Integrated Use of IVUS and FFR: Left MAIN

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Why We Need FFR in LM Disease?

- Inaccuracy of Coronary Angiogram
- Insufficiency of Non-Invasive Functional Study
- FFR guided PCI in LMCA showed favorable outcomes

Major Randomized Studies in LM

ORIGINAL ARTICLE

Outcomes in Patients With De Novo Left Main Disease Treated With Either Percutaneous Coronary Intervention

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CLINICAL RESEARCH — Interventional Cardiology

Randomized Comparison of Percutaneous Coronary Intervention With Sirolimus-Eluting Stents Versus Coronary Artery Bypass Grafting in Unprotected Left Main Stem Stenosis

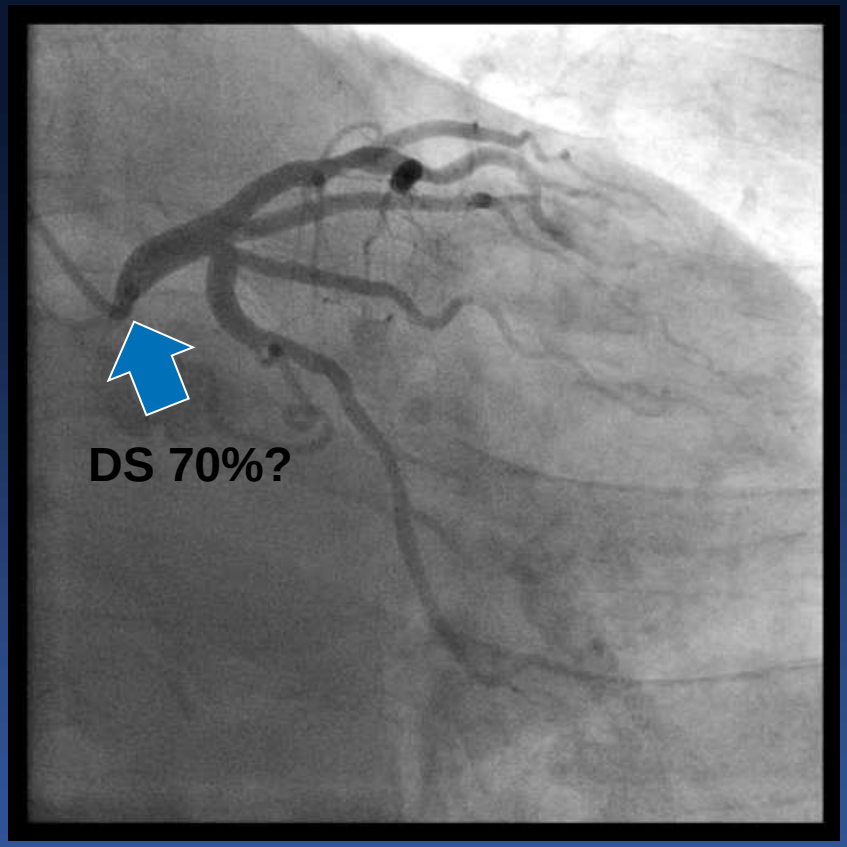
Enno Boudriot, MD,* Holger Thiele, MD,* Thomas Walther, MD,† Christoph Liebetrau, MD,*

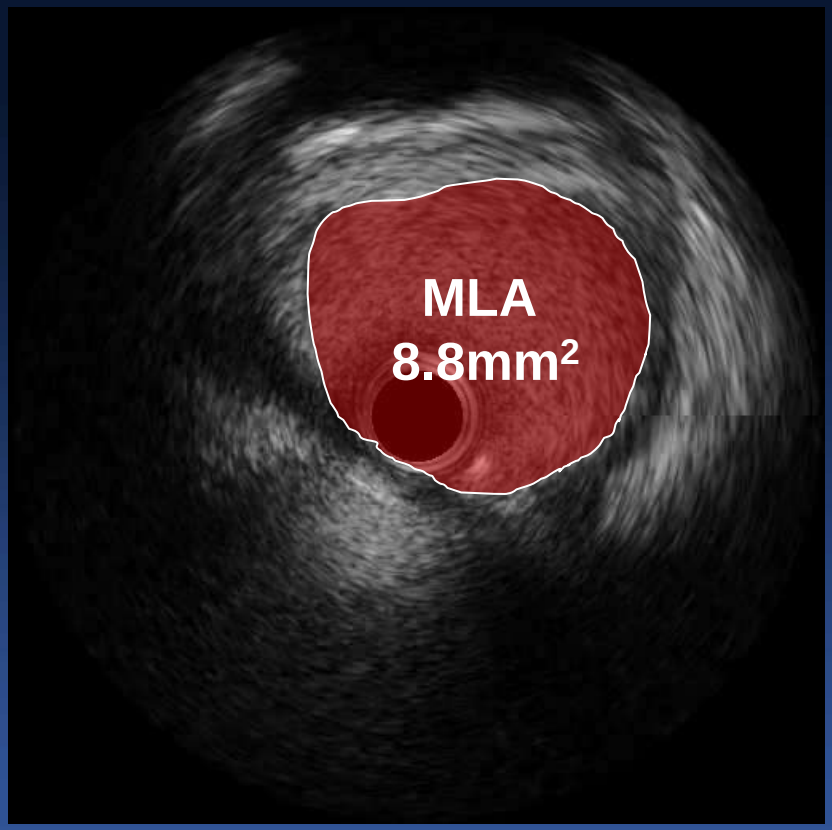
Patients age 18 to 80 years with stenosis (≥50%) of the ULM with or without additional multivessel coronary artery disease were included in this multicenter study. Patients had

Background CABG is considered the standard of care for treatment of ULM. Improvements in percutaneous coronary intervention (PCI) with use of drug-eluting stents might lead to similar results. The effectiveness of drug-eluting stenting versus surgery has not been established in a randomized trial.

Methods In this prospective, multicenter, randomized trial, 201 patients with ULM disease were randomly assigned to

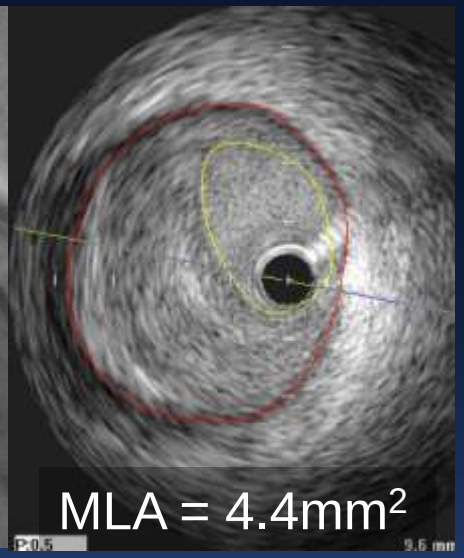
Why We Need FFR?



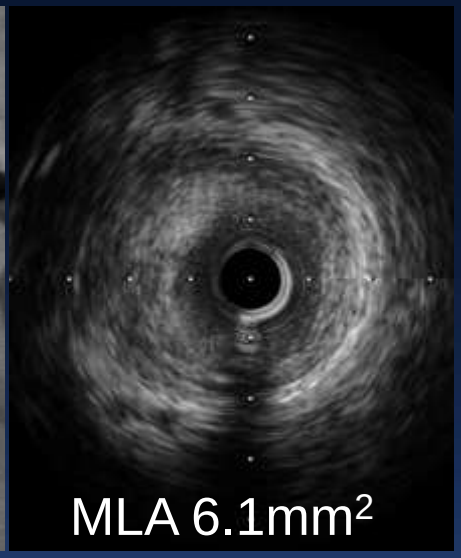


Why We Need FFR in LM?

47/M Stable angina

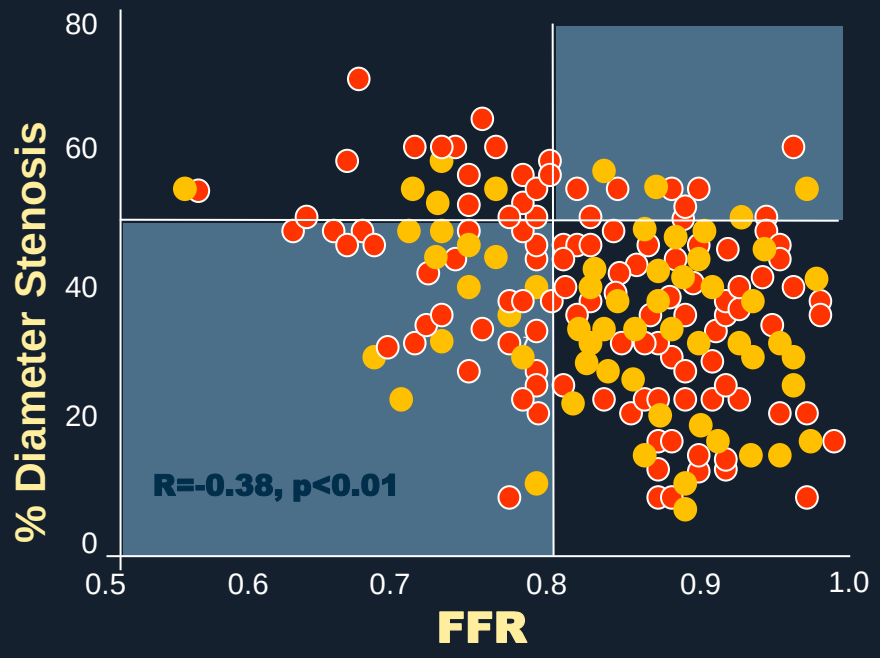


50/M Stable angina



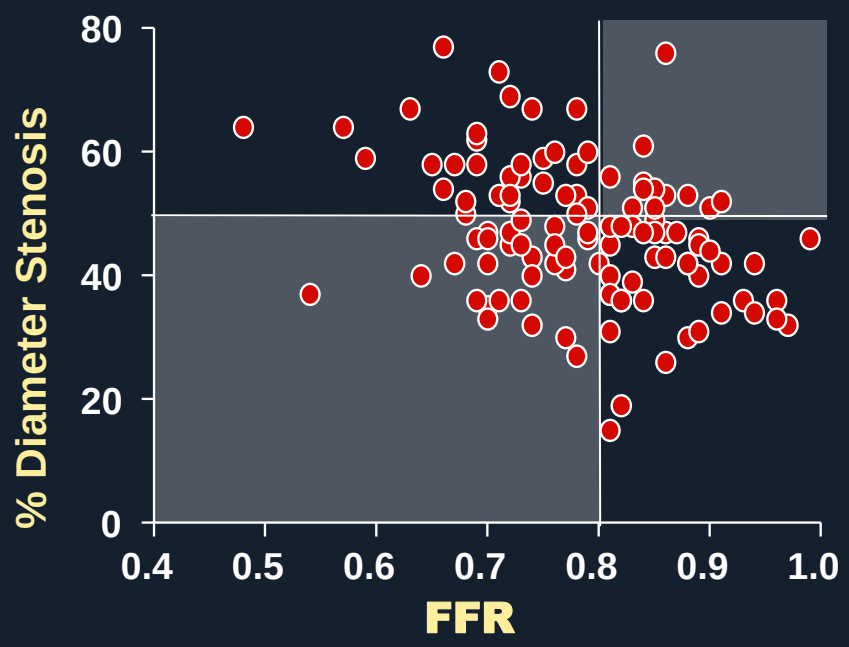
FFR and %DS in Equivocal LMCA

"Mismatch" is 29% in equivocal LMCA



Hamilos M et al. *Circulation 2009;120:1505-1512*

"Mismatch" is 37% in equivocal LMCA



Park SJ, Ahn JM et al JACC CI. 2014;7(8):868-74

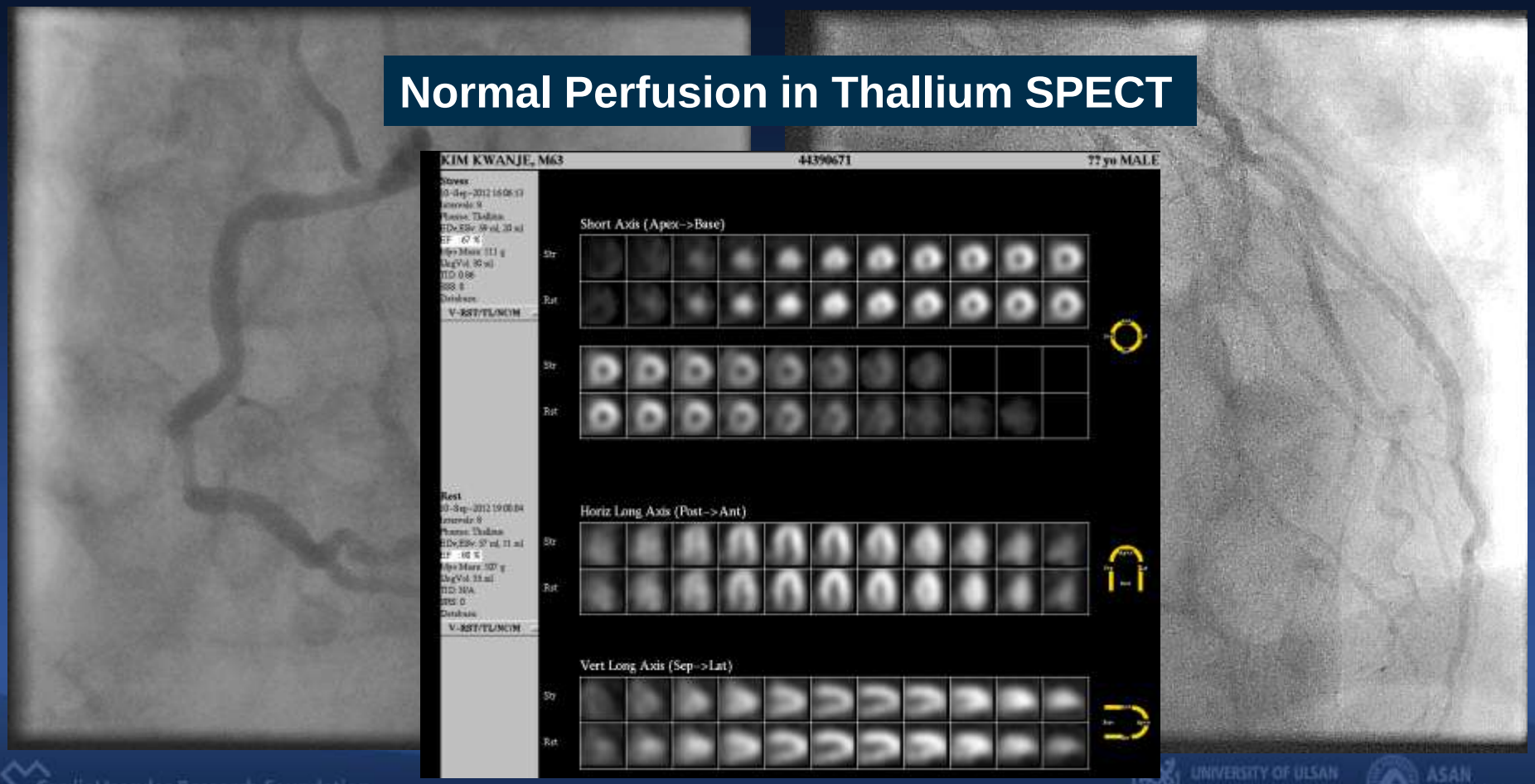
● **Isolated LMCA disease**

LM with 3VD

65yrs/M, eCP

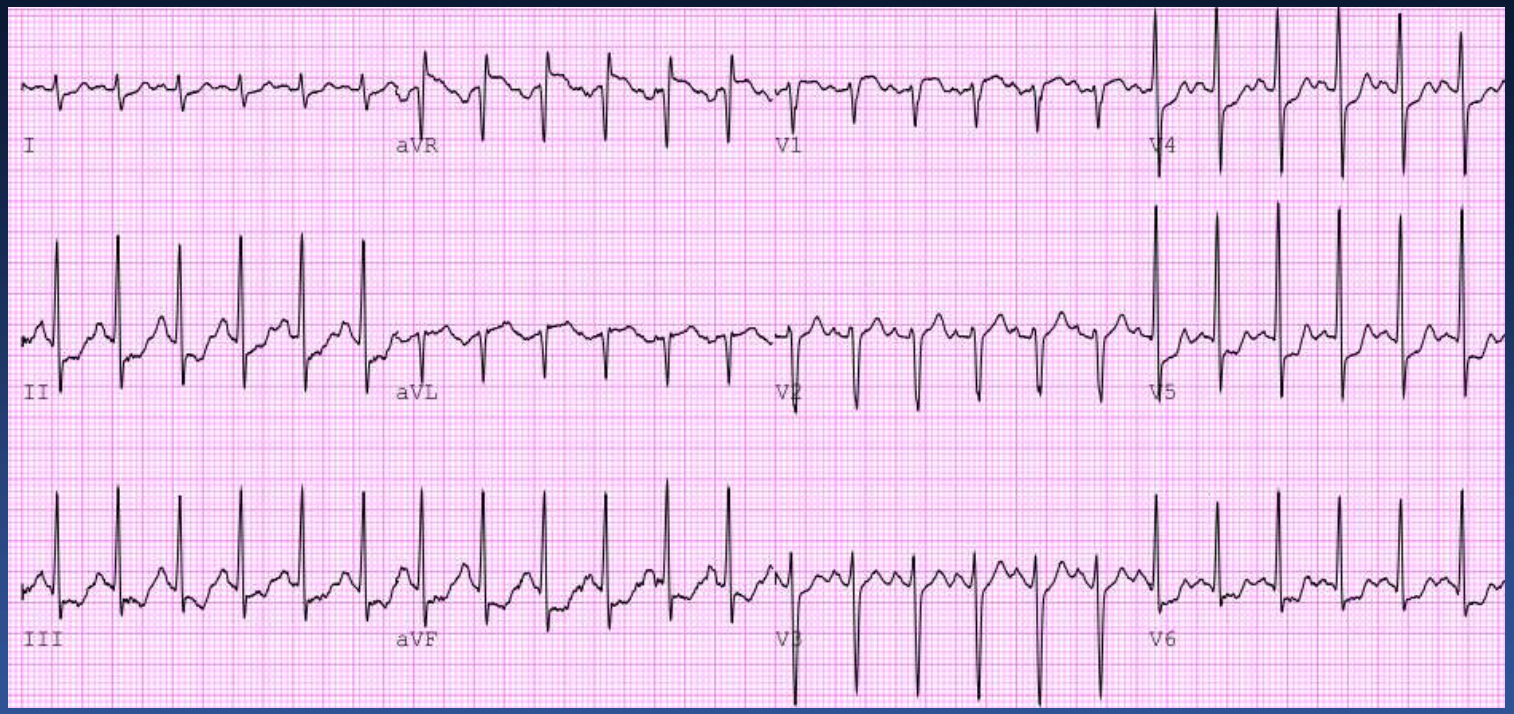
RCA

LCA



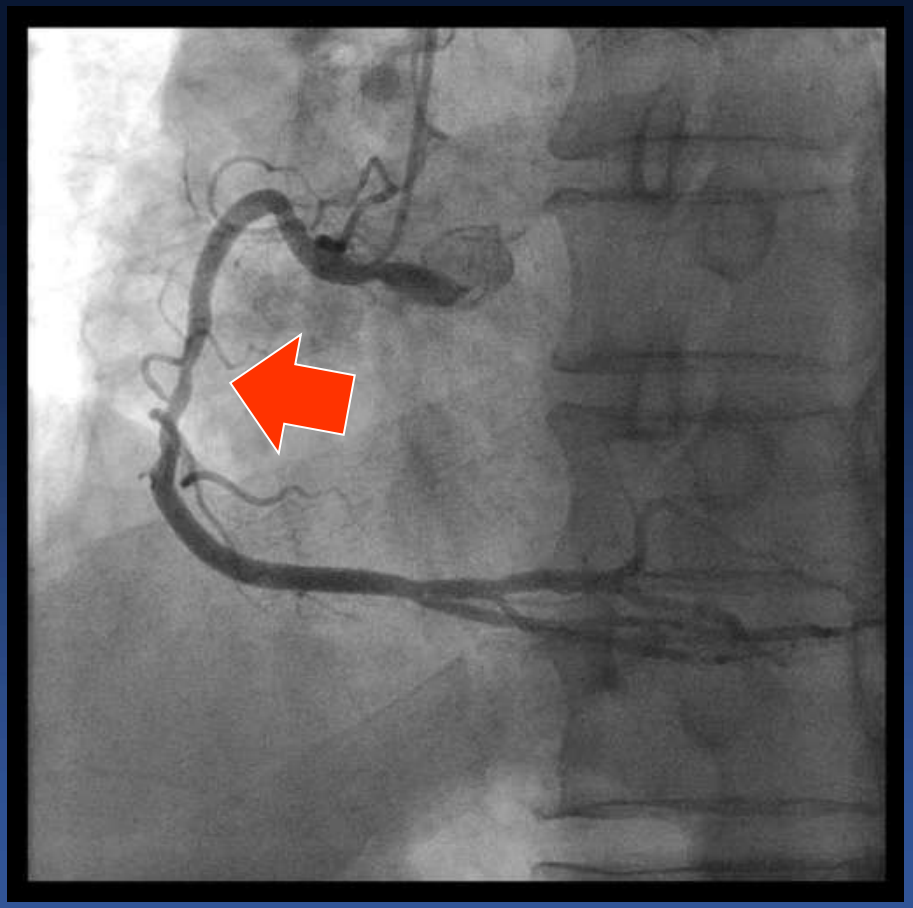
M/76, eCP

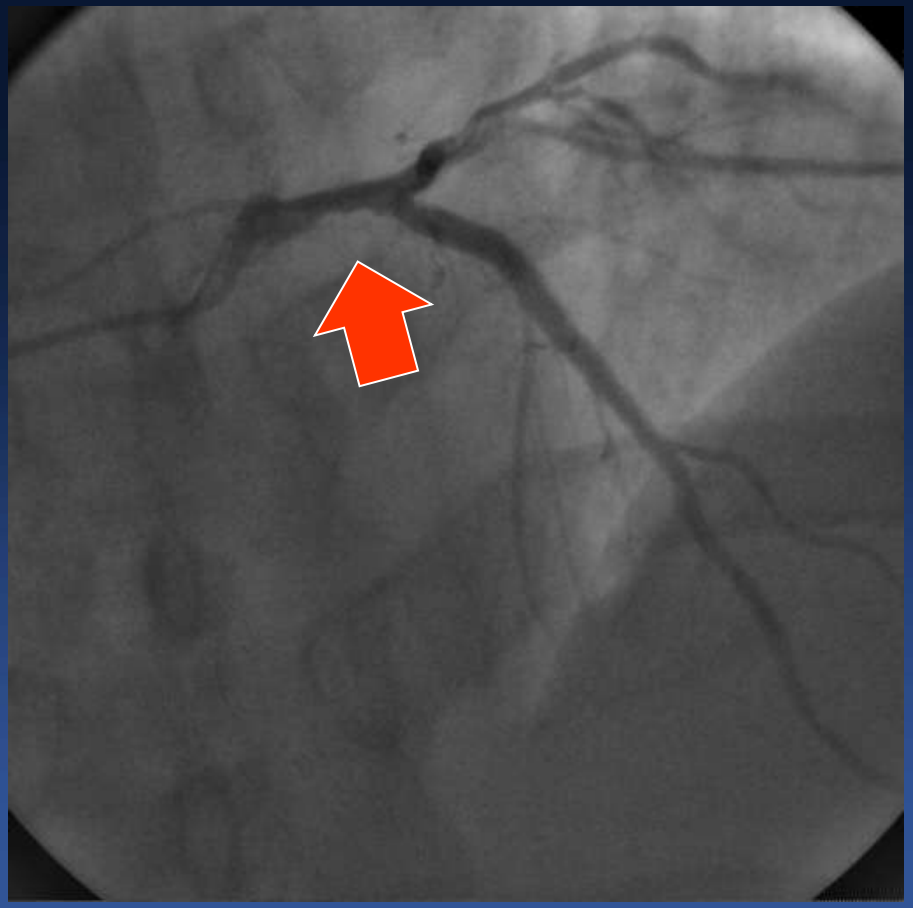
Treadmill Test



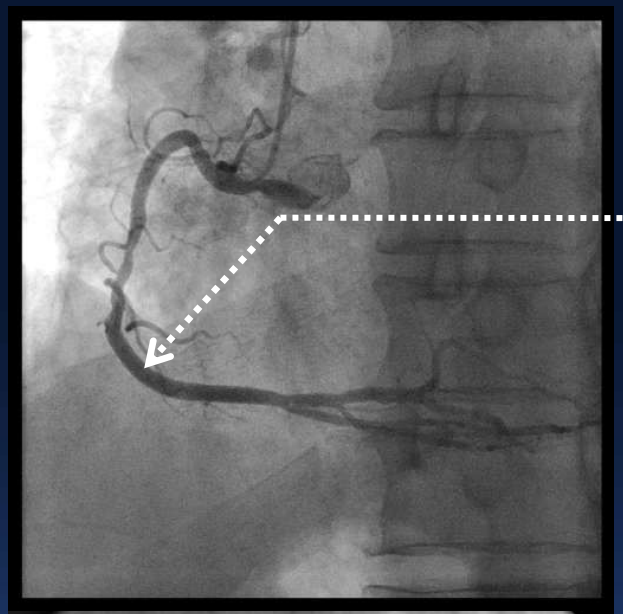
Positive at Stage 4

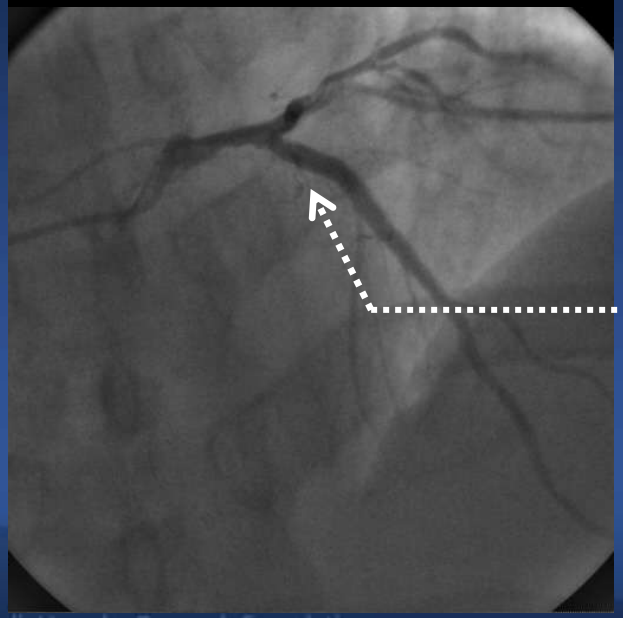
Coronary Angiography

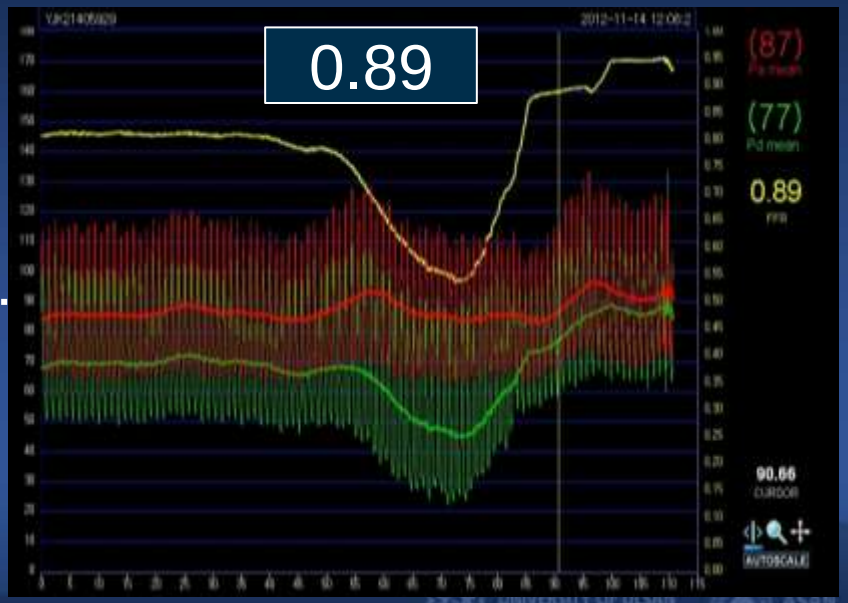




FFR

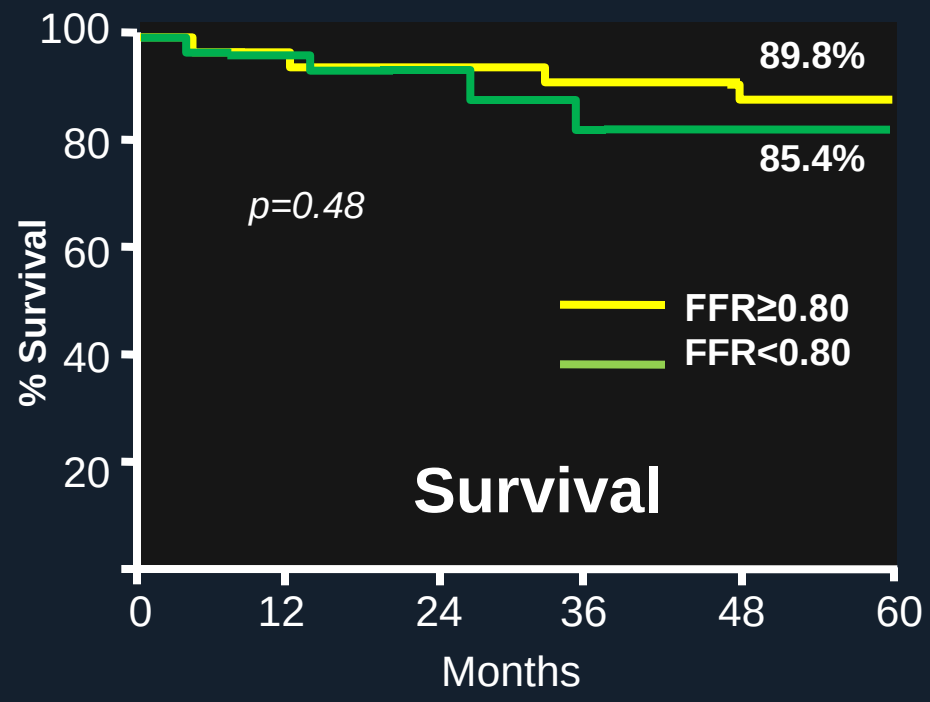


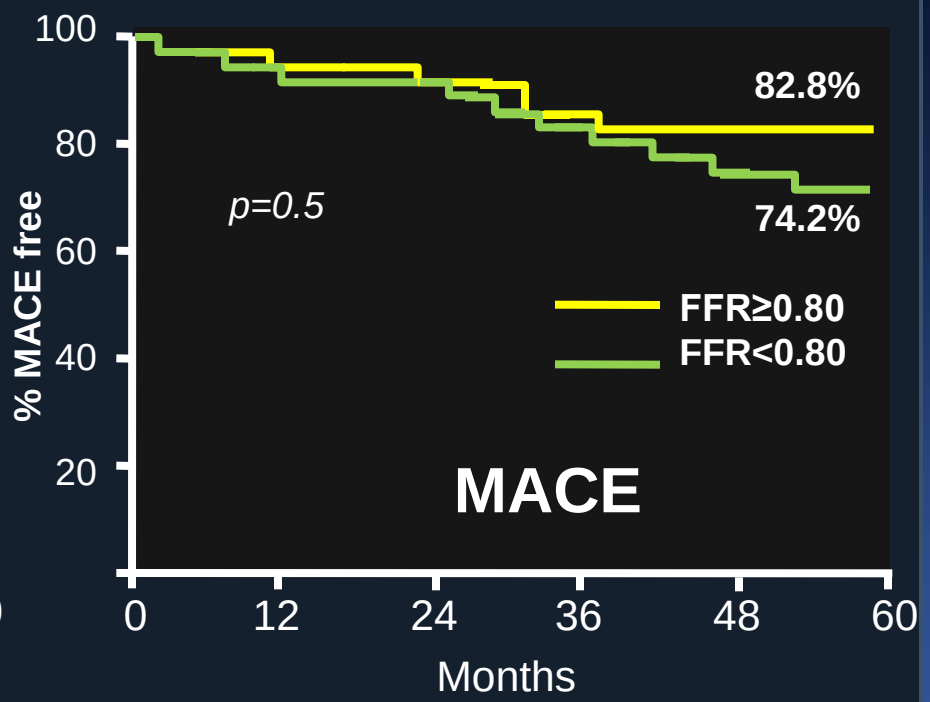




FFR Guided PCI in Equivocal LMCA

- In 213 patients with an equivocal LMCA stenosis
- FFR ≥0.80: Medication (n=138) vs. FFR<0.80: CABG (n=75)





An FFR-guided strategy showed the favorable outcome.

Circulation. 2009;120:1505-1512

FFR Guided Decision Making in LM Disease

	Hamilos et al [1]		Bech et al [2]		Courtis et al [3]		Lindstaedt et al [4]		Jasti et al [5]	
Age, y	64 ± 9	68 ± 11	63 ± 9	60 ± 9	61 ± 10	63 ± 10	61 ± 10	64 ± 9	**62 ± 11**	
Mean follow up, mo.	35 ± 25		29 ± 15		13 ± 10	14 ± 12	29 ± 18	29 ± 14	**38**	
No. of patients	75	138	30	24	60	82	27	24	14	**37**
FFR cut off value	<0.80	≥0.80	<0.75	≥0.75	<0.75	>0.80	<0.75	>0.80	<0.75	**≥0.75**
Clinical outcomes										
Death, n (%)	7 (9.6)	9 (6.5)	1	0	3 (5)	3 (4)	4 (14.8)	0	0	**3**
MI, n (%)	0	1	1	0	1 (2)	4 (5)	1 (3.7)	0	0	**0**
RR, n (%)	**4 (5.5)**	**17 (12.3)**	**2**	**5**	**0**	**9 (11)**	**1 (3.7)**	**6 (25)**	**0**	**4**

[1]Circulation 2009;120:1505-1512;[2]Heart 2001;86:547-552;[3]Am J Cardiol 2009;103:943-949;
[4]Am Heart J 2006;152:156.e151-156;[5]Circulation 2004;110:2831-2836

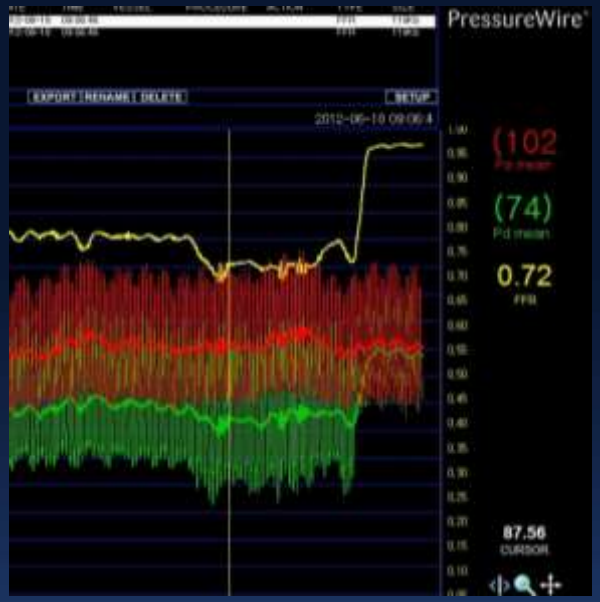
Why We Need FFR in LM?

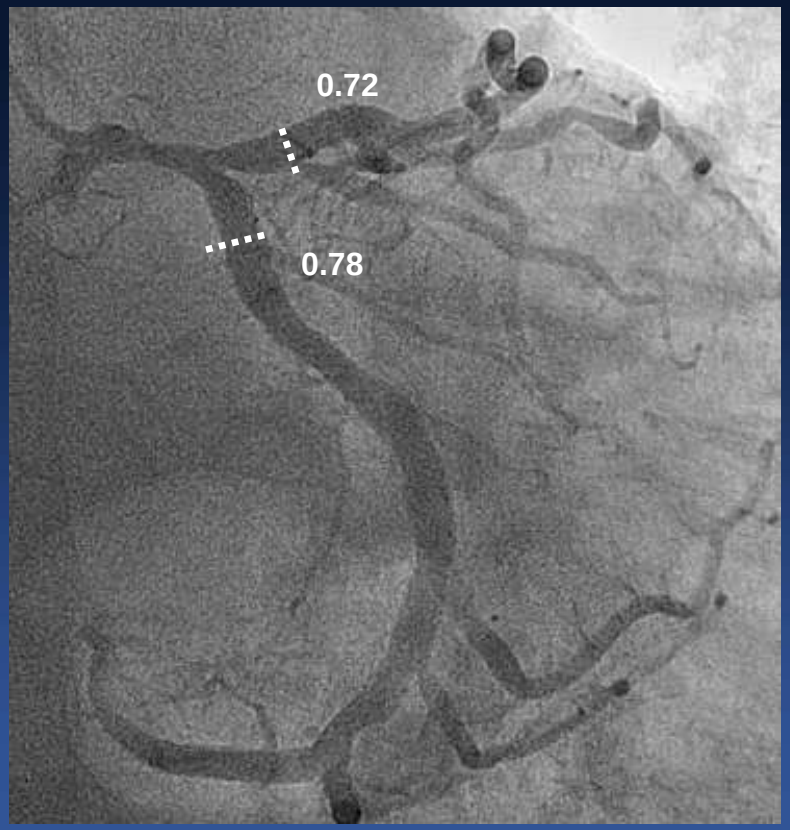
- Inaccuracy of Coronary Angiogram
- Insufficiency of Non-Invasive Functional Study
- FFR guided PCI in LMCA showed favorable outcomes

LM Bifurcation Lesion (Medina 1,0,0) with Minimal LCX Disease

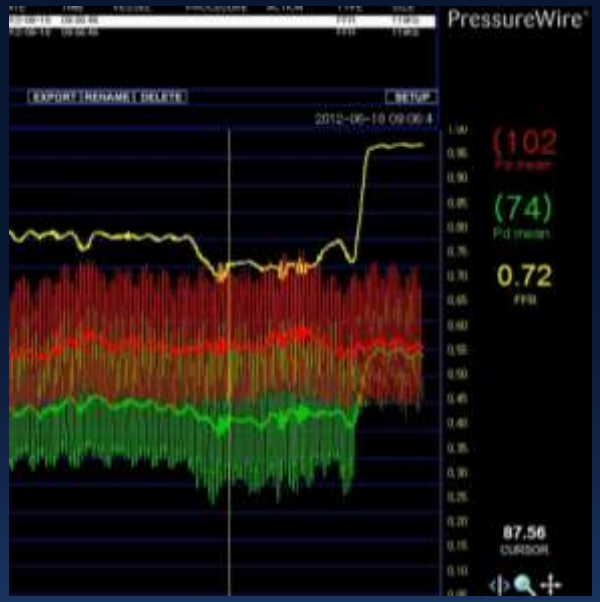
55/M, Stable angina,

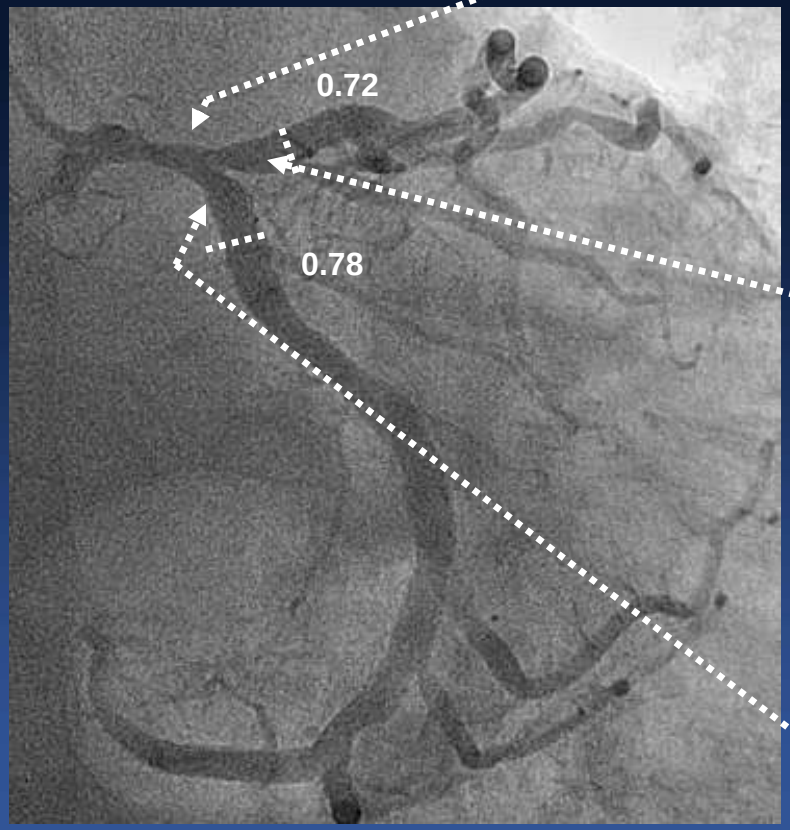
FFR in Both LAD and LCX,





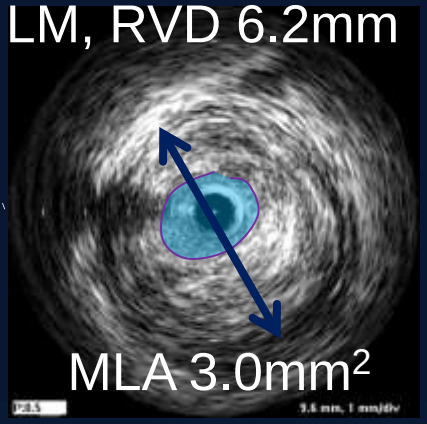
IVUS in Both LAD and LCX,

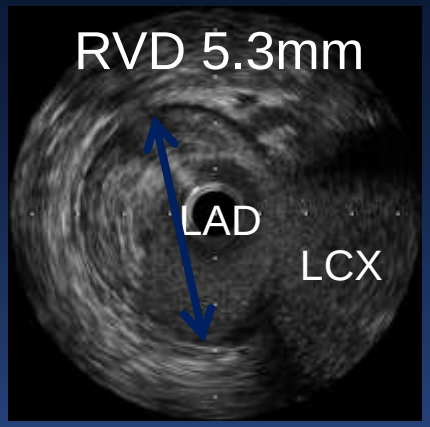


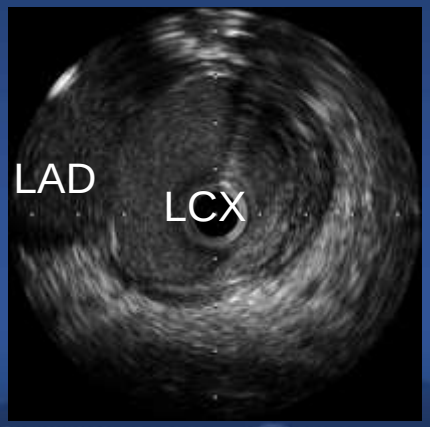


Minimal disease at LCX ostium

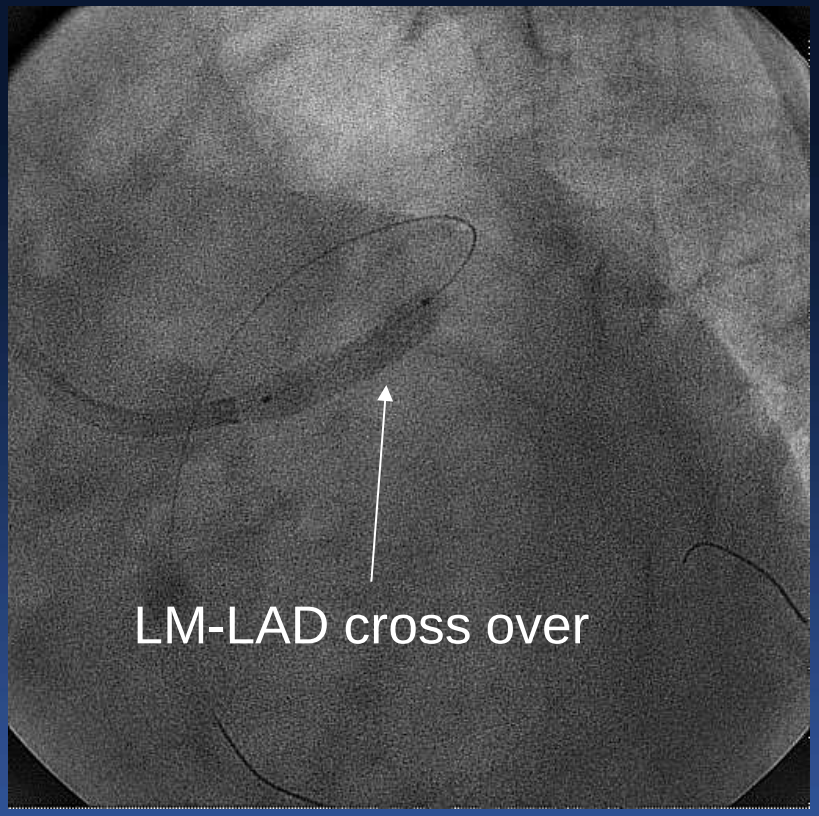
Distal LM, RVD 6.2mm



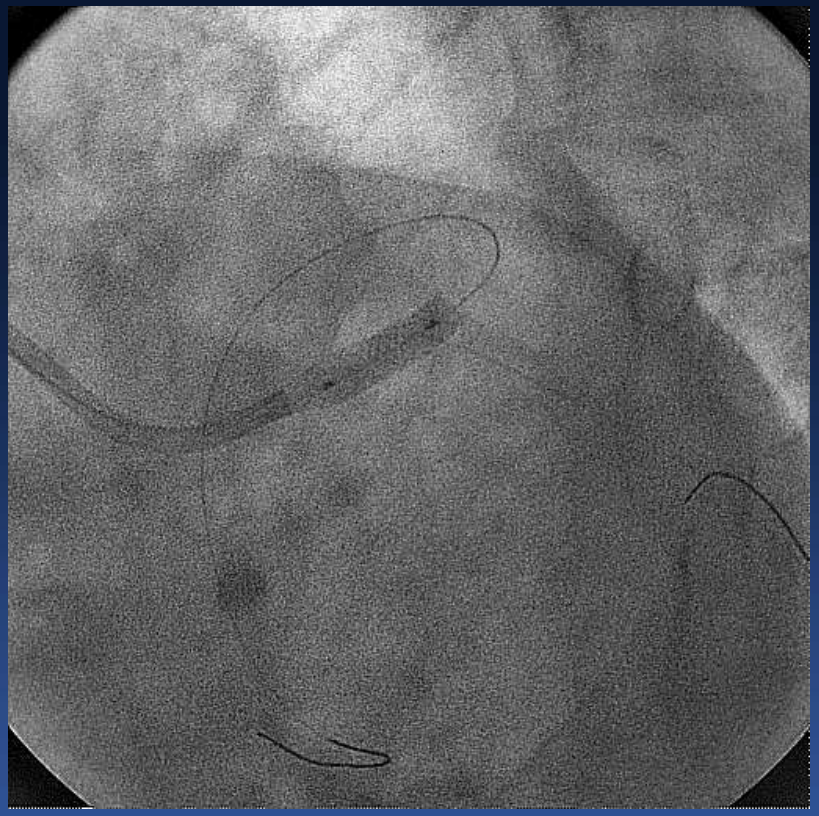




Single Stent Cross-Over
with minimal-disease at LCX OS

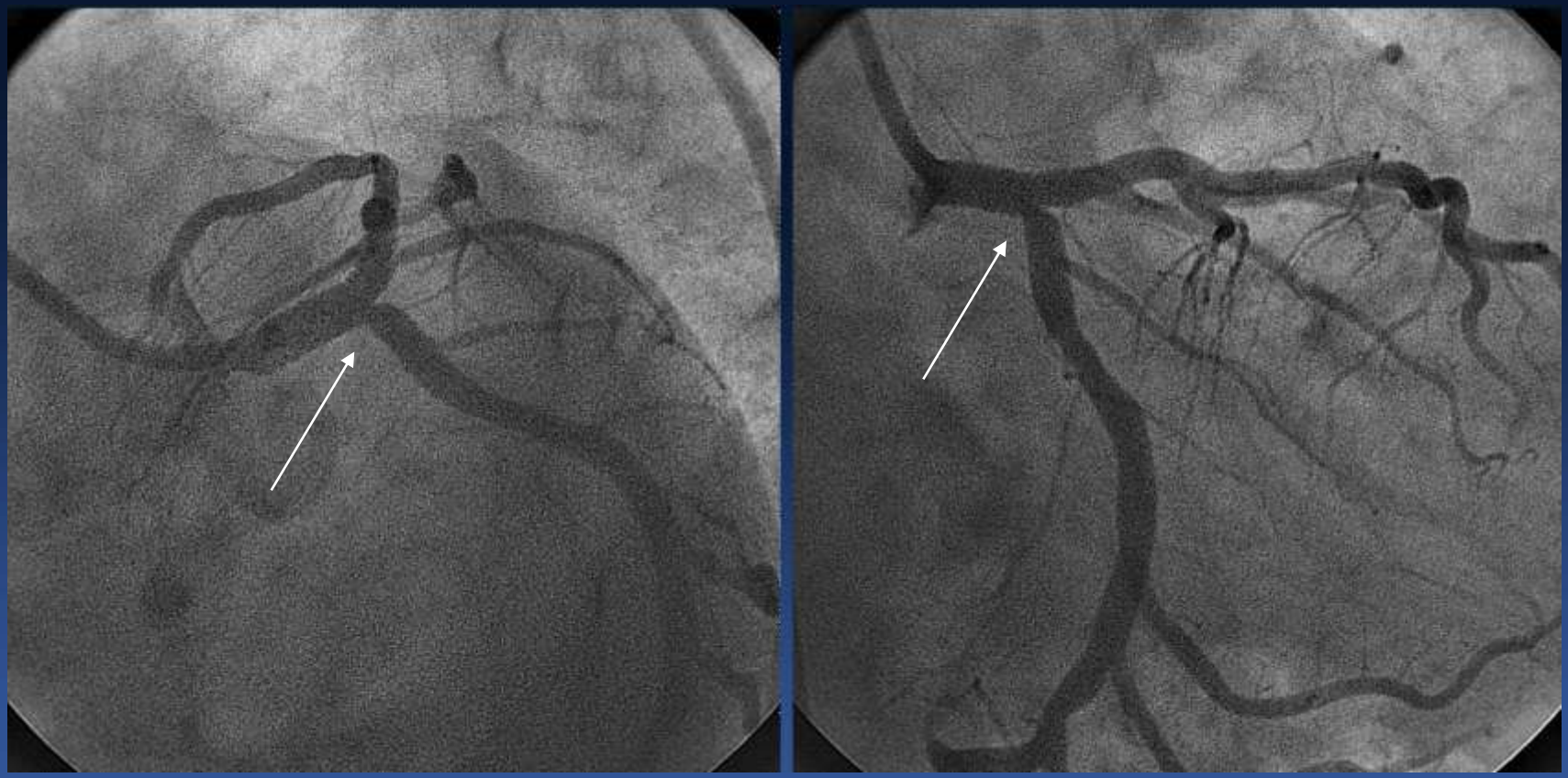


Promus Element
4.0x20



Additional high pressure
Inflation with 4.0 mm
non-compliant balloon

After Single Stent Cross-Over,
Angiographic Compromise of LCX Ostium.

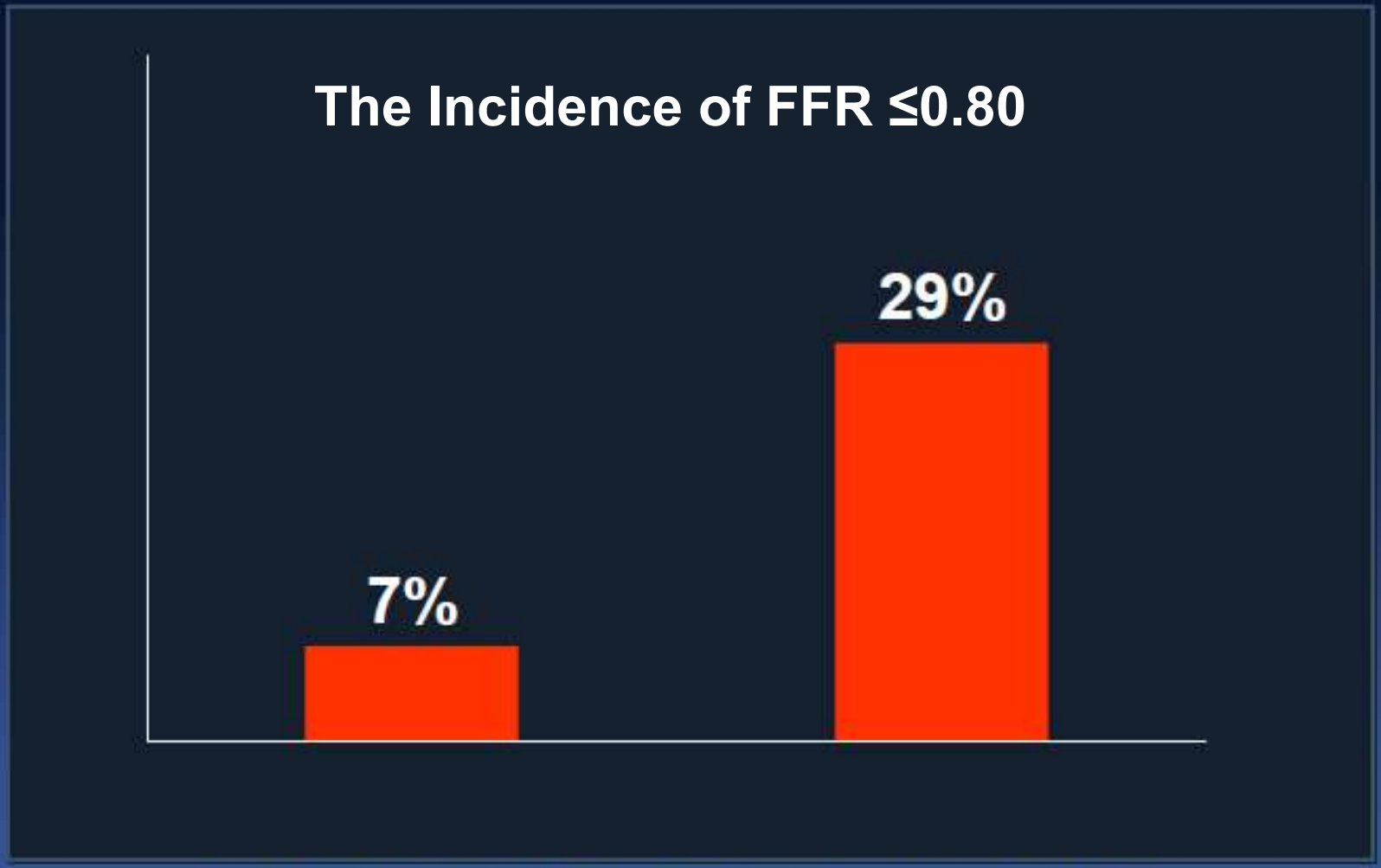


What Would You Do ?
To Treat or Not To Treat

Consider FFR, First !

FFR is 0.92

LCX FFR after Cross-Over Stenting

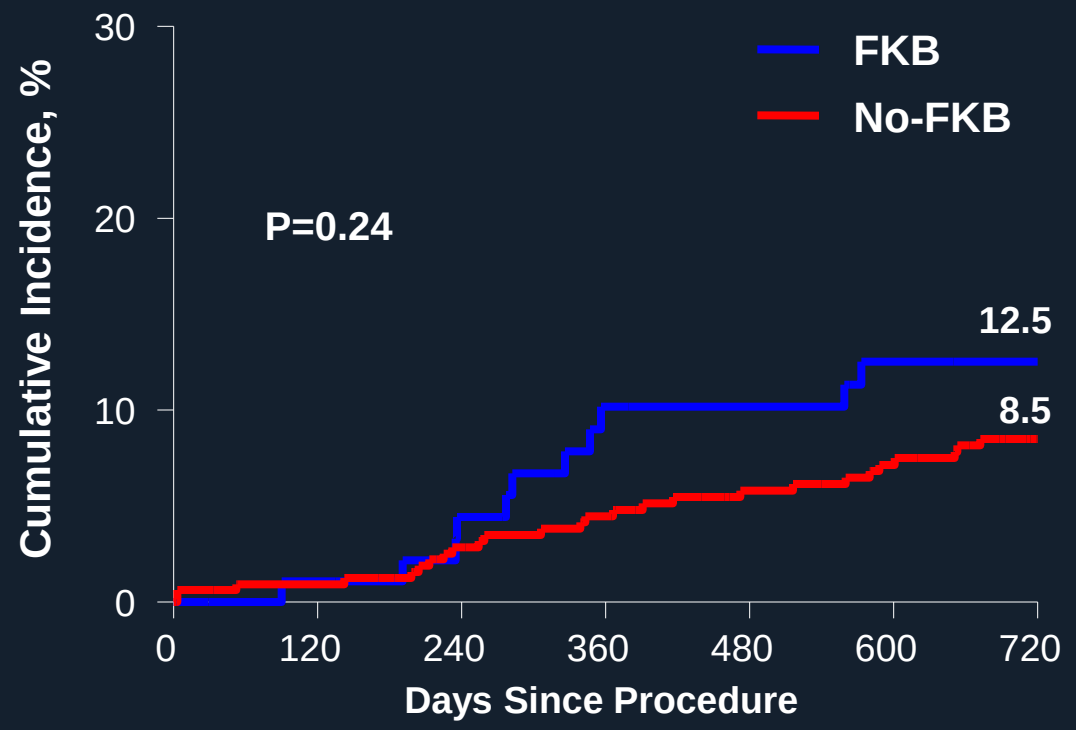


Kang et al. Catheter Cardiovasc Interv. 2014:83(4):545-52

Nam et al, Korean Circ J 2011:41(6):304-7

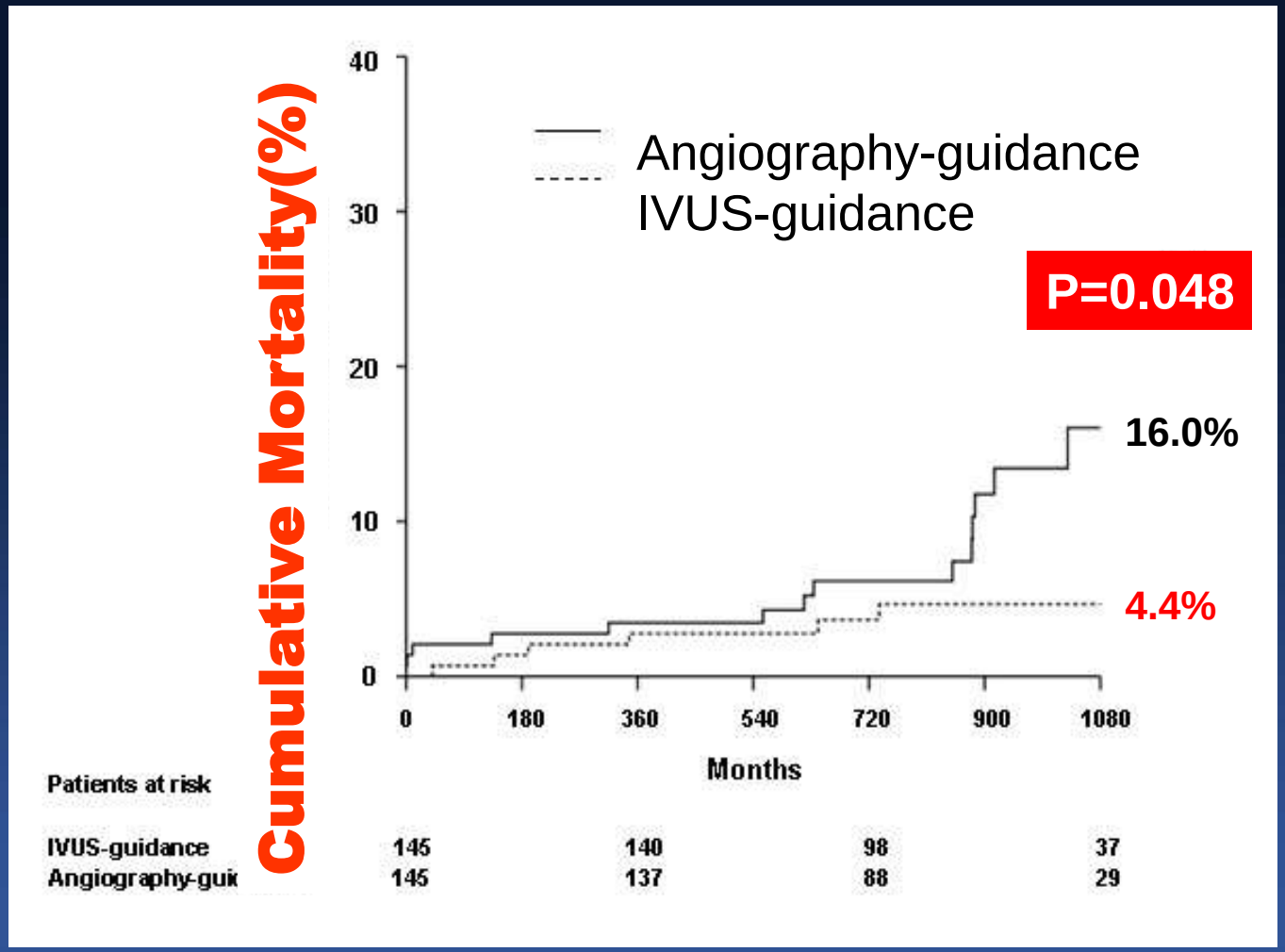
Primary End Point at 2 Years

(Death, MI, or LM-TLR)



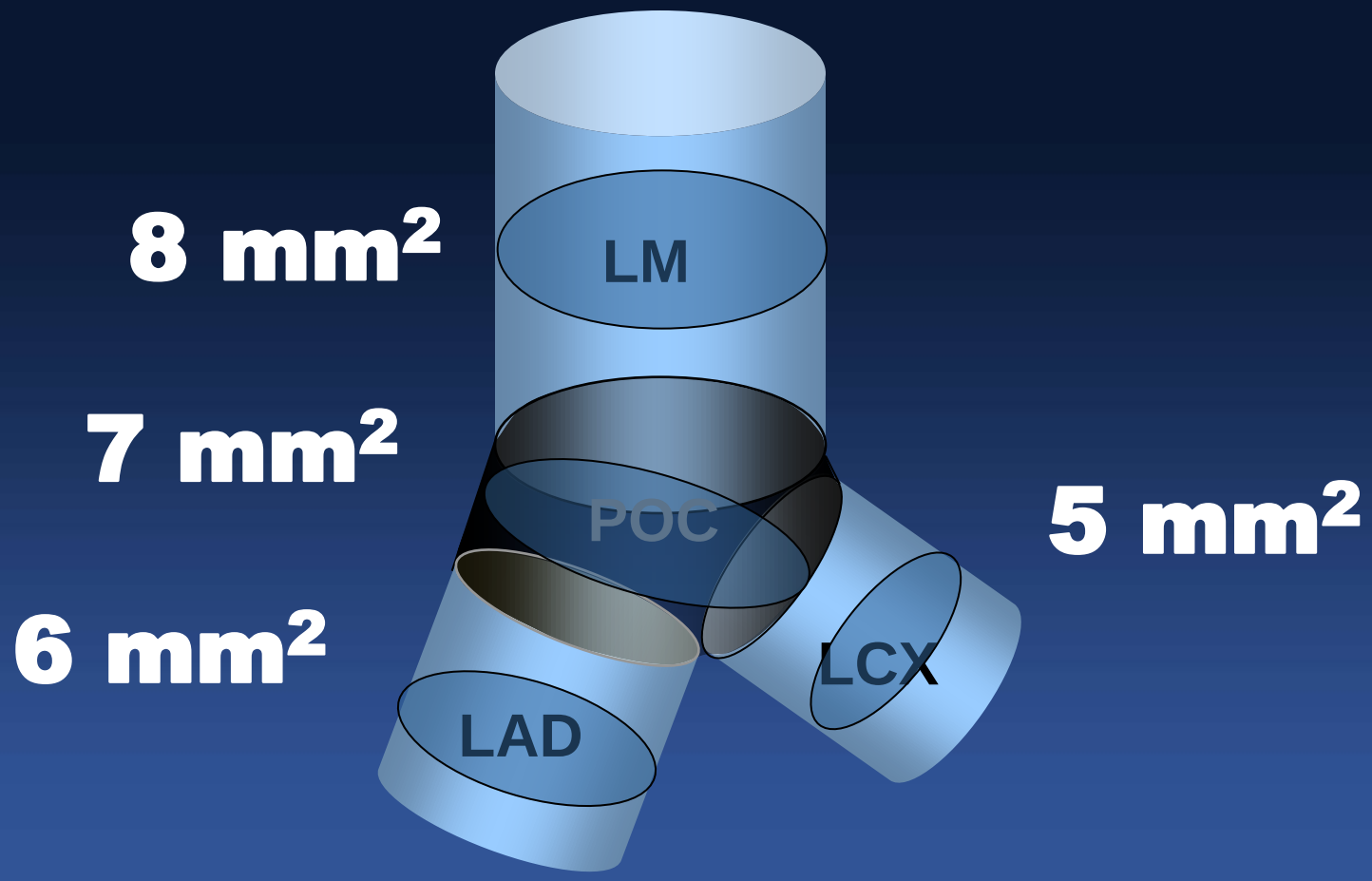
No. at Risk			
FKB	95	79	74
No-FKB	318	293	265

IVUS Guided PCI in Left Main



Park SJ et al, Circulation. Cardiovasc Interv. 2009 Jun;2(3):167-77.

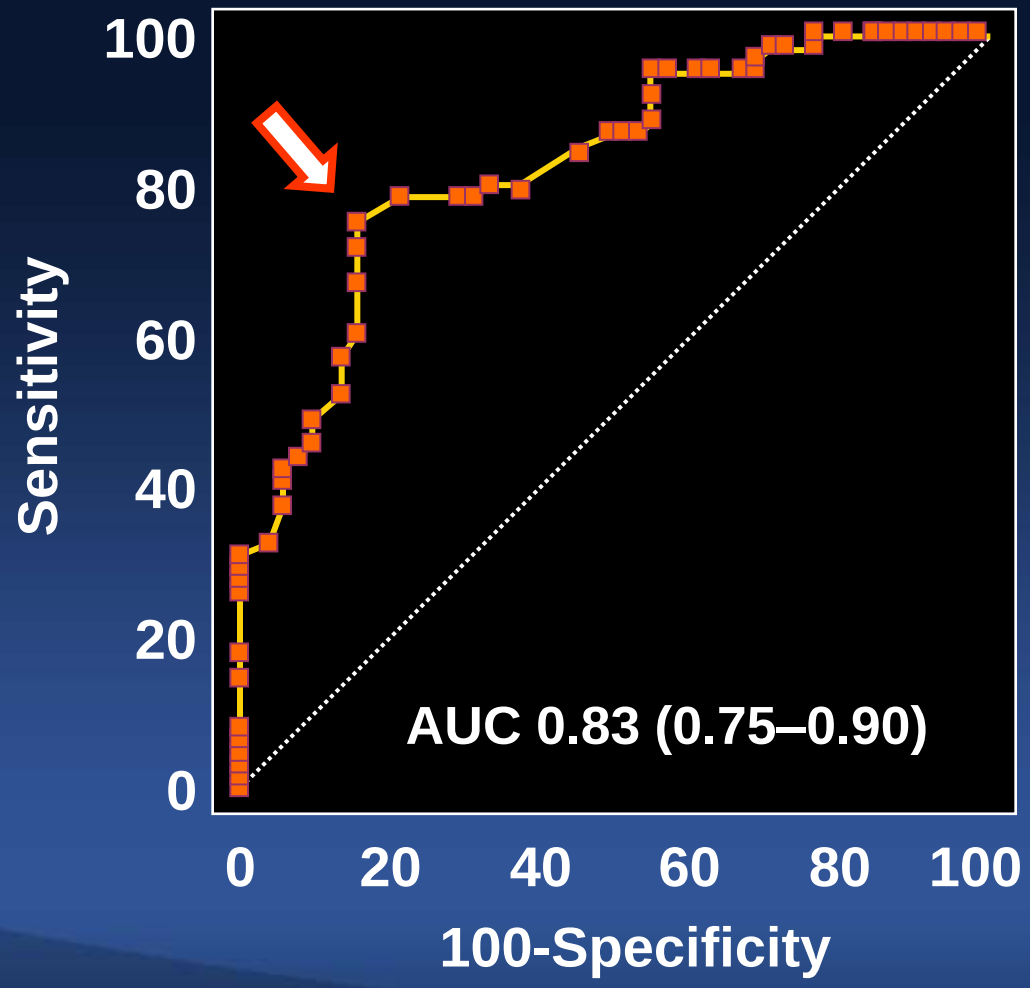
IVUS Optimization Criteria



Kang et al. Circ Cardiovasc Interv 2011;4:1168-74

New LM IVUS MLA

Matched with FFR <0.80,
Ostial and Shaft LM Disease (N=112)



Cut-off = 4.5 mm²

Sensitivity	79%
Specificity	80%
PPV	83%
NPV	76%
Accuracy	80%

Park SJ et al. JACC Cardiovasc Interv. 2014 Aug;7(8):868-74

Summary

- Coronary angiography alone is not enough to evaluate the LM stenosis.
- FFR guided decision making in the treatment of LM stenosis can avoid unnecessary and complex coronary intervention.
- IVUS guided PCI improve survival of LM stenting and may reduce the repeated intervention.
- IVUS could be used as an index of functional significance in LM stenosis.