Percutaneous Coronary Intervention in left main coronary artery

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EUROMEDICA-KYANOUS STAVROS

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29/11-1/12 2012
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“The Fear Factor”

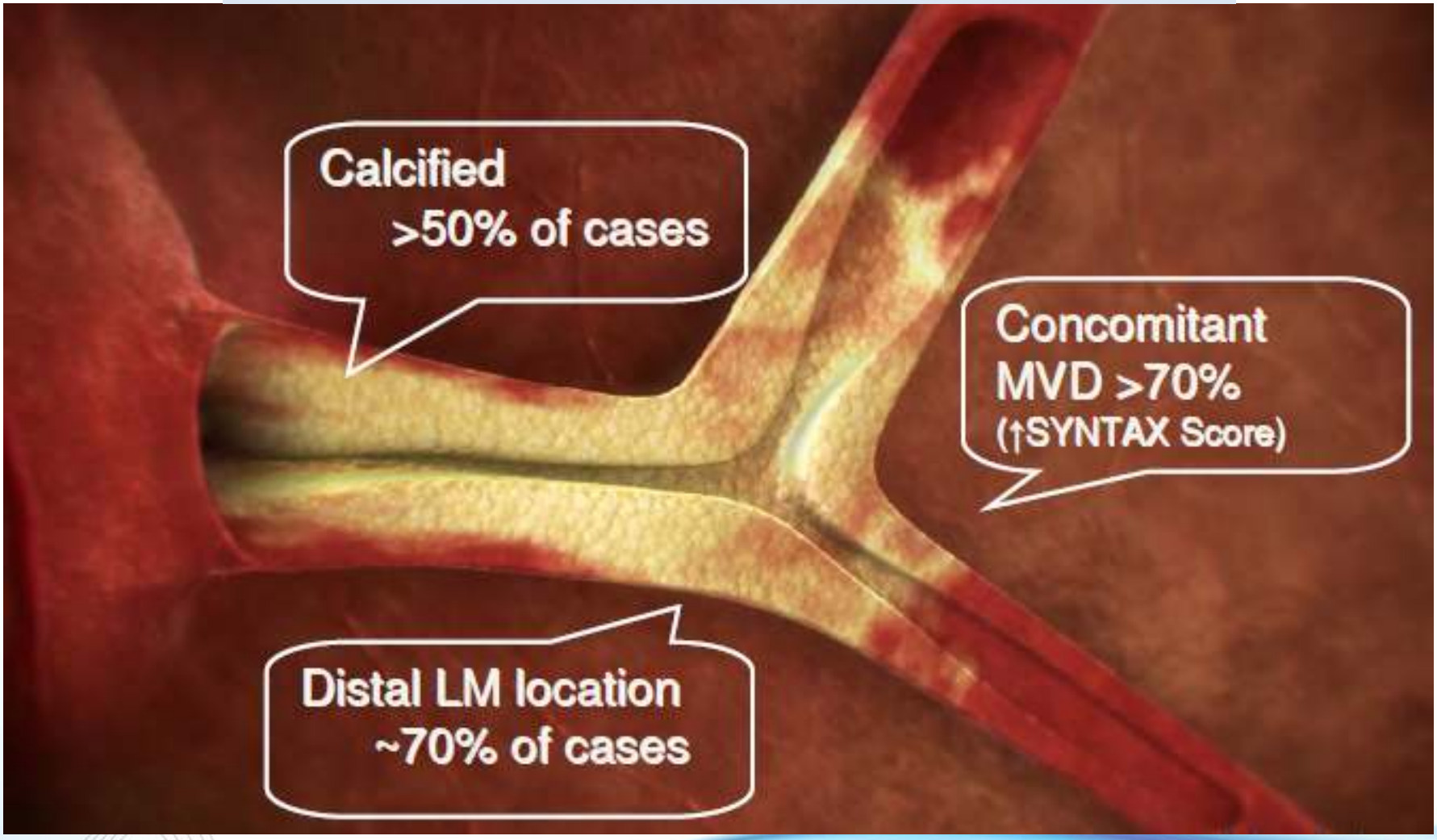
The two words “LEFT MAIN” are enough to strike fear into the hearts of most physicians

Why do we fear LM disease?

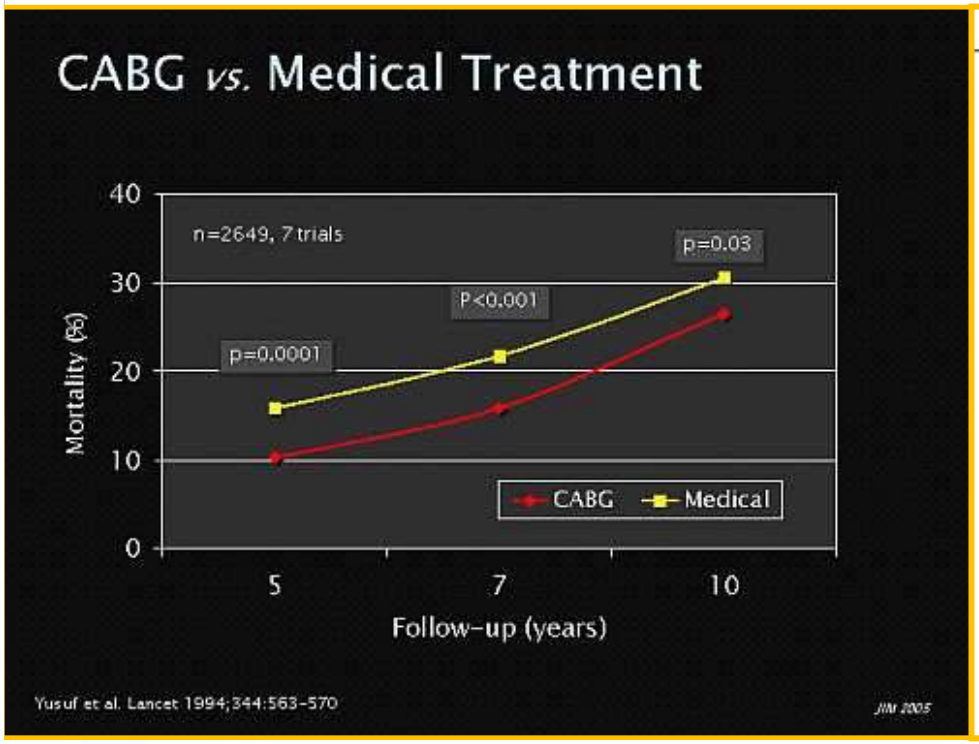
- High mortality with medical treatment
- High mortality after surgical treatment
- High mortality with acute MI and cardiogenic shock associated with LMCAD
- High mortality with PCI

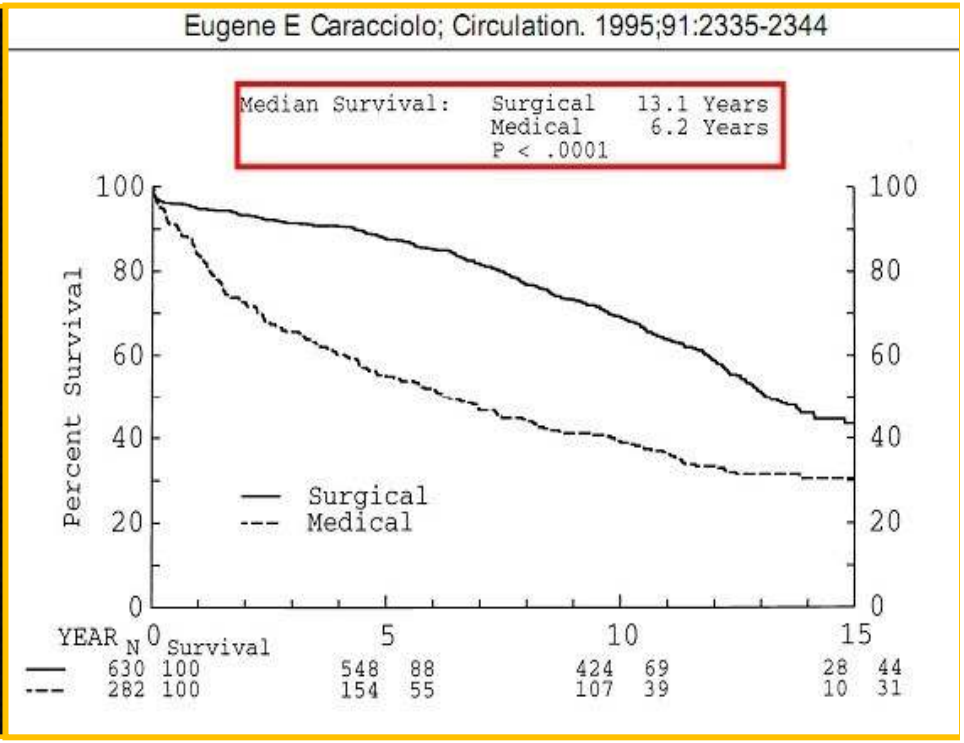
Left Main Disease comes in many sizes and shapes

Incidence 4-6% (LM only <1%)



CABG vs Medical therapy for LM disease





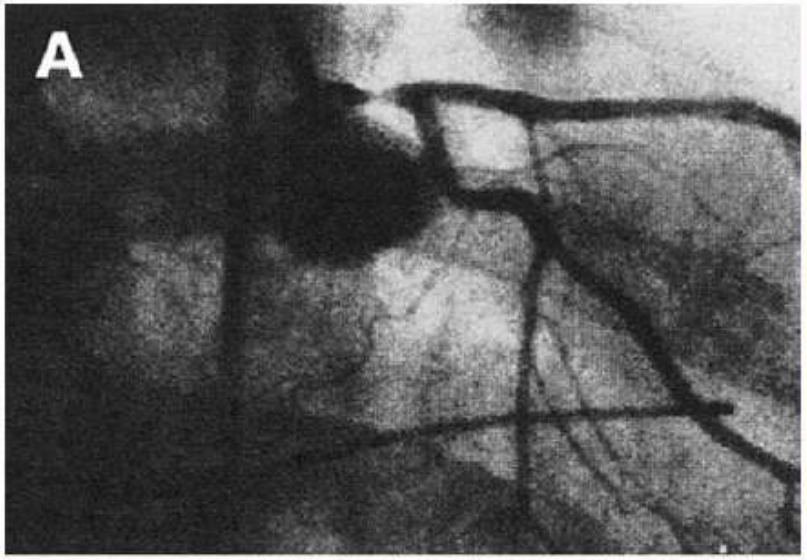
Why LM PCI ?

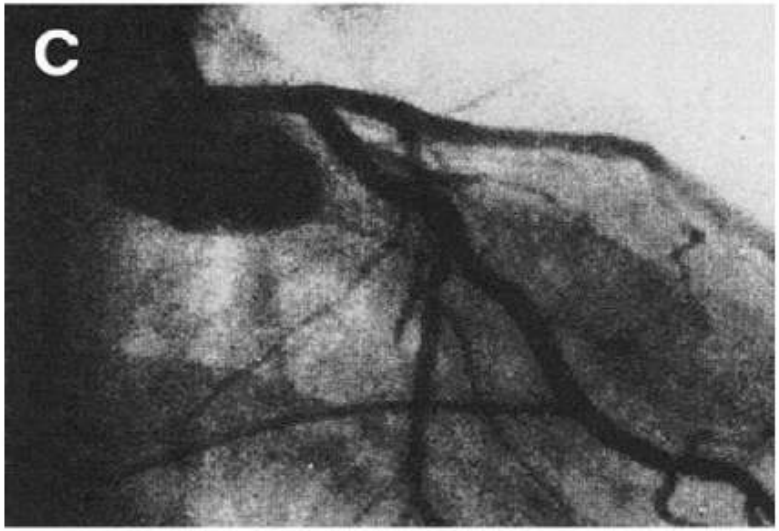
Left Main Disease is Good Invited Target for PCI

- Proximal lesions (easy to approach)
- Big vessels (easy to perform)

Would we choose this patient for PCI today?

First PCI of Left Main in the World





"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. . ." (see Fig. 1). (The patient expired suddenly about 4 months after this procedure.)

—Gruntzig

Gruntzig A. Transluminal dilation of Coronary-artery stenosis. Lancet 1978;1:263

Do The Guidelines Reflect the Current State of Knowledge?

No!!!!!!!

Historical Recommendation: Unprotected Left Main PCI

In patients eligible for CABG

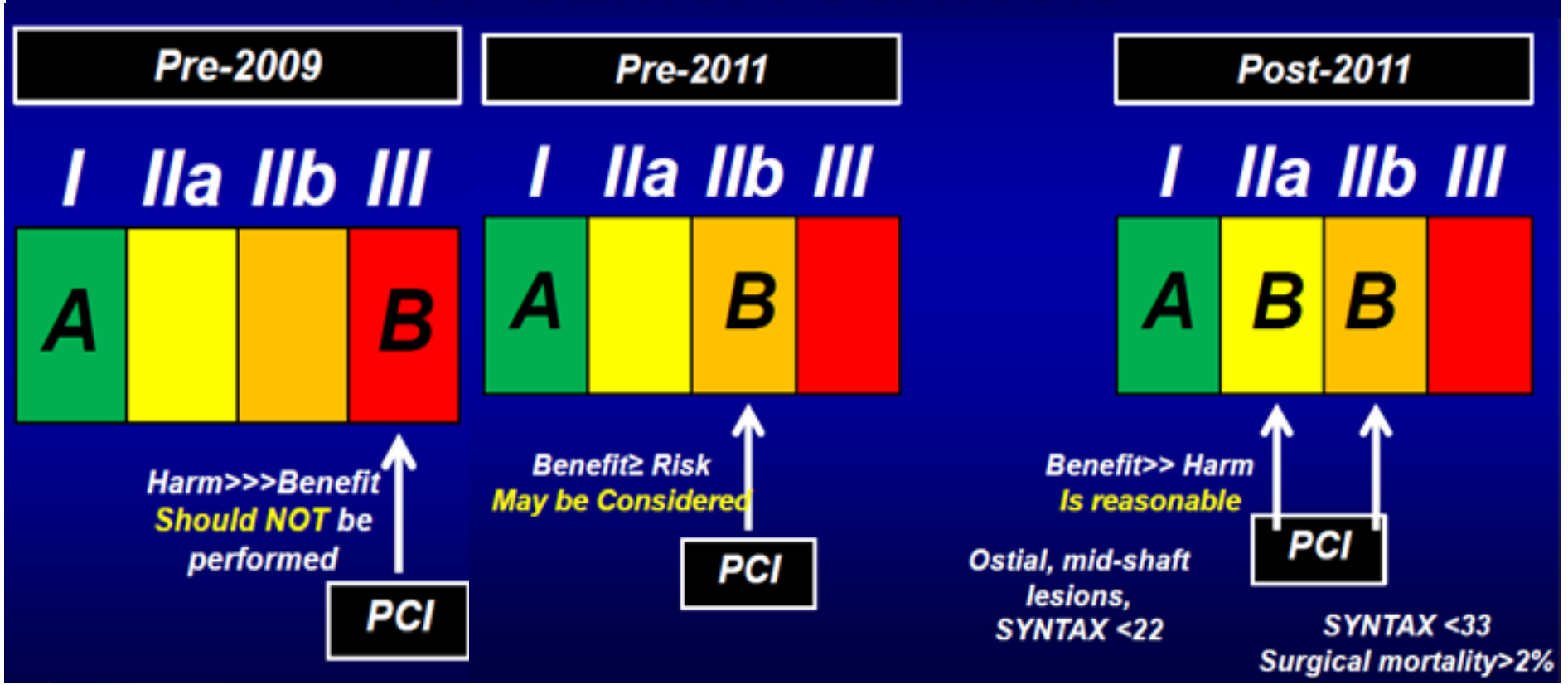
- Class IIb C in ESC guideline (2005)
- Class III in ACC/AHA/SCAI guideline (2006)

Indications for CABG vs PCI in stable patients with lesions suitable for both procedures and low predicted surgical mortality

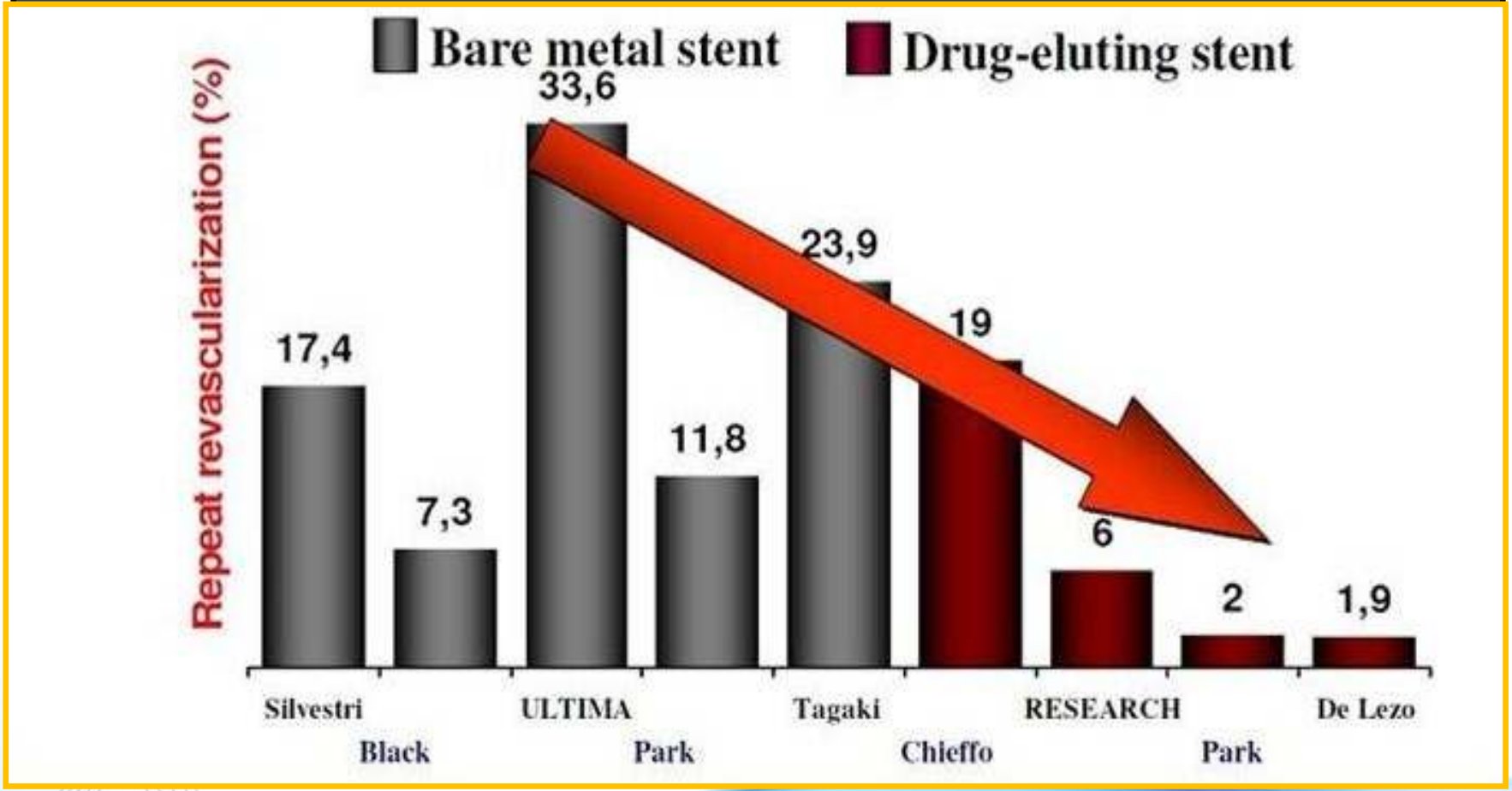
2010

Subset of CAD by anatomy	Favours CABG	Favours PCI
Left main (isolated or 1VD, ostium/shaft)	I A	IIa B
Left main (isolated or 1VD, bifurcation)	I A	IIb B
Left main + 2VD or 3VD, SYNTAX score ≤ 32	I A	IIb B
Left main + 2VD or 3VD, SYNTAX score ≥ 33	I A	III B

Updated 2011 ACC/AHA/SCAI Guidelines for ULMCA Stenosis



We have learned,
DES is Clearly Better than BMS in TVR.



Meta-analysis: DES versus BMS

10,342 patient Meta-Analysis

DES is superior to BMS at 3-year follow-up

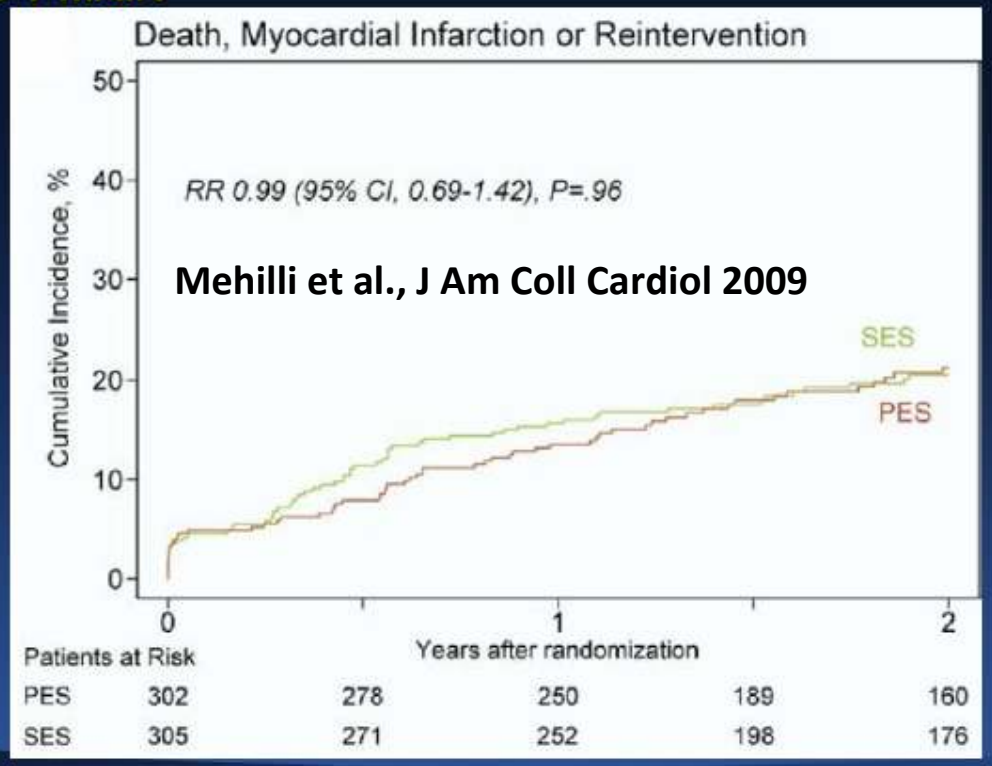
	Odds Ratio (95% CI)	p-value
Mortality	0.70 (0.53-0.92)	0.01
MI	0.49 (0.26-0.92)	0.03
TVR/TLR	0.46 (0.30-0.69)	0.01
MACE	0.78 (0.57-1.07)	0.12

Pandya et al. JACC Cardiovascular Interventions 2010

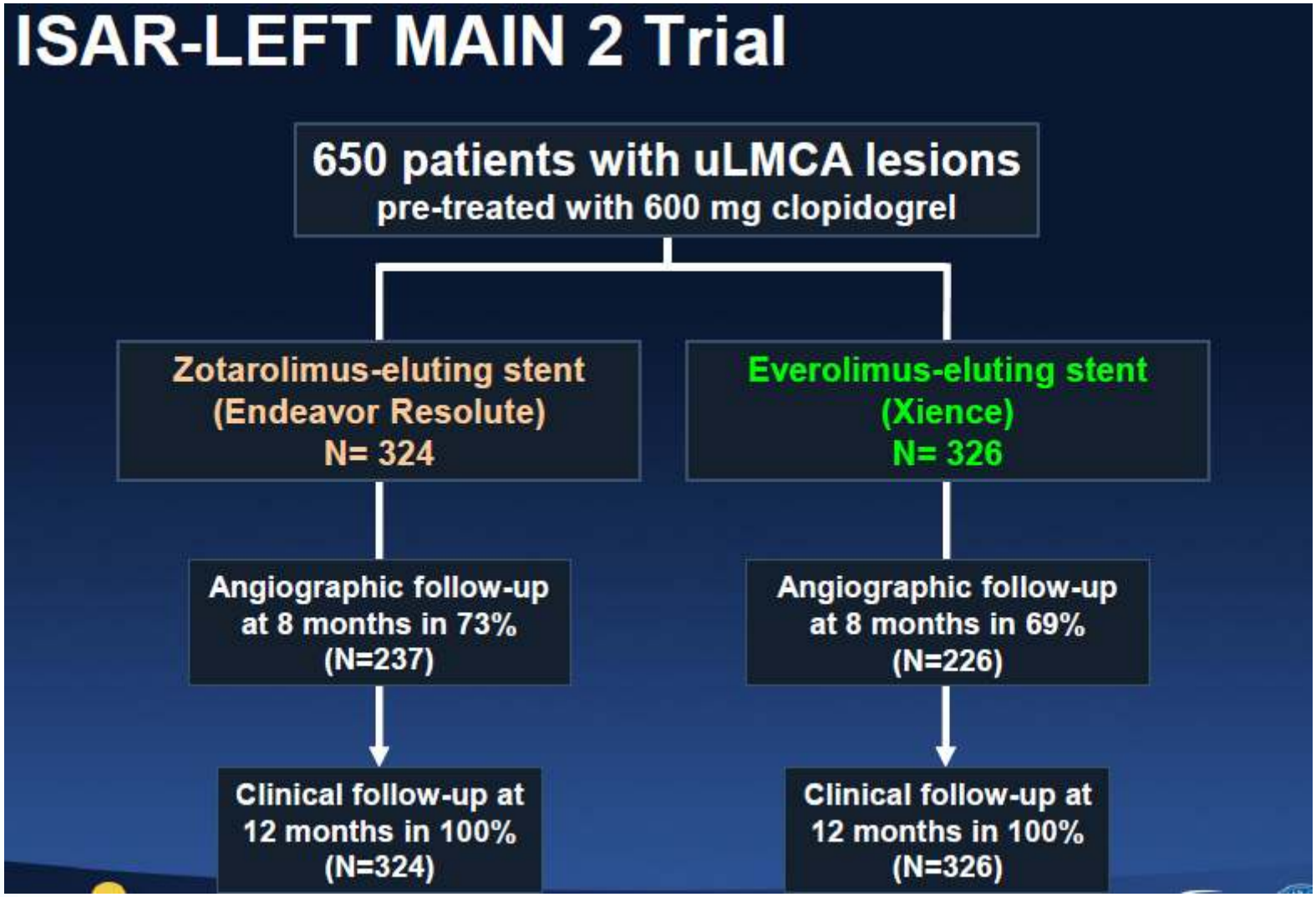
We have learned,
Efficacy and Safety of Different DES are Similar.

First Generation DES for uLMCA
Similar Clinical & Angiographic Performance

ISAR-LEFT MAIN

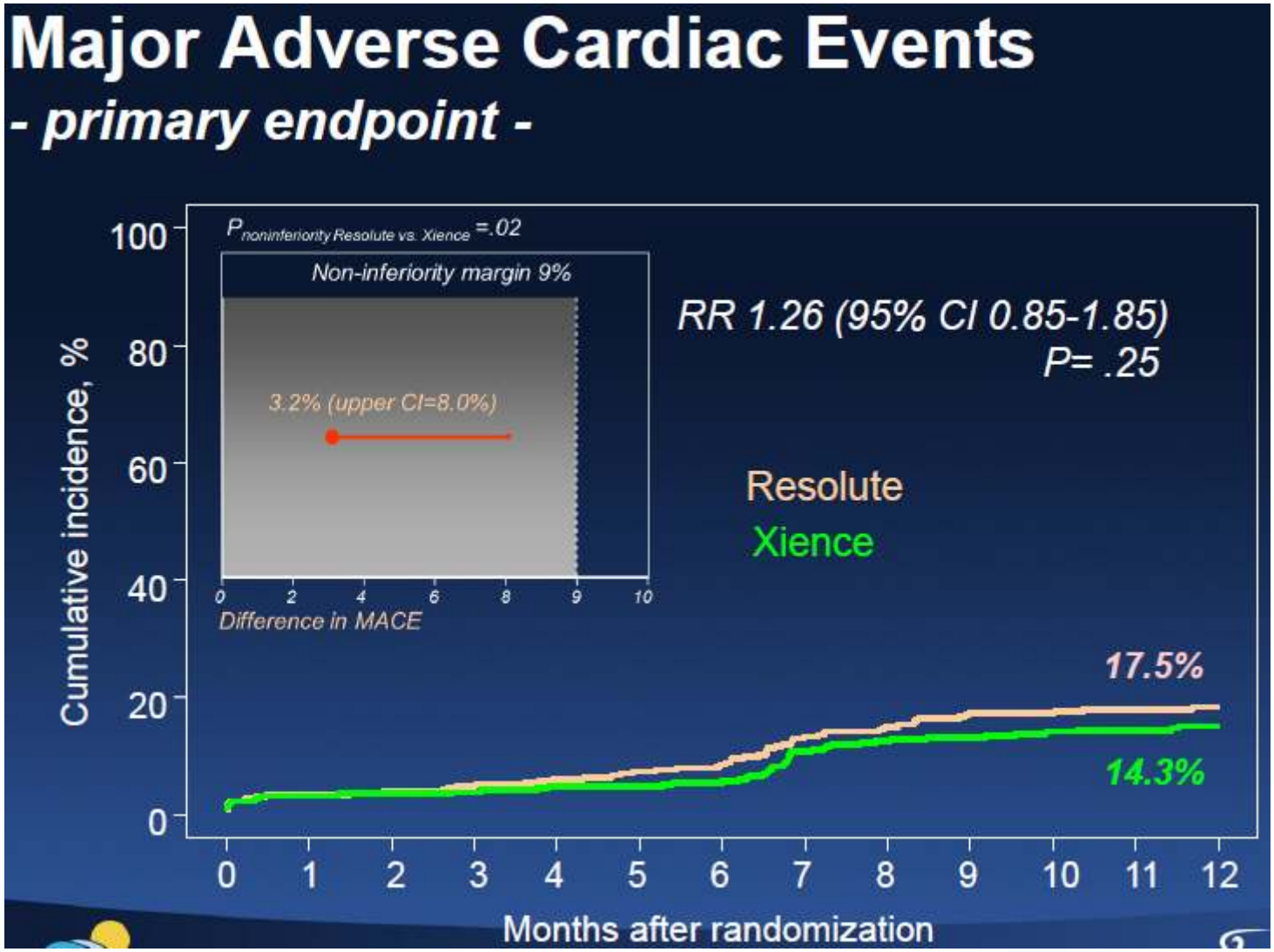


ISAR-LEFT MAIN 2 Trial

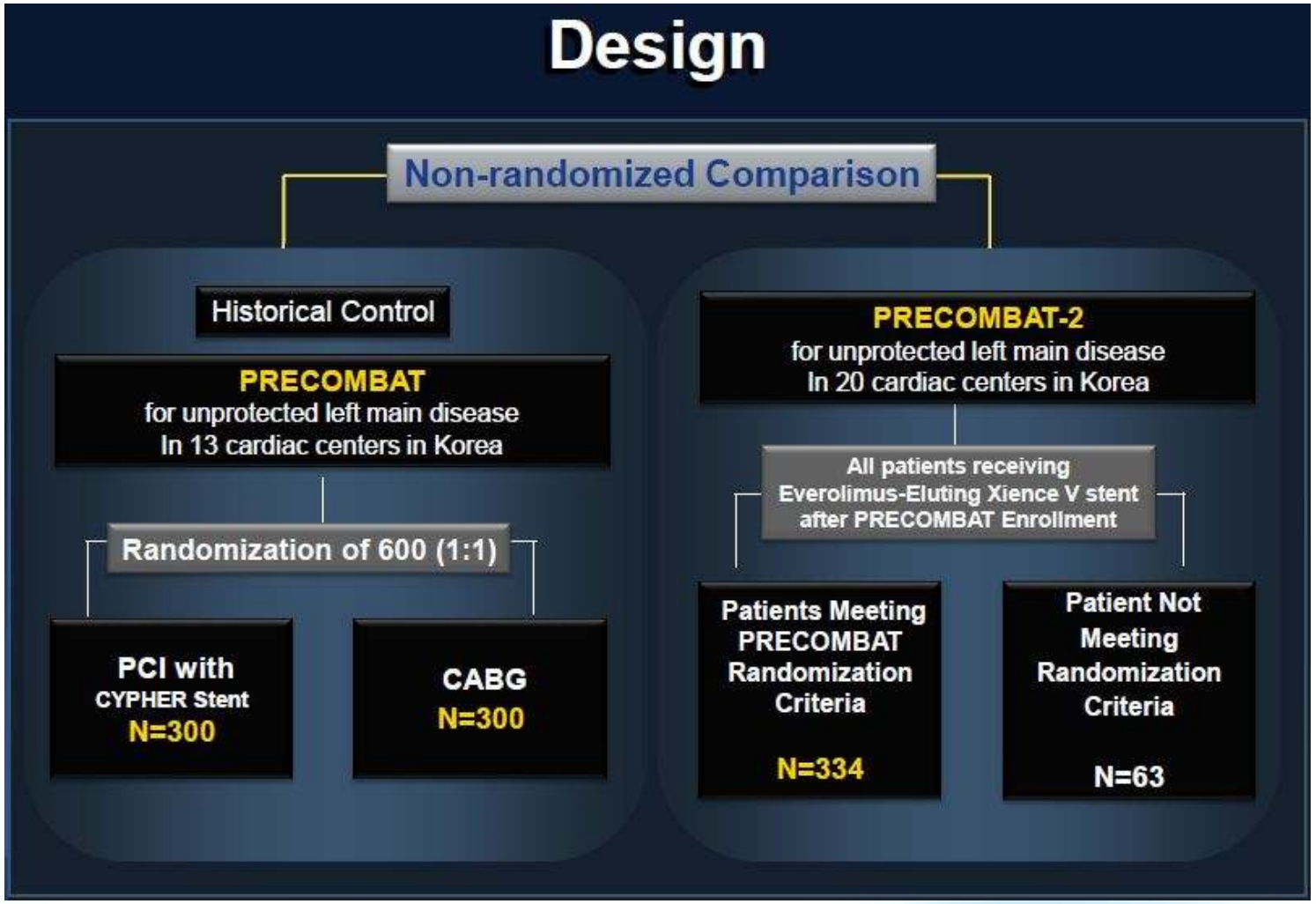


Major Adverse Cardiac Events

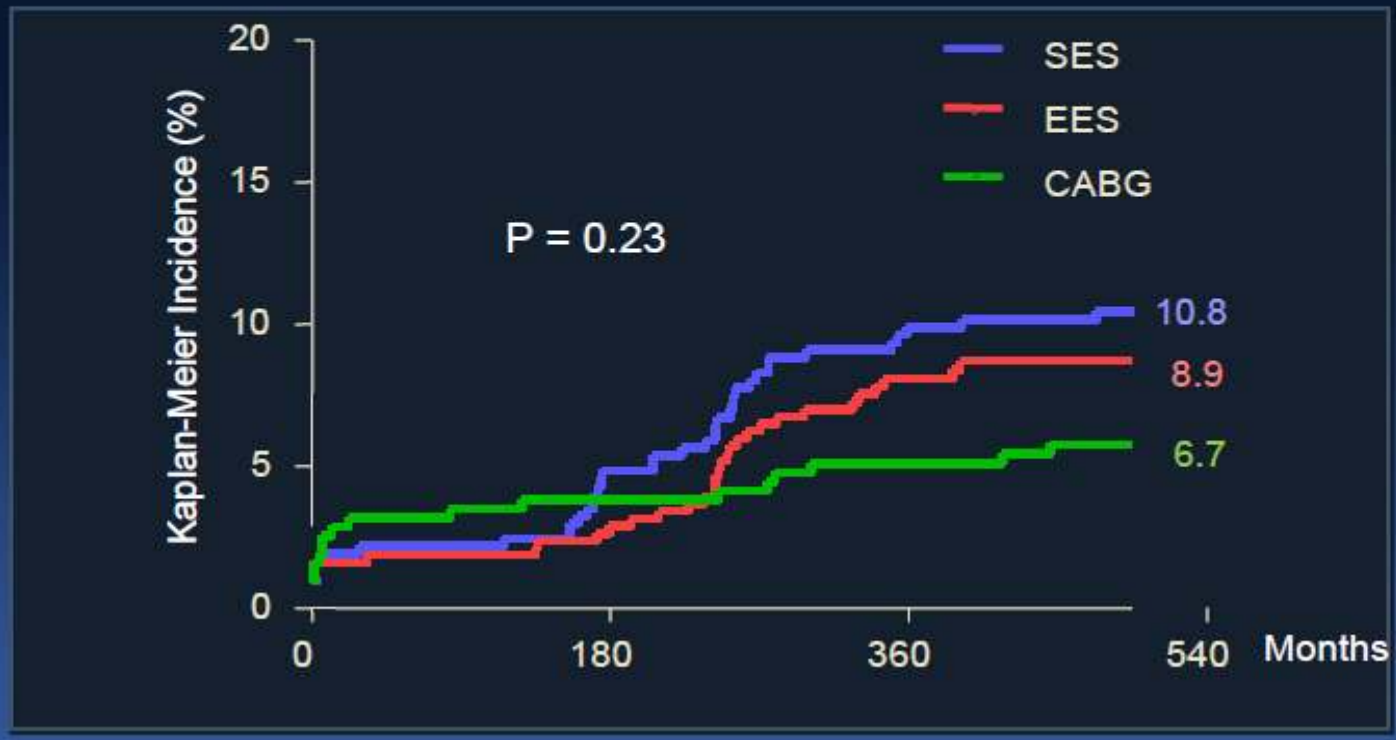
- primary endpoint -



PRECOMBAT-2 Trial

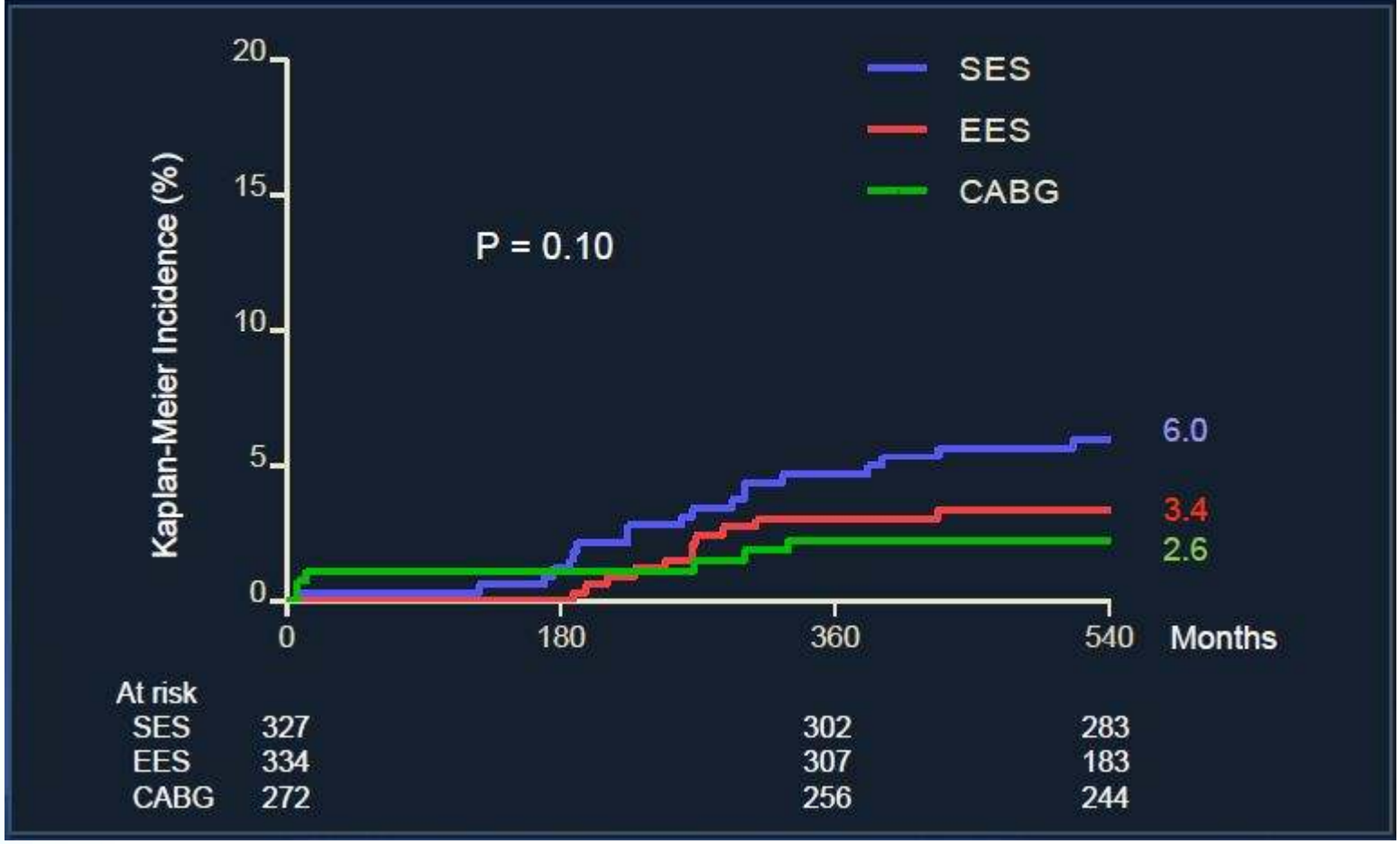


MACCE
Death, MI, Stroke or Ischemic TVR



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

Clinical-driven TVR

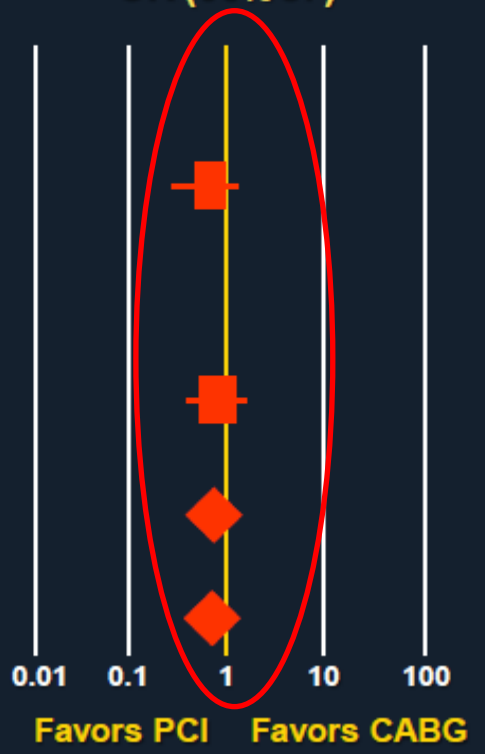


Do all patients with Left Main disease need CABG ?

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

1-Year Death, MI or 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 estiamate	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%				



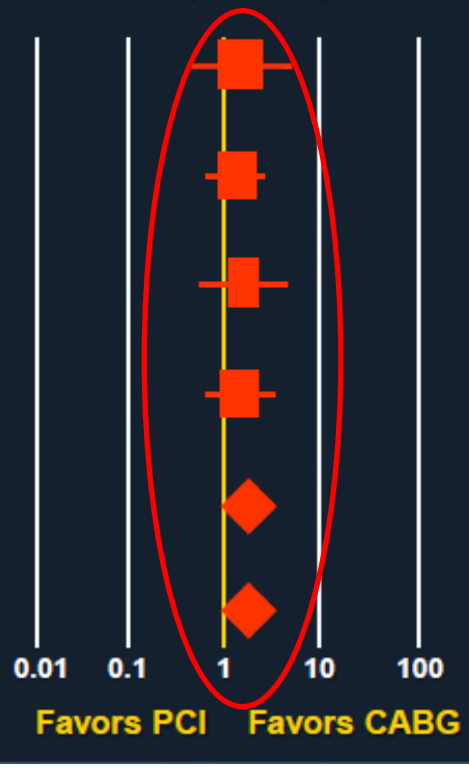
Capodanno et al, *JACC2011;58:1426-32*

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

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 estiamate	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%

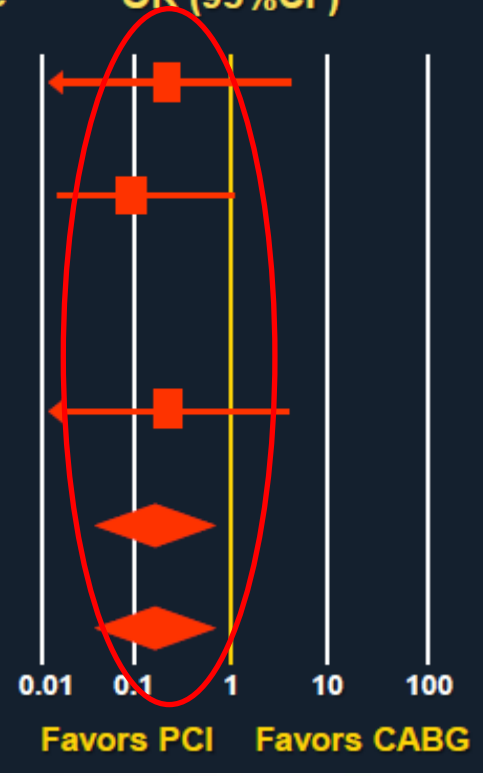


Capodanno et al, *JACC2011;58:1426-32*

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

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 estiamate	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%				



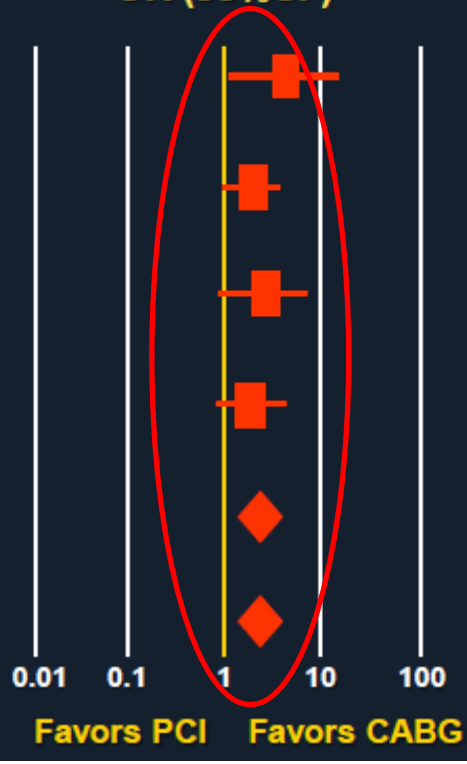
Capodanno et al, *JACC2011;58:1426-32*

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

1-Year Repeat Revascularization

	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 estiamate	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%

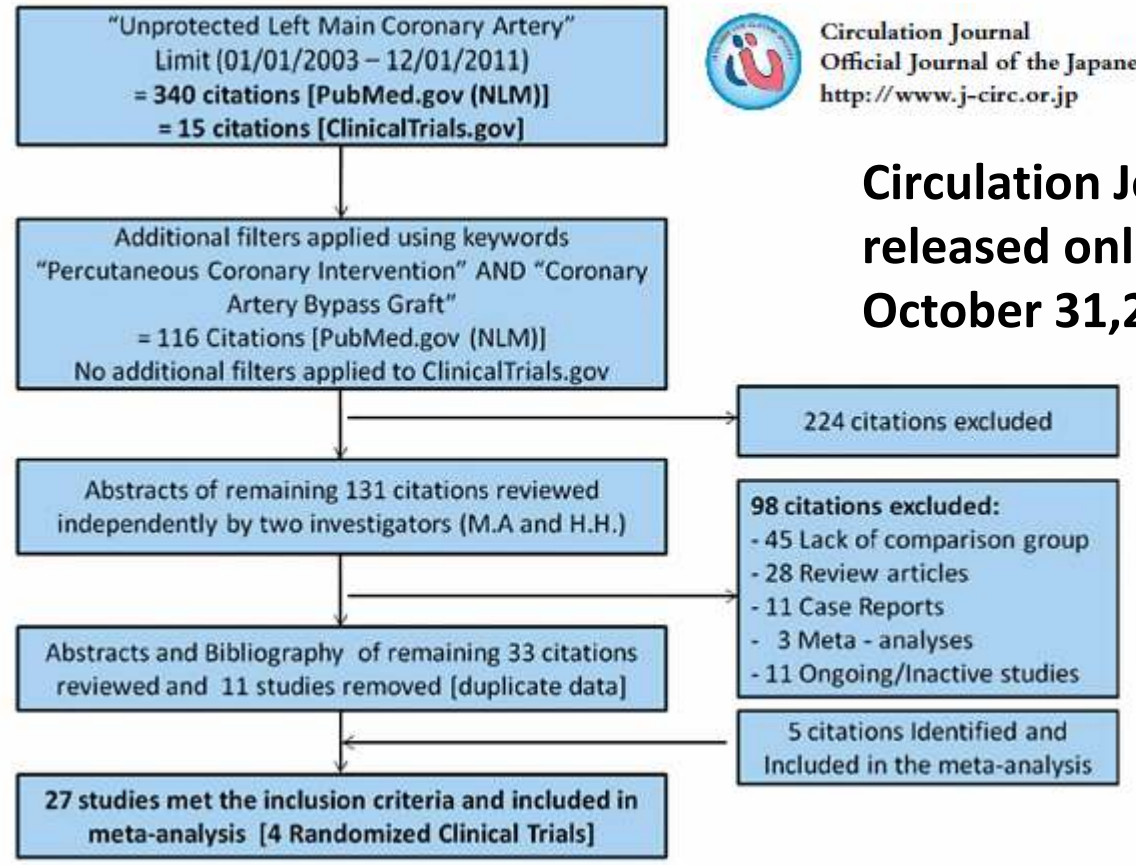


Capodanno et al, *JACC2011;58:1426-32*

Percutaneous Coronary Intervention vs. Coronary Artery Bypass Graft Surgery for Unprotected Left Main Coronary Artery Disease in the Drug-Eluting Stents Era

– An Aggregate Data Meta-Analysis of 11,148 Patients –

Mahboob Alam, MD; Henry D. Huang, MD; Saima A. Shahzad; Biswajit Kar, MD; Salim S. Virani, MD; Paul A. Rogers, MD; David Paniagua, MD; Biykem Bozkurt, MD; Igor Palacios, MD; Neal S. Kleiman, MD; Hani Jneid, MD



Circulation Journal
Official Journal of the Japanese Circulation Society
http://www.j-circ.or.jp

Circulation Journal released online October 31,2012

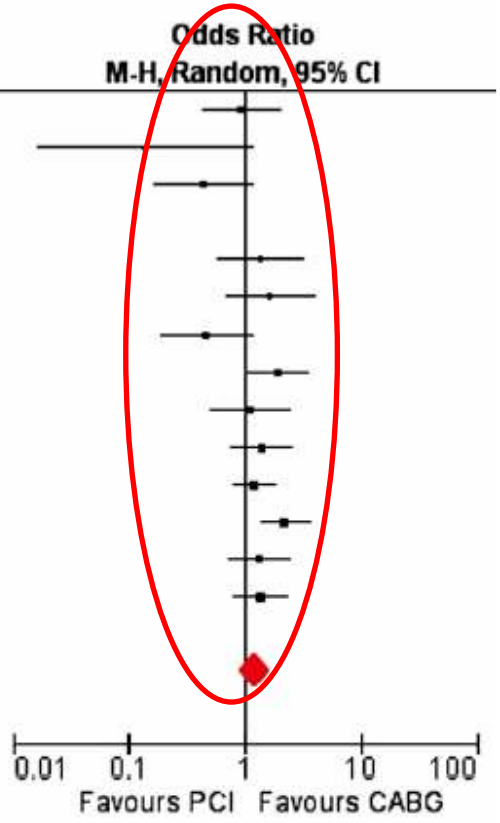
12-month major adverse cardiac and cerebrovascular events (MACCE)

C

Study or Subgroup	PCI (DES) Events	Total	CABG Events	Total	Weight	Odds Ratio M-H, Random, 95% CI	Year
Sanmartin et al. (2007)	10	96	27	245	7.0%	0.94 [0.44, 2.02]	2007
Hsu et al.	1	20	11	39	1.4%	0.13 [0.02, 1.13]	2008
Makikallio et al.	5	49	49	238	5.1%	0.44 [0.17, 1.16]	2008
Wu et al. (2008)	0	0	0	0		Not estimable	2008
Buszman et al. (RCT)	16	52	13	53	6.1%	1.37 [0.58, 3.23]	2008
White et al.	15	67	10	67	5.9%	1.64 [0.68, 3.98]	2008
Buszman et al.	8	63	18	75	5.6%	0.46 [0.19, 1.15]	2009
Cheng et al.	23	94	31	216	9.2%	1.93 [1.06, 3.54]	2009
Ghenim et al.	15	105	14	106	6.9%	1.10 [0.50, 2.40]	2009
Wu et al.	22	131	31	245	9.4%	1.39 [0.77, 2.52]	2010
Morice et al. (2010)	56	357	47	348	12.5%	1.19 [0.78, 1.81]	2010
Kang et al.	49	205	32	257	11.1%	2.21 [1.35, 3.61]	2010
Park et al. (PRE-COMBAT)	26	300	20	300	9.2%	1.33 [0.72, 2.44]	2011
Park et al.(PRECOMBAT Rg)	45	475	24	335	10.7%	1.36 [0.81, 2.27]	2011
Total (95% CI)		**2014**		**2524**	**100.0%**	**1.22 [0.94, 1.58]**	
Total events	291		327				

Heterogeneity: Tau² = 0.09; Chi² = 21.77, df = 12 (P = 0.04); I² = 45%

Test for overall effect: Z = 1.50 (P = 0.13)



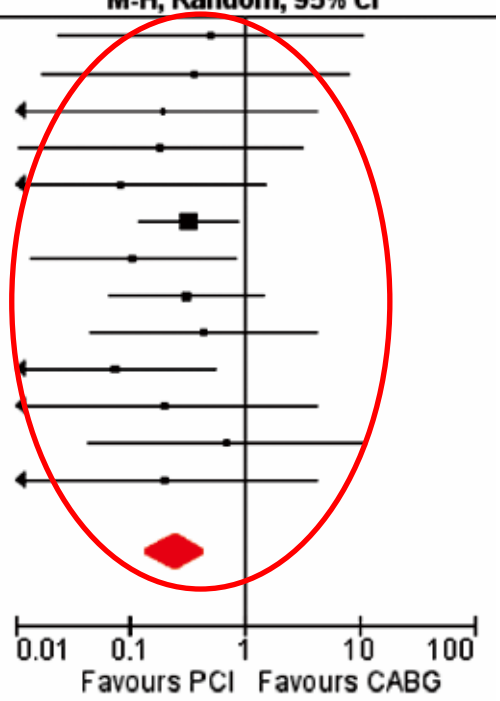
Non-fatal stroke at 12-months follow-up.

B

Study or Subgroup	PCI (DES) Events	Total	CABG Events	Total	Weight	Odds Ratio M-H, Random, 95% CI	Year
Sanmartin et al. (2007)	0	96	2	245	3.6%	0.50 [0.02, 10.61]	2007
Hsu et al.	0	20	2	39	3.5%	0.37 [0.02, 7.99]	2008
Buszman et al. (RCT)	0	52	2	53	3.6%	0.20 [0.01, 4.19]	2008
Makikallio et al.	0	49	12	238	4.1%	0.18 [0.01, 3.14]	2008
Buszman et al.	0	63	6	75	4.0%	0.08 [0.00, 1.52]	2009
Montalescot et al.	5	514	18	612	33.5%	0.32 [0.12, 0.88]	2009
Morice et al. (2010)	1	357	9	348	7.8%	0.11 [0.01, 0.84]	2010
Kang et al.	2	205	8	257	13.7%	0.31 [0.06, 1.46]	2010
Chieffo et al.	1	107	3	142	6.4%	0.44 [0.04, 4.26]	2010
Rittger et al.	1	95	24	192	8.2%	0.07 [0.01, 0.56]	2011
Boudriot et al.	0	100	2	101	3.6%	0.20 [0.01, 4.18]	2011
Park et al.(PRECOMBAT Rg)	1	475	1	335	4.3%	0.70 [0.04, 11.31]	2011
Park et al. (PRE-COMBAT)	0	300	2	300	3.6%	0.20 [0.01, 4.16]	2011
Total (95% CI)		**2433**		**2937**	**100.0%**	**0.25 [0.14, 0.44]**	
Total events	11		91				

Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 4.28$, $df = 12$ ($P = 0.98$); $I^2 = 0\%$

Test for overall effect: $Z = 4.75$ ($P < 0.00001$)



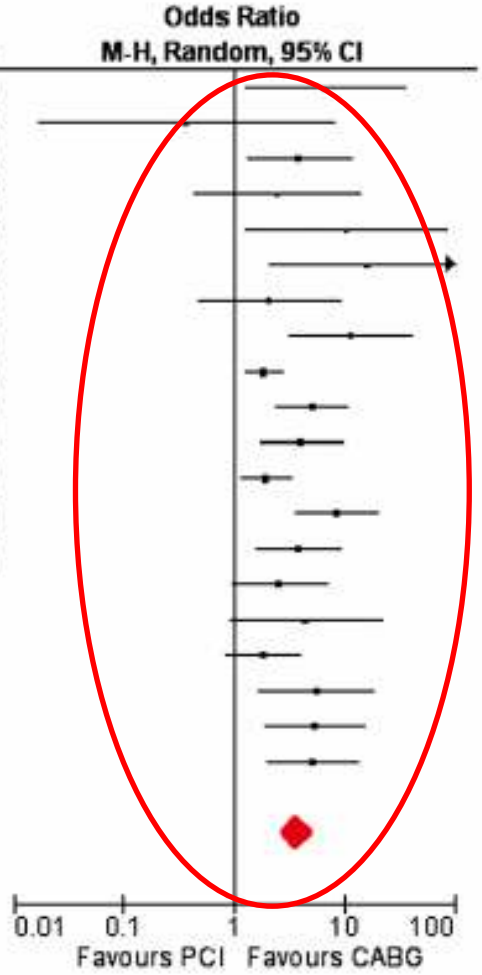
Repeat revascularization at 12-months follow-up.

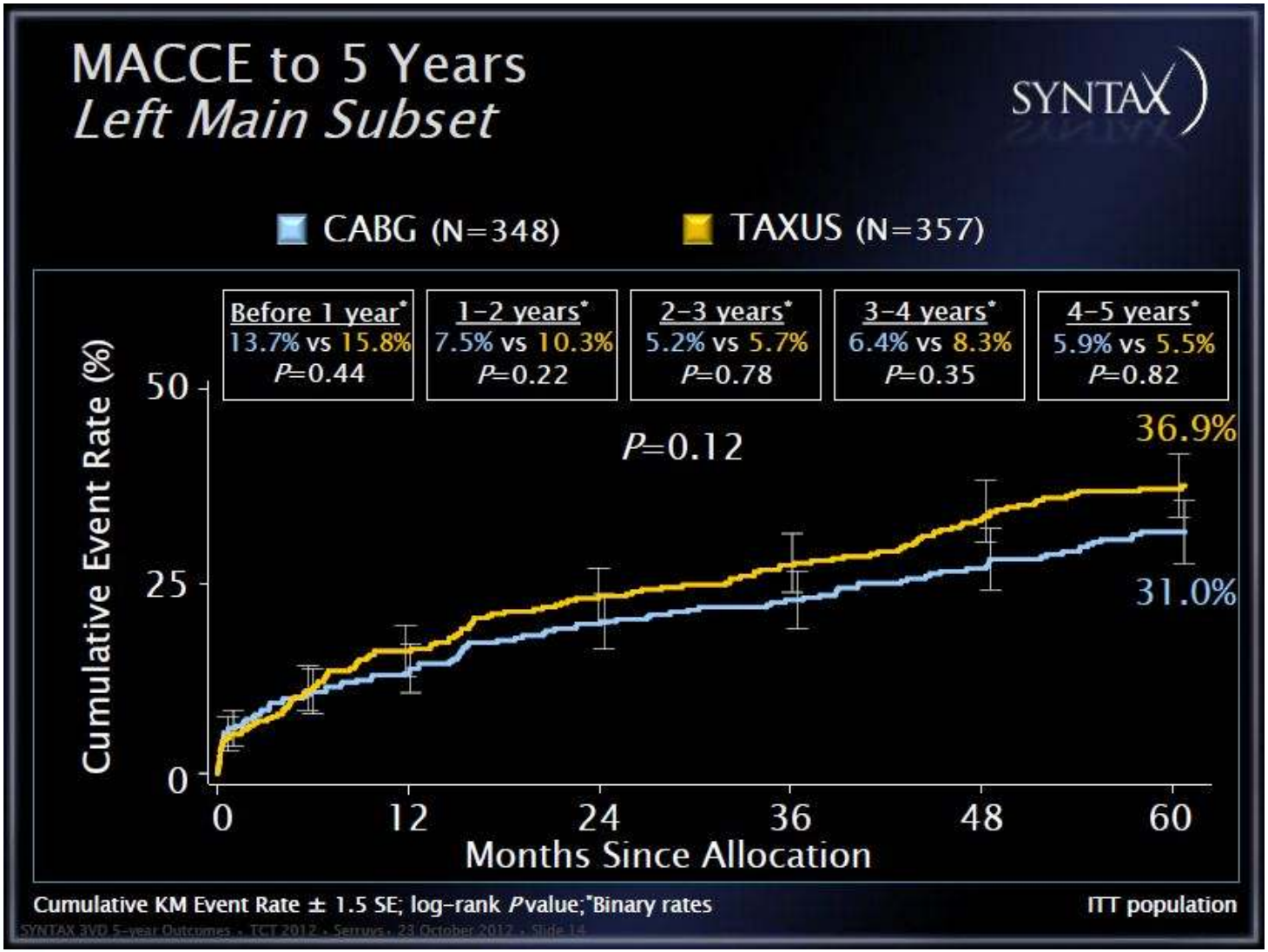
D

Study or Subgroup	PCI (DES) Events	Total	CABG Events	Total	Weight	Odds Ratio M-H, Random, 95% CI	Year
Sanmartin et al. (2007)	5	96	2	245	2.7%	6.68 [1.27, 35.02]	2007
Hsu et al.	0	20	2	39	0.9%	0.37 [0.02, 7.99]	2008
Buszman et al. (RCT)	15	52	5	53	4.9%	3.89 [1.30, 11.68]	2008
Makikallio et al.	2	49	4	238	2.5%	2.49 [0.44, 13.99]	2008
Wu et al. (2008)	9	56	1	56	1.8%	10.53 [1.29, 86.21]	2008
Ghenim et al.	14	105	1	106	1.9%	16.15 [2.08, 125.24]	2009
Buszman et al.	5	63	3	75	3.2%	2.07 [0.47, 9.02]	2009
Cheng et al.	13	94	3	216	4.0%	11.40 [3.16, 41.03]	2009
Montalescot et al.	66	514	45	612	10.9%	1.86 [1.25, 2.77]	2009
Kang et al.	35	205	10	257	7.6%	5.09 [2.45, 10.55]	2010
Chieffo et al.	21	107	8	142	6.5%	4.09 [1.73, 9.65]	2010
Morice et al. (2010)	43	357	23	348	9.6%	1.94 [1.14, 3.29]	2010
Park et al.(MAIN-COMPARE)	55	784	6	690	6.6%	8.60 [3.68, 20.10]	2010
Wu et al.	15	131	8	245	6.3%	3.83 [1.58, 9.29]	2010
Boudriot et al.	14	100	6	101	5.5%	2.58 [0.95, 7.01]	2011
Park et al. (ASAN-MAIN)	7	176	2	219	2.9%	4.49 [0.92, 21.91]	2011
Park et al. (PRE-COMBAT)	18	300	10	300	7.0%	1.85 [0.84, 4.08]	2011
Rittger et al.	10	95	4	192	4.4%	5.53 [1.69, 18.13]	2011
Park et al.(PRECOMBAT Rg)	29	475	4	335	5.1%	5.38 [1.87, 15.45]	2011
Tamburino et al.	18	222	6	361	5.9%	5.22 [2.04, 13.36]	2011
Total (95% CI)		**4001**		**4830**	**100.0%**	**3.72 [2.75, 5.03]**	
Total events	394		153				

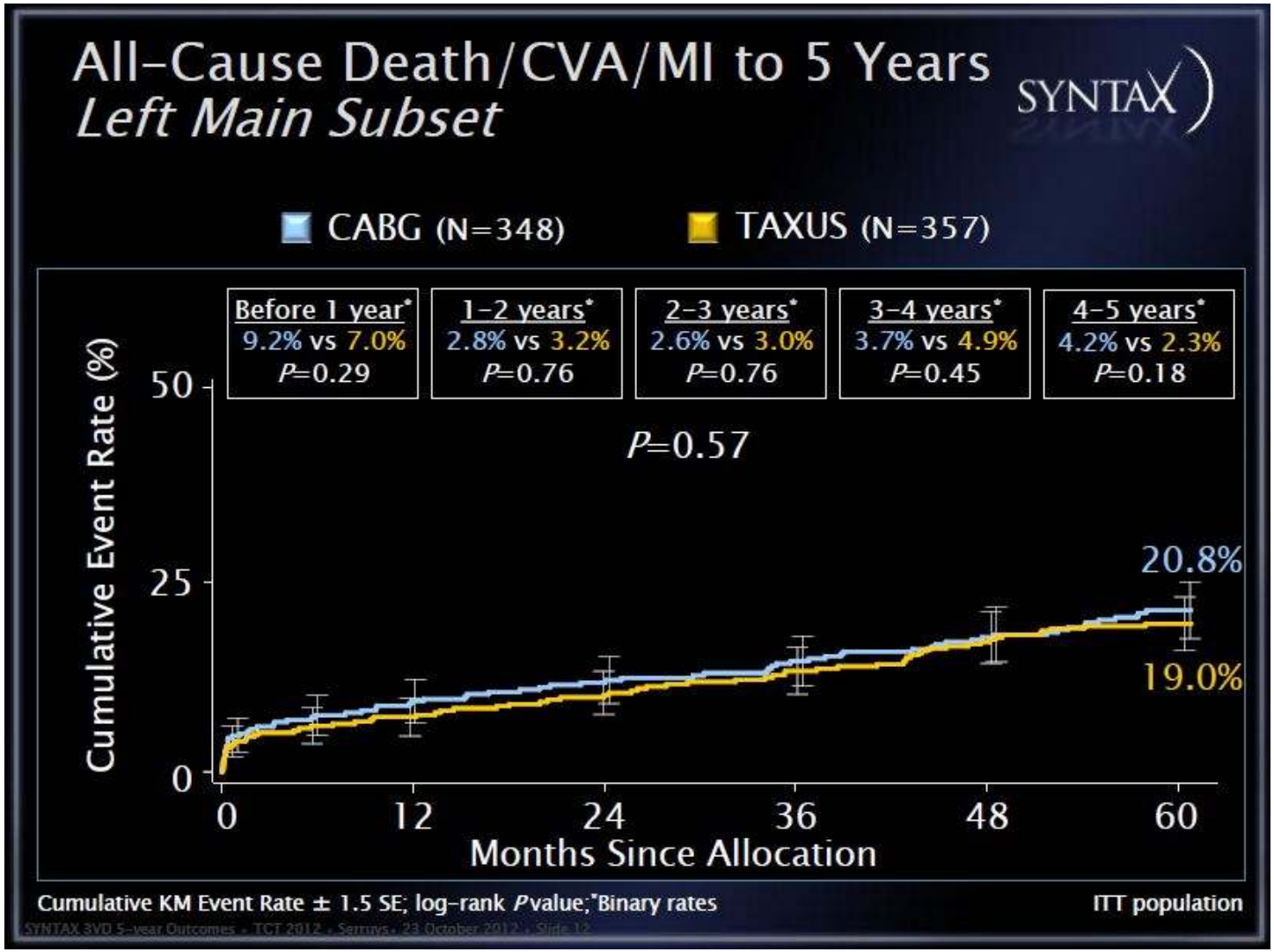
Heterogeneity: $Tau^2 = 0.18$; $Chi^2 = 33.86$, df = 19 (P = 0.02); $I^2 = 44\%$

Test for overall effect: Z = 8.49 (P < 0.00001)

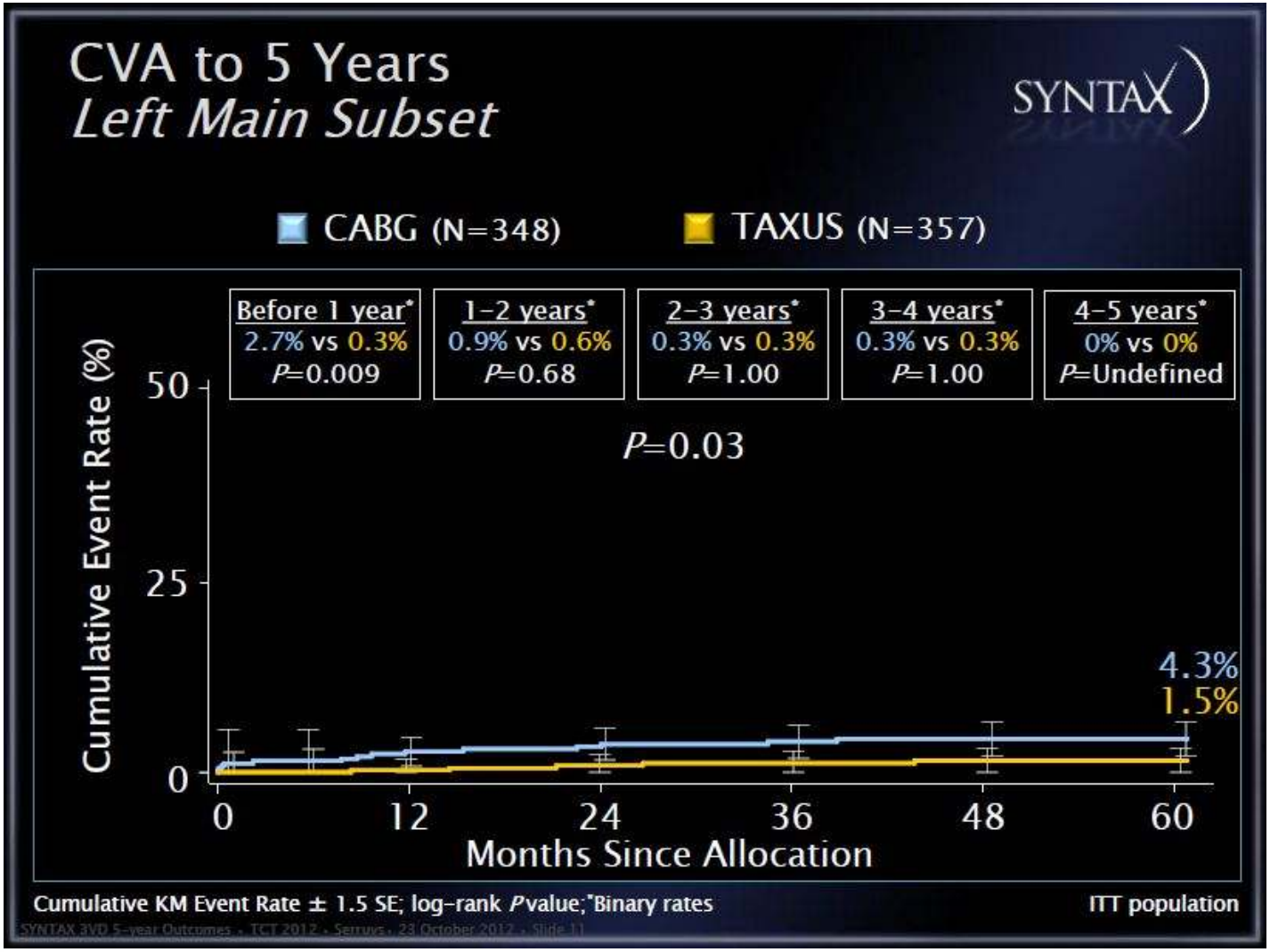




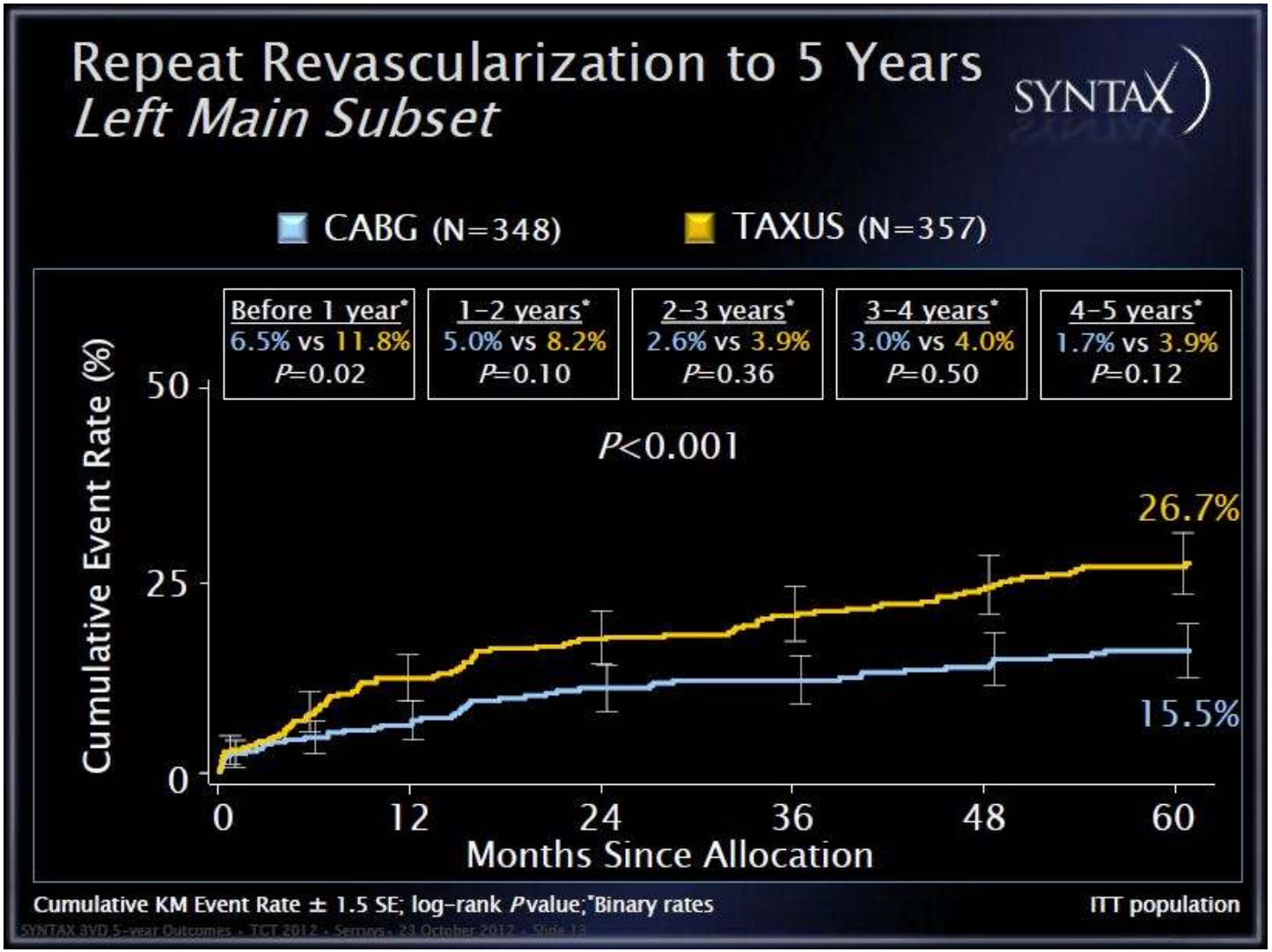
At 5 years, overall MACCE in the PCI group was comparable with CABG (31.0% CABG vs 36.9% PCI)



Similar overall safety outcomes between CABG and PCI at 5 years (20.8% CABG vs 19.0% PCI)



A higher rate of CVA in the CABG group (4.3% CABG vs 1.5% PCI) was driven mostly by periprocedural events, with no difference between groups after 1 year



There was a higher rate of revascularization in the PCI group (15.5% CABG vs 26.7% PCI), driven primarily by patients with high baseline SYNTAX scores

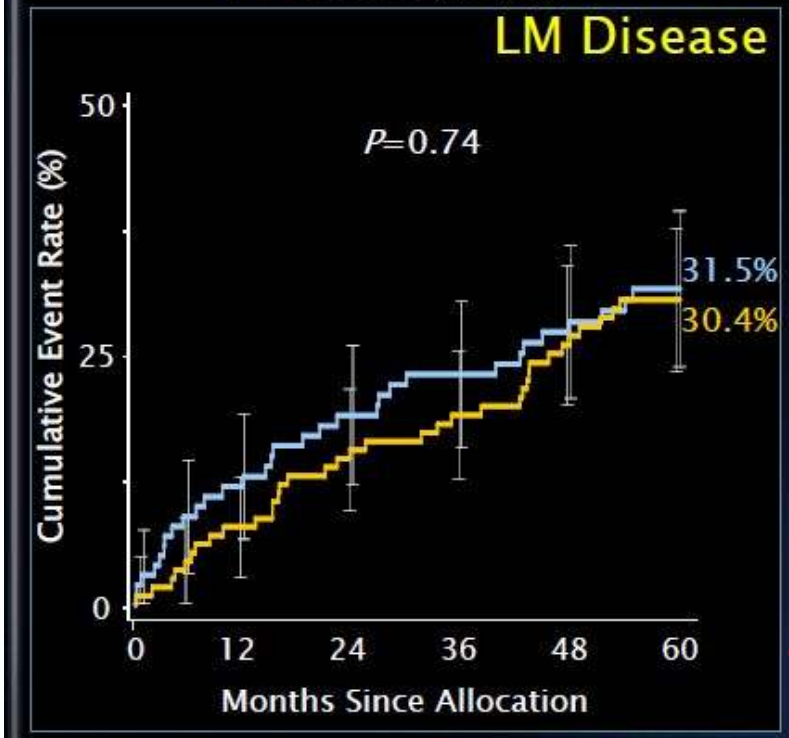
MACCE to 5 Years by SYNTAX Score Tercile

LM Subset Low Scores 0–22

SYNTAX

CABG (N=104)

TAXUS (N=118)



	CABG	PCI	*P* value
Death	11.3%	7.0%	0.28
CVA	4.1%	1.8%	0.28
MI	3.1%	6.2%	0.32
Death, CVA or MI	15.2%	13.9%	0.71
Revasc.	20.3%	23.0%	0.65

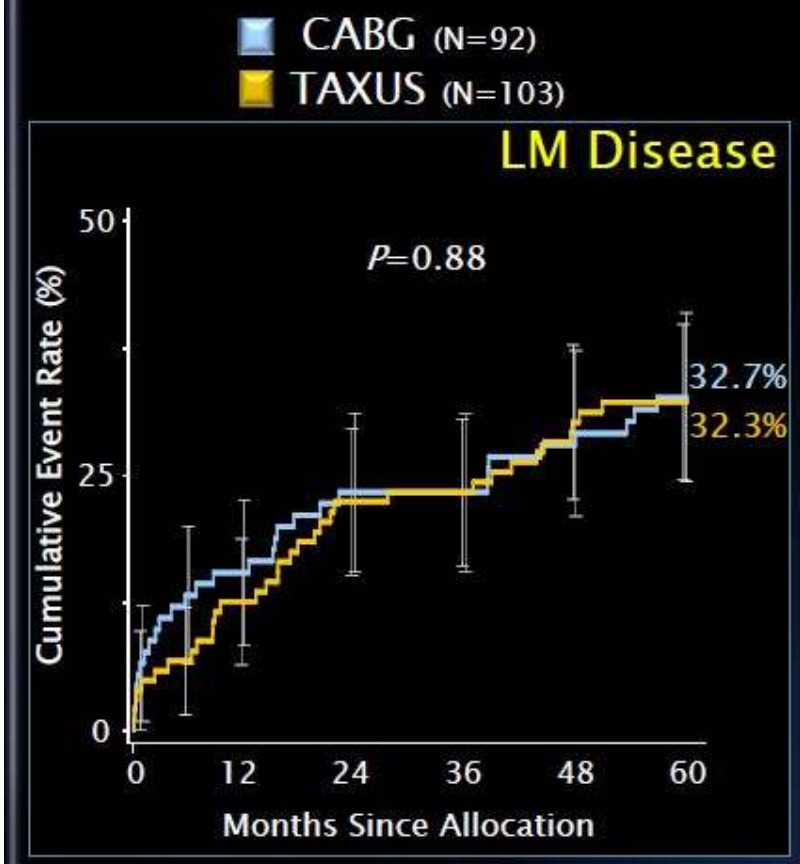
Cumulative KM Event Rate ± 1.5 SE; log-rank *P* value

Site-reported Data; ITT population

MACCE to 5 Years by SYNTAX Score Tercile

LM Subset Intermediate Scores 23–32

SYNTAX



	CABG	PCI	*P* value
Death	19.3%	8.9%	0.04
CVA	3.6%	1.0%	0.23
MI	4.6%	6.0%	0.71
Death, CVA or MI	24.9%	15.7%	0.11
Revasc.	16.6%	22.2%	0.40

Cumulative KM Event Rate ± 1.5 SE; log-rank *P* value

Site-reported Data; ITT population

SYNTAX 3VD 5-year Outcomes · TCT 2012 · Serruys · 23 October 2012 · Slide 18

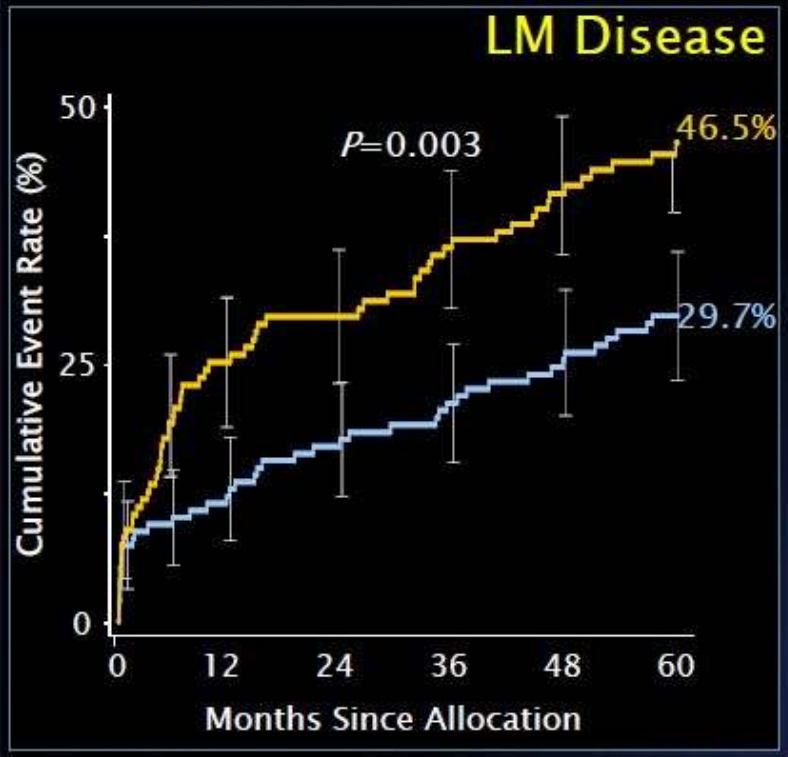
MACCE to 5 Years by SYNTAX Score Tercile

LM Subset High Scores ≥33

SYNTAX

CABG (N=149)

TAXUS (N=135)



	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

Cumulative KM Event Rate ± 1.5 SE; log-rank *P* value

Site-reported Data; ITT population

Do all patients with Left Main disease need CABG ?

Based on these data I can conclude at this point my presentation

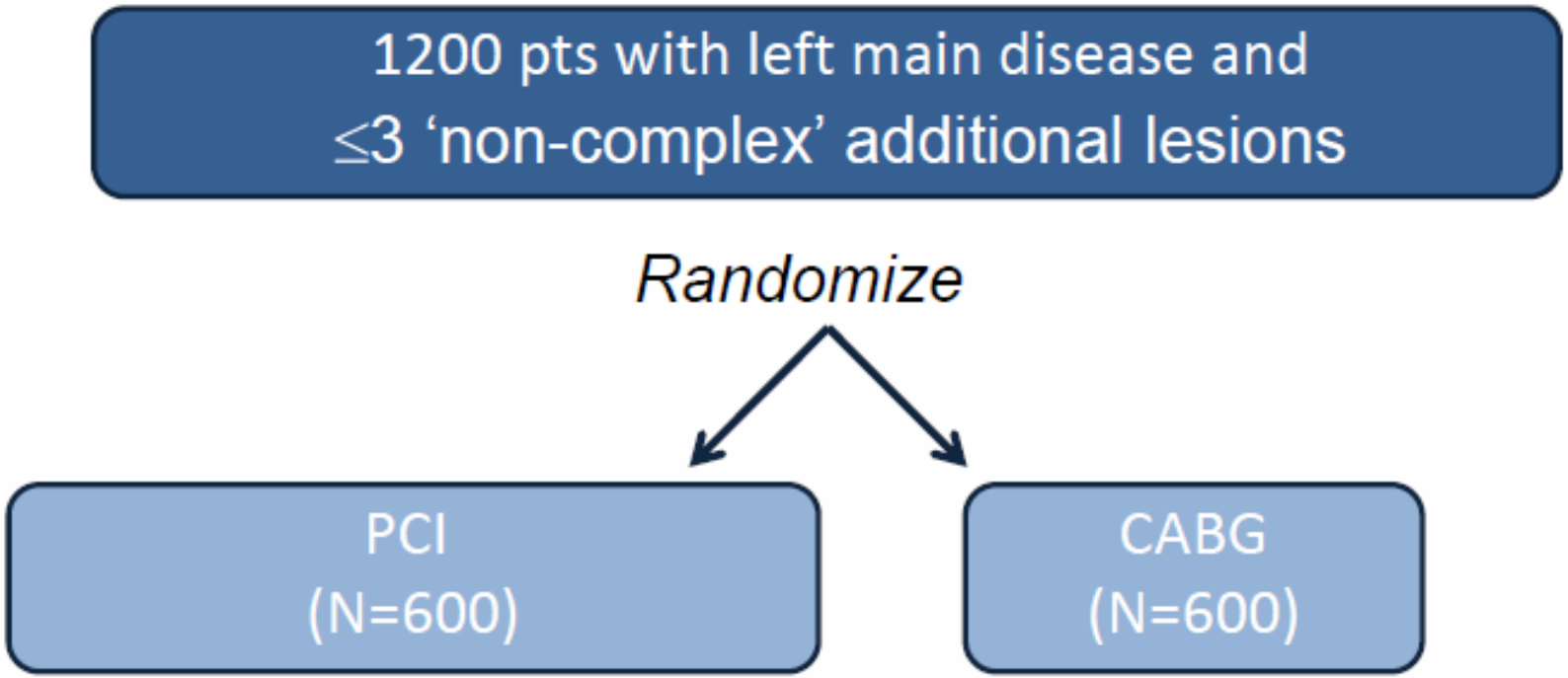
✓***CABG is preferred in patients with high SYNTAX SCORE***

✓***PCI is therefore a reasonable treatment alternative in this patient population, in particular, when the SYNTAX Score is low (≤22) or intermediate (23-32)***


PCI versus CABG
its not over yet

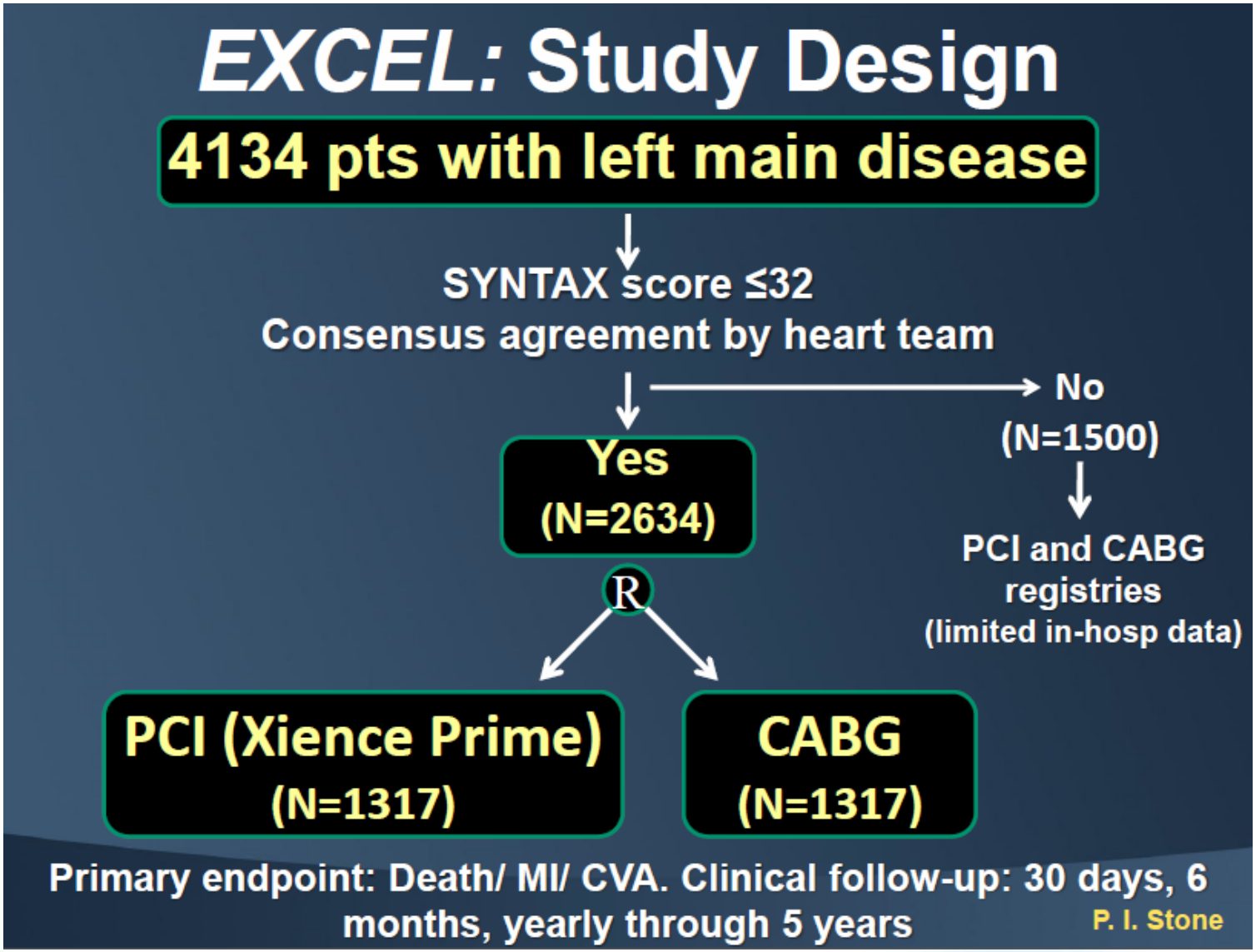
NOBLE

Nordic-Baltic-British Left Main Revascularization Study



Primary Endpoint: Death, MI, stroke or new revascularization at 2 years

EXCEL: Study Design



EXCEL: Status

- ~160 sites from 16 countries have been chosen and are being initiated

- **As of September 5th, 107 sites have been activated, and 717 pts have been randomized!**

Issues and some thoughts in PCI for left main disease

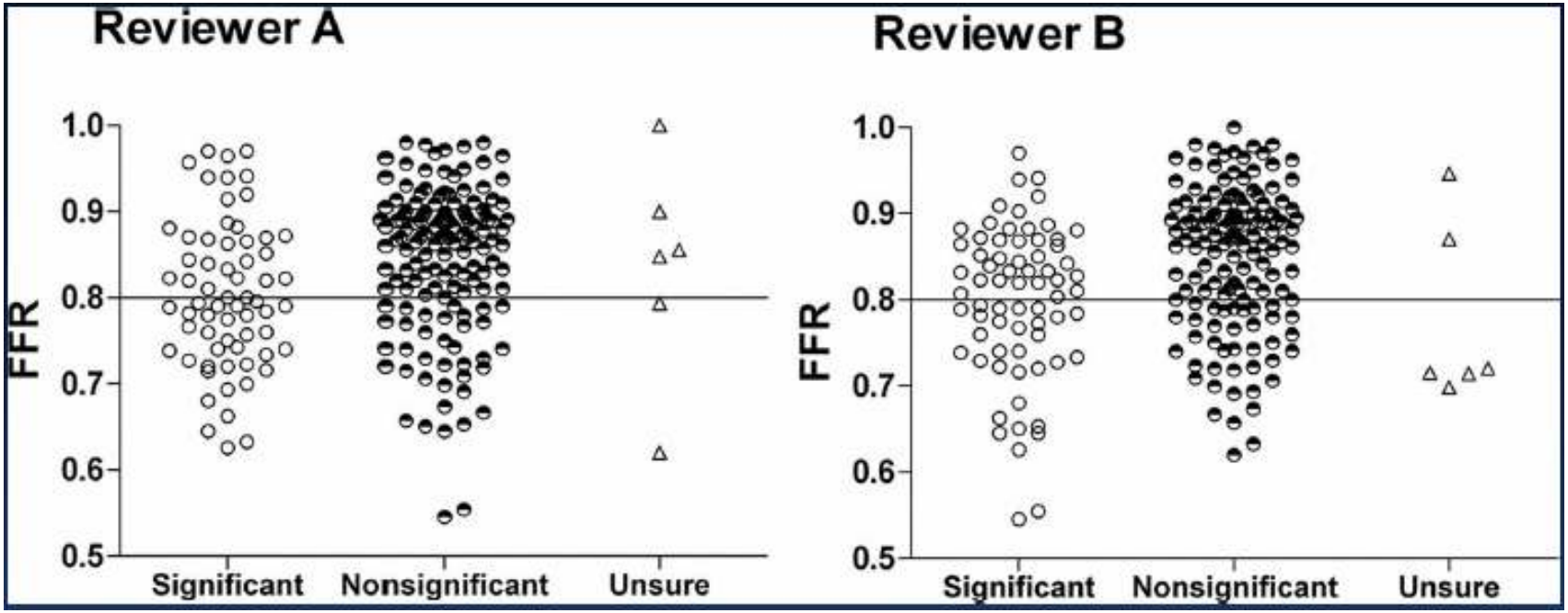
Is the lesion in the left main significant?

What is the Ideal Technique (1 stent vs. 2 stent)
The results of PCI may be further improved by procedural guidance with intravascular ultrasound (IVUS)?
What is the role of cardiac assist devices?
What is the meaning of the heart team?
Incomplete Revascularization is associated with worse Cardiac Survival?
The new generation of thienopyridine may improve clinical outcome in patients with ULMD receiving DES.

Is the lesion in the left main significant?

The most interobsever variability in the most dangerous location

Of all the coronary segments, the LM has the greatest angiographic assessment variability



In 158 patients (74%), there was agreement between Reviewer A and Reviewer B.

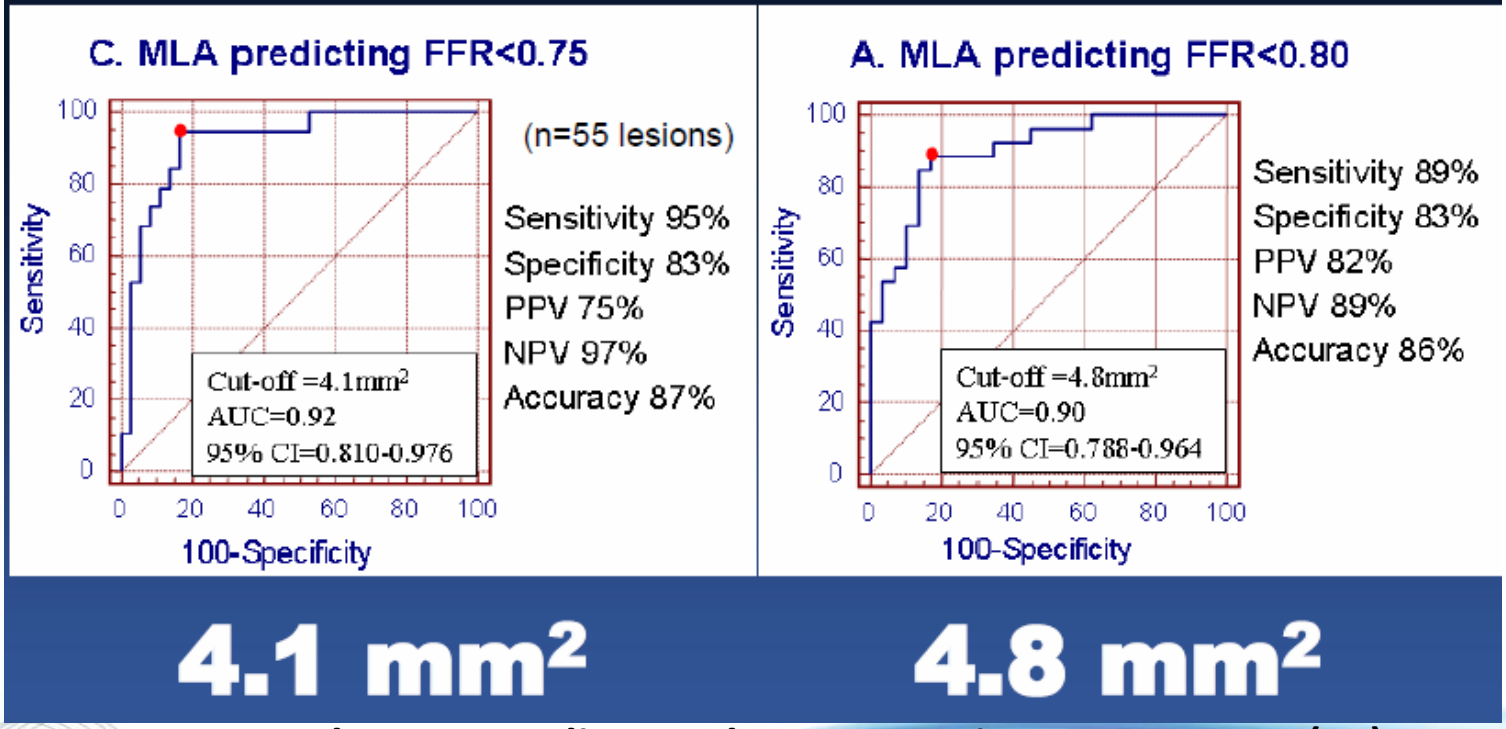
Among these 158 patients, 48 were misclassified: 23 patients had an estimated DS >50% while the FFR was >0.80, and 25 patients had an estimated DS <50% while the FFR was <0.80

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

Don't Use Anymore IVUS MLA of 6 mm2. It's Too Big !

New LM IVUS MLA

Matched with FFR <0.80



4.1 mm² **4.8 mm²**

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

Unresolved Issues and some thoughts in PCI for left main disease

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What is the Ideal Technique (1 stent vs. 2 stent)?

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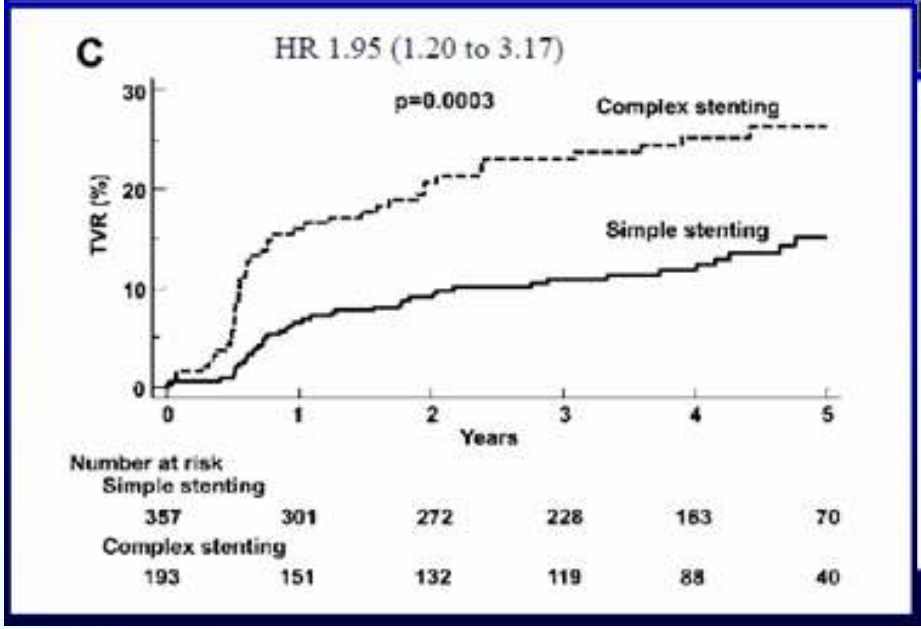
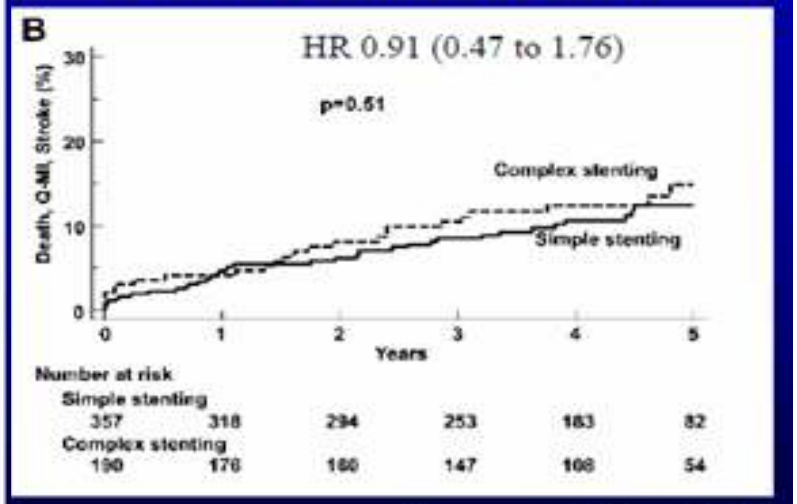
Comparison of Simple vs. Complex Stenting Techniques for LM Bifurcation Disease

Simple stenting, n=360; Complex stenting (n=196); Median f/u 4.2 yrs

- **Simple stenting:** Single stent from LM across LCx, kissing ballooning optional
- **Complex stenting:** Several techniques, including T-stenting, kissing stenting, crush technique or culotte were employed.



Similar Death/MI/Stroke



Chang et al. Heart 2012

Complex stenting technique is associated with inreased TVR rates

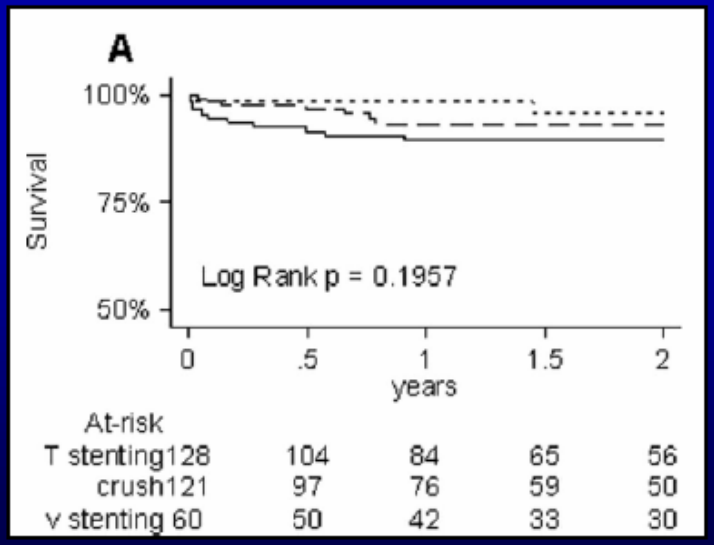
To date, no study has identified the 'optimal' distal LM method

Comparison of 2-Stent Techniques for LM Bifurcation Lesions: 2-Year Follow-up

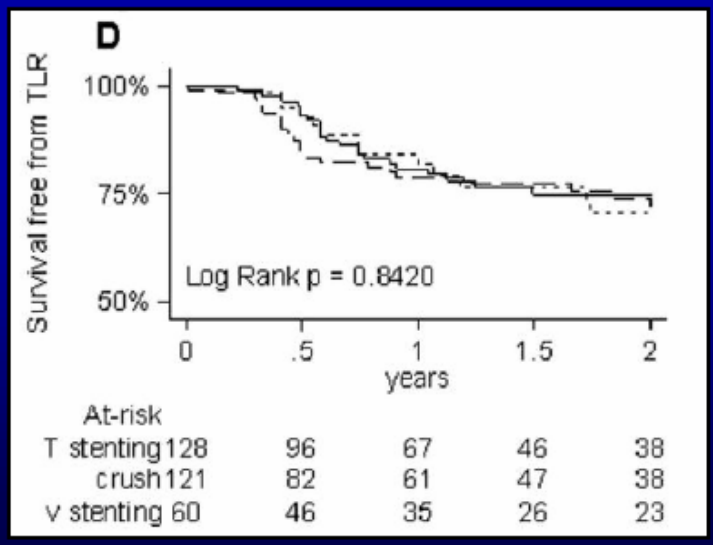
	n
T-Stenting	128
V-Stenting	60
Crush Stenting	121

No Difference in Survival, Or Freedom from TLR

Overall Survival

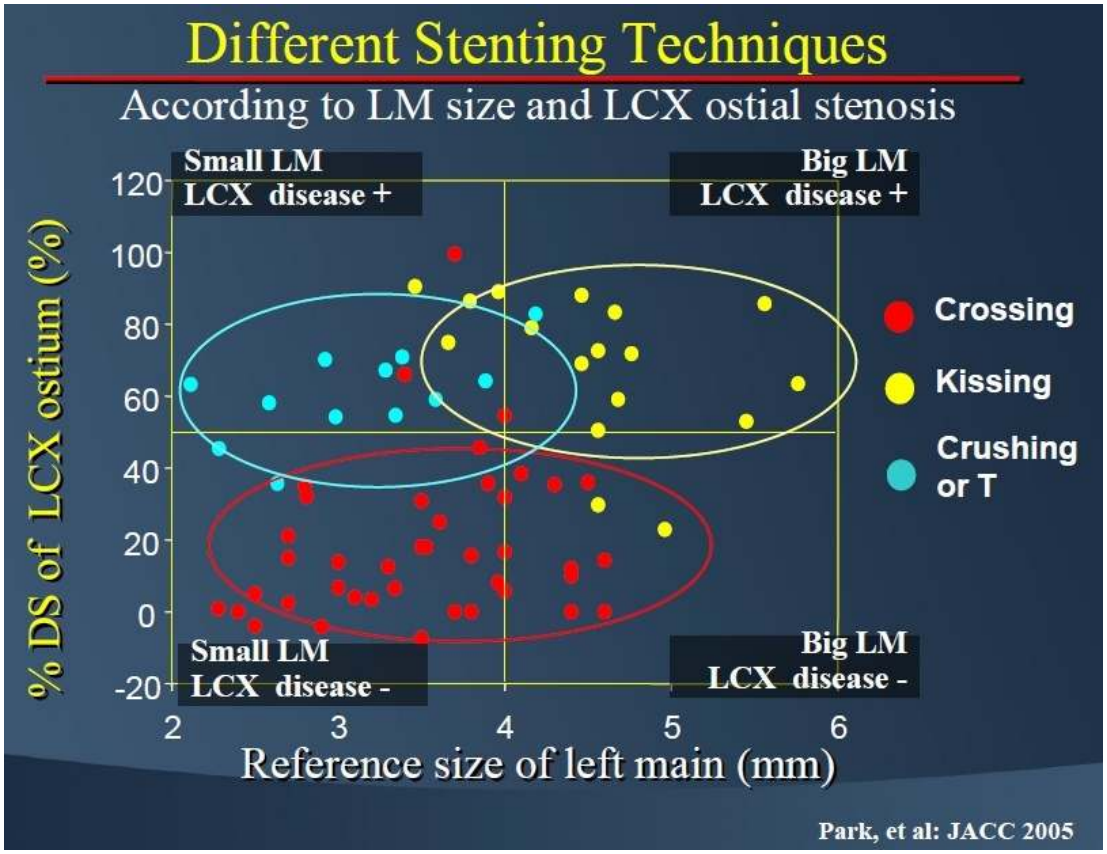


Freedom from TLR



Palmerini T. et al. Circulation: Cardiovascular Interventions 2010

In the LM bifurcation the easier seems to be the safer technique.



- ✓ **Single stent provisional strategy generally preferred**
- ✓ **Two stent strategy reserved for large LCX with severe, diffuse disease, angle favoring plaque shift**

Unresolved Issues and some thoughts in PCI for left main disease

- ✓Is the lesion in the left main significant?
- ✓What is the Ideal Technique (1 stent vs. 2 stent)?

The results of PCI may be further improved by procedural guidance with intravascular ultrasound (IVUS)?

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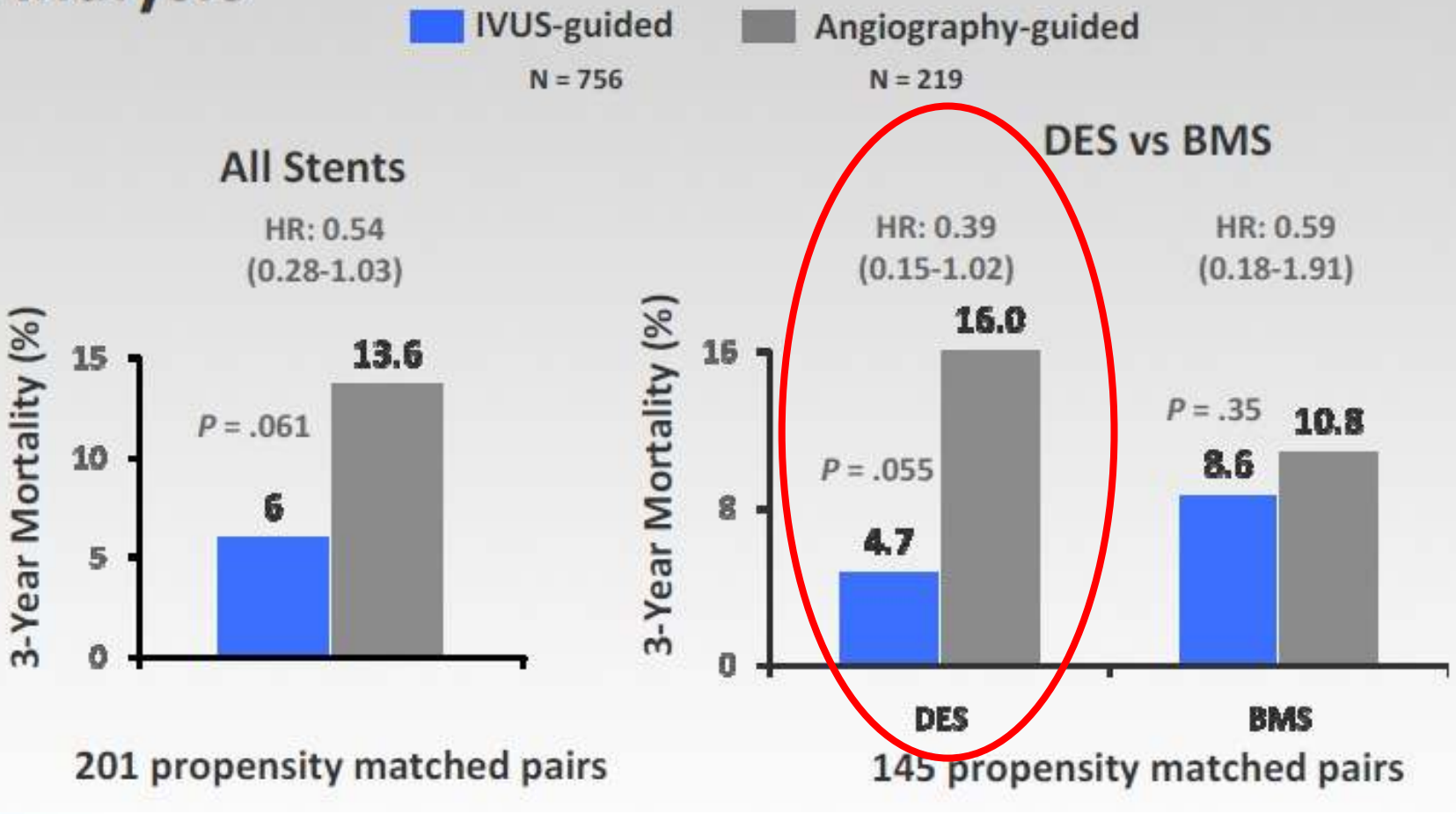
MAIN-COMPARE: IVUS-Guided Mortality Analysis



Park SJ, et al. *Circ Cardiovasc Intervent. 2009;2:167□177.*

Editorial

Unprotected Left Main Intervention
The Light at the End of the Tunnel?

Gregg W. Stone, MD; Gary S. Mintz, MD

(*Circ Cardiovasc Intervent.* 2009;2:156-158.)

"As such, in agreement with the study authors, we strongly recommend the routine use of IVUS during LMCA interventions, first to ensure the lesion is "real" and truly requires angioplasty, and second to optimize short-term and late clinical results. Our patients deserve no less."

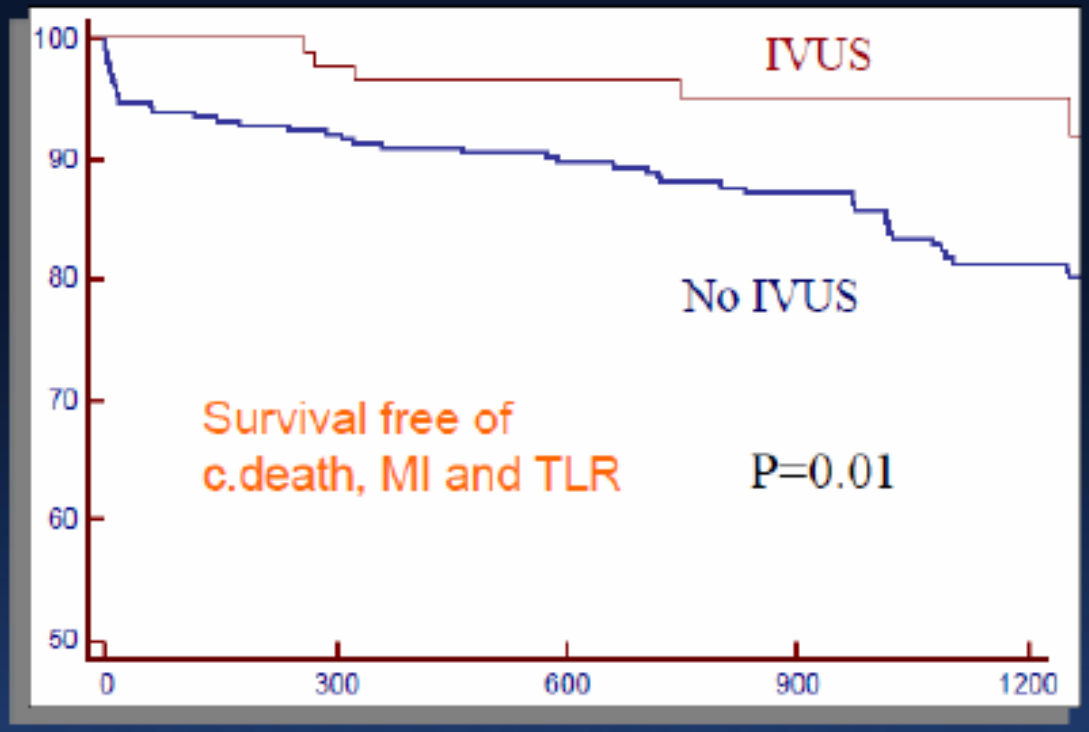
Updated 2011 ACC/AHA/SCAI GUIDELINES FOR ULMCA

Class IIb (*Level of Evidence: B*) : IVUS may be considered for guidance of coronary stent implantation, particularly in cases of left main coronary artery stenting.

ESTROFA-LM Left Main
IVUS Sub Study

"Distal-LM" subset and IVUS

All distal-LM cases
IVUS = 102
No IVUS = 307

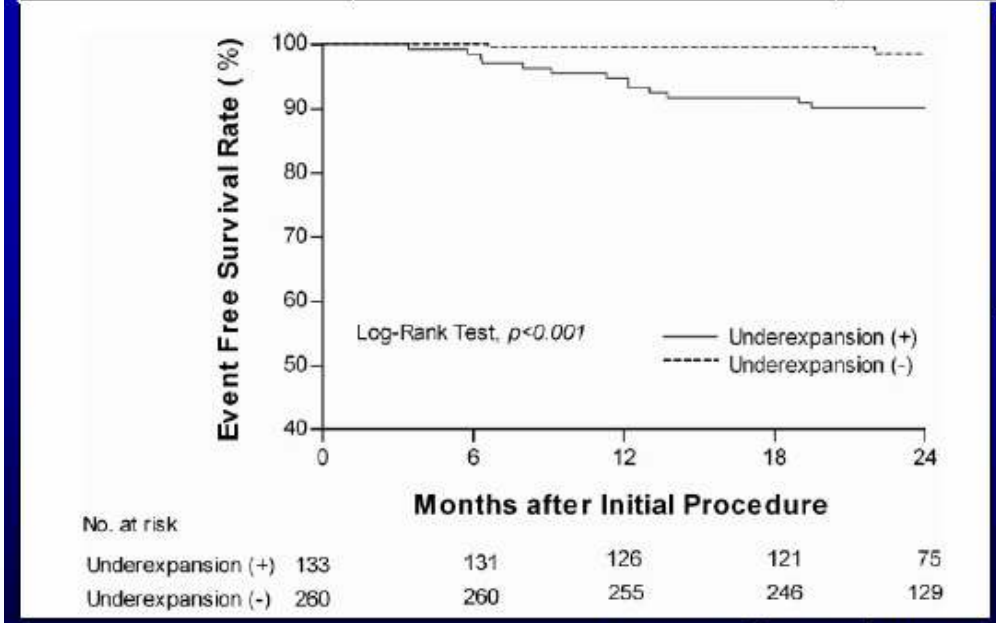


TCT2012

Post-stenting underexpansion is an independent predictor of 2-year MACE and TLR

403 patients with unprotected LM stenosis undergoing post-stenting IVUS and 9-month follow-up angiography

	Hazard Ratio	95% CI	P-Value
MACE	5.557	1.993–15.491	0.001
TLR	6.08	1.944–19.015	0.002



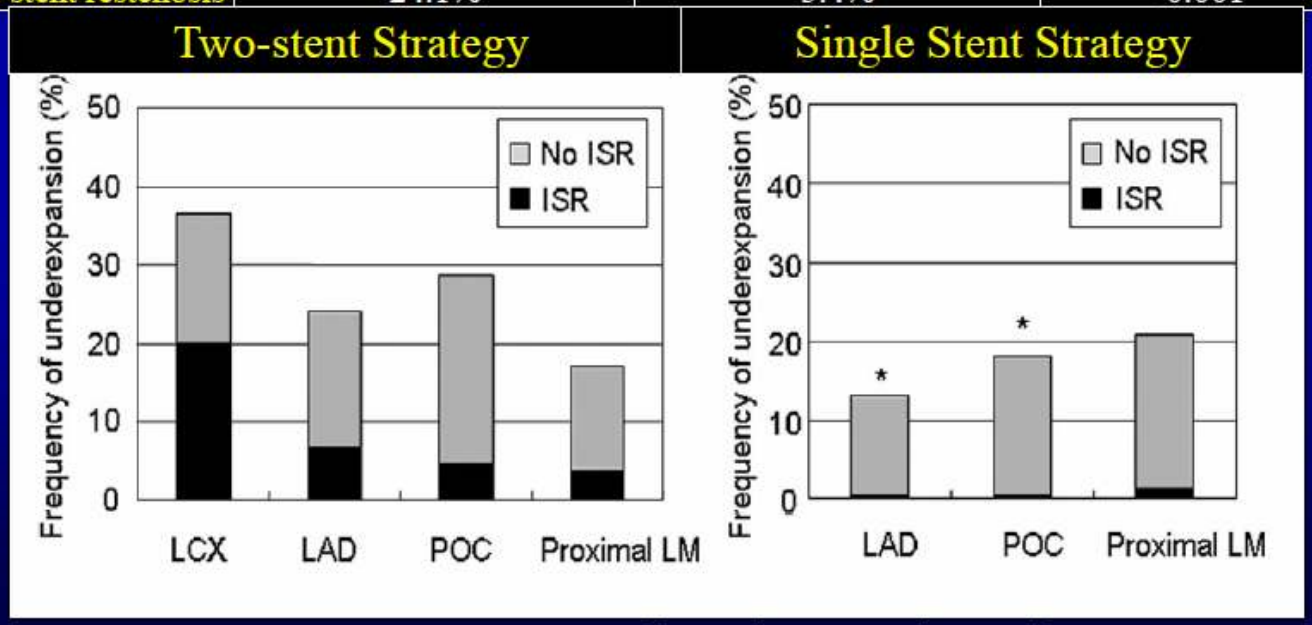
Underexpansion (n=133)
No underexpansion (n=260)

Kang et al. Circulation: Cardiovascular Interventions 2012

Stent Underexpansion results in Increased In-stent Restenosis

403 patients with unprotected LM stenosis undergoing post-stenting IVUS and 9-month follow-up angiography

	Underexpansion (n=133)	No underexpansion (n=260)	P-Value
In-stent restenosis	24.1%	5.4%	<0.001

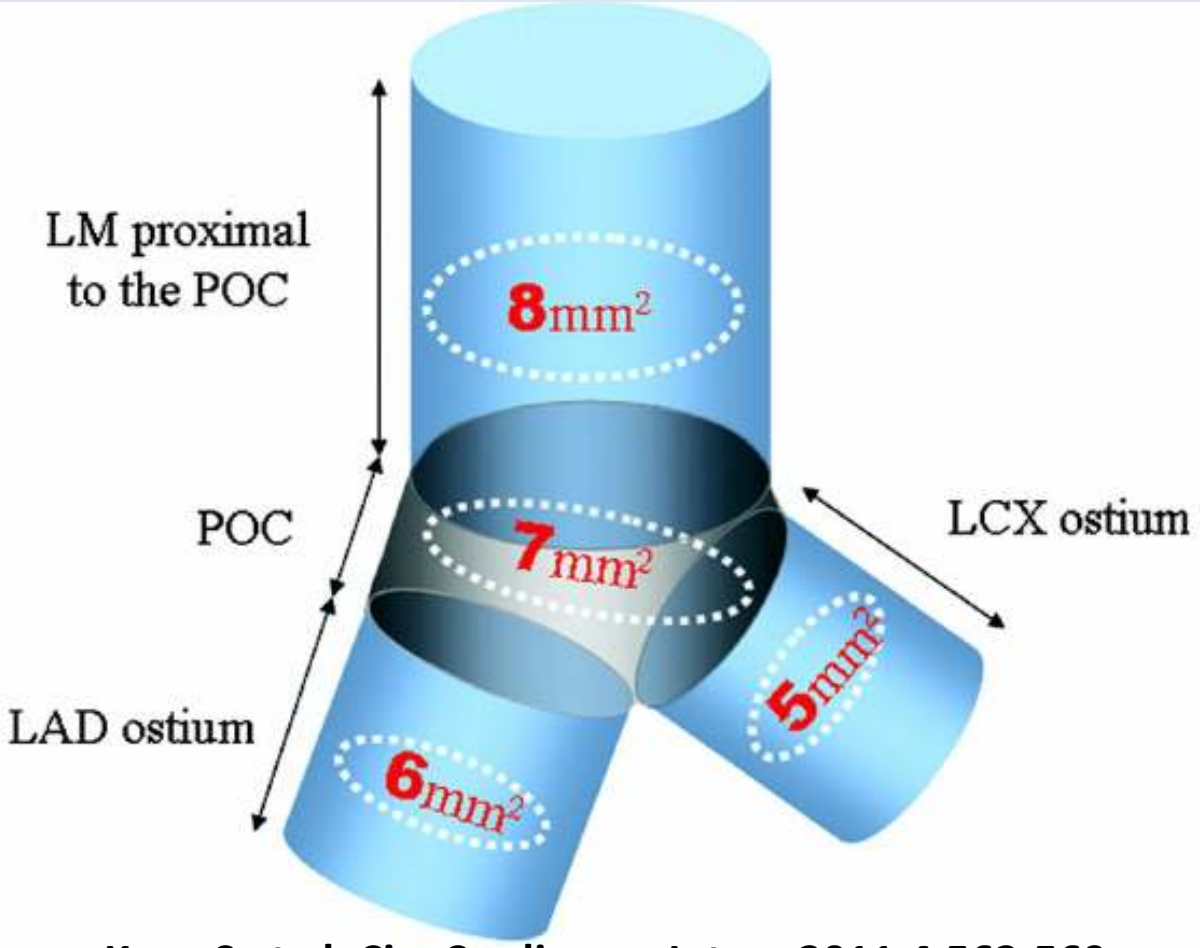


Kang et al. Circulation: Cardiovascular Interventions 2012

2-stent: LCX stent most frequently underexpanded and results in ISR more than half of cases

1-stent: Underexpansion is less common compared with 2 stent techniques with lower ISR

Minimal stent area threshold values for the prediction of angiographic in-stent restenosis



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

Unresolved Issues and some thoughts in PCI for left main disease

- ✓Is the lesion in the left main significant?
- ✓What is the Ideal Technique (1 stent vs. 2 stent)?
- ✓The results of PCI may be further improved by procedural guidance with intravascular ultrasound (IVUS)?

What is the role of cardiac assist devices? When and Which Device ?

What is the meaning of the heart team?
Incomplete Revascularization is associated with worse Cardiac Survival?
The new generation of thienopyridine may improve clinical outcome in patients with ULMD receiving DES.

Elective Intra-aortic Balloon Counterpulsation During High-Risk Percutaneous Coronary Intervention

A Randomized Controlled Trial

BCIS-1 Trial

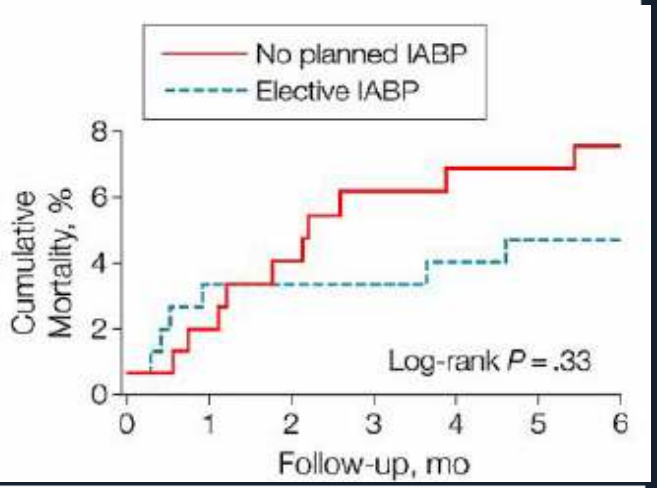
JAMA 2010; 304(8): 867-874

Divaka Perera, MD, MRCP
Rodney Stables, DM, FRCP
Martyn Thomas, MD, FRCP
Jean Booth, MSc
Michael Pitt, MD, FRCP
Daniel Blackman, MD, MRCP
Adam de Belder, MD, FRCP
Simon Redwood, MD, FRCP
for the BCIS-1 Investigators

Context Observational studies h
loon pump (IABP) insertion may i
coronary intervention (PCI). To d
ized trial.

Objective To determine wheth
fore PCI reduces major adverse
tients with severe left ventricular

Design, Setting, and Patient
tion Study, a prospective, open, n
17 tertiary referral cardiac center
and January 2009. Patients (n=3
fraction ≤30%) and extensive co



Conclusions Elective IABP insertion did not reduce the incidence of MACCE following PCI. These results do not support a strategy of routine IABP placement before PCI in all patients with severe left ventricular dysfunction and extensive coronary disease.

BCIS-1 did not support routine IABP use in all patients with poor LV and extensive *territory of ischemia undergoing PCI*

Intra-aortic Balloon Counterpulsation and Infarct Size in Patients With Acute Anterior Myocardial Infarction Without Shock

The CRISP AMI Randomized Trial

Patel, JAMA 2011

Manesh R. Patel, MD
Richard W. Smalling, MD, PhD
Holger Thiele, MD
Huiman X. Barnhart, PhD
Yi Zhou, PhD
Praveen Chandra, MD
Derek Chew, MD
Marc Cohen, MD
John French, MBChB, PhD
Divaka Perera, MD
E. Magnus Ohman, MD

Context Intra-aortic balloon counterpulsation (IABC) is an adjunct to revascularization in patients with cardiogenic shock and reduces infarct size when placed prior to reperfusion in animal models.

Objective To determine if routine IABC placement prior to reperfusion in patients with anterior ST-segment elevation myocardial infarction (STEMI) without shock reduces myocardial infarct size.

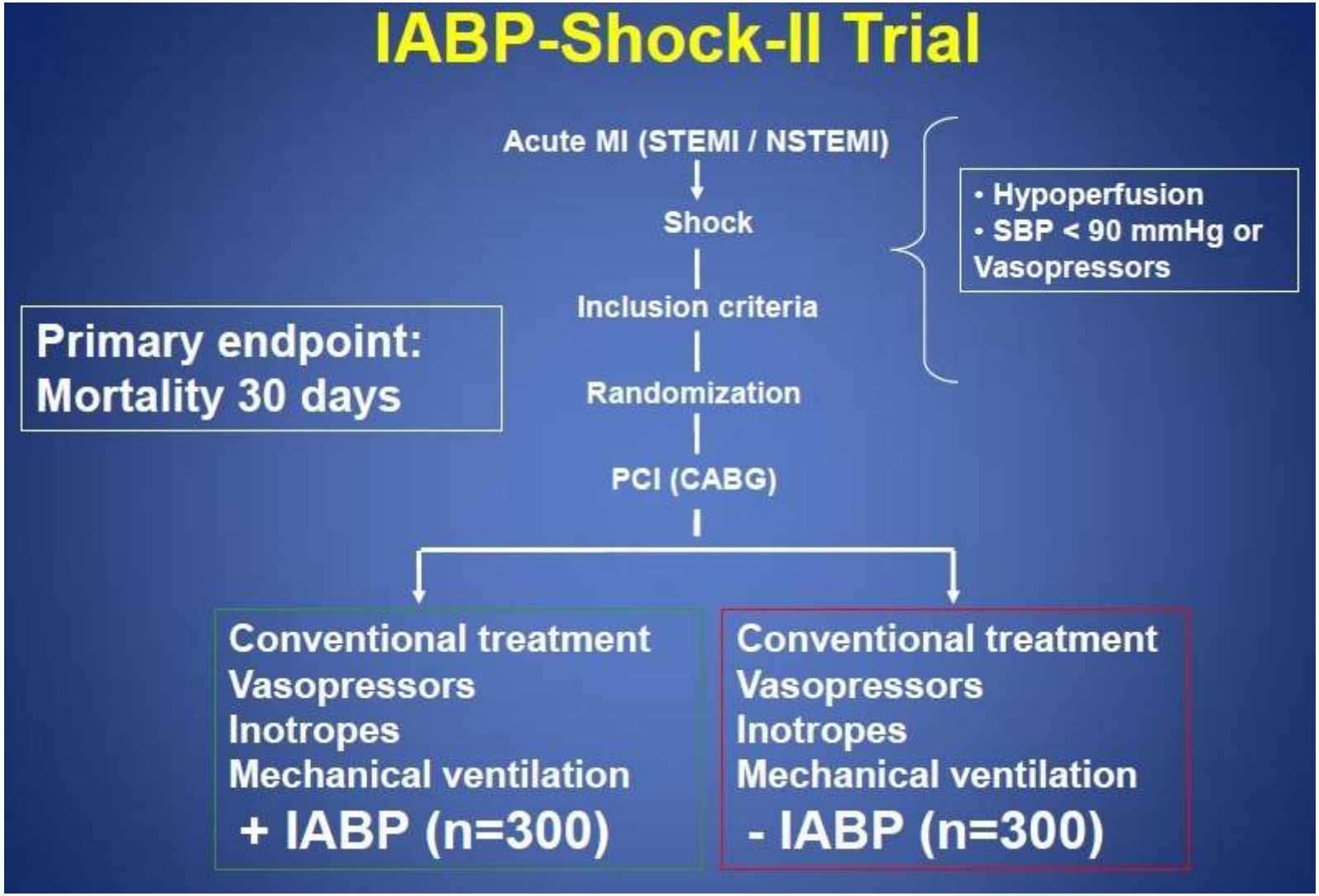
Design, Setting, and Patients An open, multicenter, randomized controlled trial, the Counterpulsation to Reduce Infarct Size Pre-PCI Acute Myocardial Infarction (CRISP AMI) included 337 patients with acute anterior STEMI but without cardiogenic shock at 30 sites in 9 countries from June 2009 through February 2011.

Intervention Initiation of IABC before primary percutaneous coronary intervention (PCI) and continuation for at least 12 hours (IABC plus PCI) vs primary PCI alone.

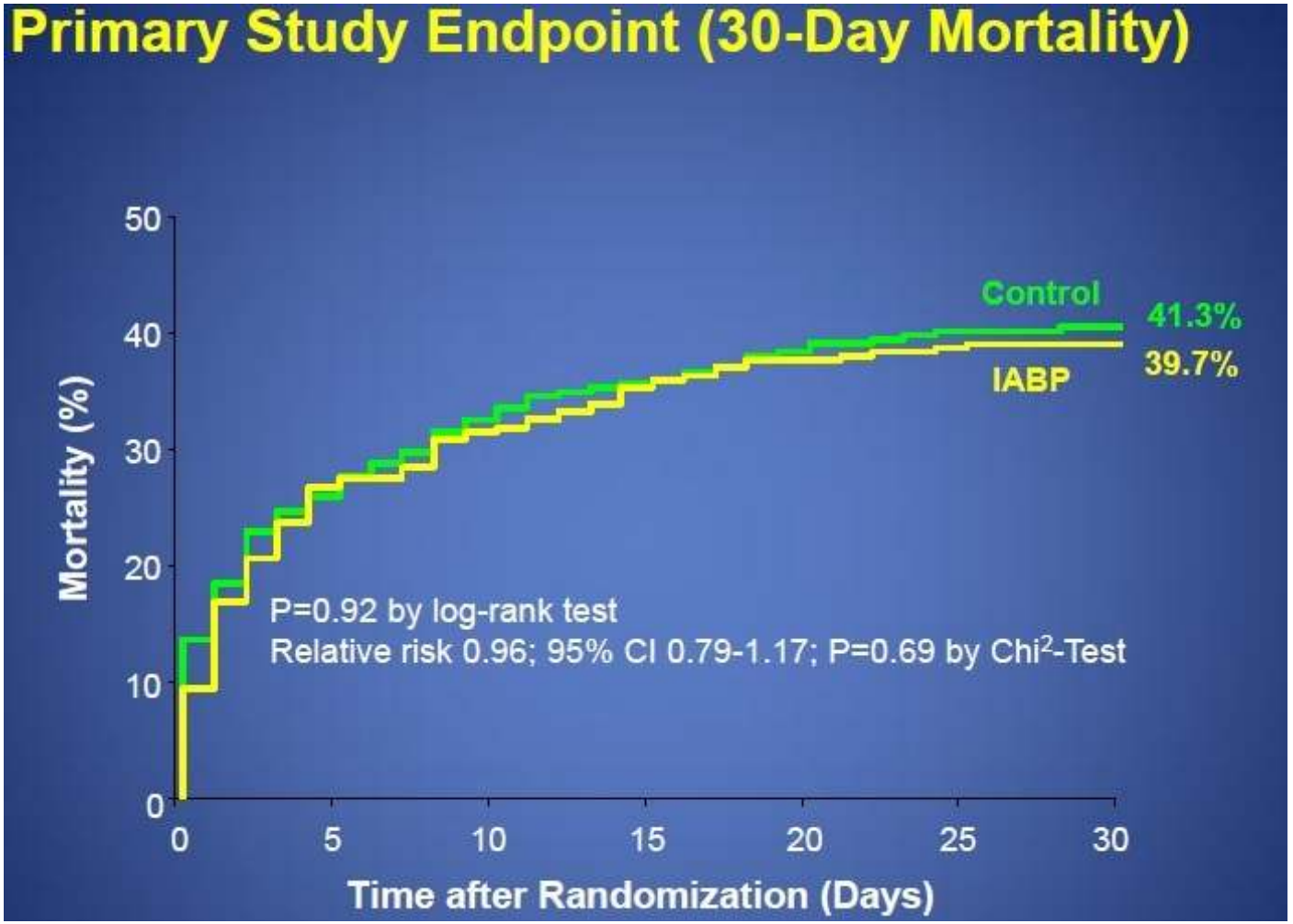
Main Outcome Measures Infarct size expressed as a percentage of left ventricular (LV) mass and measured by cardiac magnetic resonance imaging performed 3 to 5

Conclusion Among patients with acute anterior STEMI without shock, IABC plus primary PCI compared with PCI alone did not result in reduced infarct size.

CRISP-AMI did not support routine IABP use in anterior PAMI


IABP-Shock-II Trial
Acute MI (STEMI / NSTEMI)
Shock
Inclusion criteria
Randomization
PCI (CABG)
• Hypoperfusion
• SBP < 90 mmHg or Vasopressors
Primary endpoint:
Mortality 30 days
Conventional treatment
Vasopressors
Inotropes
Mechanical ventilation
+ IABP (n=300)
Conventional treatment
Vasopressors
Inotropes
Mechanical ventilation
- IABP (n=300)

NEJM 2012



No added benefit from IABP post PCI in cardiogenic shock

PROTECT II: Prospective Randomized Clinical Trial of Hemodynamic Support with Impella 2.5 vs. Intra-aortic Balloon Pump in High-Risk PCI

After DSMB stopped trial for futility, results analyzed for 448 pts.

Major Adverse Events	IABP	Impella 2.5	*P* Value
Intent to Treat			
30 Days[a]	40.1%	35.1%	0.277
90 Days	49.3%	40.6%	0.066
Per Protocol			
30 Days	42.2%	34.3%	0.092
90 Days	51.0%	40.0%	0.023

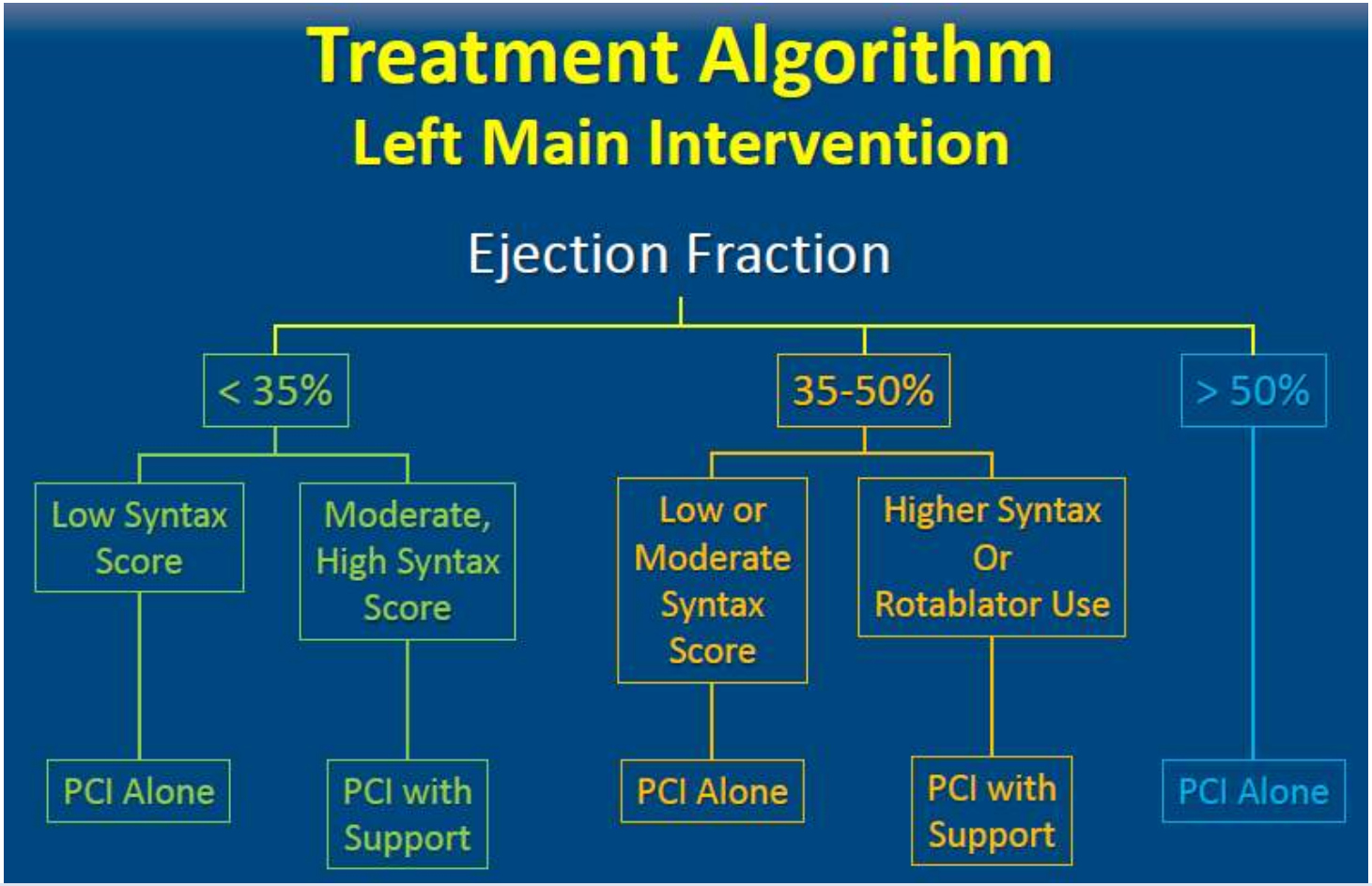
[a] Primary endpoint.

Conclusion: Impella 2.5 fails to reduce 30-day major adverse events compared with IABP in high-risk patients undergoing PCI, but a per-protocol analysis favored the percutaneous LVAD at 90 days.

O'Neill WW, et al. *Circulation.* 2012;Epub ahead of print.

No added benefit from Impella above IABP support for 'high-risk' PCI

When Would I Use Upfront Support?



Most LM PCI can be performed safely without Support (but available!)

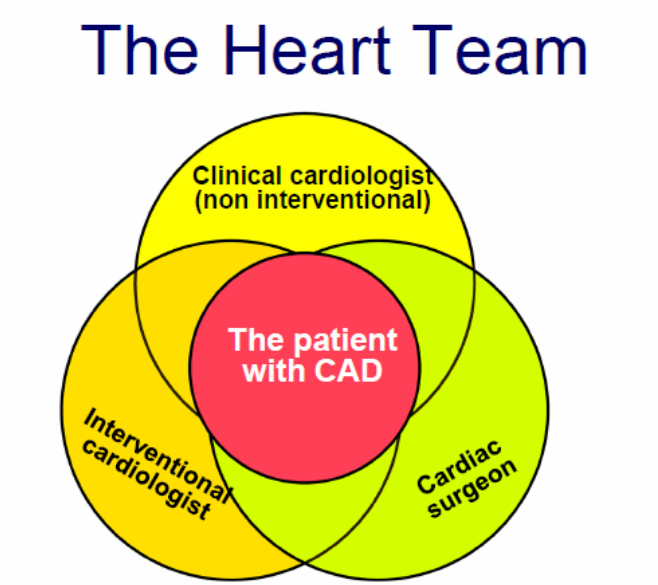
Unresolved Issues and some thoughts in PCI for left main disease

- ✓Is the lesion in the left main significant?
- ✓What is the Ideal Technique (1 stent vs. 2 stent)?
- ✓The results of PCI may be further improved by procedural guidance with intravascular ultrasound (IVUS)?
- ✓What is the role of cardiac assist devices?

What is the meaning of the heart team?

Incomplete Revascularization is associated with worse Cardiac Survival?
The new generation of thienopyridine may improve clinical outcome in patients with ULMD receiving DES.

The meaning of HEART TEAM



Joint ESC/EACTS Guidelines for Myocardial Revascularization 2010

4.1 Patient Information

Patient information needs to be objective and unbiased, patient orientated, evidence based, up-to-date, reliable, understandable, accessible, relevant and consistent with legal requirements. Informed consent requires transparency, especially if there is controversy about the indication for a particular intervention. Specialty bias and self referral should not interfere with the process.

4.2 Multidisciplinary decision making (Heart Team)

The creation of a Heart Team serves the purpose of a balanced multidisciplinary decision process. Standard protocols compatible with the current Guidelines may be used to avoid the systematic need for case-by-case review of all diagnostic angiograms.

	Class	Level
It is recommended that patients be adequately informed about the potential benefits and short- and long-term risks of a revascularisation procedure. Enough time should be spared for informed decision making.	I	C
The appropriate revascularisation strategy in patients with MVD should be discussed by the Heart Team.	I	C

It is practical as the Heart Team…

Advantages reported in the literature

…improves (consistent) decision (making more accurate according to guidelines)

…Team has more knowledge than an individual

…Increases physician and patient wellbeing

…Higher ratings of patients' experience of care

…Physicians "share the burden"

…Improves outcomes

…Liability

But remember "Medicine is not a democracy"

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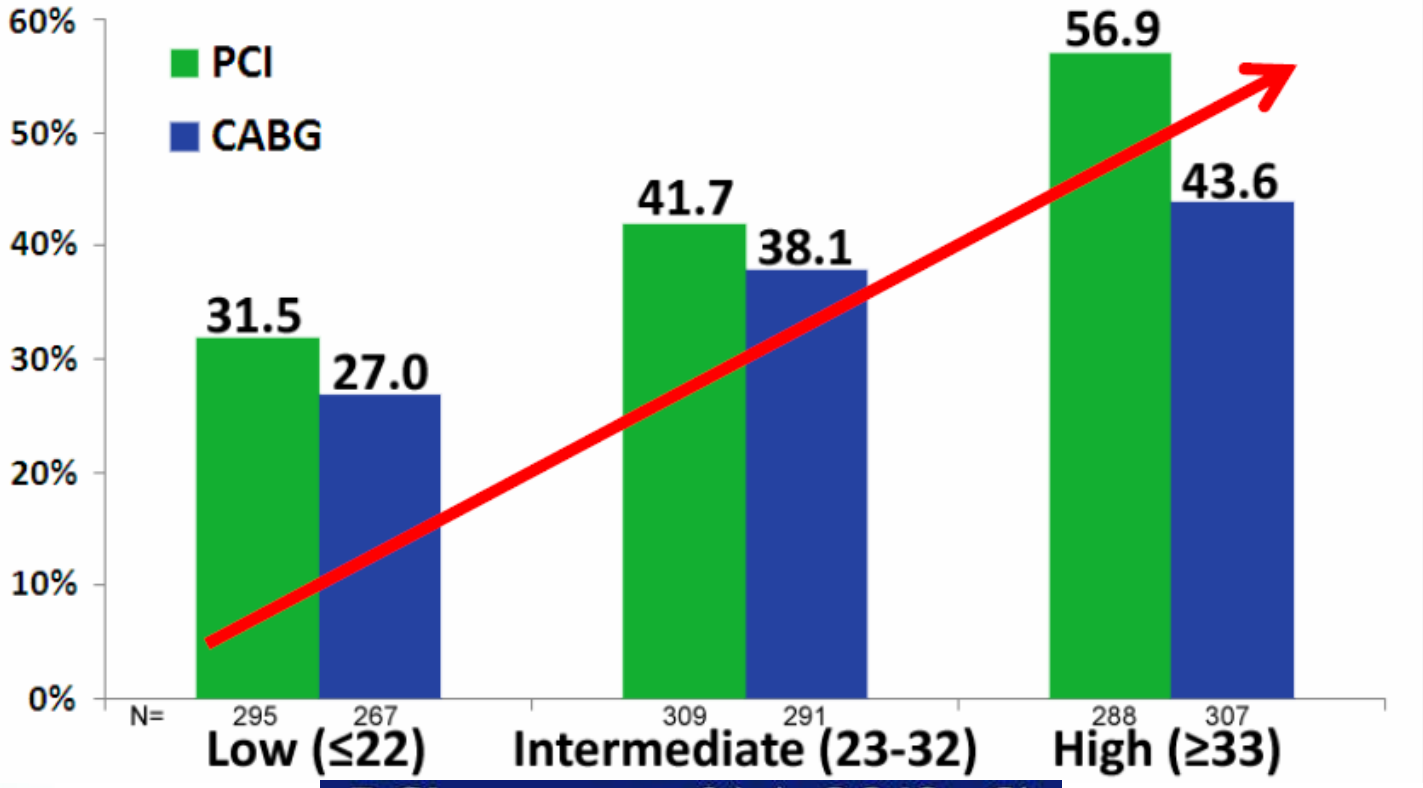
Incomplete Revascularization is associated with worse Cardiac Survival?

The new generation of thienopyridine may improve clinical outcome in patients with ULMD receiving DES

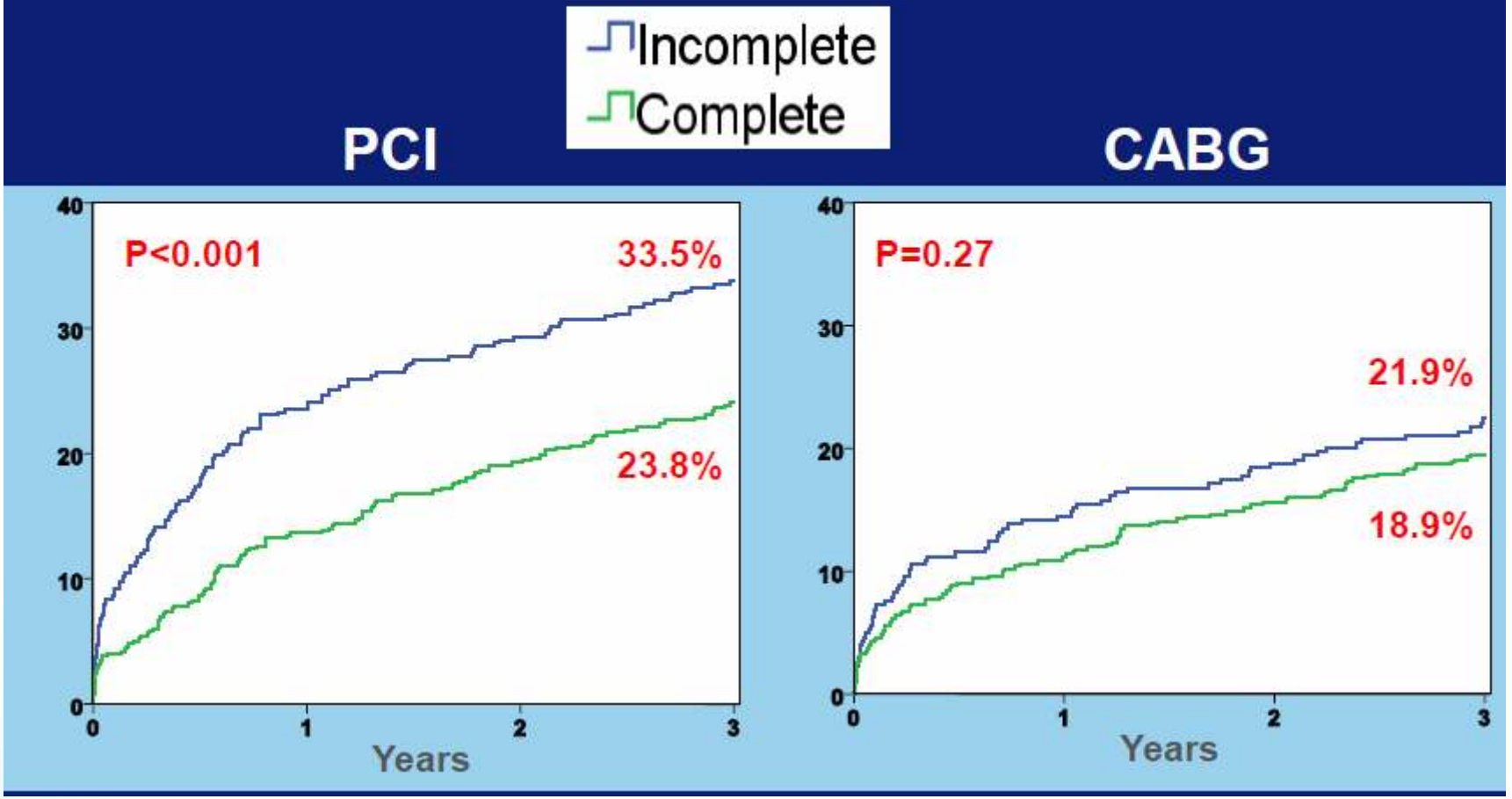
Incomplete revascularization according to SYNTAX score



PCI → 43% (388/896)

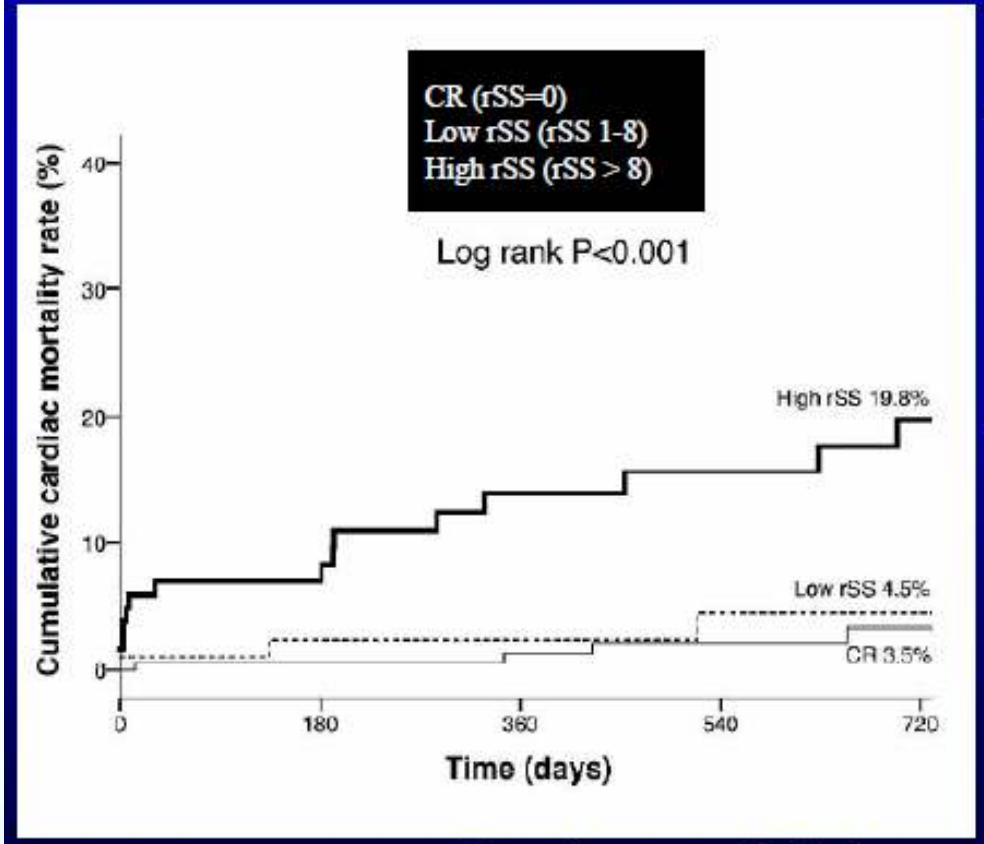
CABG → 37% (320/870)

3-year MACCE


Incomplete
Complete
PCI
CABG
P<0.001
33.5%
23.8%
P=0.27
21.9%
18.9%
40
30
20
10
0
0
1
2
3
Years

Italian CUSTOMIZE Registry of 400 patients undergoing LM PCI

Residual SYNTAX Score > 0 is a marker of Incomplete Revascularization



Residual SYNTAX score (rSS) = (SYNTAX score Pre-PCI) – (SYNTAX Score post-PCI)

Capodanno et al. Catheterization and Cardiovascular Interventions 2012

Unresolved Issues and some thoughts in PCI for left main disease

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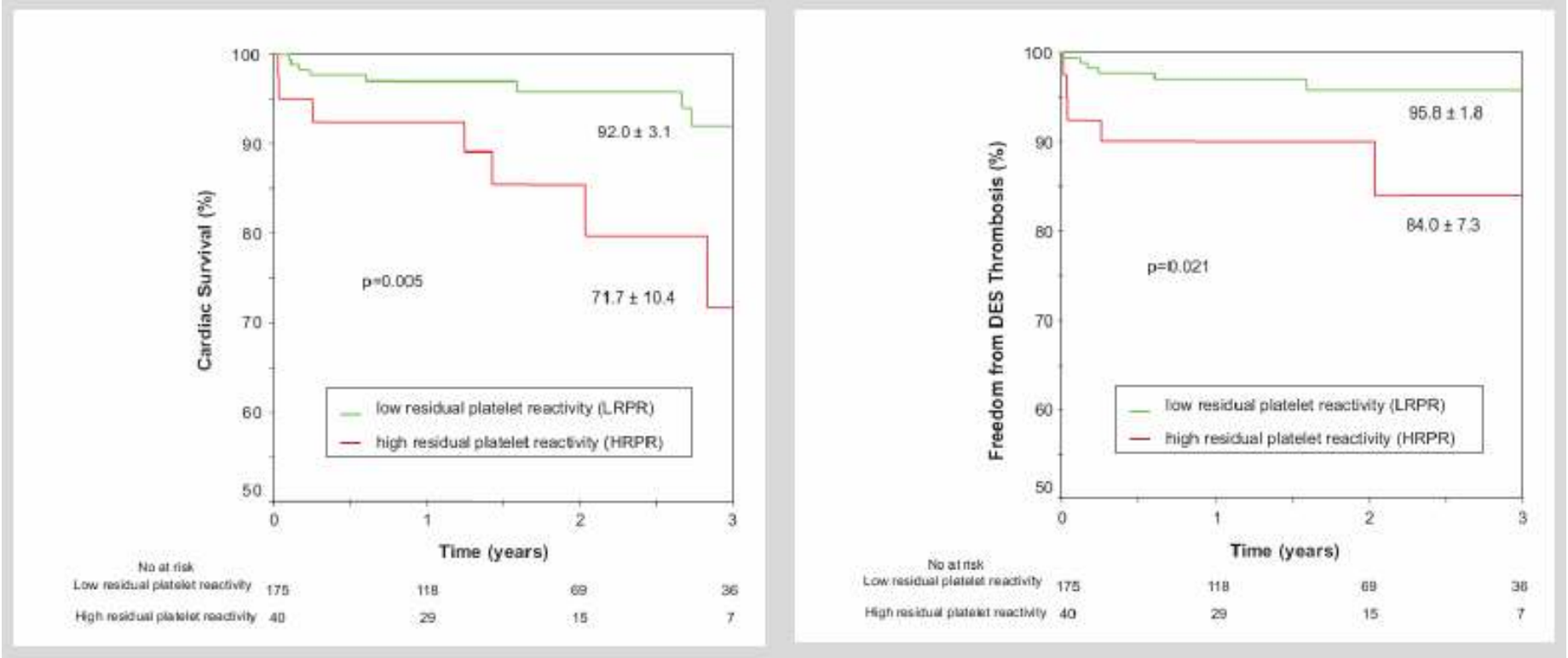
The new generation of thienopyridine may improve clinical outcome in patients with ULMD receiving DES?

High Residual Platelet Reactivity After Clopidogrel Loading and Long-Term Clinical Outcome After Drug-Eluting Stenting for Unprotected Left Main Coronary Disease



Migliorini A et al. Circulation 2009

Florence ULMD - PCI Registry

Design

- **Design:** Prospective single-center registry of ULMD PCI treated with DES.
- **End Points:** cardiac survival & stent thrombosis at 1 year.

TCT2012

From 2004 to May 2011
491 pts underwent ULMD PCI with DES

Exclusion criteria:
- anticipated noncompliant to dual antiplatelet therapy (n=6)
- 1st generation DES (n=293)

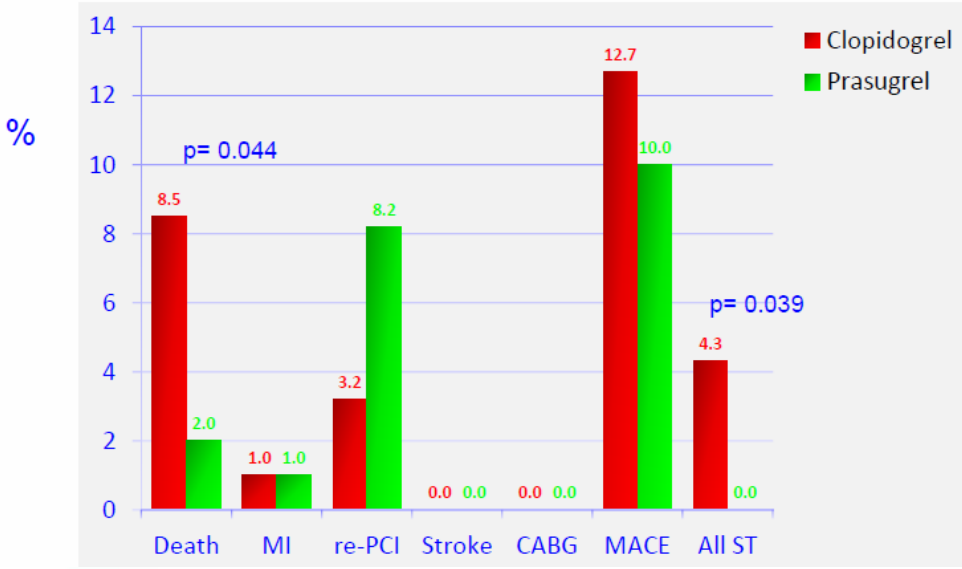
192 pts underwent ULMD PCI with EES

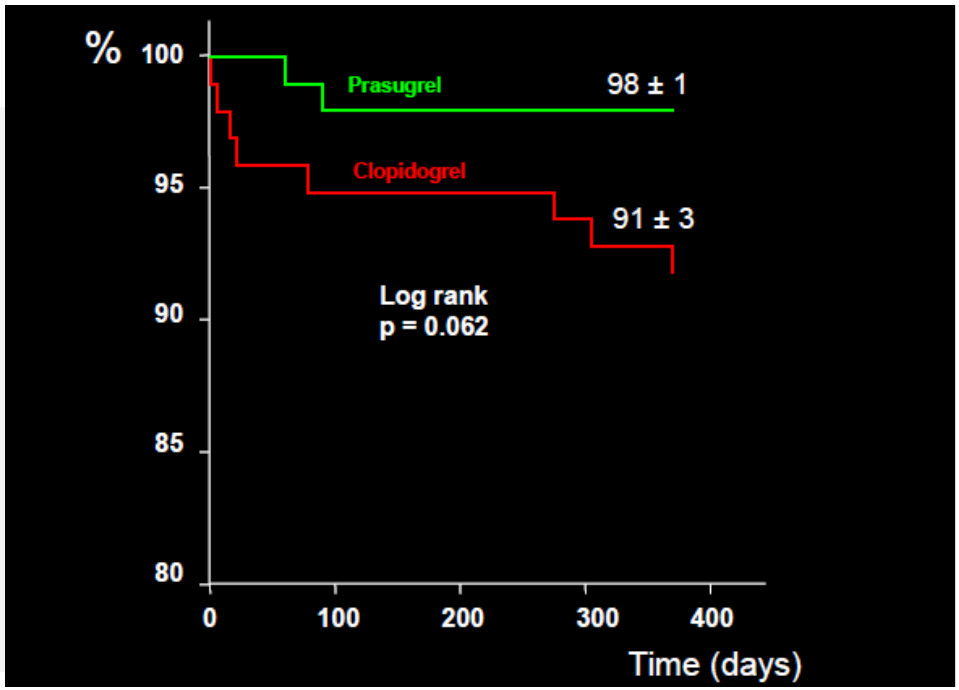
94 pts received Clopidogrel

98 pts received Prasugrel

The results of this study suggest the routine use of this synergic strategy.

One-year Clinical Outcome





The new generation of thienopyridine improves clinical outcome in all comers patients with ULMD receiving second generation DES.

Ours “Left main PCI” Spectrum

So far 59 pts

LONG-TERM OUTCOMES OF PERCUTANEOUS CORONARY INTERVENTION FOR UNPROTECTED LEFT MAIN CORONARY ARTERY DISEASE: INITIAL CLINICAL EXPERIENCE.

Graidis Ch. [1], Dimitriadis D. [1], Karasavvidis V. [1], Psifos V. [1], Gourgiotis K. [1], Neroladakis I. [1], Karakostas G. [1], Vogiatzis I. [1], Dimitriadis G. [1], Voloudakis K. [1] -

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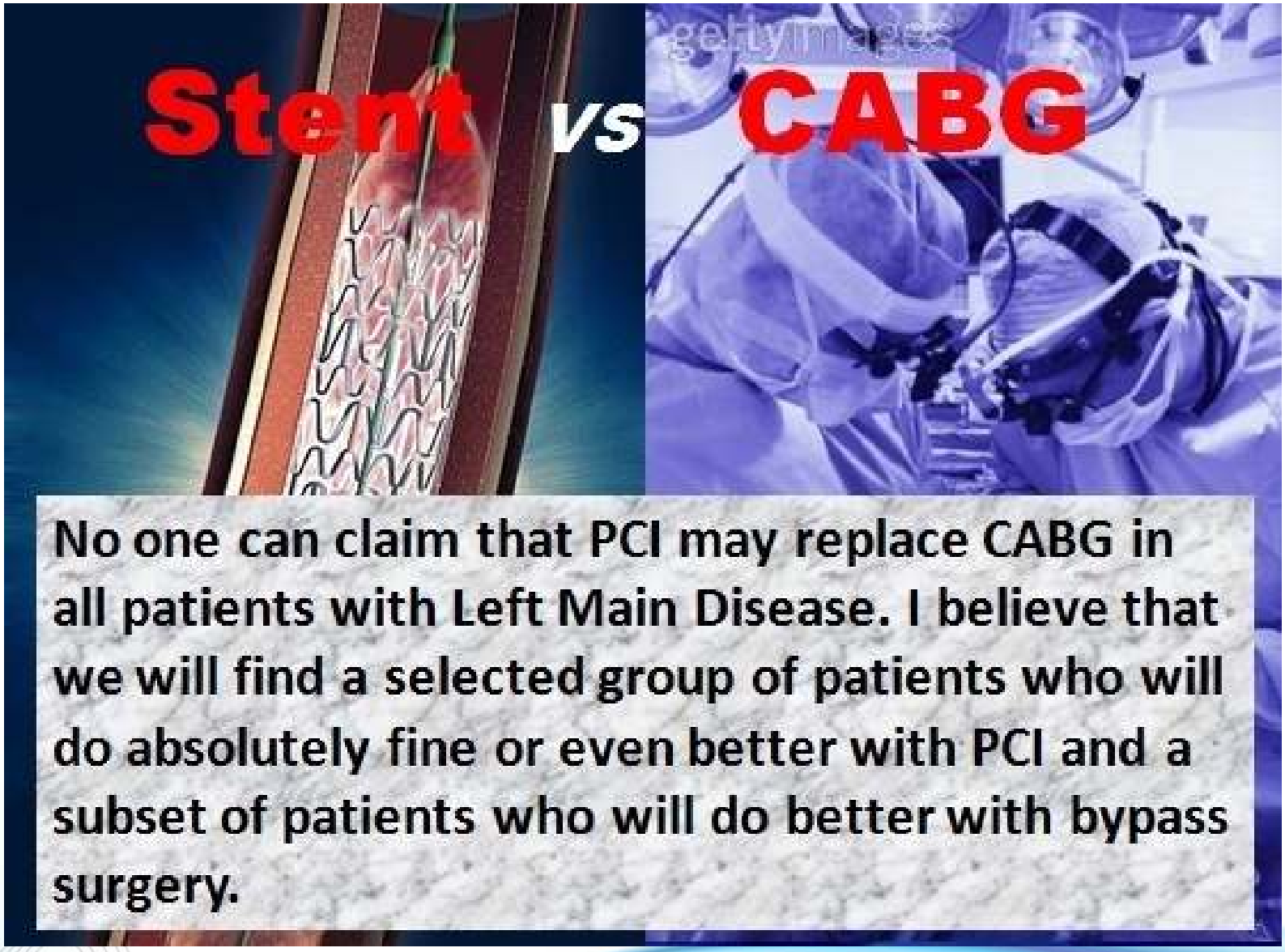
Presented at

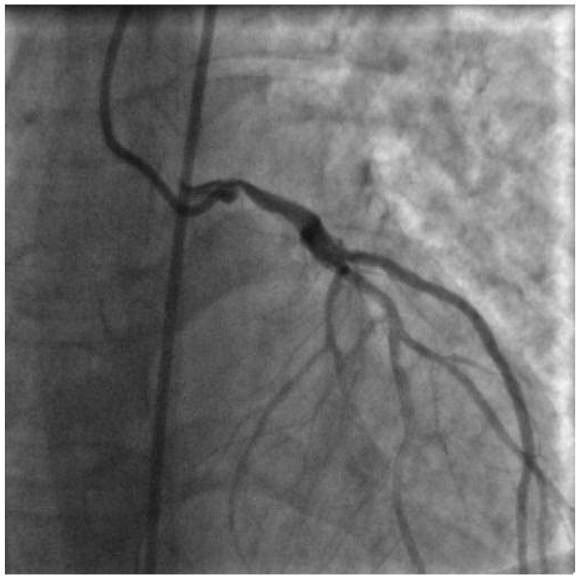
TCT Mediterranean 2012, May 4-5 2012
Limassol, Cyprus

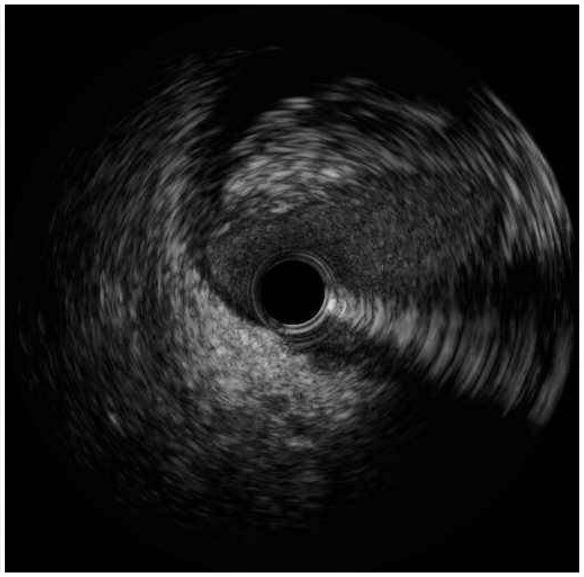
Demographic and Procedural data (n=52)	
Age (yrs)	64,4 1 ± 3,5
Male	42 (80.7%)
Distal LM involvement	36 (69.2%)
Isolated LM	16 (30.8%)
LM with 1-vessel disease	29 (55.8%)
Syntax Score <33	45 (86.5%)
Single stent in distal LM	30 (83.4%)
IABP support	10 (19.2%)
IVUS guidance	16 (30.7%)
Complete revascularization	41 (78.8%)
Procedural success	52 (100%)

Clinical outcome (n=52)	
Follow-up period (months)	28.17±18.46
Death	0 (0%)
Myocardial infarction	0 (0%)
Stroke	0 (0%)
Repeat revascularization	5 (9.61%)
PCI	5 (9.61%)
CABG	0 (0%)
Left main re-PCI	4 (7.69%)
Stent Thrombosis	0 (0%)
MACE	5 (9.61%)


Stent
vs
CABG
No one can claim that PCI may replace CABG in all patients with Left Main Disease. I believe that we will find a selected group of patients who will do absolutely fine or even better with PCI and a subset of patients who will do better with bypass surgery.

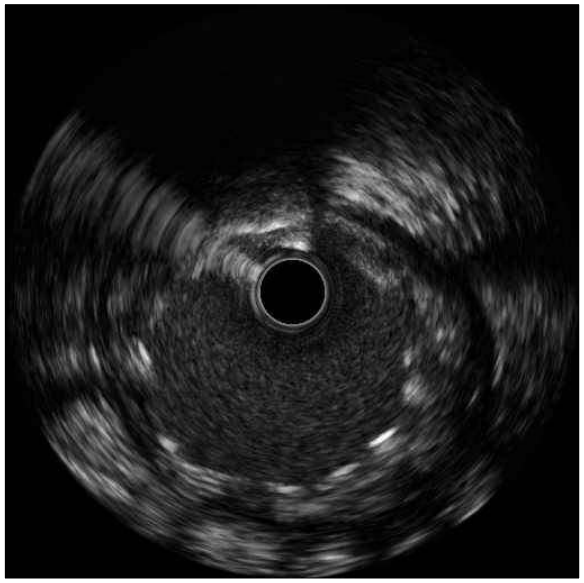
Thank you for your attention !!!!

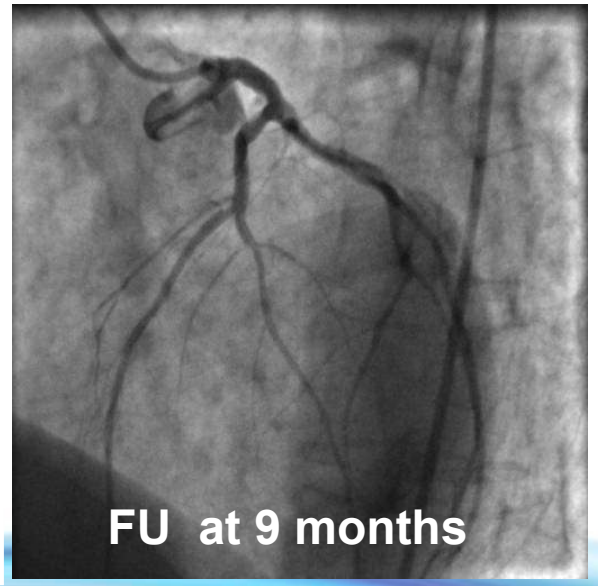




CASE 1:

The case to definitely pursue

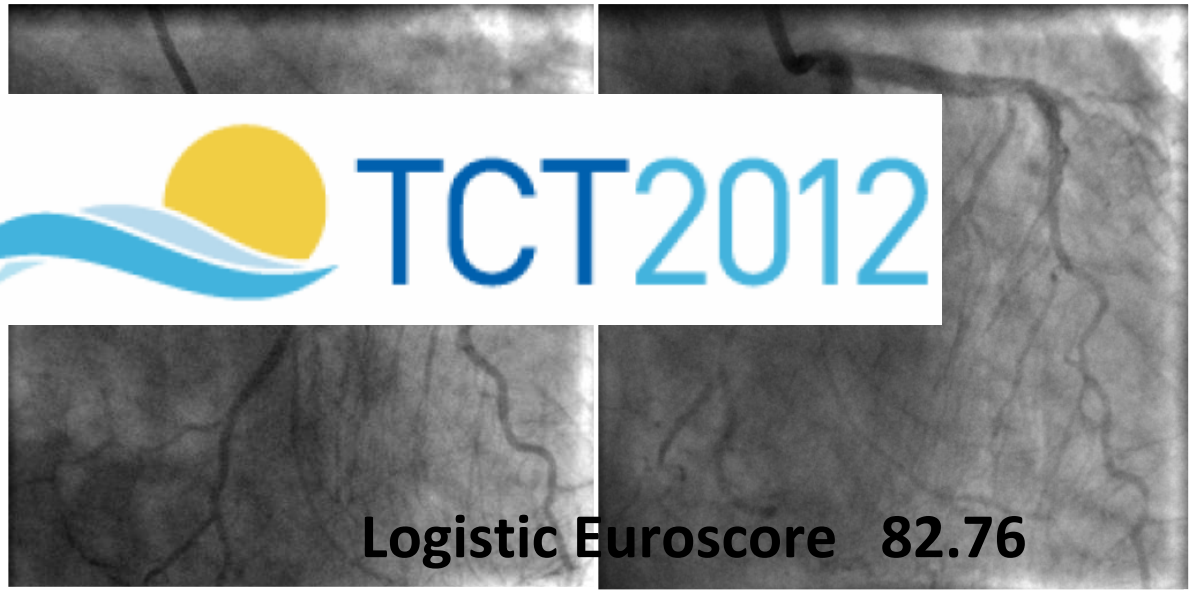




TCT2012

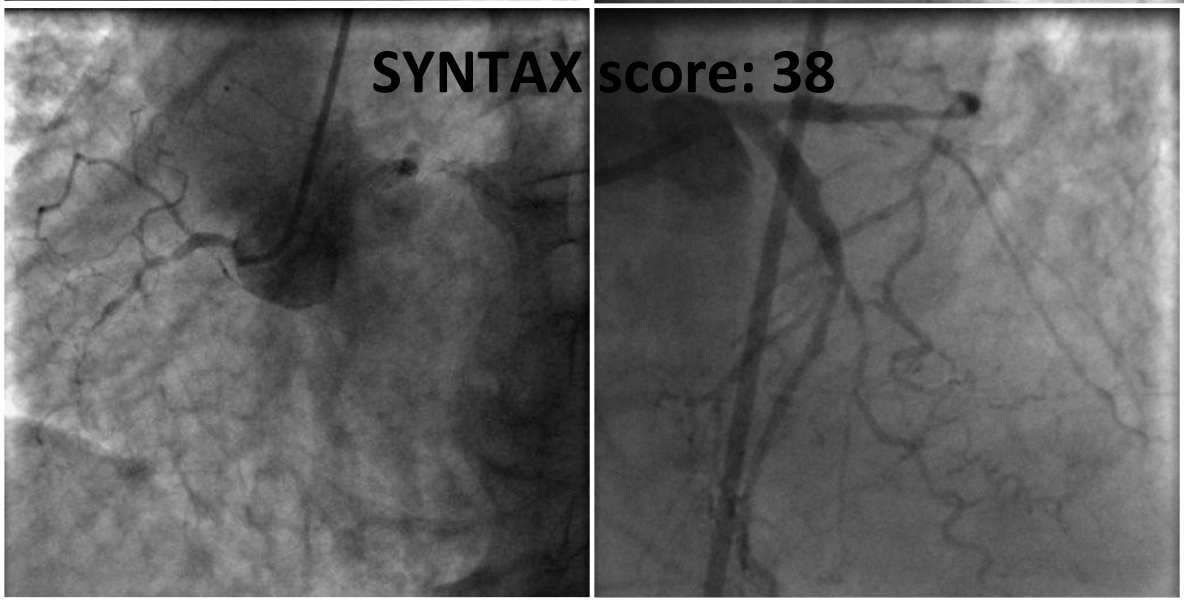
CASE 2:

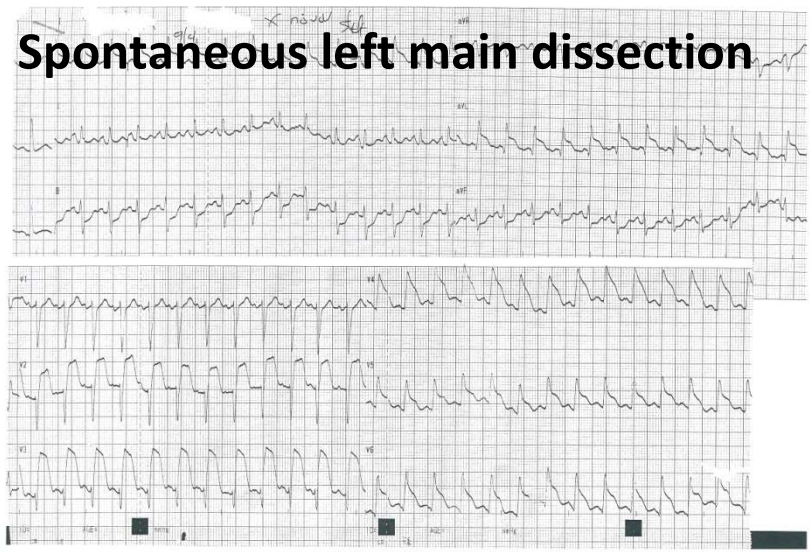
Inoperable patient



Logistic Euroscore 82.76

SYNTAX score: 38



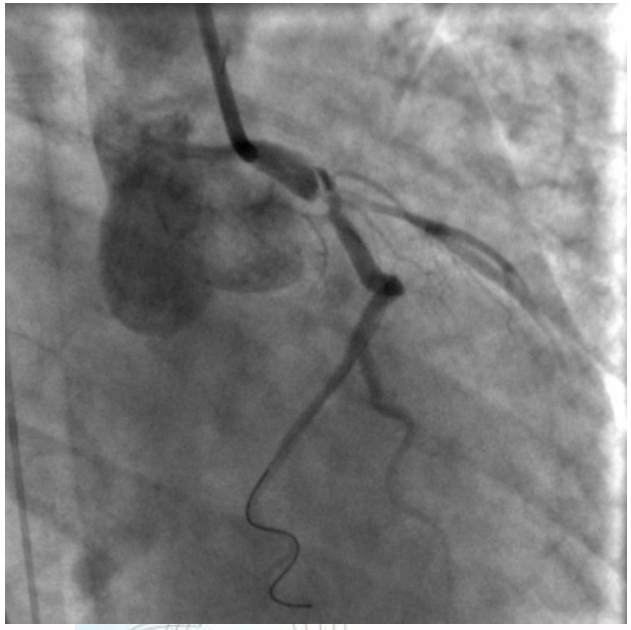


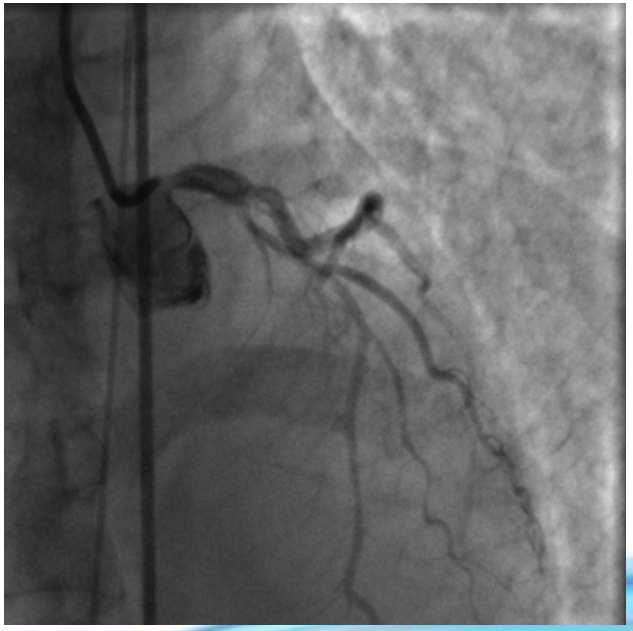
CASE 3

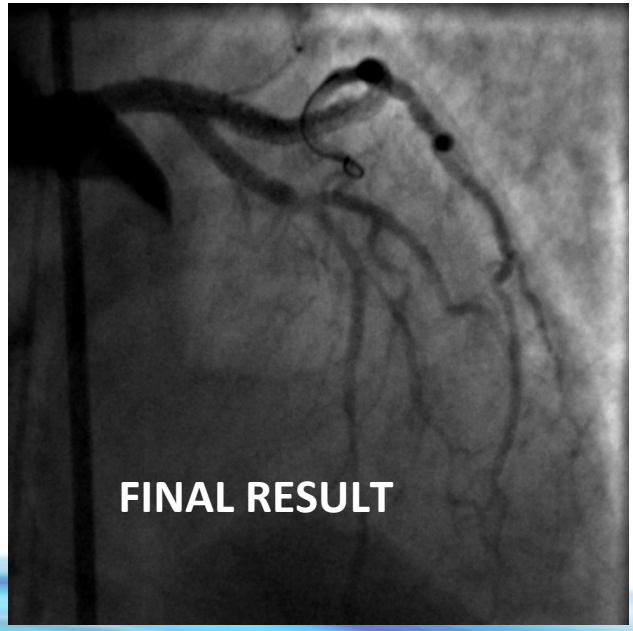
42 year old with cardiogenic shock

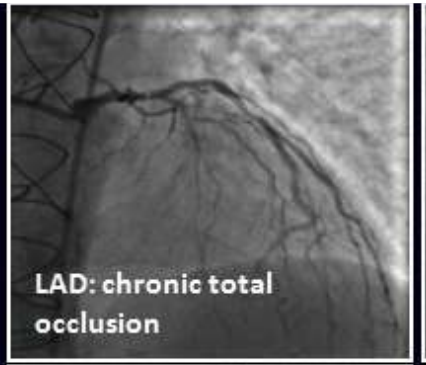
Fighting with a catastrophe!!!!!!

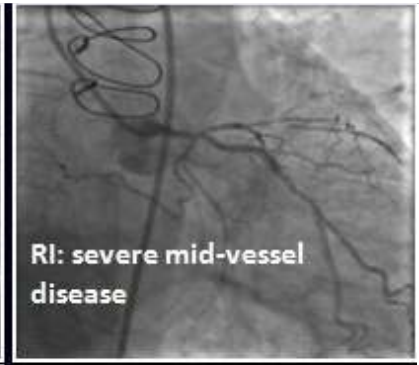
The case where I was not happy to be challenged Presented at 4ο IICE, 24 - 26 November2011

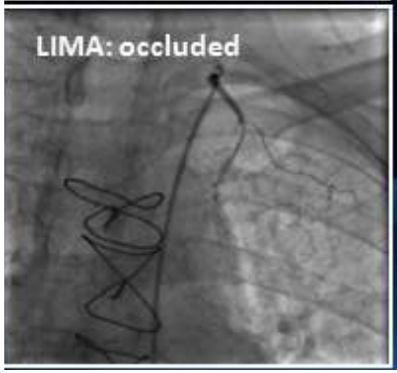


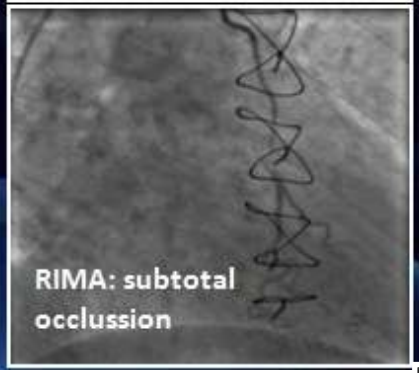


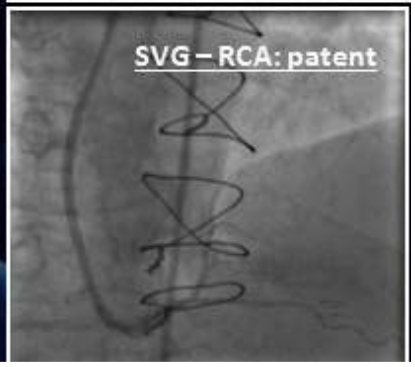












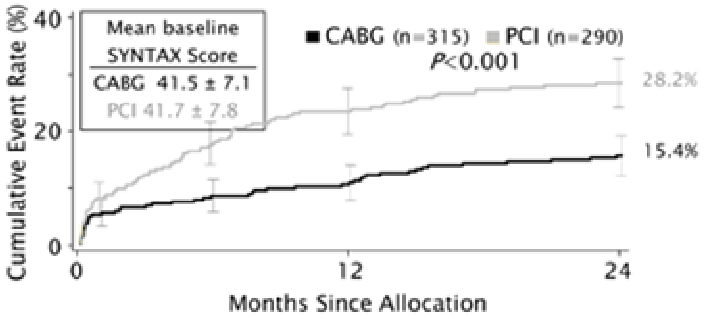
CASE 4

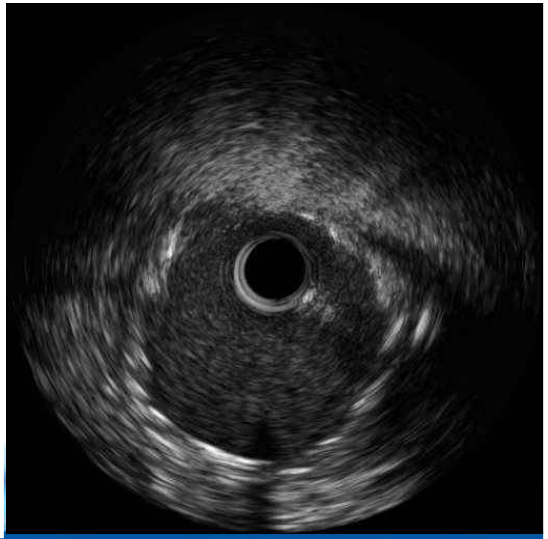
The case where I was happy to be challenged

The case which could have gone either way

Patient willingness

TOTAL SYNTAX SCORE 47.5





Hellenic Institute of Cardiovascular Diseases

www.e-Cardio.gr

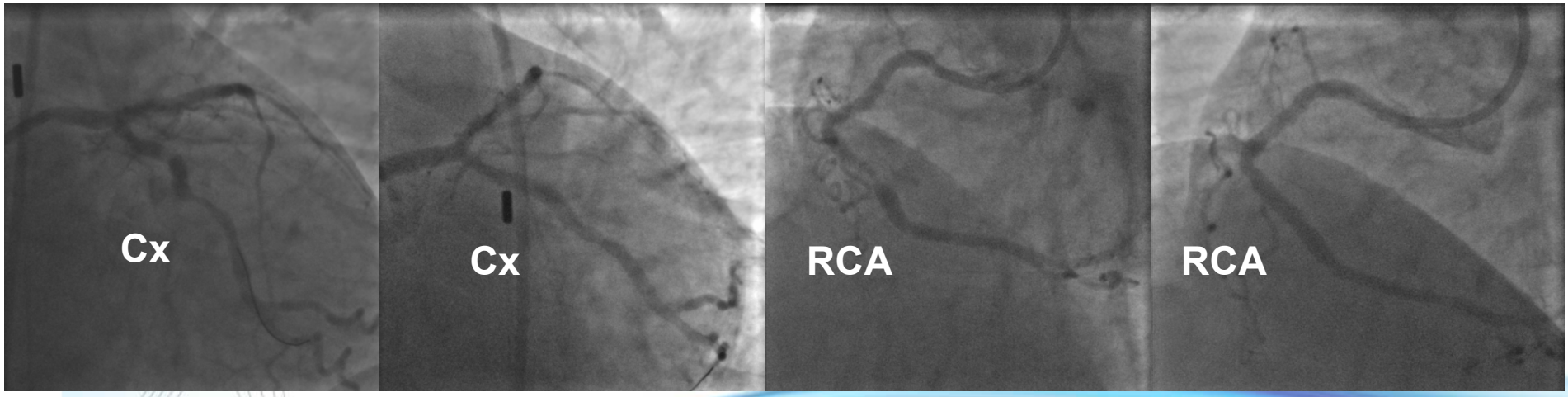
Presented at AICT 9-10 October 2009

CASE 5

The case where I went too far?

Surgical candidate
Syntax score>33

Patient willingness



Unresolved Issues and some thoughts in PCI for left main disease

- ✓Is the lesion in the left main significant?
- ✓What is the Ideal Technique (1 stent vs. 2 stent)?
- ✓The results of PCI may be further improved by procedural guidance with intravascular ultrasound (IVUS)?
- ✓What is the role of cardiac assist devices?
- ✓What is the meaning of the heart team?
- ✓Incomplete Revascularization is associated with worse Cardiac Survival?

How often is the left main responsible for an ACS and is always a dramatic event?

The new generation of thienopyridine may improve clinical outcome in patients with ULMD receiving DES

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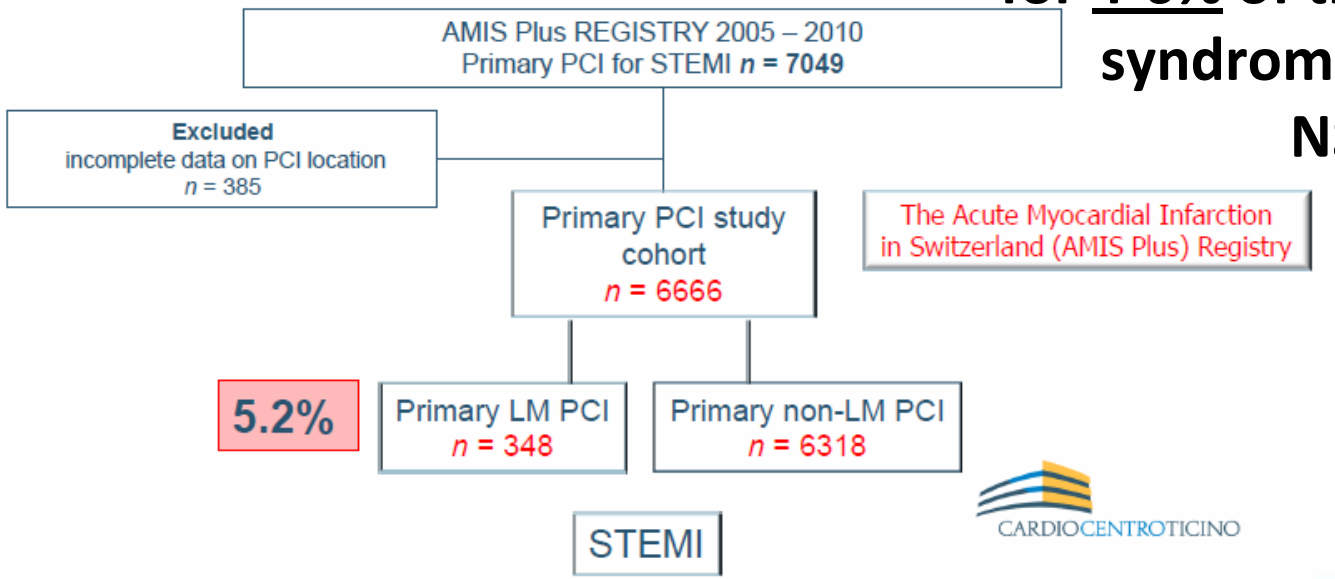
Primary Percutaneous Coronary Intervention for Unprotected Left Main Disease in Patients With Acute ST-Segment Elevation Myocardial Infarction

The AMIS (Acute Myocardial Infarction in Switzerland) Plus Registry Experience

Giovanni B. Pedrazzini, MD,* Dragana Radovanovic, MD,† Giuseppe Vassalli, MD,*§ Daniel Sürder, MD,* Tiziano Moccetti, MD,* Franz Eberli, MD,‡ Philip Urban, MD,‖ Stephan Windecker, MD,¶ Hans Rickli, MD,# Paul Erne, MD,**
on behalf of the AMIS Plus Investigators

ULM-lesions are responsible for 4-6% of the acute coronary syndromes (STEMI and NSTEMI)



CARDIOCENTROTICINO

Is the clinical presentation of left main ACS different from “non LM” ACS?

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AMIS Plus

The AMIS (Acute Myocardial Infarction in Switzerland) Plus Registry Experience

JACC Intv 2011;4:618-26	LM PCI *n*=348	Non LM PCI *n*=6318	*p*-value
Age, mean (SD)	63.5 **(12.2)**	61.9 **(12.4)**	0.02
Women, *n* (%)	87/348 (25.0)	1455/6318 (23.0)	0.4
Resuscitation prior to admission, *n* (%)	37/348 **(10.6)**	400/6318 **(6.3)**	<0.001
Cardiogenic shock at admission, *n* (%)	42/344 **(12.2)**	217/6279 **(3.5)**	<0.001
Dyspnea	107/307 **(34.9%)**	1287/5507 (23.4%)	< 0.001
IABP, *n* (%)	48/343 **(14.0)**	400/6244 (6.4%)	<0.001
Vasopressor, *n* (%)	56/341 **(16.4)**	641/6194 **(10.3)**	<0.001

In-Hospital Outcome

Primary Percutaneous Coronary Intervention for Unprotected Left Main Disease in Patients With Acute ST-Segment Elevation Myocardial Infarction

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	Primary ULM PCI *n*=348	Primary Non-LM PCI, *n* =6318	*p*-value
In-hospital death, *n* (%)	38/348 **(10.9)**	241/6318 **(3.8)**	<0.001
In-hospital death, pts. with CS at admission, *n* (%)	23/42 **(54.8)**	77/217 **(35.5)**	0.024
MACCE, *n* (%) (death, re-infarction, stroke)	43/346 **(12.4)**	314/6291 **(5.0)**	<0.001
Re-infarction, *n* (%)	4/346 (1.2)	56/6289 (0.9)	0.55
Cerebrovascular events, *n* (%)	5/346 (1.4)	42/6289 (0.7)	0.10

LM-PCI vs Non LM-PCI

Primary Percutaneous Coronary Intervention for Unprotected Left Main Disease in Patients With Acute ST-Segment Elevation Myocardial Infarction

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Multivariate analysis

Variable	Odds Ratio (95% CI)	P-value
Cardiogenic shock at admission	4.87 (2.84-8.35)	<0.001
Resuscitation	4.20 (2.60-6.77)	<0.001
Charlson Score ≥2**	2.66 (1.76-4.02)	<0.001
Left main treated (disease)	2.36 (1.34-4.17)	0.003
Age (per 1 year increase)	1.07 (1.05-1.09)	<0.001
Heart rate (per 1-beat/min increase)	1.02 (1.01-1.03)	<0.001
Systolic BP (per 1-mmHg increase)	0.98 (0.97-0.98)	<0.001

TICINO

Indipendent predictors of in-hospital mortality

✓**The most important condition predicting in-hospital death is cardiogenic shock (30-50% mortality)**