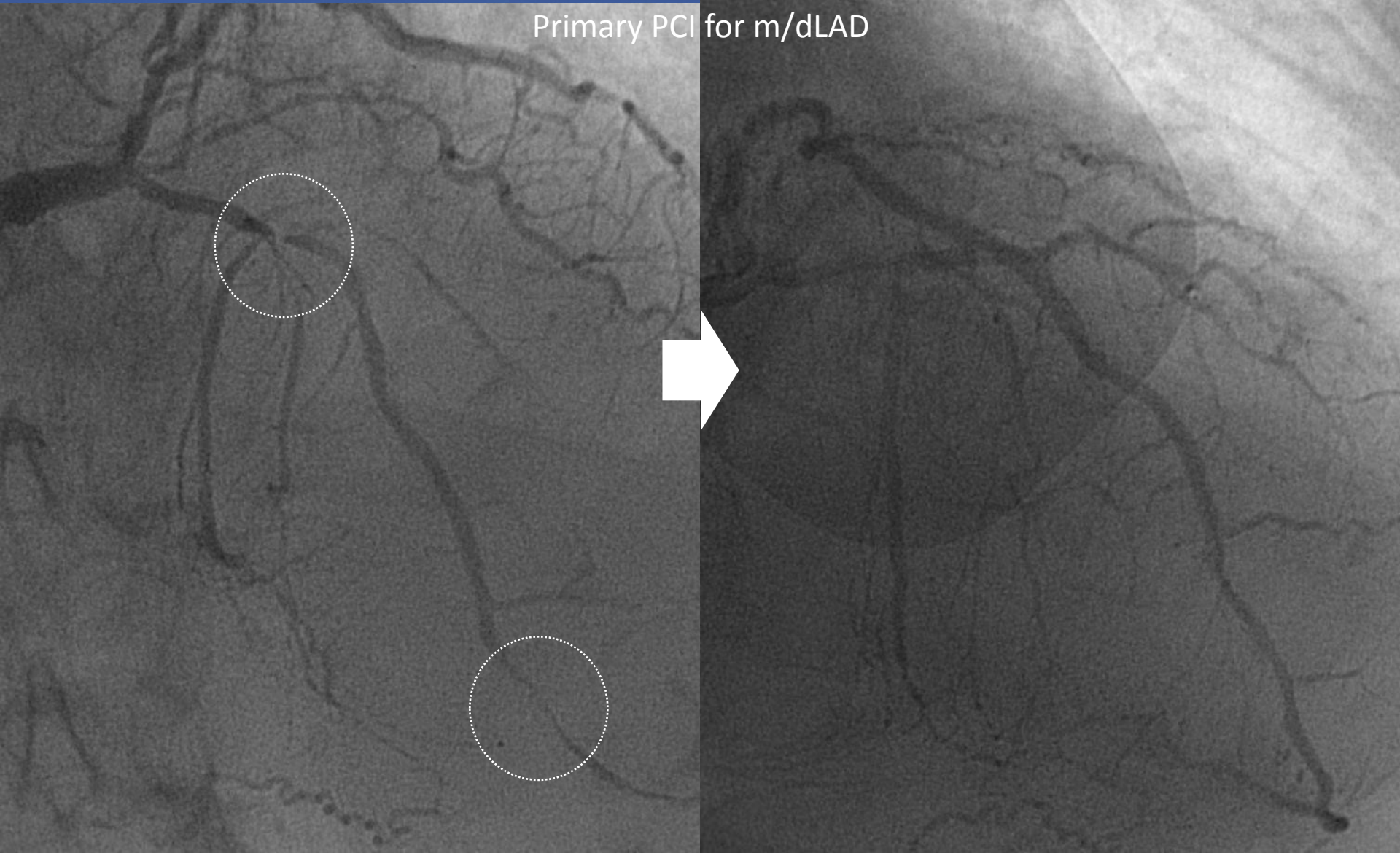
**Well-salvaged myocardium  
+ No significant ischemic burden  
REC) Medical treatment**

\*after adenosine stress

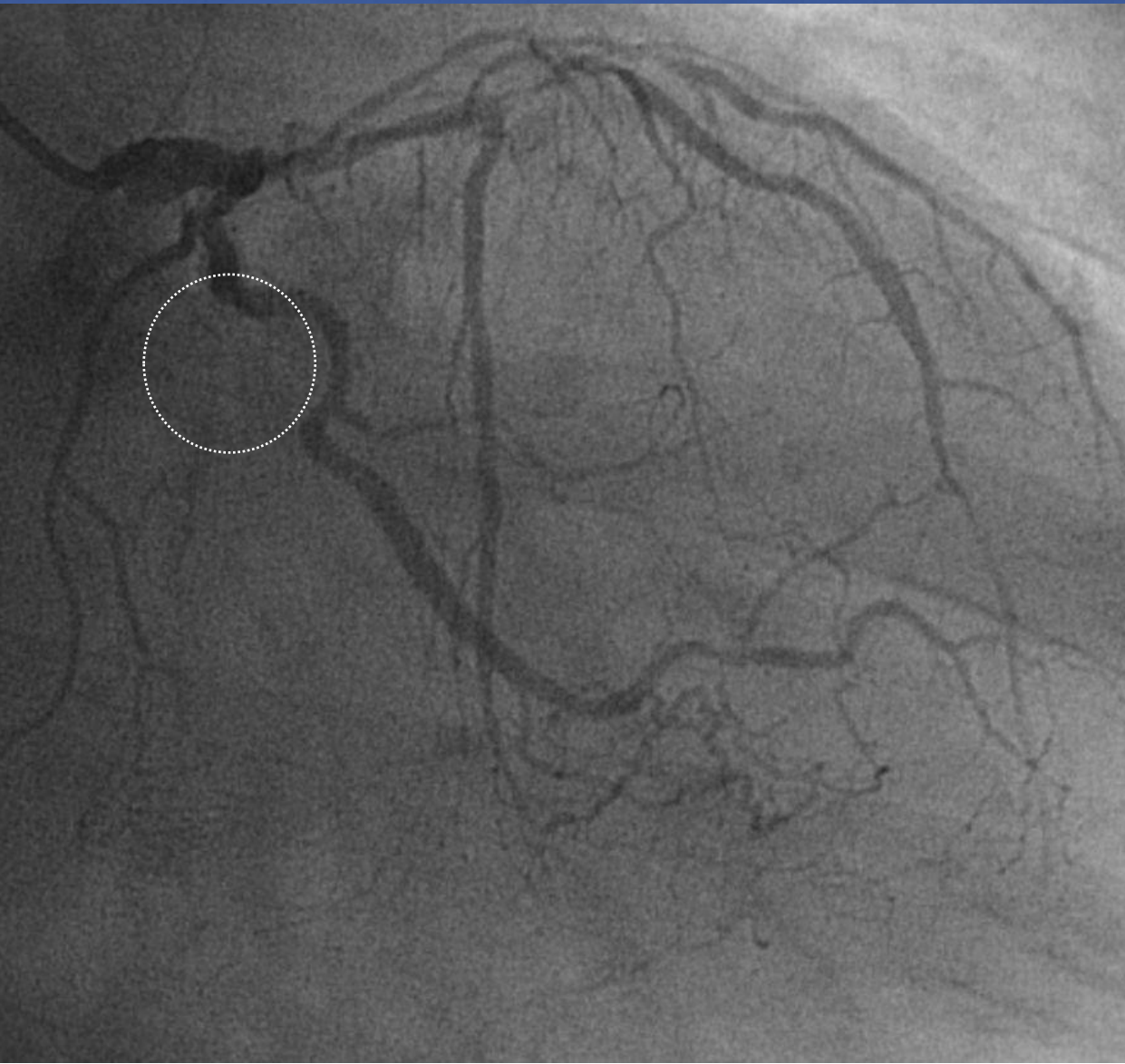
# 73/F STEMI, LAD



Primary PCI for m/dLAD



# 73/F STEMI, LAD

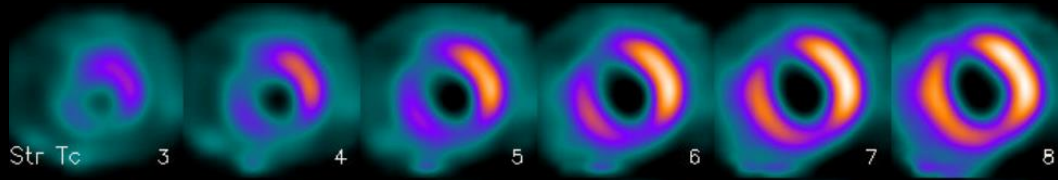


Total occlusion in dLCx

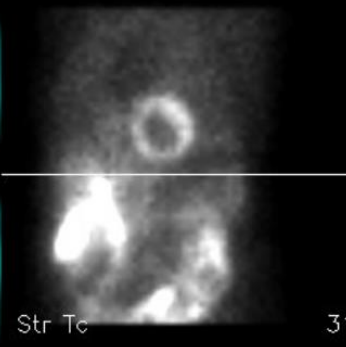
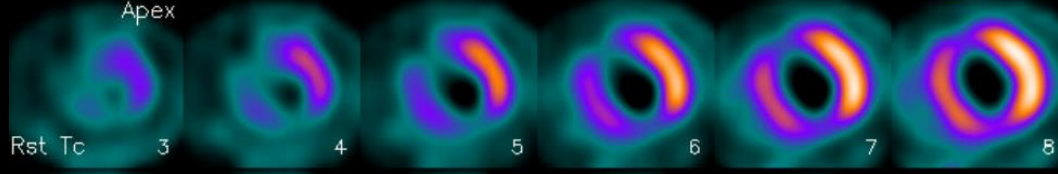


**Tc-99m MIBI MPI**  
**(D+2 after PPCI**  
**for mLAD/dLAD)**

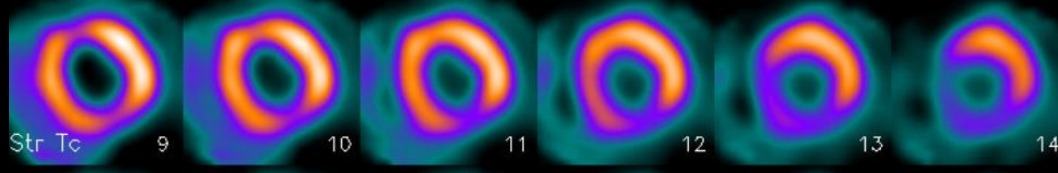
**Stress**



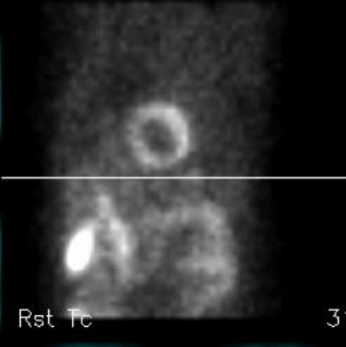
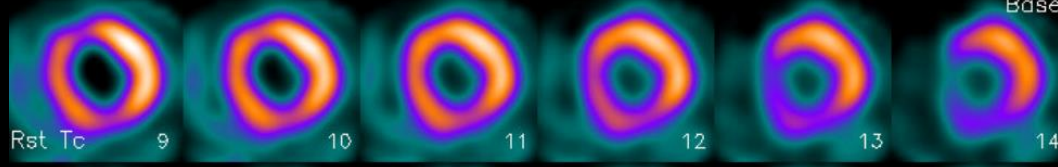
**Rest**



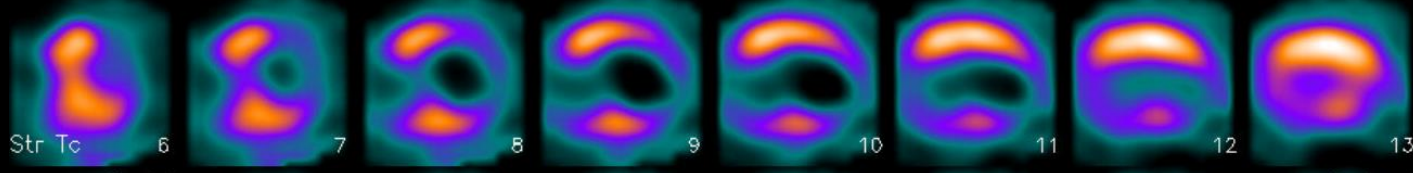
**Stress**



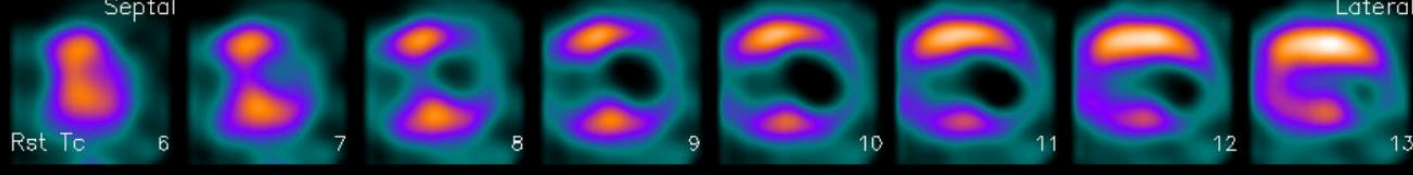
**Rest**



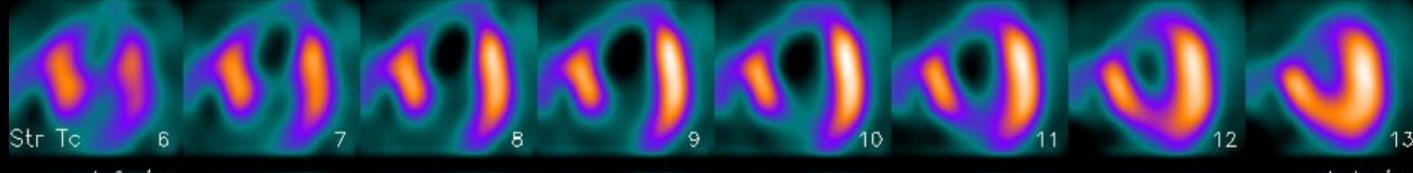
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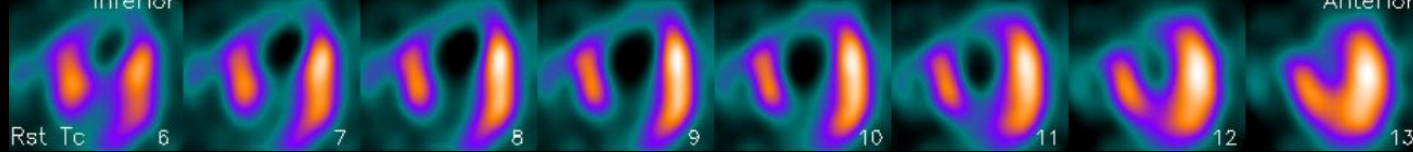
**Rest**

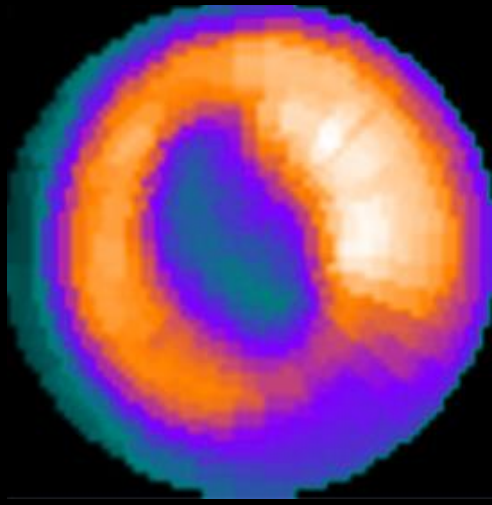


**Stress**

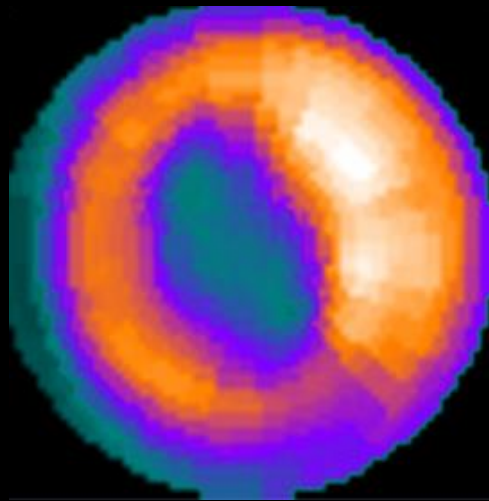


**Rest**

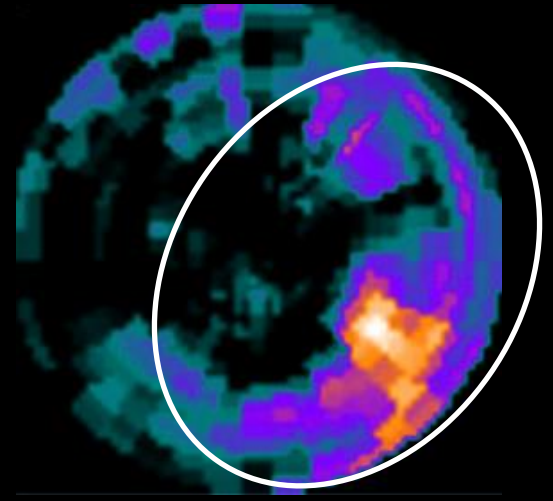




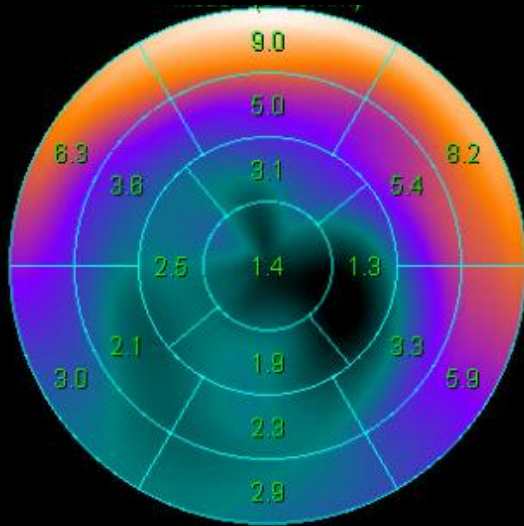
Stress



Rest



Reversibility map  
(ischemic burden)



Wall motion (mm)



Thickening (%)

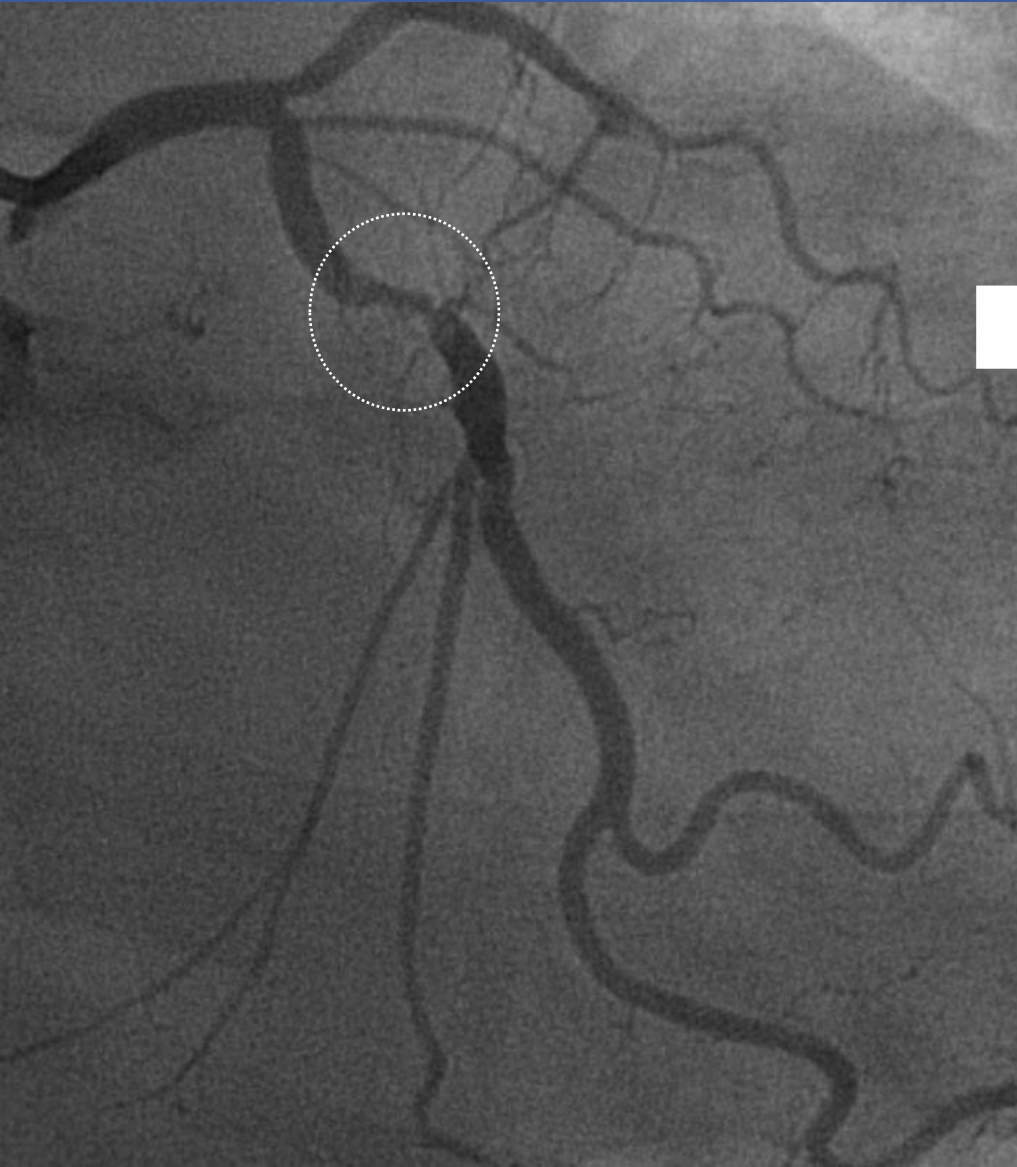
**Infarcted myocardium (LAD)  
+ significant ischemia (LCx)**  
**REC) Revascularization for LCx**

Role of MPI:

Evaluation of ischemic heart failure

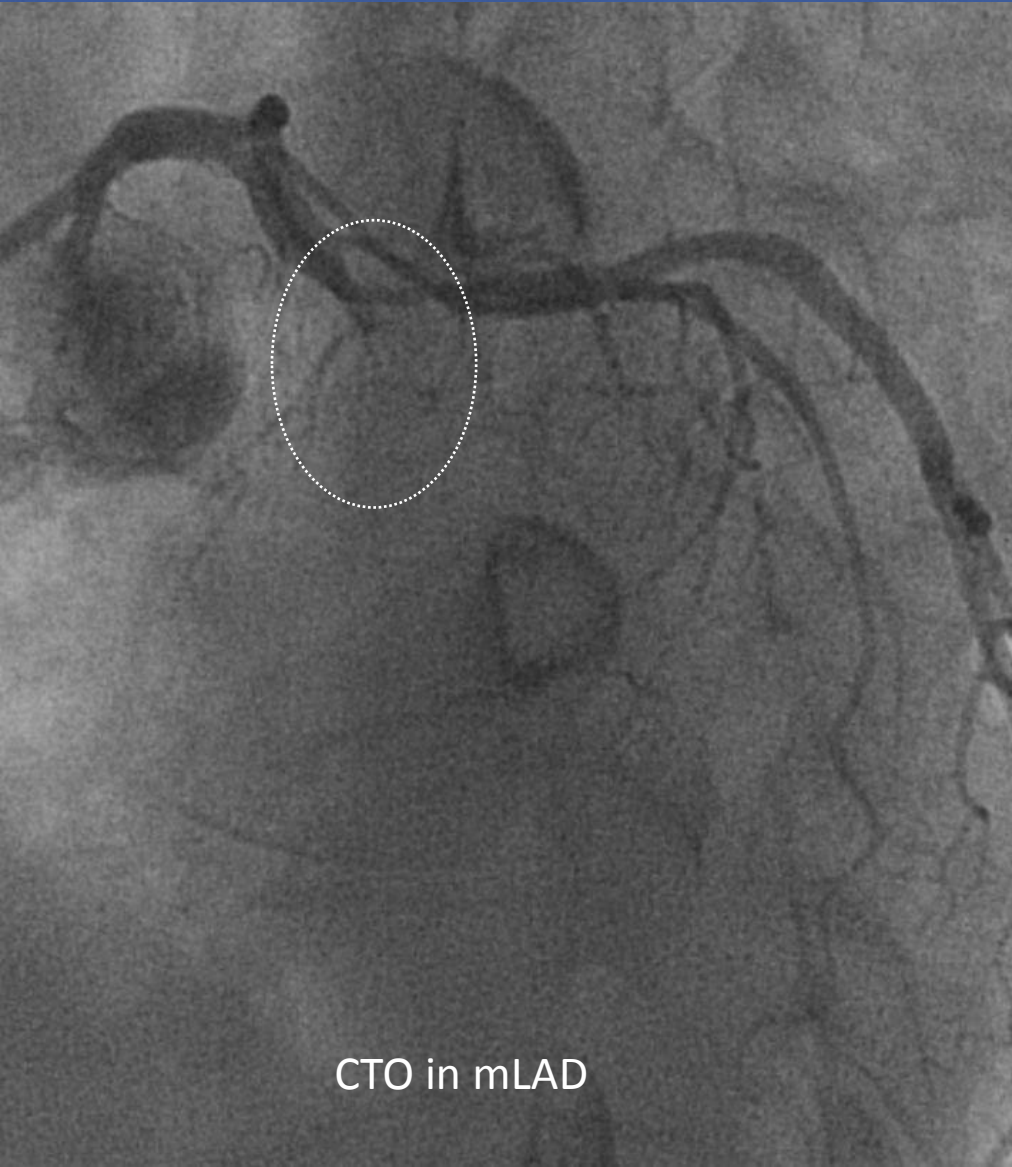


69/F STEMI, LCx



Primary PCI for mLCx

# 69/F STEMI, LCx



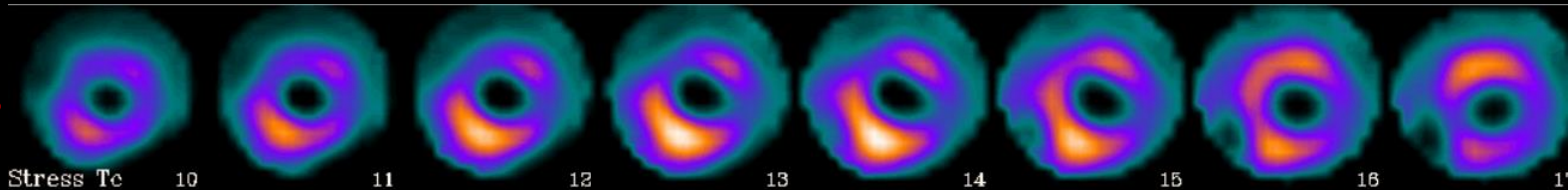
CTO in mLAD



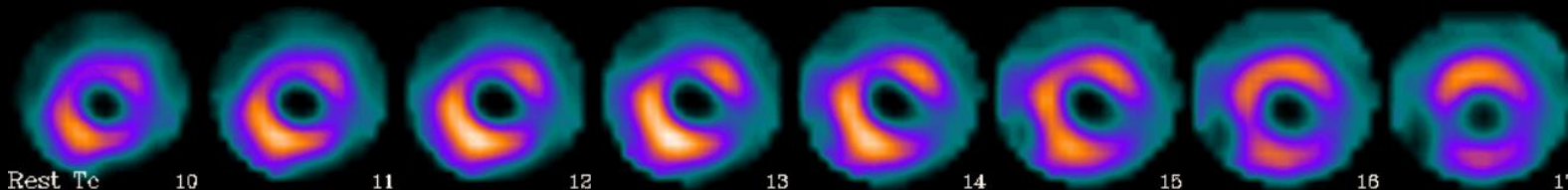
No significant stenosis in RCA



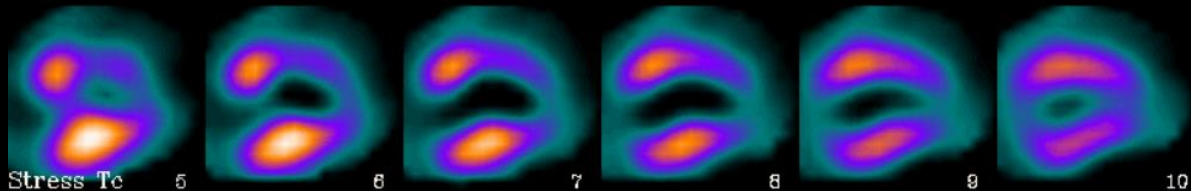
Stress



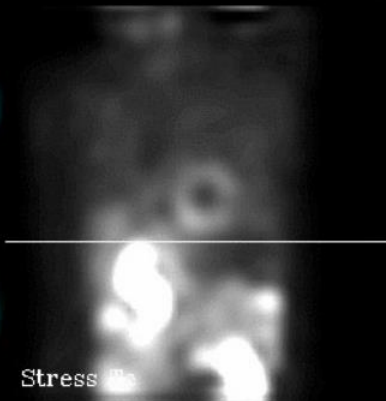
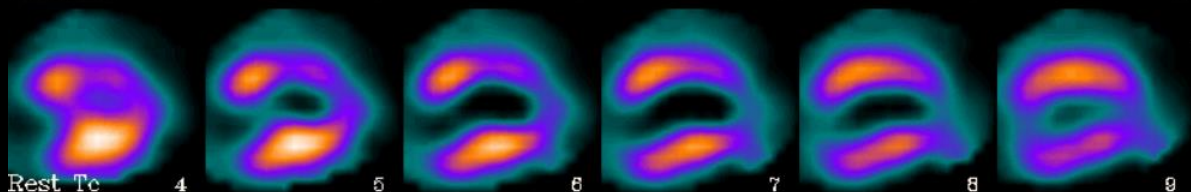
Rest



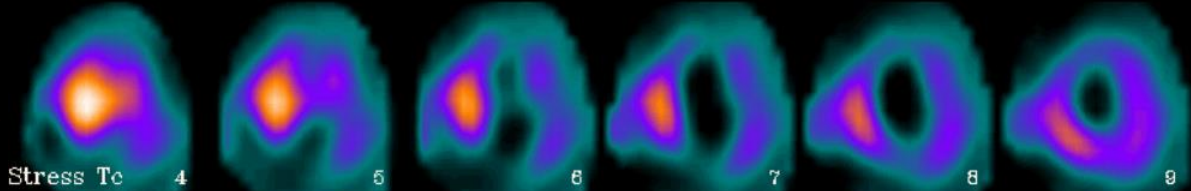
Stress



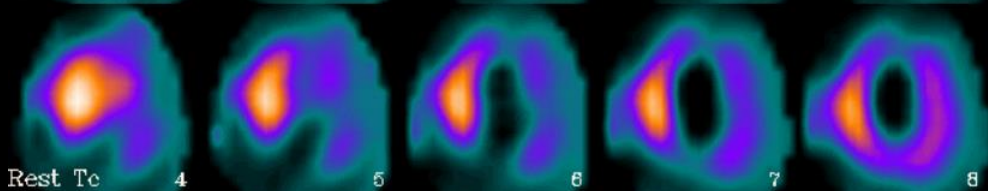
Rest



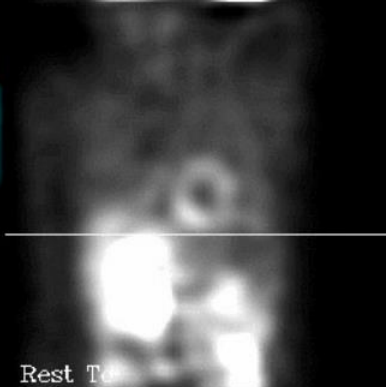
Stress

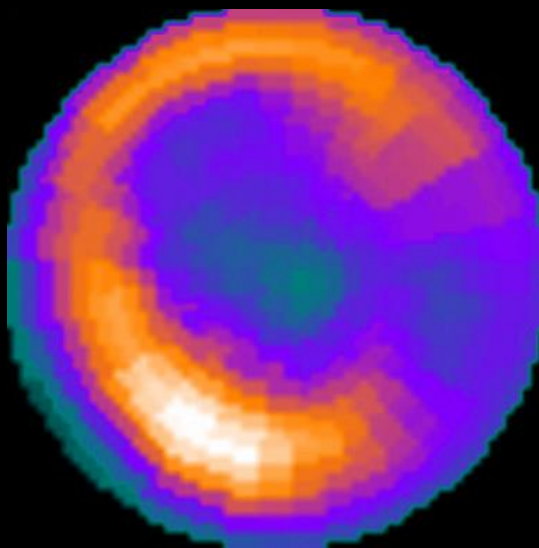


Rest

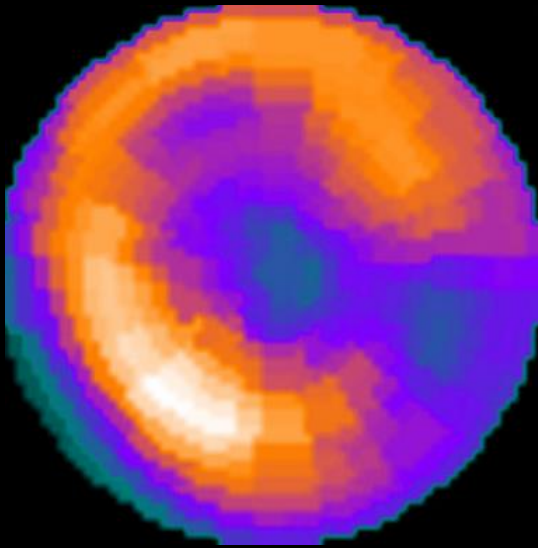


TID Ratio  
1.02

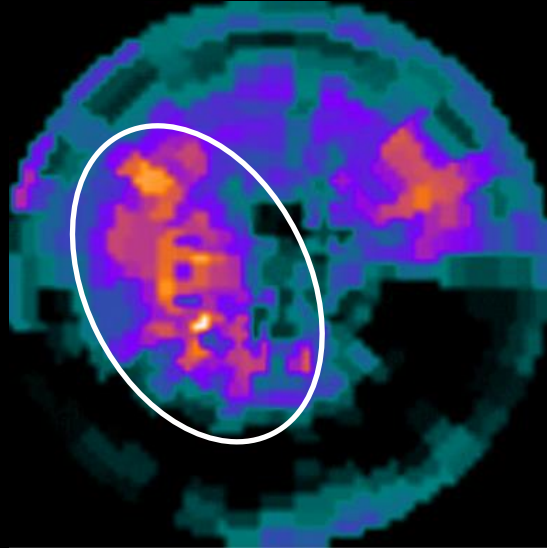




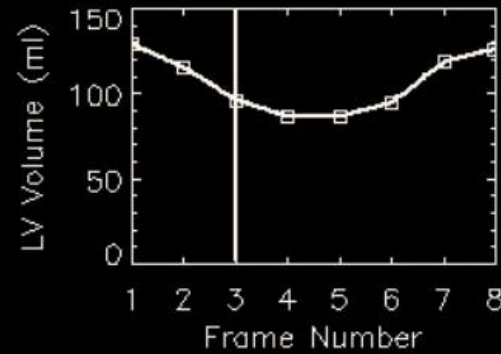
Stress



Rest



Reversibility map  
(ischemic burden)



EF = 33% (R0)  
 EDV = 129 ml  
 ESV = 86 ml  
 SV = 43 ml  
 Mass = 164 gm

**Infarcted myocardium (LCx territory)  
 + significant ischemic burden in non-culprit artery (LAD)**  
  
**REC) Revascularization for LAD**

# 47/M STEMI, LAD



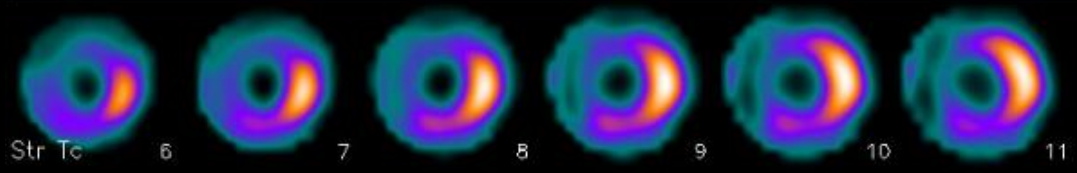
Failed primary PCI for LAD at local clinic



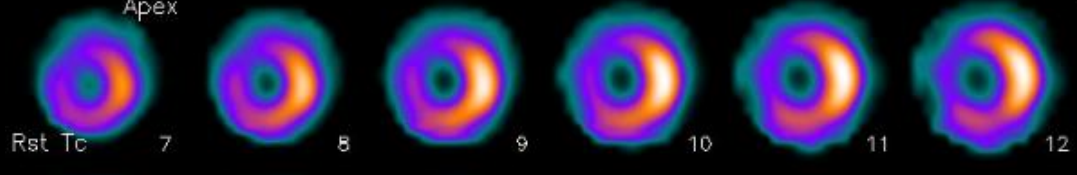
**Tc-99m TF MPI**  
**(3 days post-MI)**

**LVEF 30.8%**

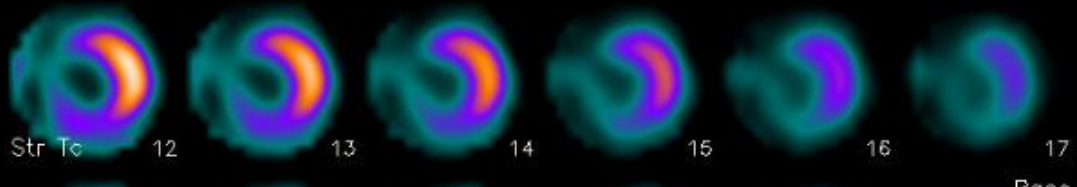
**Stress**



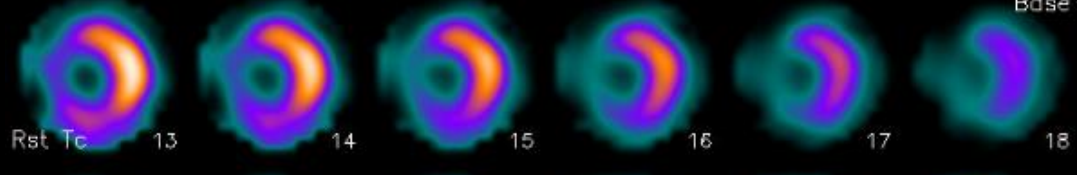
**Rest**



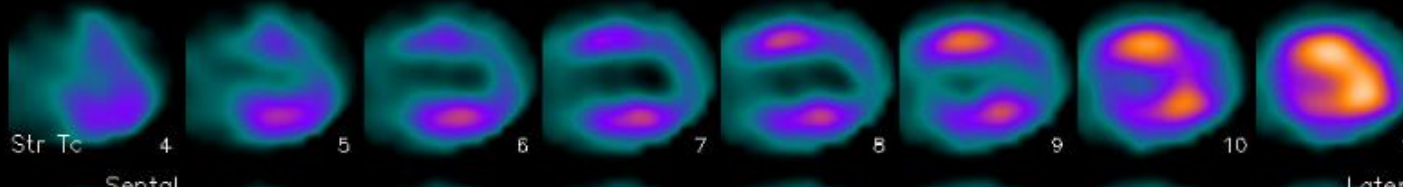
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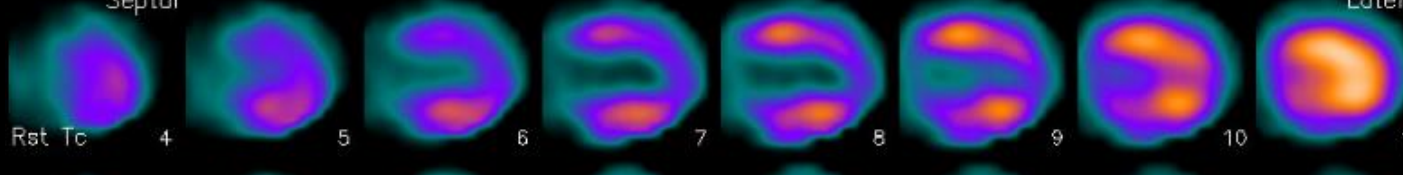
**Rest**



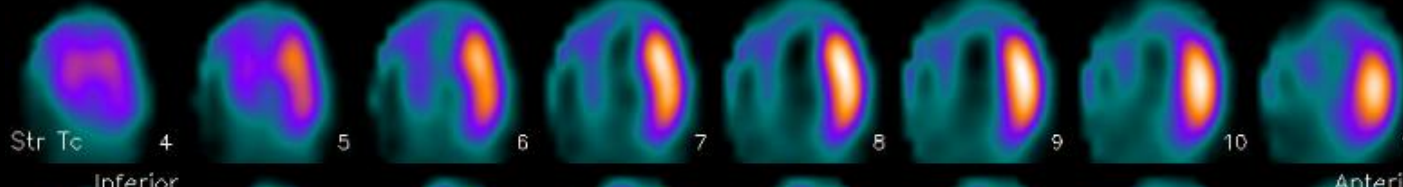
**Stress**



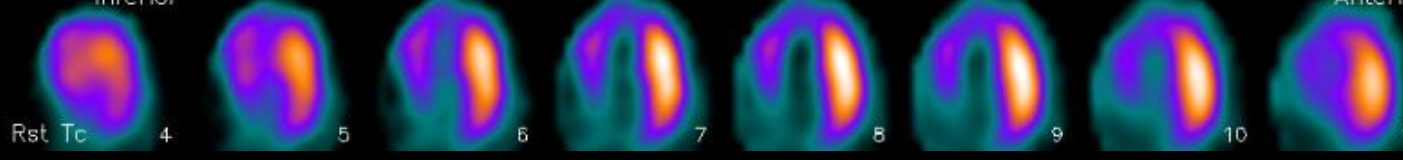
**Rest**

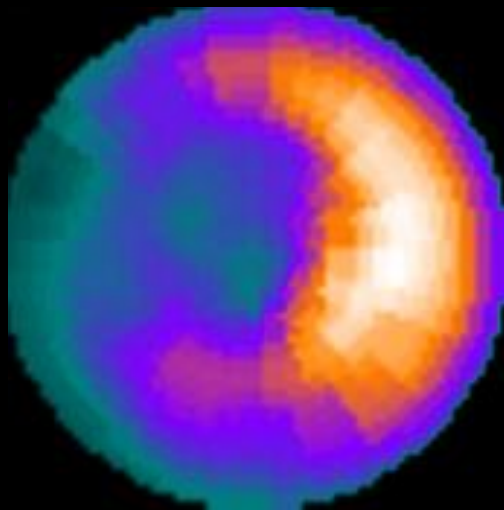


**Stress**



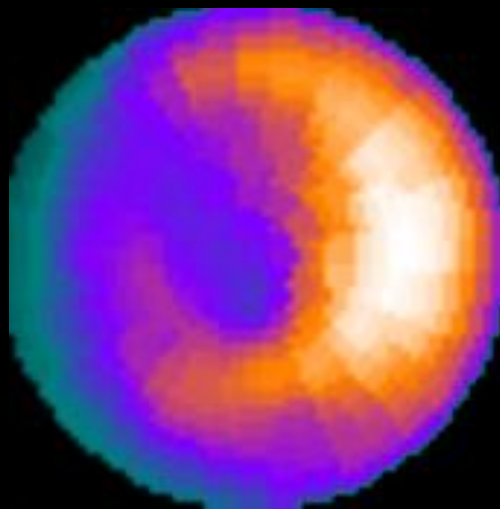
**Rest**





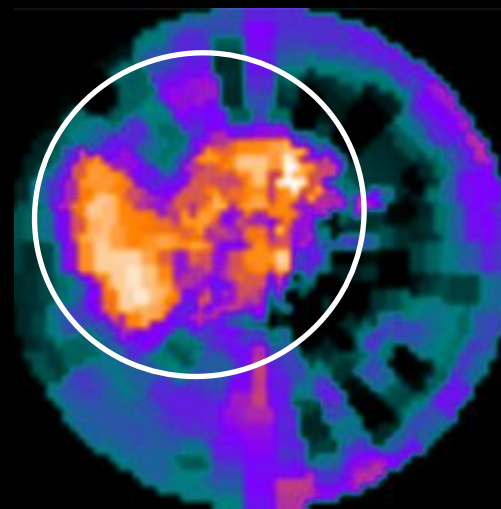
Stress

EF: 34%  
 EDV: 125ml  
 ESV: 83ml  
 Perf. Vol.: 115ml



Rest

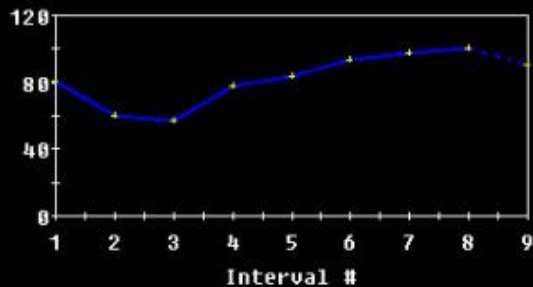
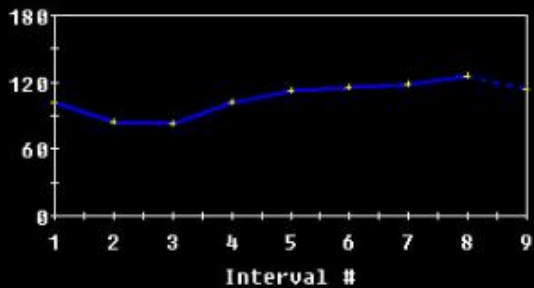
EF: 43%  
 EDV: 100ml  
 ESV: 57ml  
 Perf. Vol.: 100ml



Reversibility map  
 (ischemic burden)

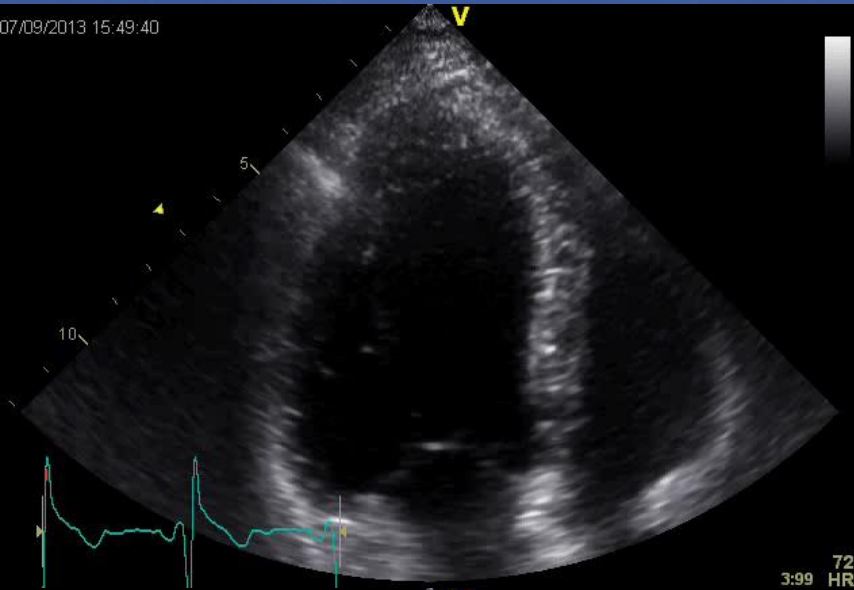
**Infarcted myocardium  
 + viable ischemic myocardium in  
 LAD territory**

**REC) Revascularization for LAD**



# F/U Echocardiography

LVEF 31%



LVEF 68%

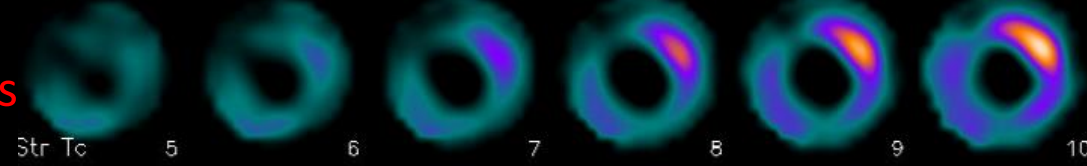




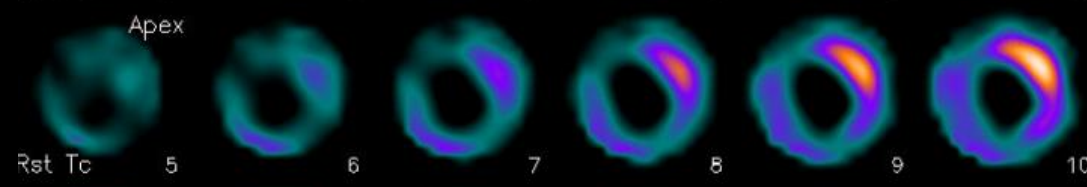
82/M

Low LVEF after  
PPCI

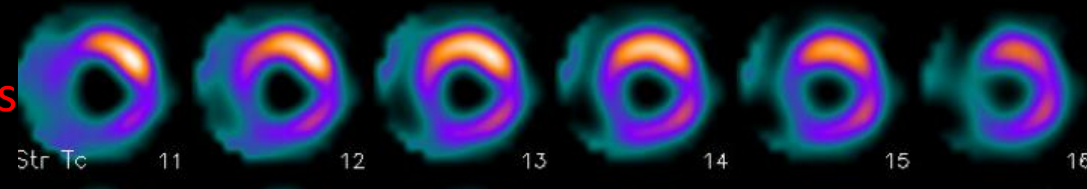
Stress



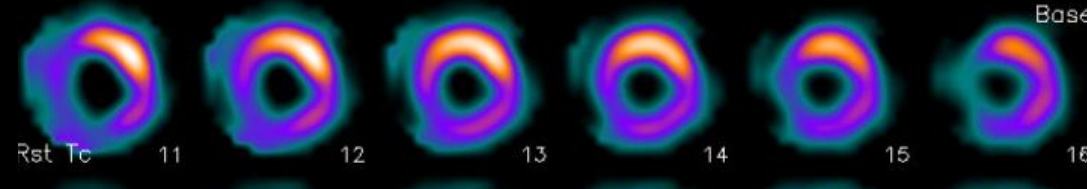
Rest



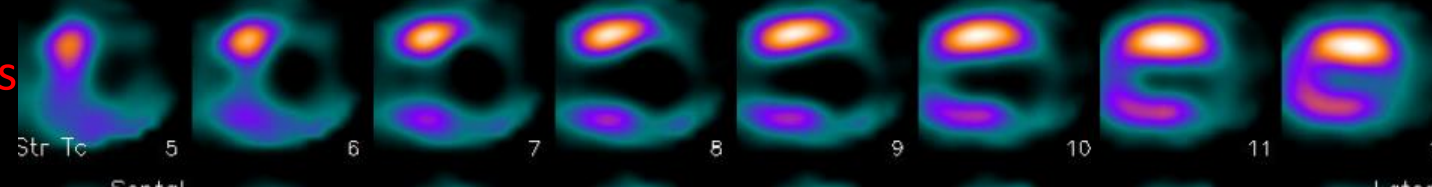
Stress



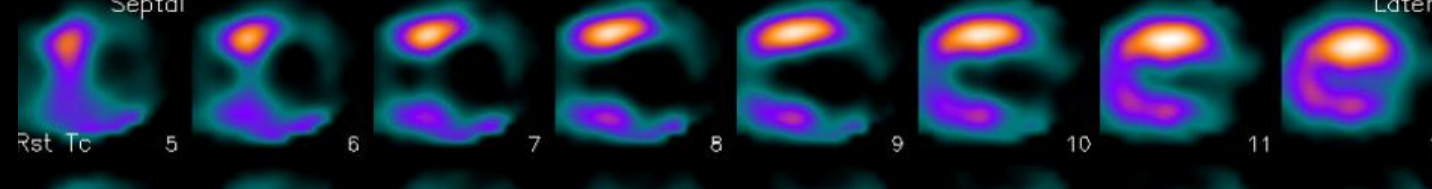
Rest



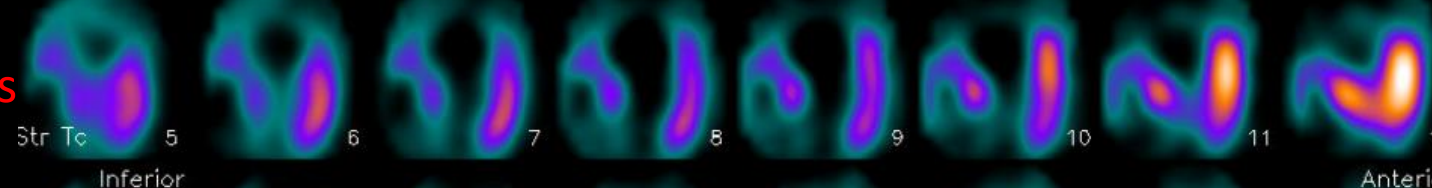
Stress



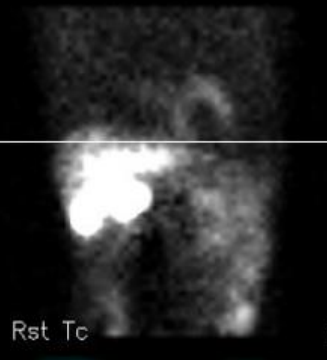
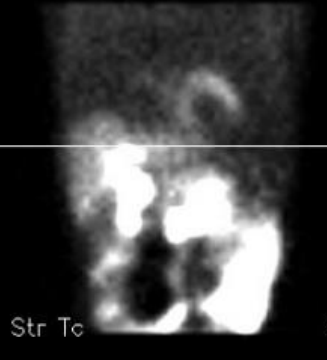
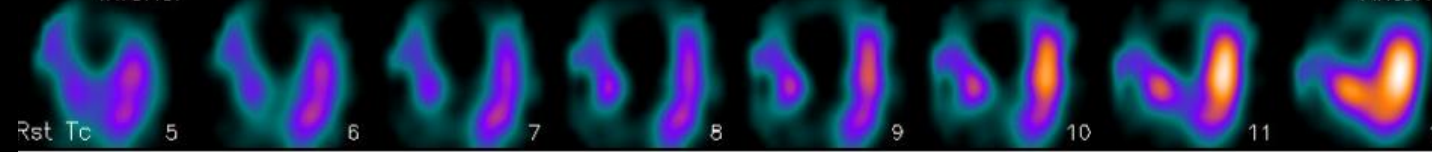
Rest

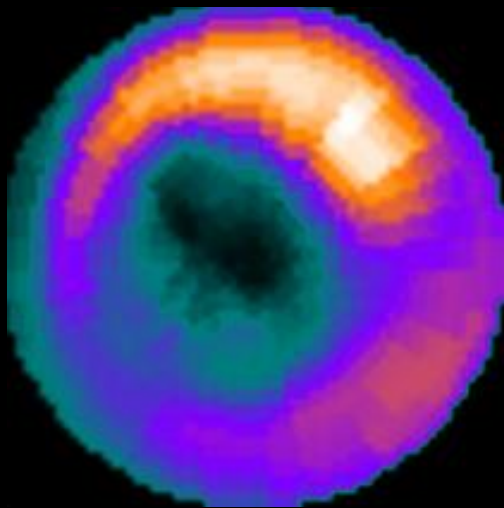


Stress

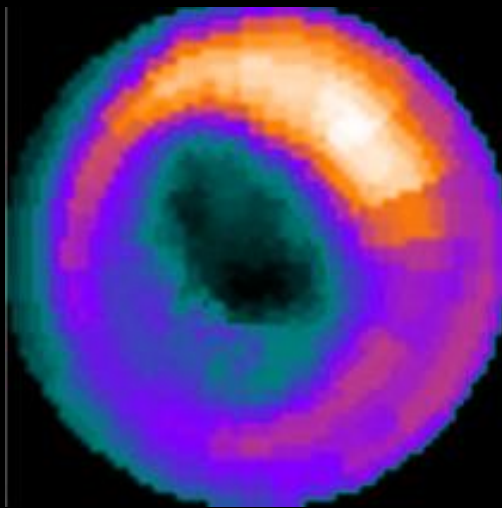


Rest

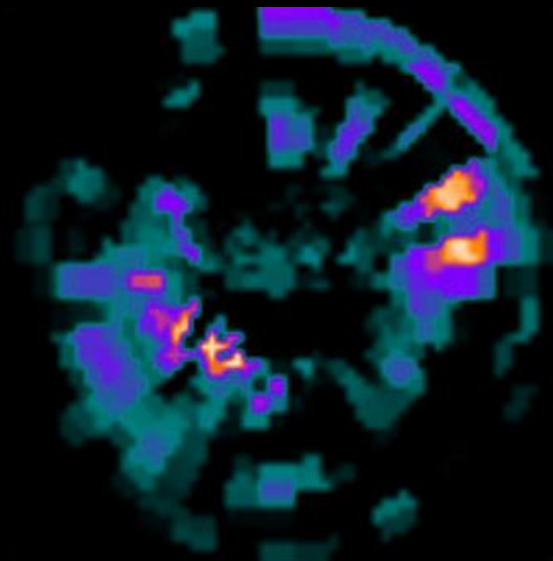




Stress



Rest



Reversibility map  
(ischemic burden)

STRESS\_FBPSC(G)

EF: 22%

EDV: 187ml

ESV: 145ml

Perf. Vol.: 172ml

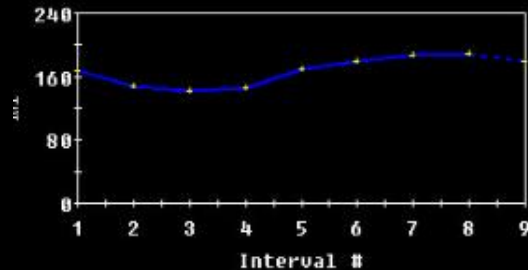
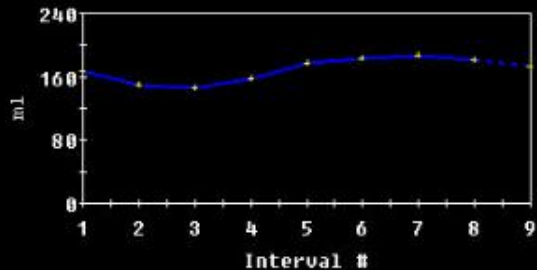
REST\_FBPSC(G)

EF: 25%

EDV: 189ml

ESV: 142ml

Perf. Vol.: 166ml



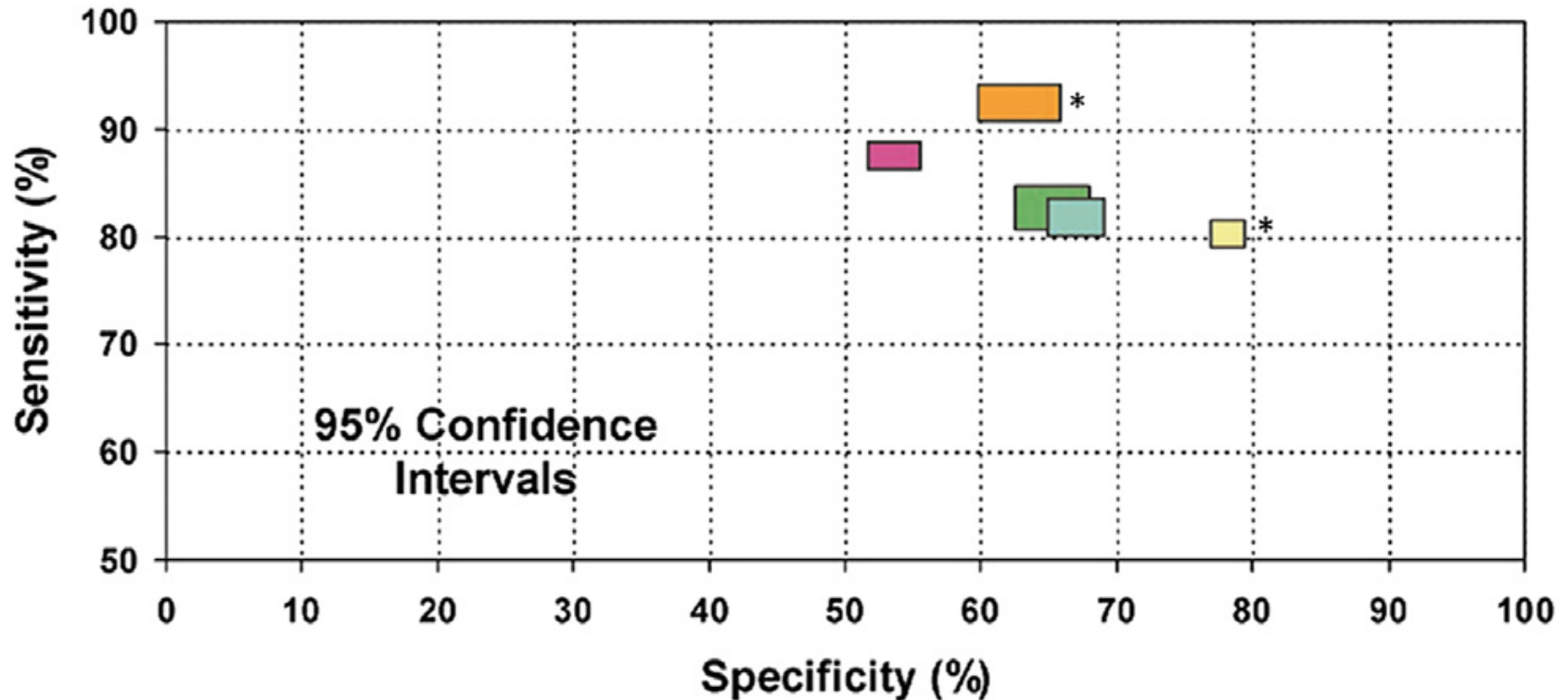
**Non-viable infarction  
+ minimal ischemic burden  
→ LV dysfunction d/t  
large infarct burden**






**REC) Medical HF treatment**



# Evaluation of ischemic heart failure

## Viability evaluation by SPECT using Tc-99m agent

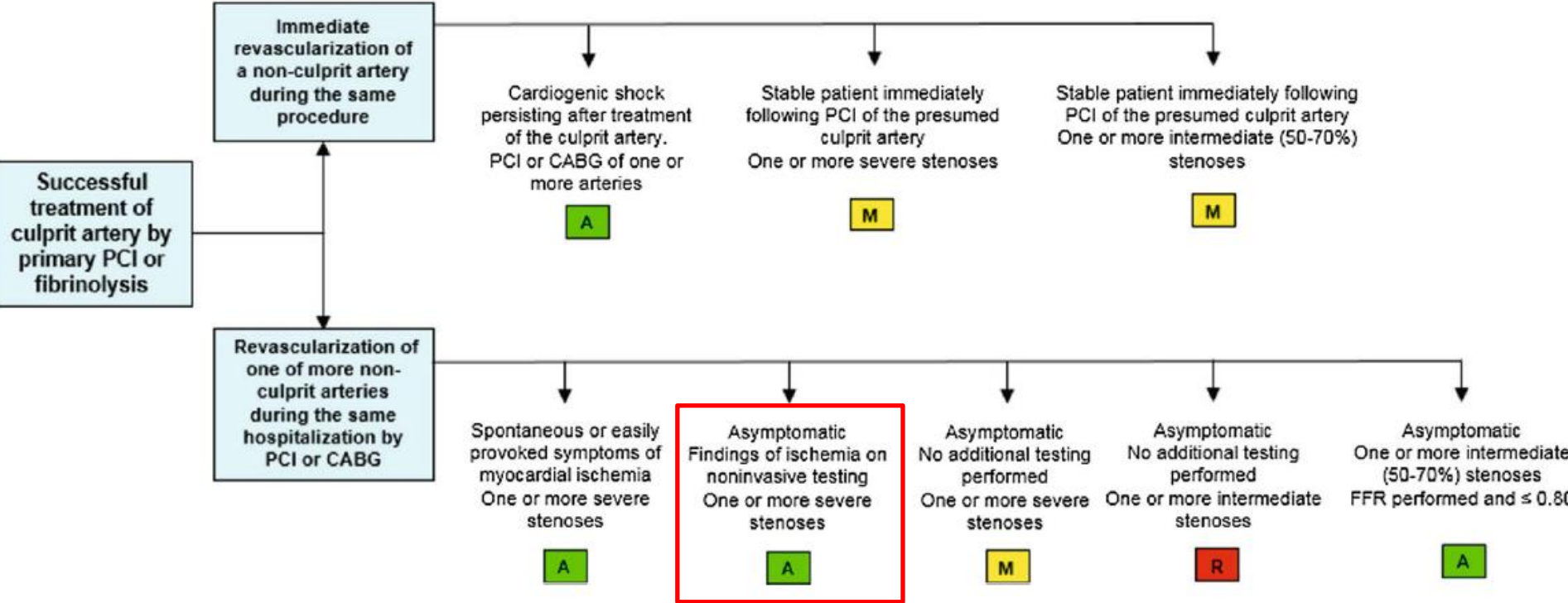


 Dobutamine Echo	41 st./1421 pts	 TI-201	40 st./1119 pts
 FDG PET	20 st./598 pts	 MRI	13 st./420 pts
 Tc-99m	25 st./721 pts		

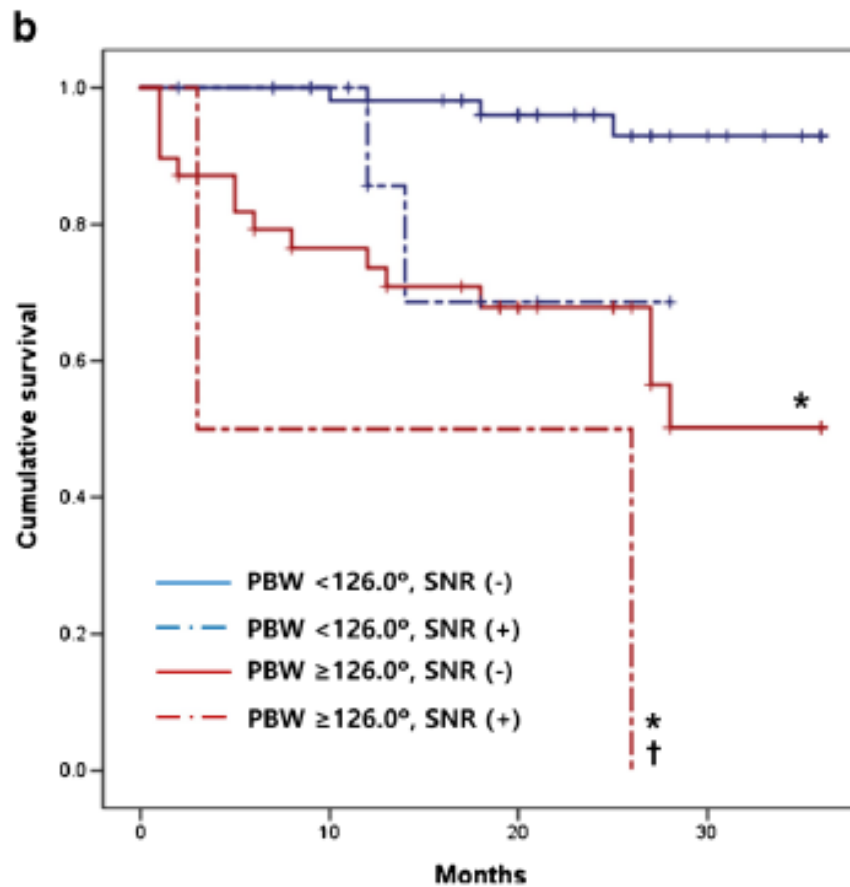
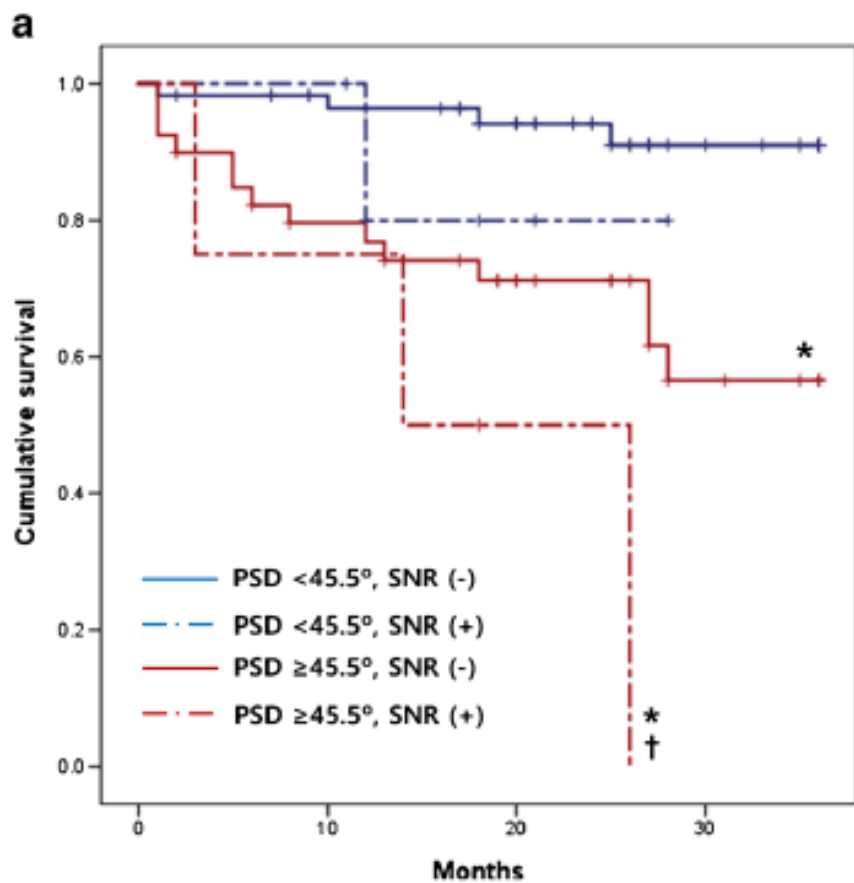
## CONCLUSION:

Can MPI guide treatment in STEMI patients with multivessel disease?

# Current recommendation for use of MPI



# MPI-guided PCI



- PCI guided by ischemia on SPECT
- - - - PCI not guided by ischemia on SPECT

# Potential indications of MPI in acute MI with multivessel disease



1. Persistent LV dysfunction after PPCI
2. CTO in non-culprit arteries
3. (Concerns of) contrast nephropathy

thank you!