

# **Precision in Stent Sizing: Insights from Imaging-Guided LM PCI**

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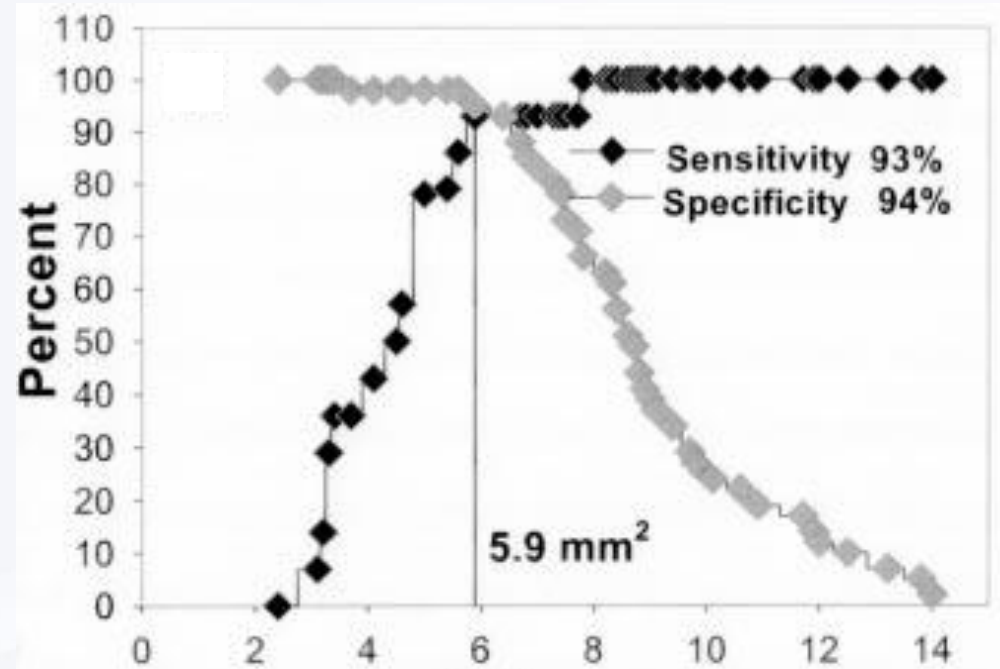
# Critical Decision in LM PCI

- To Stent or Not
- Provisional or Two Stenting
- Stent Optimization

# Significant LM Stenosis

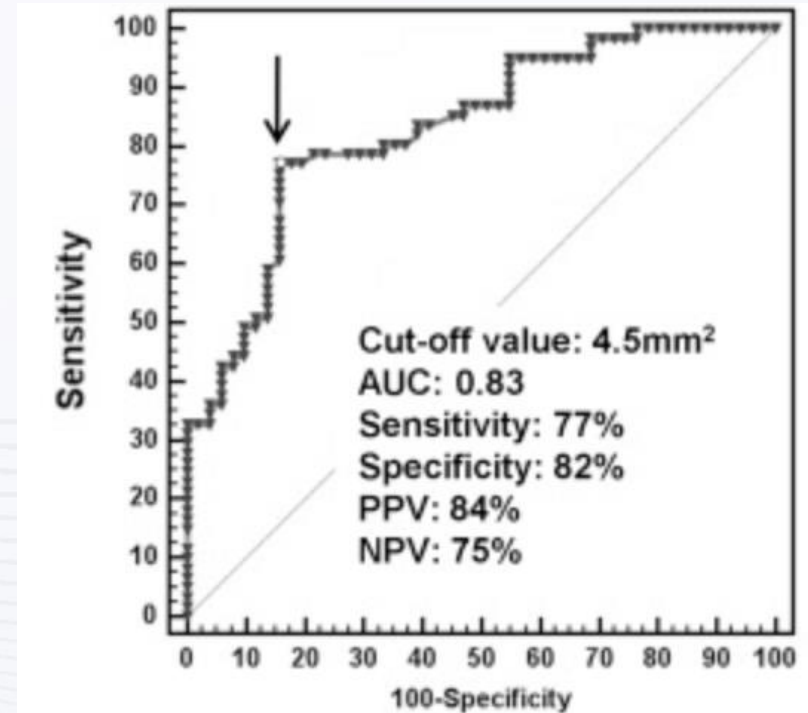
## FFR-Matched IVUS Criteria

Western Cohort



**MLA 5.9**

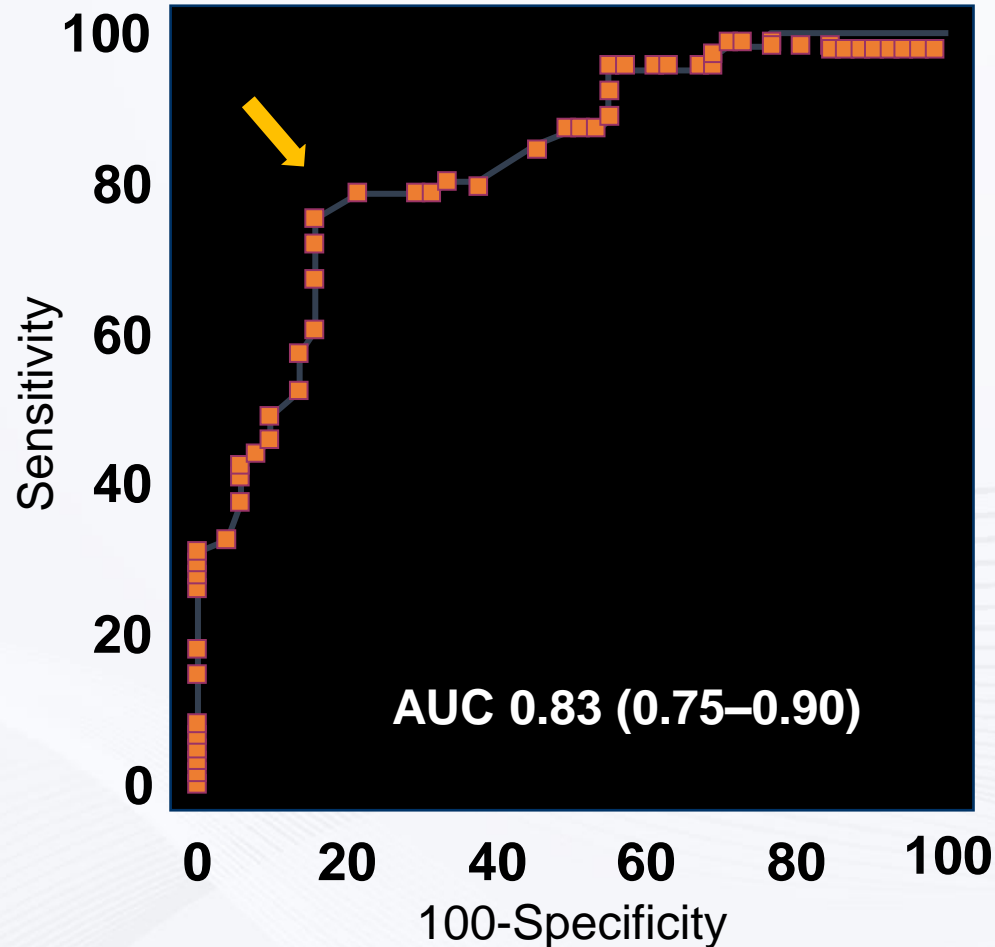
Asian Cohort



**MLA 4.5**

# IVUS MLA

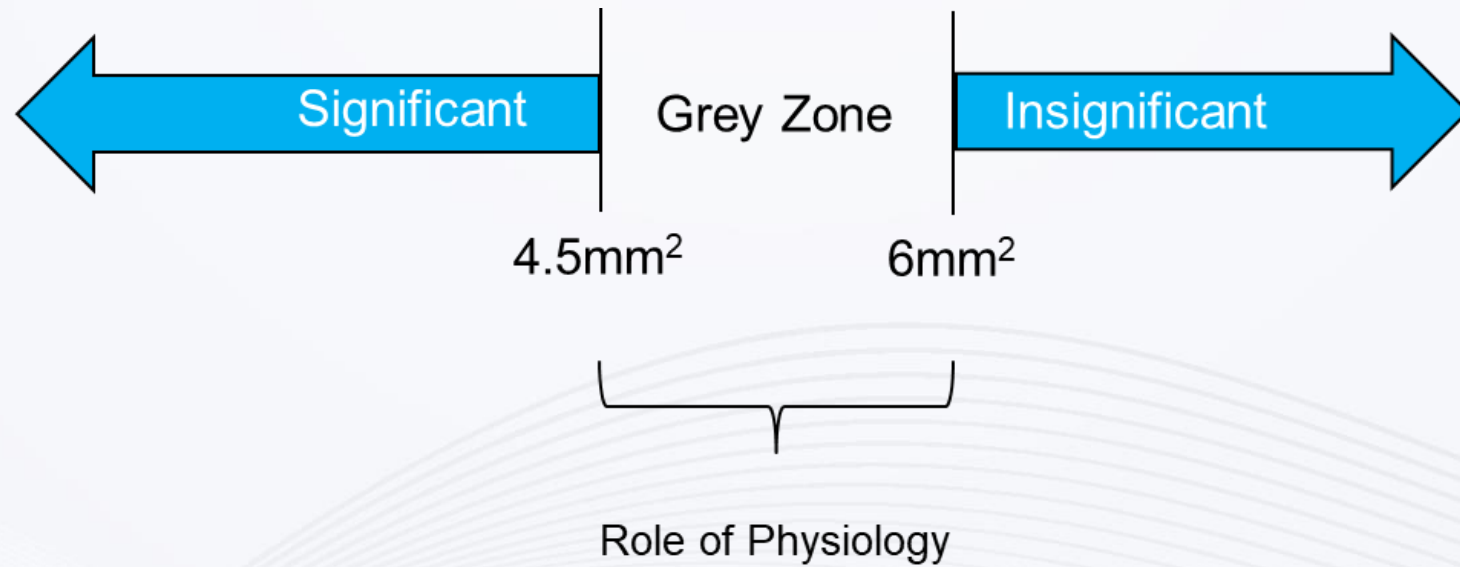
Matched with FFR <0.80 (N=112)



**Cut-off = 4.5 mm<sup>2</sup>**

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

# Role of IVUS MLA in Decision



- Which Needs Provisional or Two Stenting?

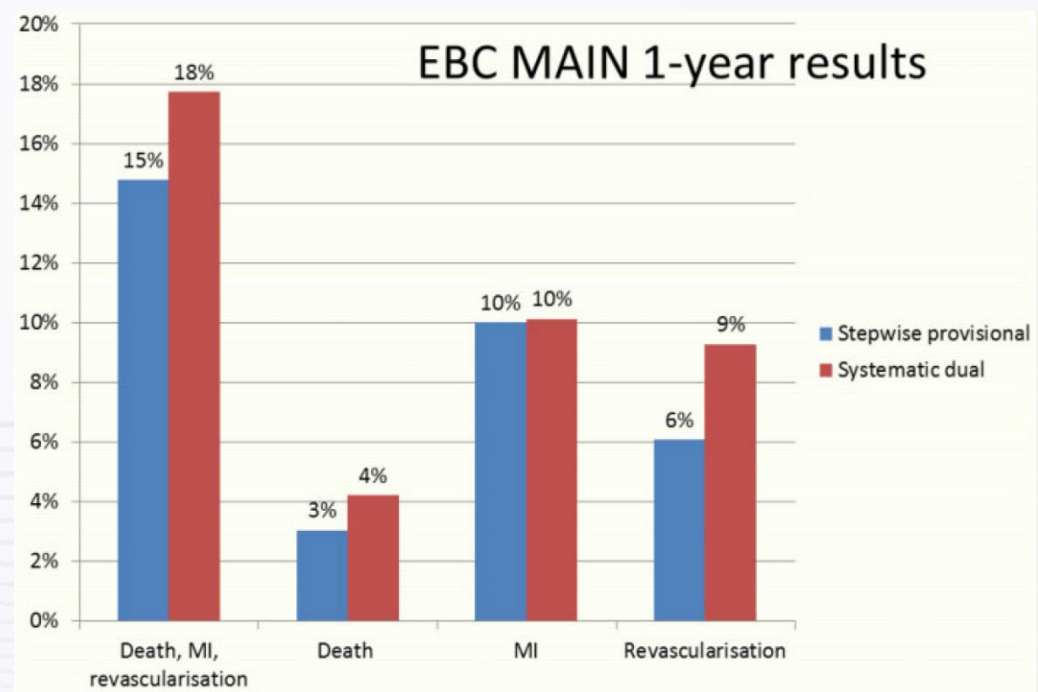
# Randomized Trials For True LM Bifurcation

## DK-CRUSH V Trial favored DK-CRUSH



**Two Stenting: 47%  
in Provisional Group**

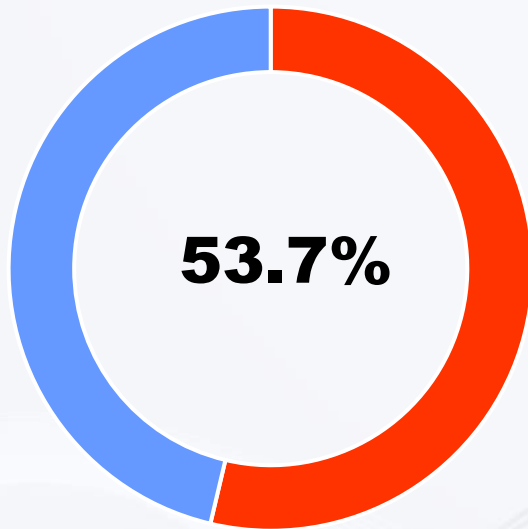
## EBC-MAIN Trial favored One-Stenting



**Two Stenting: 22%  
in Provisional Group**

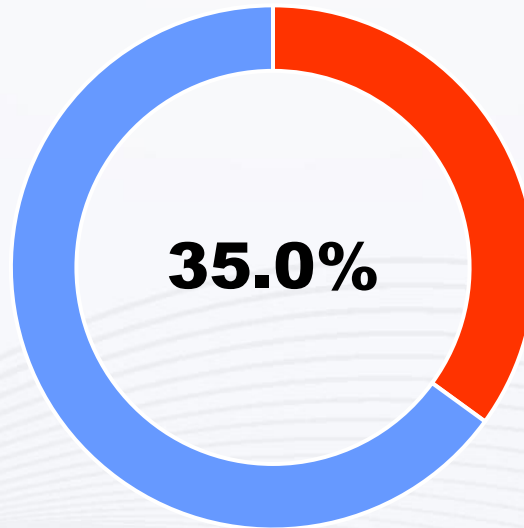
# Two Stent Technique in Randomized Trials

***PRECOMBAT Trial***



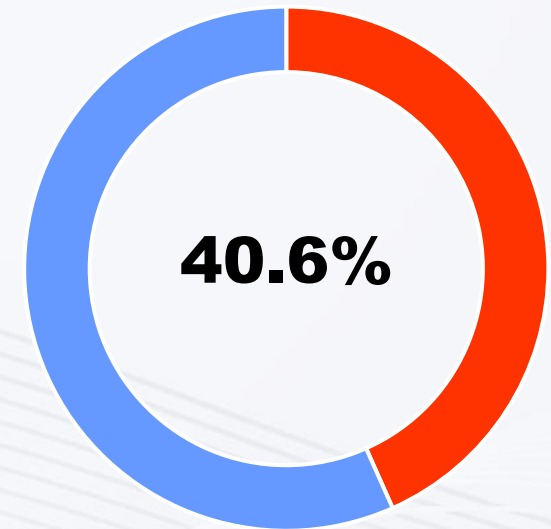
Crush Technique

***EXCEL Trial***



T Stenting

***NOBLE Trial***

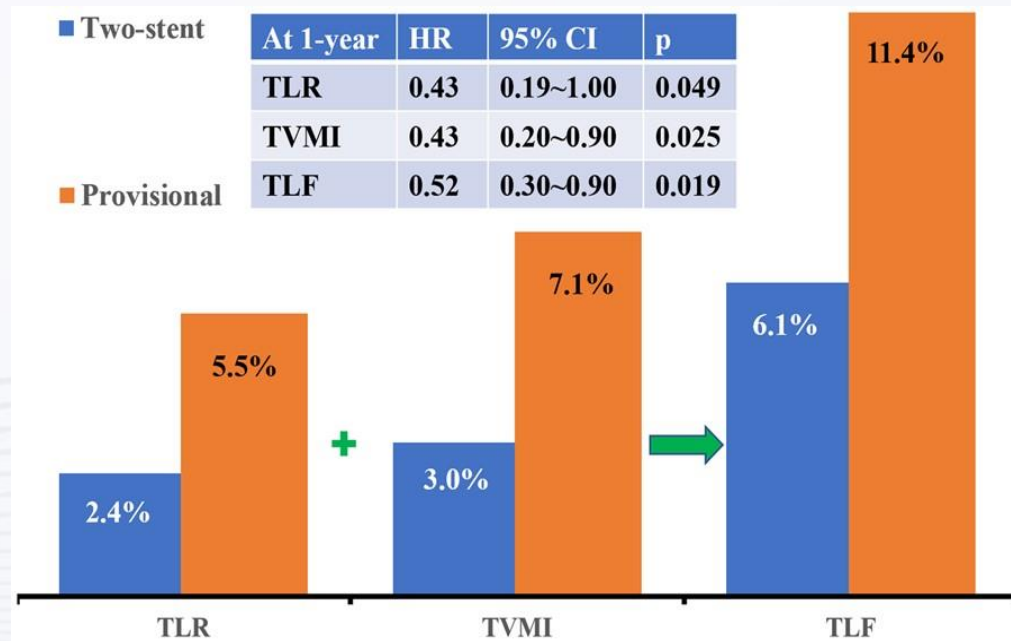
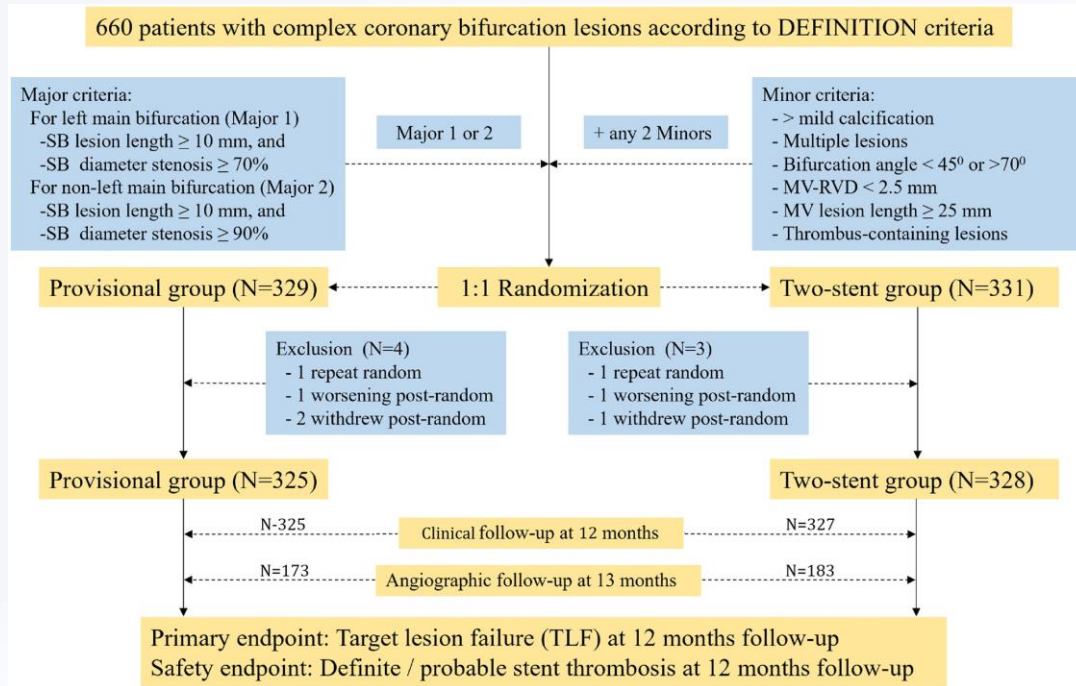


Culotte

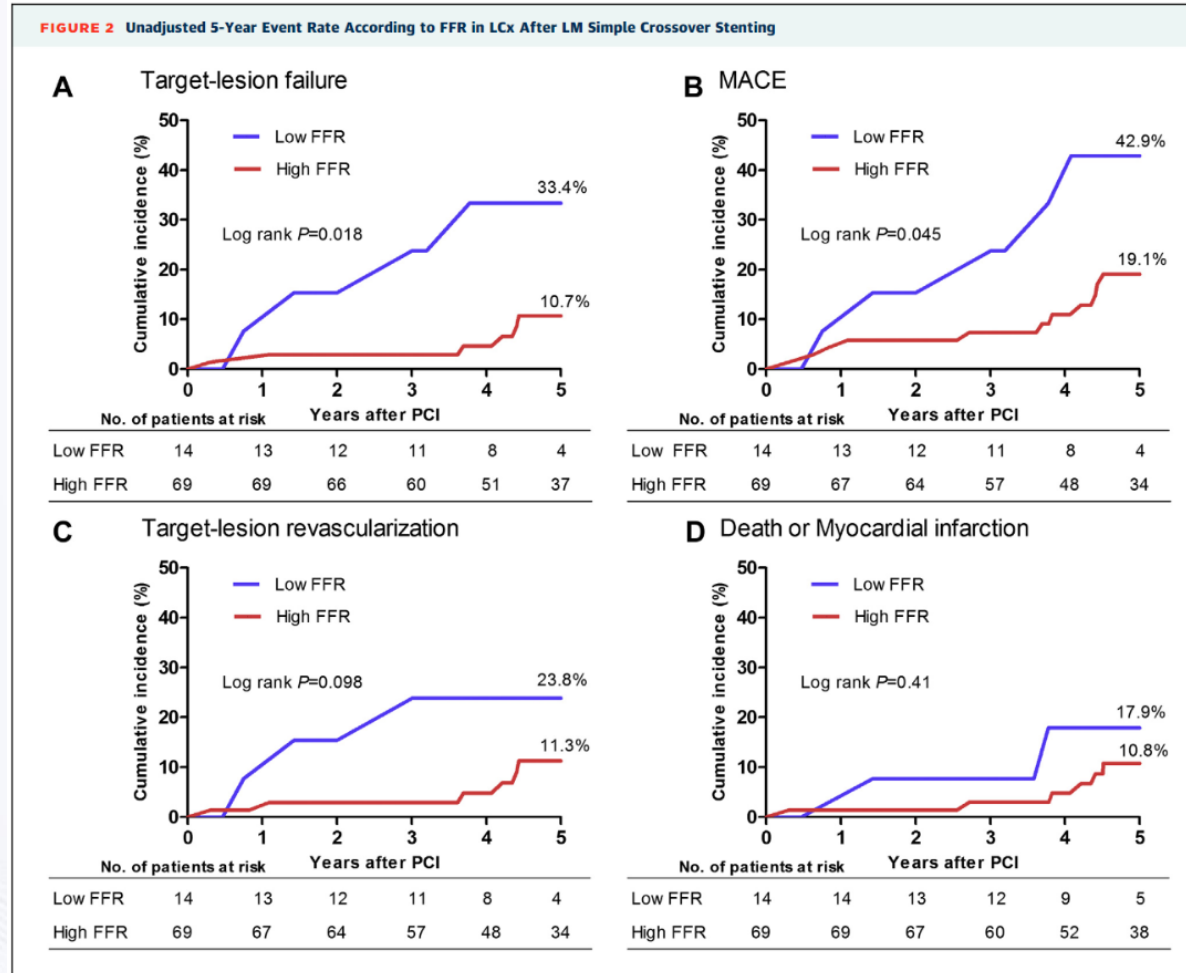


# Definition Criteria

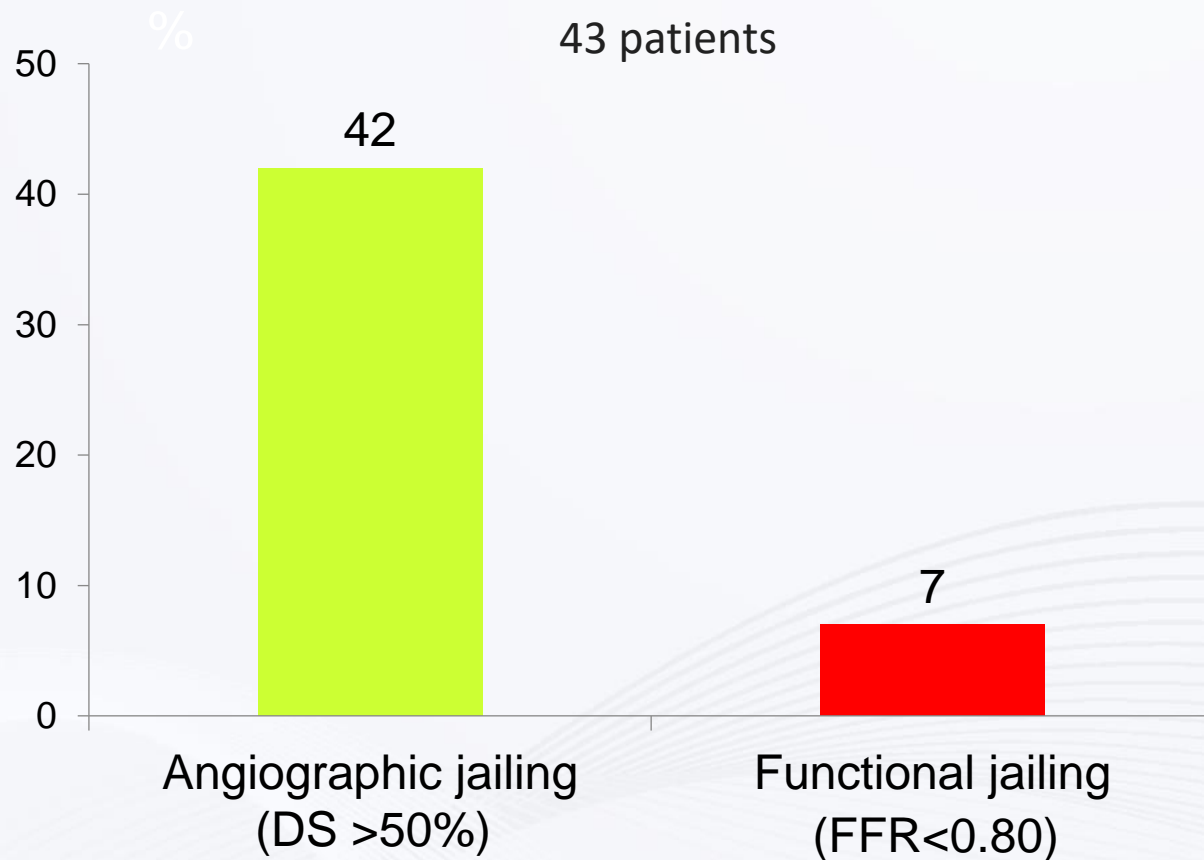
## DEFINITION II Trial: LM 28.8%



# LCX FFR after Simple Cross Over



# Functionally Significant LCX Jailing After Stent Crossover (LCX ostial DS<50%)



MLA at LCXos of < **3.7** mm<sup>2</sup>

- Sensitivity of 100%
- Specificity of 71%
- PPV of 16%
- NPV of 100%

Plaque burden at LCXos of > **56**%

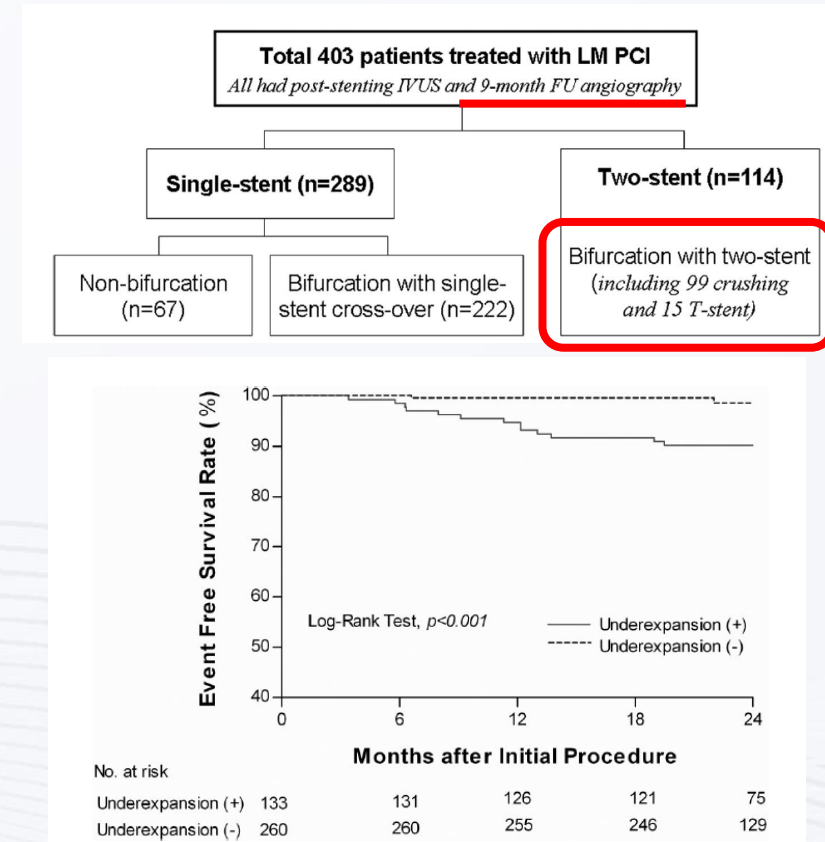
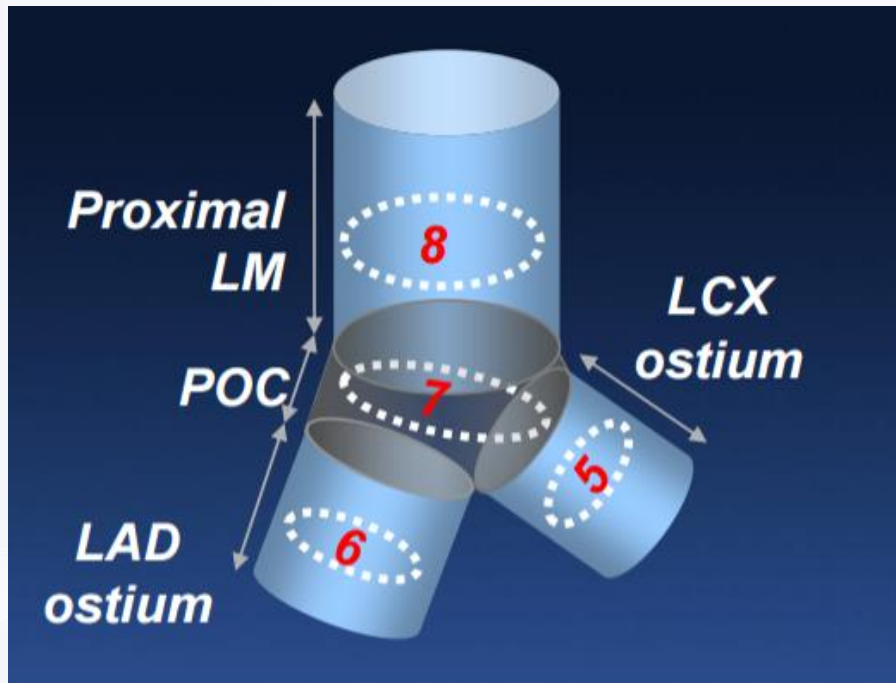
- Sensitivity of 100%
- Specificity of 65%
- PPV of 14%
- NPV of 100%

- How to Optimize the Stent Results?

## *Two Stenting*

# LM IVUS MSA Criteria

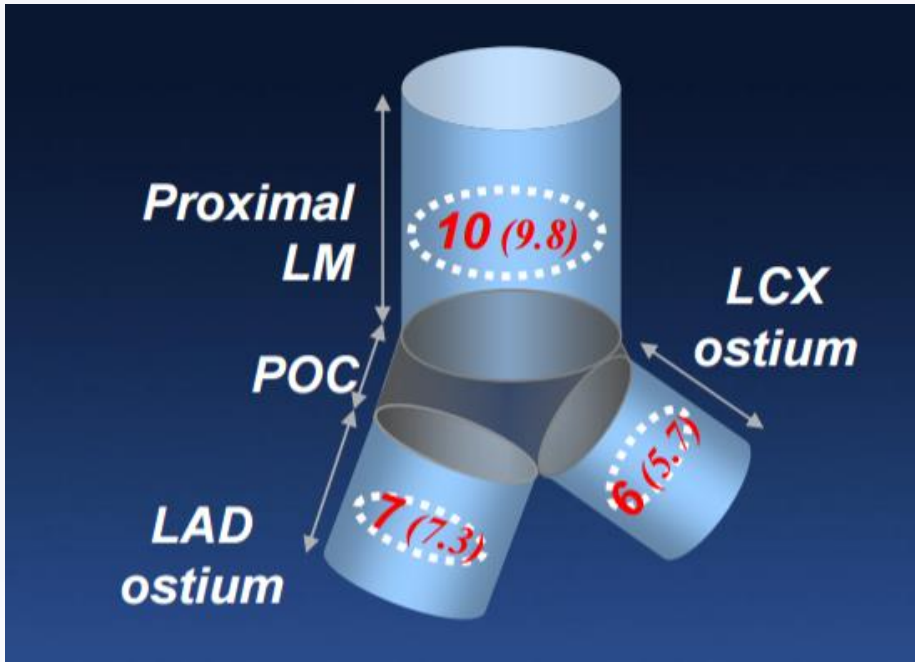
## Asan Medical Center Criteria



Kang SJ, et al. Circ Cardiovasc Interv 2011;4:562-9

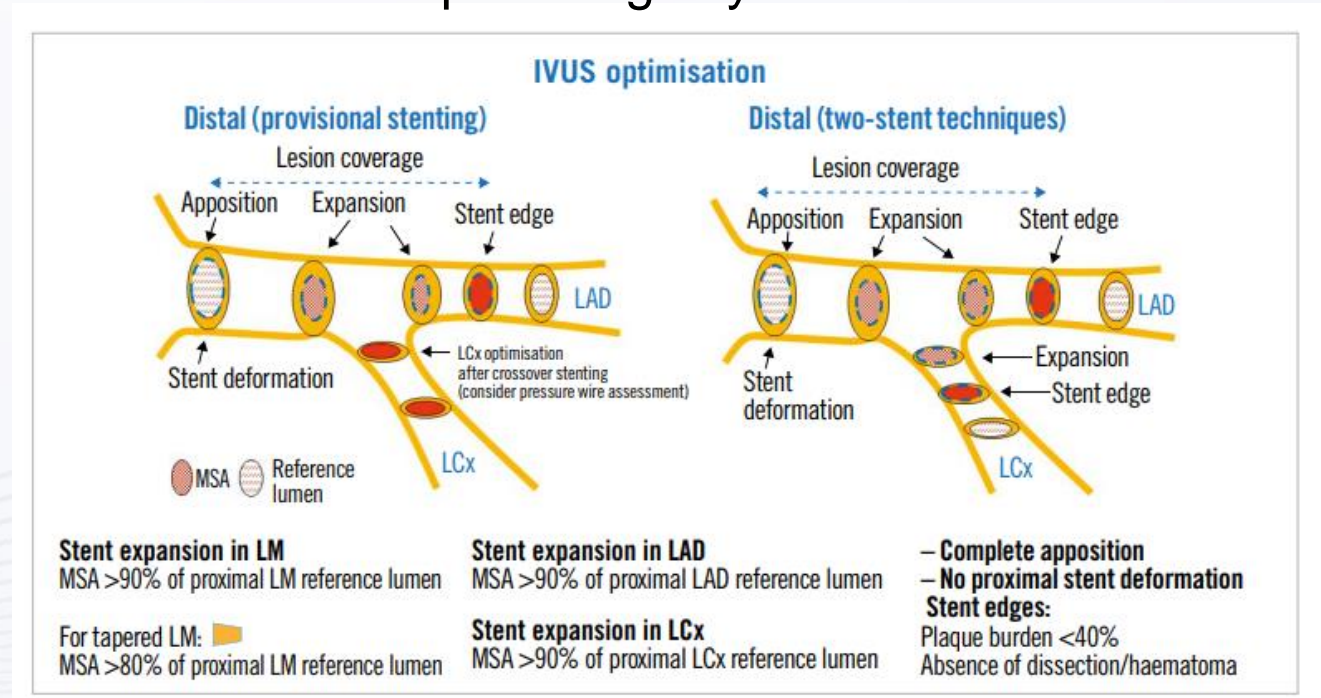
# LM IVUS MSA Criteria

## EXCEL Criteria



EXCEL Trial Analysis  
A. Maehara TCT 2018

## Spain Registry Criteria



EuroIntervention. 2020 Jun 25;16(3):210-217

# Optimal MSA Criteria For LM Crush Technique Based on Long-Term (5-Year) Clinical Outcomes

292 Patients

- Treated By Crush Technique
- Complete IVUS Imaging

35 MACES at 5 Years

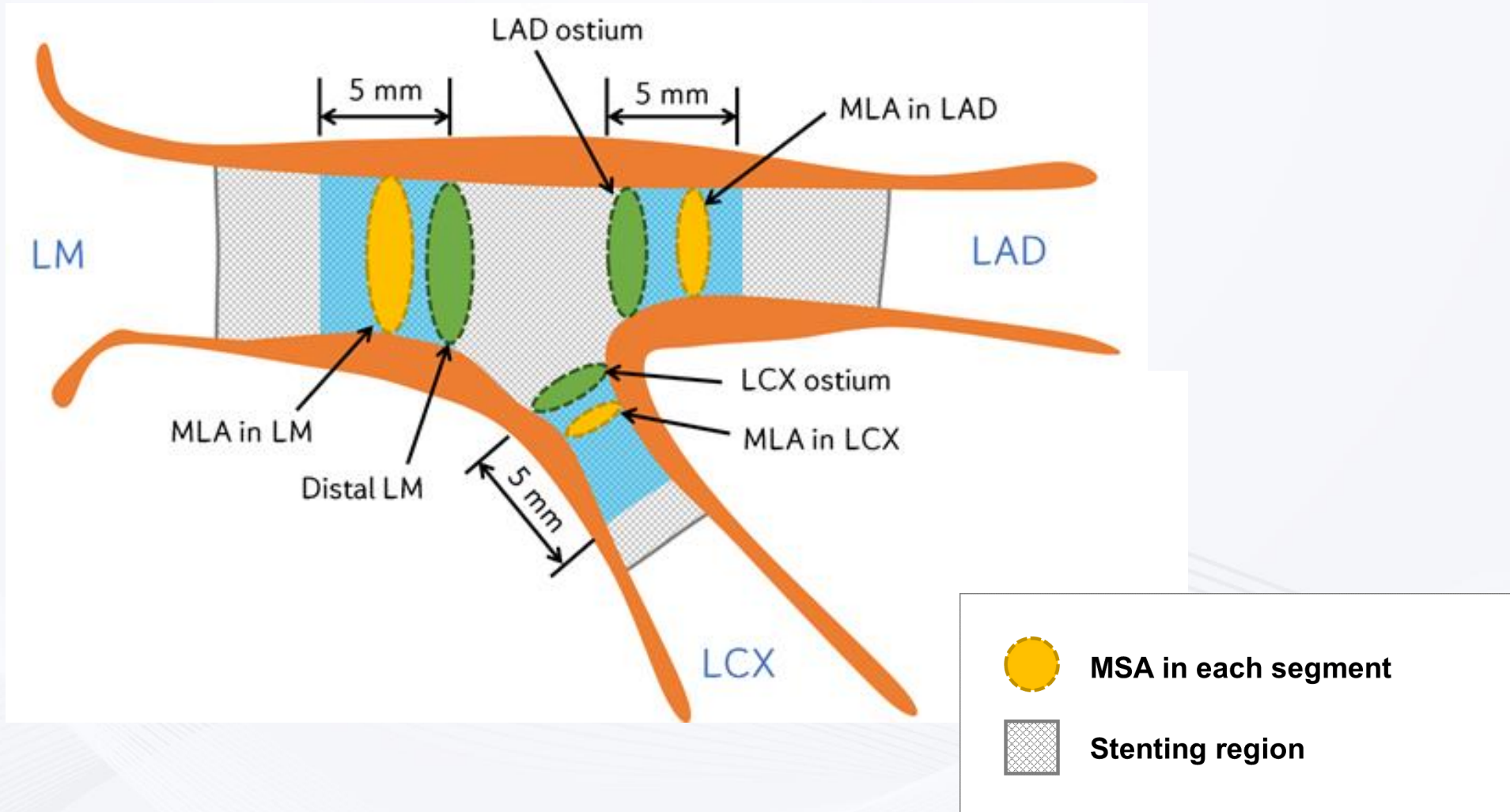
Patients with unprotected LM bifurcation lesion who underwent upfront two-stent technique from March 2005 to Dec 2019 (N=479)

Excluded, N = 187

- 5 patient underwent simultaneous kissing stents
- 15 patients underwent classic T-stenting
- 88 patients without IVUS-guidance
- 18 patients without poststenting IVUS from LAD-pullback
- 61 patients without poststenting IVUS from LCX-pullback

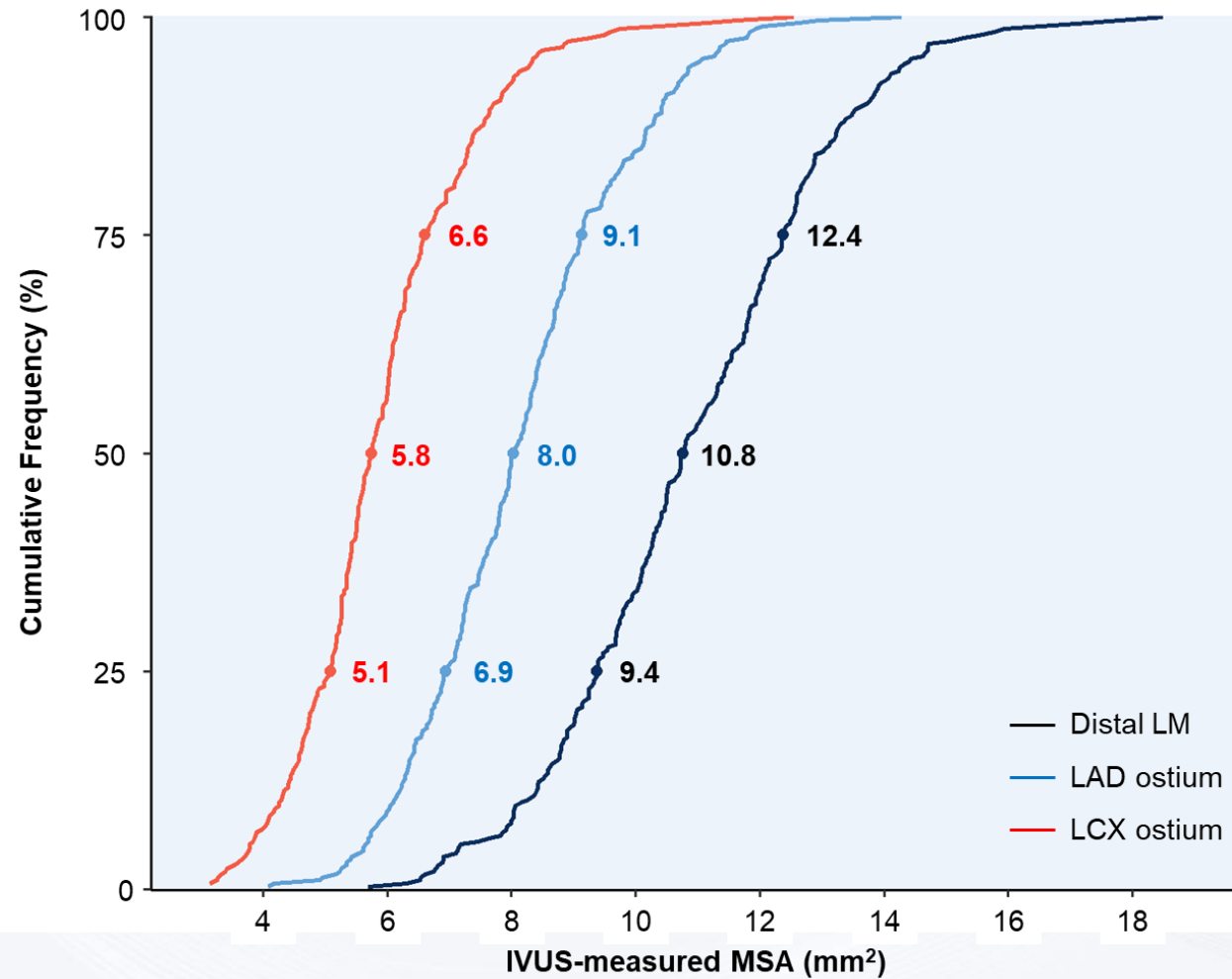
Patients who underwent two-stent PCI with crush technique and had complete poststenting IVUS images from both LAD and LCX pullback (N=292)

# Distribution of MSA

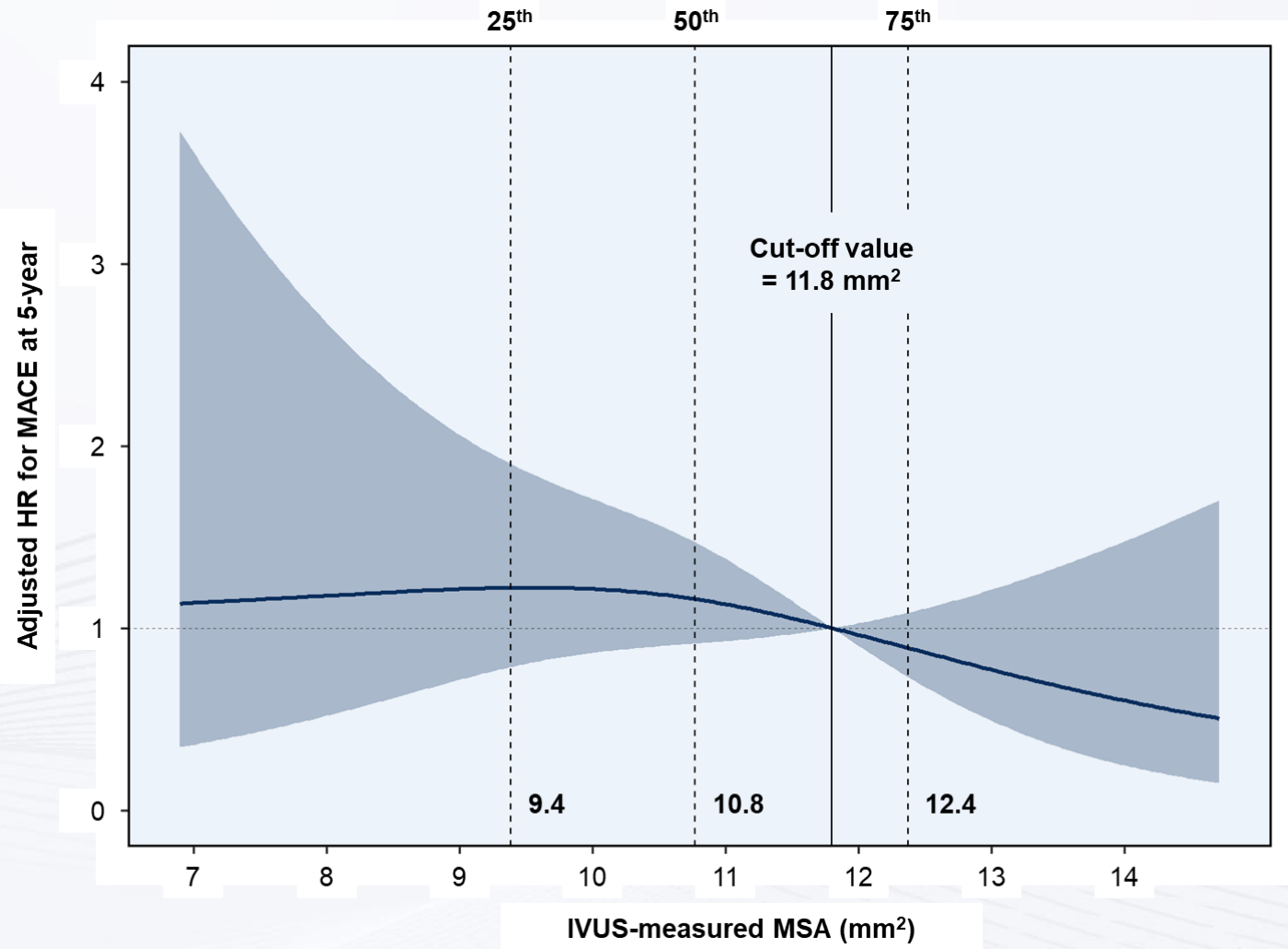
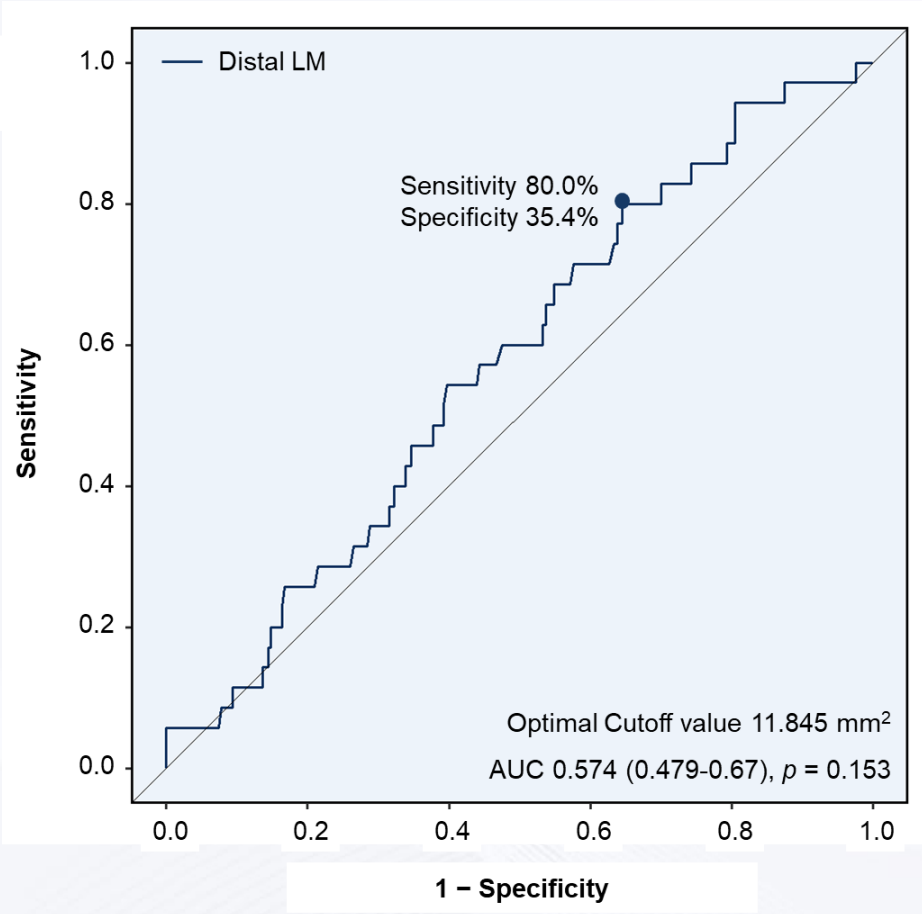




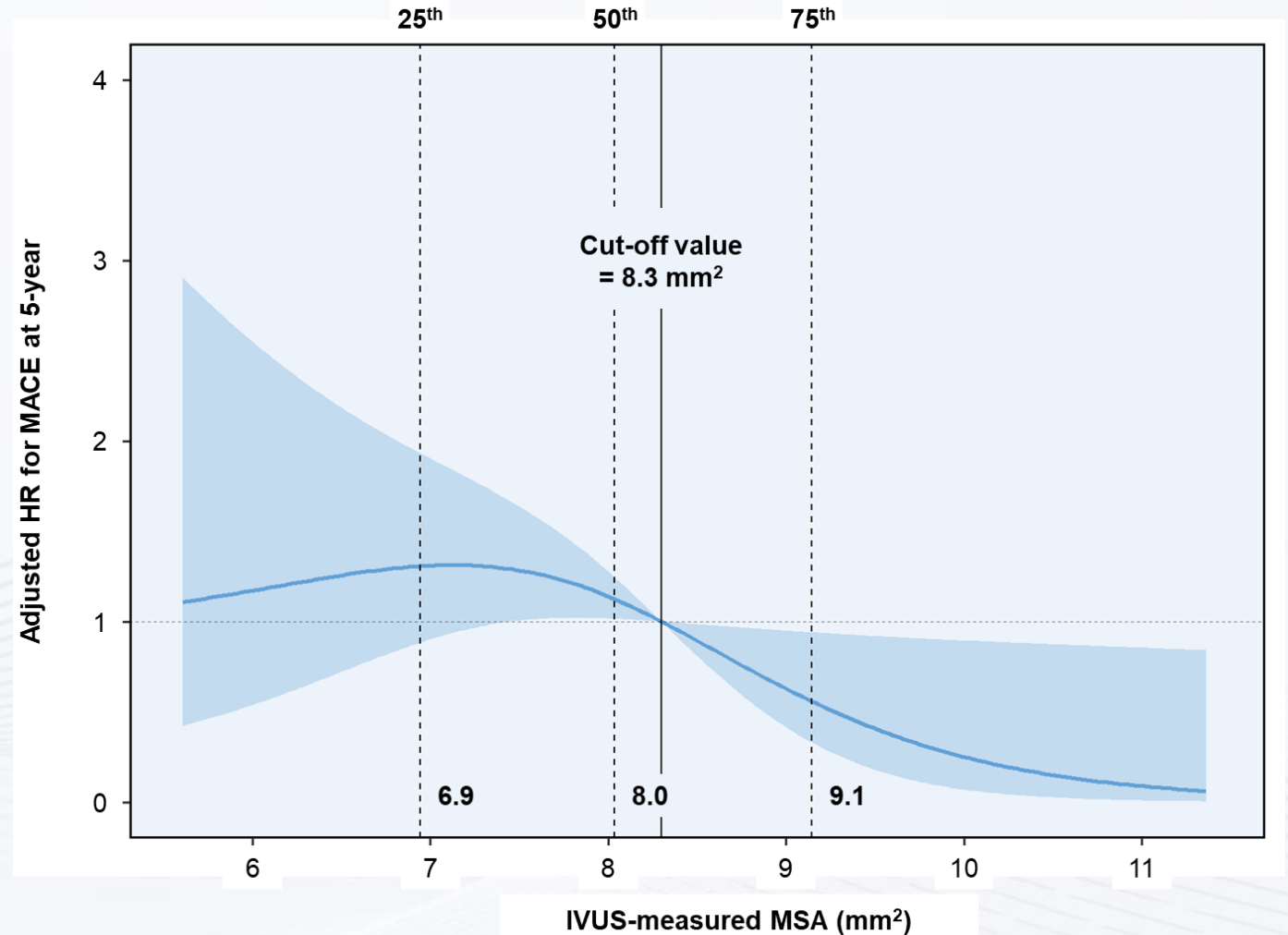
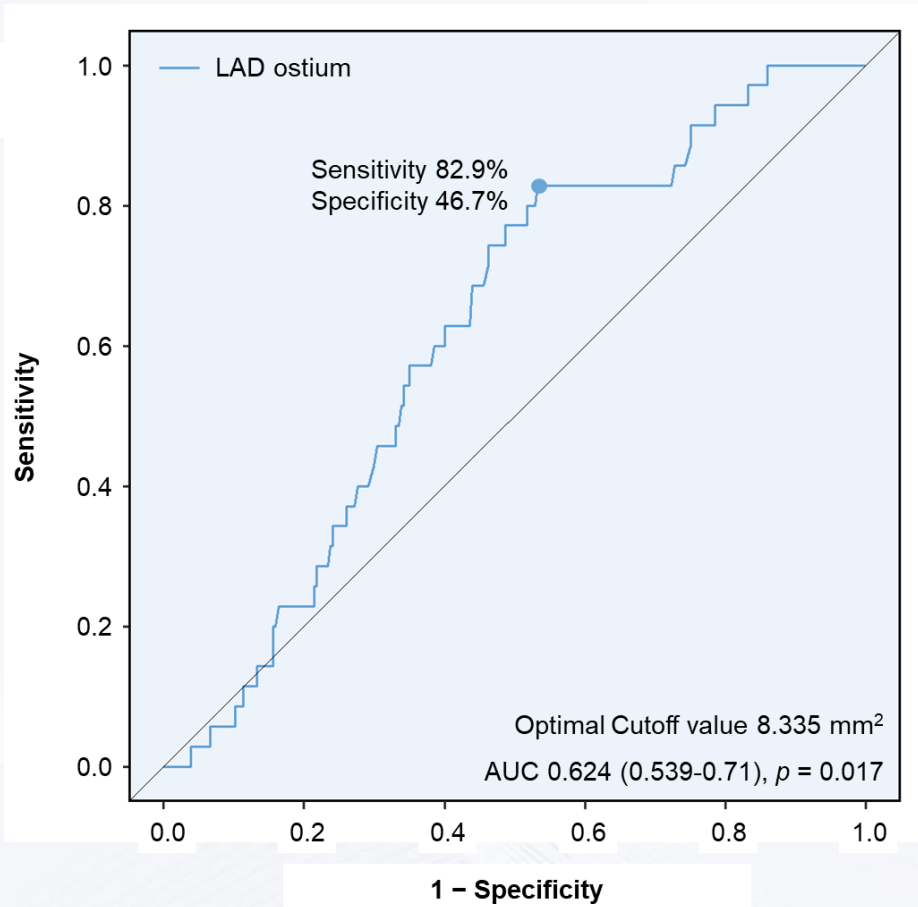
# Distribution of MSA



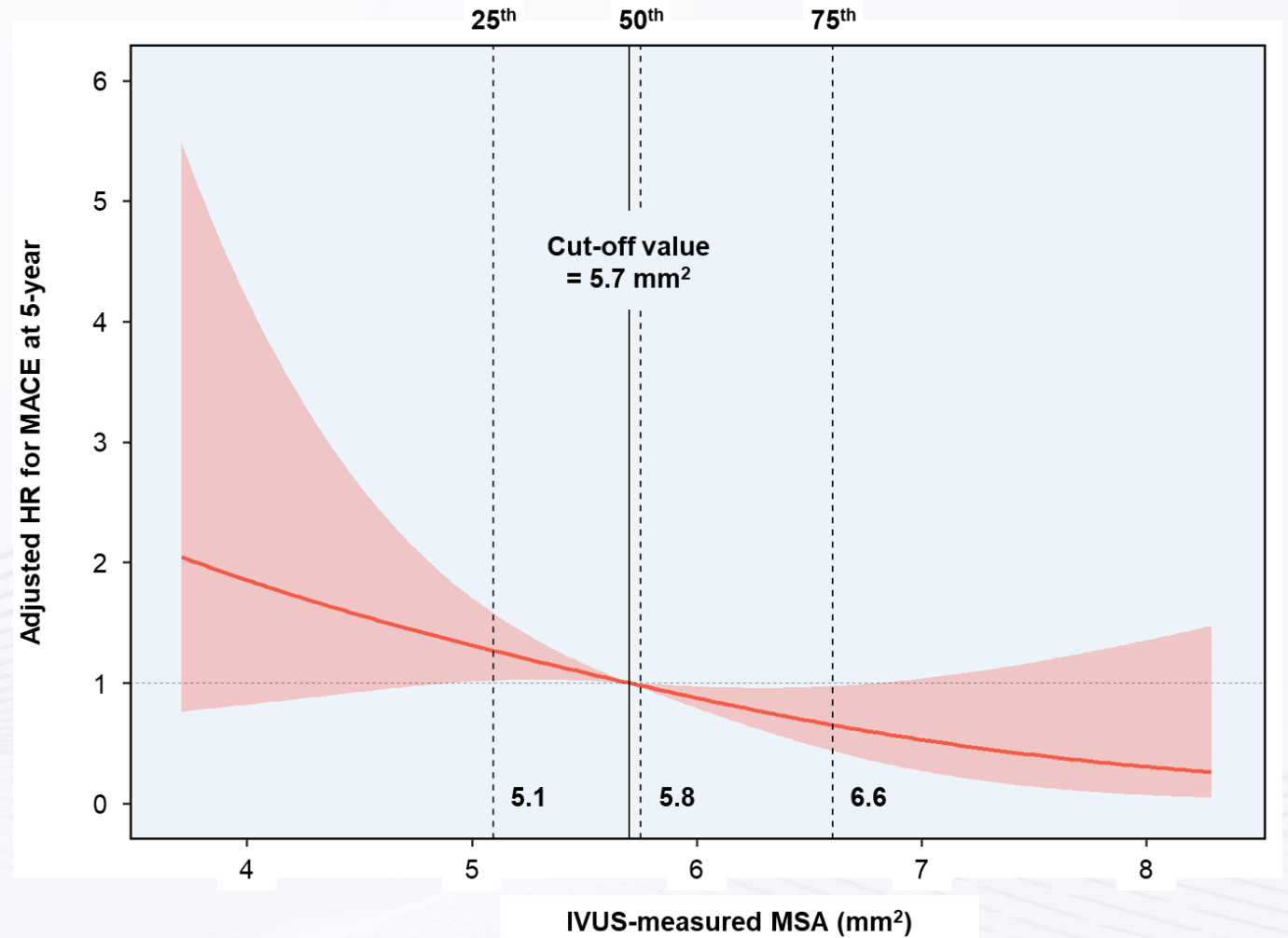
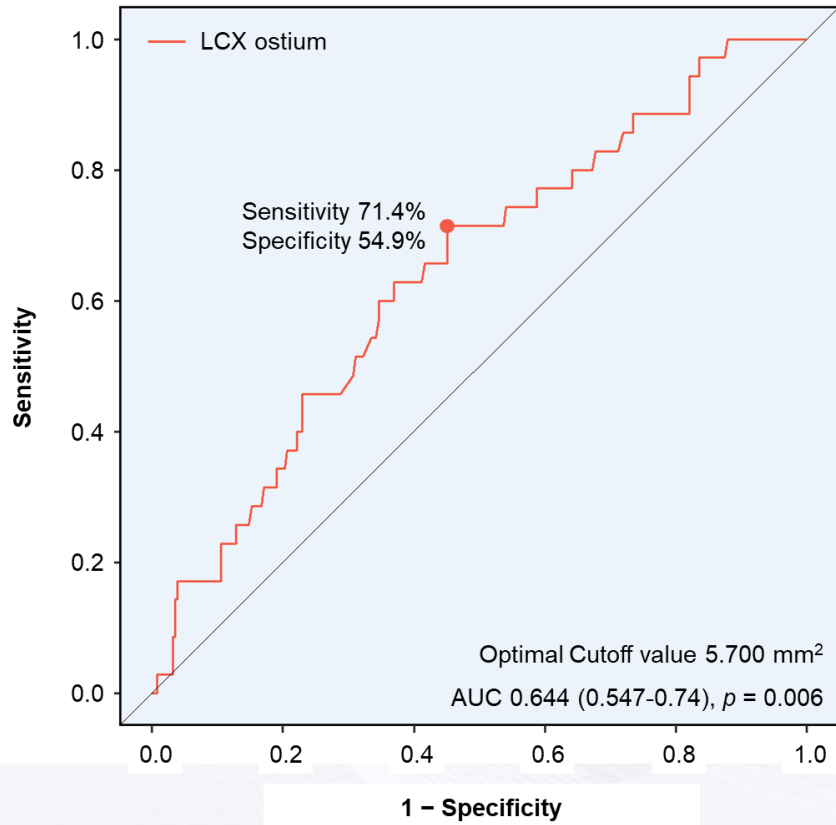
# Relationship between distal LM MSA and MACEs



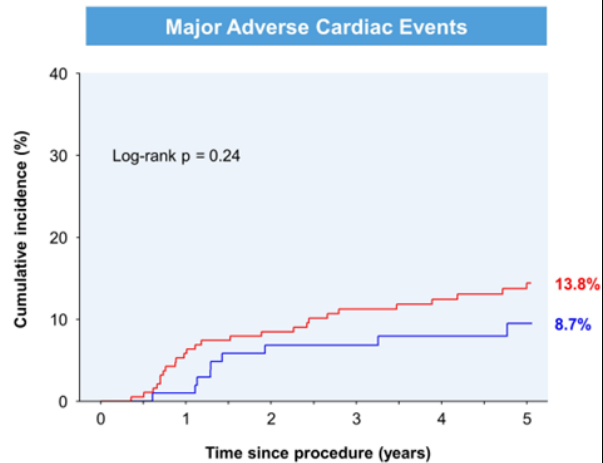
# Relationship between LAD ostial MSA and MACEs



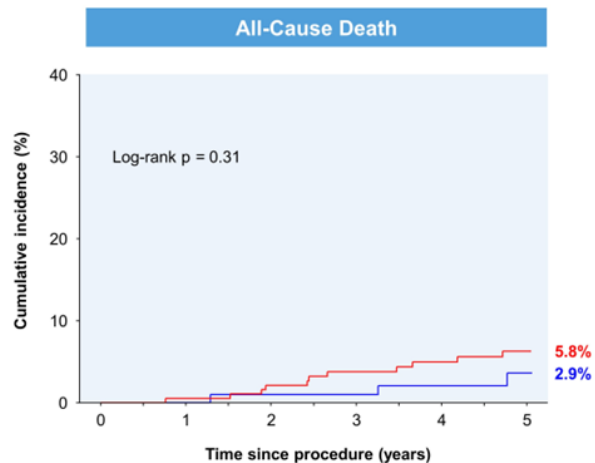
# Relationship between LCX ostial MSA and MACEs



## LM < 11.8 mm<sup>2</sup>: 64.7%

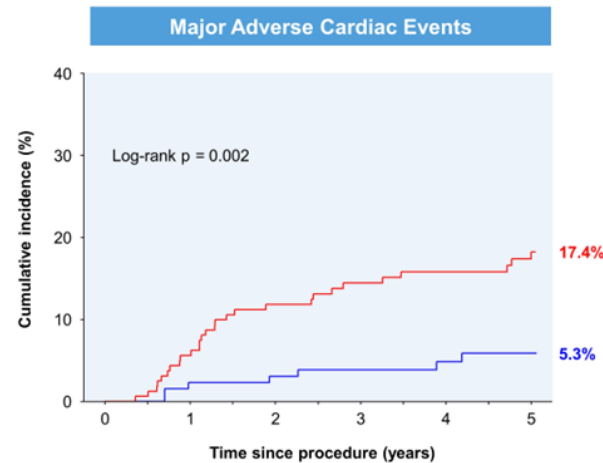


No. at risk	0	1	2	3	4	5
LM MSA < 11.8 mm <sup>2</sup>	189	178	173	155	141	125
LM MSA ≥ 11.8 mm <sup>2</sup>	103	102	94	87	67	56

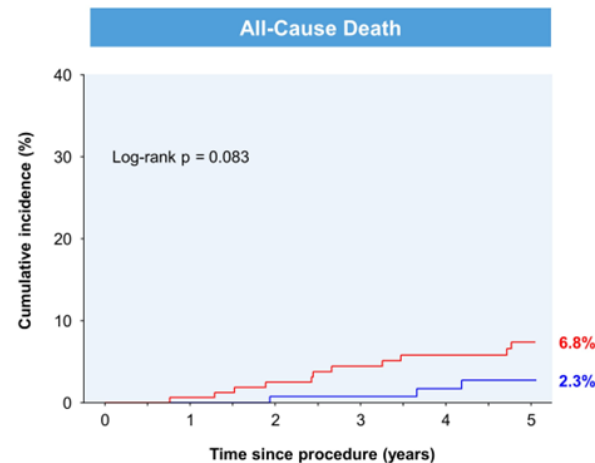


No. at risk	0	1	2	3	4	5
LM MSA < 11.8 mm <sup>2</sup>	189	188	185	168	152	135
LM MSA ≥ 11.8 mm <sup>2</sup>	103	103	100	93	72	60

## LAD < 8.3 mm<sup>2</sup>: 55.1%

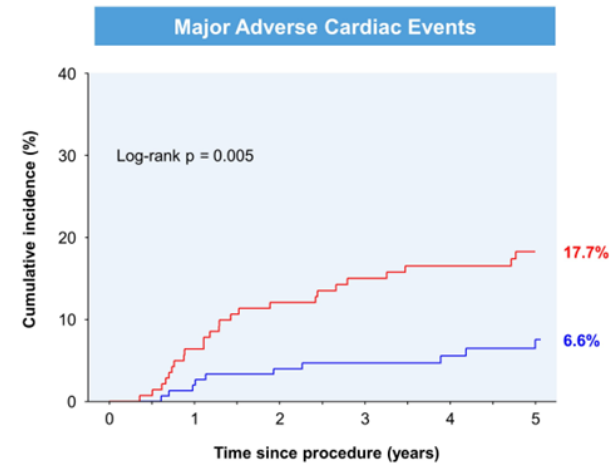


No. at risk	0	1	2	3	4	5
LAD MSA < 8.3 mm <sup>2</sup>	161	152	142	128	114	98
LAD MSA ≥ 8.3 mm <sup>2</sup>	131	128	125	114	94	83

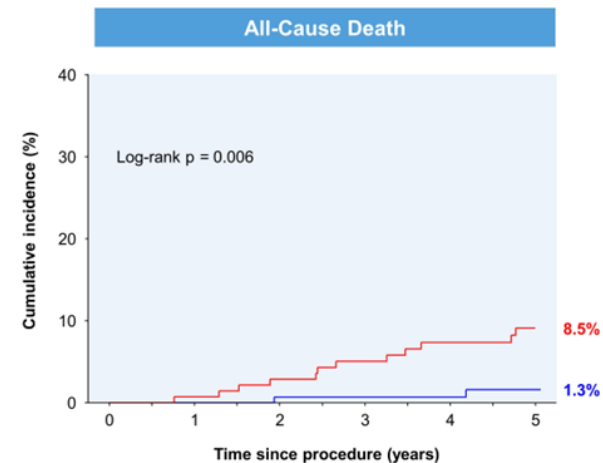


No. at risk	0	1	2	3	4	5
LAD MSA < 8.3 mm <sup>2</sup>	161	160	157	143	128	111
LAD MSA ≥ 8.3 mm <sup>2</sup>	131	131	128	118	96	84

## LCX < 5.7 mm<sup>2</sup>: 48.3%

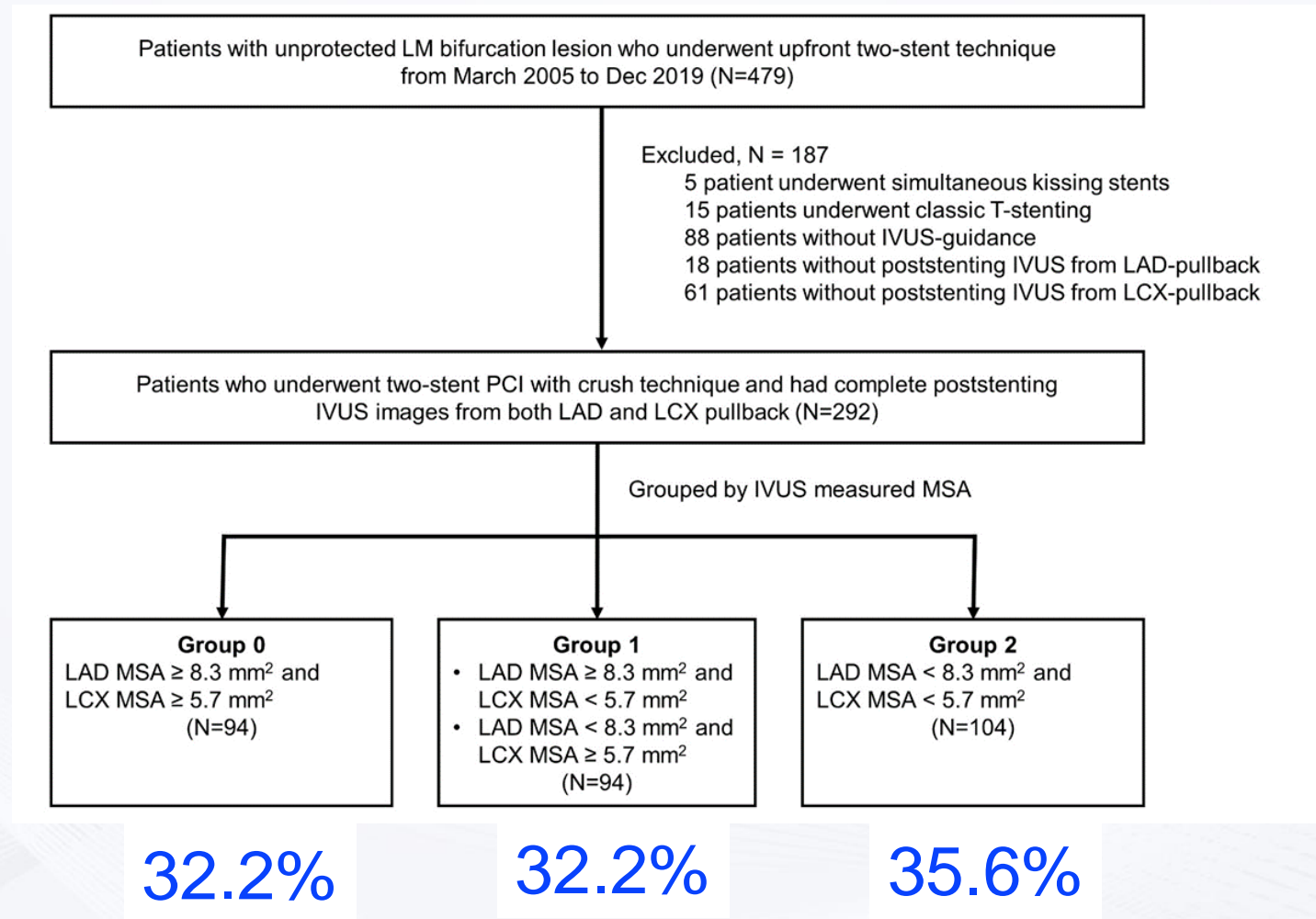


No. at risk	0	1	2	3	4	5
LCX MSA < 5.7 mm <sup>2</sup>	141	132	124	114	103	93
LCX MSA ≥ 5.7 mm <sup>2</sup>	151	148	143	128	105	88



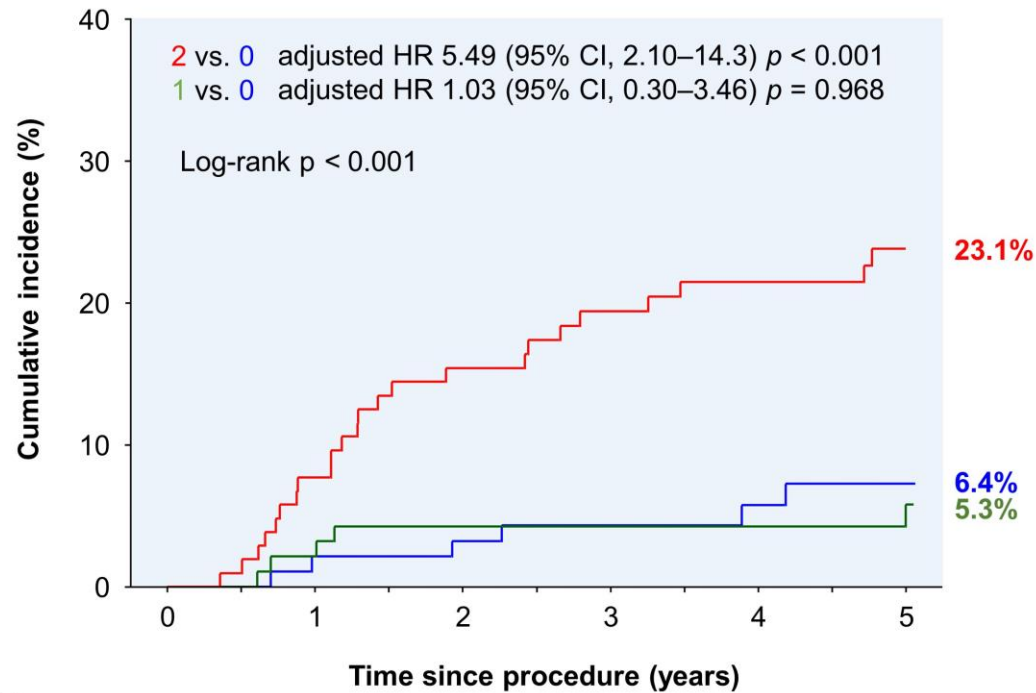
No. at risk	0	1	2	3	4	5
LCX MSA < 5.7 mm <sup>2</sup>	141	140	137	127	114	103
LCX MSA ≥ 5.7 mm <sup>2</sup>	151	151	148	134	110	92

# Incidence of Under-expansion of LM Segments and Outcomes



# Incidence of Under-expansion of LM Segments and Outcomes

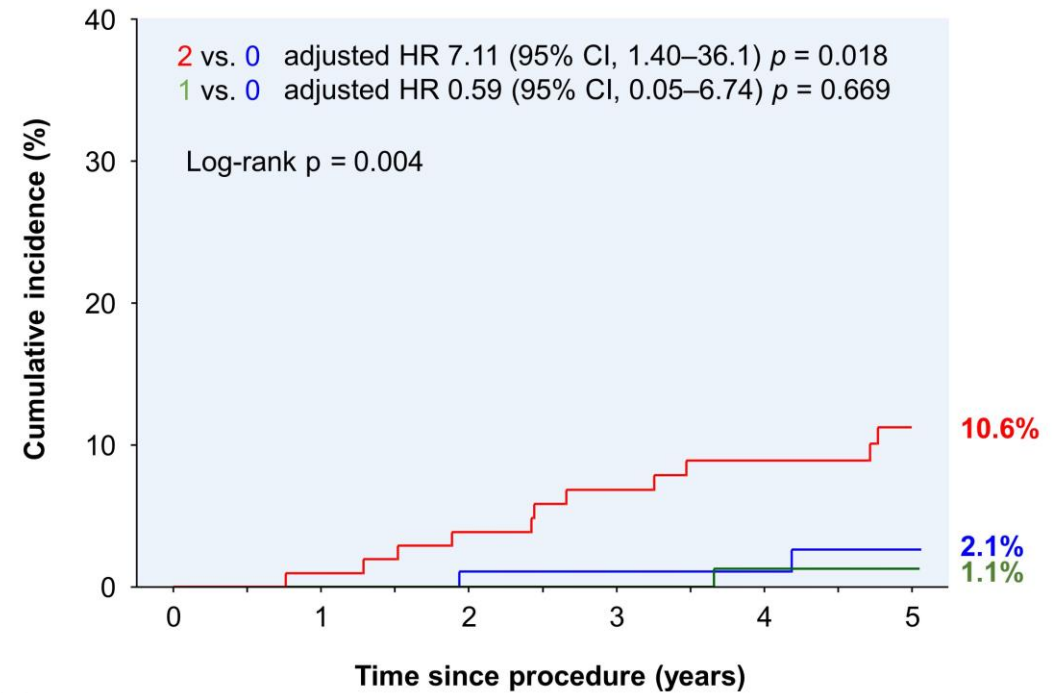
## Major Adverse Cardiac Events



### No. at risk

	0	1	2	3	4	5
Group 2	104	96	88	79	73	64
Group 1	94	92	90	84	71	63
Group 0	94	92	89	79	64	54

## All-Cause Death

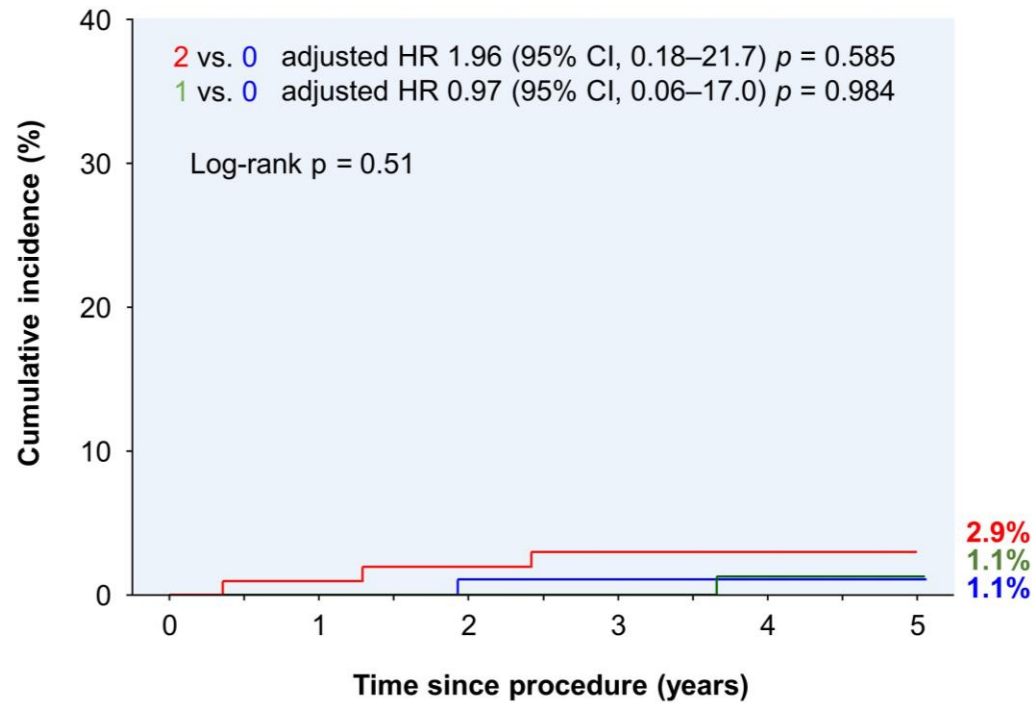


### No. at risk

	0	1	2	3	4	5
Group 2	104	103	100	91	84	74
Group 1	94	94	94	88	74	66
Group 0	94	94	91	82	66	55

# Incidence of Under-expansion of LM Segments and Outcomes

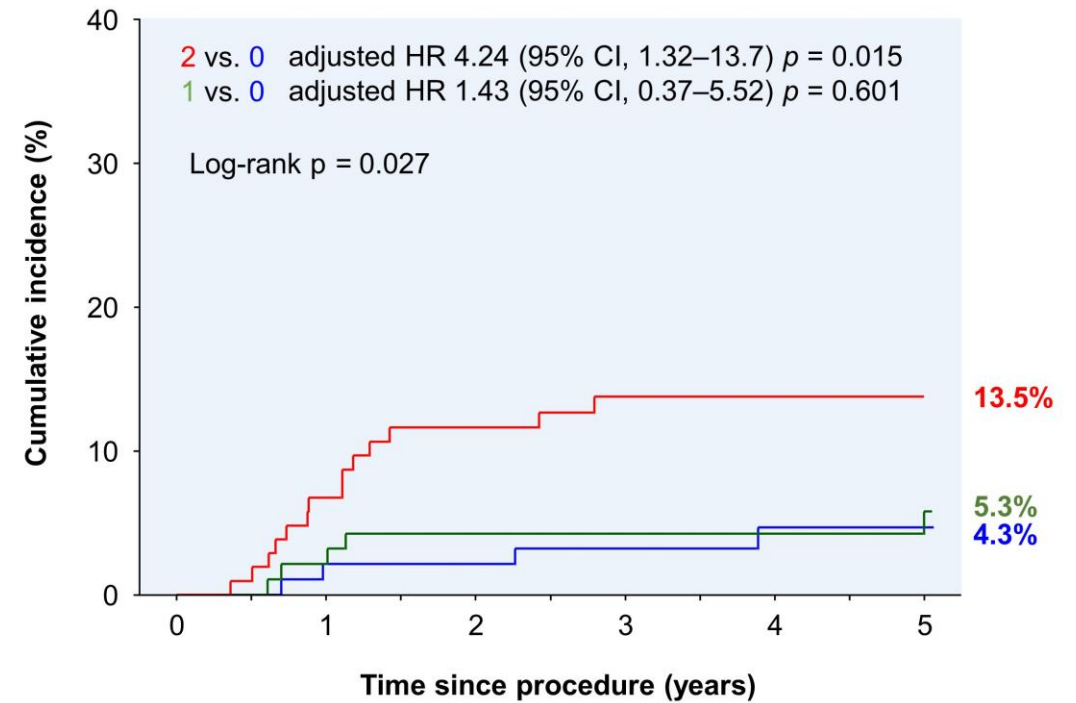
## Myocardial Infarction



### No. at risk

— Group 2	104	102	98	89	82	72
— Group 1	94	94	94	88	74	66
— Group 0	94	94	90	81	65	54

## Target Lesion Revascularization



### No. at risk

— Group 2	104	96	88	79	73	64
— Group 1	94	92	90	84	71	63
— Group 0	94	92	90	80	65	55



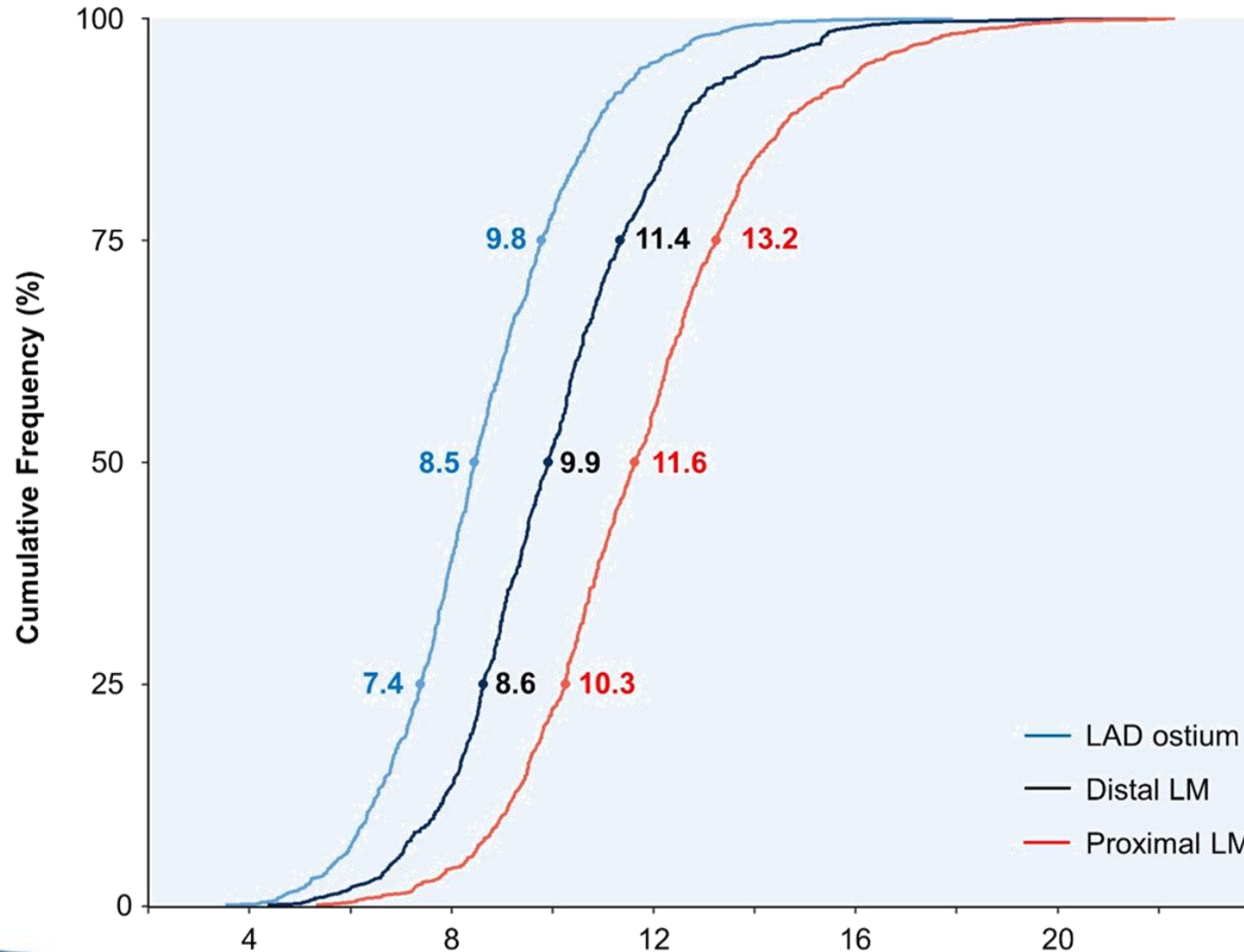
- How to Optimize the Stent Results?

## *Provisional Stenting*

# Methods

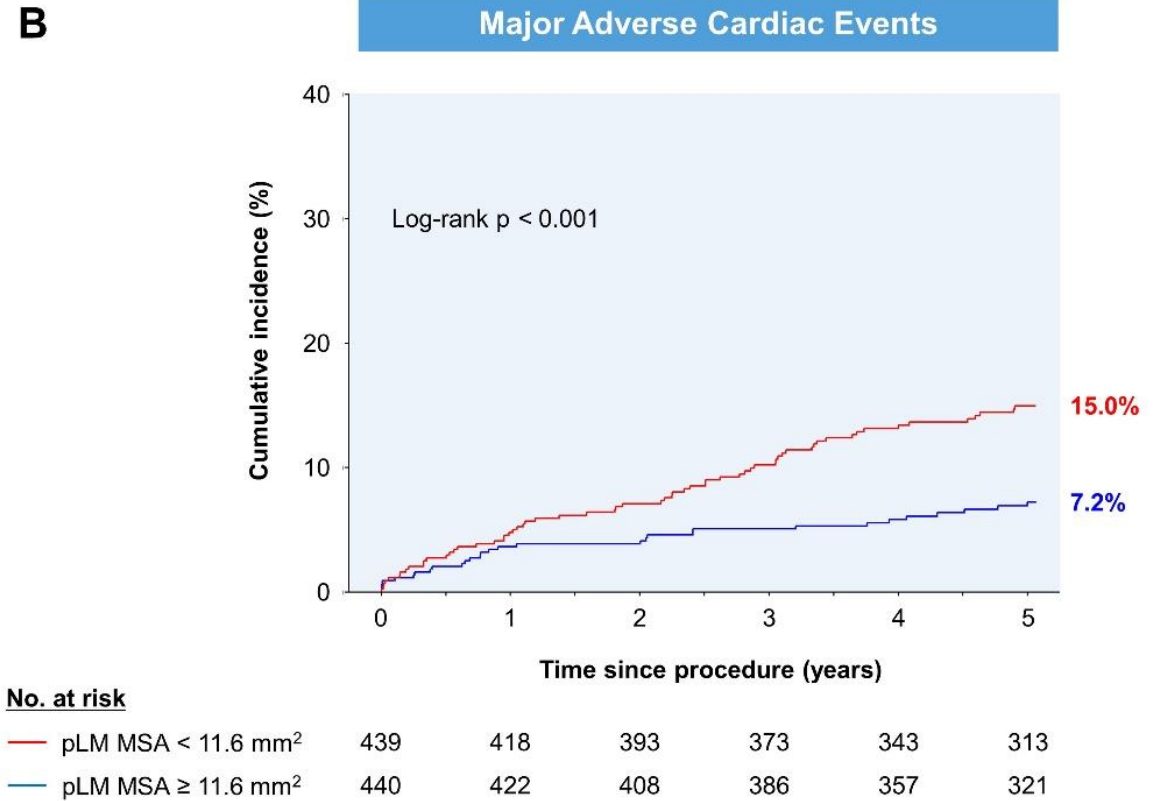
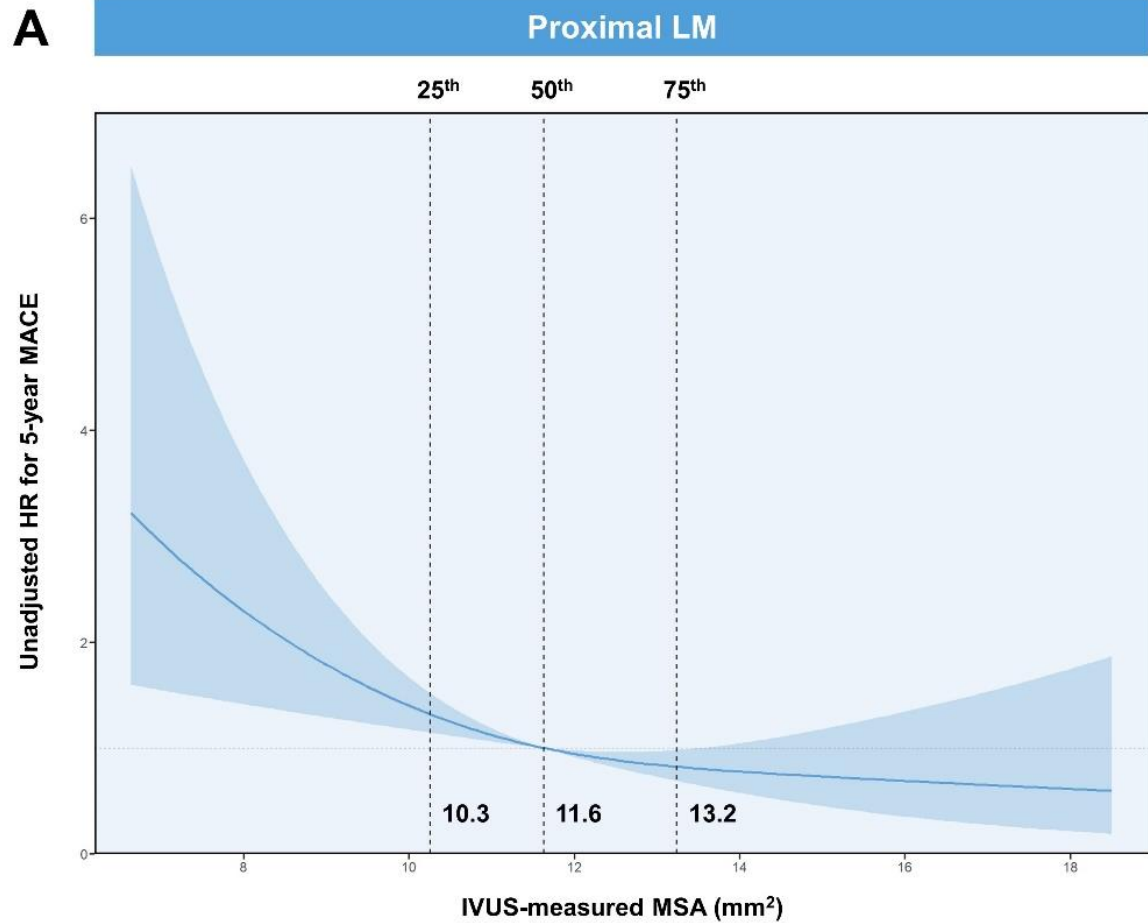
- We identified 879 consecutive patients with LM bifurcation stenosis who were treated using [single-stent crossover](#) stenting at [Asan Medical Center](#) between March 2005 and September 2022.
- MSA within the ostial LAD, distal LM, and distal and proximal segment of the stent.
- 5-year MACE, including [all-cause death](#), [myocardial infarction](#), and [target lesion revascularization](#) related to LM stenosis.

# IVUS-measured Minimal Stent Area

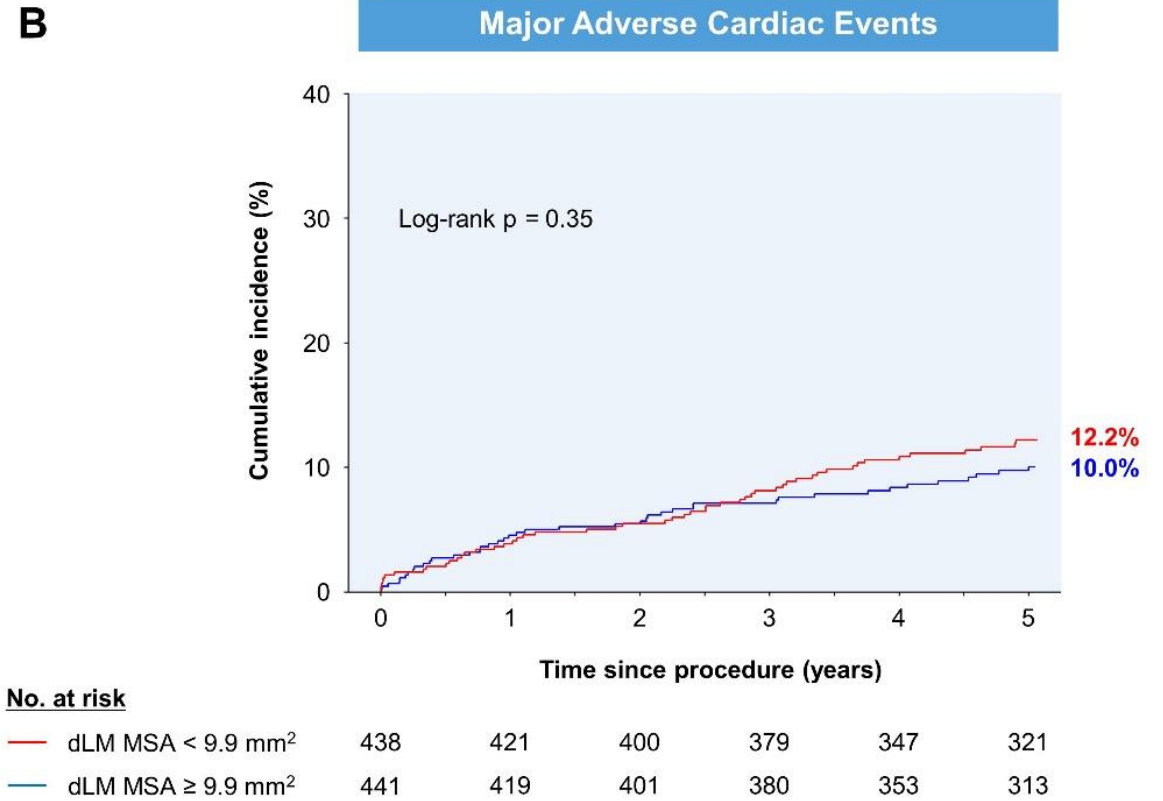
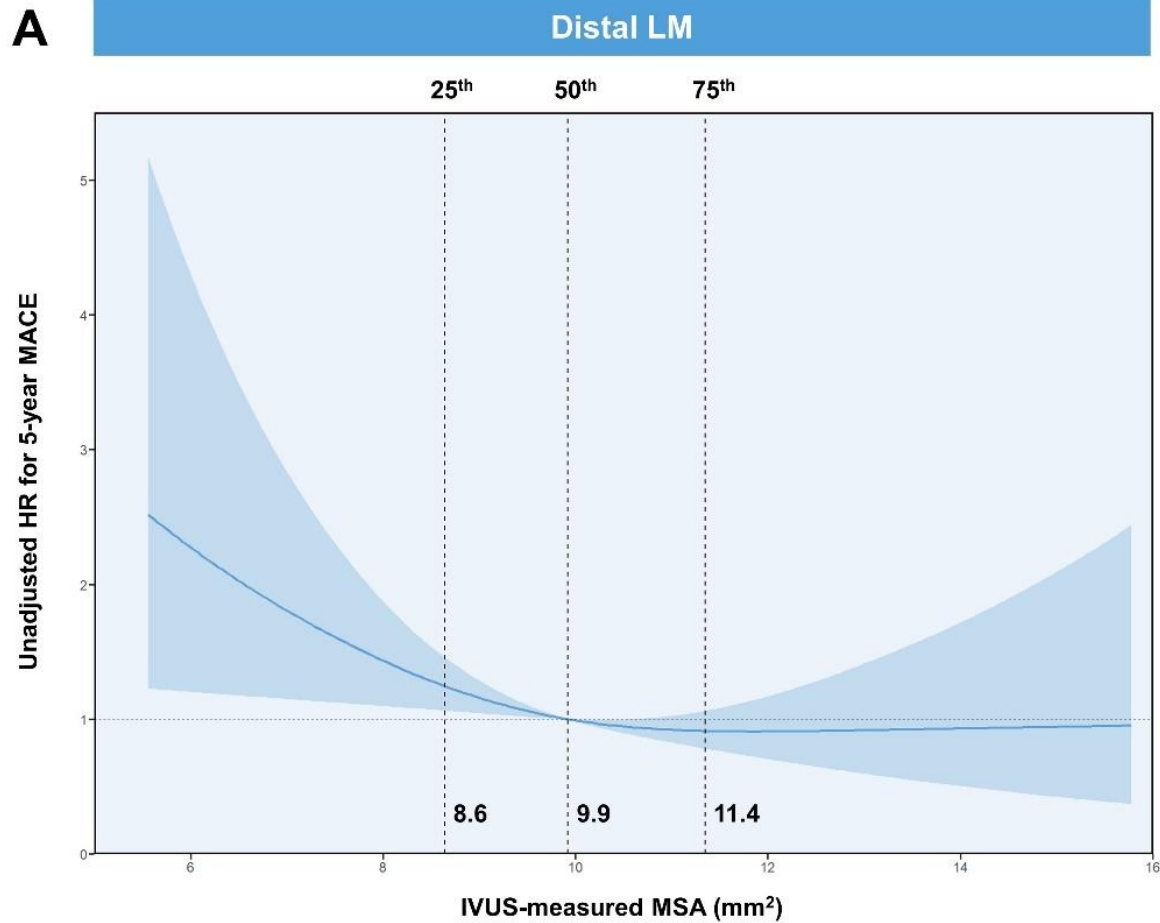


- N = 879
- 64.2 ± 10.2 years
- Male, 698 (79.4%)
- Diabetes, 311 (35.4%)

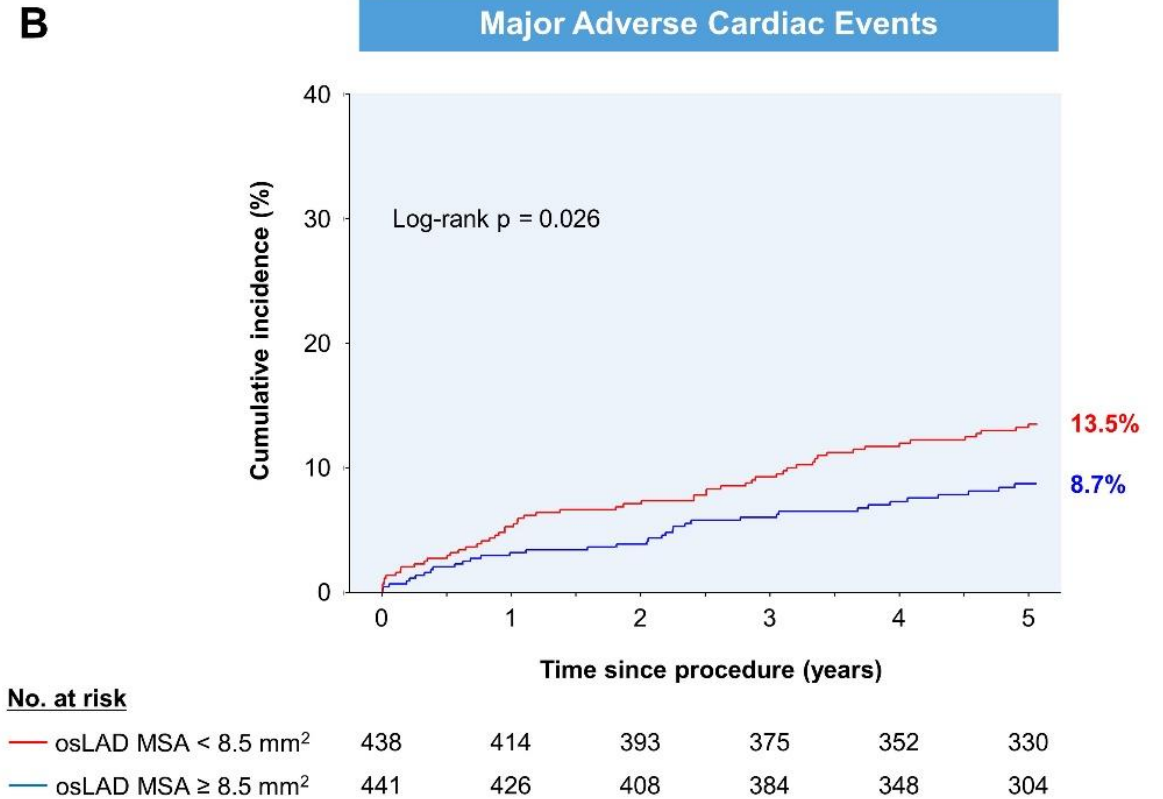
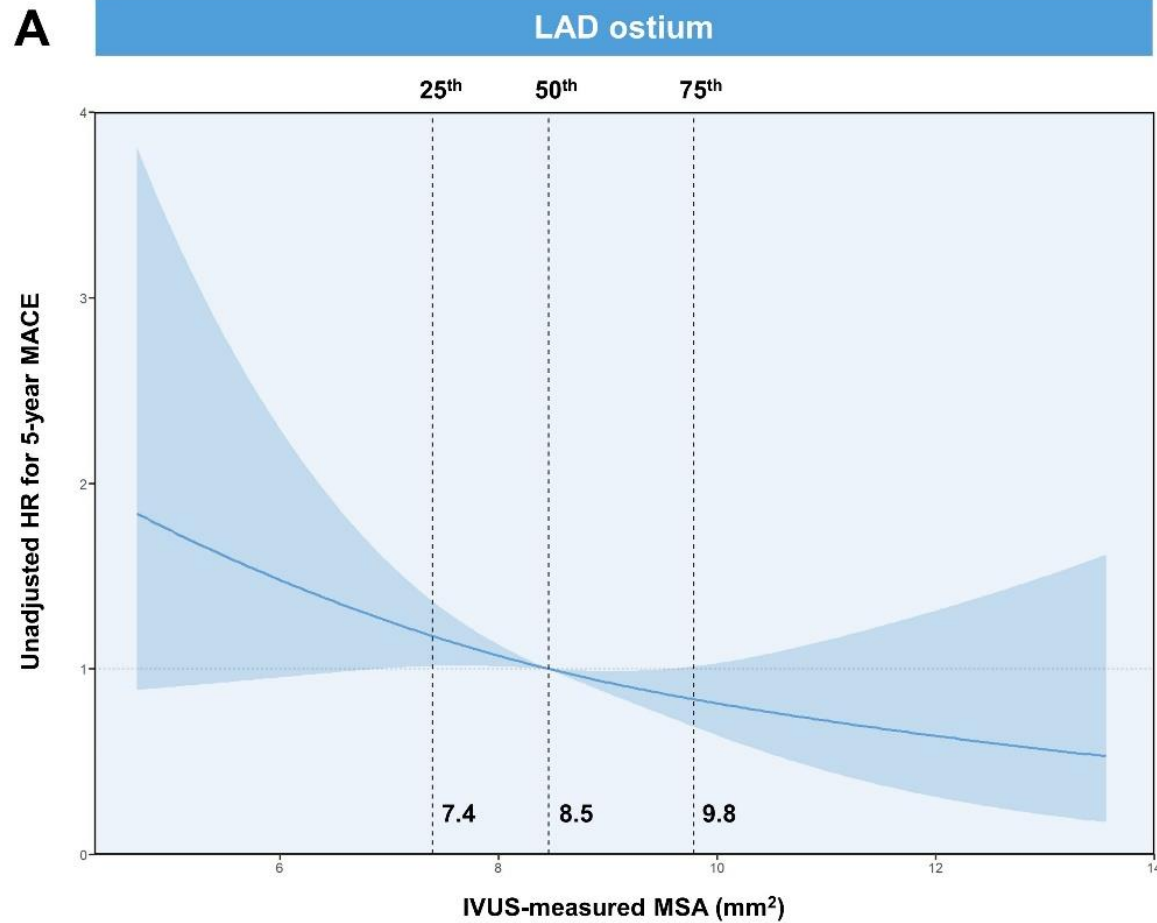
# Proximal LM Minimal Stent Area (**11.6mm<sup>2</sup>**)



# Distal LM Minimal Stent Area (**9.9mm<sup>2</sup>**)

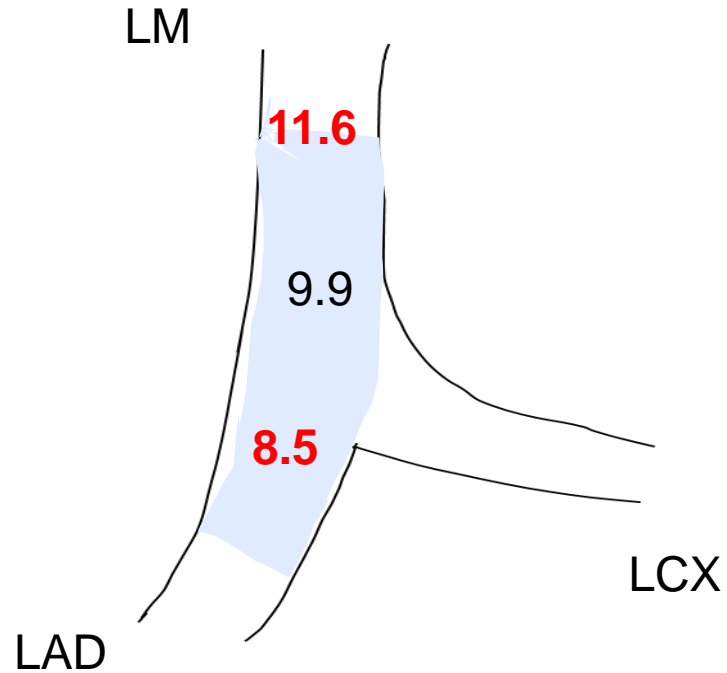


# LAD Ostium Minimal Stent Area (**8.5mm<sup>2</sup>**)

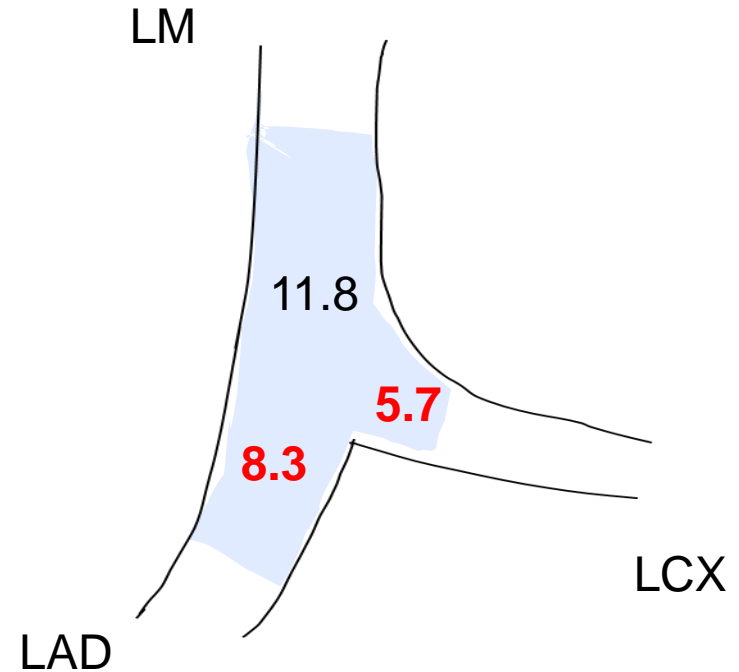


# New IVUS MSA for LM Bifurcation Stenting

Provisional Stenting



Two Stenting by Crush Technique



# Summary

- Intracoronary Imaging has an important roles in LM PCI including decision making in revascularization, and bifurcation stenting strategy, and final optimization.
- Imaging itself is not associated with better outcomes. Additional effort for more optimal stenting based on coronary imaging may lead to better stent and patients' outcomes.
- Suggested “number” could be a bench marker of favorable outcomes.