18TH CARDIOVASCULAR SUMMIT
TCTAP2013
APRIL 23-26
COEX, SEOUL, KOREA

Left Main Stem Intervention : What does the data currently indicate?

Interesting cases from Malaysia

'Malaysia Live' – Interventional Cardiac Society of Malaysia

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23rd. April, 2013

Disclosure

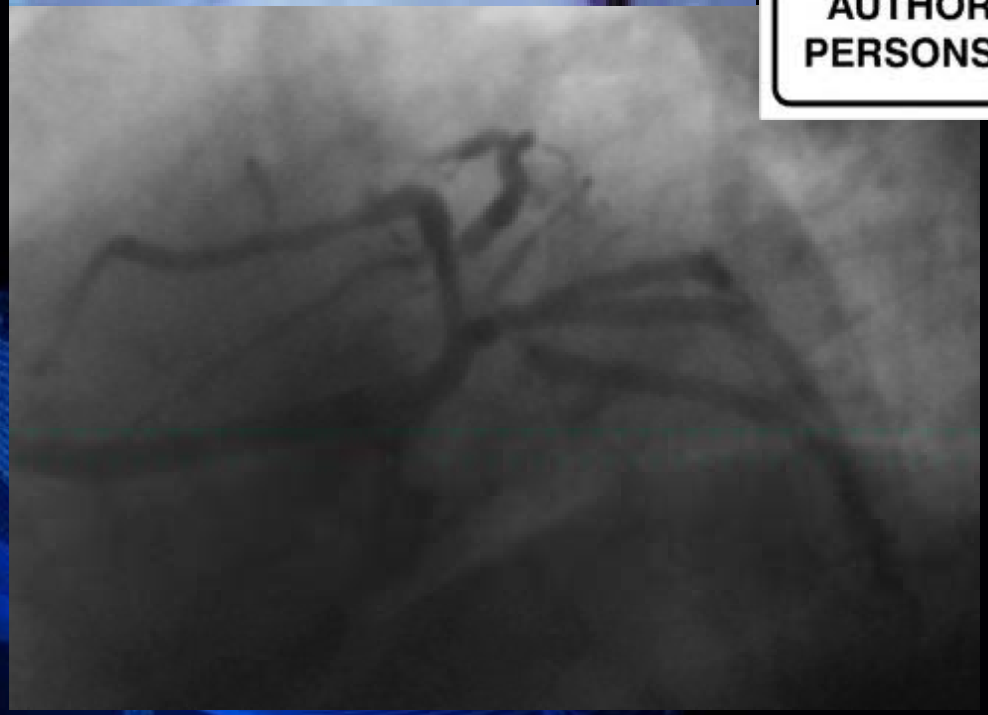
- Speaking & Faculty honorariums from Novartis, MSD, Roche, Solvay Pharma, Xepa-Soul Pattinson, Servier, Sanofi, Cordis J&J, Astra Zeneca, Lilly, Medtronic, Biosensor, Terumo
- No share ownership in any pharmaceutical companies
- No conflict of interest with reference to this lecture or meeting

Sypnosis

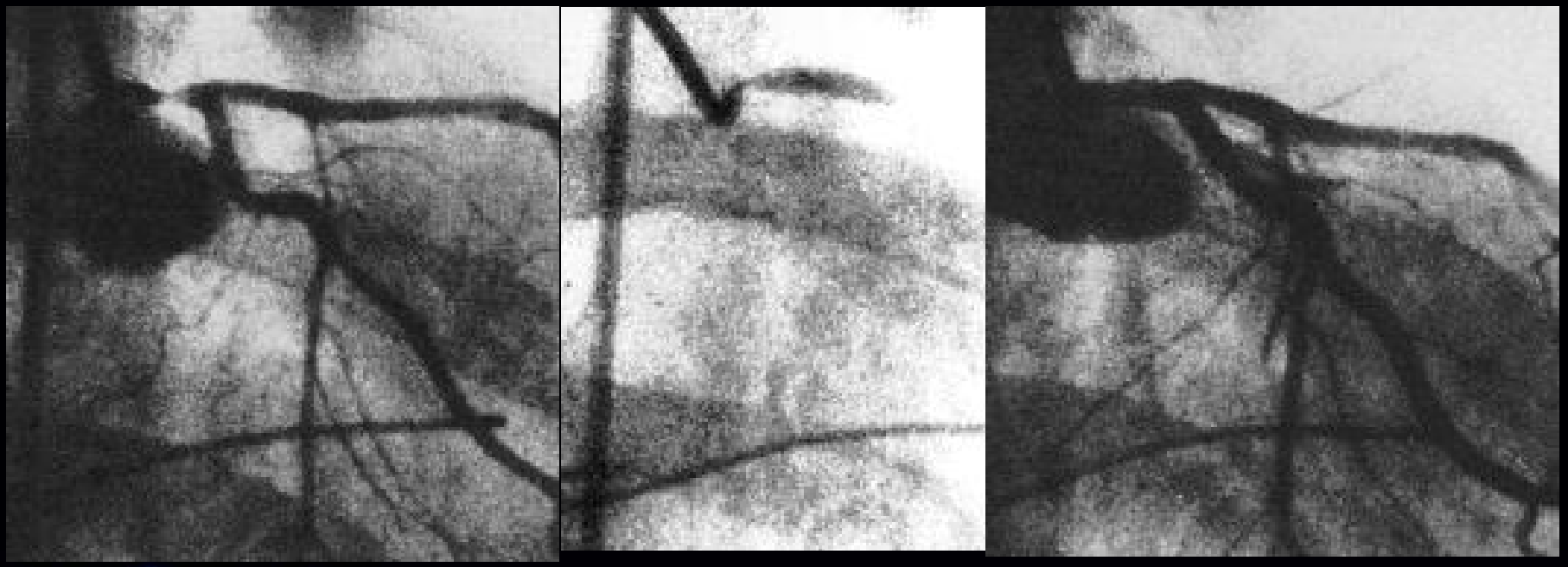
- Evidence for LMCA PCI vs CABG – Current Data RCT & Meta-analyses : Selection of patients for PCI
- Technical Issues: BMS vs DES, New vs Old DES, Single vs 2-stent Techniques, Kissing Balloon Inflation
- Optimisation of LM PCI Results : IVUS, FFR
- Malaysia NCVD – PCI Registry : LM Intervention
- Summary


NO
ENTRY


NO ENTRY
AUTHORISED
PERSONS ONLY



Andreas Gruentzig's Log Book : 3rd. PCI case



"Third PCI patient ever treated. Forty-three year old man with severe angina pectoris since September, 1977. First angiogram (November 11) revealed severe stenosis of the main L.C.A. . ."
Note: The patient expired suddenly about 4 months after this procedure.

Gruntzig A. Lancet 1978;1:263.

Since 1994 :

1994

1998

2008

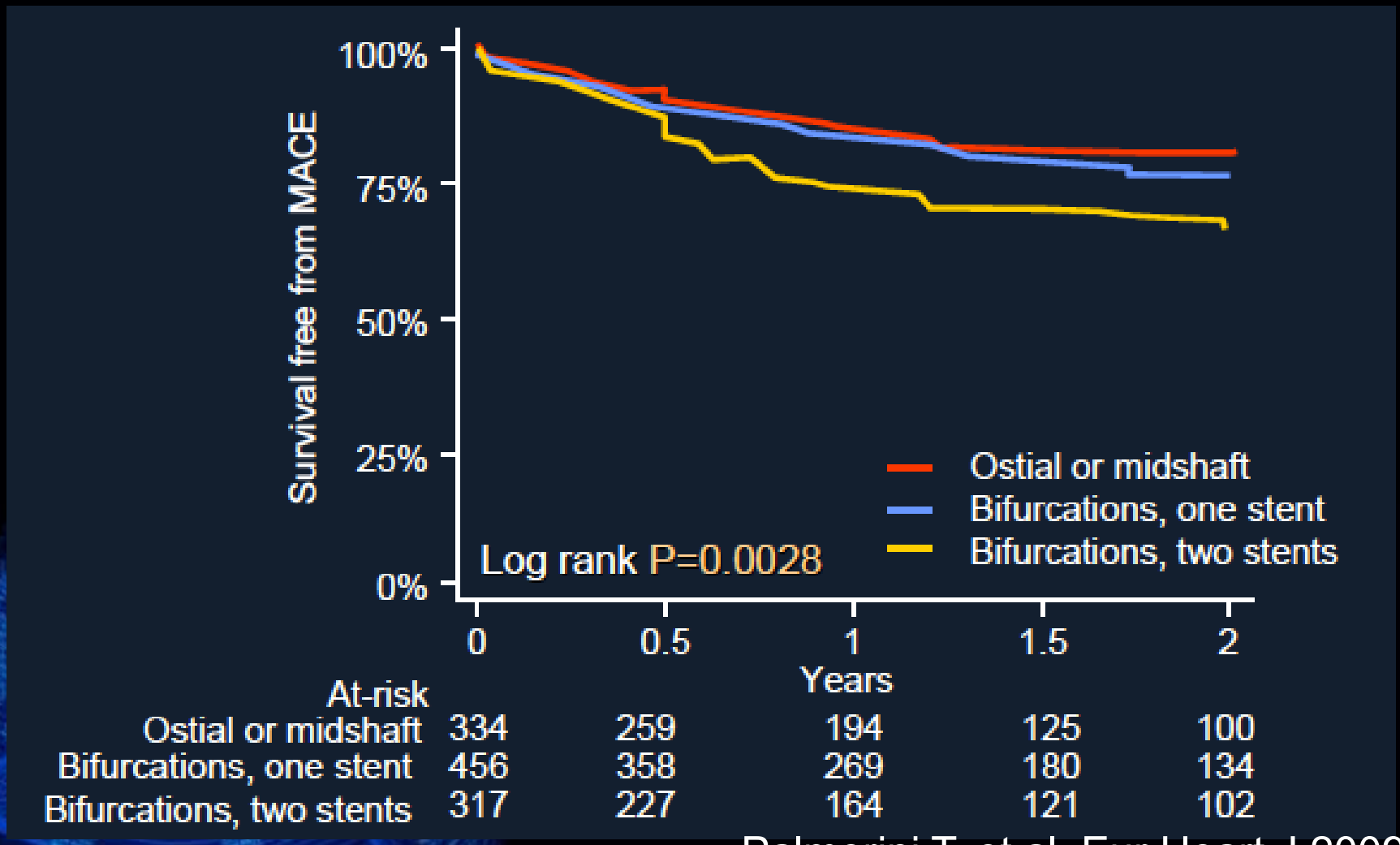
2011
2012

- Started BMS in Unprotected LM disease,
- J Am Coll Cardiol 1998;31:37-42 : Early experience,
- Am J Cardiol 1998;82:670-3 : IVUS analysis
- J Am Coll Cardiol 2001;38:1054-60 : Role of debulking
- Circulation 2001;104:1609-1614 : ULTIMA registry
- Am J Cardiol 2002;90:374-8 : Bifurcation stenting
- Am J Cardiol 2003;91:12-6 : Long-term outcome
- Clin Cardiol 2004;27:393-5 : Bail-out stenting
- Int J Cardiol 2004;97:73-6 : Acute MI
- JACC 2005;45:351-6 : SES stenting.
- Am J Cardiol 2006;98:1567-1570 : EuroSore evaluation
- Int J of Cardiology 2007. 208-213 : 5 year F/U data
- Cathter Cardio Interv 70:840-846, 2007: Kissing stent technique long-term
- NEJM. 2008 Apr 24;358(17):1781-92. MAIN COMPARE registry
- JACC, ASAN-MAIN registry, MAIN-COMPARE 5-year results
- NEJM, 2011 May 5;364(18):1718-27. PRECOMBAT, Randomized Study of PCI vs.CABG
- Circulation. Cardiovascular Interventions. 2010 Apr;3(2):127-33, Major Predictor of Outcomes
- Journal of the American College of Cardiology. 2010 Oct 19;56(17):1366-75, 5-10 years Longterm
- JACC. Cardiovascular Interventions. 2011 Nov;4(11):1168-74, New IVUS MLA of LM, 4.8 mm2
- Circulation. Cardiovascular Interventions. 2011 Dec 1;4(6):562-9, Stent Optimization
- Catheterization and Cardiovascular Interventions. 2011 Jul 29, IVUS POC Concept
- Circulation. Cardiovascular Interventions. 2011 Aug 1;4(4):355-61, Geometric Changes after Single Stent Cross Over
- Circulation Journal. 2011 Apr;75(4):749-55. Review
- Journal of the American College of Cardiology. 2011 Mar 22;57(12):1349-58 , LM DES-ISR
- Catheterization and Cardiovascular Interventions. 2011 Apr;1:77:775-782, 1 vs. 2 stents in LM
- The American Journal of Cardiology. 2011 Feb 1;107(3):367-73 ,MLA of POC influenced Severity of LM disease
- JACC. Cardiovascular Interventions. 2012 Jul;5(7):708-17, PRECOMBAT2,
- Catheterization and Cardiovascular Interventions. 2012 Aug 1;80(2):206-12. Os and Shaft lesion Long-term, MAIN COMPARE,
- Circulation. Cardiovascular Interventions. 2012 Aug 7,PCI vs.CABG in DM
- Current Treatment options in Cardiovascular Medicine. 2012 Feb;14(1):108-16. Review

>1200 Left Main PCI, 42 Publications.

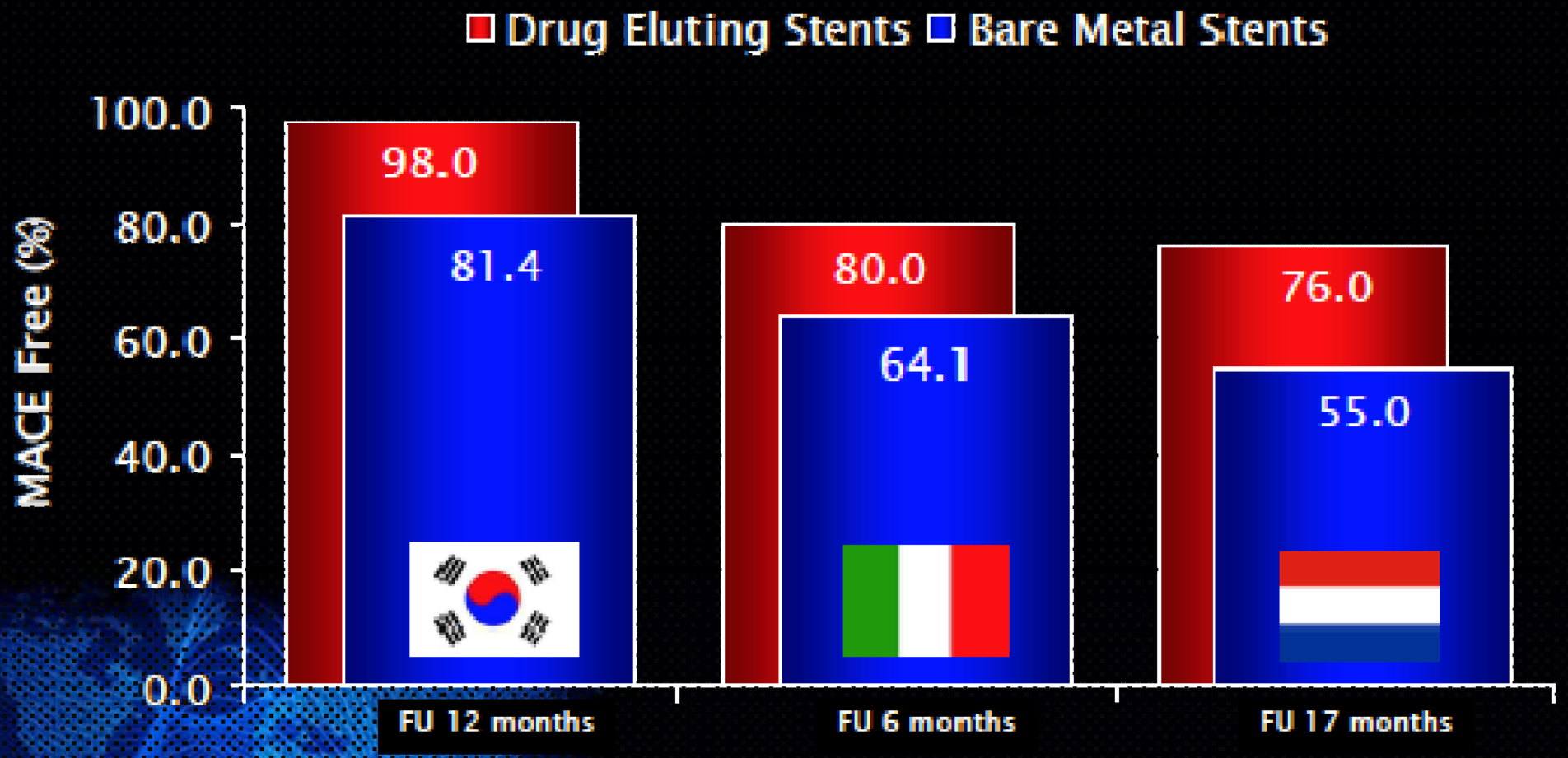
Ostial and Mid-shaft vs. Bifurcation in LMCA PCI: GISE-SICI

1111 patients treated with DES; 2 year follow-up



Palmerini T, et al. Eur Heart J 2009

BMS vs DES in LM PCI: MACE



DES better than BMS

Park S-J. J Am Coll Cardiol 2005;45:351-356

Valgimigli M. Circ 2005;111:1383-1389

Chieffo. Circ 2005;111:791-795

MAIN-COMPARE Registry :

DES PCI vs CABG for LM CAD

(N=2240, Stent 1102, CABG 1139, Propensity Matched Pair 542)

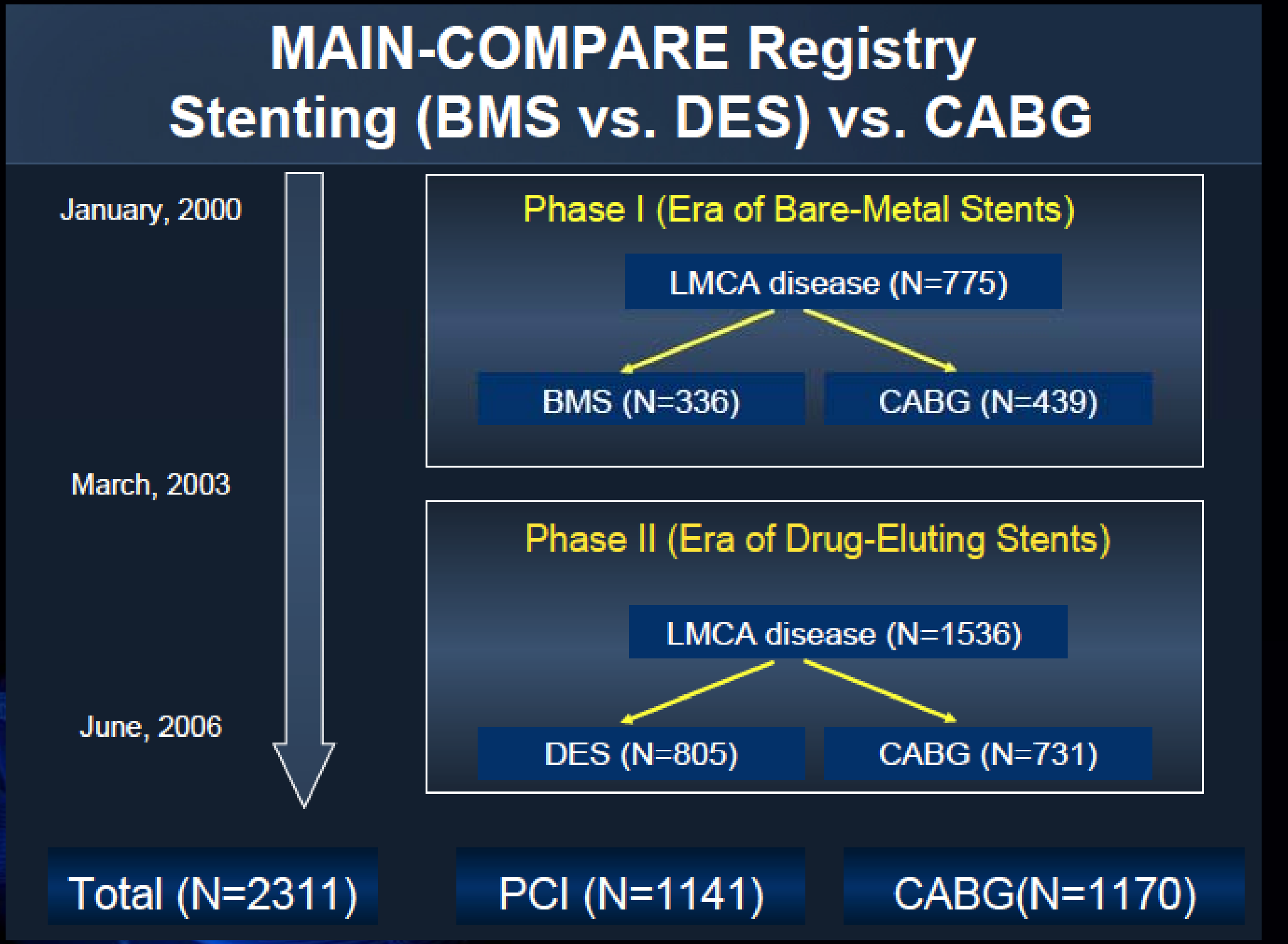
ORIGINAL ARTICLE

Stents versus Coronary-Artery Bypass Grafting for Left Main Coronary Artery Disease

Ki Bae Seung, M.D., Duk-Woo Park, M.D., Young-Hak Kim, M.D., Seung-Whan Lee, M.D., Cheol Whan Lee, M.D., Myeong-Ki Hong, M.D., Seong-Wook Park, M.D., Sung-Cheol Yun, Ph.D., Hyeon-Cheol Gwon, M.D., Myung-Ho Jeong, M.D., Yangsoo Jang, M.D., Hyo-Soo Kim, M.D., Pum Joon Kim, M.D., In-Whan Seong, M.D., Hun Sik Park, M.D., Taehoon Ahn, M.D., In-Ho Chae, M.D., Seung-Jea Tahk, M.D., Wook-Sung Chung, M.D., and Seung-Jung Park, M.D.

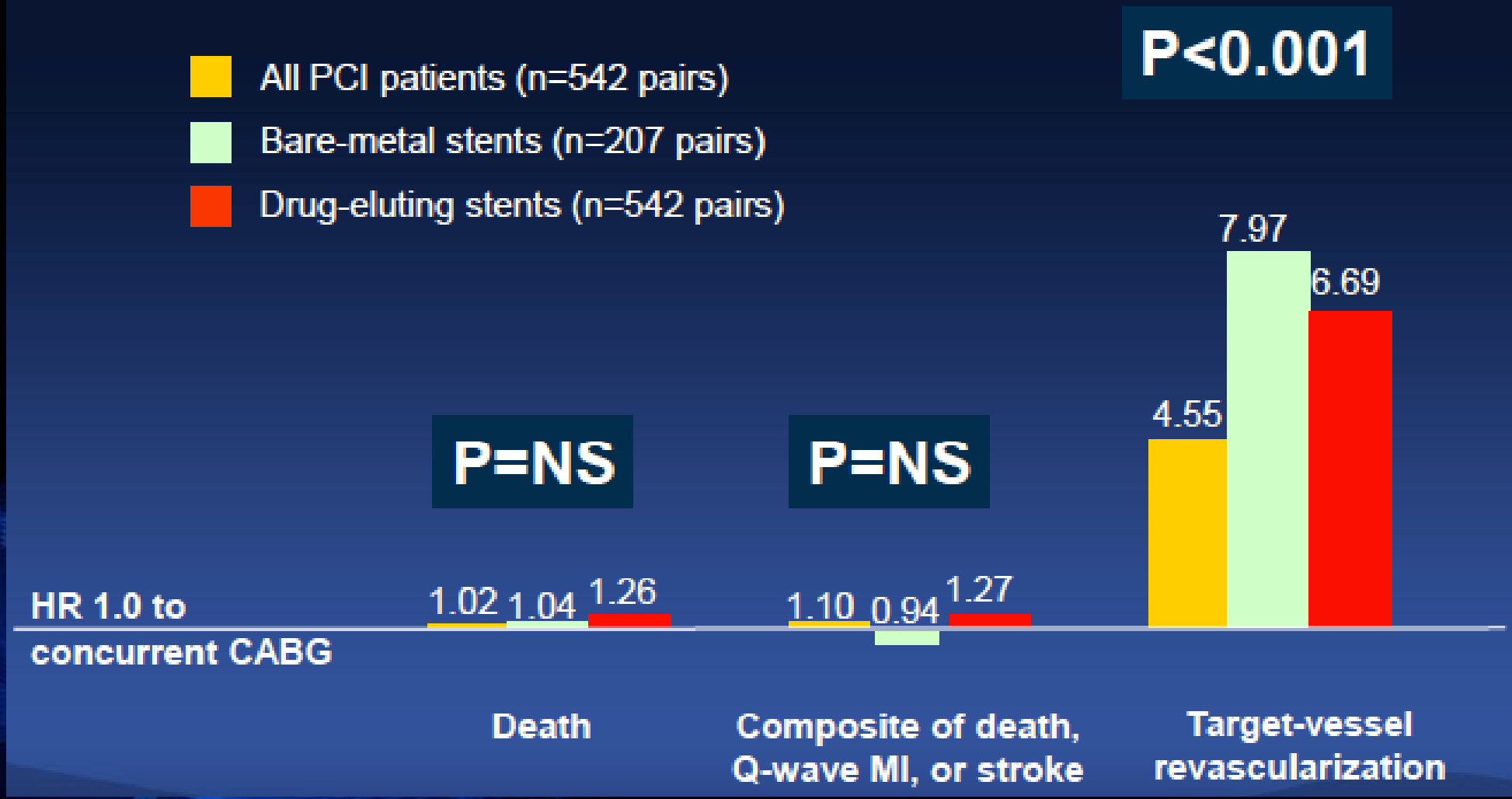
NEJM 2008;358:1781-92

MAIN-COMPARE Registry
Stenting (BMS vs. DES) vs. CABG



Hazard Ratios for Clinical Outcomes

Median 5-Year Outcomes



Park DW, et al. JACC 2010;56:117-24

PCI vs. CABG for Left Main Disease

Meta-analysis of 4 RCTs.

N=1,611 pts

Trial	LEMANS	SYNTAX LM	Boudriot et al.	PRECOMBAT
Year	2008	2009	2010	2011
N total	105	705	201	600
Age, mean years	61	65	68	62
Male	67%	74%	75%	77%
Diabetes	18%	25%	36%	32%
Distal LM involved	58%	61%	71%	65%
+0/1/2/3 VD, %	0/9/23/68	13/20/31/36	29/31/27/14	10/17/32/41
Syntax Score, mean	25	30	24	25
Log Euroscore, mean	3.4	3.9	2.5	2.7
LIMA-LAD	81%	97%	99%	94%

Capodanno et al, *JACC* 2011;58:1426-32

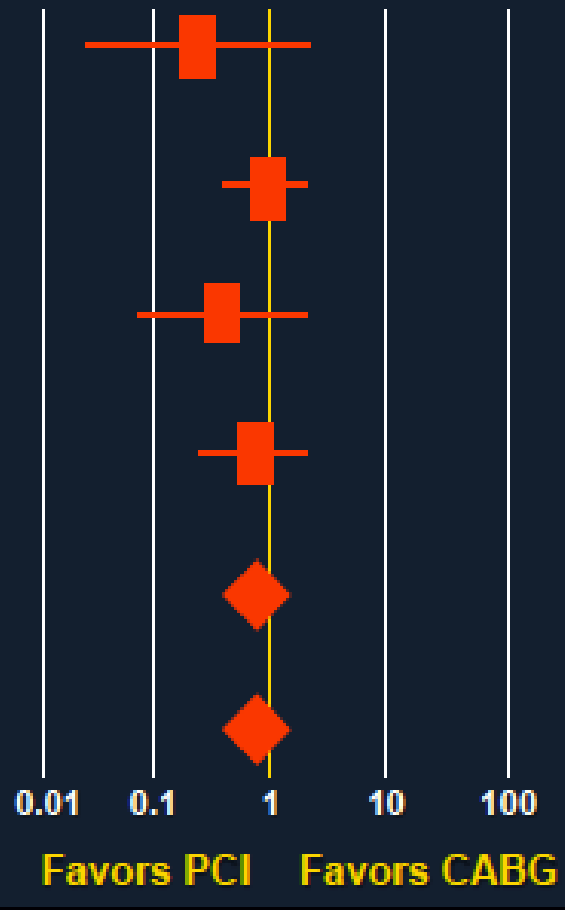
PCI vs. CABG for Left Main Disease

Meta-analysis of 4 RCTs.

1 year mortality

	PCI	CABG	OR (95%CI)	*p*-Value
LEMANS	1/52	4/53	0.24 (0.03-2.23)	0.21
SYNTAX left main	15/355	15/336	0.94 (0.45-1.96)	0.88
Boudriot et al.	2/100	5/101	0.39 (0.07-2.07)	0.27
PRECOMBAT	6/300	8/300	0.75 (0.26-2.17)	0.59
Fixed effects estimate	3.0% (24/807)	4.1% (32/790)	0.74 (0.43-1.28)	0.29
Random effects estimate			0.74 (0.43-1.28)	0.29

I^2=0%



Capodanno et al, *JACC* 2011;58:1426-32

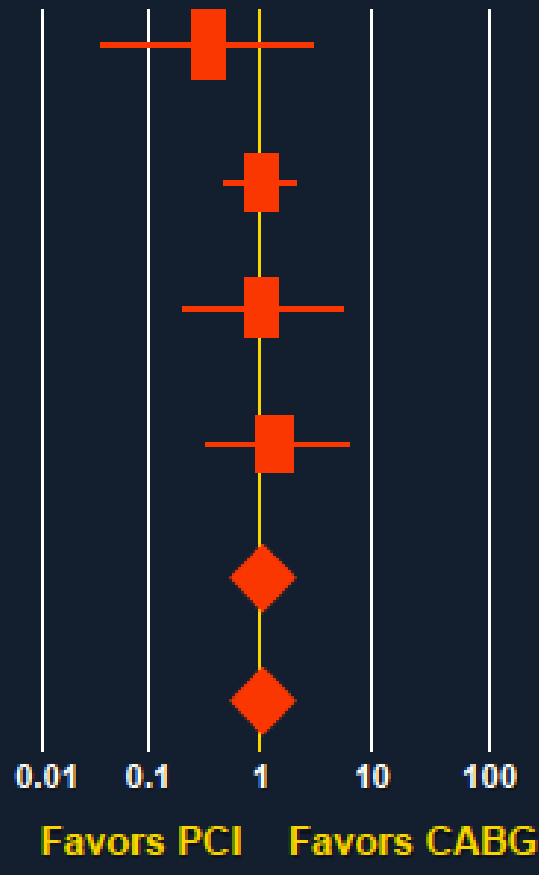
PCI vs. CABG for Left Main Disease

Meta-analysis of 4 RCTs.

1 year MI

	PCI	CABG	OR (95%CI)	*p*-Value
LEMANS	1/52	3/53	0.33 (0.03-3.25)	0.34
SYNTAX left main	15/355	14/336	1.02 (0.48-2.14)	0.97
Boudriot et al.	3/100	3/101	1.01 (0.20-5.13)	0.99
PRECOMBAT	4/300	3/300	1.34 (0.30-6.03)	0.71
Fixed effects estimate	2.8% (23/807)	2.9% (23/790)	0.98 (0.54-1.78)	0.95
Random effects estimate			0.98 (0.54-1.78)	0.95

I^2=0%



Capodanno et al, *JACC* 2011;58:1426-32

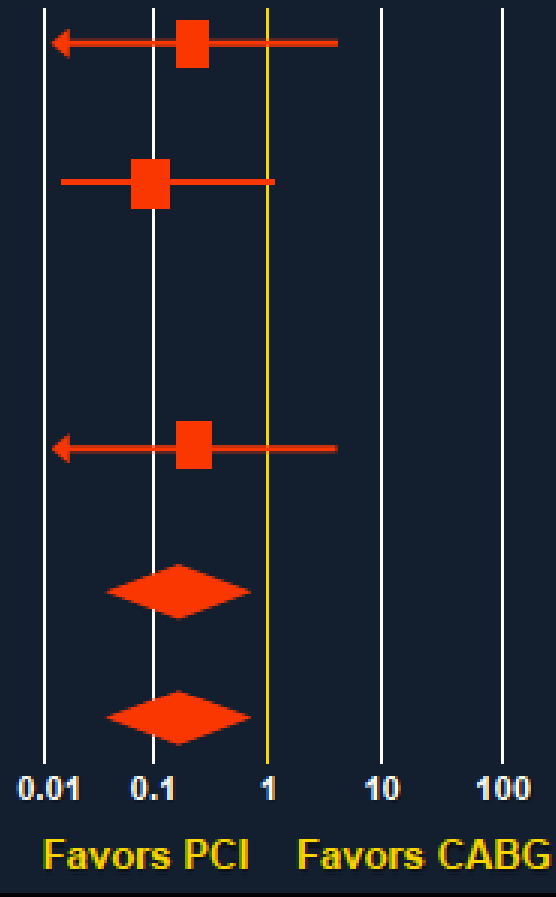
PCI vs. CABG for Left Main Disease

Meta-analysis of 4 RCTs.

1 year stroke

	PCI	CABG	OR (95%CI)	*p*-Value
LEMANS	0/52	2/53	0.20 (0.01-4.09)	0.30
SYNTAX left main	1/355	8/336	0.12 (0.01-0.93)	0.04
Boudriot et al.				
PRECOMBAT	0/300	2/300	0.20 (0.01-4.16)	0.30
Fixed effects estimate	0.1% (1/707)	1.7% (12/689)	0.15 (0.03-0.67)	0.01
Random effects estimate			0.15 (0.03-0.67)	0.01

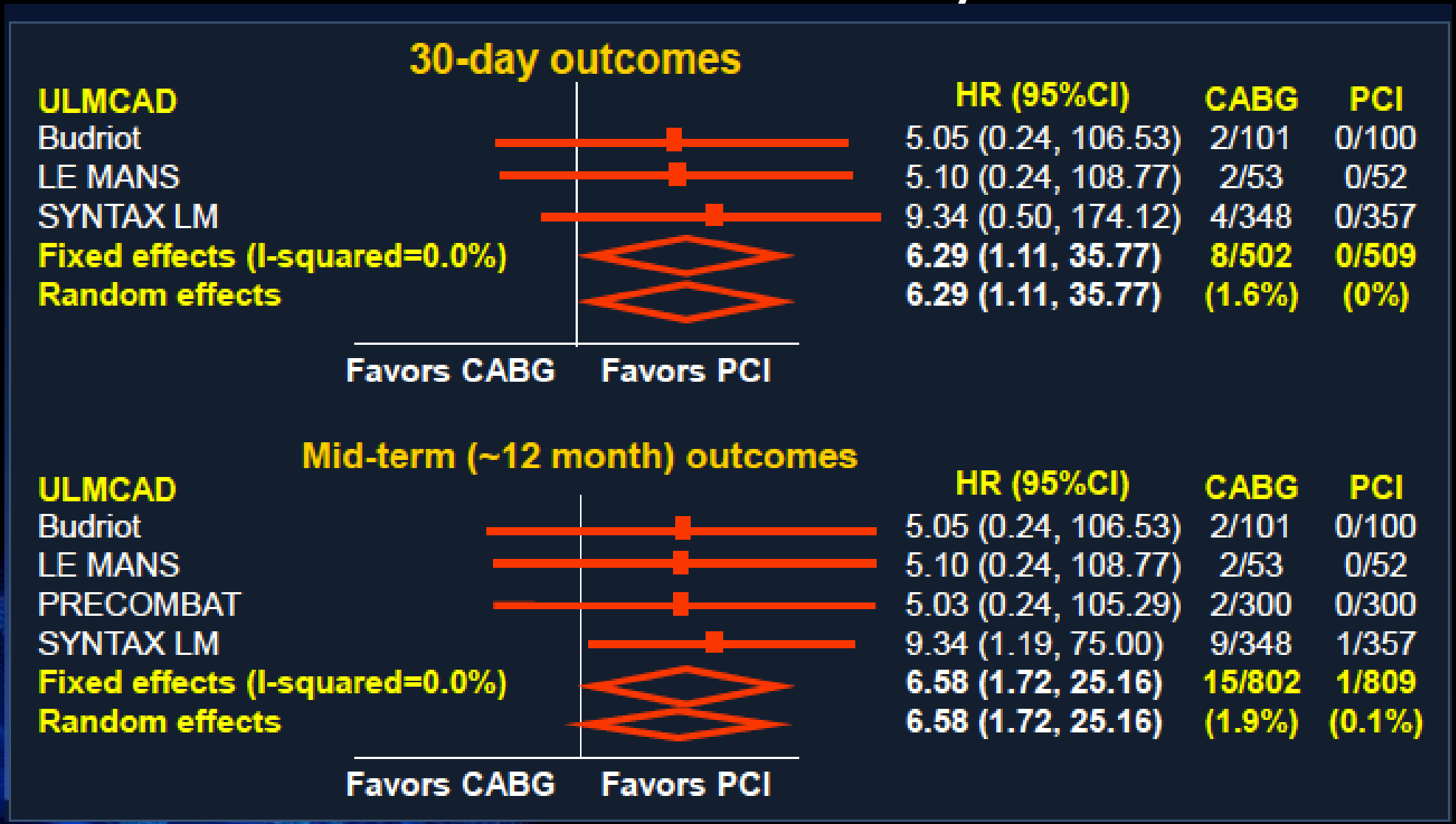
I^2=0%



Capodanno et al, *JACC* 2011;58:1426-32

PCI vs. CABG in LMCA disease:

Stroke Meta-analysis



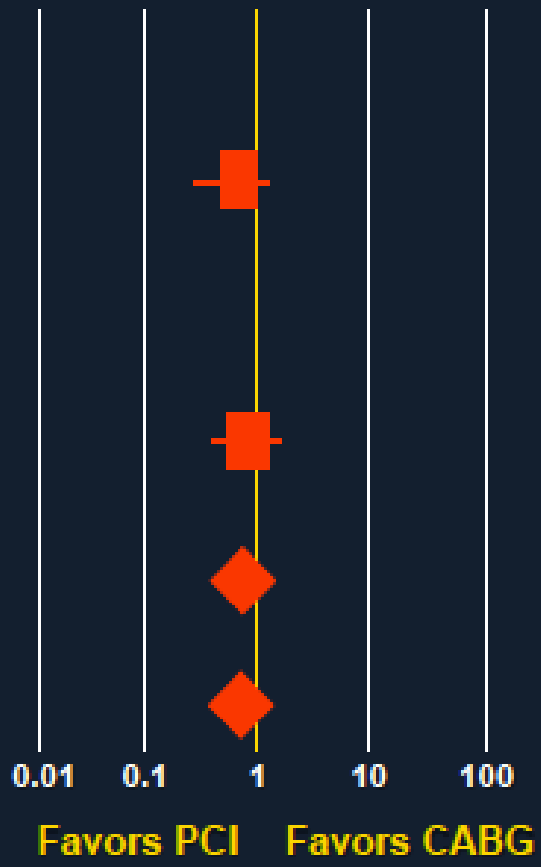
Palmerini T et al. *JACC* 2012;60:798-805

PCI vs. CABG for Left Main Disease

Meta-analysis of 4 RCTs.

1 year Death/MI/Stroke

	PCI	CABG	OR (95%CI)	*p*-Value
LEMANS				
SYNTAX left main	25/355	31/336	0.75 (0.43-1.29)	0.29
Boudriot et al.				
PRECOMBAT	10/300	12/300	0.83 (0.35-1.95)	0.66
Fixed effects estimate	5.3% (35/655)	6.8% (43/636)	0.77 (0.48-1.22)	0.26
Random effects estimate			0.77 (0.48-1.22)	0.26
I^2=0%				

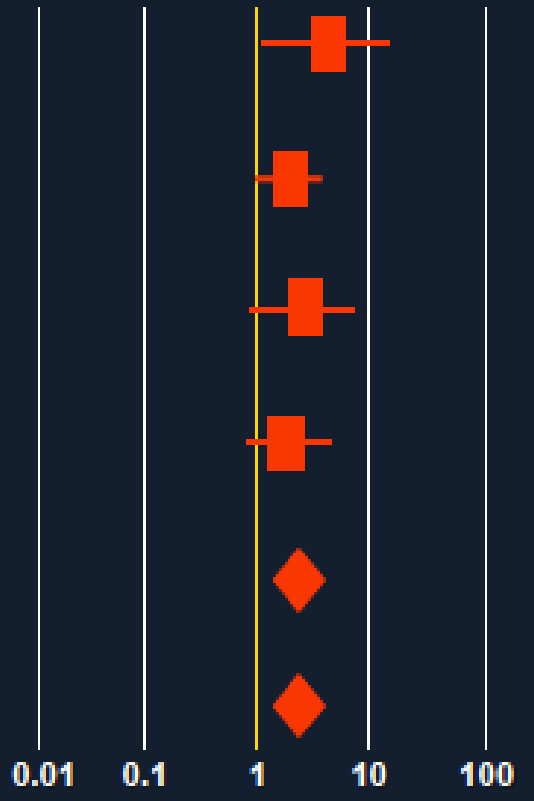


Capodanno et al, *JACC* 2011;58:1426-32

PCI vs. CABG for Left Main Disease Meta-analysis of 4 RCTs.

1 year TVR

	PCI	CABG	OR (95%CI)	*p*-Value
LEMANS	15/52	5/53	3.89 (1.30-11.68)	0.02
SYNTAX left main	45/355	22/336	2.07 (1.22-3.53)	0.007
Boudriot et al.	14/100	6/101	2.58 (0.95-7.01)	0.06
PRECOMBAT	18/300	10/300	1.85 (0.84-4.08)	0.13
Fixed effects estimate	11.4% (92/807)	5.4% (43/790)	2.25 (1.54-3.28)	<0.001
Random effects estimate			2.25 (1.54-3.28)	<0.001



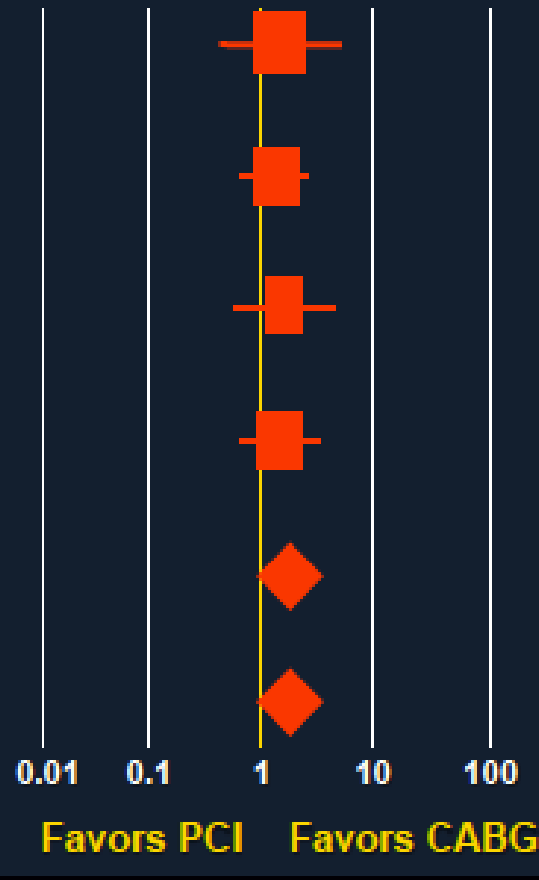
I^2=0%

Capodanno et al, *JACC* 2011;58:1426-32

PCI vs. CABG for Left Main Disease Meta-analysis of 4 RCTs.

1 year MACCE

	PCI	CABG	OR (95%CI)	*p*-Value
LEMANS	16/52	13/53	1.37 (0.58-3.23)	0.48
SYNTAX left main	56/355	46/336	1.18 (0.77-1.80)	0.44
Boudriot et al.	19/100	14/101	1.46 (0.69-3.10)	0.33
PRECOMBAT	26/300	20/300	1.33 (0.73-2.44)	0.36
Fixed effects estimate	14.5% (117/807)	11.8% (93/790)	1.28 (0.95-1.72)	0.11
Random effects estimate			1.28 (0.95-1.72)	0.11

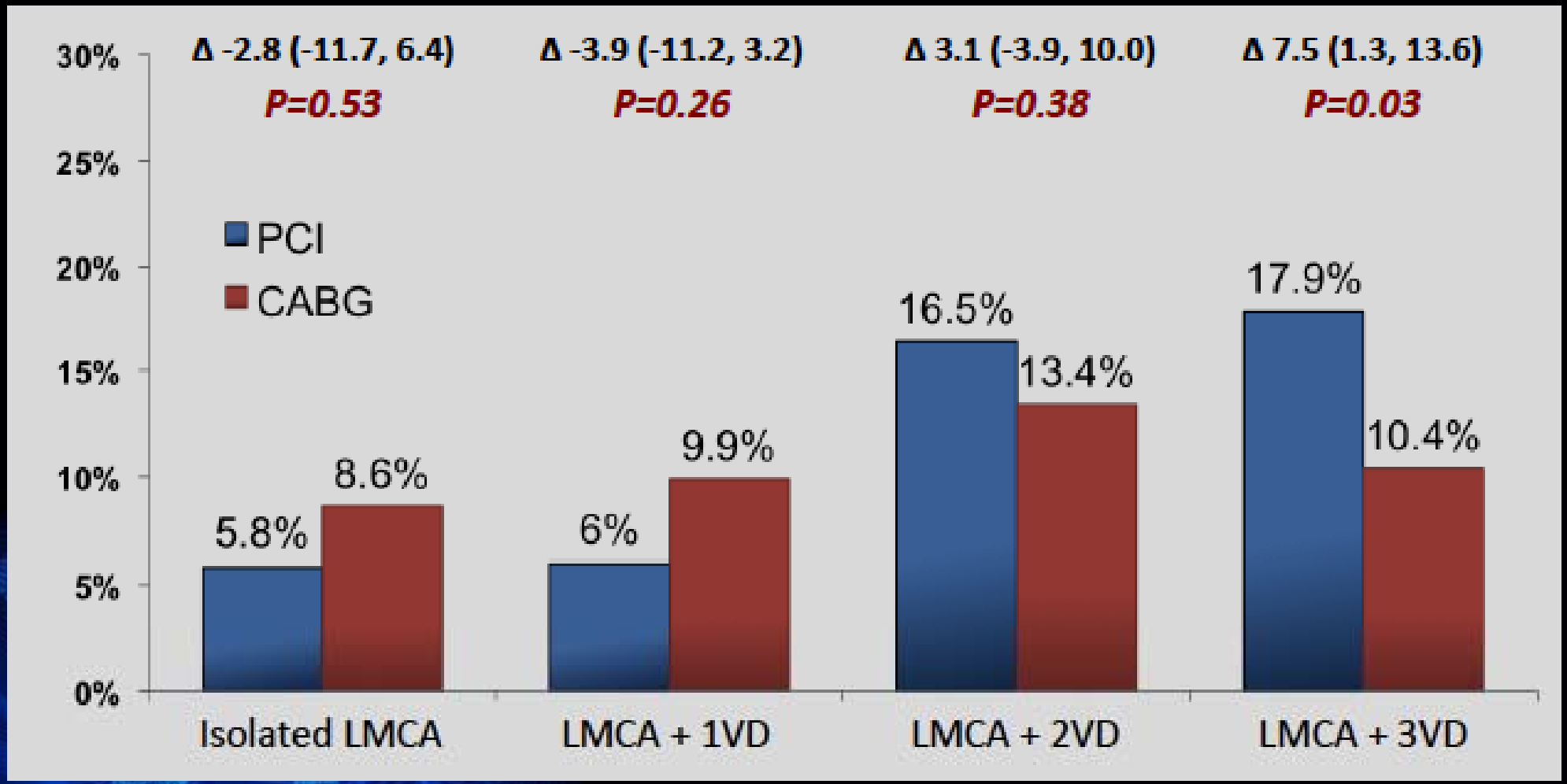


I^2=0%

Capodanno et al, *JACC* 2011;58:1426-32

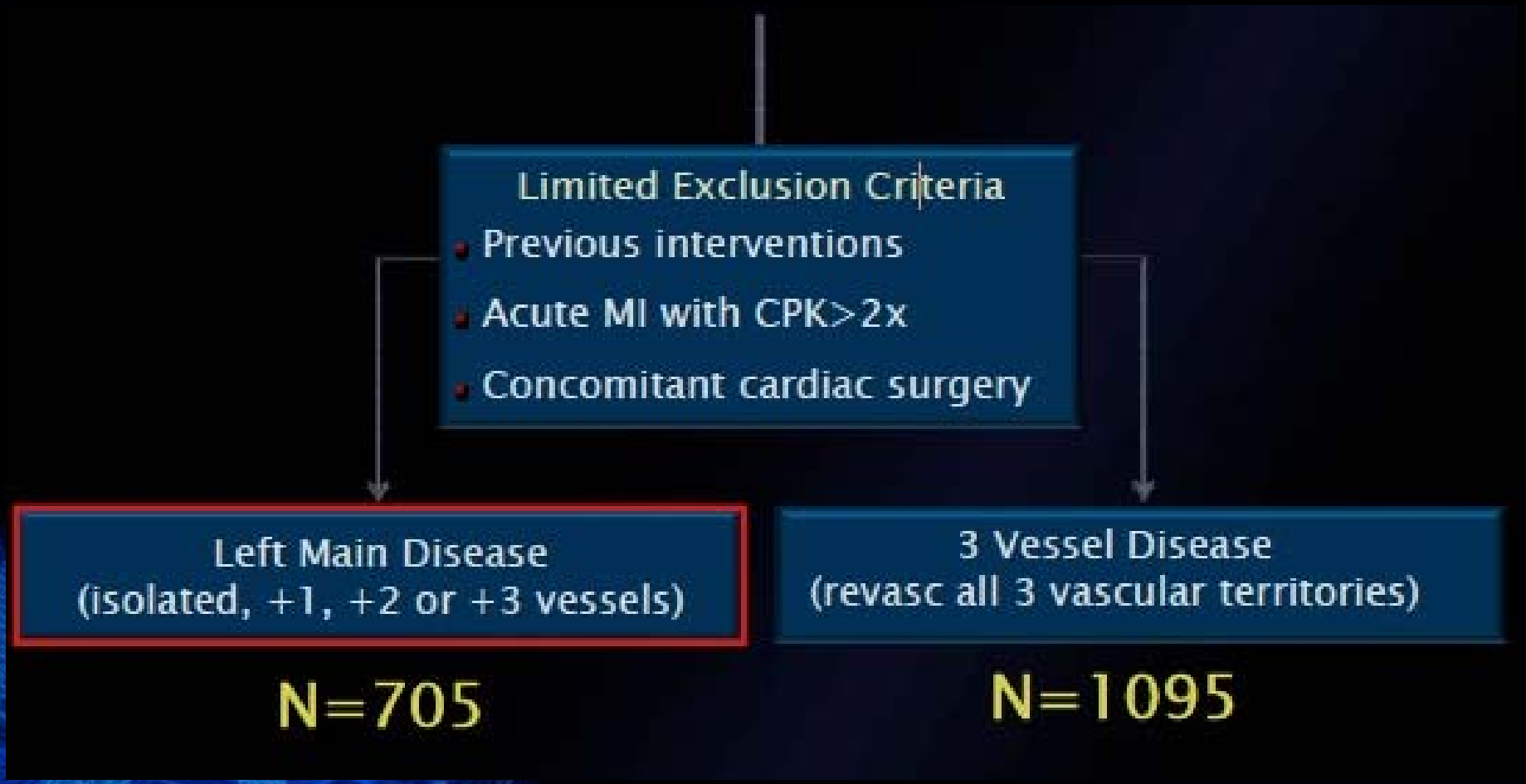
PCI vs. CABG for Left Main Disease
Meta-analysis of 4 RCTs, 1,611 Patients

1 Year MACCE



Capodanno et al, JACC 2011;58:1426-32

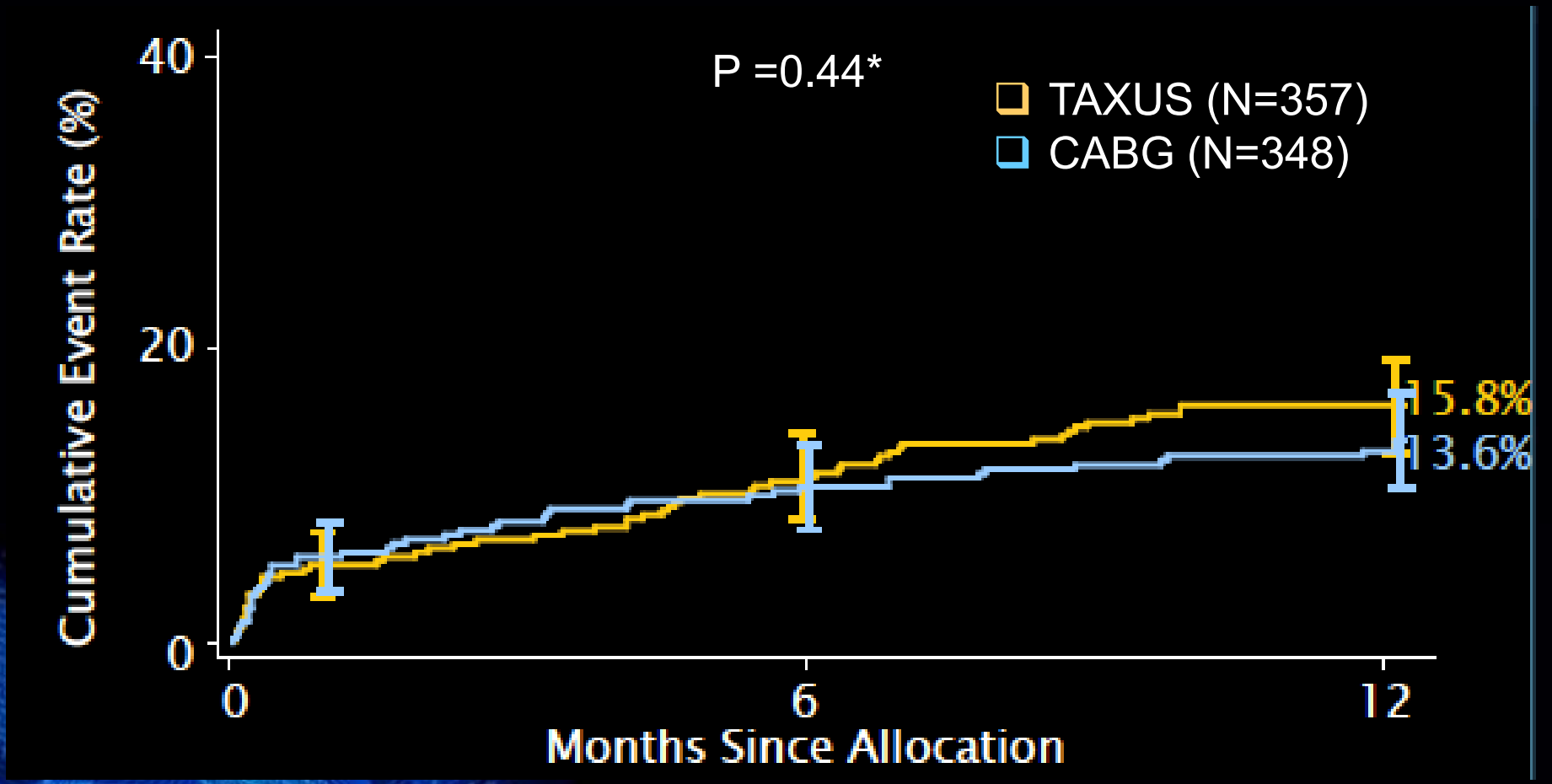
SYNTAX: Left Main Subgroup



Serruys PW et al. NEJM 2009;360:961-72

SYNTAX - *Left Main Subset* :

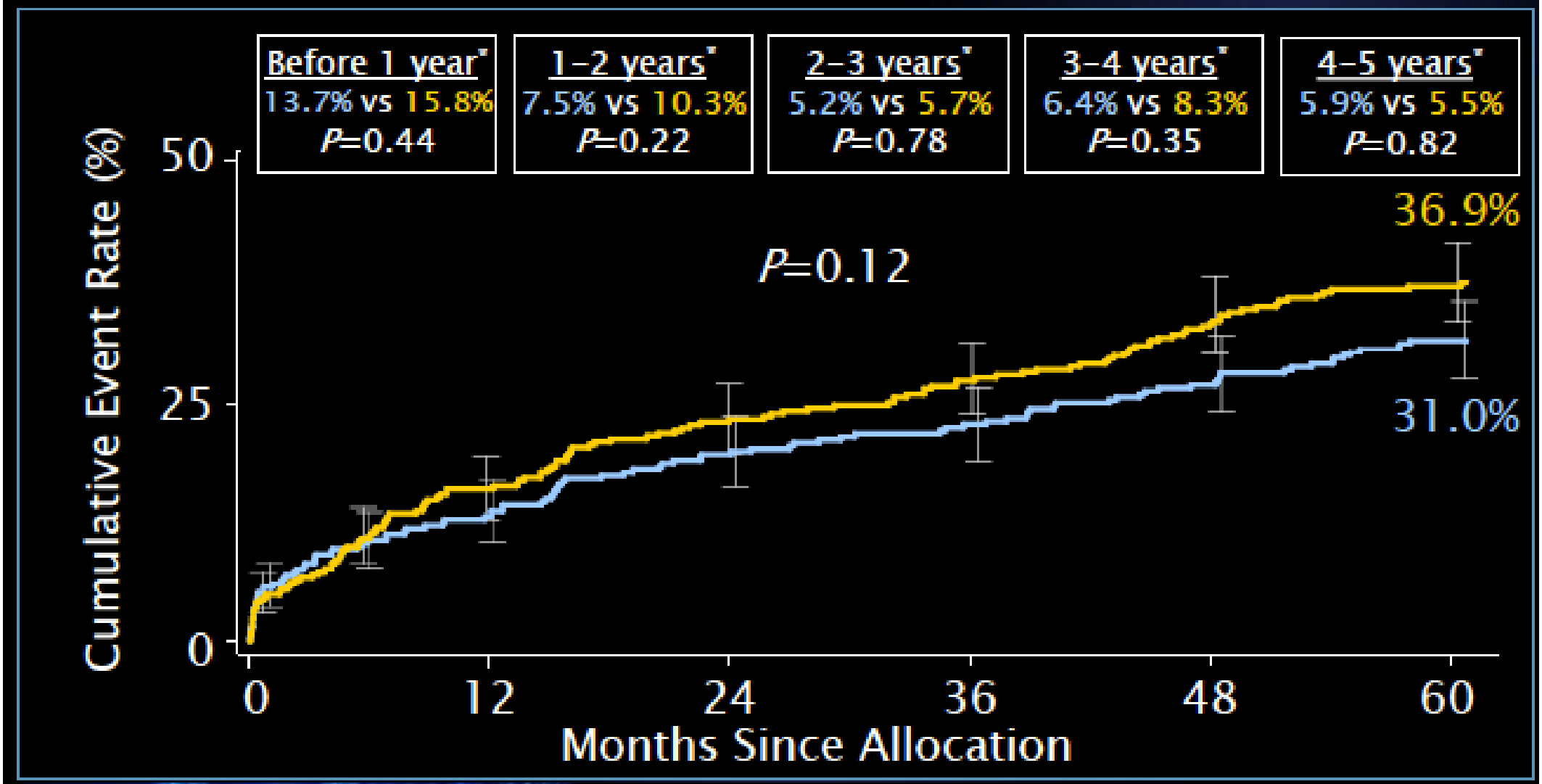
MACCE to 12 Months



Event rate ± 1.5 SE, *Fisher exact test
ITT population

Serruys PW. TCT 2008

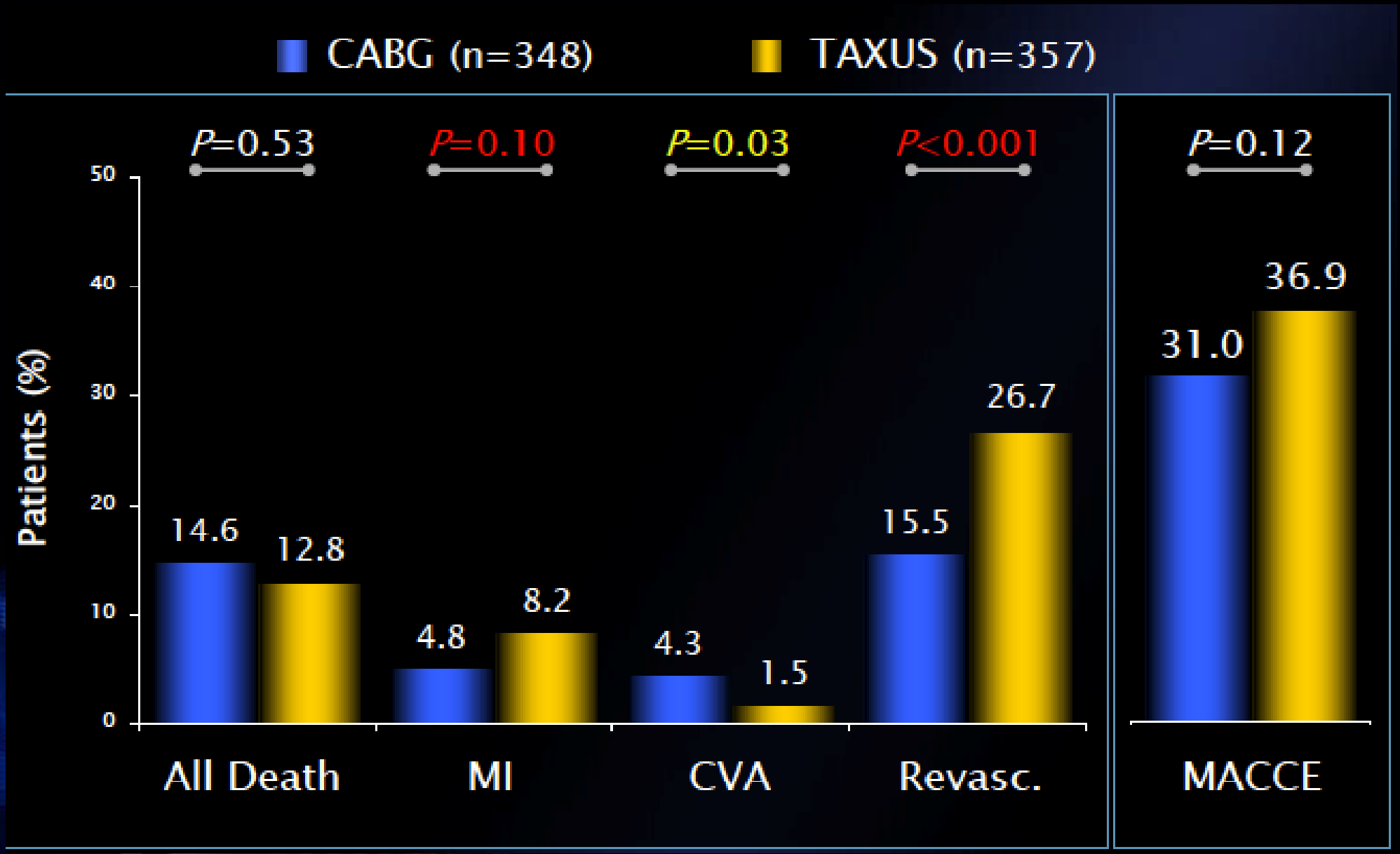
SYNTAX: MACCE to 5 Years
Left Main Subset



Mohr FW et al. Lancet 2013;381:629–38

SYNTAX : *Left Main Disease*

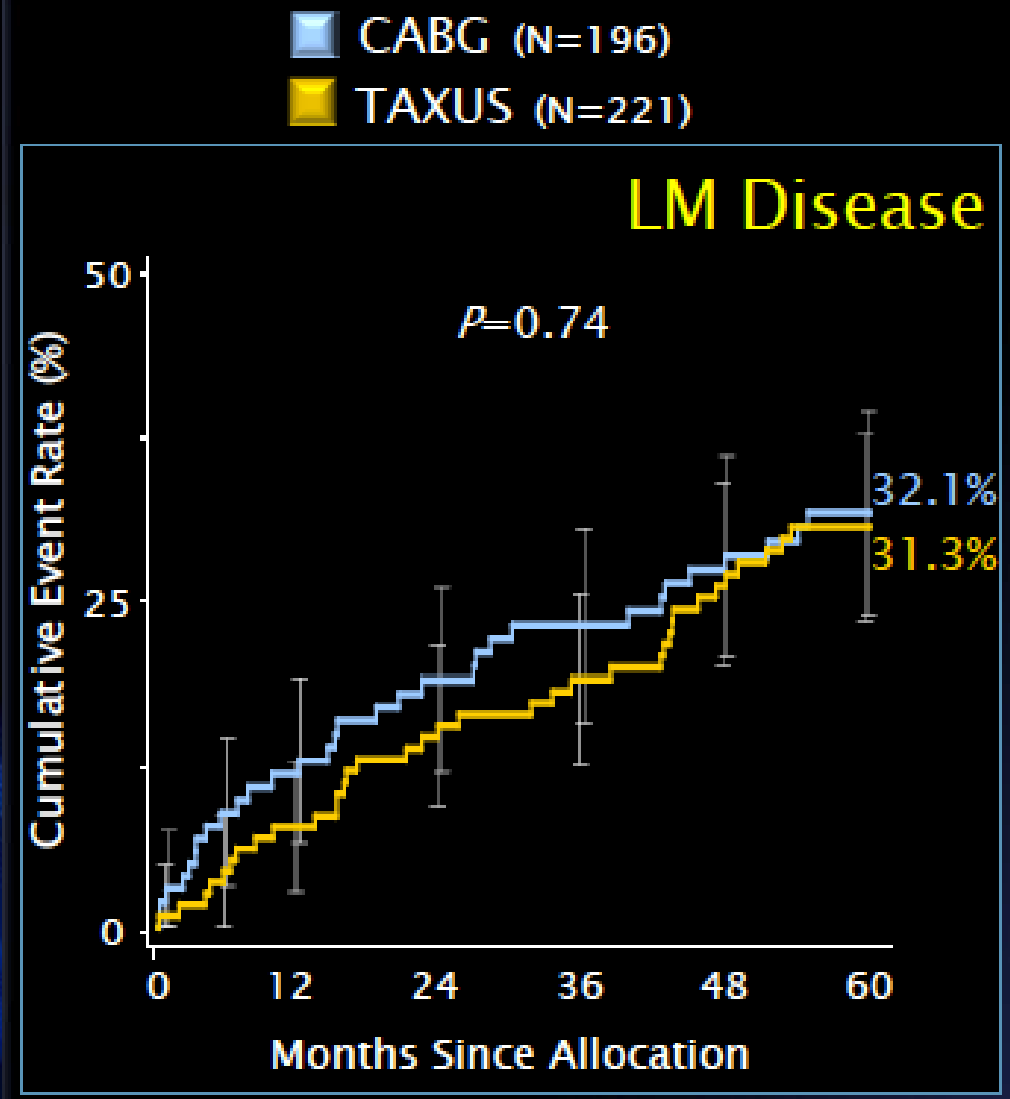
5 year Outcomes [n=705]



Mohr FW et al. Lancet 2013;381:629–38

MACCE to 5 Years by SYNTAX Score Tercile

Low to Intermediate Scores (0-32)

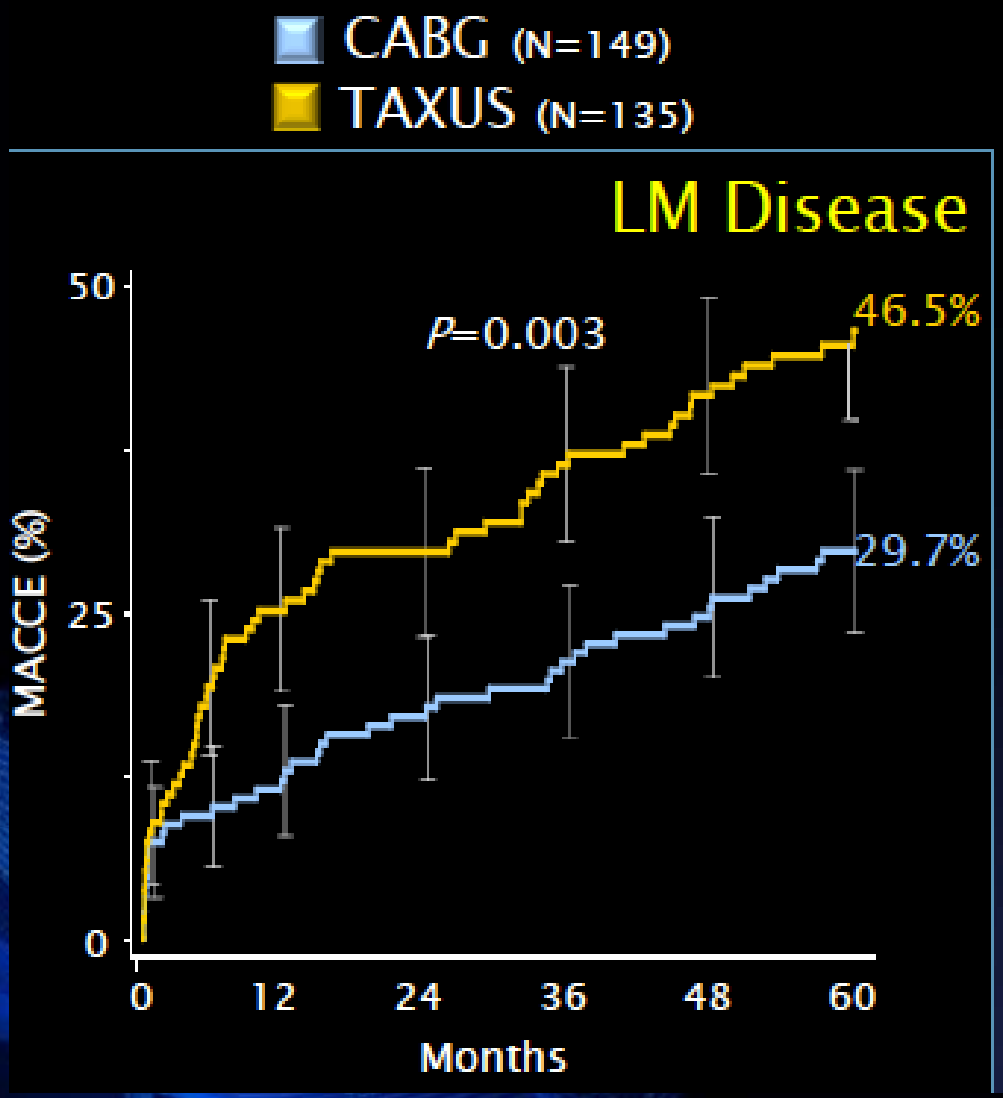


	CABG	PCI	*P* value
Death	15.1%	7.9%	0.02
CVA	3.9%	1.4%	0.11
MI	3.8%	6.1%	0.33
Death, CVA or MI	19.8%	14.8%	0.16
Revasc.	18.6%	22.6%	0.36

Serruys PW et al. Lancet 2013;381:629–38

MACCE to 5 Years by SYNTAX Score Tercile

High Scores ≥ 33



	CABG	PCI	*P* value
Death	14.1%	20.9%	0.11
CVA	4.9%	1.6%	0.13
MI	6.1%	11.7%	0.13
Death, CVA or MI	22.1%	26.1%	0.40
Revasc.	11.6%	34.1%	<0.001

Serruys PW et al. Lancet 2013;381:629–38

LMCA PCI : 1 or 2-stents

Distal LMS and Stent Strategy

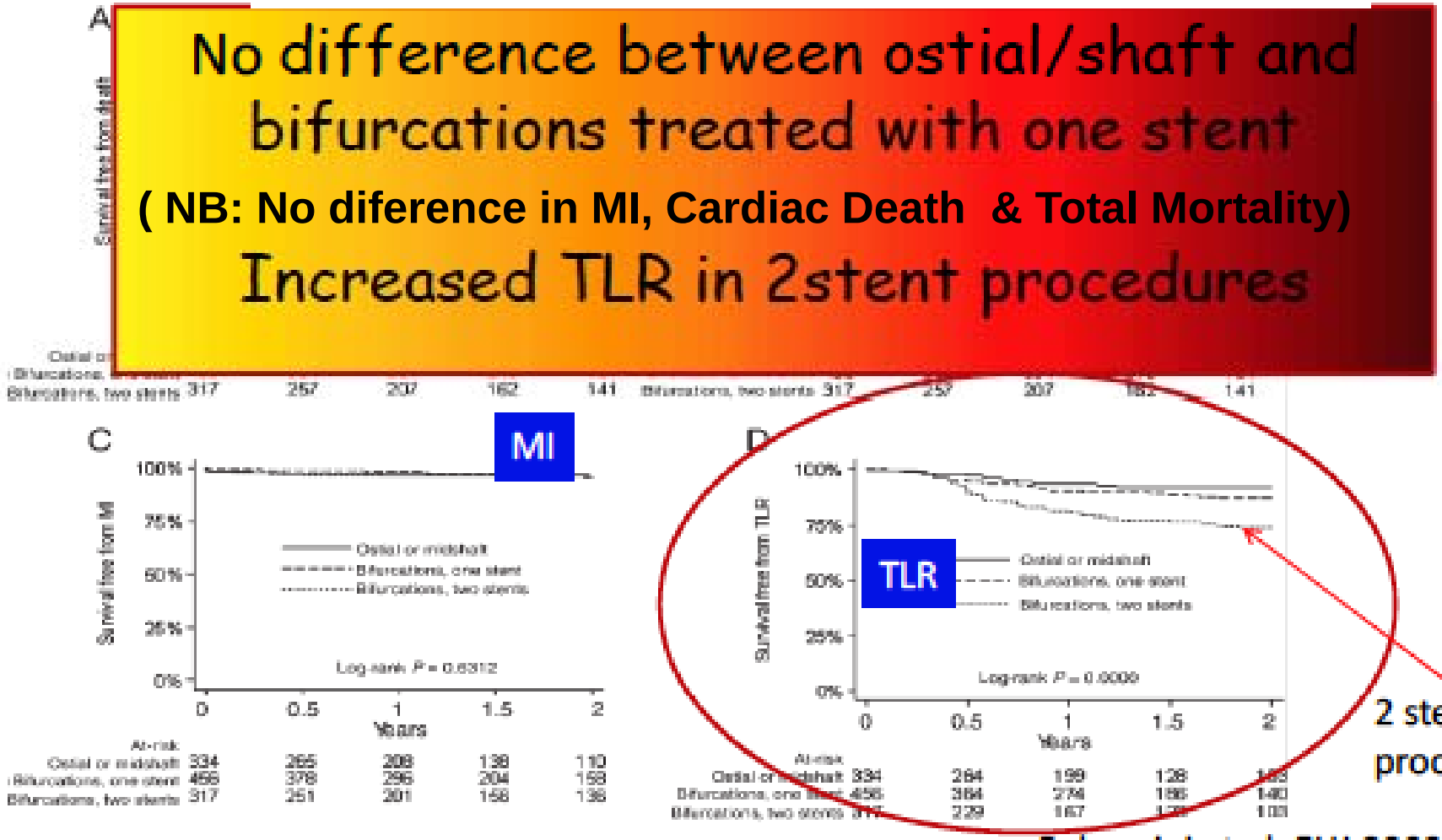
Italian Registry: N:1111

777 bifurcations/ 334 non-bifurcation

No difference between ostial/shaft and bifurcations treated with one stent

(NB: No diference in MI, Cardiac Death & Total Mortality)

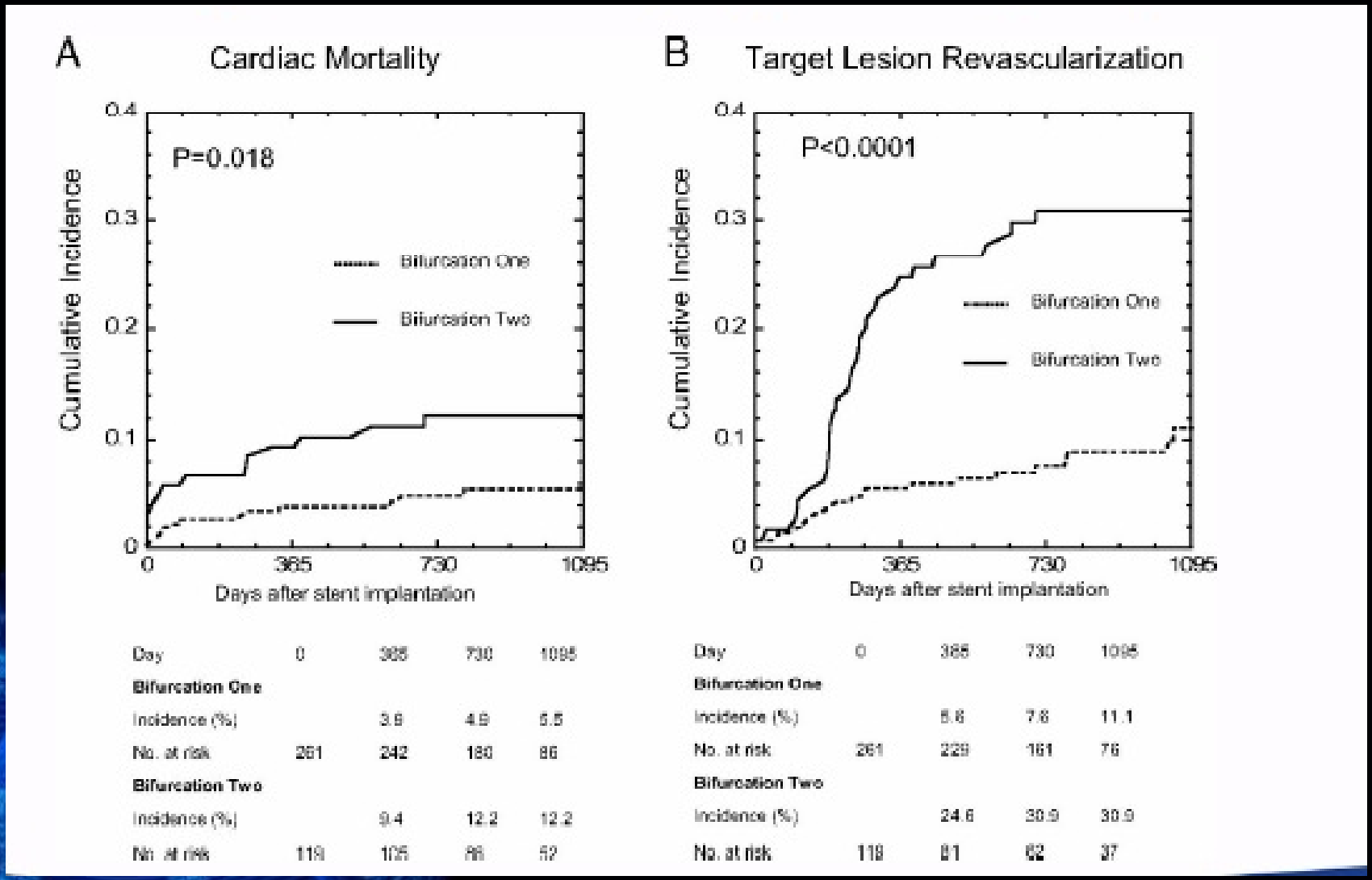
Increased TLR in 2stent procedures



2 stent procedures

Palmerini et al. EHJ 2009;30:2087

J-Cypher Registry : 3 yr outcomes after SES implantation for ULM CAD



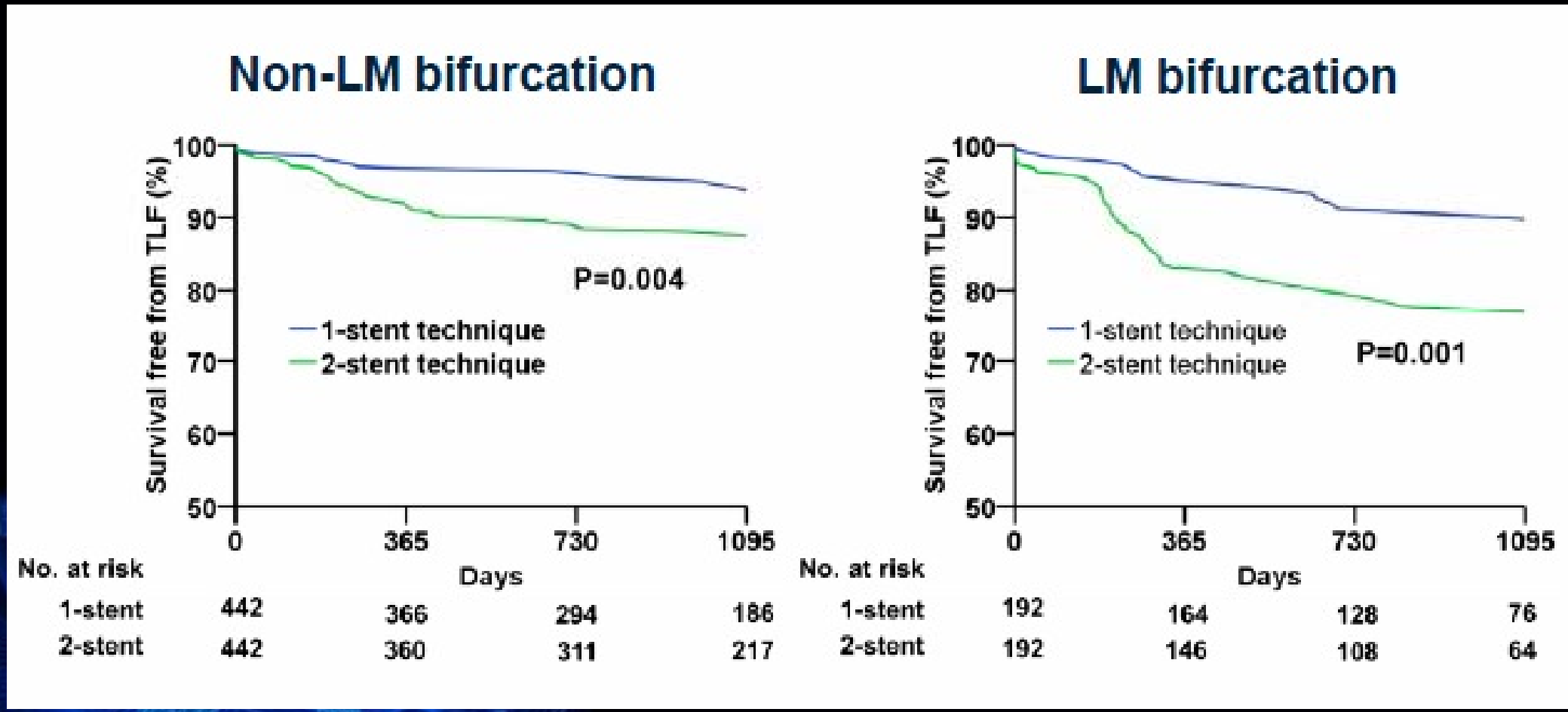
Day	0	365	730	1095
Bifurcation One				
Incidence (%)		3.9	4.9	5.5
No. at risk	261	242	180	86
Bifurcation Two				
Incidence (%)		9.4	12.2	12.2
No. at risk	119	105	86	52

Day	0	365	730	1095
Bifurcation One				
Incidence (%)		5.6	7.6	11.1
No. at risk	261	229	161	76
Bifurcation Two				
Incidence (%)		24.6	30.9	30.9
No. at risk	119	81	62	37

Toyofuku, M. et al. Circulation 2009;120:1866-1874

COBIS Registry II 1-stent vs. 2-stent for LMCA bifurcation

TLF in Propensity-Matched Cohort

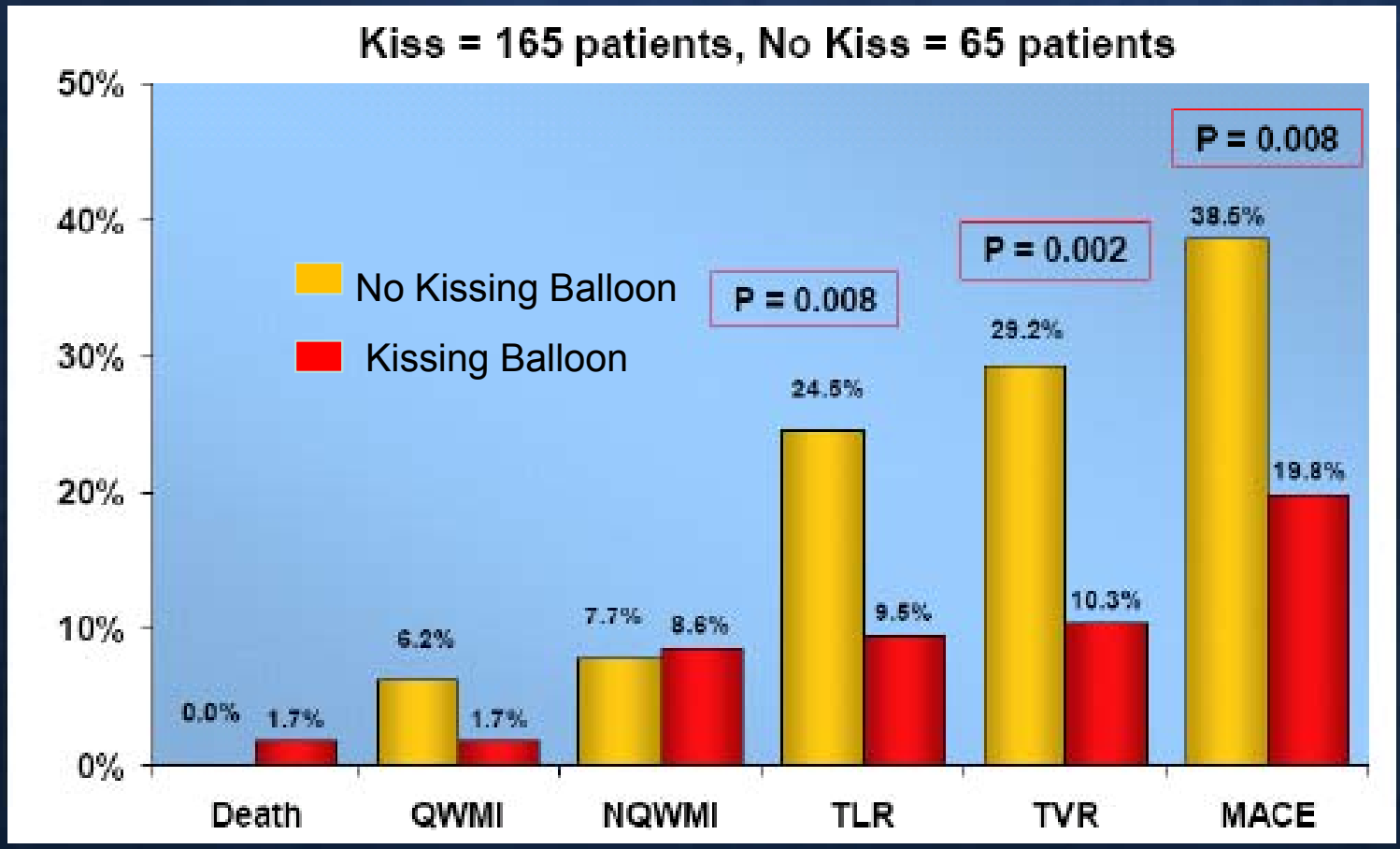


Y.B. Song et al, TCT 2012

Kissing Balloon Inflation

Importance of Kissing Balloon Inflation in Classical Crush Stenting

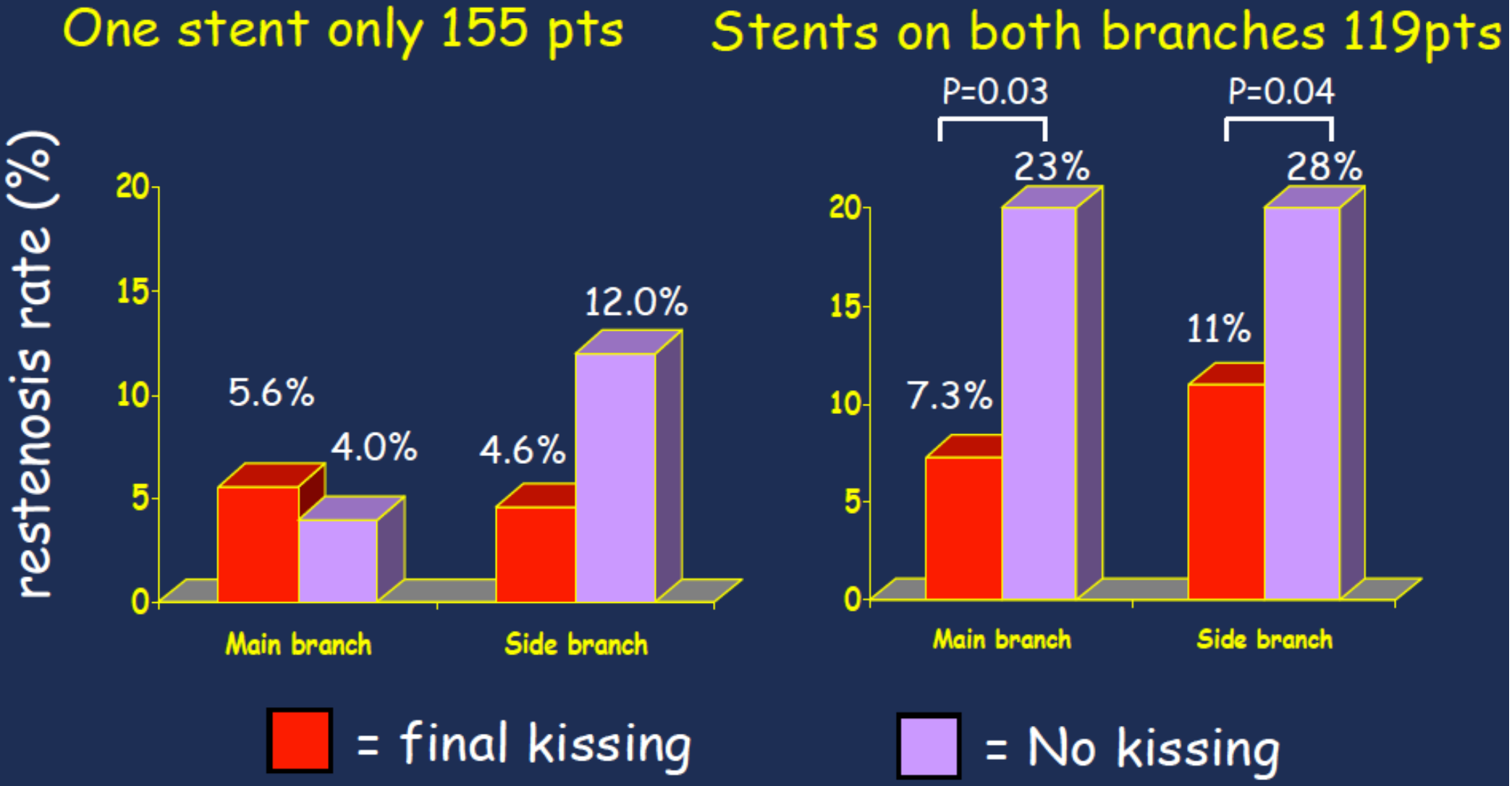
Nine-month outcme after Crush Stenting



Ge, JACC 2005

DES in Bifurcation
(Milan Experience: April 2002-March 2005)

Angiographic follow-up



Total no.= 274
Out of 368

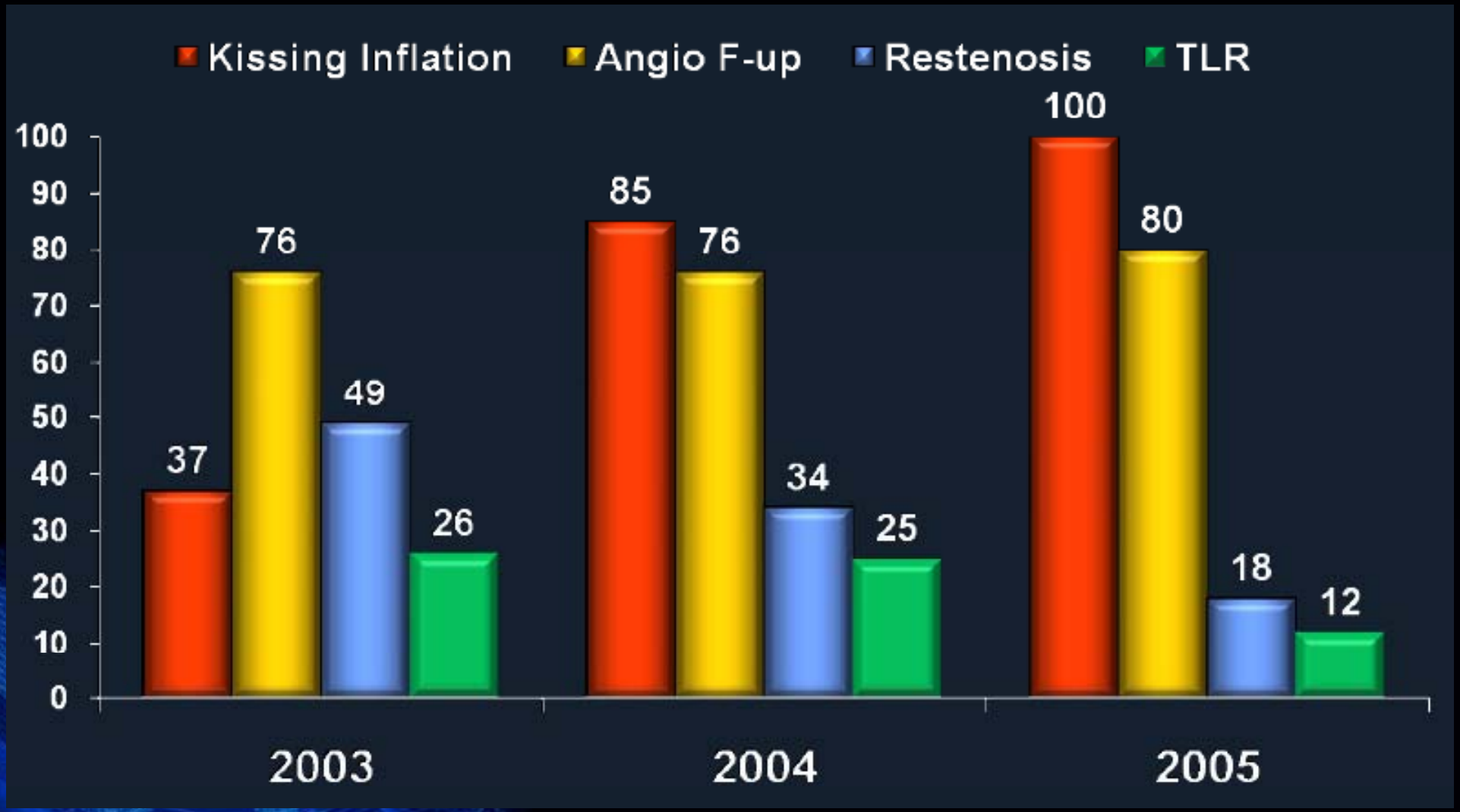
Antonio Colombo, ACC 2006

Role of Kissing Balloon Inflation in Crush Technique : CACTUS Trial Insight

	YES Final Kissing 163 pts.	NO Final Kissing 14 pts.	P
Myocardial infarction	7.5%	29%	0.001
TLR	6.3%	12.9%	0.25
MB restenosis	4.7%	16%	0.03
SB restenosis	11.9%	36%	0.001
Stent thrombosis	0.9%	6.5%	0.06

Colombo A et al Circulation 2009;119(1):71-8

Optimal performance of 2 stent techniques important in reducing event rates

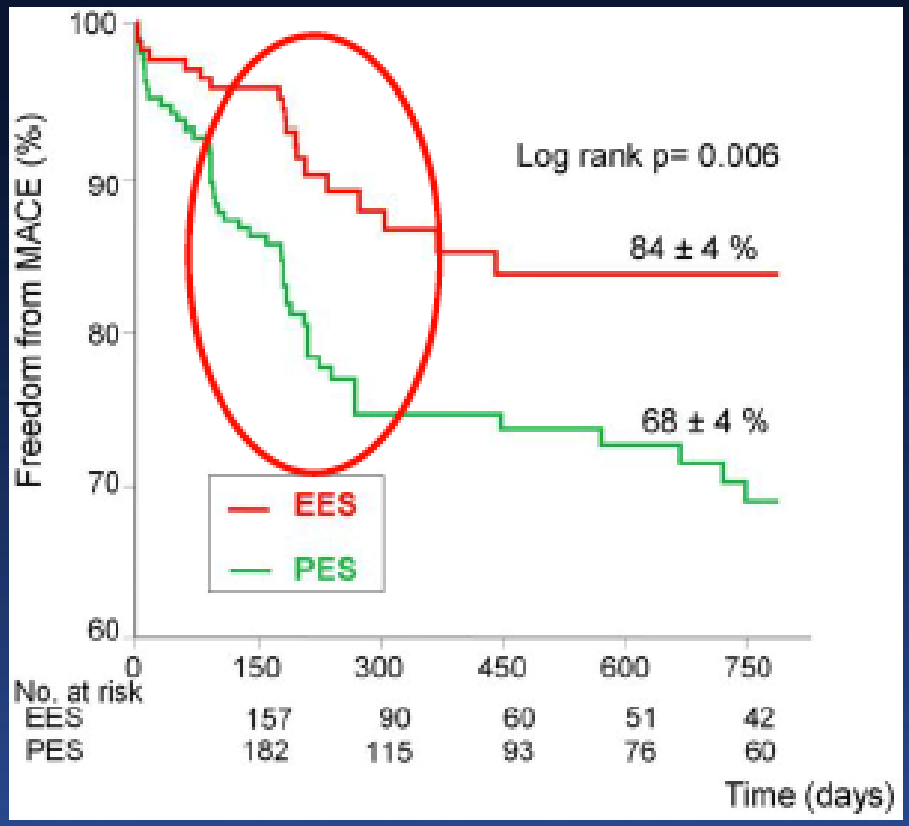


Impact of learning curve in Technique; TCT 2006

DES : Old vs New

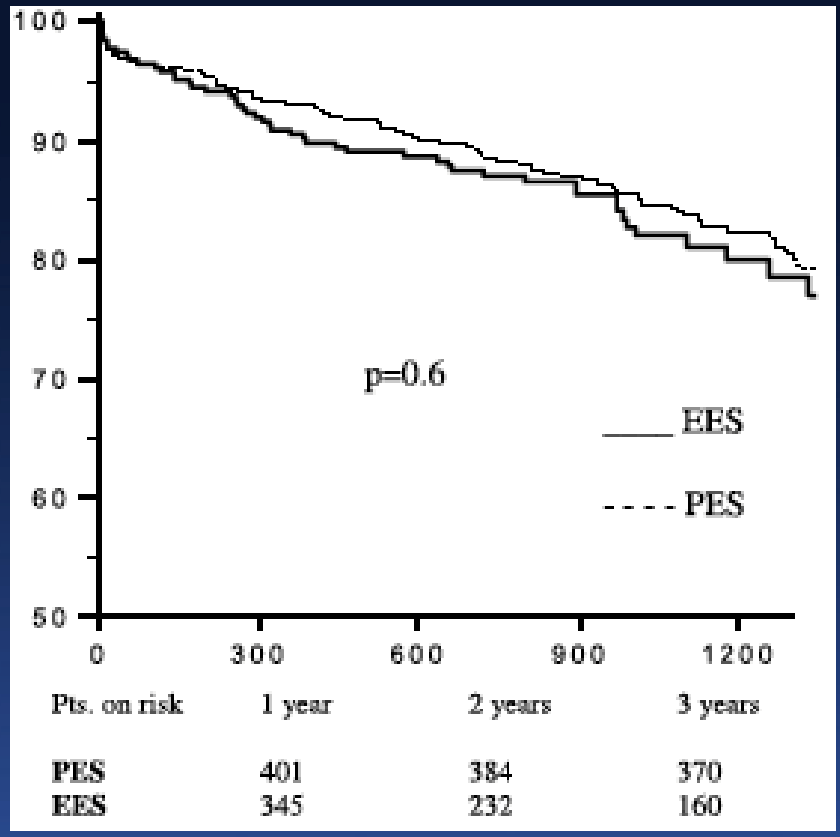
New vs Old DES for ULMCA PCI : Discordant Results

ULMD Florence Registry



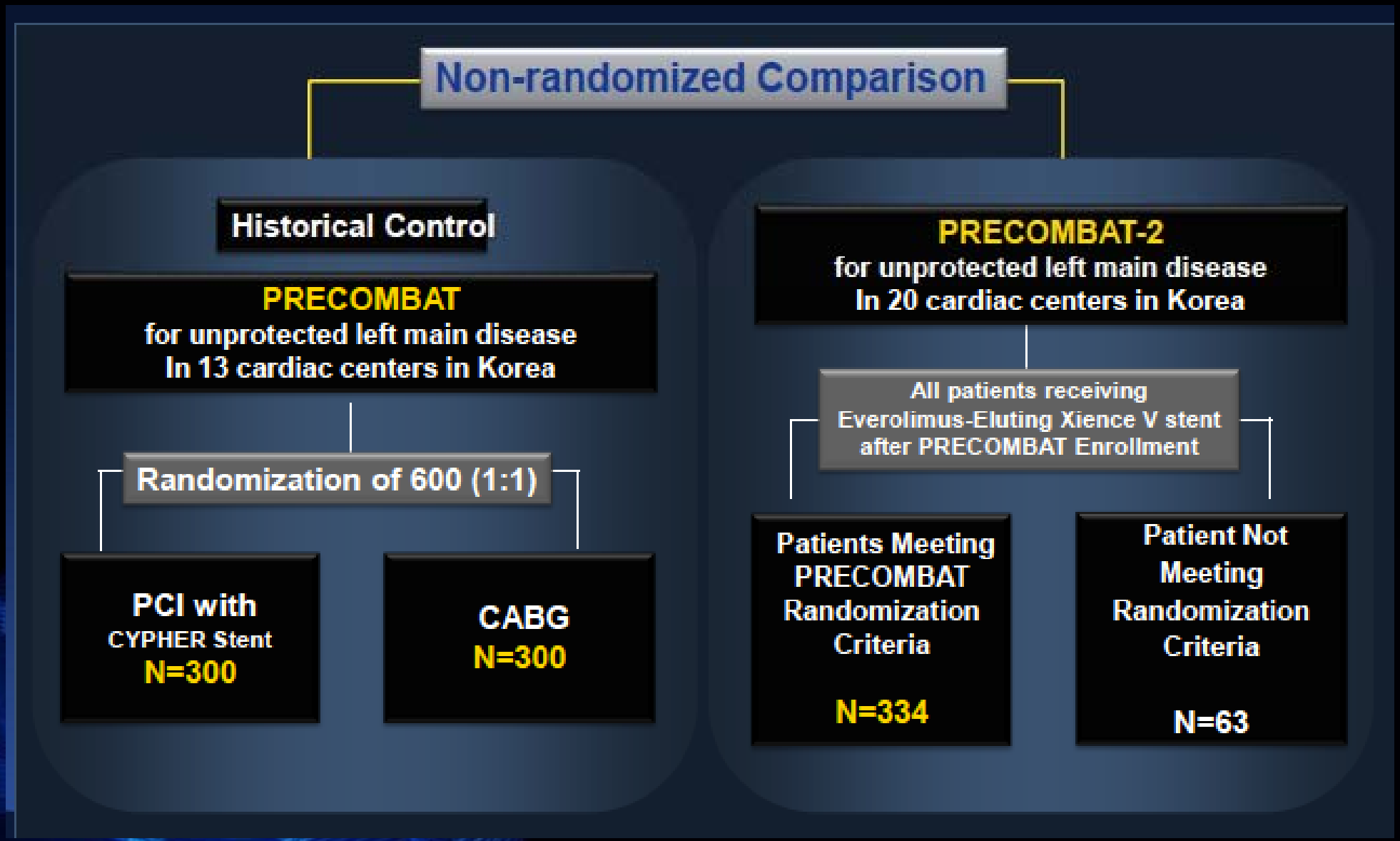
Valenti et al, JACC 2012

ESTROFA-LM



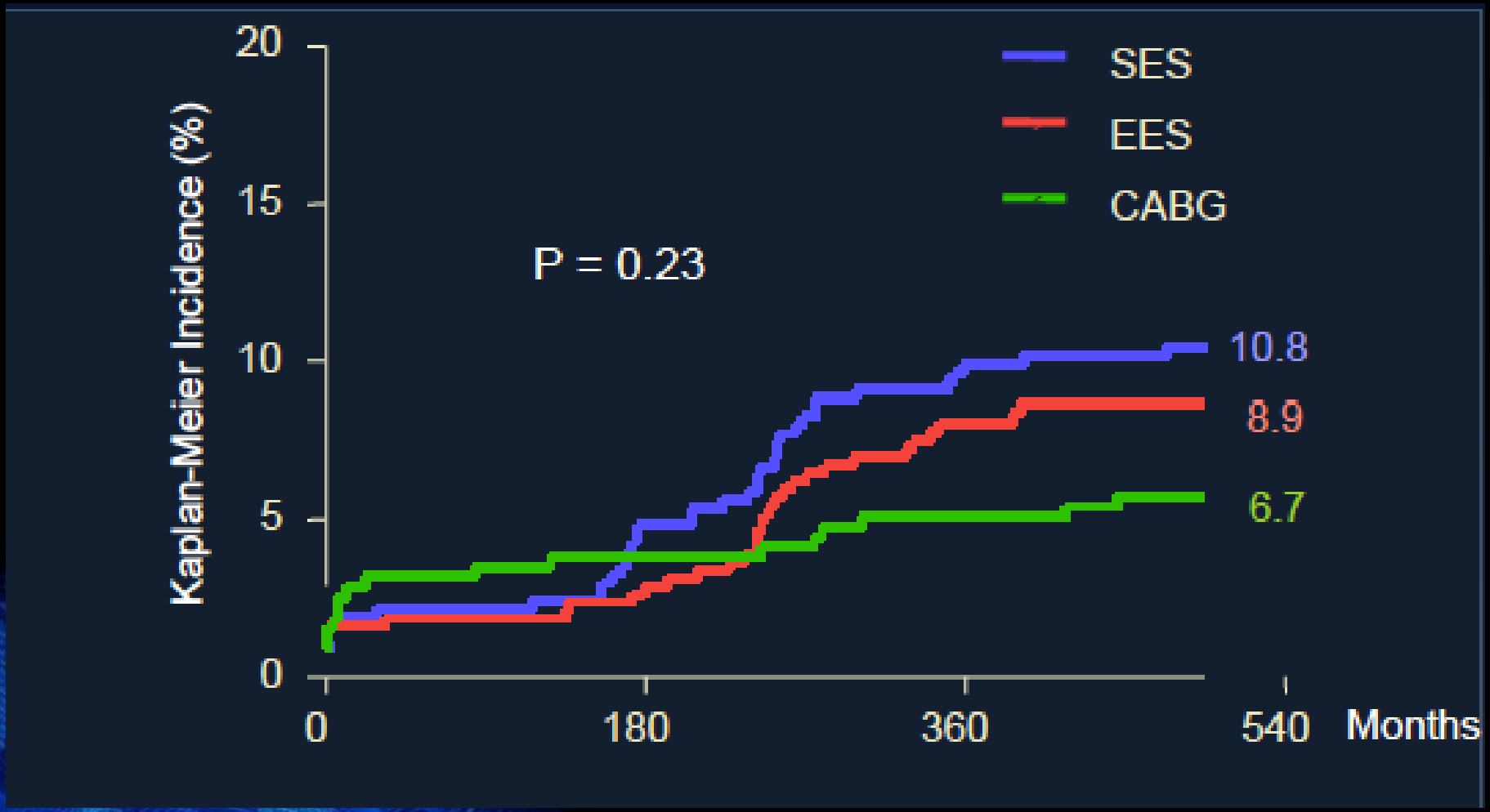
De La Torre Hernandez et al, AJC 2013

PRE-COMBAT – 2 Design



Y-H Kim JACC CV Intv 2012 and J-M Ahn, TCT 2012

MACCE *Death, MI, Stroke or Ischemic TVR*



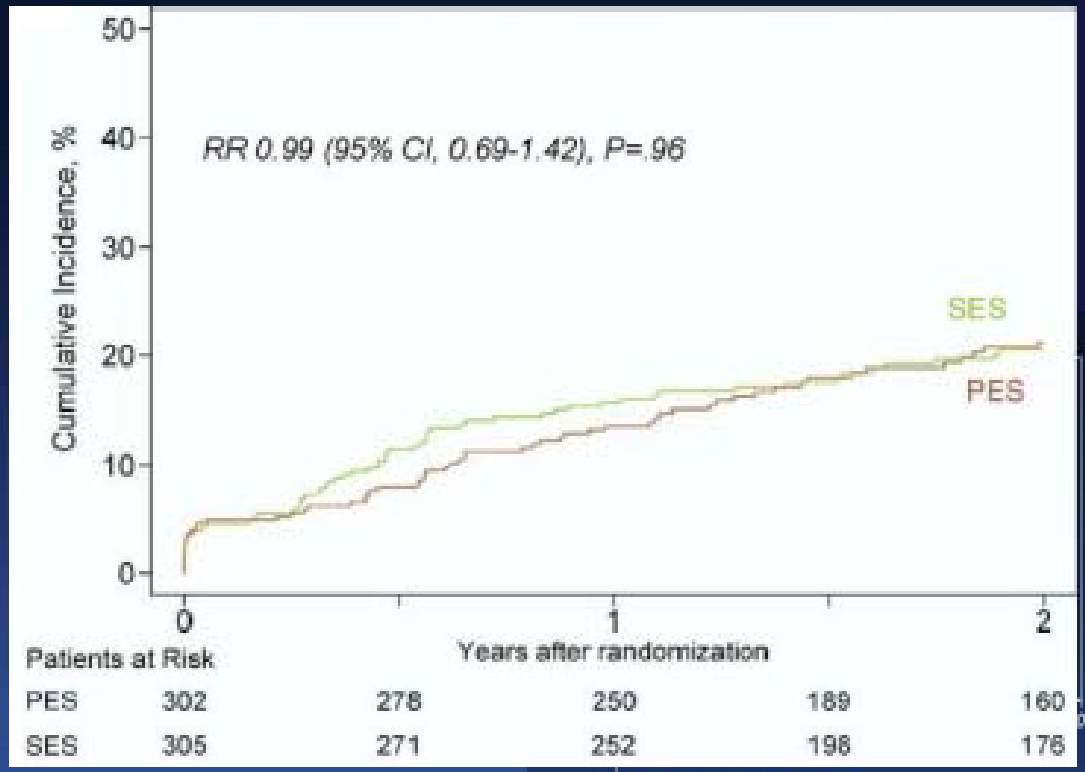
Kim YH et al, JACC. Cardiovascular Interventions. 2012 Jul;5(7):708-17

MACCE : *Death, MI, or TLR*

(SES vs. PES vs. EES vs. ZES)

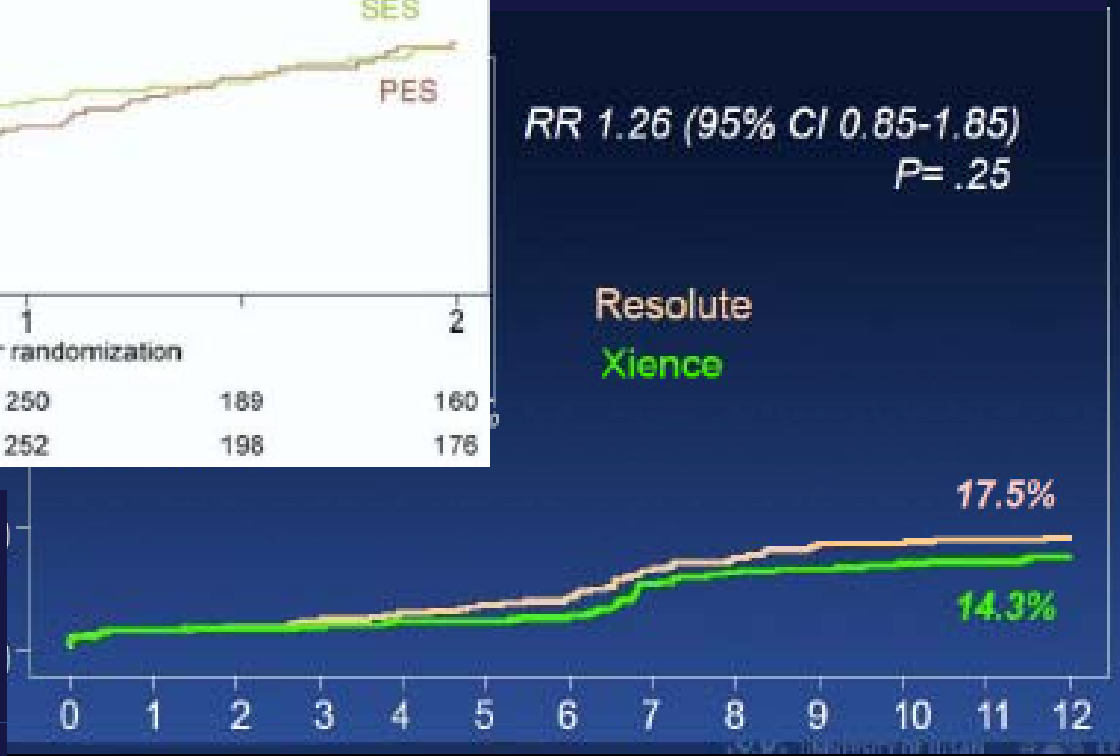
ISAR-LM

SES vs. PES



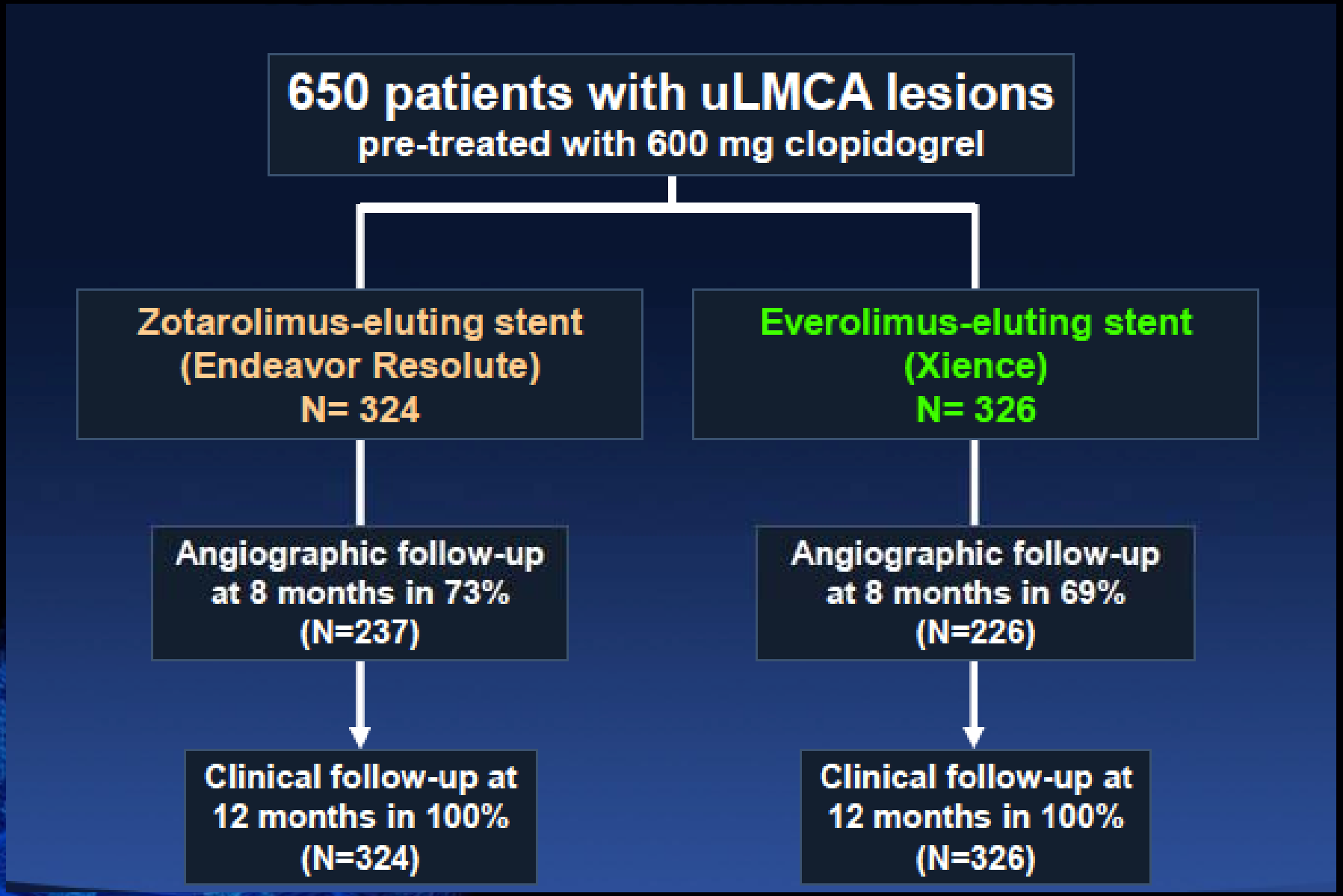
ISAR-LM2

EES vs. ZES



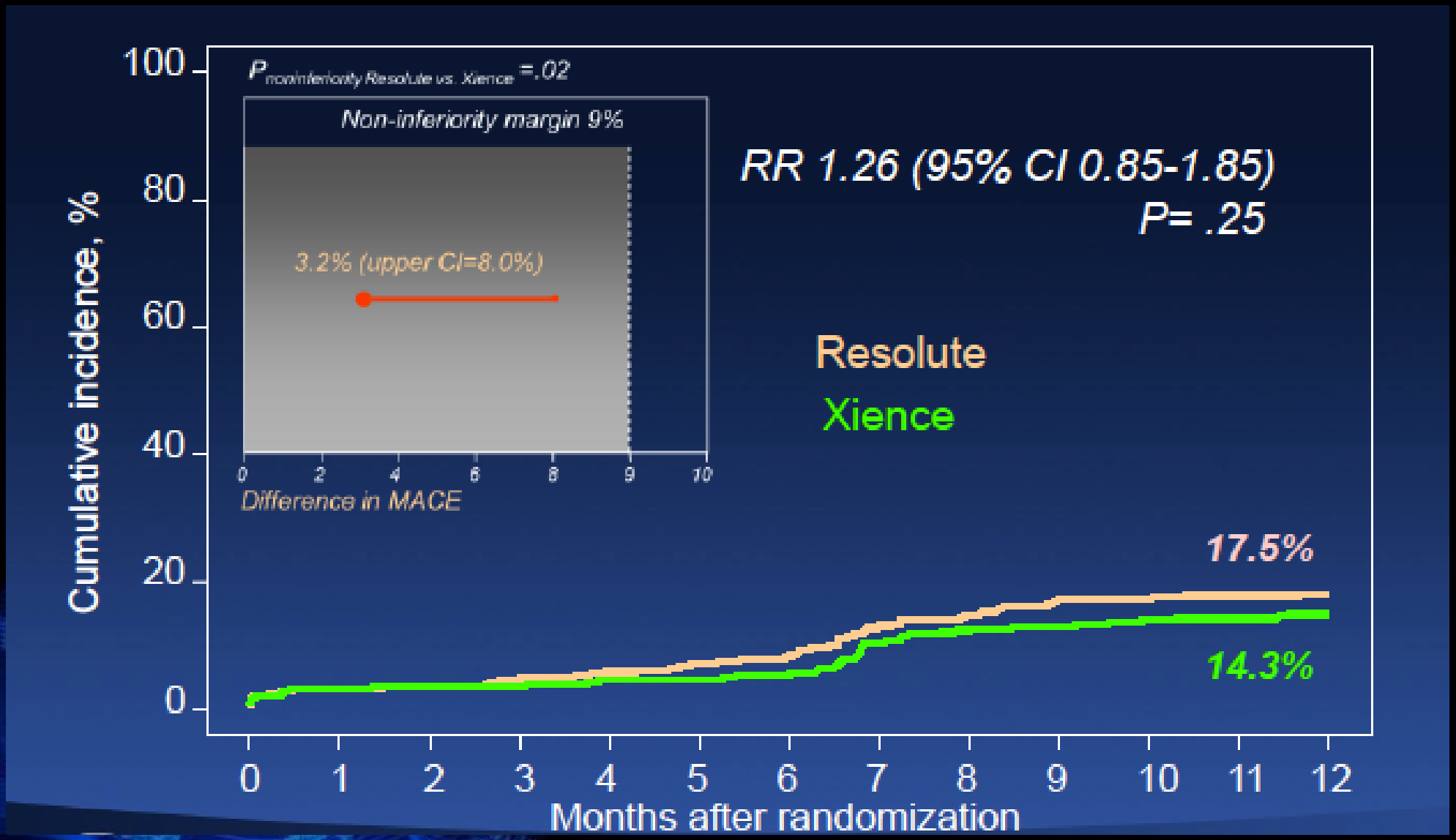
Mehilli et al., J Am Coll Cardiol 2009,
Mehilli et al., TCT 2012

ISAR LEFT MAIN 2 Trial



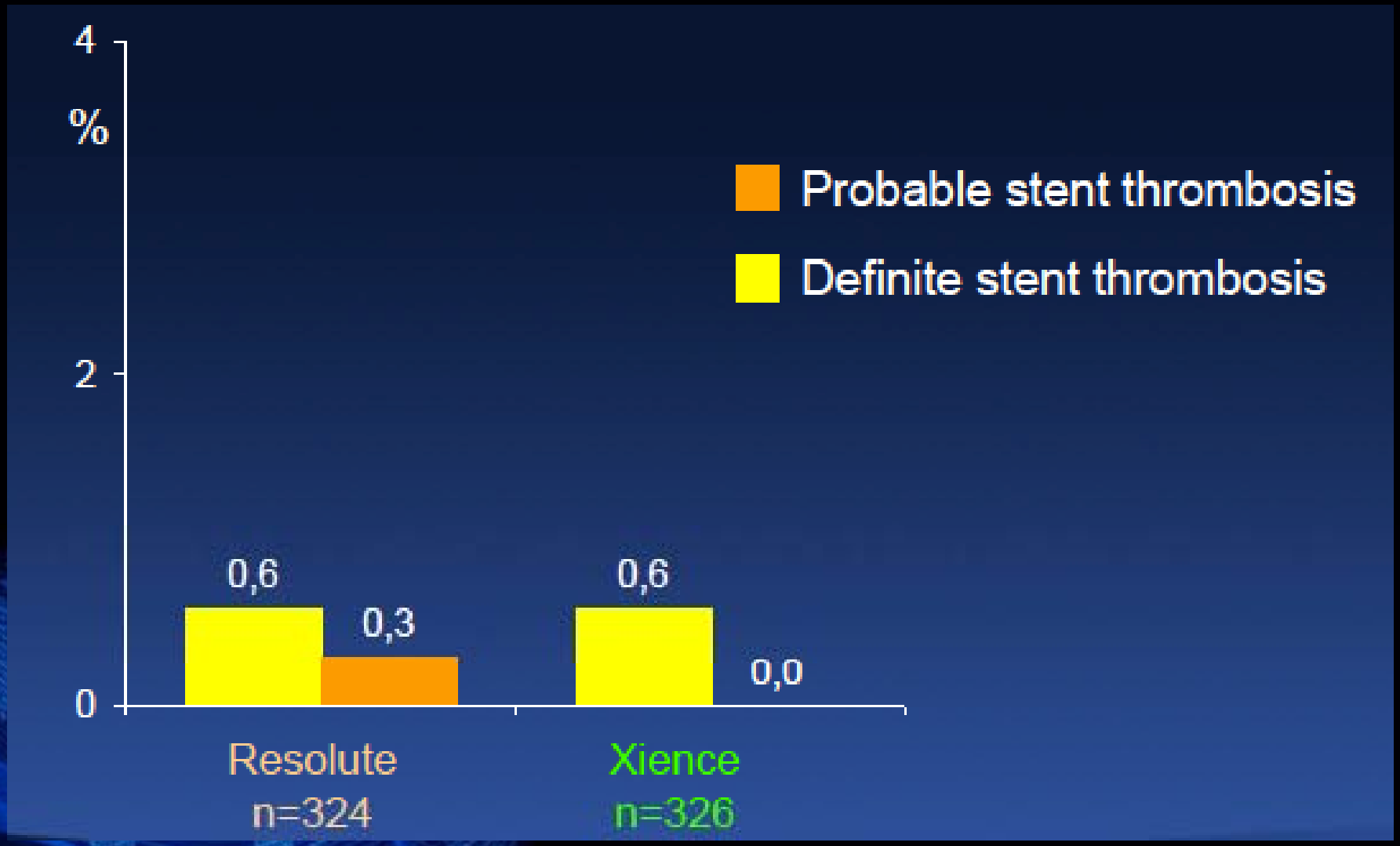
Mehilli et al., TCT 2012

ISAR Left Main 2 : MACE



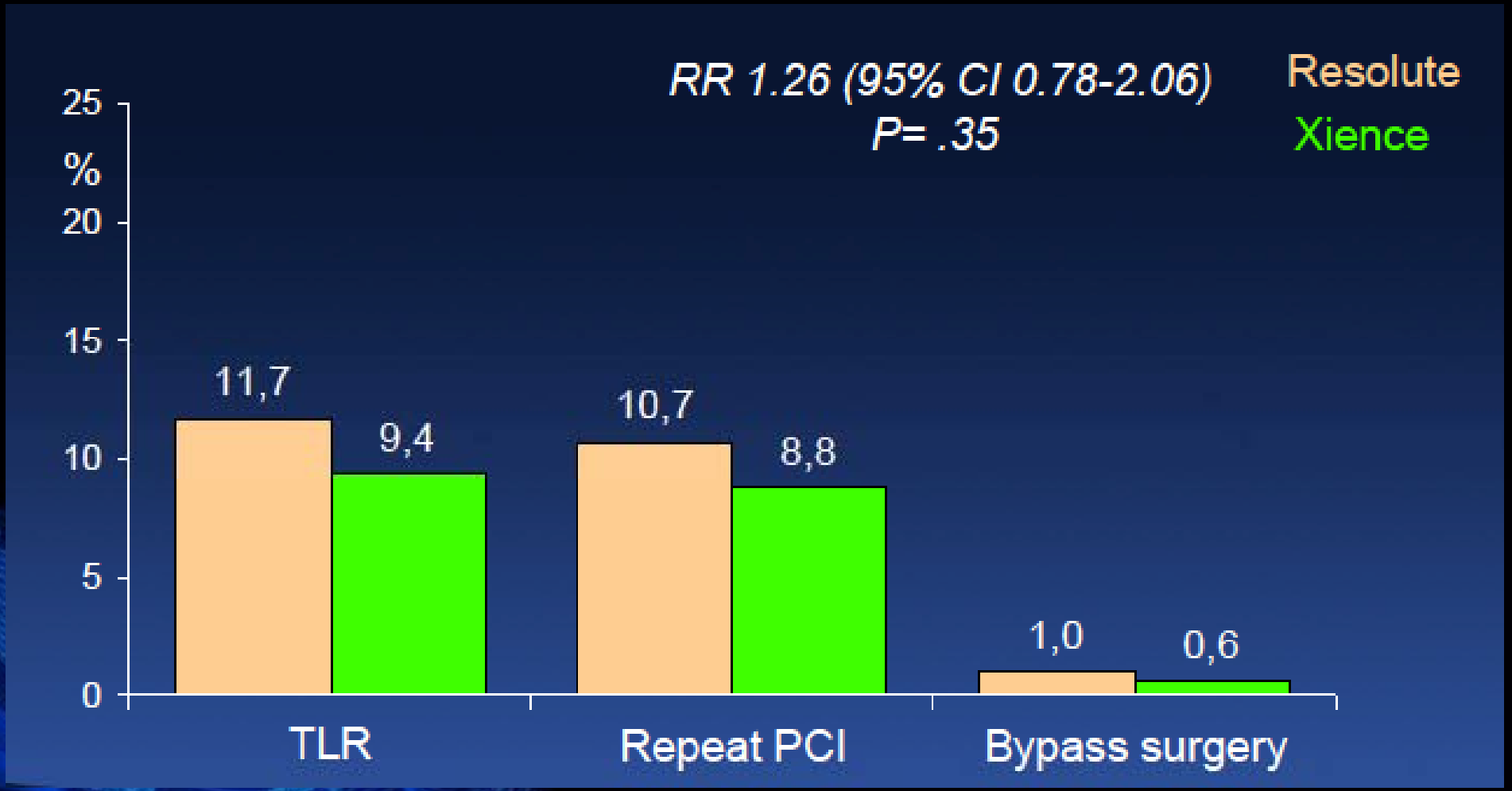
J. Mehilli, TCT 2012

ISAR Left Main 2: Incidence of Stent Thrombosis - *secondary endpoint* -



J. Mehilli, TCT 2012

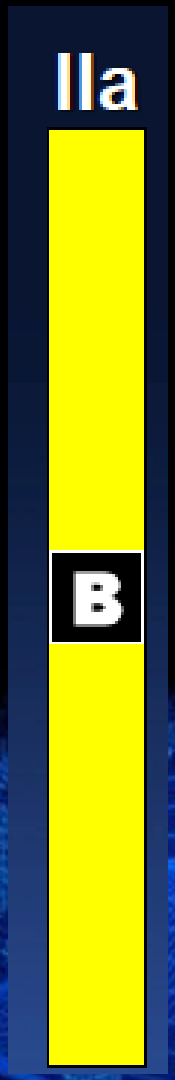
ISAR Left Main 2 : Target Lesion Revascularisation



J. Mehilli, TCT 2012

ACC / AHA Guidelines :

Left main PCI for Stable CAD



- Both must be present:

•Anatomic conditions associated with a low risk of PCI procedural complications and a high likelihood of good long-term outcome (e.g., a low SYNTAX score of ≤22, ostial or trunk left main CAD)

•Clinical characteristics that predict a significantly increased risk of adverse surgical outcomes (e.g. STS-predicted risk of operative mortality ≥5%)

2011 ACCF/AHA/SCAI Guidelines for PCI. JACC 2011;58;e44-e122;

ACC / AHA Guidelines :

Left main PCI for Stable CAD

Both must be present

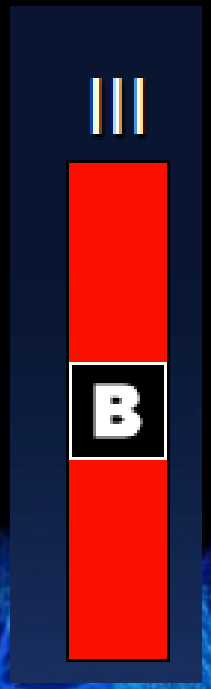
- Anatomic conditions associated with a low to intermediate risk of PCI procedural complications and an intermediate to high likelihood of good long-term outcome (e.g., low-intermediate SYNTAX score of <33, bifurcation left main CAD)

- Clinical characteristics that predict an increased risk of adverse surgical outcomes (e.g., moderate-severe COPD, disability from prior stroke, or prior cardiac surgery; STS-predicted risk of operative mortality >2%)

2011 ACCF/AHA/SCAI Guidelines for PCI. JACC 2011;58;e44-e122;

ACC / AHA Guidelines :

Left main PCI for Stable CAD



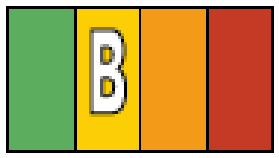
HARM

- In patients with unfavorable anatomy for PCI (e.g. Syntax score ≥33) and who are good candidates for CABG (vs. performing CABG)

2011 ACCF/AHA/SCAI Guidelines for PCI. Levine et al. JACC 2011;58;e44-e122;

2012 SIHD Guidelines: Heart Team Approaches to Revascularization Decisions

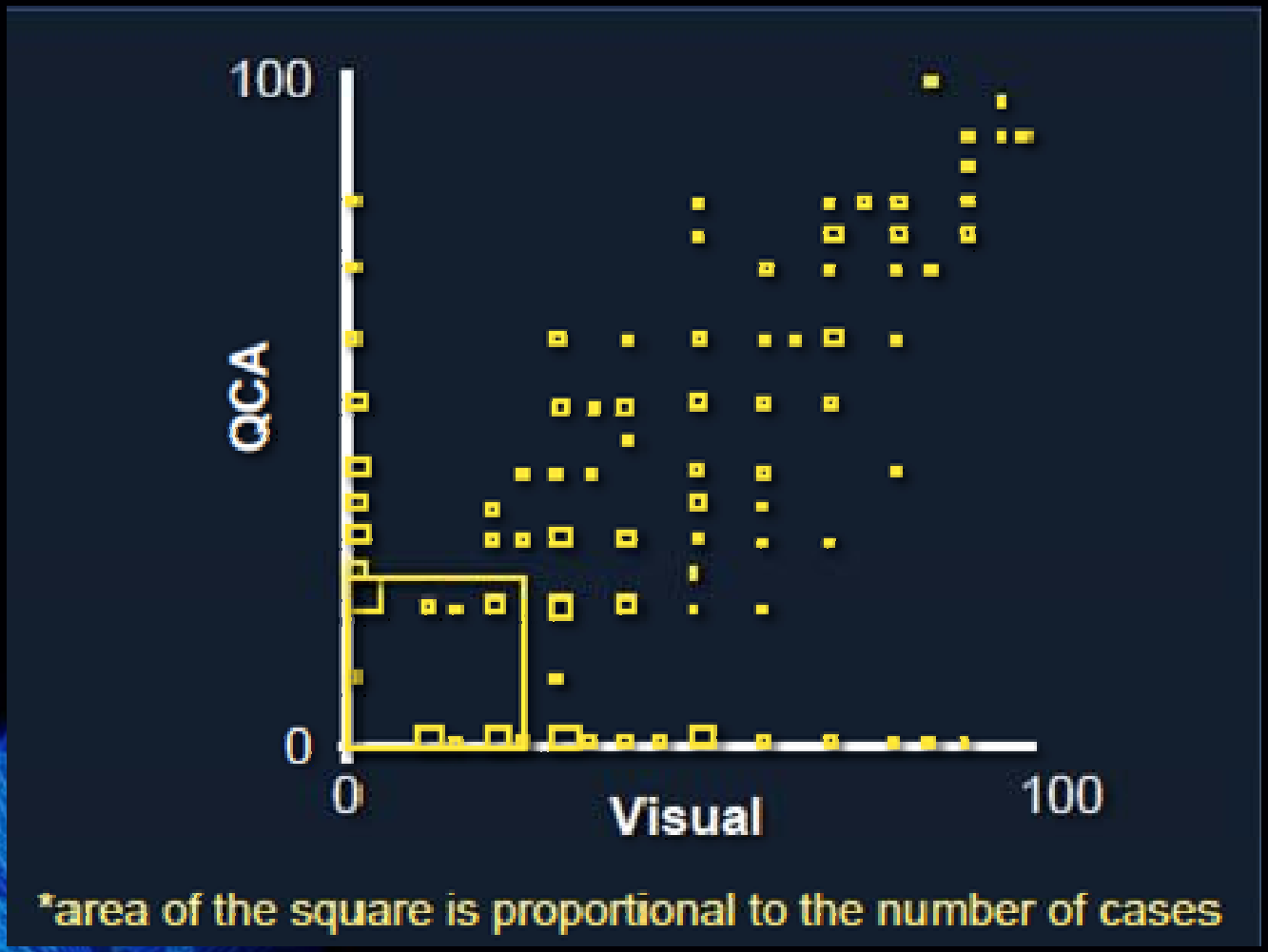
A Heart Team approach to revascularization is recommended in patients with unprotected left main or complex CAD.



Calculation of the STS and SYNTAX scores is reasonable in patients with unprotected left main and complex CAD.

Optimisation of LMS Intervention: Tools & Techniques

Angiographic Variability in visual vs QCA assessment of LMCA DS%

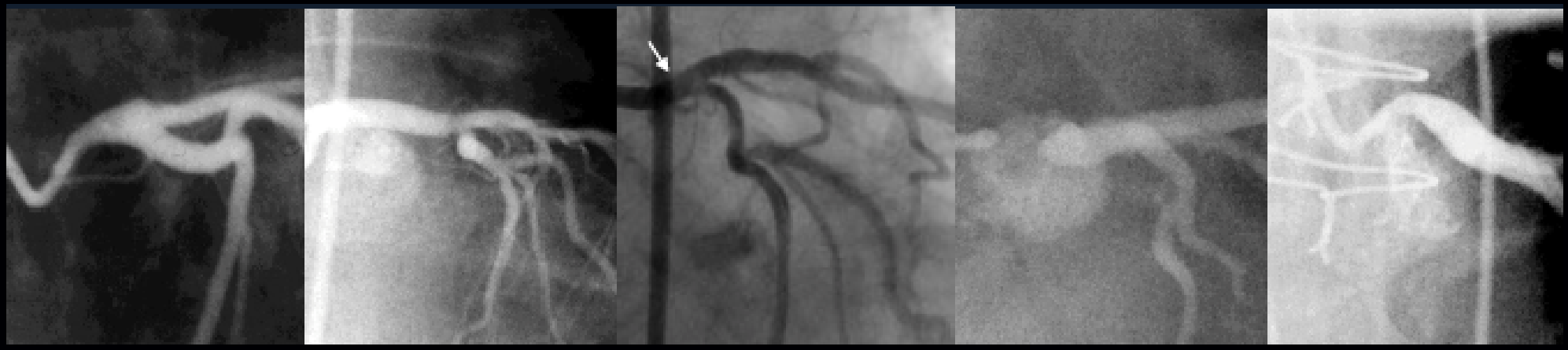


LMCA has the greatest angiographic variability

Fisher et al. Cathet Cardiovasc Diagn 1982;8:565-75

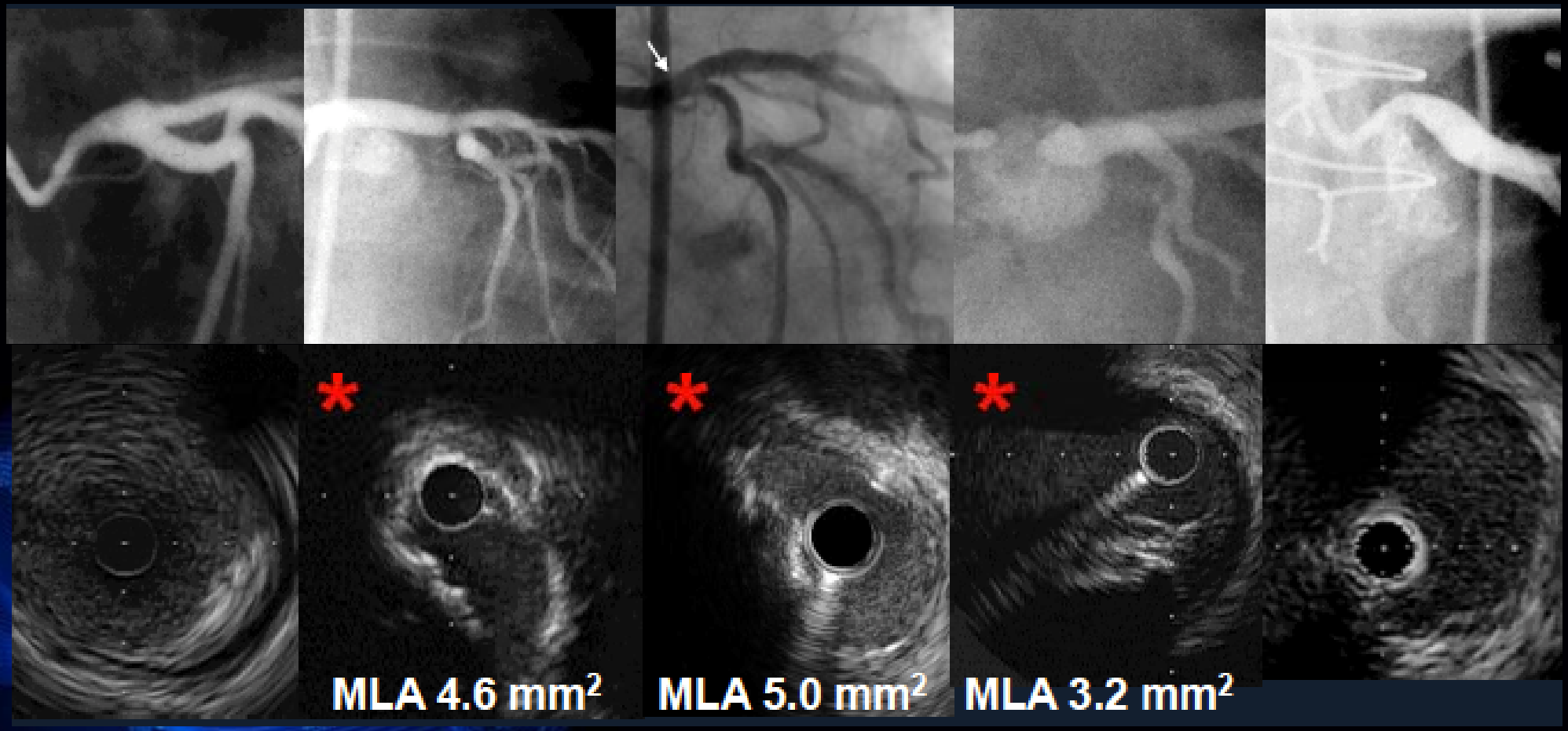
Left Main Disease:

Which is Significant Angiographically



Left Main Disease:

Which is Significant Angiographically – Versus IVUS Assessment

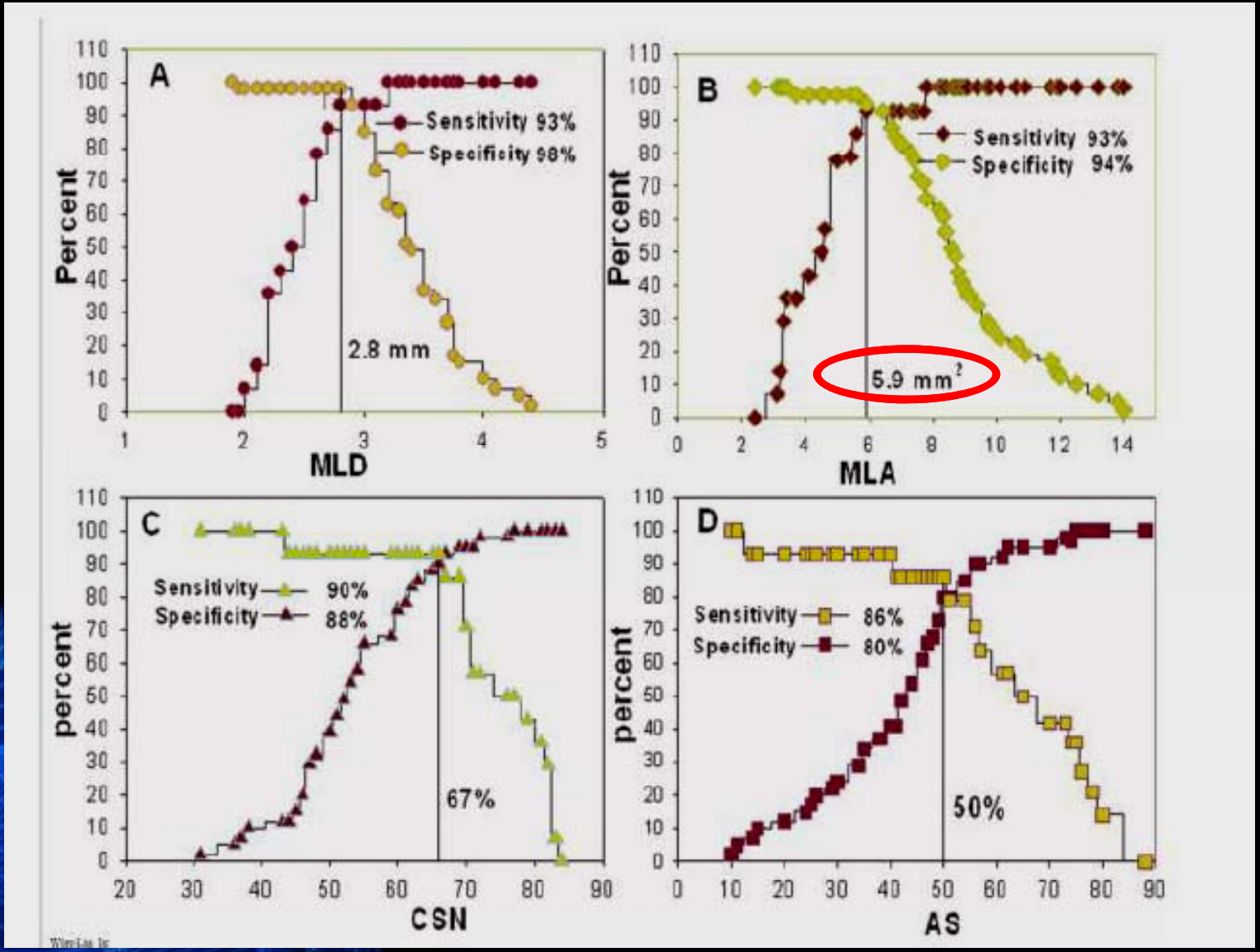


IVUS Assessment of Ischaemia – based on MLA (mm^2)

- Proximal epicardial vessels: < 4.0 mm^2
- Left main stem : < 6.0 mm^2

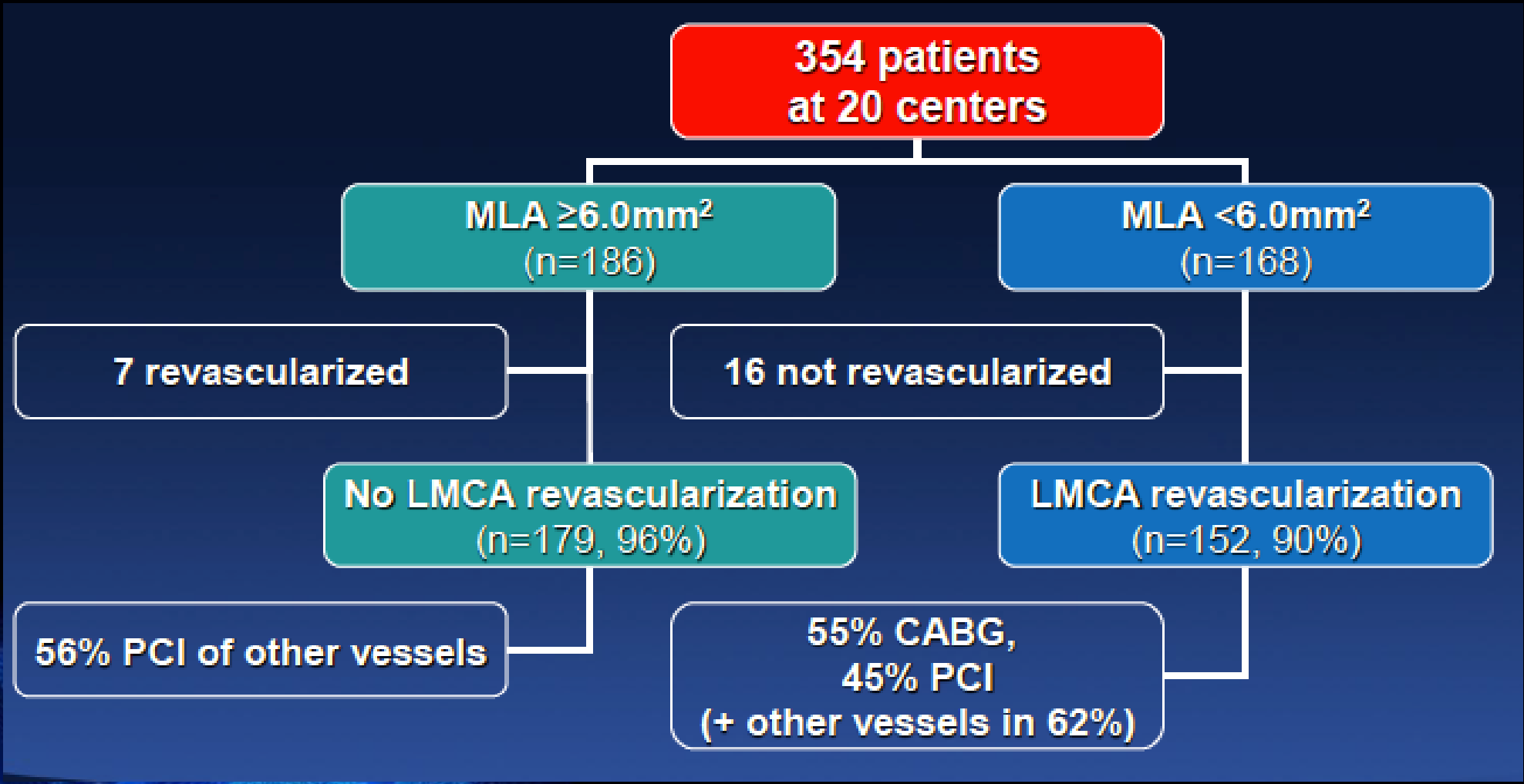
IVUS determinants of LMCA FFR < 0.75

55 patients with ambiguous LMCA stenoses



Jasti et al. Circulation 2004; 110: 2831-6

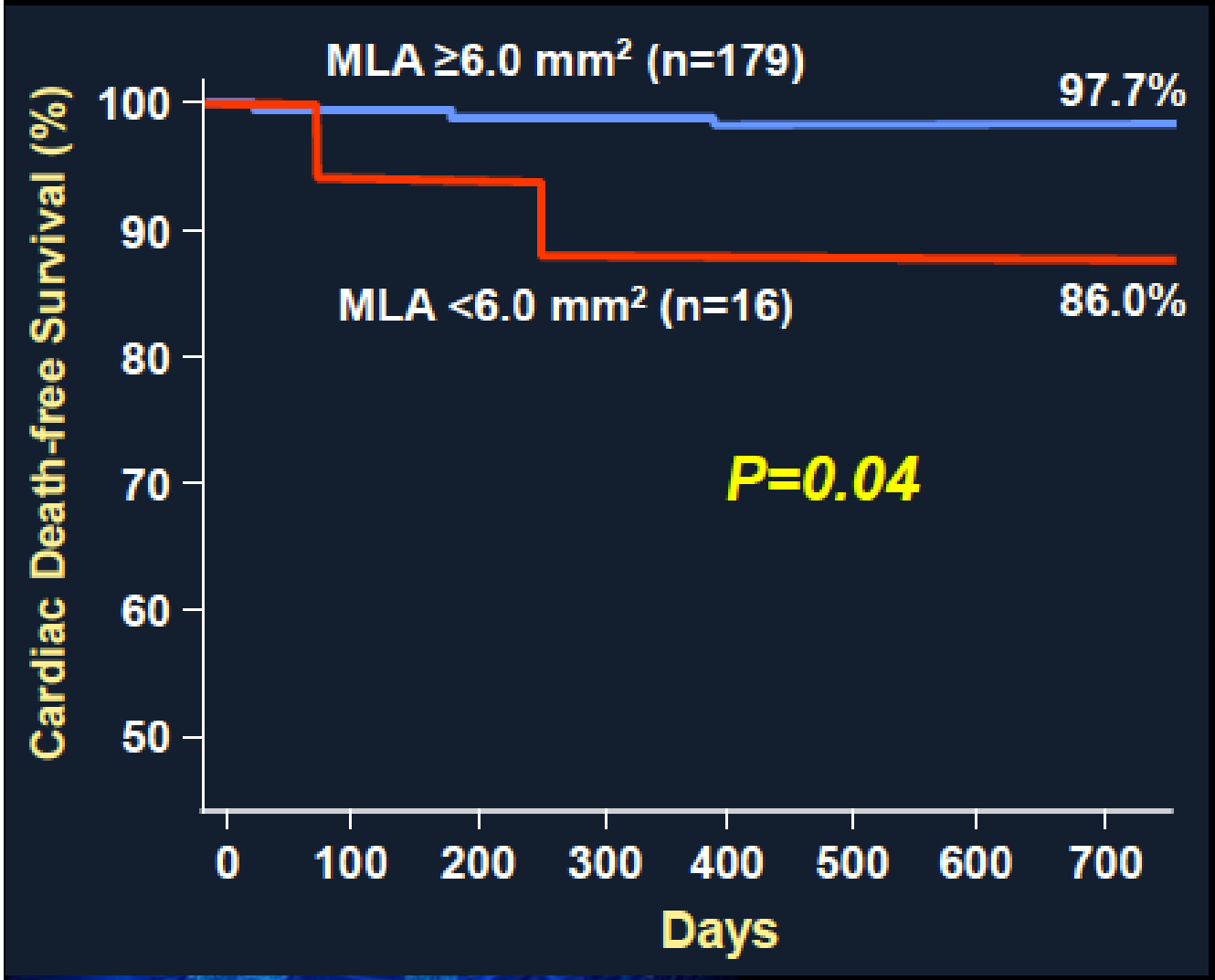
The LITRO Study



Prospective application of predefined IVUS criteria for revascularization of intermediate LM lesions:

De La Torre Hernandez et al. *JACC* 2011;58:351-8

LITRO: 2-year FU in Pts Without LM Revascularization According to MLA



Survival free from cardiac death, MI, or revascularization (MACE) was 62.5% in the in the group with MLA <6.0 mm2 vs. 87.3% in the group with MLA ≥6.0 mm2 *(p=0.02)*

De La Torre Hernandez et al. *JACC* 2011;58:351-8

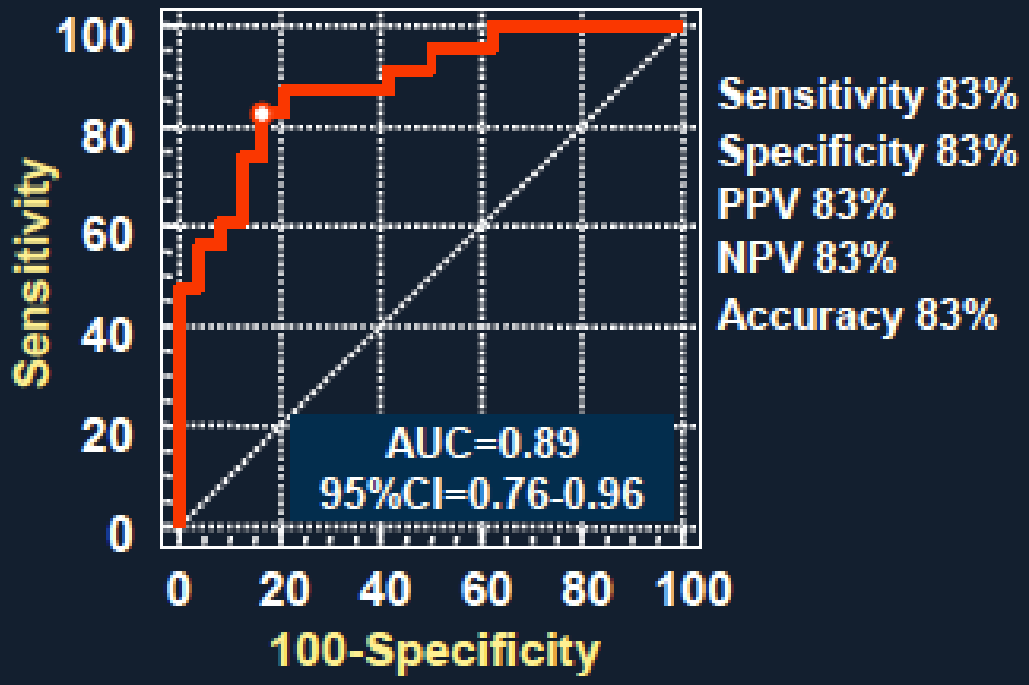
IVUS Determinants of LM FFR (n=47)

Independent predictors of FFR (continuous variable)

MLA (*p<0.001*) and plaque burden (*p=0.036*)

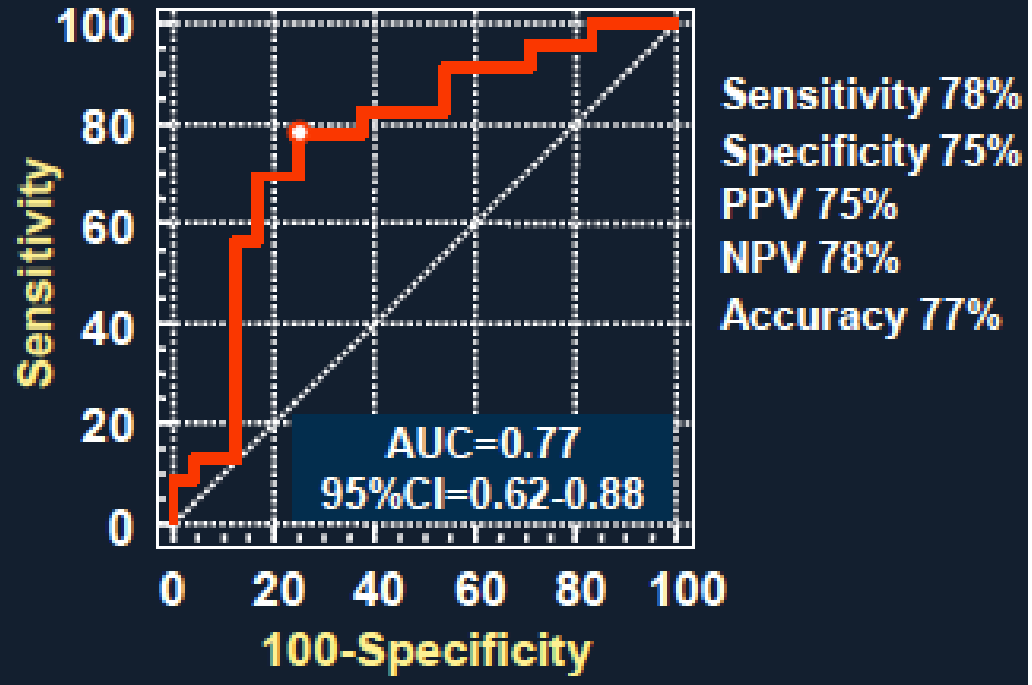
MLA predicting FFR<0.80

Cut-off = 4.8 mm^2



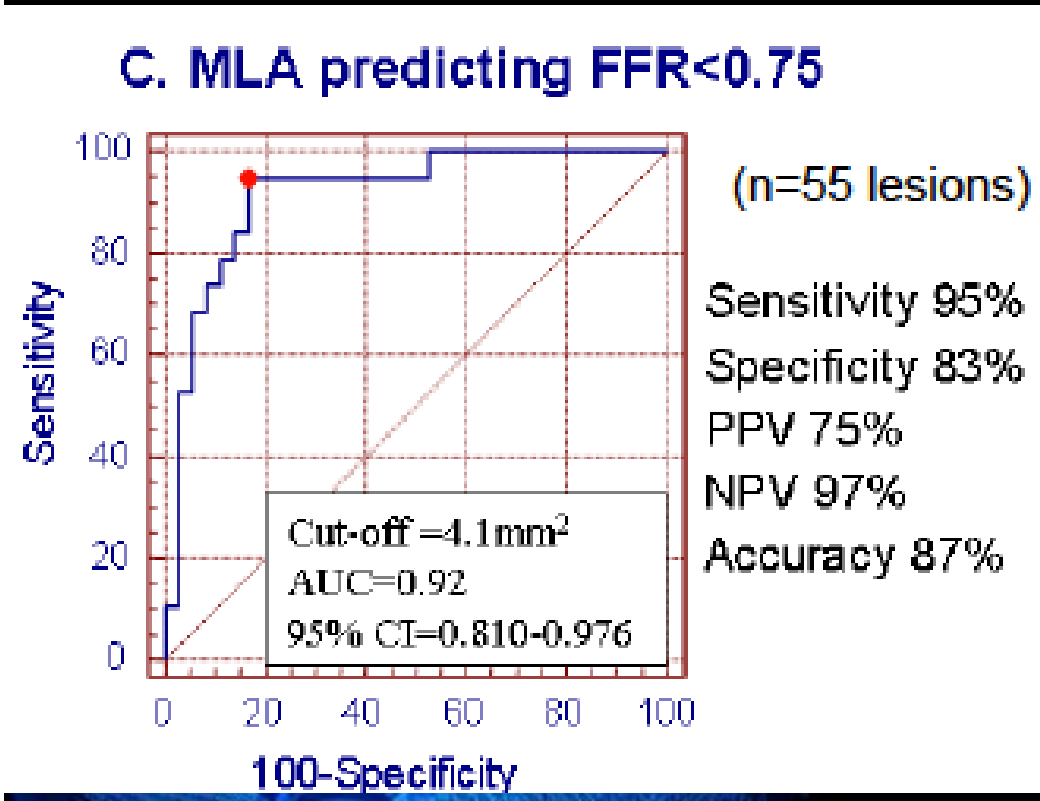
PB predicting FFR<0.80

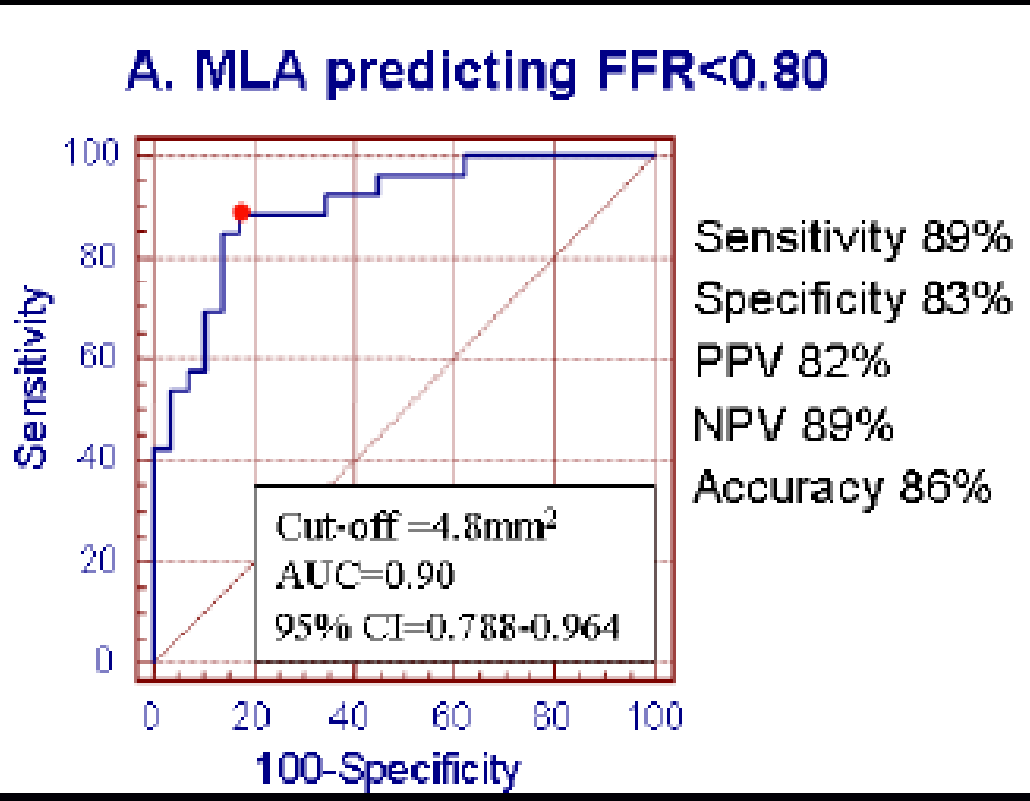
Cut-off = 72%



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

New LM IVUS MLA Criteria for Intervention Matched with FFR <0.80





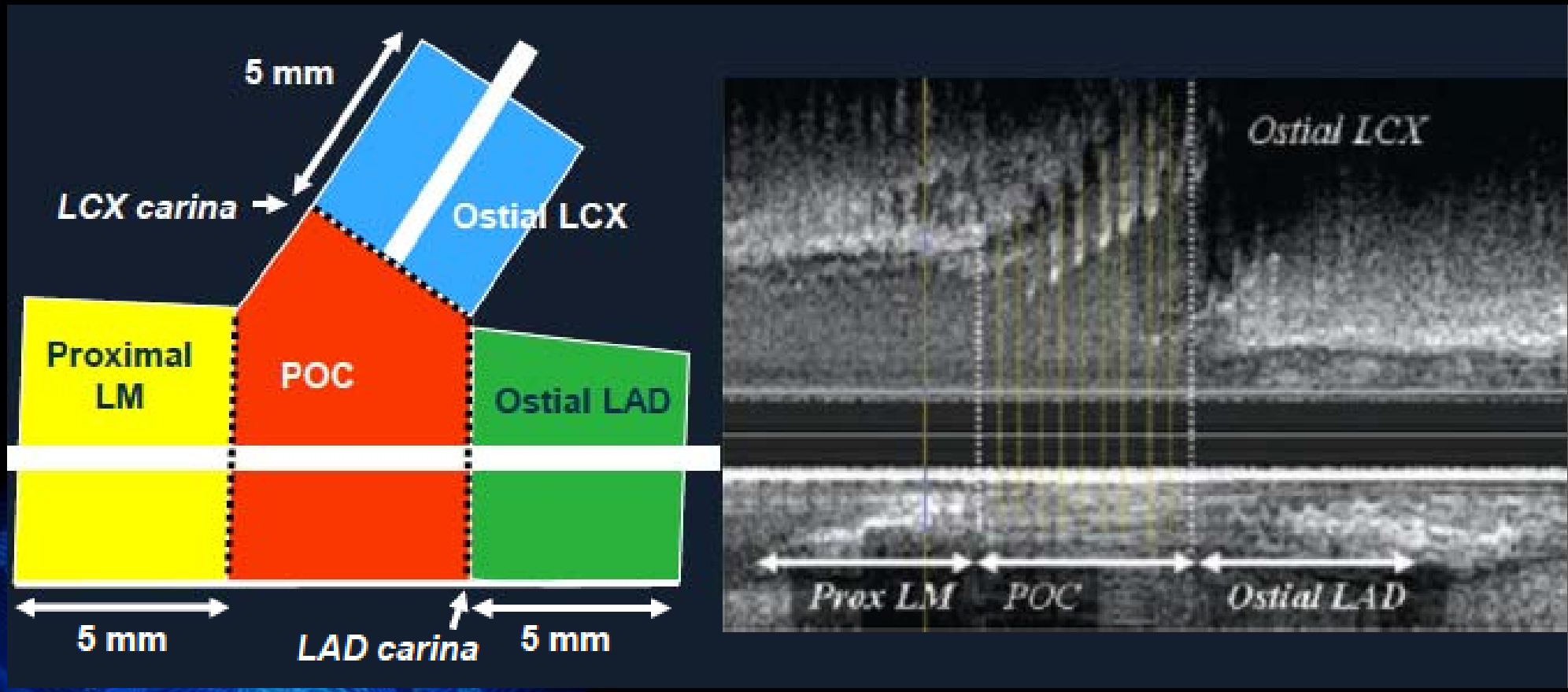
4.1 mm^2

4.8 mm^2

Kang SJ, et al, JACC. Cardiovascular Interventions. 2011 Nov;4(11):1168-74.

Post-Stenting IVUS Evaluation : Criteria for Stent Underexpansion at the Distal LM Bifurcation Complex

(n=403 with Routine 9-month Angio FU): IVUS Segmentation



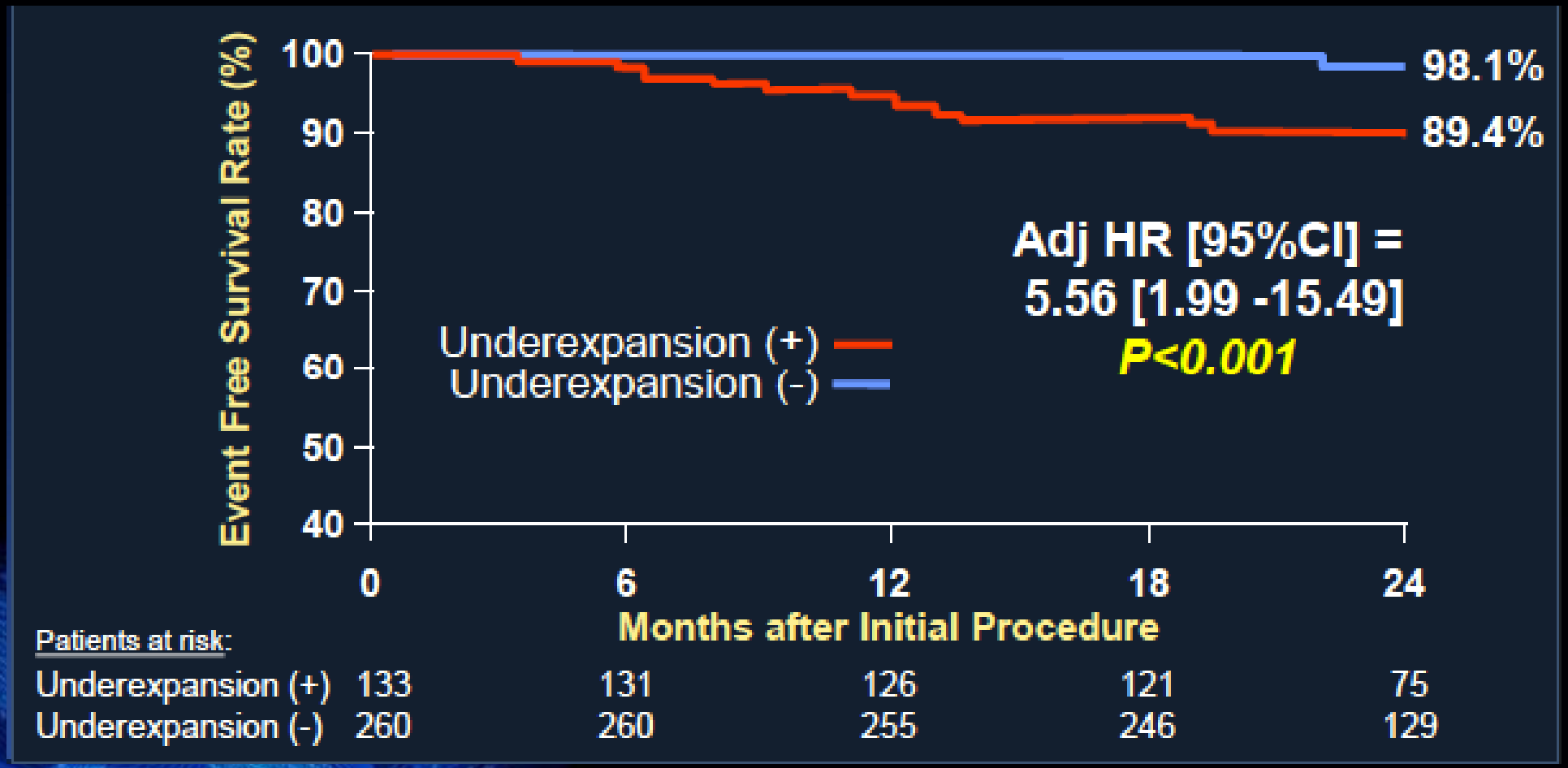
POC = polygon of confluence

Kang et al. *Circulation Cardiovasc Interv*. 2011;4:562-9

Stent Underexpansion Predicts MACE

133 pts (33.8%) had ≥ 1 segment underexpansion(UE)

N=403; Routine 9-mth Angio F/up



LCX not imaged in 10 2-stent pts

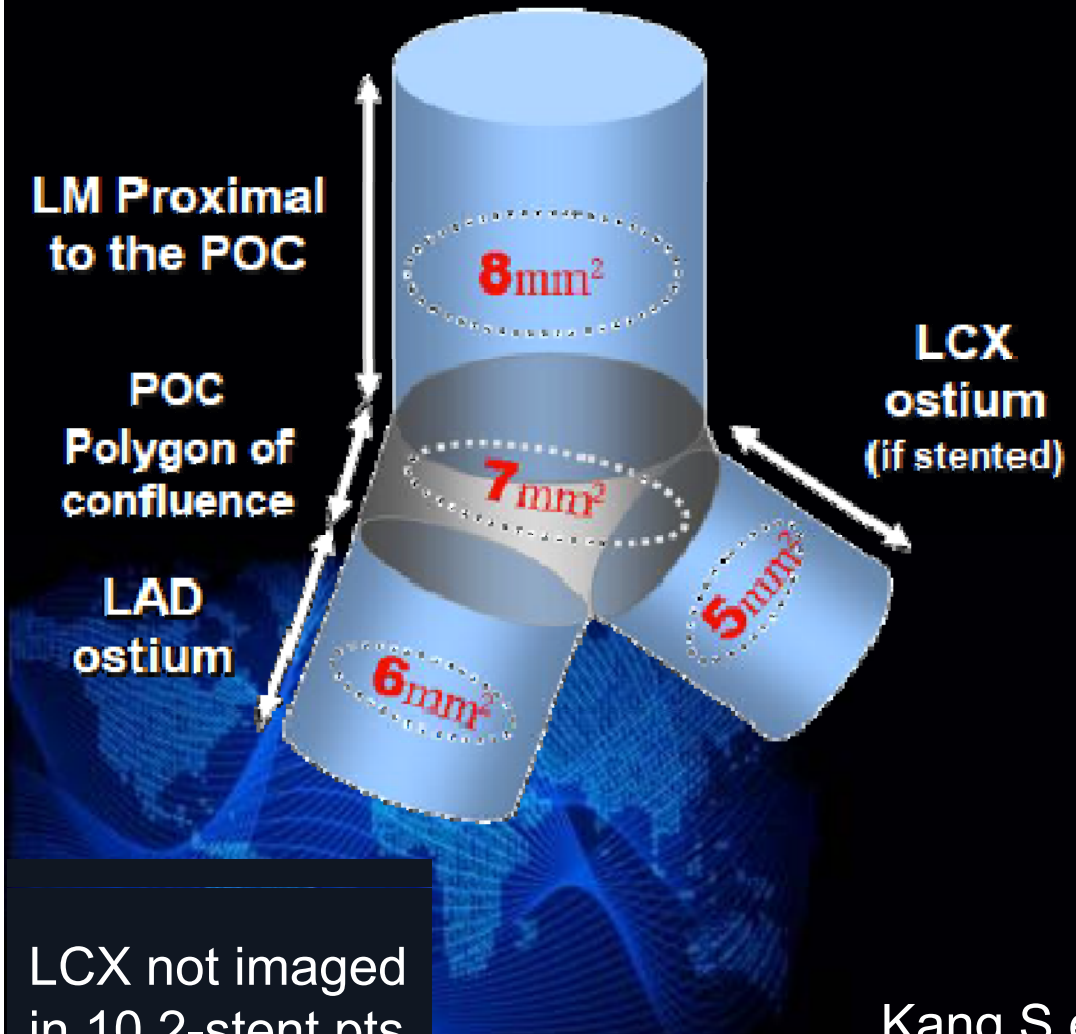
Kang S et al. Circ Cardiovasc Interv 2011;4:562-569

Stent Underexpansion Predicts MACE & TLR

133 pts (33.8%) had ≥ 1 segment underexpansion(UE)

N=403; Routine 9-mth Angio F/up

Optimal expansion criteria (post hoc)



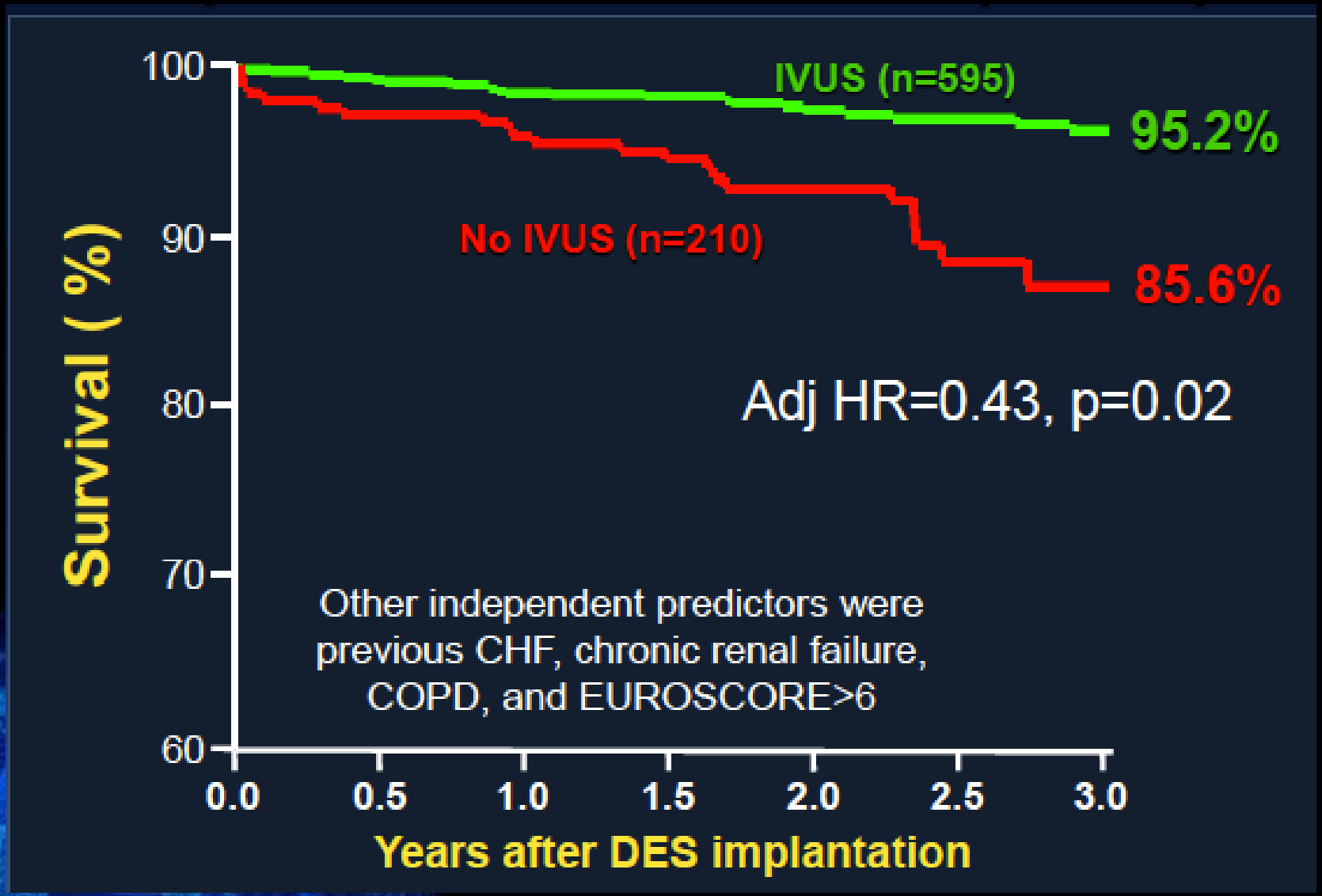
LCX not imaged in 10 2-stent pts

2-year MACE-free survival was lower in pts with vs. without underexpansion (89.4% vs. 98.1%; adj HR 5.56 [1.99 -15.49]; P<0.001)

2-year TLR-free survival was lower in pts with vs. without underexpansion (90.9% vs 98.5%; adj HR 6.08 [1.94 - 19.02]; P=0.002); 12/16 TLRs (80%) occurred in cases with underexpansion

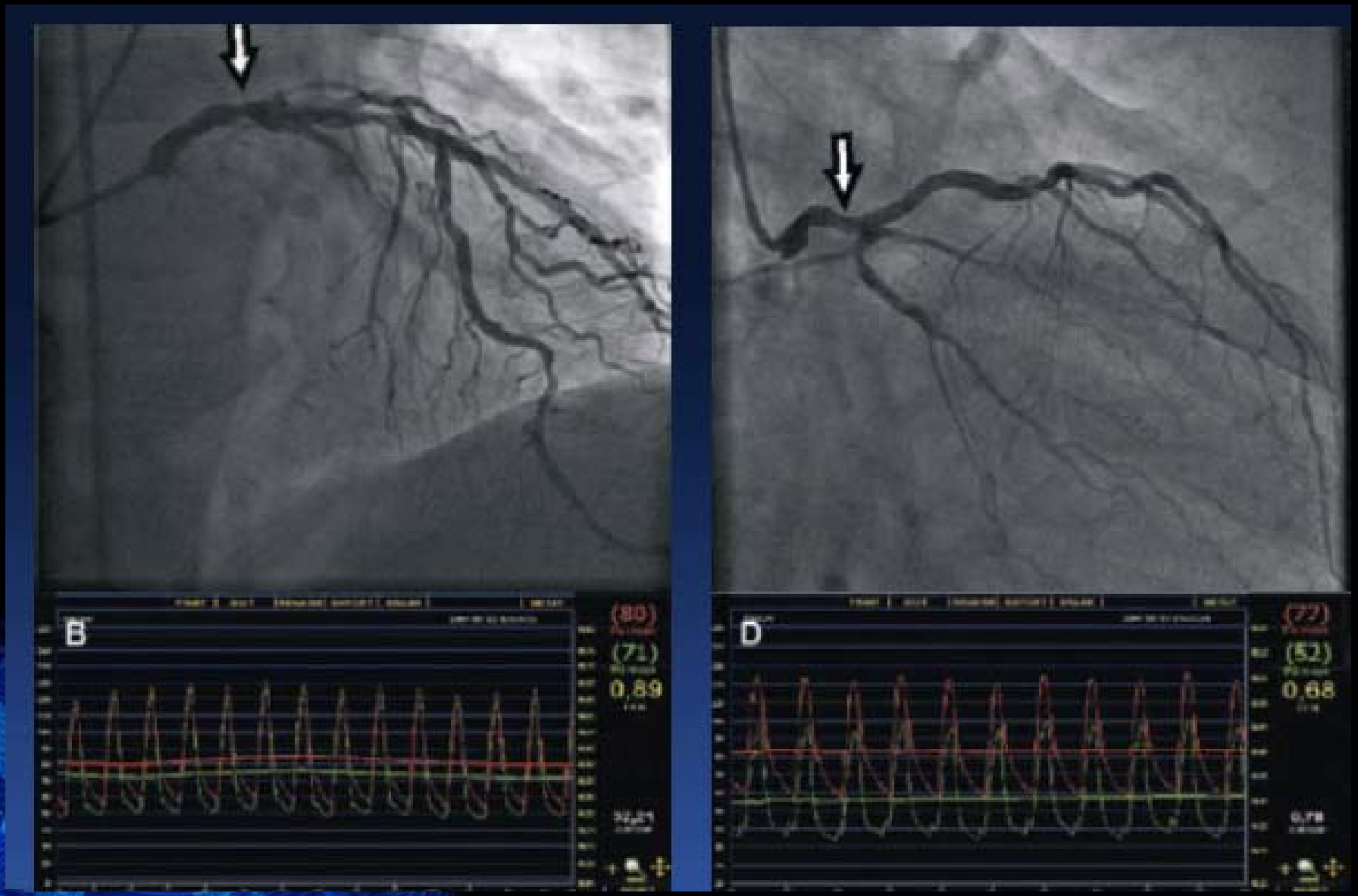
Kang S et al. Circ Cardiovasc Interv 2011;4:562-569

MAIN-COMPARE: Impact of IVUS guidance on mortality after LMCA-DES Implantation



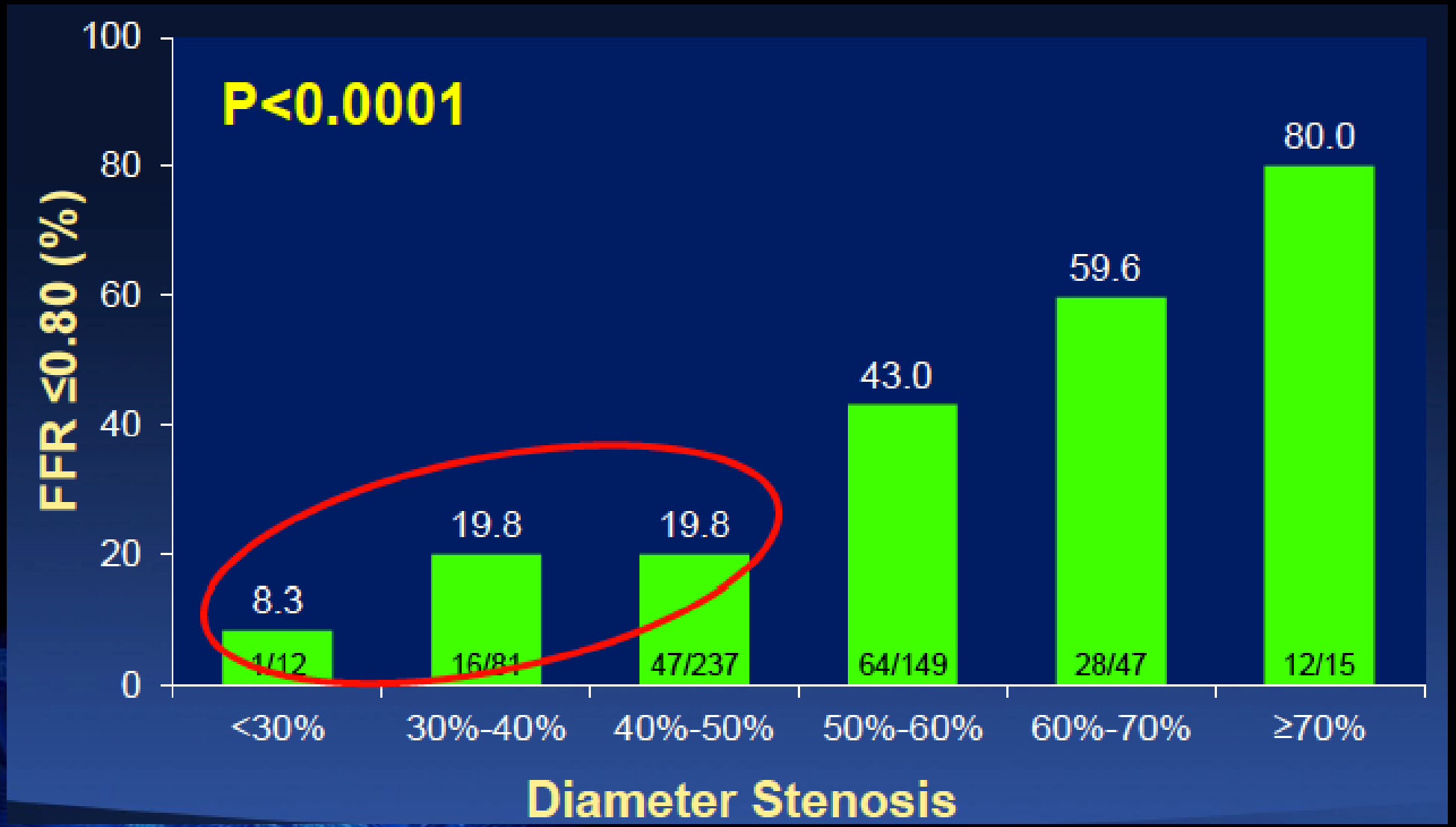
Park SJ. ***Circ Cardiovasc Intervent. 2009;2:167-177***

Visual assessment vs. LM FFR



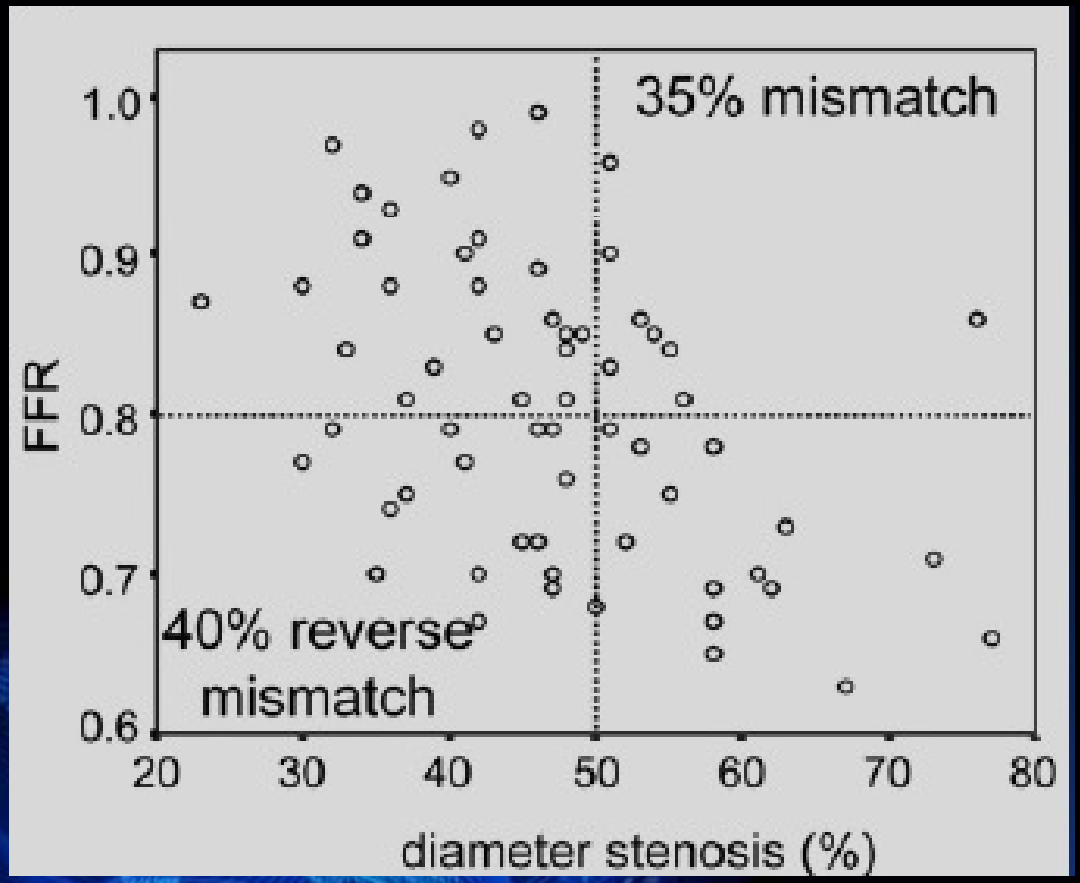
Hamilos M et al. Circulation 2009;120:1505-1512

QCA DS% and FFR Correlation



VERDICT & F1RST studies. Stone GW. TCT2012; submitted

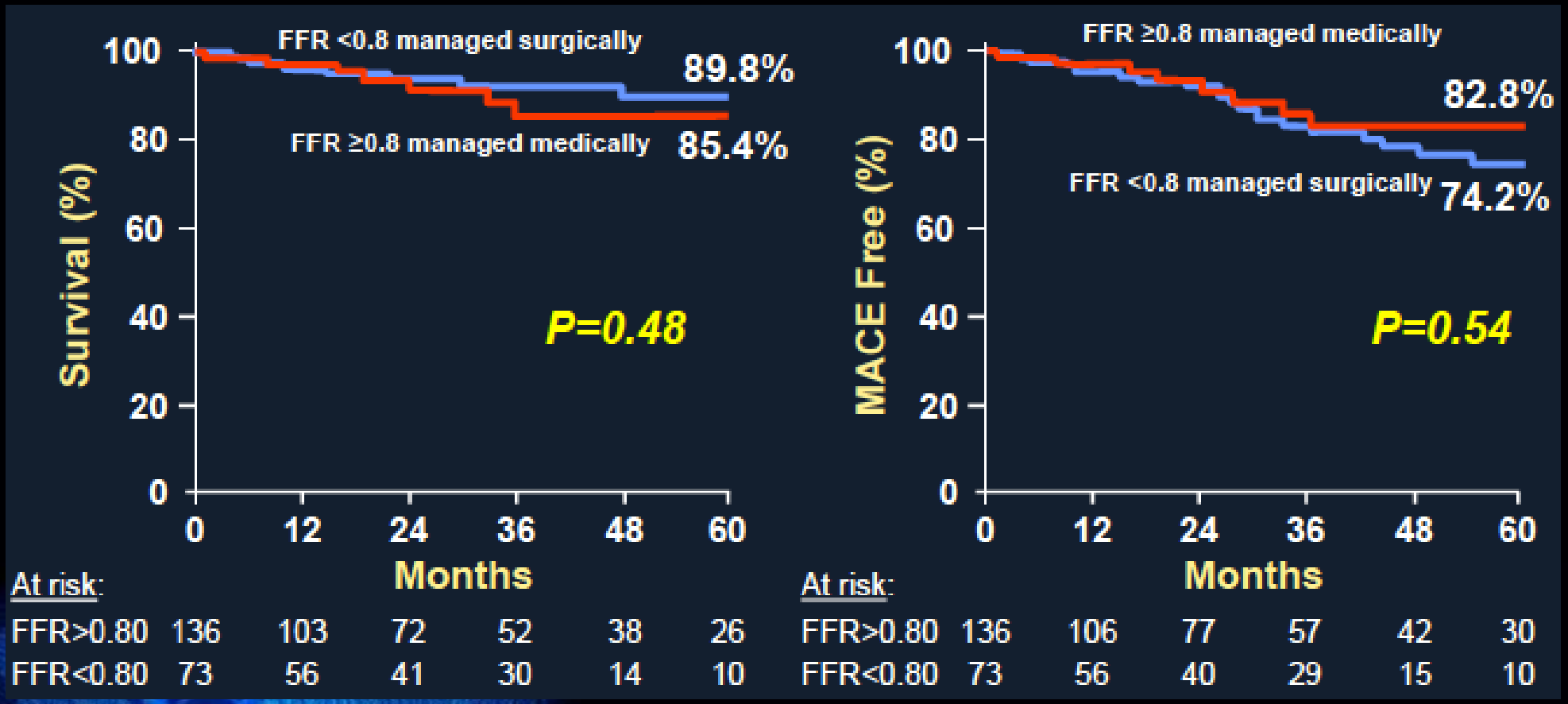
Visual-Functional Mismatch in LMCA Lesions: FFR vs. QCA 63 LMCA lesions included in overall analyses



- LMCA lesions had a greater frequency of reverse mismatch (underestimation), but lower mismatch (overestimation)
- The presence of plaque rupture influenced the assessment of mismatches

S-J Park et al, JACC CV Intv 2012

136 LM pts with FFR ≥0.8 managed medically vs. 73 LM pts with FFR <0.8 managed surgically: 5-year follow-up

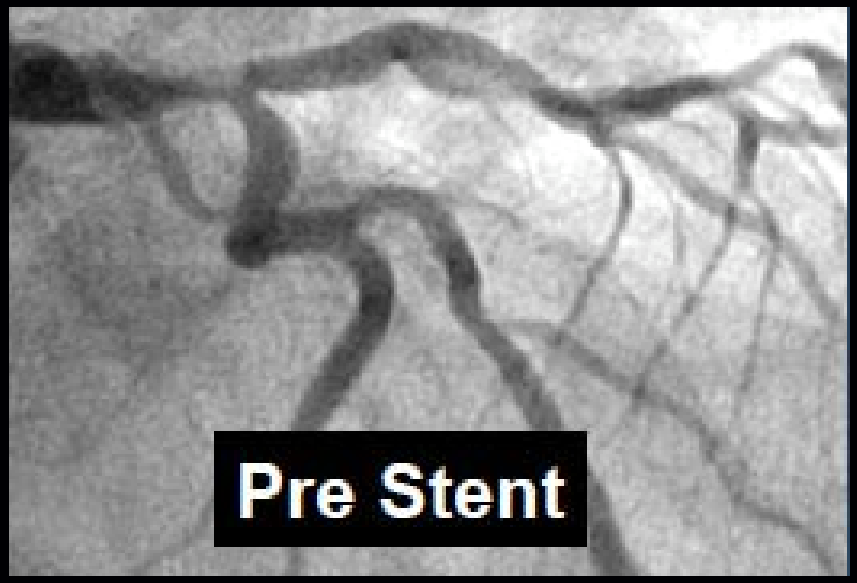


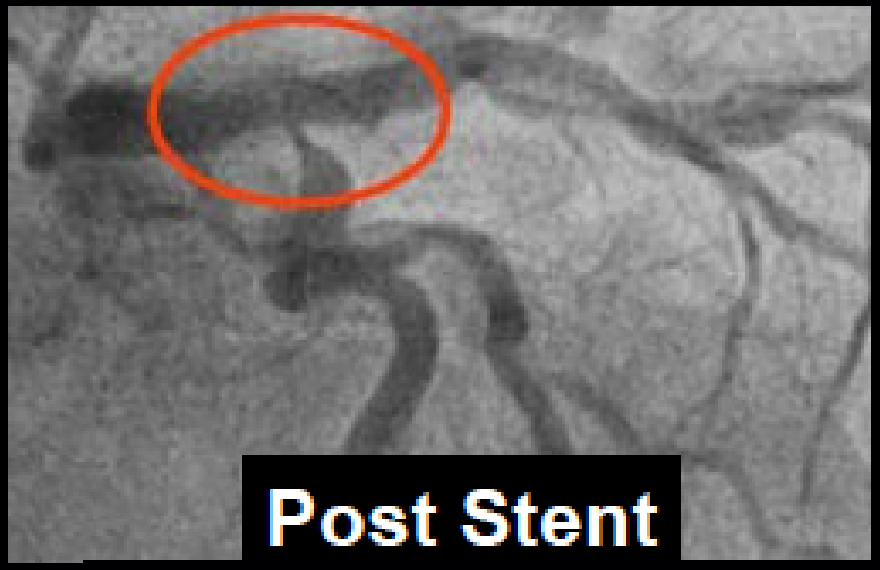
Isolated LM ds: 5-yr survival: 100% Med vs 75% Surg (*P=0.32*)

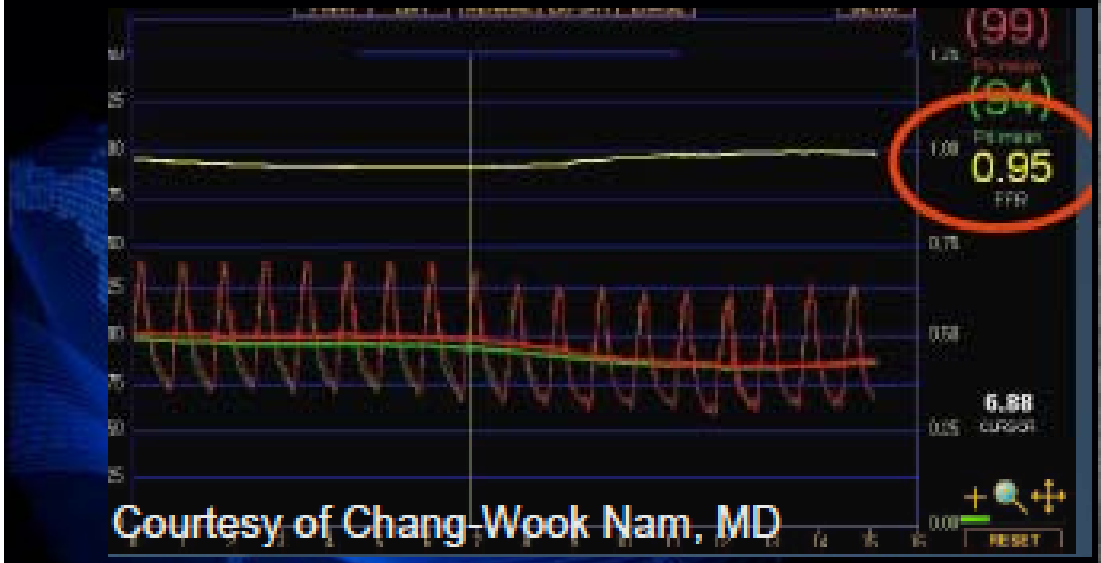
Isolated LM ds: 5-yr MACE-free survival: 70% Med vs 66% Surg (*P=0.54*)

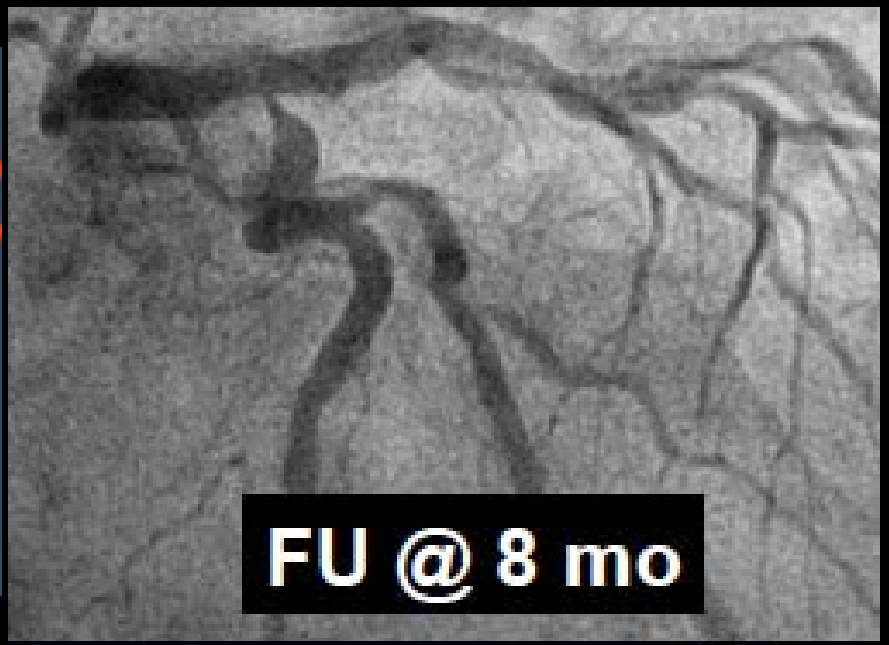
Hamilos M et al. *Circulation* 2009;120:1505-1512

Jailed LCx ostium:
Should you do something about it?



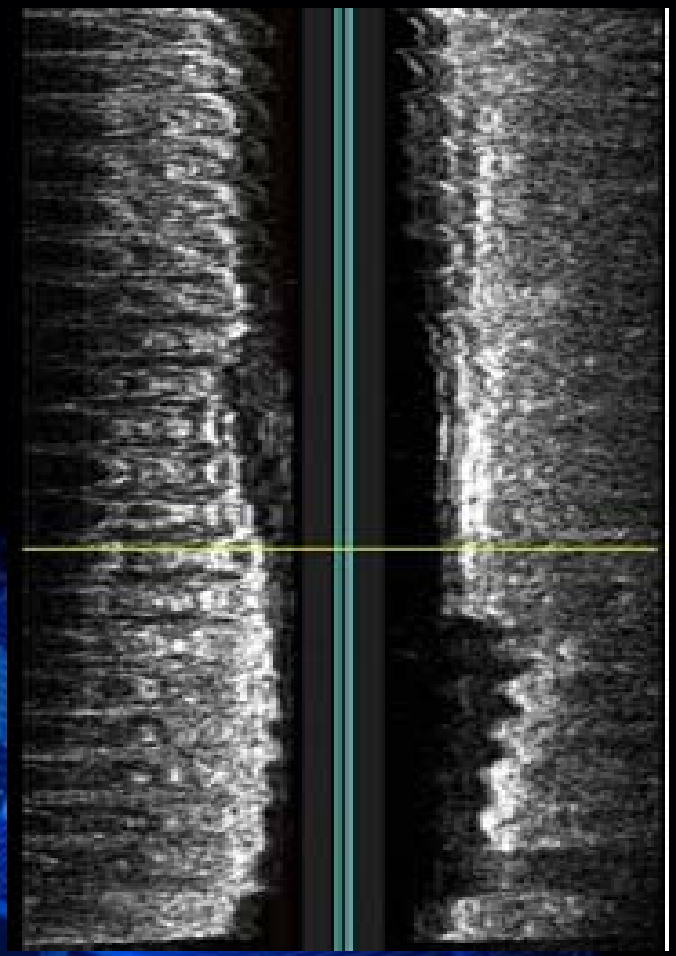




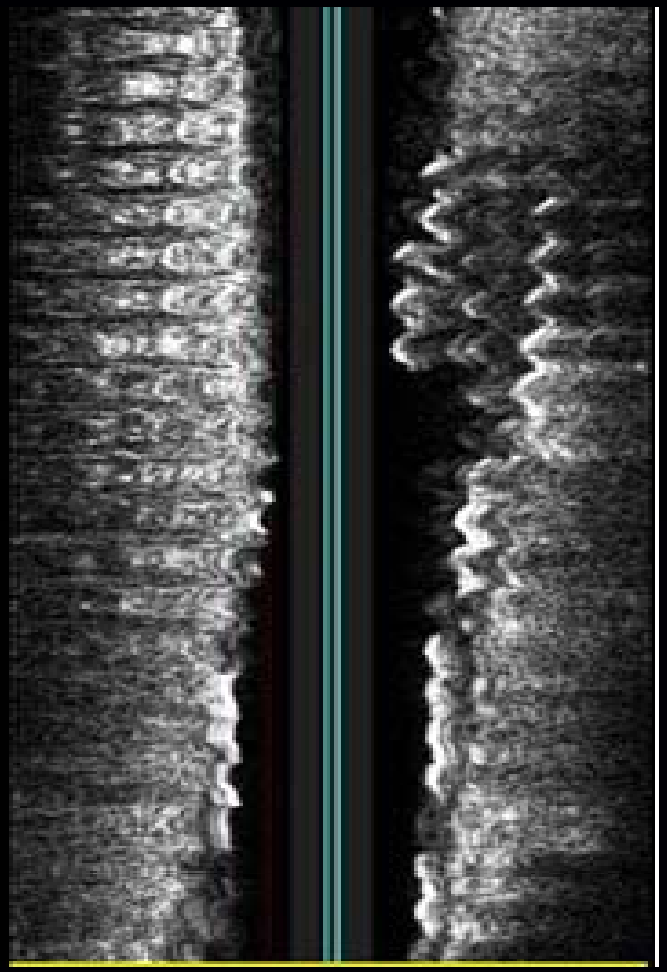


Carina Shift : Post-LM Crossover Single Stent Placement

LCX – Pre LAD Stent (Longitudinal View)



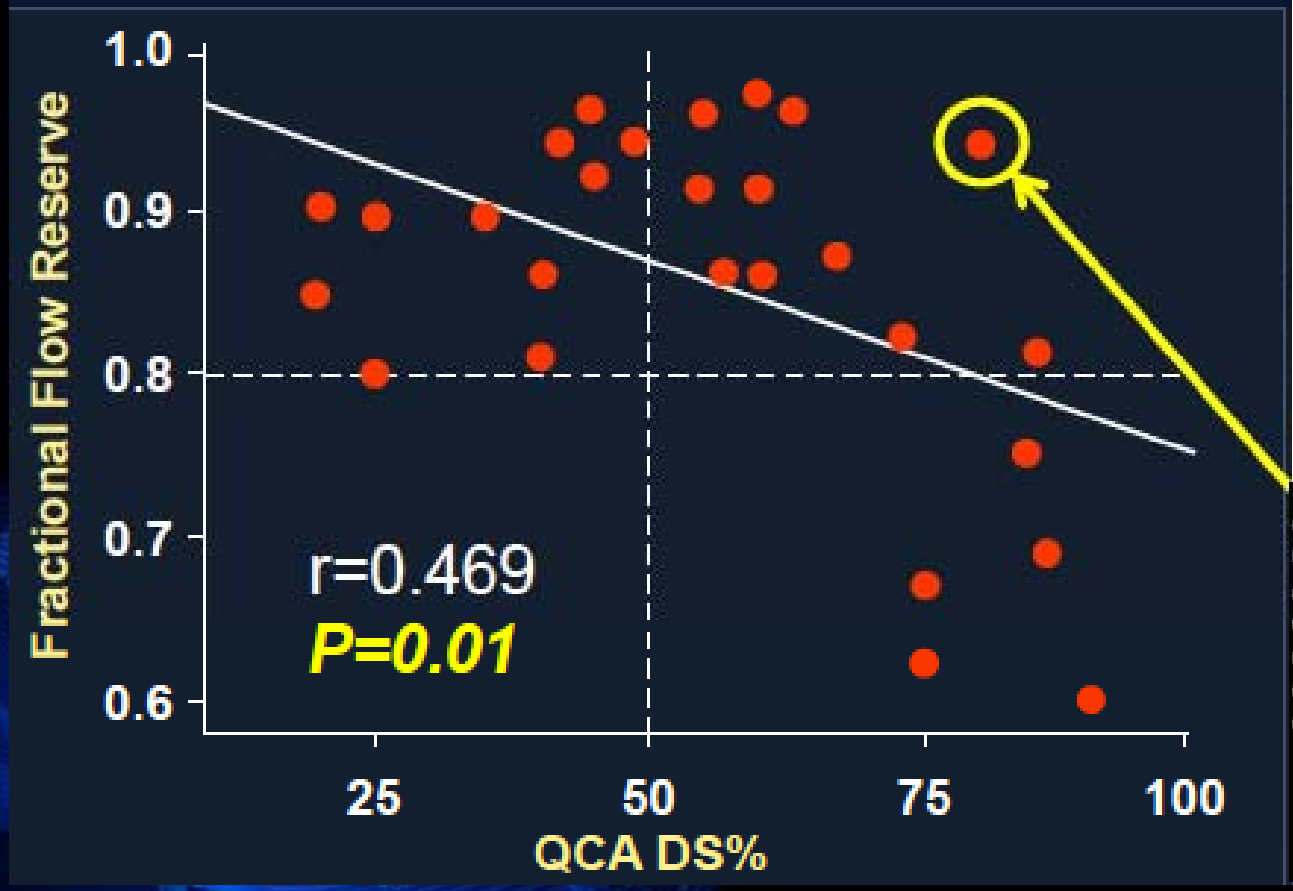
LCX – Post LAD Stent (Longitudinal View)

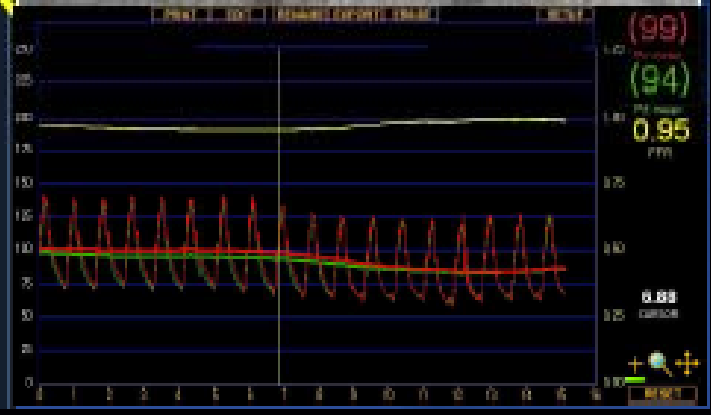


Pullback from LCx artery

FFR of "Jailed" LCX After Stent from LM to LAD in 29 Pts

By QCA ostial LCX DS increased from 30±15% pre to 56±21% post (>50% in 17 (59%) cases). FFR ≤0.80 in 5 (17%).

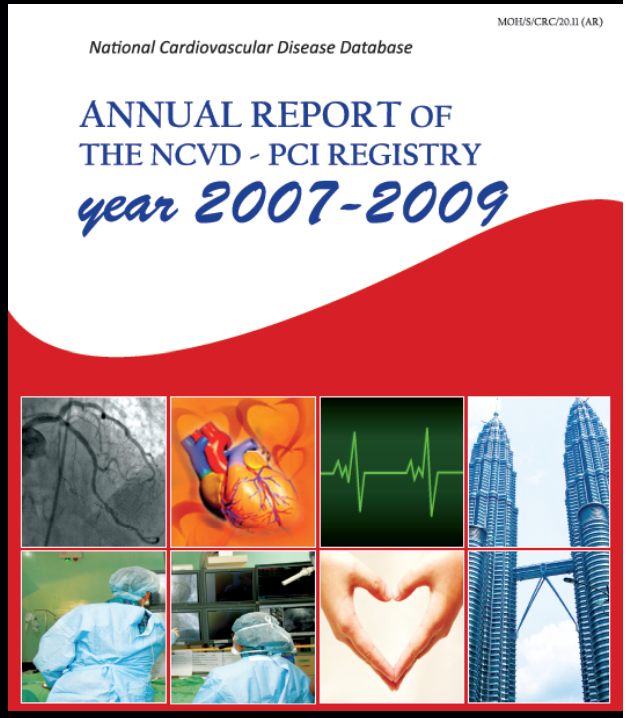




Nam CW et al. *Korean Circ J* 2011;41:304-7

Malaysia NCVD PCI registry – LMCA PCI

NCVD PCI Registry - Malaysia



- 2007-2009 Report:

- Total patients = 10602
- Total reported procedures = 11,498
- Number of intervened lesions : 15,538
- LMS : 1.8% of lesions

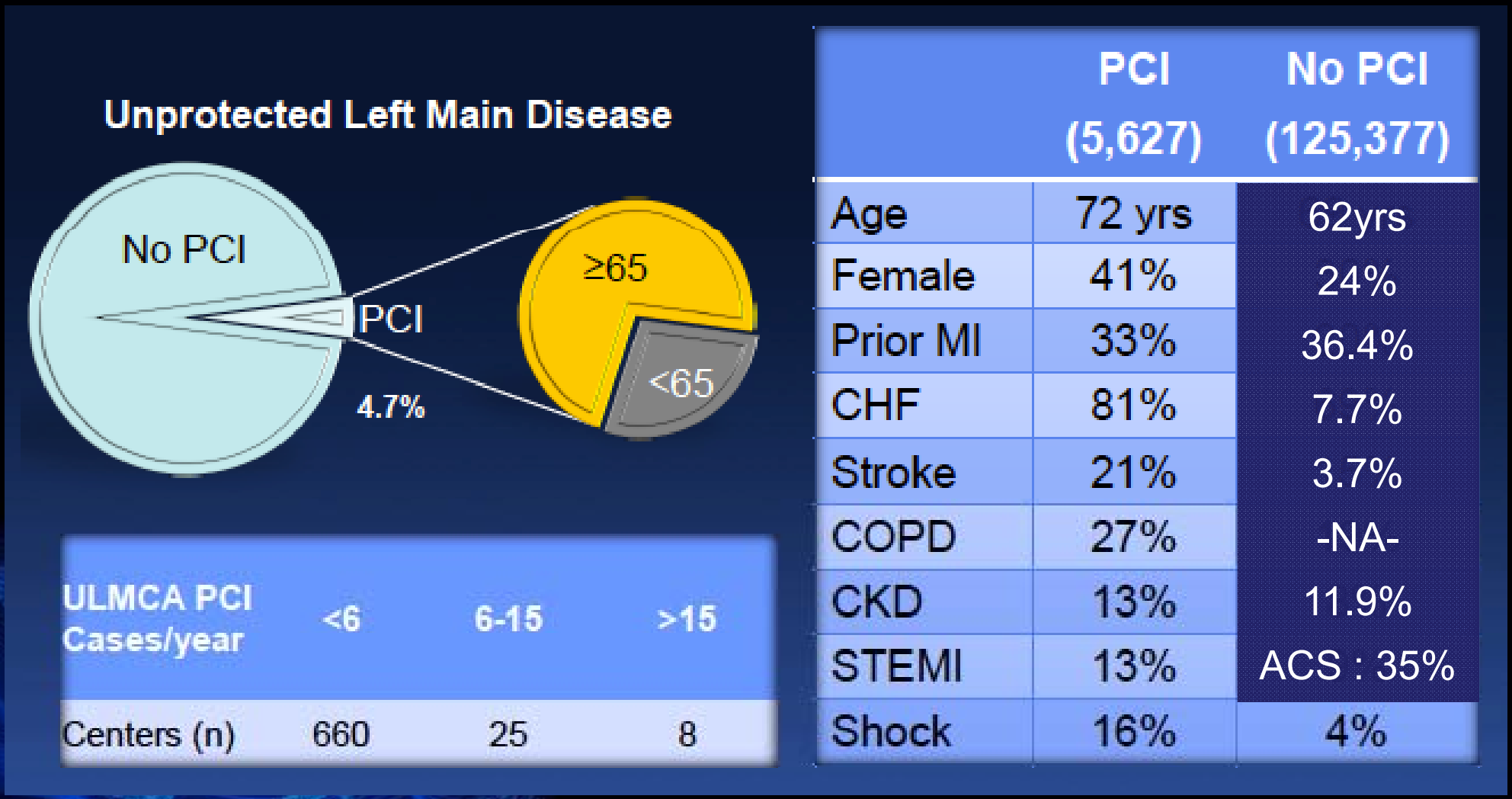
NCVD PCI Registry – LM Subgroup

- This Analysis 2007-2010:
- Total patients = 13223
- Total reported procedure = 20774
- LMS procedure
  - Total patients = 352 (2.7% of patients)
  - Total procedure = 369

Demographic

	All patients	Patients undergone LMS intervention	Significance
Number of patients	13223	352	
Mean age in years (SD)	57.2 (10.2)	61.6 (11.1)	p < 0.001
Body mass index (kg/m2)	26.7 (5.0)	26.2 (2.0)	
Gender (Male:Female)	81%:19%	76%:24%	
Hyperlipidemia	76.0%	80.0%	
Hypertension	73.9%	73.7%	
Diabetes Mellitus	47.1%	50.1%	
Previous myocardial infarct	44.0%	36.4%	p = 0.009
Heart failure	4.3%	7.7%	
Cerebro-vascular disease	1.4%	3.7%	
Renal impairment	6.8%	11.9%	p=0.004
Previous bypass surgery	4.2%	13.9%	P < 0.001
Presentation as acute coronary syndrome	43.3%	35.0%	
Smoking status			
Never smoked	44.7%	52.4%	
Former smoker	32.9%	30.8%	
Current smoker	22.4%	16.8%	

Unprotected LM PCI in the USA NCDR CathPCI, 2004 - 2008



ULMCA PCI Cases/year	<6	6-15	>15
Centers (n)	660	25	8

	PCI (5,627)	No PCI (125,377)
Age	72 yrs	62yrs
Female	41%	24%
Prior MI	33%	36.4%
CHF	81%	7.7%
Stroke	21%	3.7%
COPD	27%	-NA-
CKD	13%	11.9%
STEMI	13%	ACS : 35%
Shock	16%	4%

J.M. Brennan et al, JACC 2012 and TCT 2012

LMS intervention

- Majority of the left main stem intervention was done on unprotected LMS.
- Only 49 of 352 (13.9%) patients had previous CABG

Clinical Presentation of LMS disease

Clinical Presentation	Number	Percentage of total LMS-PCI procedure (%)
Elective PCI	239	65.3
ST elevation Myocardial Infarct	56	15.2
NSTEMI/Unstable Angina	72	19.5

NCVD PCI Registry Malaysia 2007-2010

LMS Lesion types

	Number	Percentage
De Novo	371	90.9
In Stent restenosis		8.3
• Previous DES	23	
• Previous BMS	6	
Acute stent thrombosis	1	0.3
Missing data	7	0.5

Types of stents used

Type of stents	Numbers	Percentage
Drug Eluting Stent (DES)	381	86 %
Bare Metal Stent (BMS)	55	12 %
Antibody stent	6	1 %
Missing	1	0 %

Devices used

Device	Number	% of all LMS intervention
IVUS	122	33.1
Intraaortic balloon pump	52	14.1
Rotablator	19	5.2
Cutting balloon	18	4.9
Drug eluting balloon	23	6.2

LMS PCI Procedural Complications:

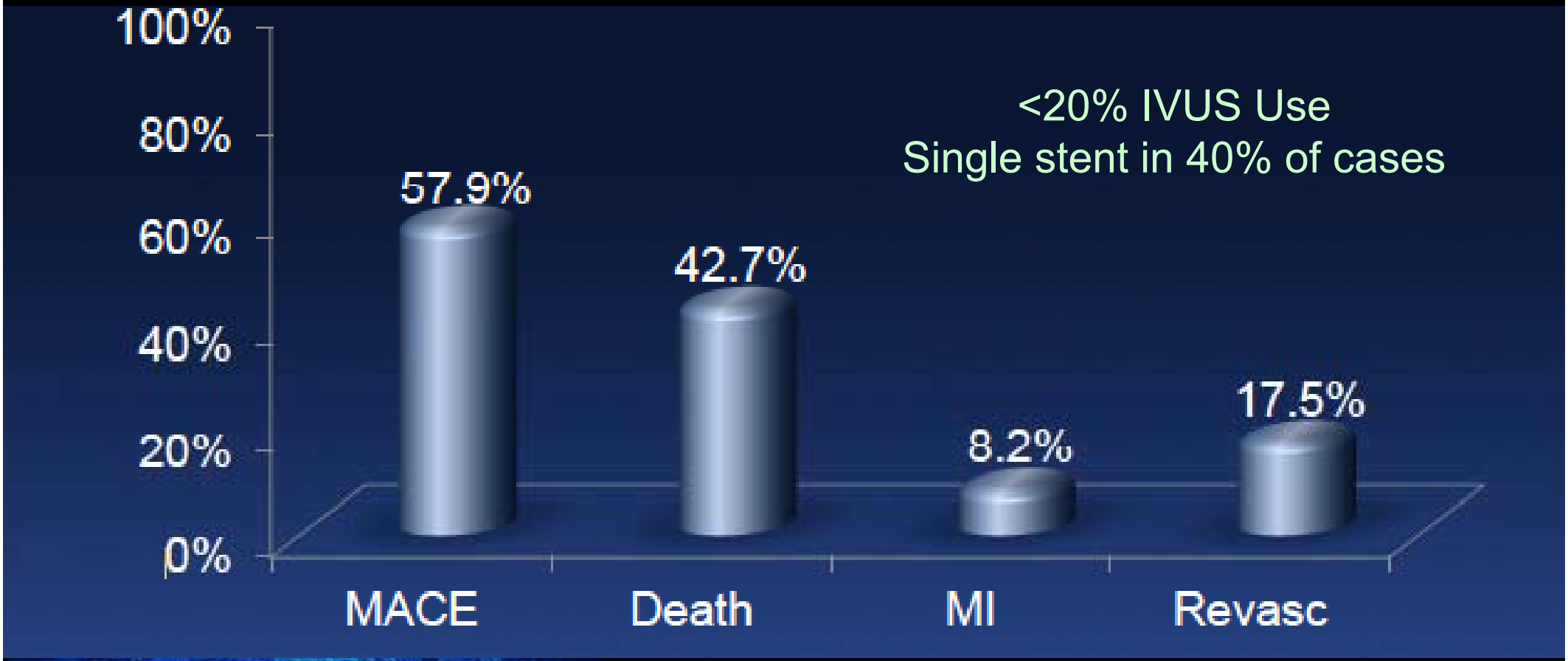
Complications	Number
Dissection	29
Perforation	4
Transient no reflow	3
Persistent no reflow	2

In hospital mortality

	All PCI	LMS-PCI
ACS	8%	8%
Elective	0.4%	1.6%

Unprotected LM PCI:

NCDR CathPCI 30-month Outcomes in 2765 pts with linked f/up data



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LM PCI in 2012 & Malaysia

- Unprotected LMCA PCI no longer ‘restricted’ indication
- Ostial/Body LMCA and LMCA Bifurcation PCI – safe and effective with proper patient selection and strategies
- Technical aspects : DES use, Single Provisional stent strategy or 2-stent techniques if necessary, IVUS and FFR guidance (‘Functional PCI’)
- Heart Team; Experienced operators and expanding evidence – improved LM PCI outcomes