

# **Optimal MSA for LM Crush Technique : New Criteria from AMC**

**Do-Yoon Kang, MD.**

Clinical Assistant Professor, University of Ulsan College of Medicine,  
Heart Institute, Asan Medical Center, Seoul, Korea

# **Complex PCI 2022**

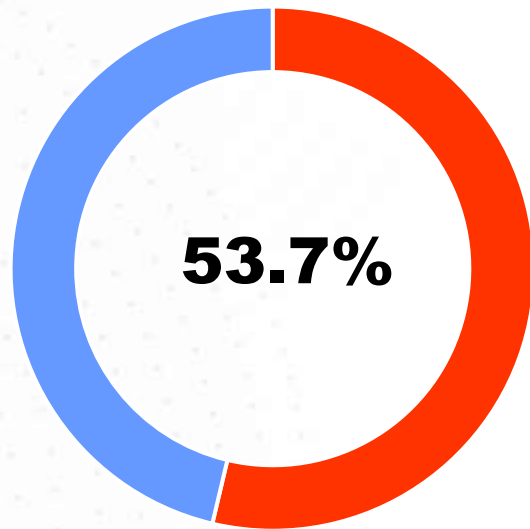
## **COI Disclosure**

***Do-Yoon Kang***

**I DO NOT have a financial conflicts of interest  
to disclose concerning the presentation**

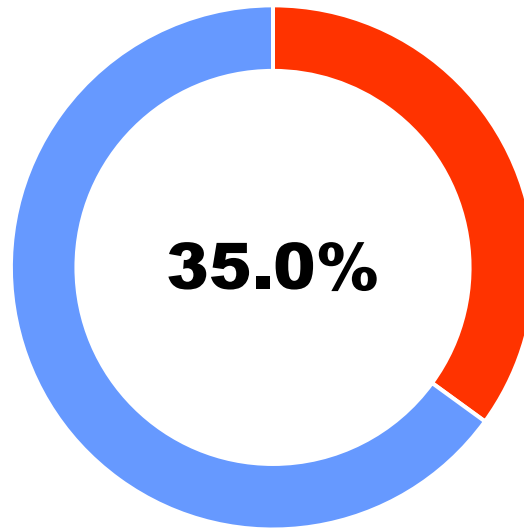
# Two Stent Technique in Randomized Trials

PRECOMBAT Trial



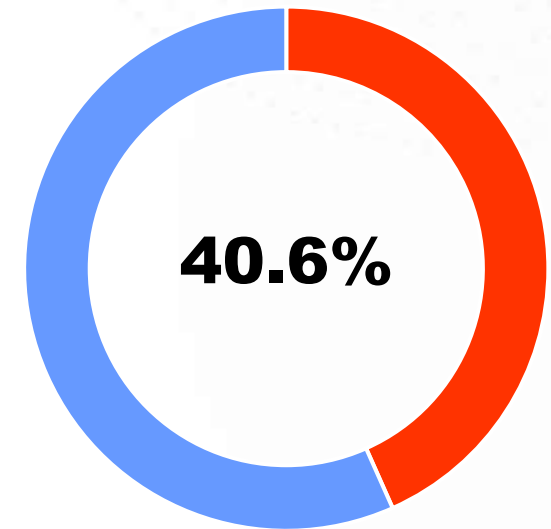
Crush Technique

EXCEL Trial



T Stenting

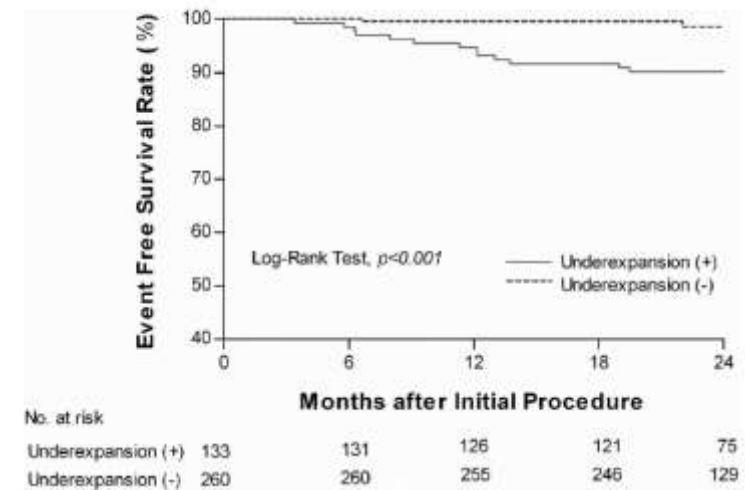
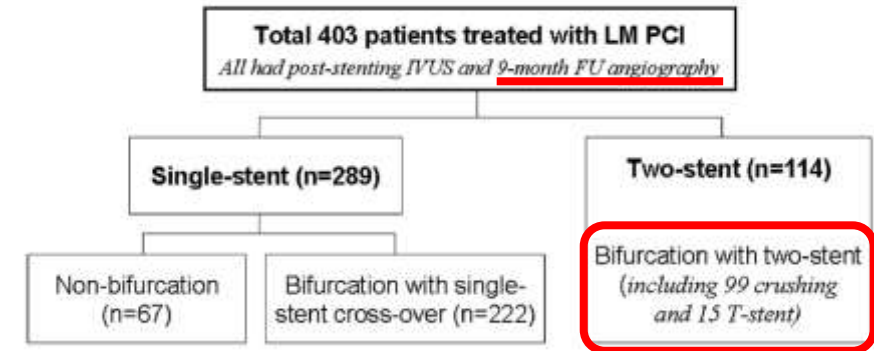
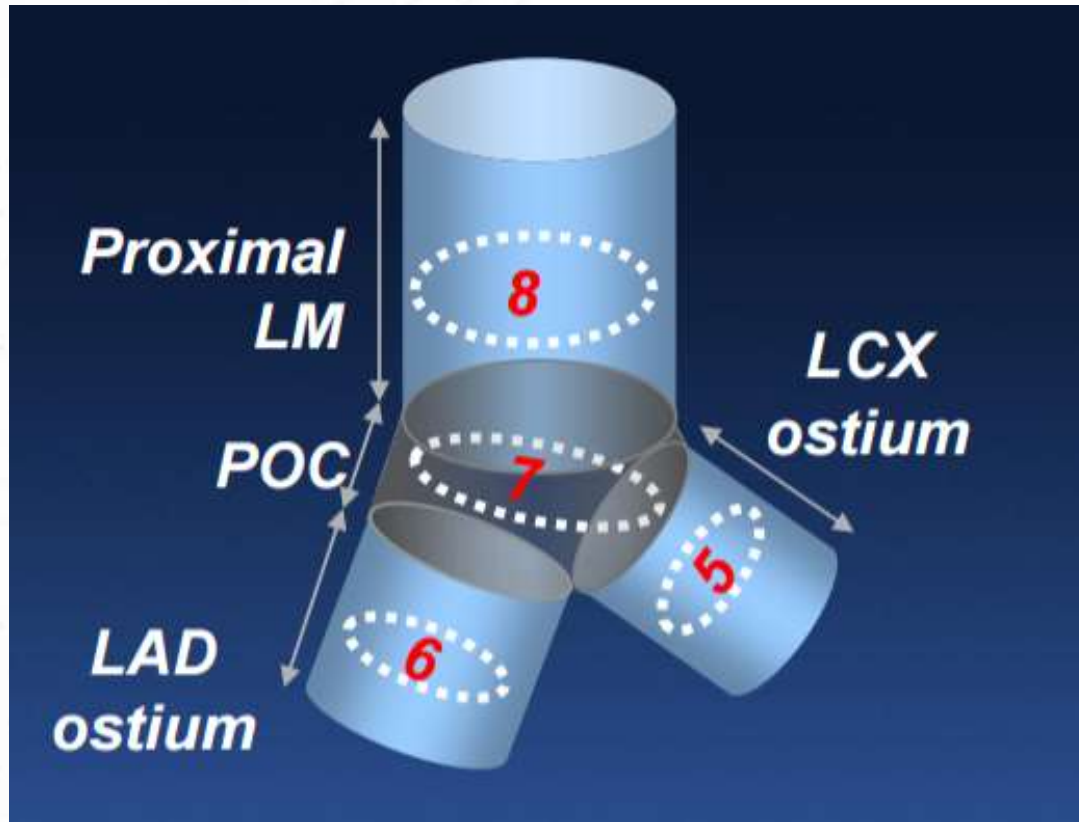
NOBLE Trial



Culotte

# LM IVUS MSA Criteria

## Asan Medical Center Criteria



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

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

292 Patients

- Treated By Crush Technique
- Complete IVUS Imaging

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

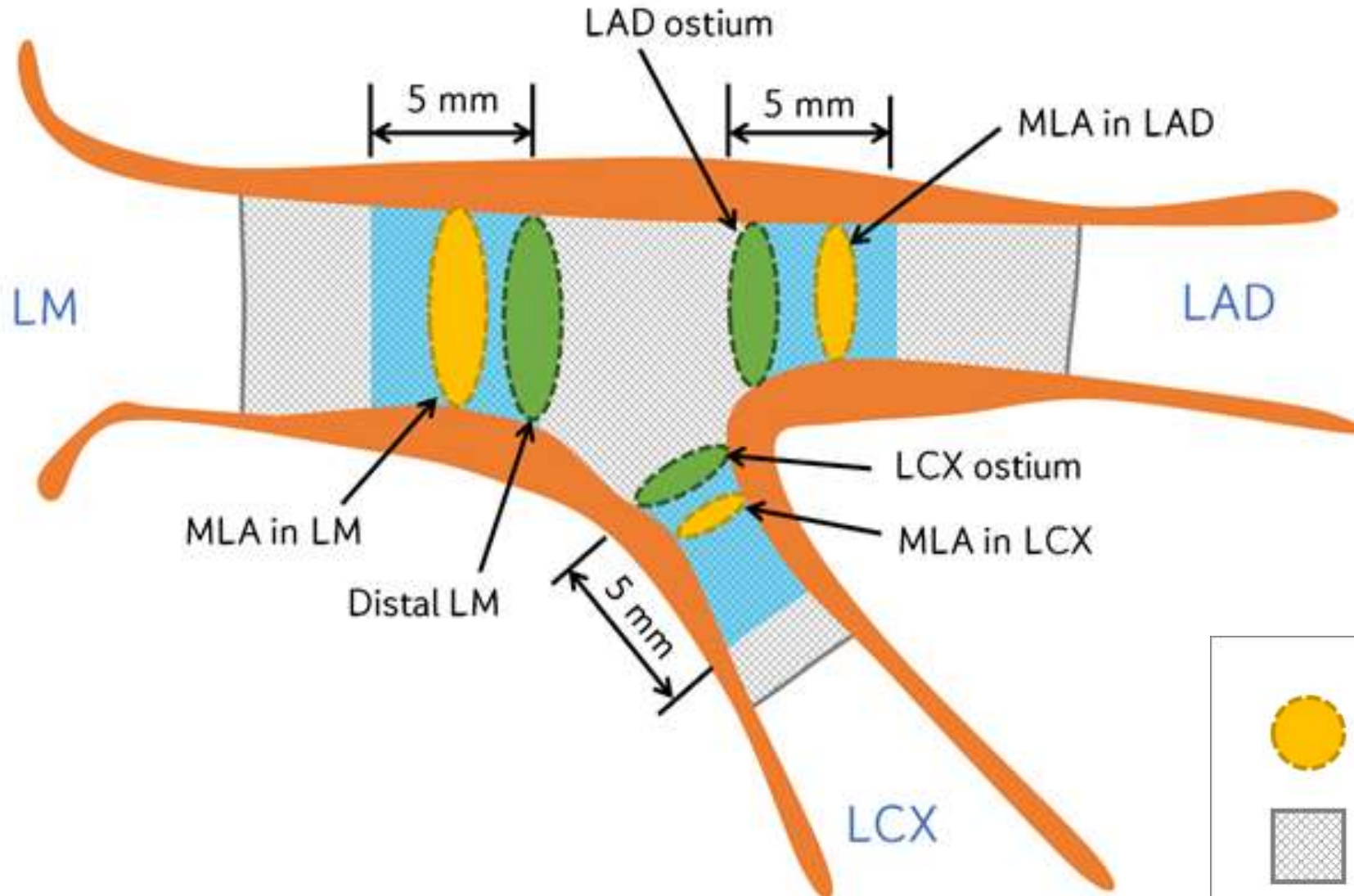
88 patients without IVUS-guidance


18 patients without poststenting IVUS from LAD-pullback

61 patients without poststenting IVUS from LCX-pullback

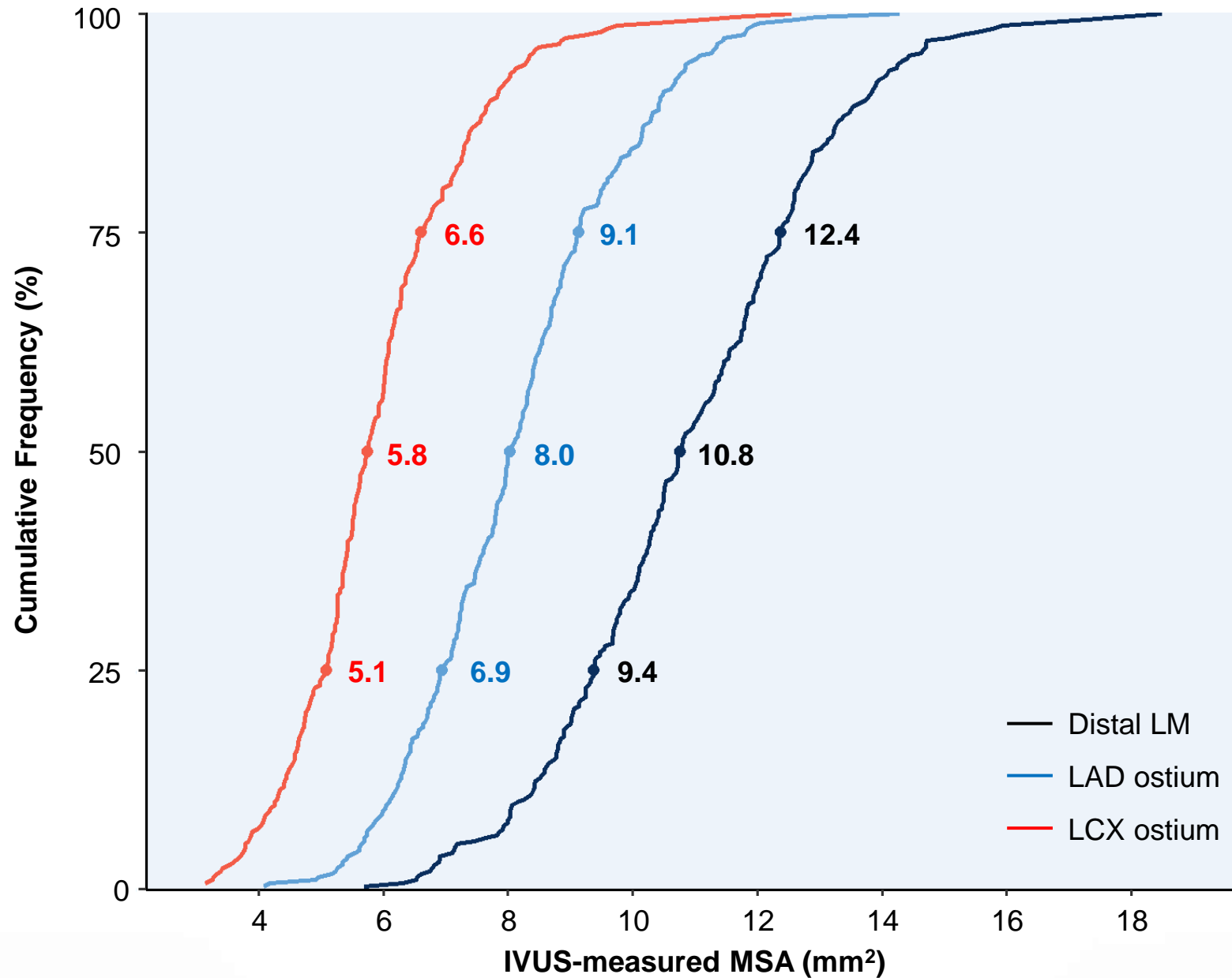
Patients who underwent two-stent PCI with crush technique and had complete poststenting IVUS images from both LAD and LCX pullback (N=292)

# Distribution of MSA



-  MSA in each segment
-  Stenting region

# Distribution of MSA



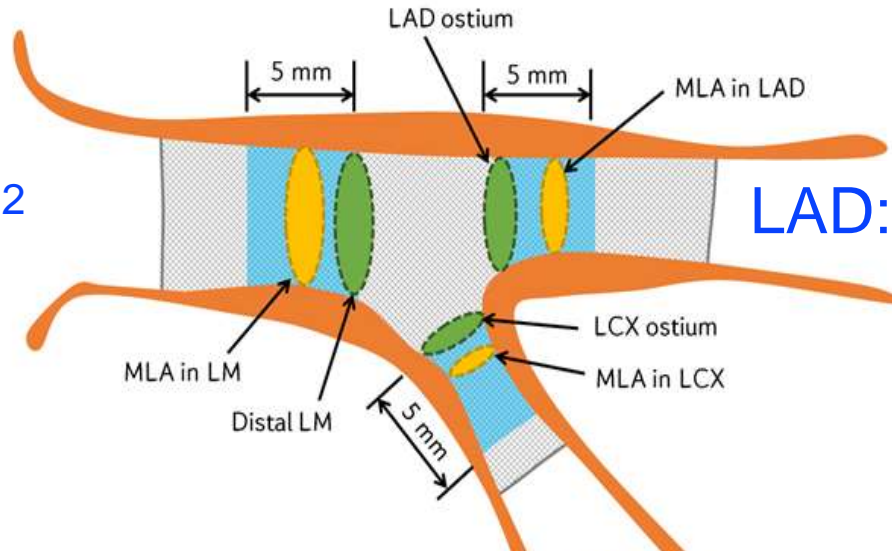


# ROC Curve Analysis

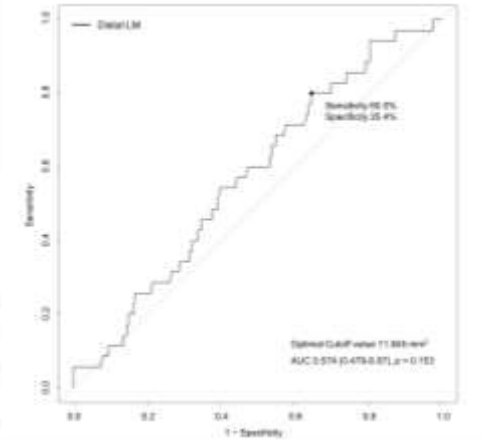
LM: 11.8 mm<sup>2</sup>

LAD: 8.3 mm<sup>2</sup>

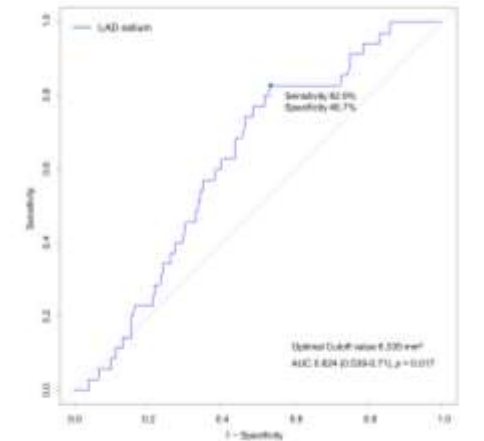
LCX: 5.7 mm<sup>2</sup>



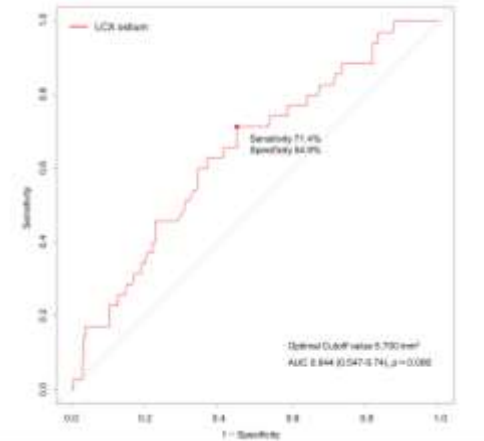
LM



LAD



LCX

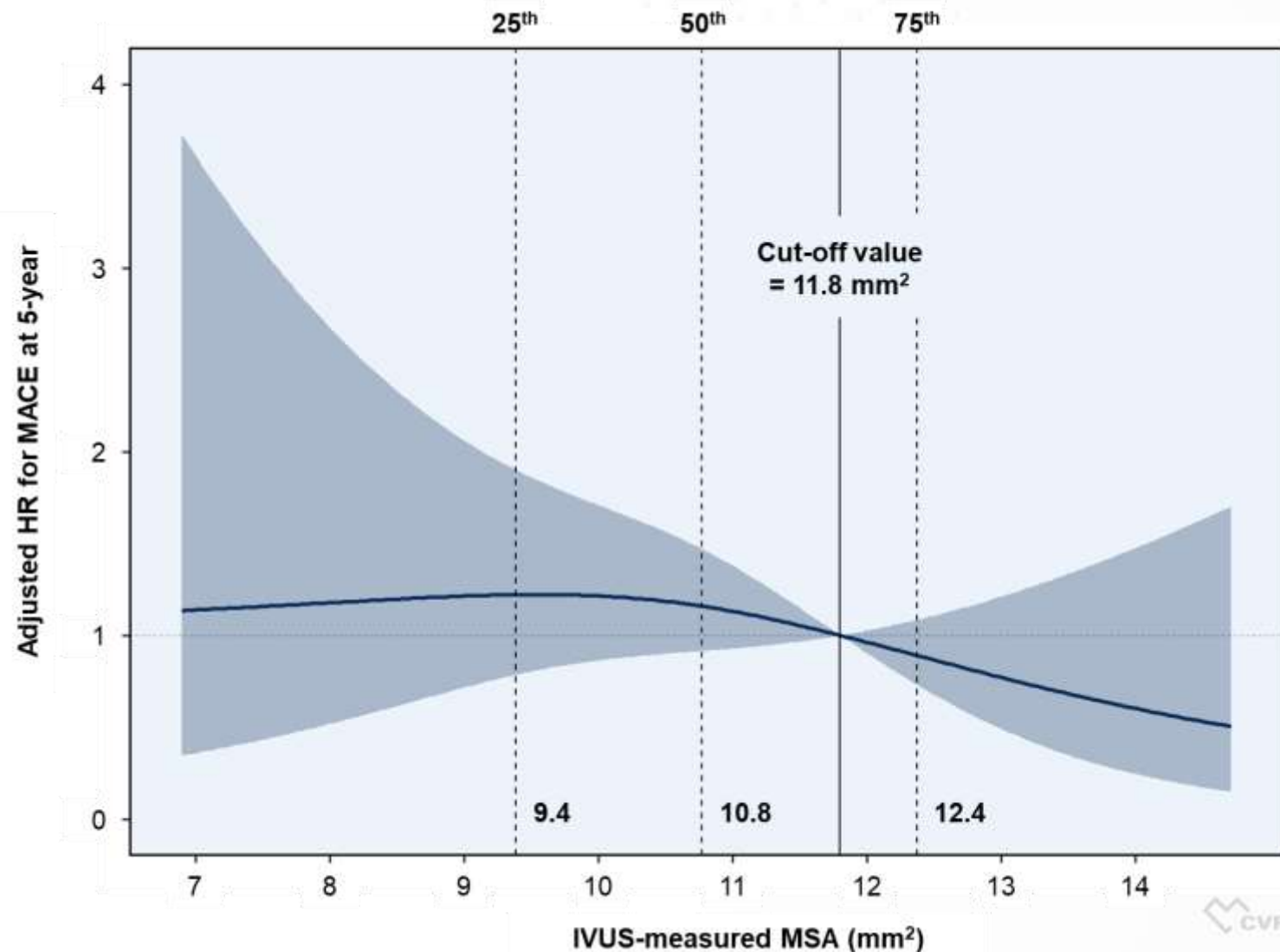
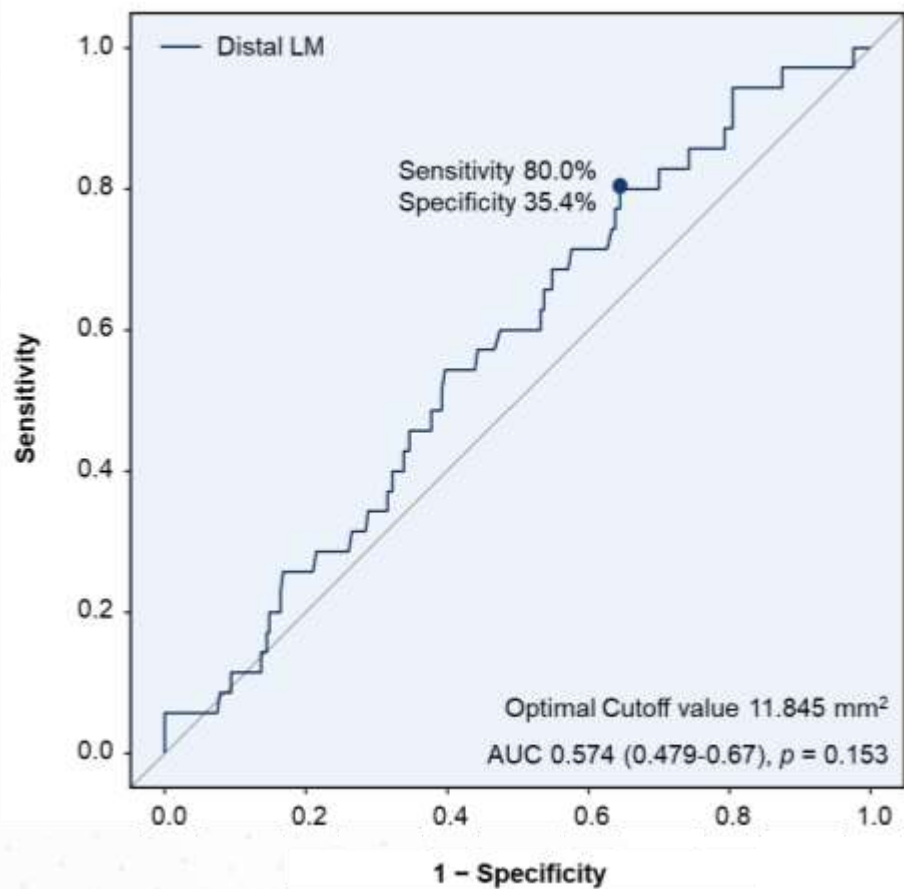


	Cutoff point	AUC (95% CI)	Sensitivity	Specificity	P value
<b>IVUS-measured MSA (mm<sup>2</sup>)</b>					
Distal LM	11.8	0.57 (0.48–0.67)	80.0%	35.4%	0.153
LAD ostium	8.3	0.62 (0.54–0.71)	82.9%	46.7%	0.017
LCX ostium, by LCX pullback	5.7	0.64 (0.55–0.74)	71.4%	54.9%	0.006



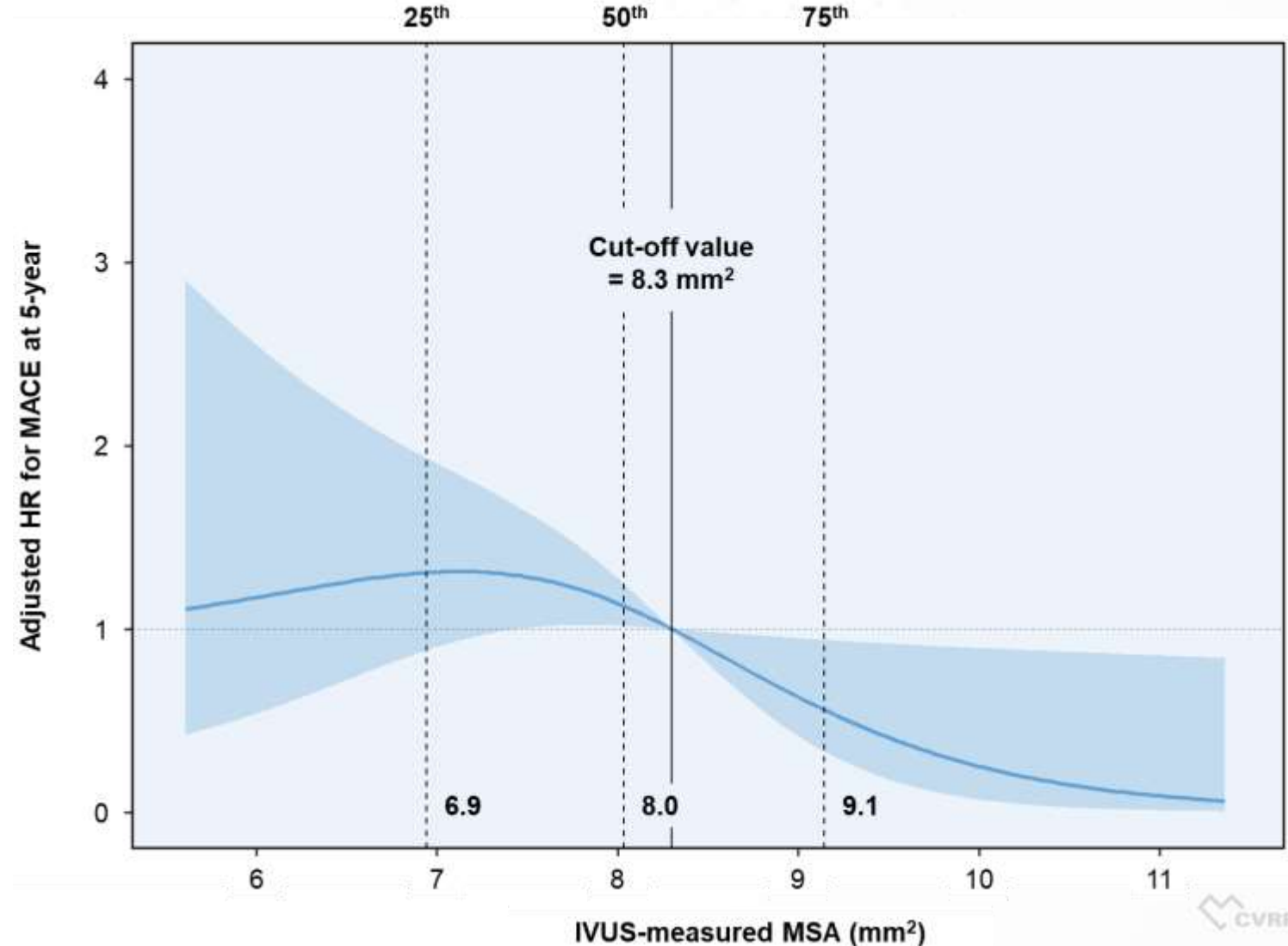
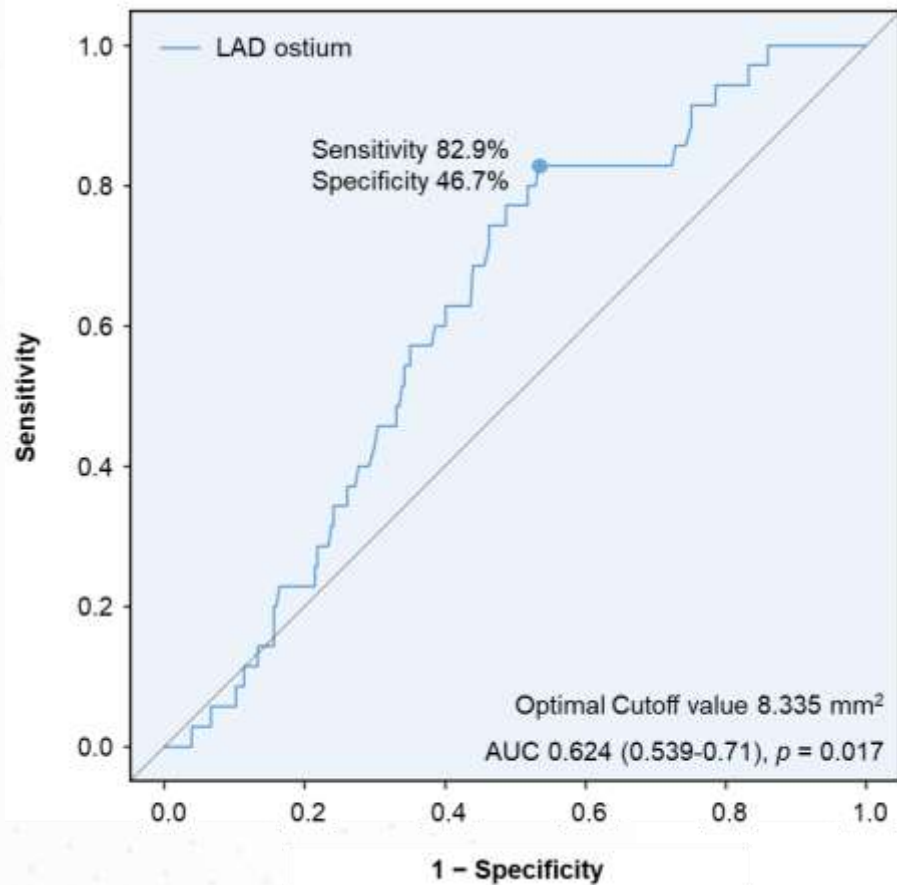
# Relationship between LM MSA and Events

At 5 Years, 35 MACEs



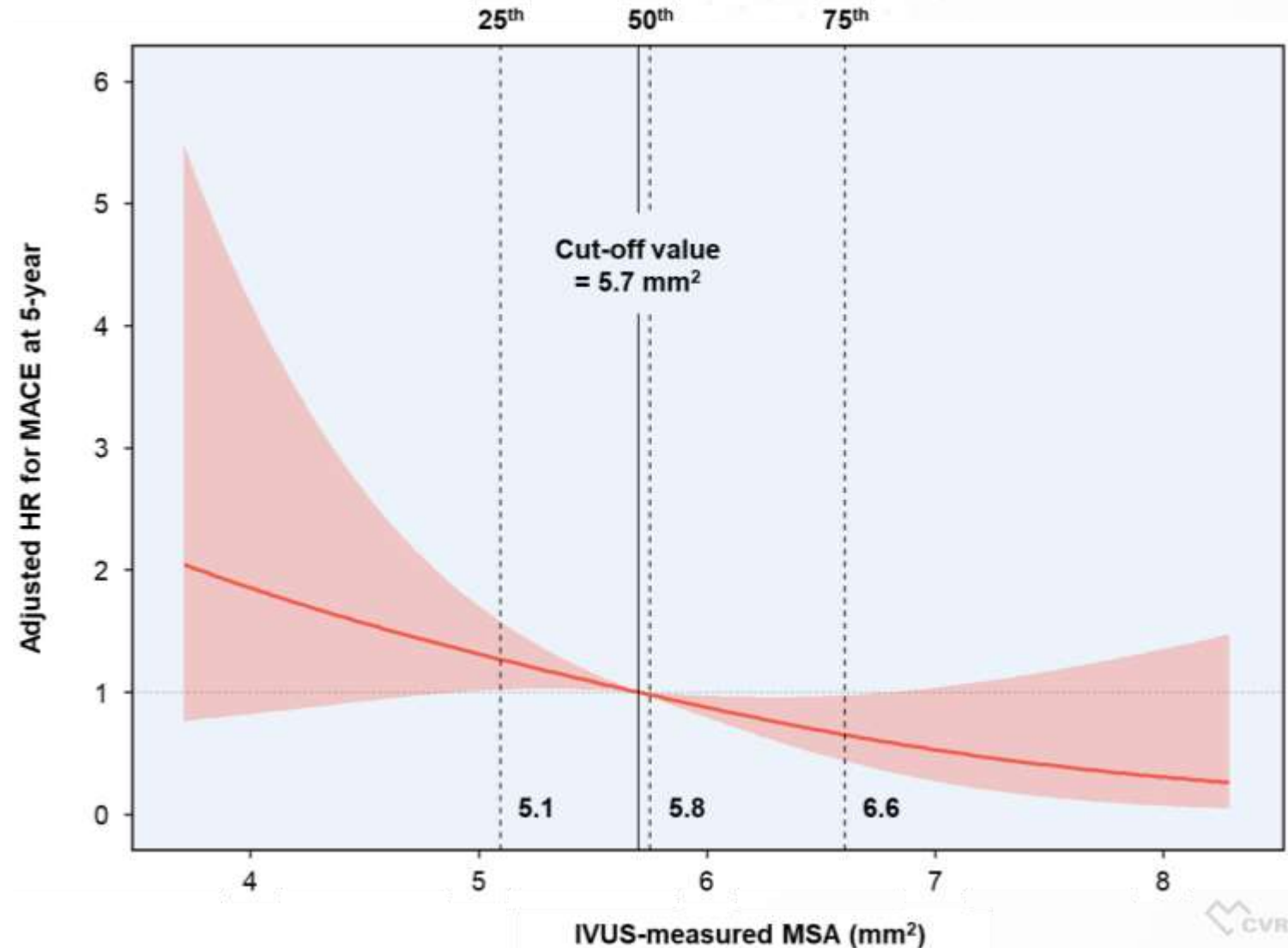
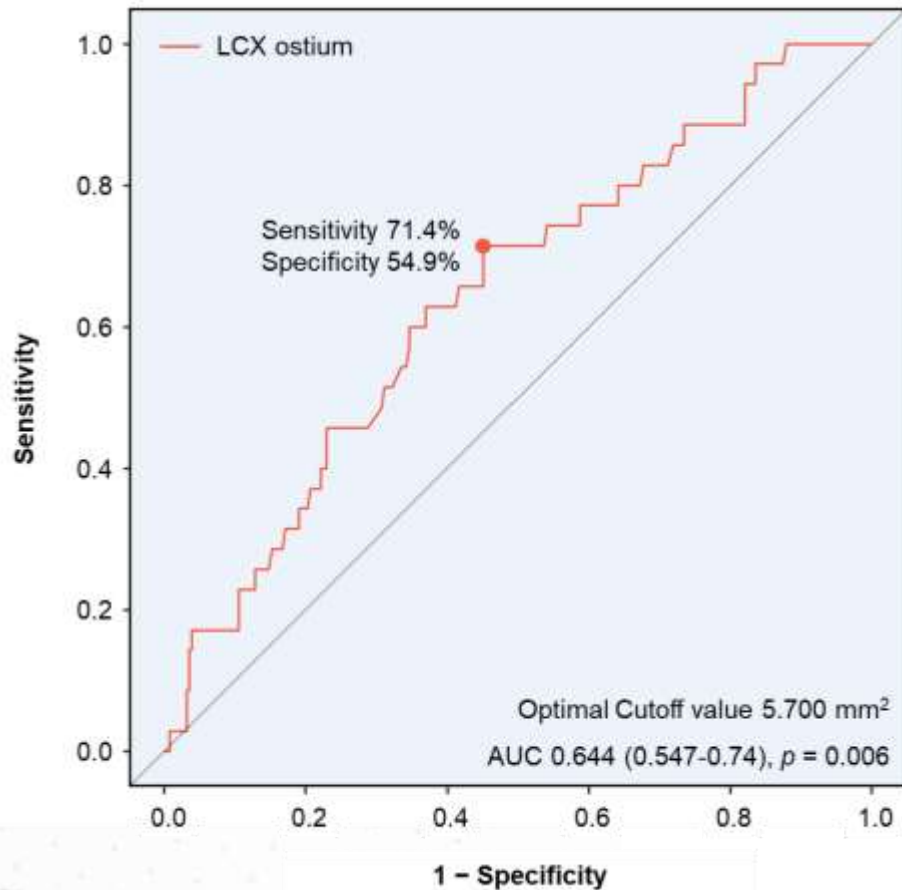
# Relationship between LAD ostial MSA and Events

At 5 Years, 35 MACEs



# Relationship between LCX ostial MSA and Events

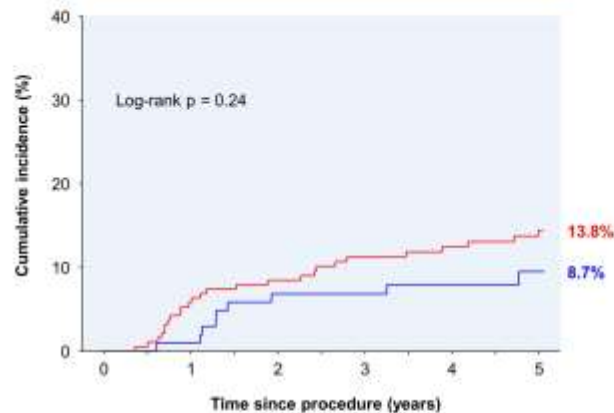
At 5 Years, 35 MACEs



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

A

### Major Adverse Cardiac Events

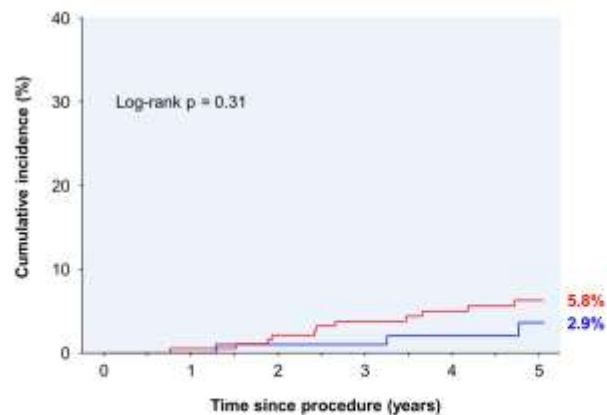


No. at risk

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

D

### All-Cause Death



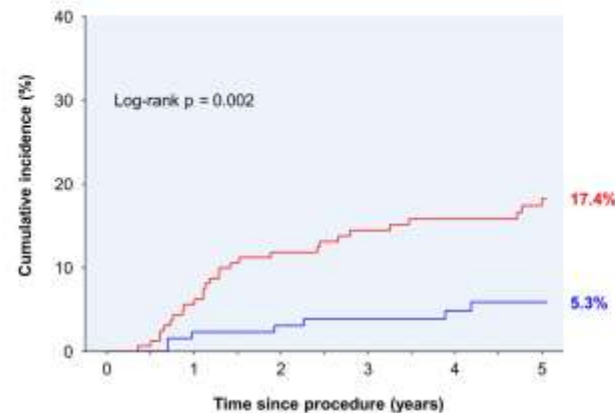
No. at risk

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%

B

### Major Adverse Cardiac Events

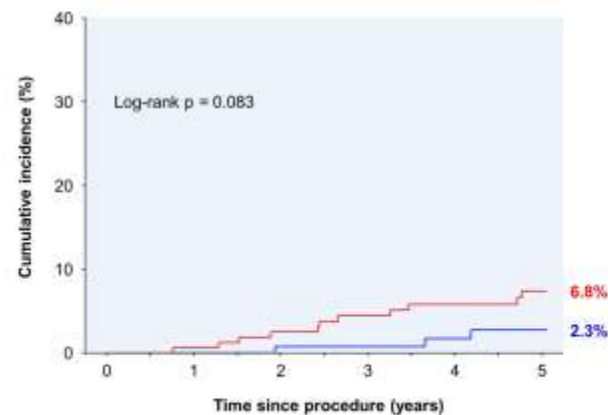


No. at risk

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

E

### All-Cause Death



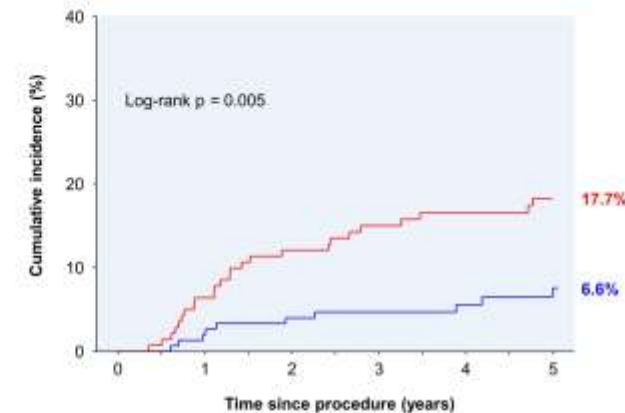
No. at risk

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%

C

### Major Adverse Cardiac Events

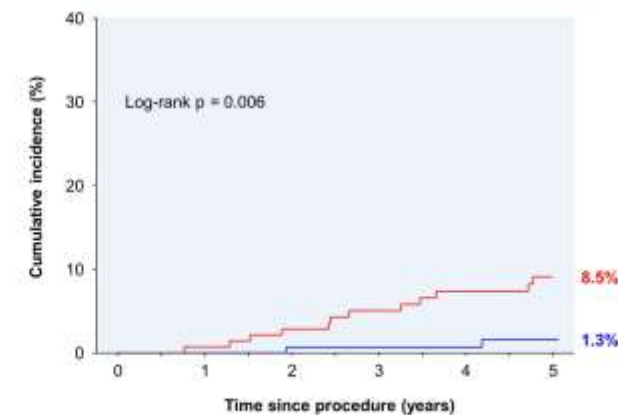


No. at risk

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

F

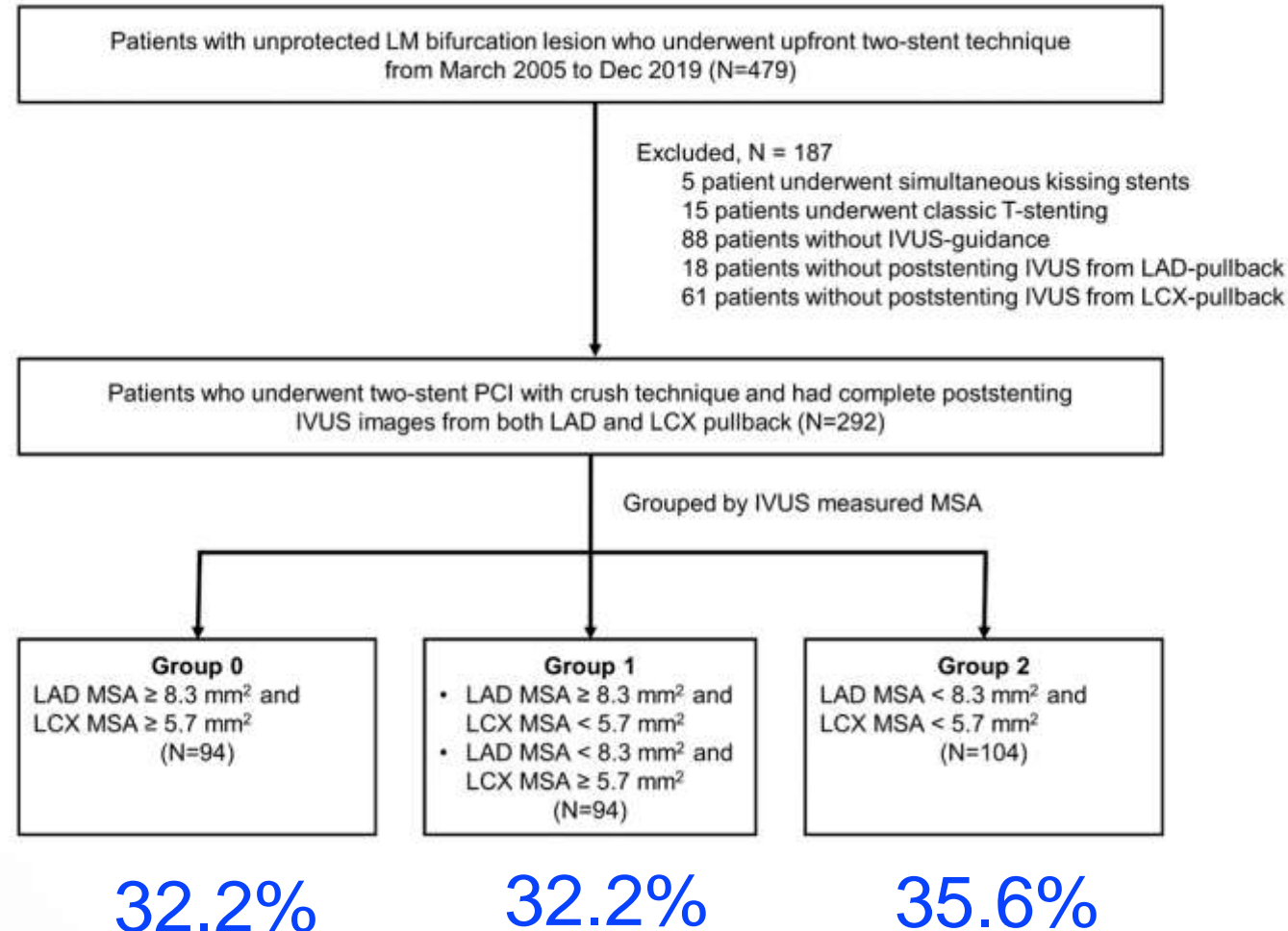
### All-Cause Death



No. at risk

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

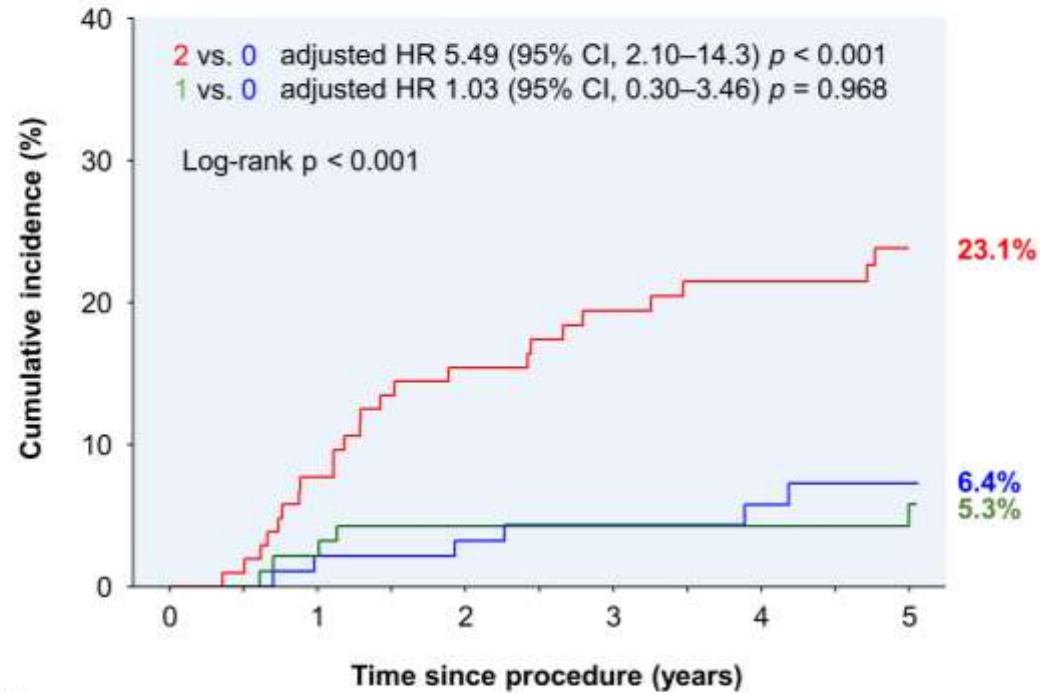




# Incidence of Under-expansion of LM Segments and Outcomes

**A**

## Major Adverse Cardiac Events

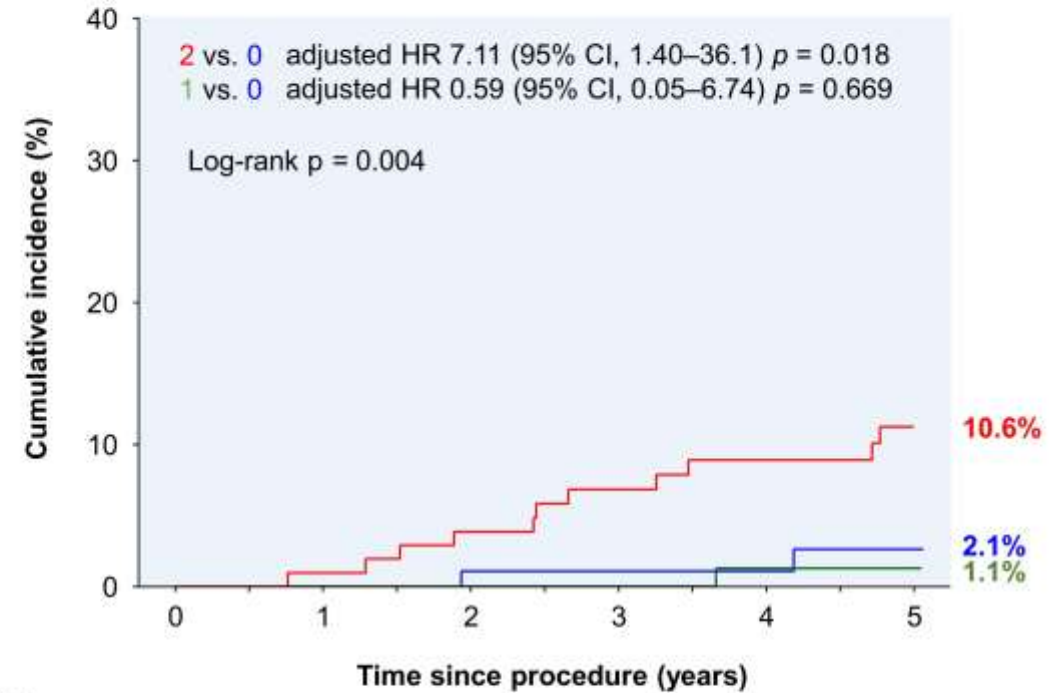


### No. at risk

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

**B**

## All-Cause Death

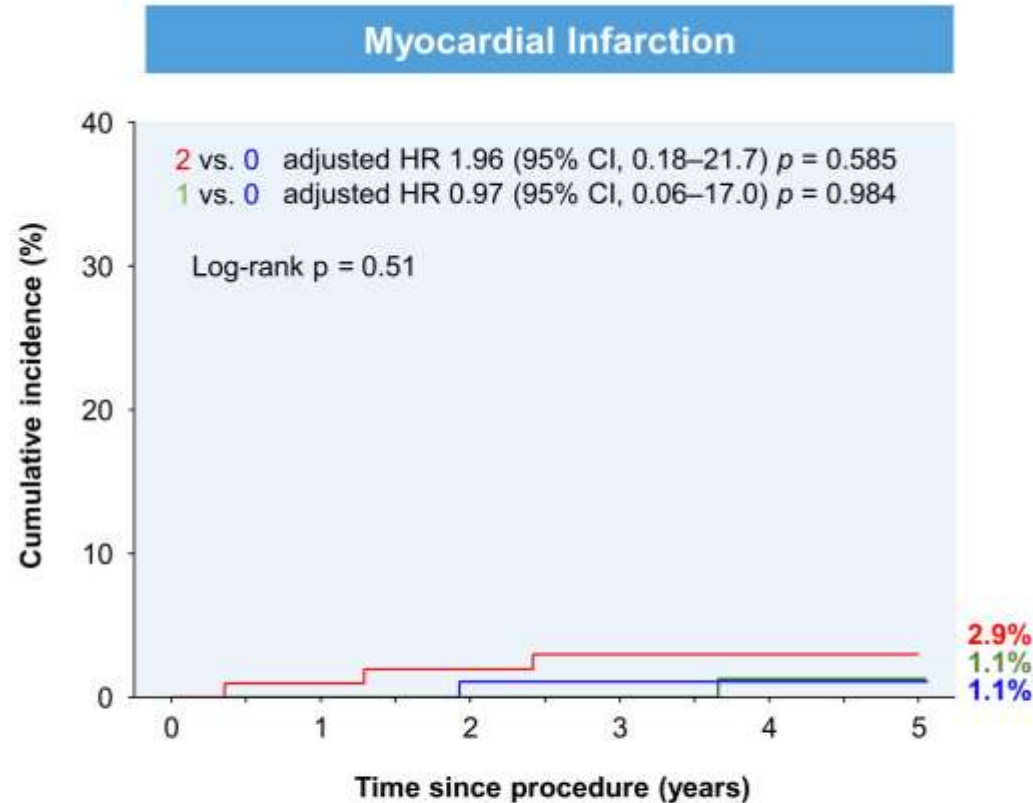


### No. at risk

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

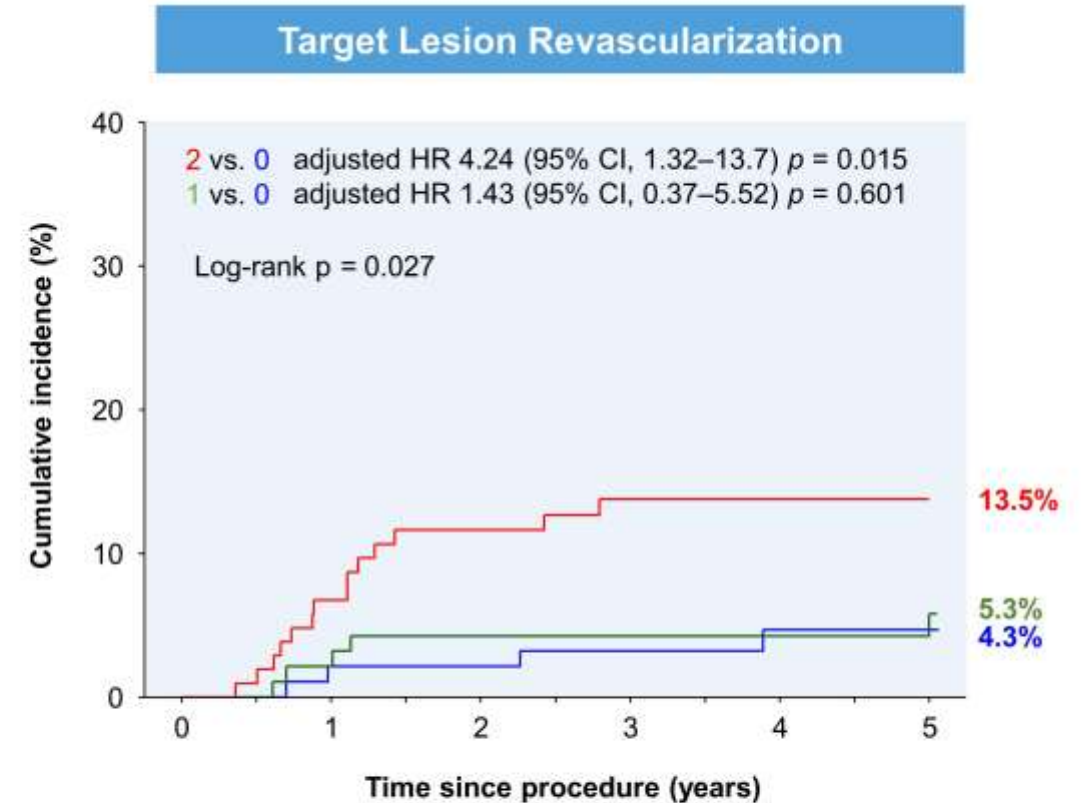
C



**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

D



**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



# Summary : Optimal MSA for LM Crush Technique

- In patients underwent LM upfront two-stenting with the crush technique, the stent under-expansion in the LAD ( $< 8.3 \text{ mm}^2$ ) and LCX ( $< 5.7 \text{ mm}^2$ ) ostium were significantly associated with the risk of 5-year MACE.
- Patients with stent under-expansion of both the LAD and LCX ostium showed the highest rate of 5-year MACE and all-cause death.
- Obtaining a sufficiently large MSA could be pivotal in preventing adverse clinical events, therefore, operators should make the best effort to achieve a sufficiently large MSA under IVUS guidance.