Hong Kong Left Main Stenting Registry

CL Chan, KC Chan, CY Cheung, LW Tam, KY Lee, KL Tsui, MH Jim, EB Wu, LL Cheung, CK Chan, YH Chan, ML Wong, TS Tse, PT Tsui

RCT SYNTAX 5 years

	CABG	PCI	P value
Overall MACCE			
Syntax 0-22	28.6%	32.1%	NS
Syntax 23-32	25.8%	36%	0.008
Syntax >=33	26.8%	44%	<0.0001
All –cause Death			
Syntax 0-22	10.1%	8.9%	NS
Syntax 23-32	12.7%	13.8%	NS
Syntax >=33	11.4%	19.2%	0.005
MI			
Syntax 0-22	4.2%	7.8%	NS
Syntax 23-32	3.6%	11.2%	0.0009
Syntax >=33	3.9%	10.1%	0.004
TVR			
Syntax 0-22	16.9%	23%	0.056
Syntax 23-32	12.7%	24.1%	0.0005
Syntax >=33	12.1%	30.9%	<0.0001

FW Mohr et al, Lancet 2013;381:629638

Guidelines on unprotected LM PCI

2010 ESC Guideline		
PCI	CABG	PCI
SYNTAX score <=22	I B	I B
SYNTAX score 23-32	I B	IIa B
SYNTAX score>=33	I B	III B
2011 ACCF/AHA/SCAI Guideline		
PCI	CABG	PCI
SYNTAX score <=22	I B	IIa B (STS score>=5%)
SYNTAX score <=32	I B	IIb B (STS score>2%)
SYNTAX score>=33	I B	III B
UA/NSTEMI	IB	IIa B (Not fit for surgery)
STEMI with TIMI 1/2 flow	IB	IIa C (Faster than surgery)

Hong Kong Left Main Stenting Registry

- Participating centres
  - Kwong Wah Hospital
  - Grantham Hospital
  - Prince of Wales Hospital
  - Pamela Youde Nethersole Hospital
  - Queen Elizabeth Hospital
  - United Christian Hospital
  - Princess Margaret Hospital
  - Tuen Mun Hospital
  - Pok Oi Hospital

Study Objectives

- Compare long term survival of BMS versus DES in left main stenting
- Compare clinical outcome of first and newer generation DES in left main stenting
- *Compare clinical outcome of kissing balloon dilatation versus nil in left main single stent strategy*
- *Compare one year versus prolonged DAPT in left main stenting*

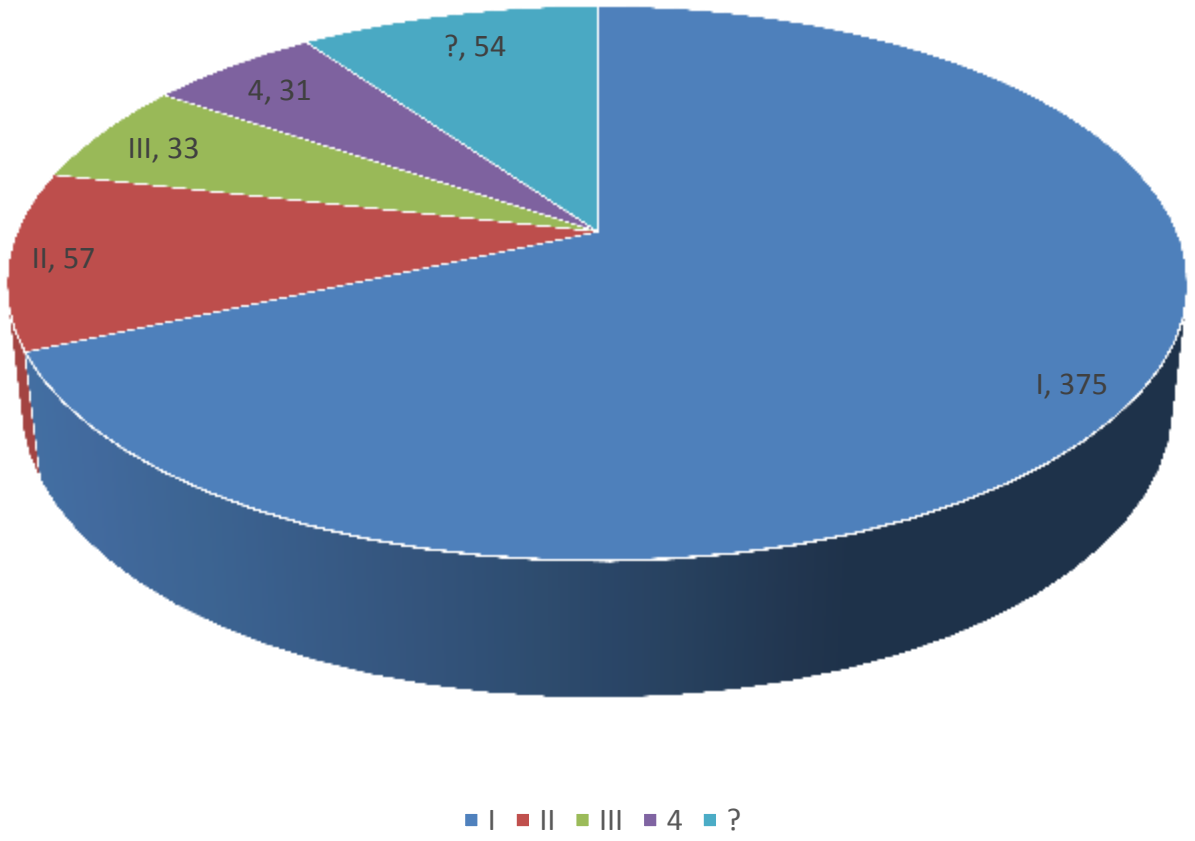
Study Population

- From January 2007 to December 2010
- 550 consecutive patients from 9 public hospitals in Hong Kong
- Inclusion criteria
  - All elective or urgent PCI
  - No CABG before
  - All comers
- Exclusion criteria
  - Emergency PCI for cardiogenic shock
- Retrospective analysis
- Clinical follow up data were collected up till 30 June 2014.

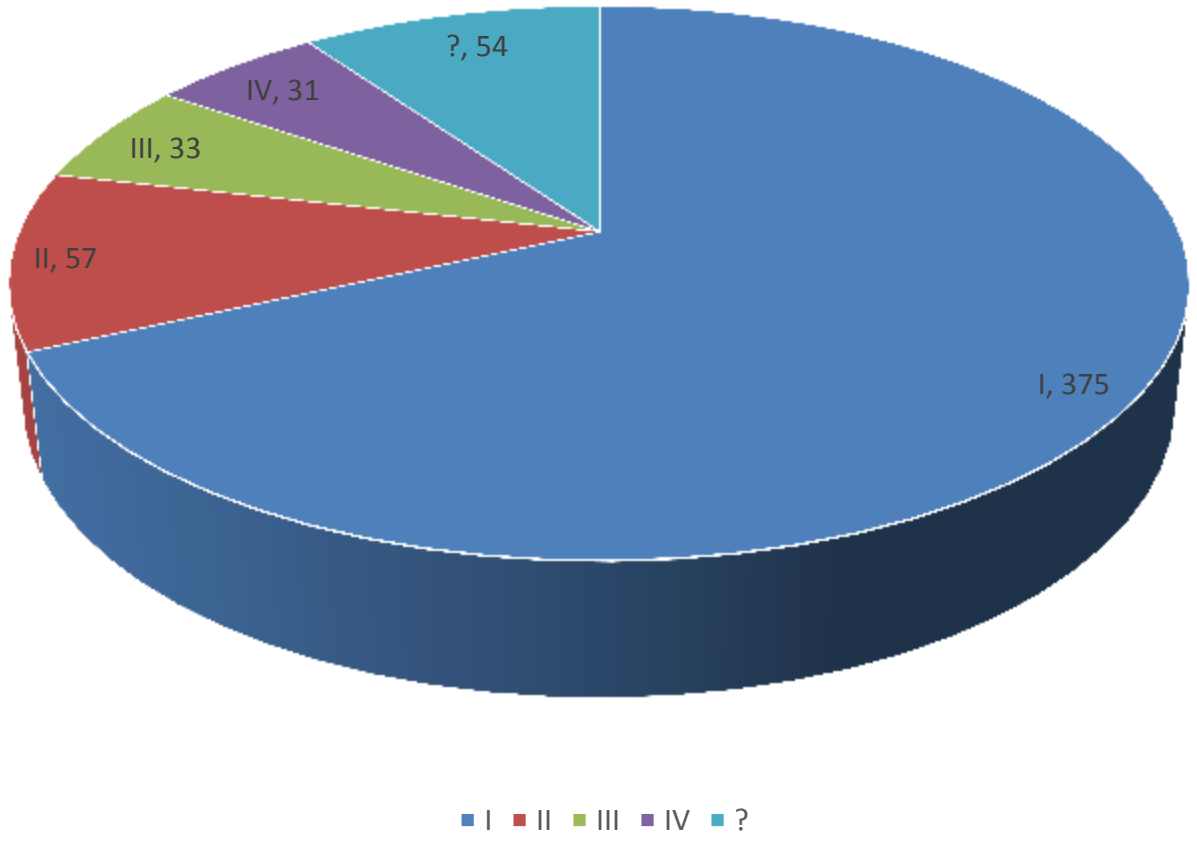
Baseline Data

- Age 68 $\pm$ 11 years
- Male predominance (74%).
- Diabetes mellitus (44%), hypertension (65%), hypercholesterolemia (75%) and smoking history (44%)
- Prior myocardial infarction (39%), prior stroke (11%), peripheral vascular disease (3%) and creatinine > 200 mmol/L (5%)

Angina Class



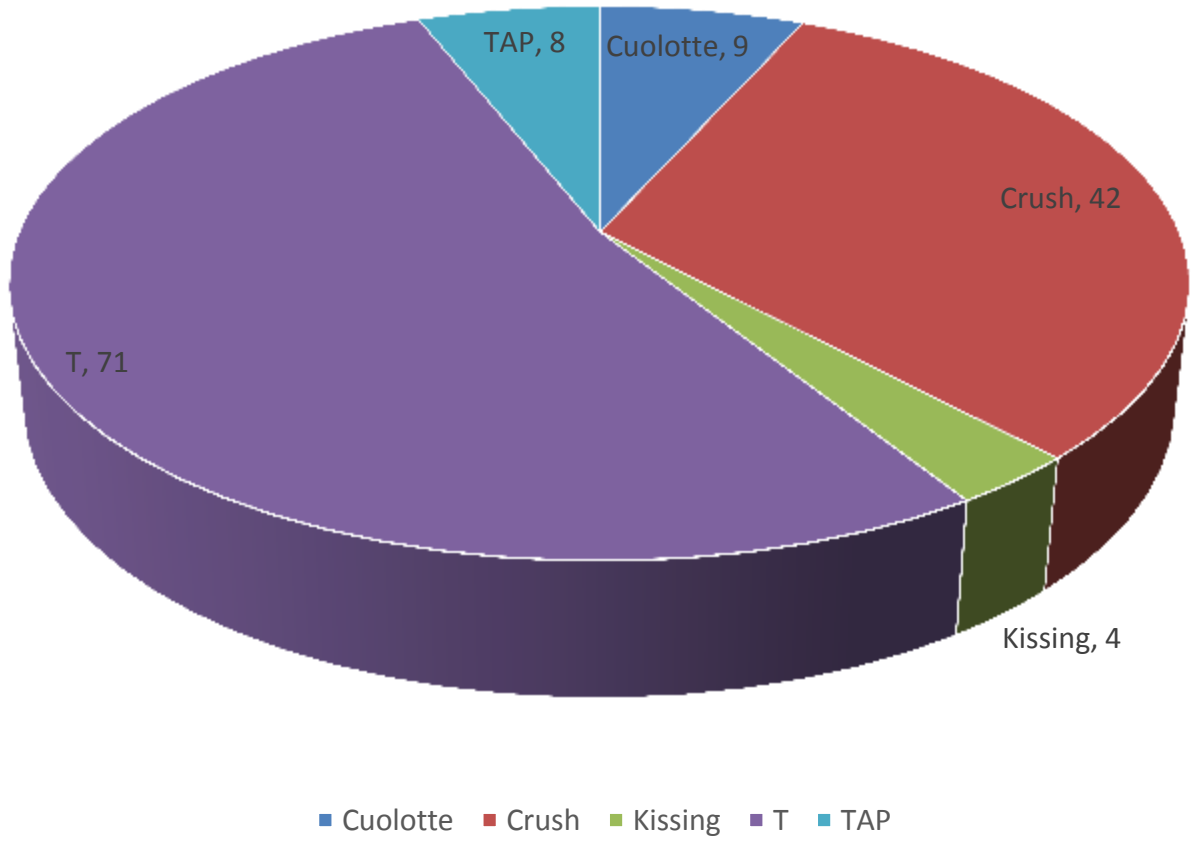
NYHA Class



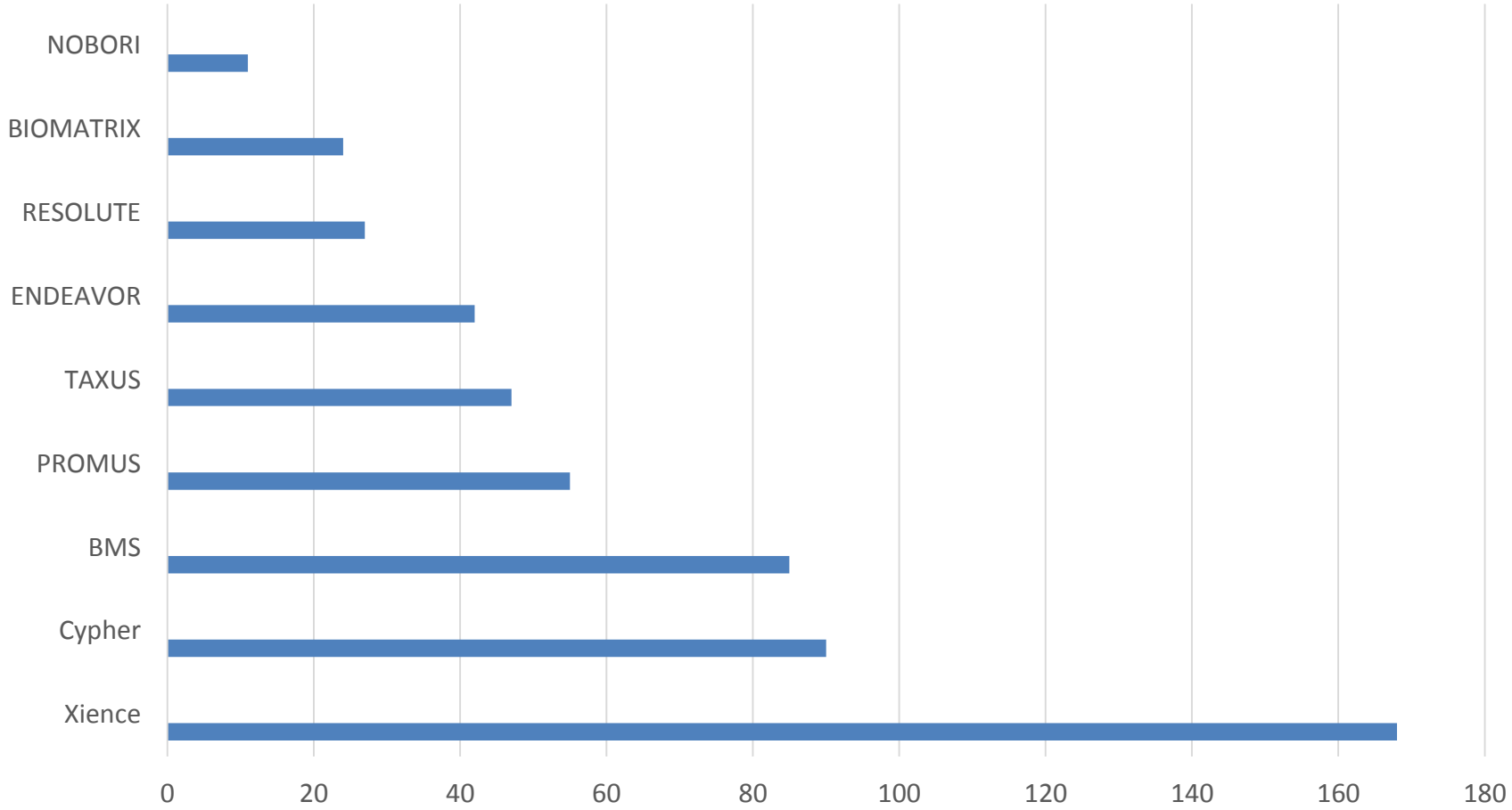
Procedural Data

- Intra-aortic balloon pump and GP2b3a was used in 13% and 6% of patients respectively
- PCI was guided by intravascular ultrasonography in 80% of patients.
- Distal bifurcation disease was present in 74% of patients
- Two-stent technique was adopted in 26% of patients.
- The main branch stent size and length was 3.4 ±0.5mm and 22± 12mm respectively
- High pressure post-dilatation and kissing balloon inflation was performed in 86% and 53% of patients respectively

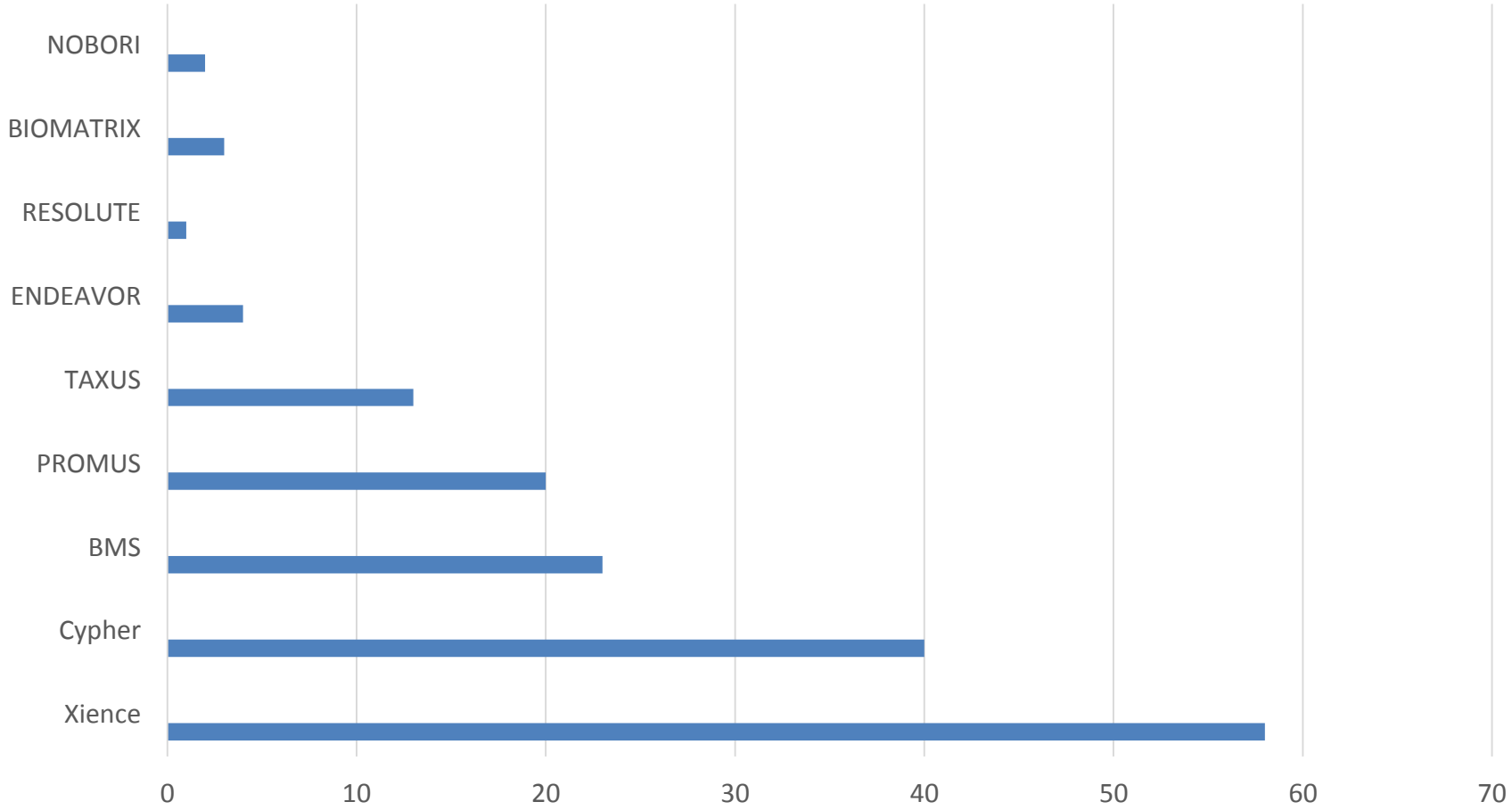
Which two stents technique



Choice of Main Branch Stent



Choice of Side Branch Stent



MAIN-COMPARE vs Hong Kong LM Registry

	SES	PES	Hong Kong LM Registry
Using IVUS	76.4%	65.8%	80%
Average stent diameter (mm)	3.3+/-0.2	3.4+/-0.2	3.4+/-0.5
Average stent length (mm)	33.4+/-22.1	31.5+/-20.6	22+/-12
Max deployment pressure (atm)	15.8+/-3.9	15.8+/-4.4	16.6+/-3.5
Bifurcation	58.6%	51.3%	74%
Cross over	62.2%	61.9%	73.6%
T stenting	6.6%	8.2%	12.9%
Crush stenting	18.1%	18.6%	7.6%
Kissing stents	12.2%	10.3%	0.7%
Tap	0%	0%	8%

KB Seung et al, N Engl J Med 2008;358:1781-92

DELFT vs Hong Kong LM Registry

	DELFT	Hong Kong LM REGISTRY
Number	358	550
Age	66	68
Male	74%	74%
DM	30%	44%
HT	67%	65%
HYPERCHOLESTEROLEMIA	64%	75%
SMOKING	34%	44%
Prior MI	45%	39%
Distal LM	74%	74%
ONE STENT	57%	74%
Follow up interval	1 year	1 year
Death	6.7% (cardiac)	7.8% (all-cause)
MI	7.5%	6.0%
TVR	10%	7.8%
MACE	24.3%	19.1%

E Meliga et al, J Am Coll Cardio 2008;51:2212-19

SYNTAX vs Hong Kong LM Registry

	SYNTAX PCI REGISTRY	Hong Kong LM REGISTRY
Follow up interval	5 years	4.6 years
All-cause death	30.0%	19.6%
MI	9.8%	9.1%
TVR	23.6%	11.6%
STENT THROMBOSIS OR GRAFT OCCLUSION	2.2%	3.6%
MACCE	42.9%	34%

FW Mohr et al, Lancet 2013;381:629638

1-year outcome in different patient groups

Outcome within 1 year	Count (%)											
	All (n=550)				Bifurcation lesion (n=406)				DES (n=465)			
	BMS (n=85)		DES (n=465)		BMS (n=49)		DES (n=357)		First generation DES (n=137)		Newer generation DES (n=328)	
MACE	29	(34.1)	76	(16.3)	19	(38.8)	59	(16.5)	32	(23.4)	43	(13.1)
Death	14	(16.5)	29	(6.2)	8	(16.3)	20	(5.6)	11	(8.0)	18	(5.5)
Non-fatal MI	7	(8.2)	26	(5.6)	6	(12.2)	22	(6.2)	13	(9.5)	13	(4.0)
TVR	14	(16.5)	29	(6.2)	10	(20.4)	24	(6.7)	9	(6.6)	20	(6.1)
Stent thrombosis	3	(3.5)	8	(1.7)	1	(2.0)	4	(1.1)	3	(2.2)	5	(1.5)

MACE=major adverse cardiac event, MI=myocardial infarcation, TVR=target vessel revascularisation.

Association with 1-year outcomes: Simple logistic regression (after constrained full matching)

Outcome within 1 year	BMS vs. DES						First vs. Newer Generation DES		
	All (n=550)			Bifurcation lesion (n=406)			DES (n=465)		
	OR_{unadj} (95% CI)		p value	OR_{unadj} (95% CI)		p value	OR_{unadj} (95% CI)		p value
MACE	2.88	(1.71-4.79)	<0.001	4.42	(2.28-8.48)	<0.001	1.73	(1.04-2.84)	0.031
Death	2.77	(1.37-5.39)	0.003	4.25	(1.63-10.34)	0.002	1.09	(0.50-2.24)	0.822
Non-fatal MI	1.45	(0.57-3.28)	0.400	2.82	(0.97-7.20)	0.039	2.79	(1.23-6.37)	0.014
TVR	4.79	(2.25-10.00)	<0.001	4.95	(2.06-11.36)	<0.001	0.97	(0.41-2.09)	0.932
Stent thrombosis	3.84	(0.76-16.90)	0.076	3.46	(0.16-34.74)	0.310	1.84	(0.36-8.49)	0.431

MACE=major adverse cardiac event, MI=myocardial infarcation, TVR=target vessel revascularisation.

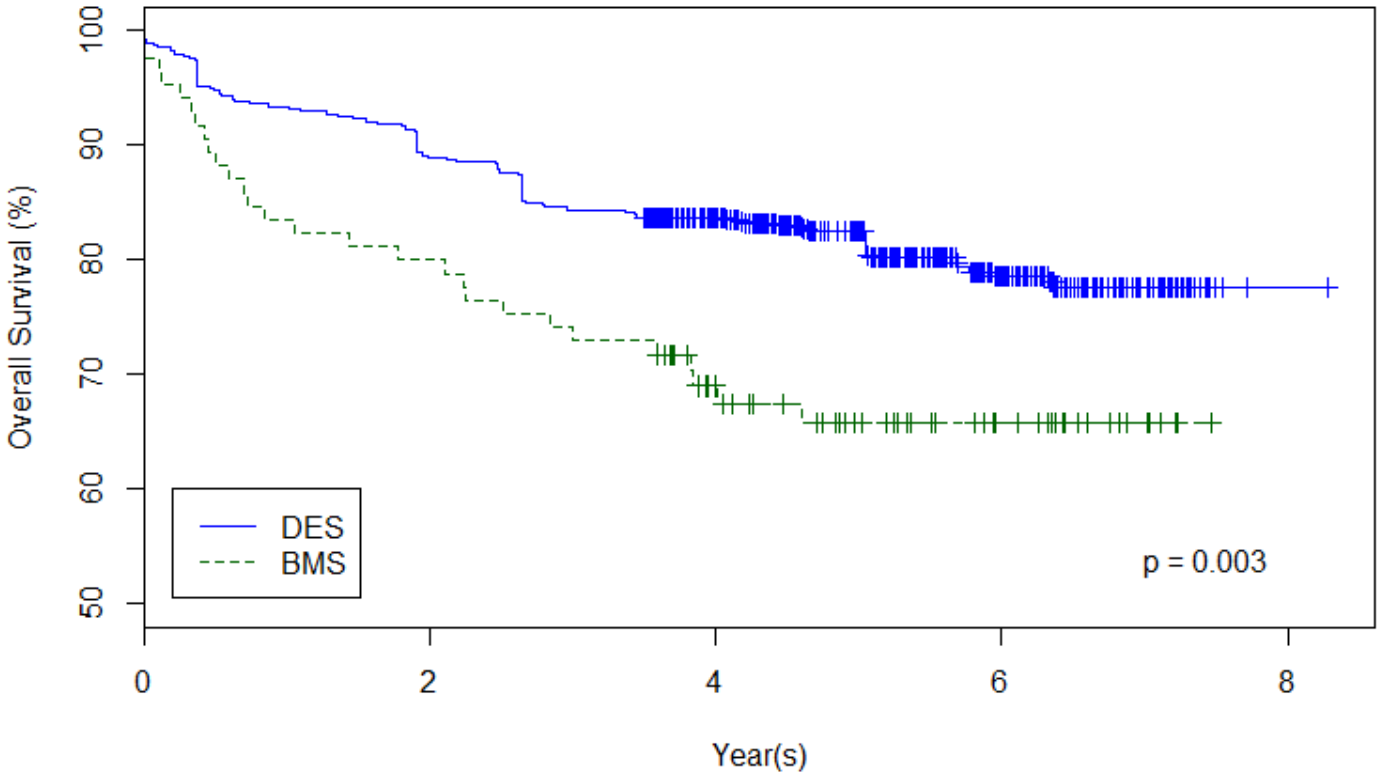
Association with 1-year MACE: Multiple logistic regression (after constrained full matching)

Outcome: 1-year MACE	All (n=550)		Bifurcation lesion (n=406)		DES (n=465)	
	OR_{adj}(95% CI)	p value	OR_{adj}(95% CI)	p value	OR_{adj}(95% CI)	p value
BMS (ref. DES)	4.19 (2.31-7.64)	<0.001	6.48 (3.11-13.62)	<0.001	—	—
Stent code main 1 (ref. 2)	—	—	—	—	1.62 (0.95-2.74)	0.076
Male (ref. female)	—	—	0.30 (0.16-0.57)	<0.001	0.78 (0.45-1.39)	0.3918
Diabetes mellitus	1.24 (0.72-2.12)	0.435	—	—	1.31 (0.77-2.23)	0.3223
Hypertension	1.54 (0.88-2.78)	0.139	—	—	—	—
History of myocardial infarction	2.08 (1.26-3.47)	0.005	1.86 (1.04-3.37)	0.037	2.07 (1.24-3.51)	0.006
History of stroke	1.63 (0.82-3.16)	0.156	—	—	—	—
History of peripheral vascular disease	7.20 (2.74-19.14)	<0.001	—	—	—	—
Chronic renal impairment	4.00 (1.62-9.83)	0.002	—	—	5.94 (2.50-14.30)	<0.001
Two stents strategy (ref. one stent)	1.63 (0.89-3.00)	0.114	—	—	1.50 (0.85-2.66)	0.1644
High pressure postdilatation	0.32 (0.16-0.66)	0.002	—	—	—	—

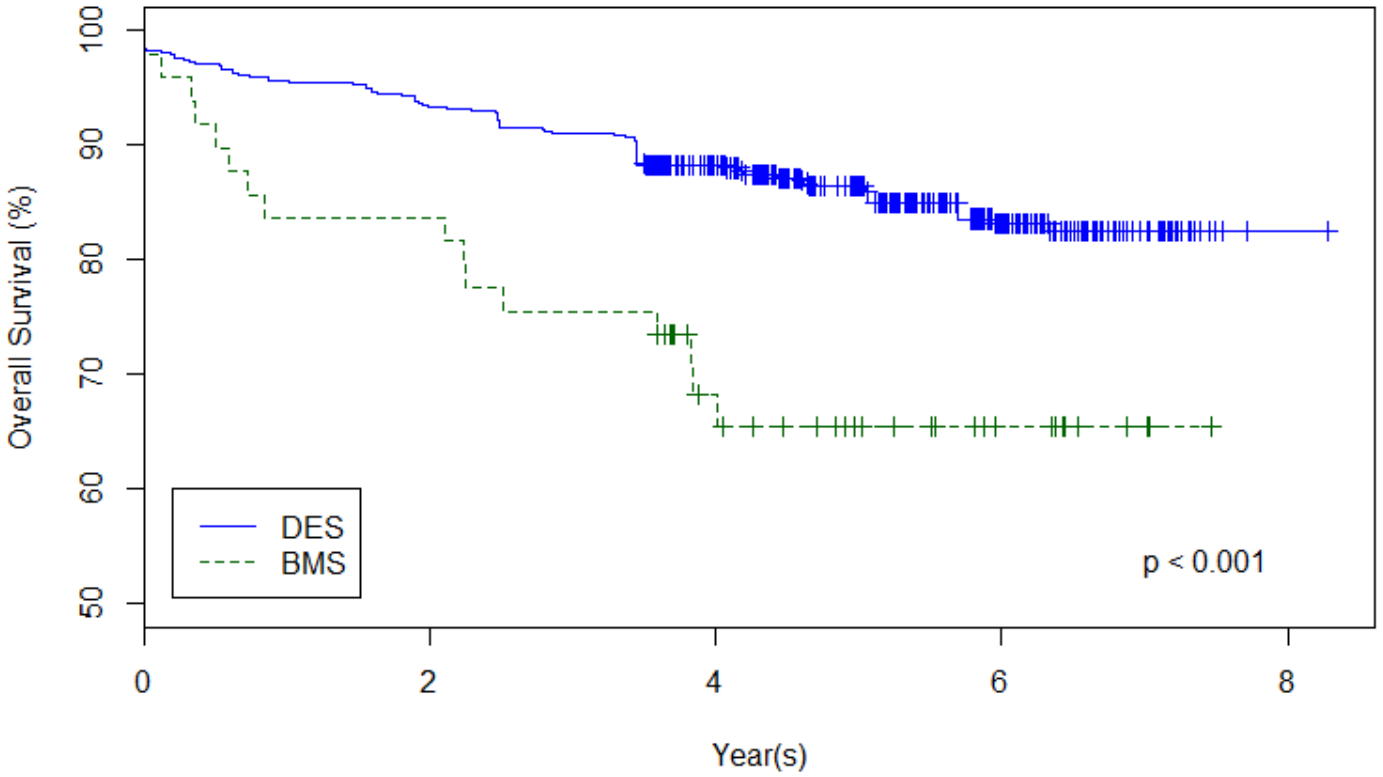
Variables with p<0.1 in simple logistic regression model were included in the multiple regression analysis.

— not applicable.

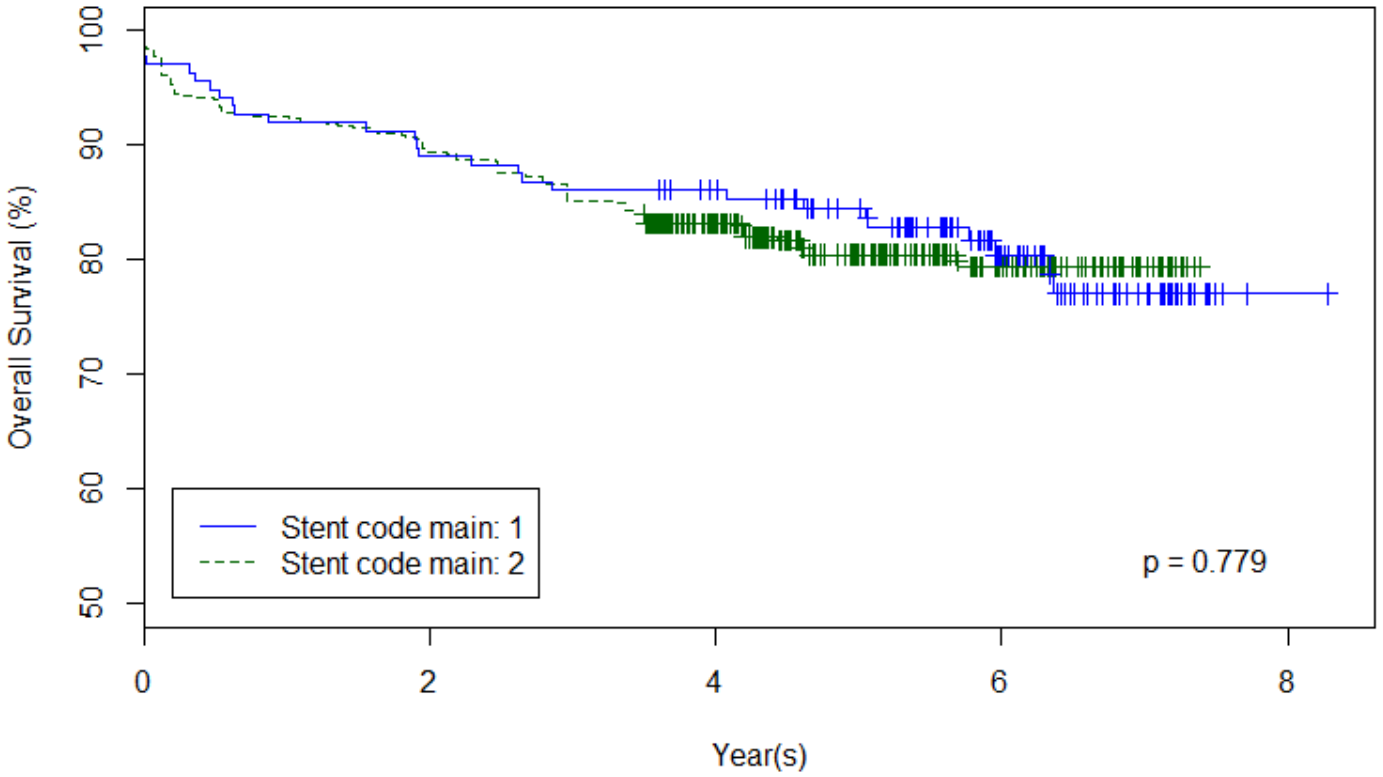
DES versus BMS in all left main lesions



DES versus BMS in left main bifurcation lesions



First versus newer generation DES in left main stenting



Multiple cox proportional hazards regression (after constrained full matching)

Subject group	Variable	HR_{adj} (95% CI)		p value
All	BMS (ref. DES)	1.64	(1.05-2.54)	0.028
Bifurcation lesion	BMS (ref. DES)	3.15	(1.73-5.71)	<0.001
DES	New generation DES (ref. First generation DES)	1.02	(0.64-1.64)	0.921

Adjusted for variables with $p<0.1$ in simple cox proportional hazards regression model.

Conclusion

- Compared with bare metal stents, drug-eluting stents prolong survival in left main coronary artery stenting, including bifurcation lesions
- Median term outcomes are comparable with other global registries, with lower TVR rates (?related to high rates of IVUS use)
- Simple cross-over is the most used technique
- No significant difference in major outcomes between first and second generation DES