

Live Case #3: KJ, 88 yrs old M

Presentation: Non-STEMI with peak TnI 2.2 in 8/11/2009

Now has exertional SOB. No angina

Past History: Hypertension, Hyperlipidemia, Prior PCIs in 1998-99.

Medications: ASA, Clopidogrel, Rosuvastatin, Metoprolol

Cardiac Cath: 08/11/09:

3 V+LM CAD & LVEF 35% (moderate-severe inferior hypo)

Left Main: 70-80% distal bifurcation

LAD: mid LAD 60% with myocardial bridge

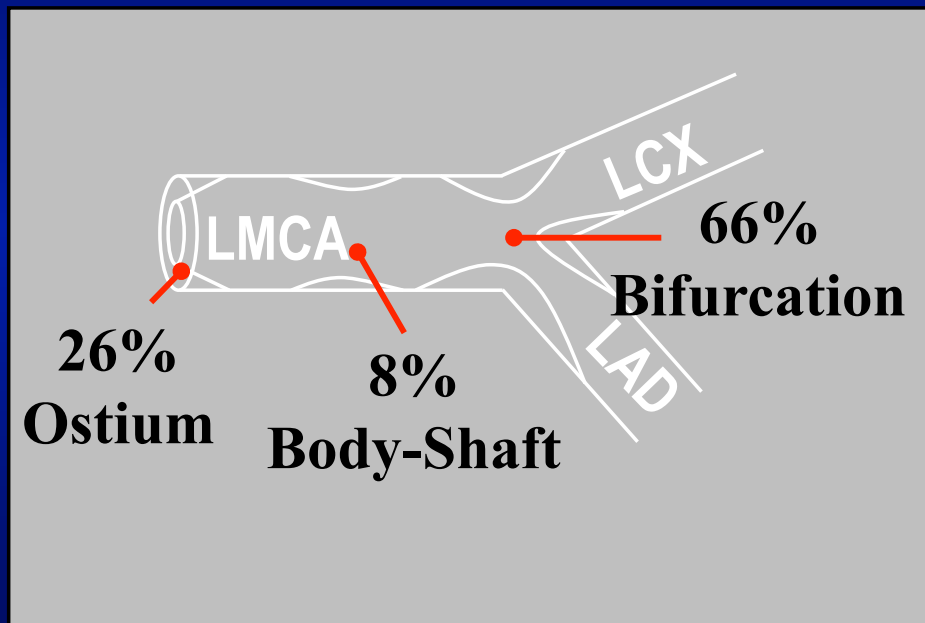
LCx: Large size and TO of moderate size LPL

RCA: 95% calcific ostial lesion

Prior PCI: PCI of RCA (3.0mm CB PTCA & 3.5/23mm Xience V DES)

Plan Today: Intervention of Unprotected LM bifurcation with IABP assist

LMCA Stenosis Location



About two third of LMCA Lesions include distal bifurcation

PCI for Unprotected LMCA Lesions

“therefore, significant LMCA lesion has become an established surgical disease”

- now numerous reports of high procedural success & sustained long-term results of LMCA stenting have been reported especially in the era of DES

But even now 2005 PCI guidelines categorizes unprotected LM as Class III indication

Appropriateness Criteria: Method of Revascularization of Advanced Coronary Artery Disease

	CABG			PCI		
	No diabetes and normal LVEF	Diabetes	Depressed LVEF	No diabetes and normal LVEF	Diabetes	Depressed LVEF
Two vessel coronary artery disease with proximal LAD stenosis	A	A	A	A	A	A
Three vessel coronary artery disease	A	A	A	U	U	U
Isolated Left main stenosis	A	A	A	I	I	I
Isolated Left main and additional Coronary artery disease	A	A	A	I	I	I

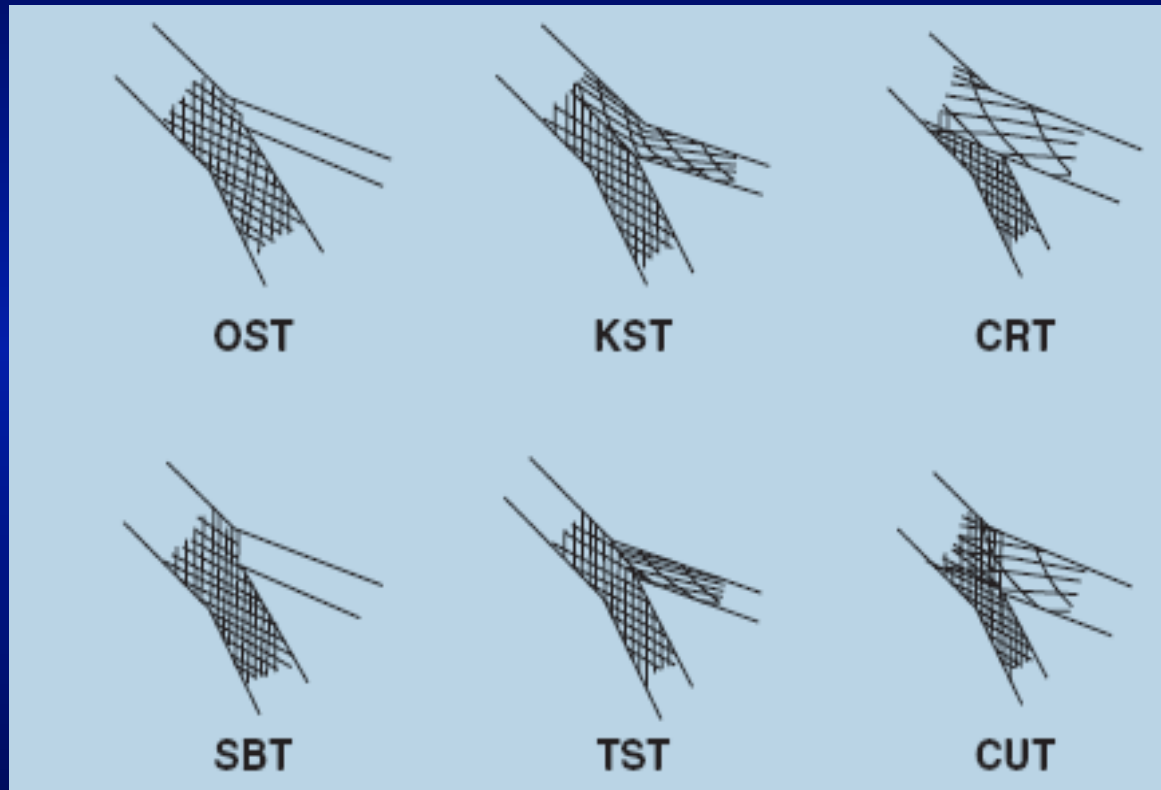
Patel et al. JACC 2009;53:530-553

Issues in PCI (DES) of ULMCA Stenosis

- **Procedural success**
- **Acute complications / stent thrombosis**
- **Restenosis / TLR**
- **Sudden death**
- **Long-term follow-up vs. CABG**

Coronary Artery Bifurcation Lesion Interventional Techniques

Interventional Bifurcation Techniques



Meta-analysis of PCI of Unprotected LMCA BMS

Author	Year	N	Clinical Setting _{MI/UA}	F/U (mths)	Cardiac death (%)	Restenosis (%)	MACE (%)
ULTIMA (Ellis)	1997	107	91 / 16	15±8	10.6	22	30/80
Park et al.	1998	42	All elective	10±5	0	22	19
Karam et al.	1998	39	36 / 3	24±7	15.4	5	20
Kosuga et al.	1999	107	83 / 24	35	11.2	40	22
Wong et al.	1999	55	All elective	16±10	1.8	20	18
Silvestri et al.	2000	140	All elective	12	8.7	23	28
Kosuga et al.	2001	101	86 / 15	34	5.9	20	38
Lee et al.	2001	13	All elective	18±3	7.7	23	38
Park et al.	2001	127	All elective	12±11	0.9	12	13
Tan et al.	2001	279	Various	19	20.2	25	35
Takagi et al.	2002	67	Various	31±23	11.9	24	34
Sharma et al.	2002	200	Various	15±8	6	12	18
Total		1077		16 ±12	9.1	22	26

DES for the Unprotected LM Coronary Artery

	Park (1)	Chieffo (2)	Valgimigli (3)	Lee (4)	Price (5)	Migliorini (6)	Erglis (7)
Patients (n)	102	85	95	50	50	101	53
Distal lesion location (%)	71	81	65	60	94	87	81
Cardiac mortality 12 m (%)	0	3.5	11	4	2	11	2
Angiographic F/U (%)	84.3	NR	NR	42	98	96	100
Angiographic resten (%)	7*	19*	NR	NR	44‡	16*	6*
TLR or TVR (%)	2	18.8	6.3	13	38	14	2

1. JACC 2005;45:351;

2. Circulation 2005;111:791;

3. Circulation 2005;111:1383;

4. JACC 2006;47:864;

5. JACC 2006;47:871;

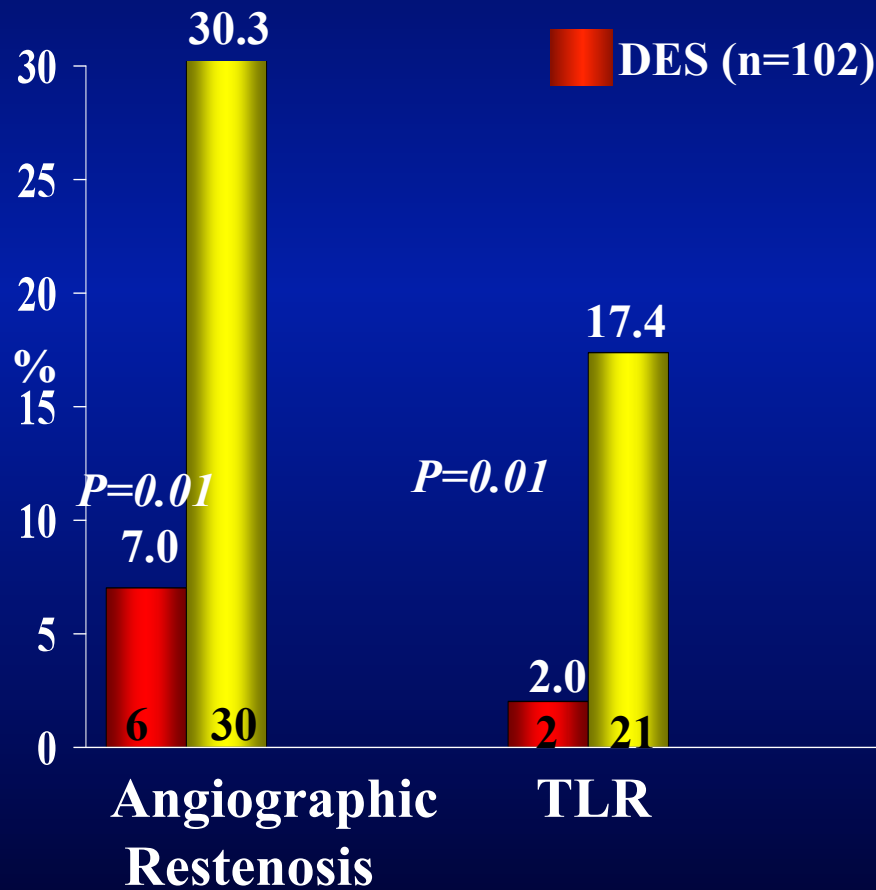
6. CCI 2006;68:225;

7. JACC 2007;50:491

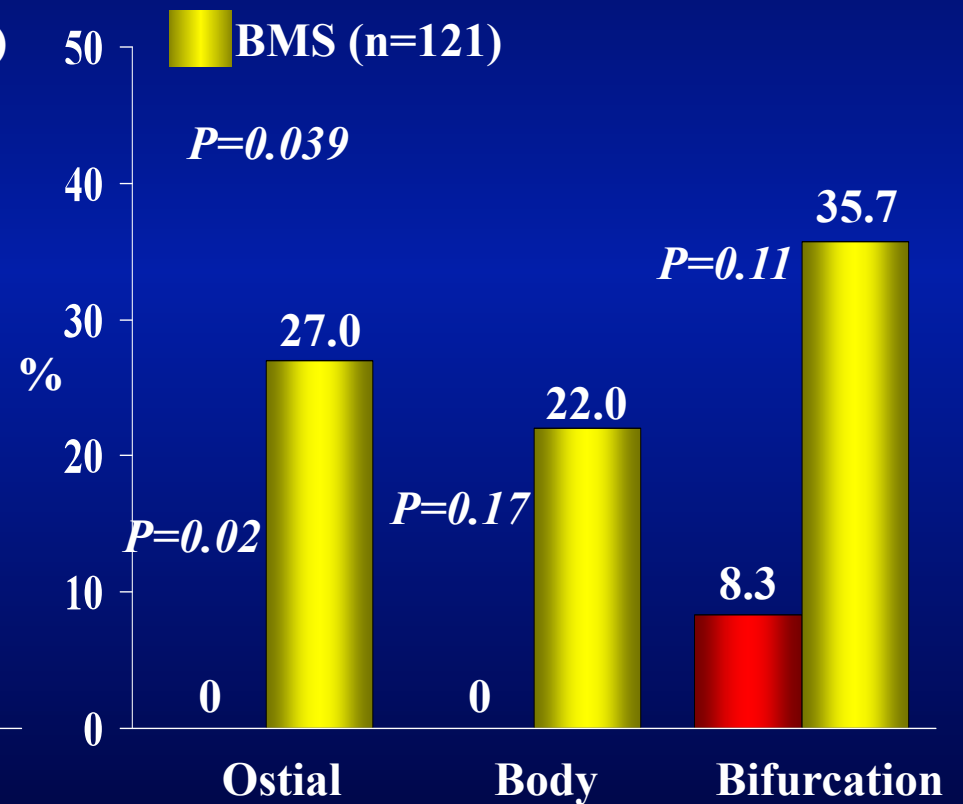
DES (SES) for Unprotected Left Main Stenosis

Incidence of TLR and Impact of Lesion Location

Restenosis/TLR (all cases)



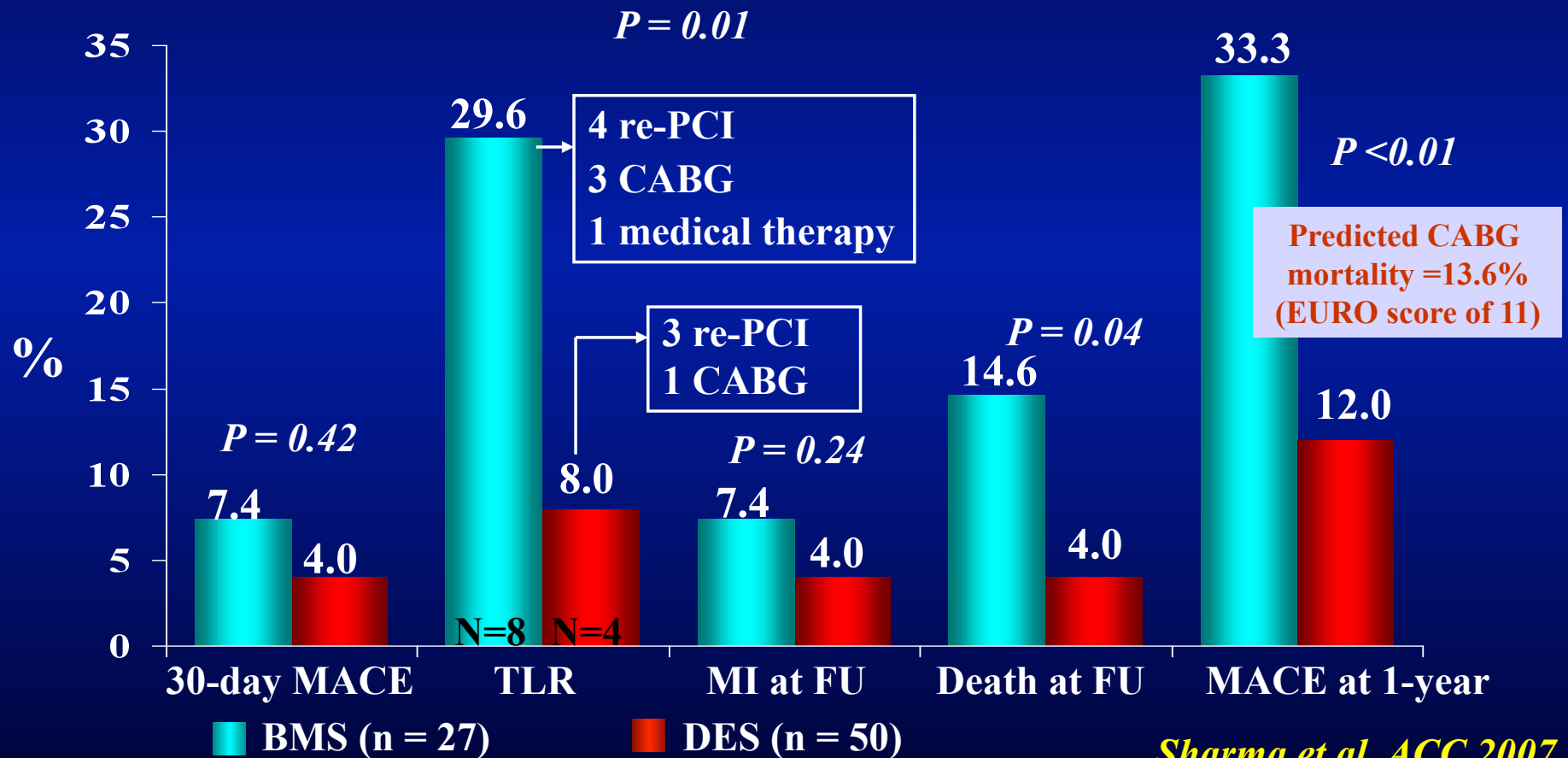
Restenosis/TLR based on Lesion Location



Park et al, J Am Coll Cardiol 2005;45:351

Unprotected LMCA Bifurcation Lesion: Impact of DES

Major Adverse Cardiac Events up to 1-Year

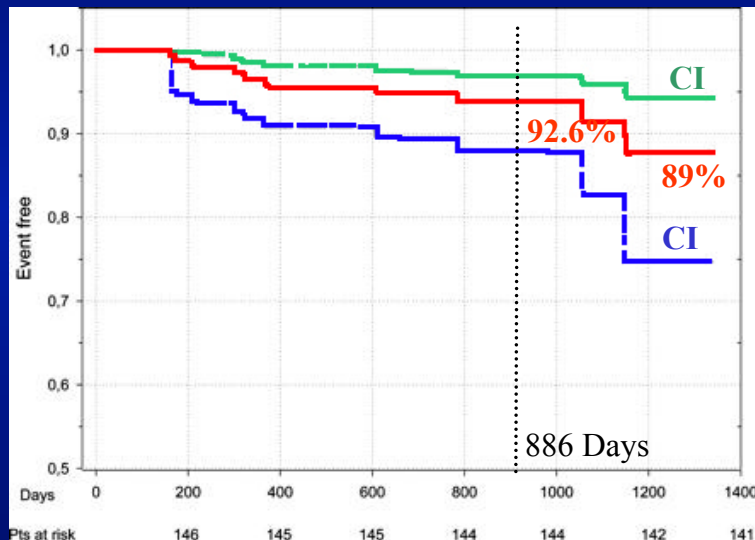


Sharma et al, ACC 2007

DES in Non-Bifurcation Unprotected LMCA

*Event-Free at
1400 days*

*MACE at Hospitalization and at
Long-Term Clinical FU (N = 147)*



MACE at 886±308 days occurred in 11 pts (7.4%); the dashed lines represent the 95% CIs

	<u>In-Hospital</u> <u>(N = 147)</u>	<u>Follow-Up</u> <u>(886±308 D)</u>
Cardiac death (%)	0	2.7
Death in 60 high-risk pts (%)	0	6.6
Death in 87 low-risk pts (%)	0	0
TLR (%)	0.7	0.7
TVR (%)	0.7	4.7
MACE (%)	4.0	7.4

High-risk pts were defined as EuroSCORE ≥ 6 and/or Parsonet ≥ 13 and/or prior bypass surgery with failure of all conduits.

Chieffo et al, Circulation 2007;116:158.

A Randomized Comparison of PES vs. BMS for Treatment of Unprotected LMCA Stenosis

6-Months Cumulative Outcomes: All had CB and IVUS

	BMS (n = 50)	PES (n = 53)	P Value
Total death (%)	2	2	>0.99
MI (%)	14	9	0.548
TLR (%)	16	2	0.014
MACE (%)	30	13	0.054
Angiographic restenosis (%)	22	6	0.021
IVUS neointimal volume (mm ³)	26 ± 22	17 ± 17	0.014

Erglis et al. J Am Coll Cardiol 2007;50:491

PCI (DES) vs. CABG for ULMCA Lesion

- **Observational Data (Park, Cedars, Chieffo)**
- **Randomized Trials**
 - **LEMANS Trial**
 - **SYNTAX Trial**

LE MANS Trial

1-Yr Outcomes After PCI vs. CABG for ULM Intervention

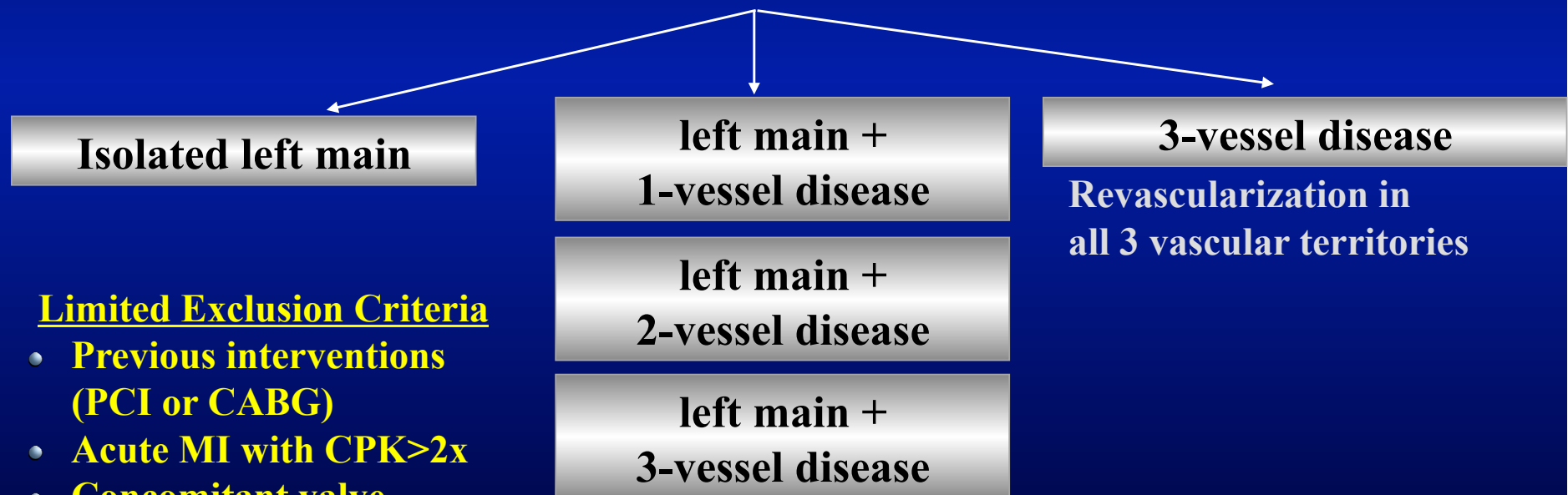
Outcome	PCI (n=52)	CABG (n=59)	P
30-day MACCE (%)	2	13	0.03
1- yr MACCE-Free Survival (%)	71.2	75.5	0.29
In-stent restenosis (%)	9.6	-	-
Stent thrombosis (%)	0	-	-
Change in LVEF (%)	3.3 ± 6.7	0.5 ± 0.8	0.047

SYNTAX Trial

Eligible Patients

Syntax Objective: To compare the MACCE rate at 12 months between patients treated with TAXUS® stents vs. patients undergoing CABG for de novo 3VD and/or LM disease. (*MACCE = major adverse cardiac and cerebrovascular events; defined as death, stroke, MI, or repeat revascularization)

De novo disease



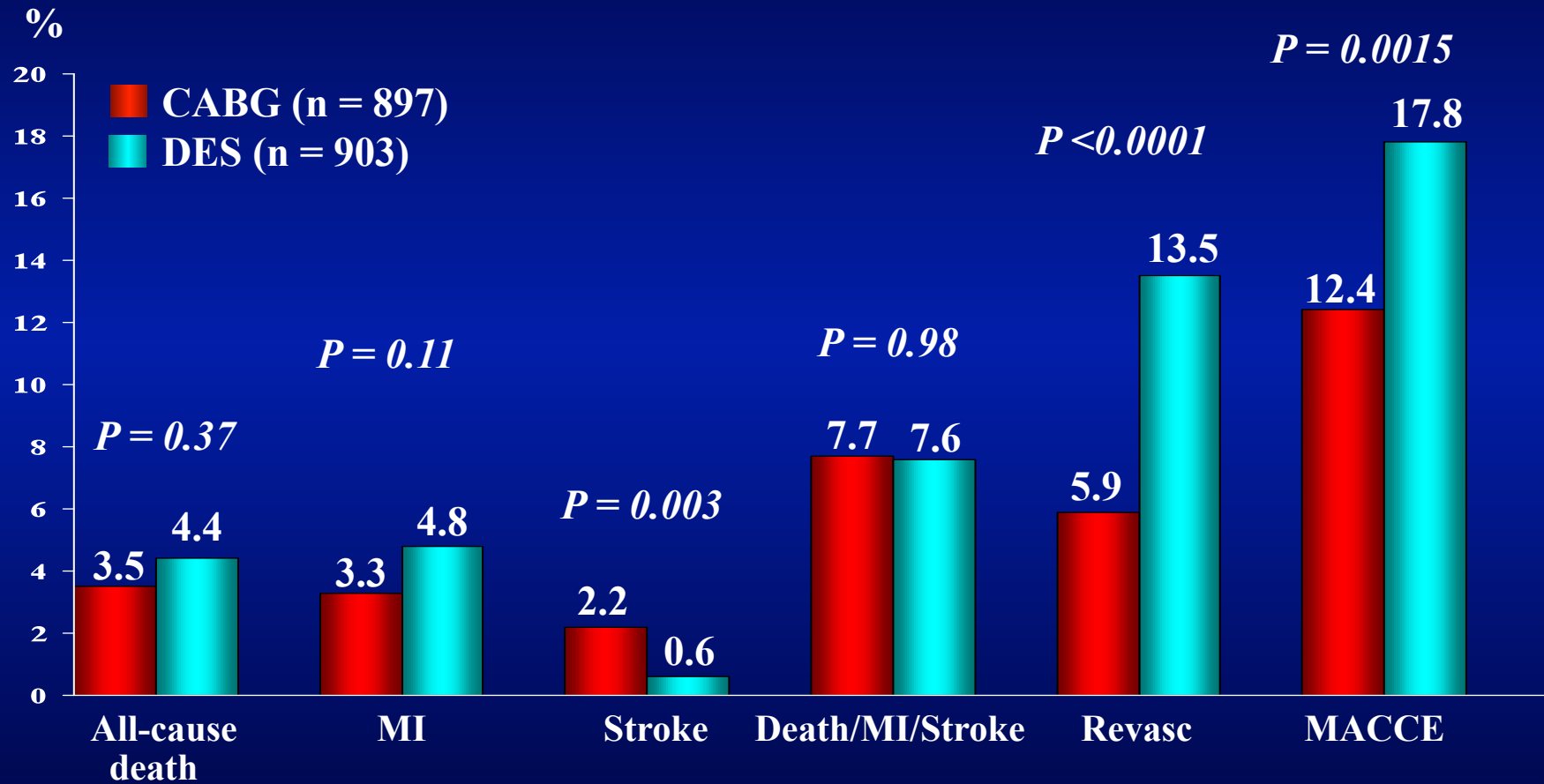
Limited Exclusion Criteria

- Previous interventions (PCI or CABG)
- Acute MI with CPK>2x
- Concomitant valve surgery

Serruys P et al. NEJM 2009;360:961.

SYNTAX Trial (TAXUS DES)

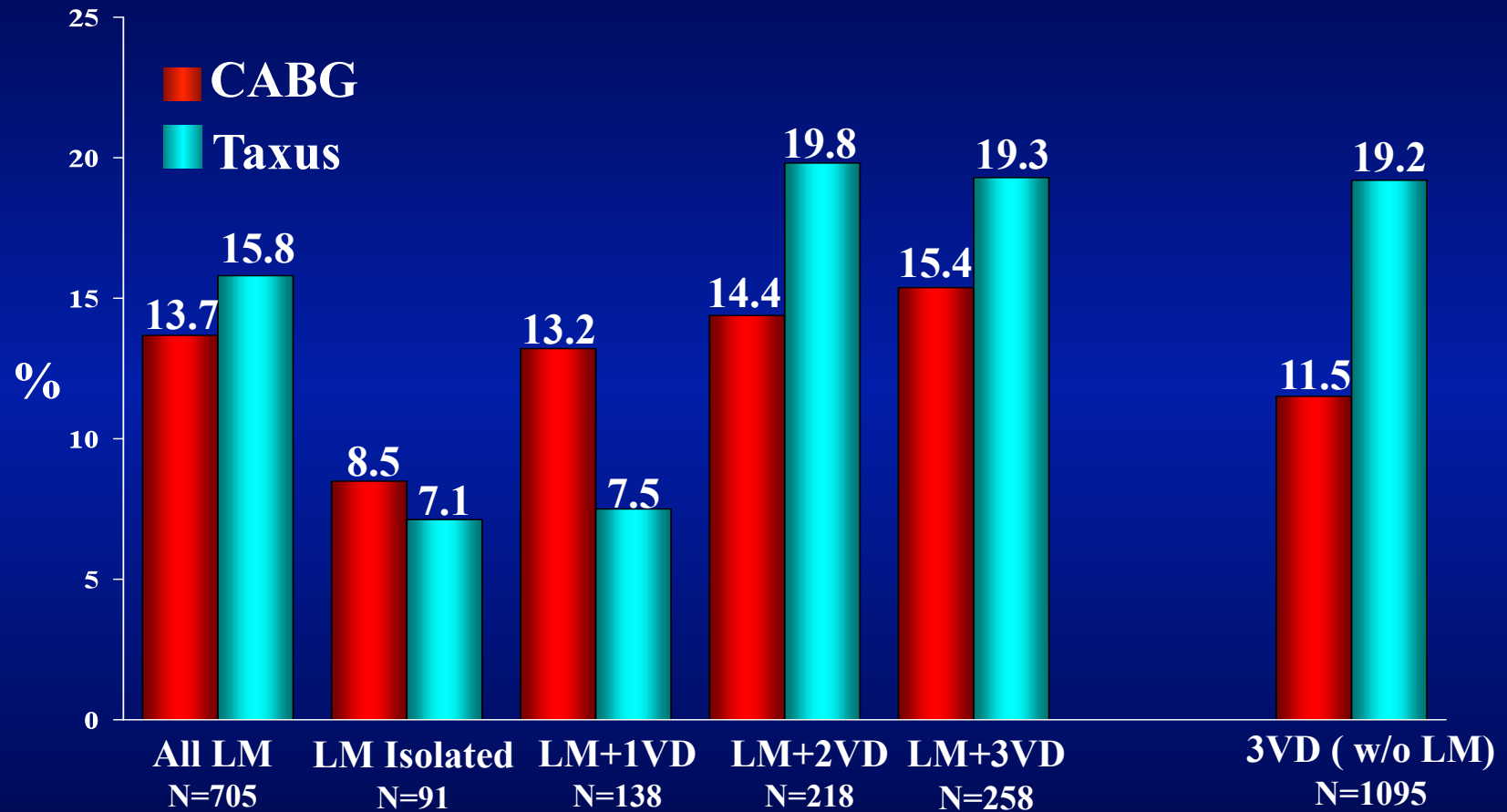
Main Results at 1-Year



Serruys P et al. NEJM 2009;360:961.

SYNTAX Trial: Left Main and 3 V CAD

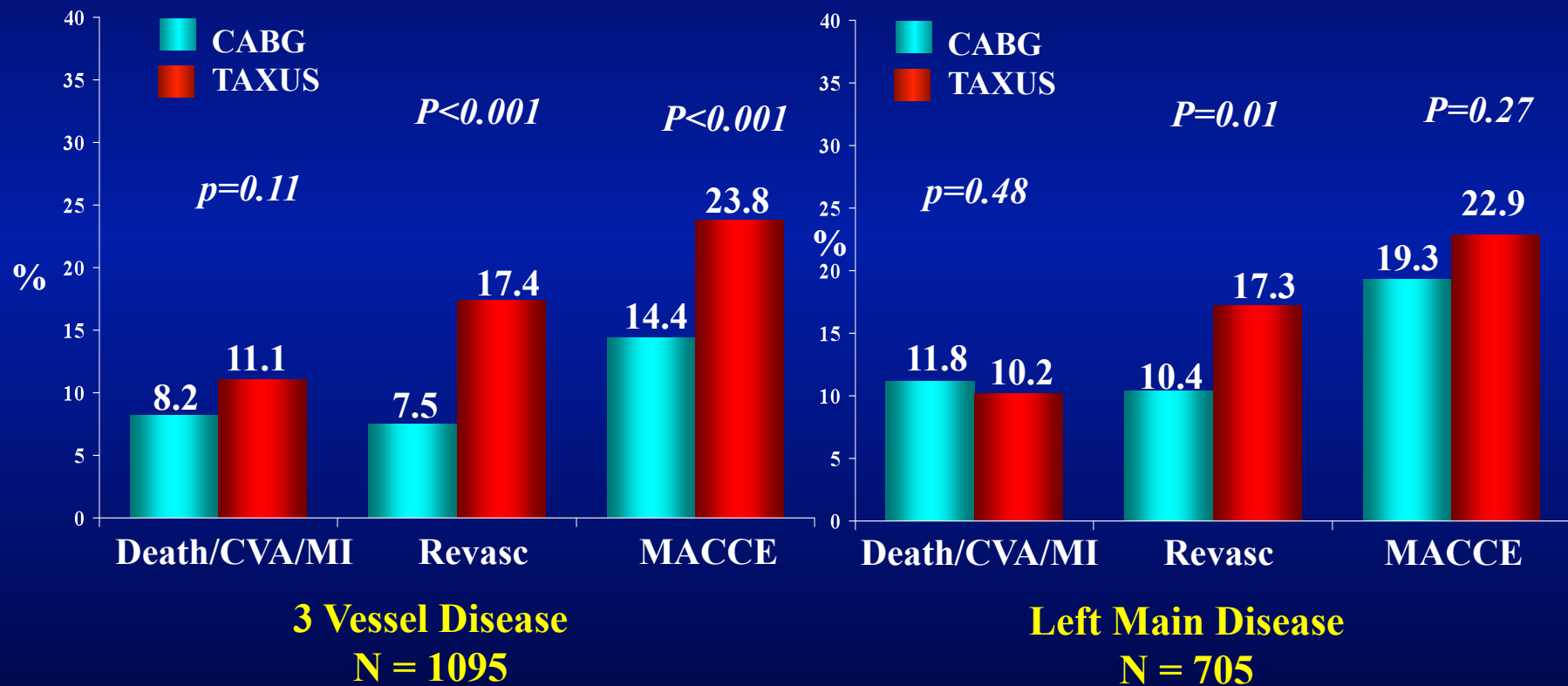
Subgroup MACCE Rates at 12 Months



Serruys P et al. NEJM 2009;360:961.

Optimal Revascularization Strategy in Pts with 3-vessel Disease and/or LM Disease: 2-Yr Outcomes of SYNTAX Trial

2-Yr Outcomes in 3VD and LM Subgroups



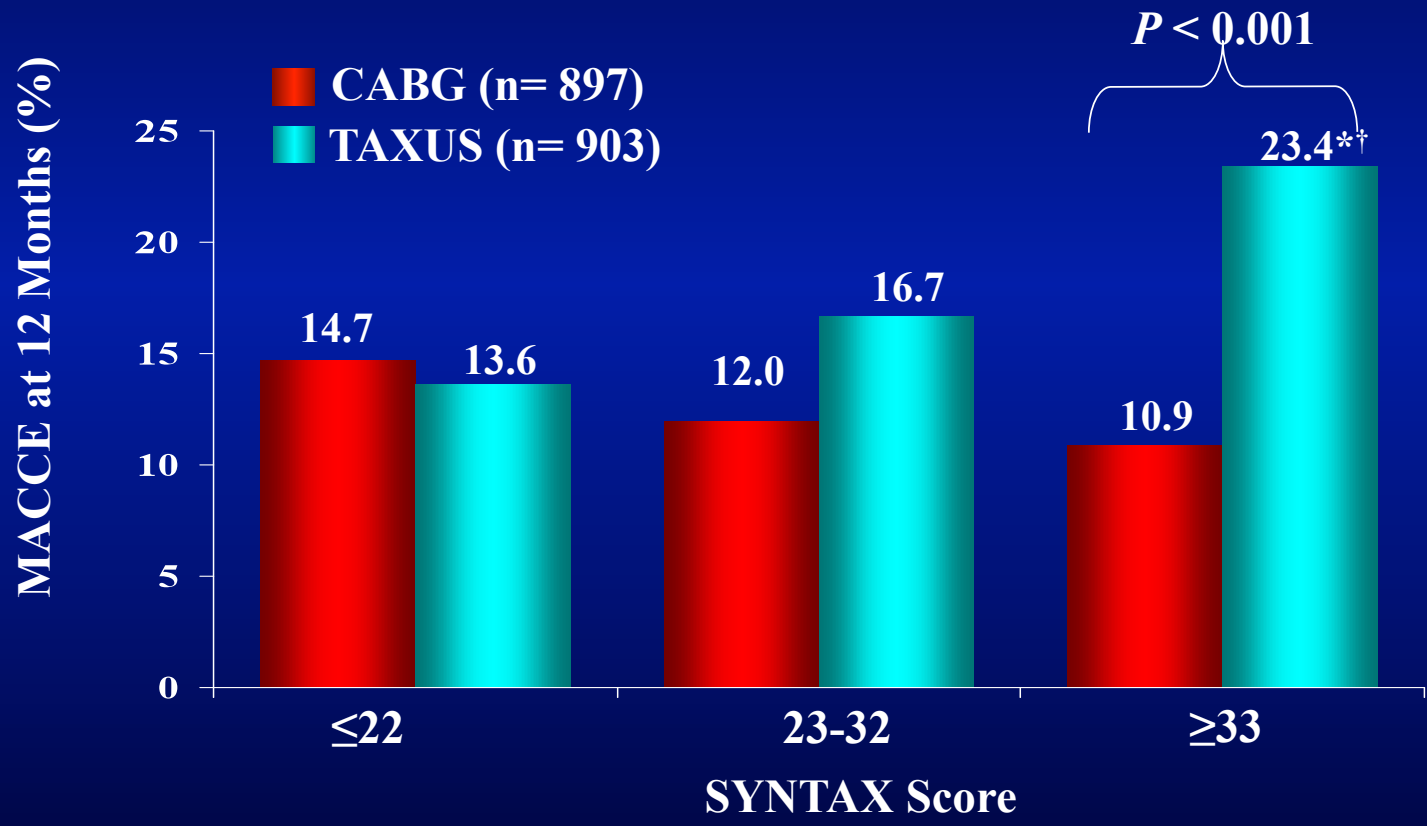
Kappetein P et al, Clinical Trial Update III, 2009

SYNTAX Trial: MACCE vs SYNTAX Score

* $P= 0.03$ vs PCI with SYNTAX score ≤ 22

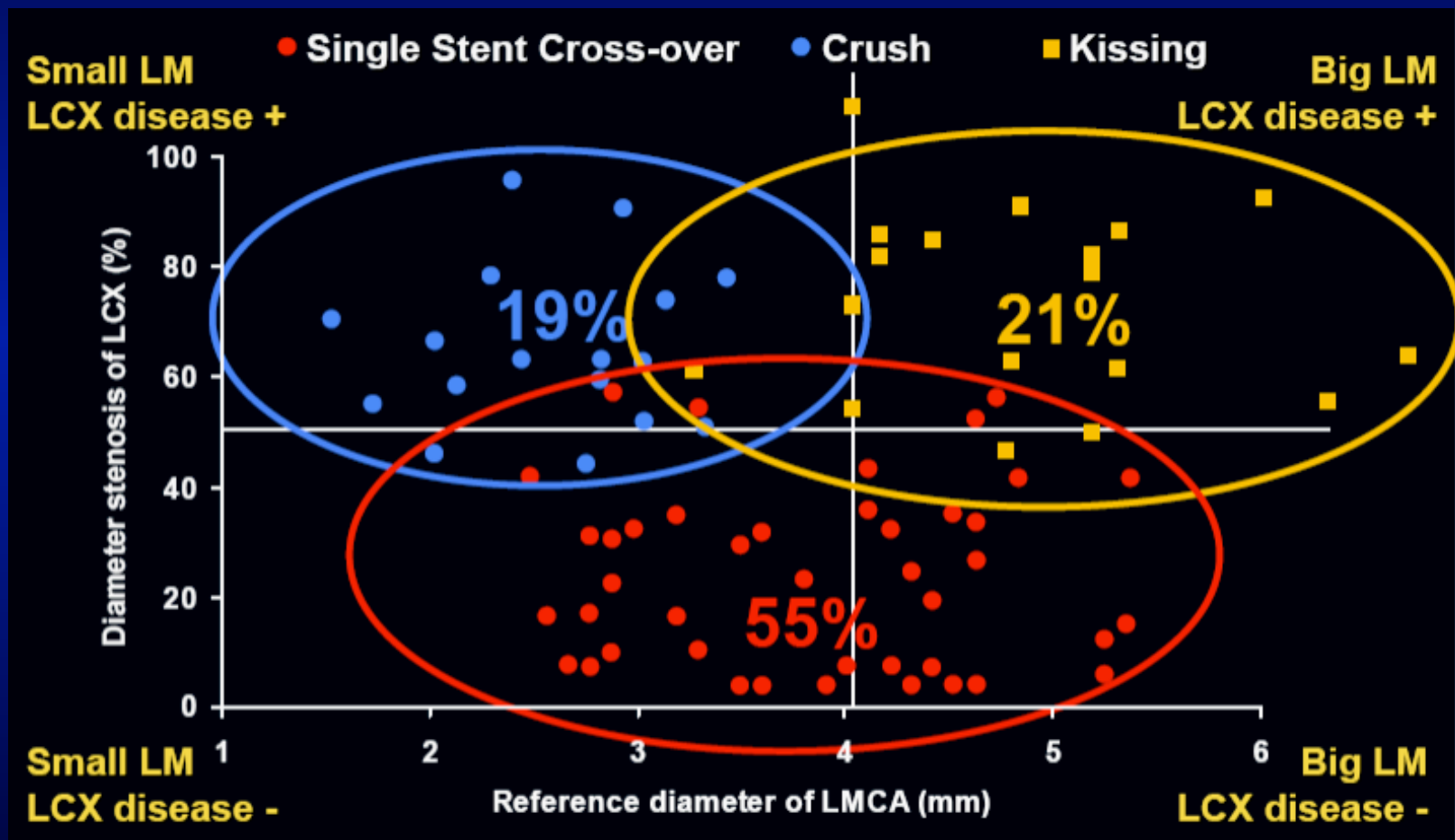
† $P= 0.002$ vs PCI with SYNTAX score 23-32

Trend for PCI: $P=0.006$



Serruys P et al. NEJM 2009;360:961.

Different Treatment Strategy for ULM Bifurcation Lesions



Proposed Approach to LM PCI

<i>Sign LCX</i>	<i>Crush or T stenting</i>	<i>Kissing stents</i>
<i>50%</i>		
<i>Insign or small LCX</i>	<i>Single across LCX</i>	<i>Single across LCX</i>
	<i>Small LM</i>	<i>Large LM</i>

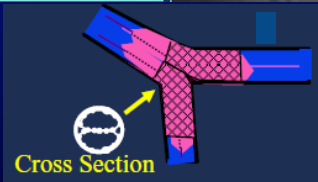
4 mm

Complex Lesions: Bifurcation Left Main Stenting

An approach for bifurcational lesions when using 2 stents as intention to treat

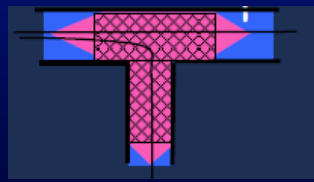
Bifurcational lesion with short disease proximal to the bifurcation or very short left main

SKS/V-STENT



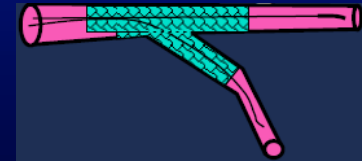
Bifurcational lesion with main branch disease extending proximal to the bifurcation and side branch which has origin with about 90° angle

T-STENT



Bifurcational lesion with main branch disease extending proximal to the bifurcation and side branch which has origin with about 60° angle

MINI Crush





Take Home Message: LM Stenting with DES

- ✓ **Many studies have shown the feasibility and safety of LM stenting with DES and MACE outcomes upto 2 yrs remains equal to CABG in the majority**
- ✓ **Optimal technique, strategy, stent deployment and positioning remain crucial in this setting**
- ✓ **In many patients a single stent cross-over has shown to show excellent long-term results**

Who Should Get the PCI (DES) for ULM Lesions

PCI is preferred (*Current Class III Indication*):

- Lesions in ostium and mid shaft
- Distal bifurcation lesion with one limb is disease free ('cross over' technique)
- Distal bifurcation lesion involving both branches in a patient with significant comorbid condition ('surgical high risk' *Current Class IIb Indication*)

CABG is strongly indicated (*Current Class I Indication*):

- Additional total occlusion of Left coronary system
- Severe concomitant multi-vessel disease especially calcified (Syntax score >33)
- Heavily calcified distal LM bifurcation
- Intolerance to prolonged antiplatelet therapy

Appropriateness Criteria for ULM Lesion: Personal View Point

I hope to see revised focused
PCI update from ACC/AHA

Making LMCA PCI as Class I (isolated ostial)
Or IIa-b to other subgroups

And keep Class III only for Syntax score >33

Isolated Left main stenosis	A	A	A	U	U	U
Isolated Left main and additional Coronary artery disease	A	A	A	U	U	?
				SC<33	SC<33	SC<33