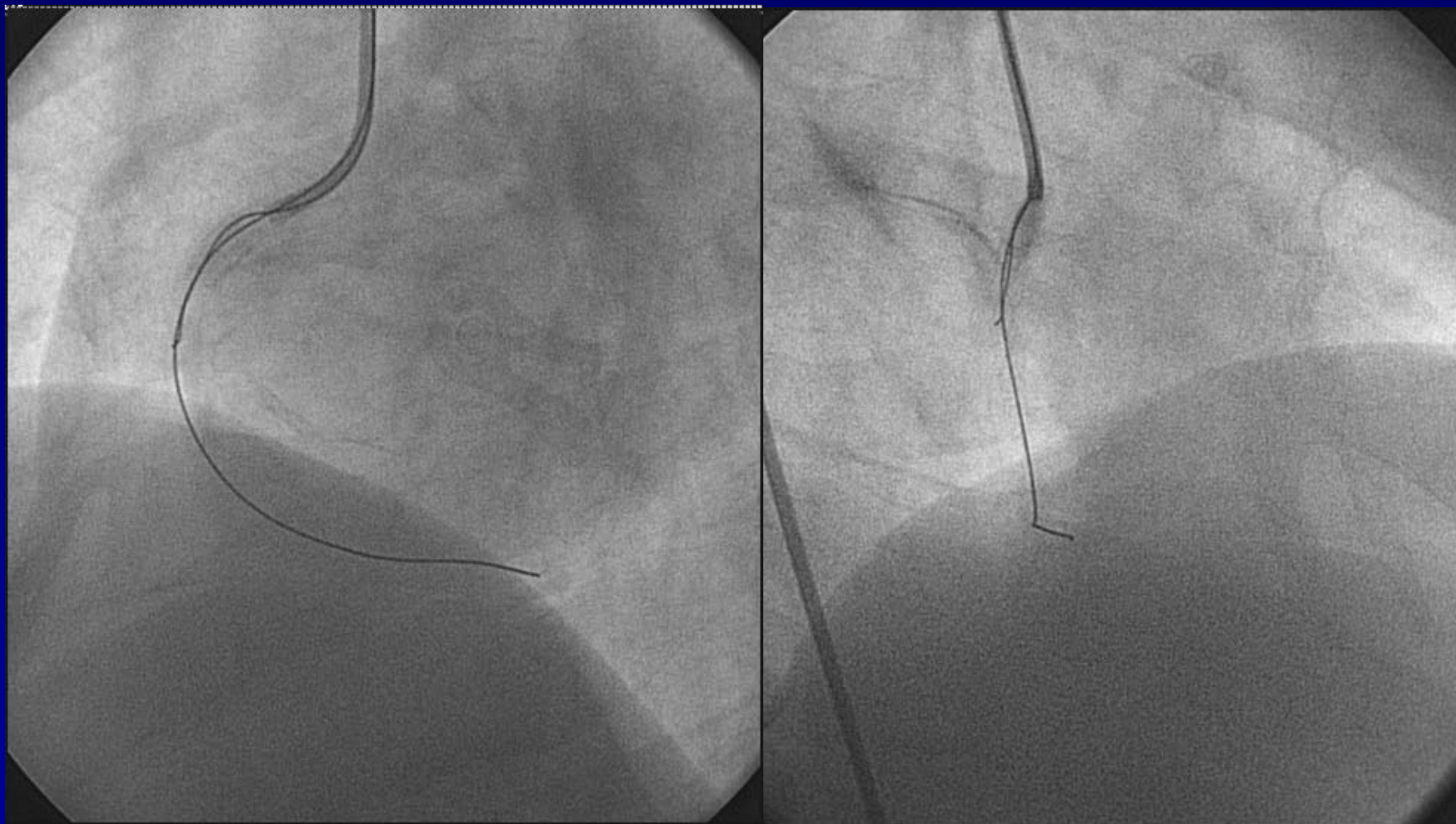


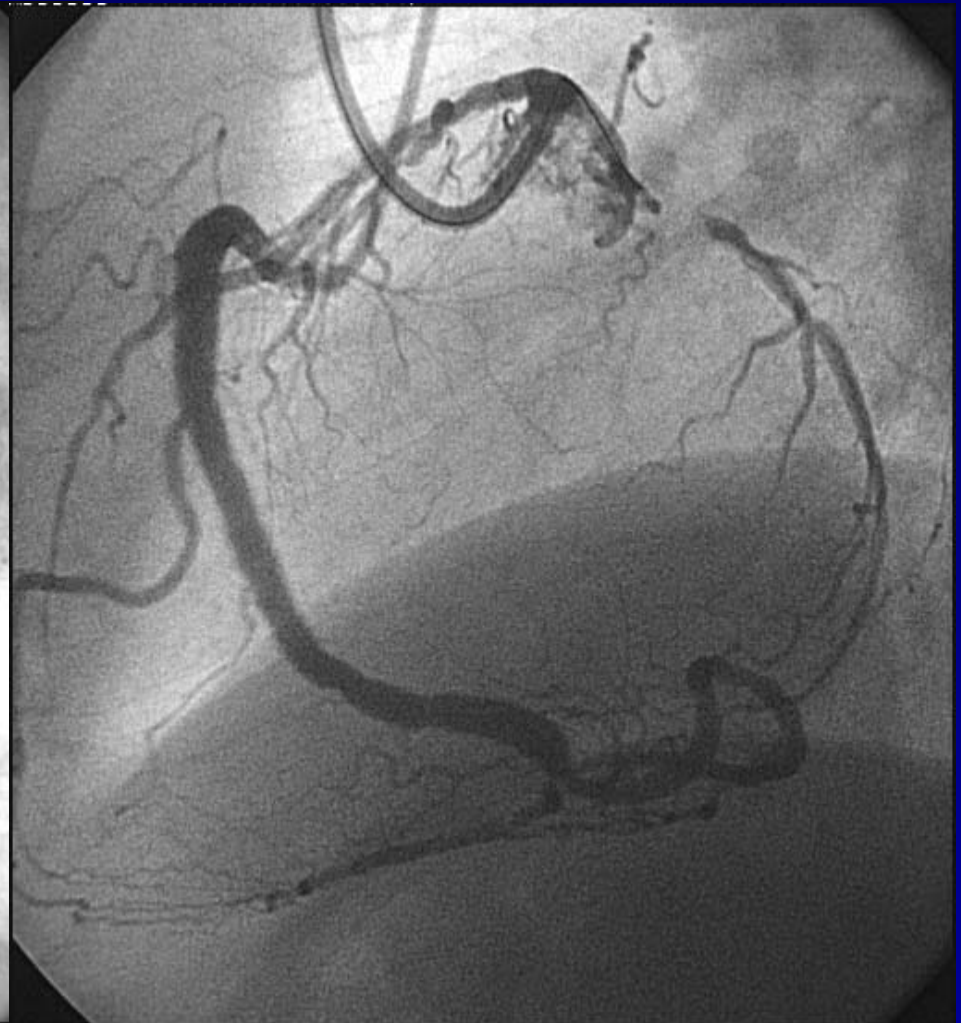
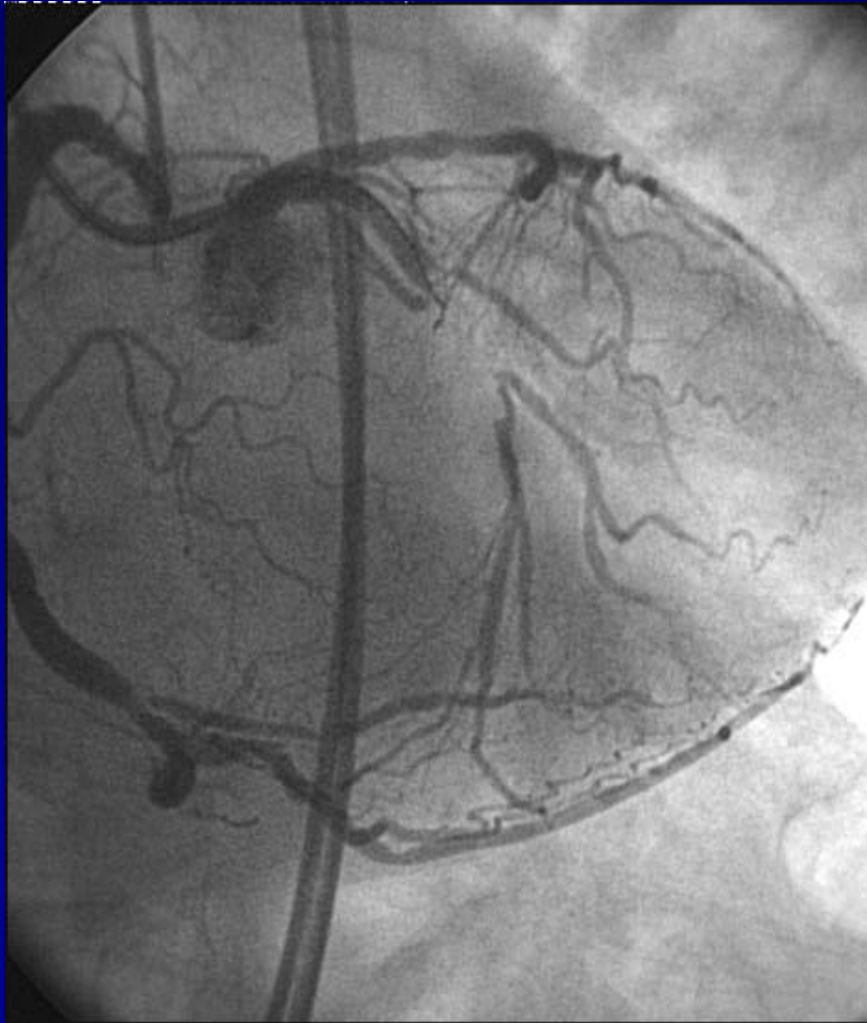
DES in CTO Revascularisation

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Senior Consultant Cardiologist
Gleneagles Medical Centre
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DES in CTO Revascularisation

- New dedicated CTO wires such as Miracle, Conquest
- New wiring techniques such as parallel wires, see-saw technique
- Retrograde approach
- CART technique
- Success rate has improved >80%
- Uncertainty regarding benefits of procedure ? viability
- Concern about potential complication such as perforations, damaging collaterals





BMS in CTOs: Procedural and Angiographic Outcomes

Trial	N	Reocclusion			Restenosis			Target Vessel Revasc		
		PTCA	Stent	P	PTCA	Stent	P	PTCA	Stent	P
Stenting in Chronic Coronary Occlusion (SICCO)	114	26%	16%	0.058	74%	32%	<0.01	42%	22%	0.025
Gruppo Italiano di Studi sulla Stent nelle Occlusioni coronariche (GISSOC)	110	34%	8%	0.004	68%	32%	0.0008	22%	5%	0.04
Mori et al. 1996	96	11%	7%	0.04	57%	28%	0.005	49%	28%	<0.05
Stent vs Percutaneous Angioplasty in Chronic Total Occlusion (SPACTO)	85	24%	3%	0.01	64%	32%	0.01	40%	25%	NS
Total Occlusion Study of Canada (TOSCA)	410	20%	11%	0.02	70%	55%	<0.01	15%	8%	0.03
Primary Stenting of Occluded Native Coronary Arteries (PRISON)	200	7.3%	8.2%	NS	33.3	21.9	0.14	10%	2.5%	0.002
Stents in Total Occlusion for Restenosis Prevention (STOP)	96	17%	8%	NS	71%	42%	0.032	42%	25%	NS

CTO Representation in DES Trials

Trial	N	% CTO
ARRIVE	2,586	1.8
DIABETES	221	13.1
e-Cypher	14,316	2.9
WISDOM	903	7.0

WISDOM: Reported Usage Patterns

N=903 patients

	% of Patients
Diabetic Patients	33.4%
Patients with Small Vessels (RVD< 2.5 mm)	10.0%
Patients with Long Lesions (LL>20 mm)	15.2%
Acute Coronary Syndrome	18.3%
Chronic Total Occlusions	7.0%



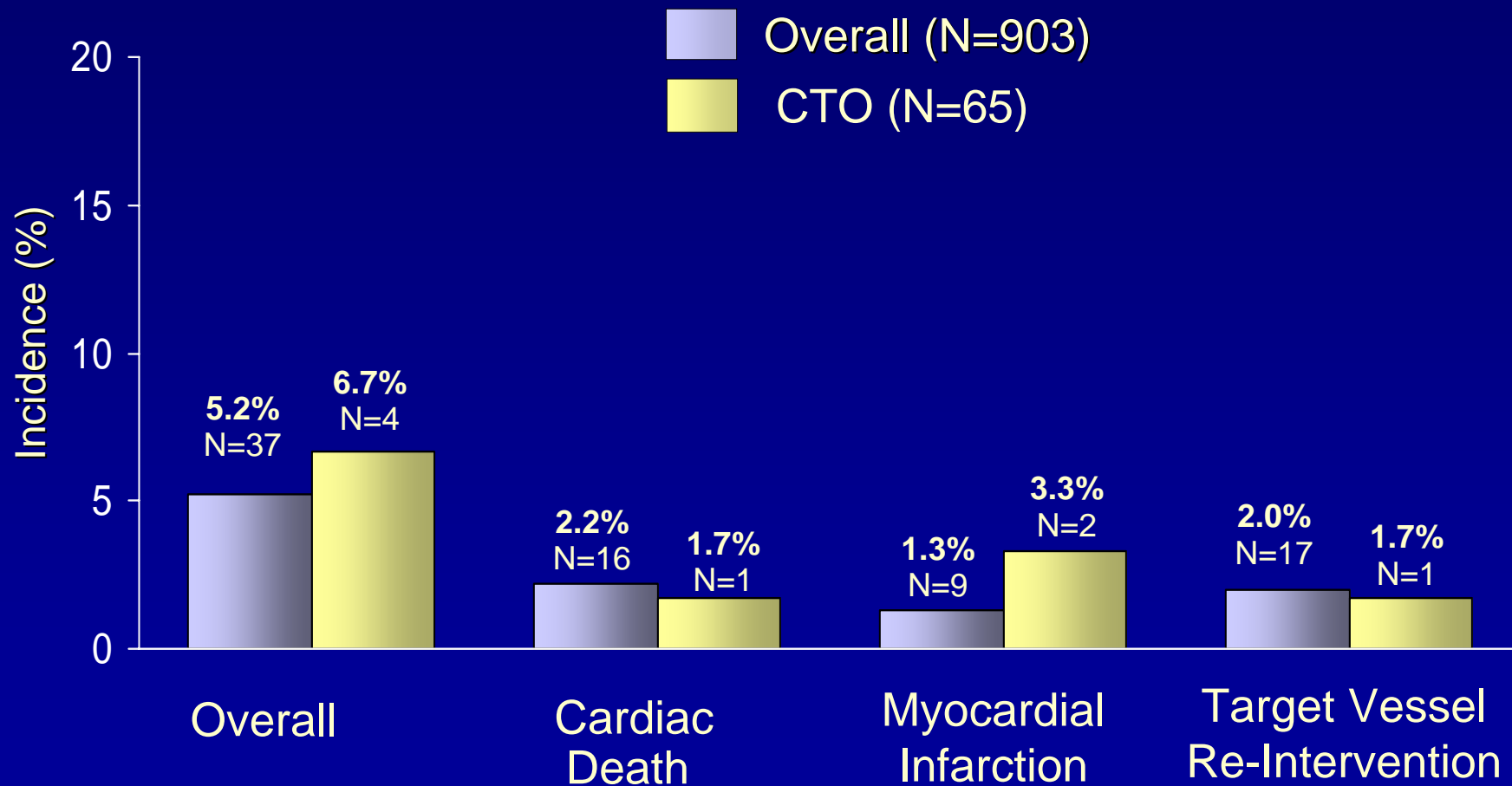
Significant contemporary DES use in real world clinical practice

Chan, 2004

WISDOM: Patients with Acute Coronary Syndrome and Chronic Total Occlusions

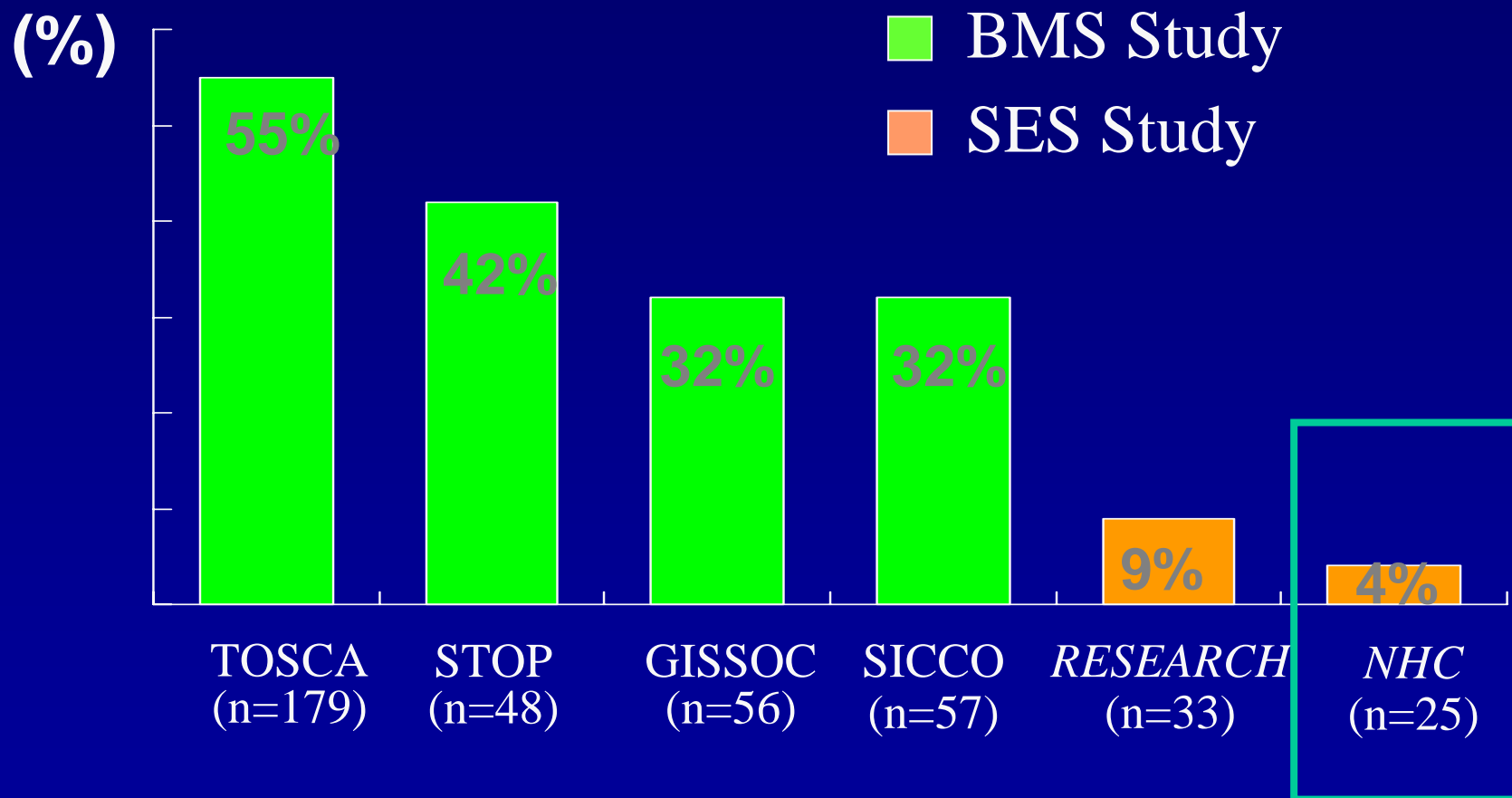
	Overall (N=903)	ACS (N=142)	CTO (N=65)
Age (yrs)	58.5 ± 11.4	55.0 ± 12.4	53.7 ± 11.1
Diabetes (%)	33	35	26
Acute Coronary Syndrome (%)	18	100	35
Investigator Reported			
RVD (mm)	3.0 ± 0.5	3.0 ± 0.5	3.0 ± 0.4
Lesion length (mm)	15.9 ± 6.6	15.5 ± 6.0	18.6 ± 7.5
Number of stents/lesion	1.1 ± 0.3	1.1 ± 0.3	1.2 ± 0.5
Total stent length/lesion (mm)	22.1 ± 9.0	22.3 ± 7.6	26.6 ± 12.5

WISDOM: Impact of Chronic Total Occlusions at 12 months



Historical Comparison

6 Month Restenosis Rate



TCT Summit 2007

CTO: TAXUS vs BMS

Study	N	FUP mos	Device	MACE	TLR
WISDOM	57	12	TAXUS	7.0%	1.8%
MS II	222	12	TAXUS	7.2%	3.6% TVR
T-SEARCH	57	12	TAXUS	7.0%	NA
Werner	48	12	TAXUS	12.5%	6.3%
TRUE	101	6	TAXUS	5.9%	NA
ARRIVE	57	6	TAXUS	3.5%	1.7% TVR
Werner	48	12	BMS	47.9%	43.8%
Olivari	369	12	BMS	15.0%	14.1%
SICCO	58	10	BMS		22.4%
Buller	202	6	BMS	23.0%	8.4% TVR
Lotan	48	6	BMS	39.6%	25.0%

DES in CTO Revascularization

SES and PES Registries

Trial	N	ABR	TVR	MACE	TVR	MACE
		6 months			1 year	
SICTO, EuroPCR 2004	25	0	8.0	0		
E-Cypher, TCT2004	360		1.4*	3.1		
RESEARCH, JACC 2004	56	9.1	3.6	3.6		
Werner, JACC 2004	48	8.3			6.3	12.5
Nakamura, AJC 2005	60	2.0	3.0		3.0	
TRUE Registry, TCT2005	183	17.0 [†]	16.9 [†]	17.1 [†]		
Ge, EHJ 2005	122	9.2	9.0	16.4		

Data expressed as percentages. *Denotes TLR, [†]7-month outcomes

DES in CTO Revascularization

SES and PES Comparative Studies

Trial	N		ABR (%)		TVR (%)		MACE (%)	
	SES	PES	SES	PES	SES	PES	SES	PES
RESEARCH/ T-SEARCH, ACC 2004*	76	57			2.6	3.6		
Asian Registry, TCT2005*	396	526	4.0	6.7	3.6	6.7	3.6	6.7
Suarez de Lezo, AHA 2005†,‡	60	58	7.4	19.0	3.3	7.0	3.0	7.0

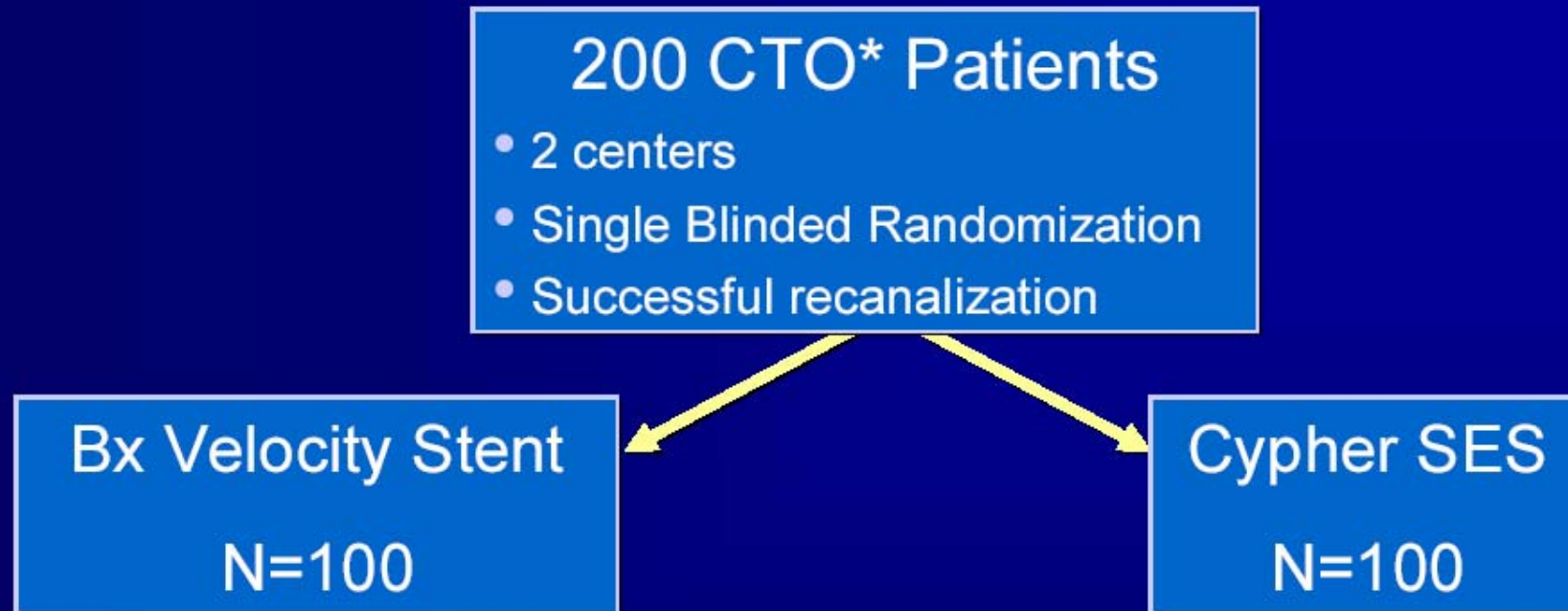
P=NS for all comparisons.

*1-year outcomes, †8 month outcomes, ‡Angiographic f/u in only 48% of patients

Cypher & TAXUS Performance in CTOs

- *Reported outcomes of Cypher & TAXUS stenting in high risk patients with chronic total occlusions compared to historical BMS demonstrate:*
 - *consistent reduction in MACE*
 - *consistent reduction in TLR/TVR*

PRISON II

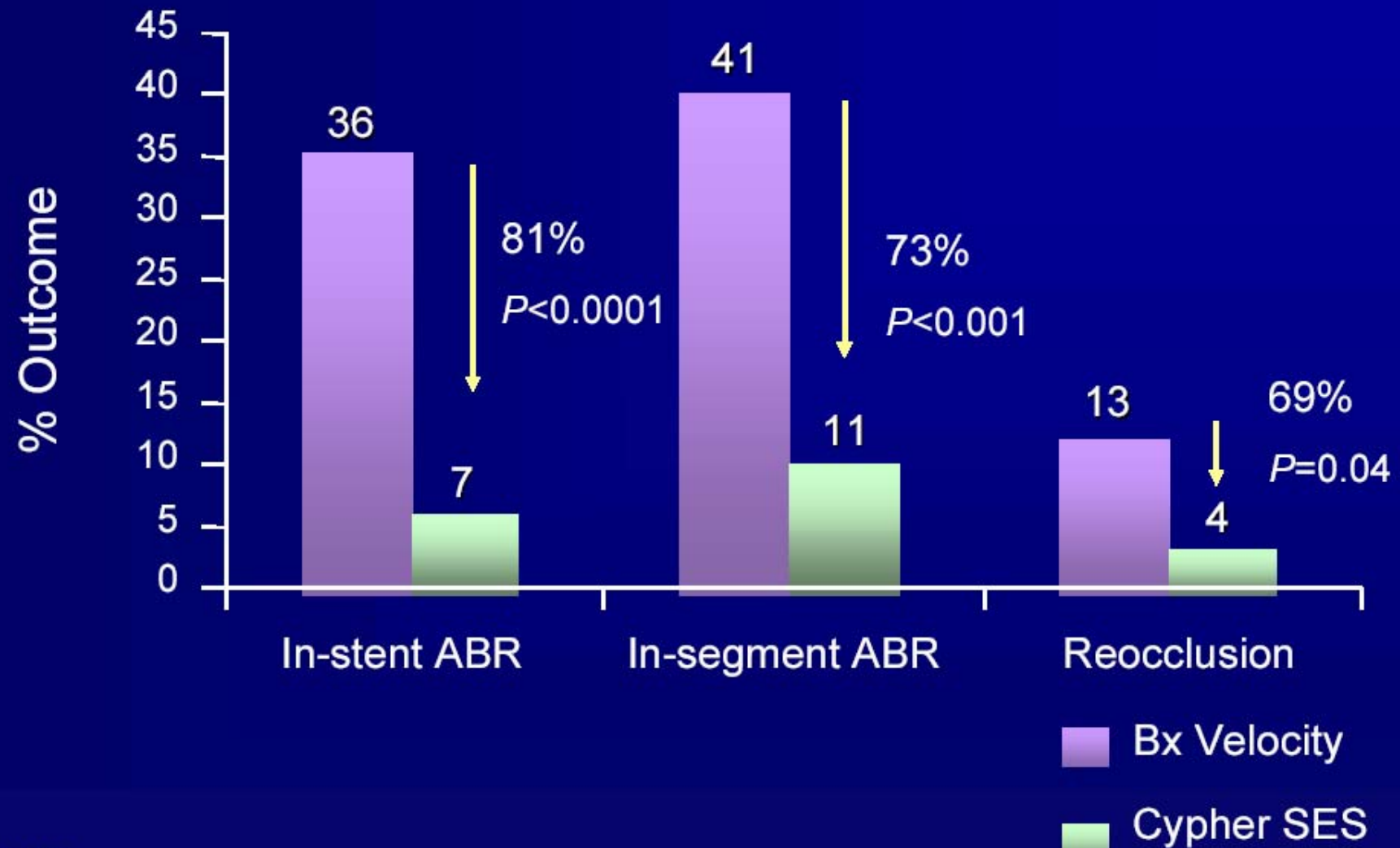


Primary Endpoint: In-segment angiographic binary restenosis at 6 months
Antiplatelet Therapy: ASA/ Clopidogrel 6 months

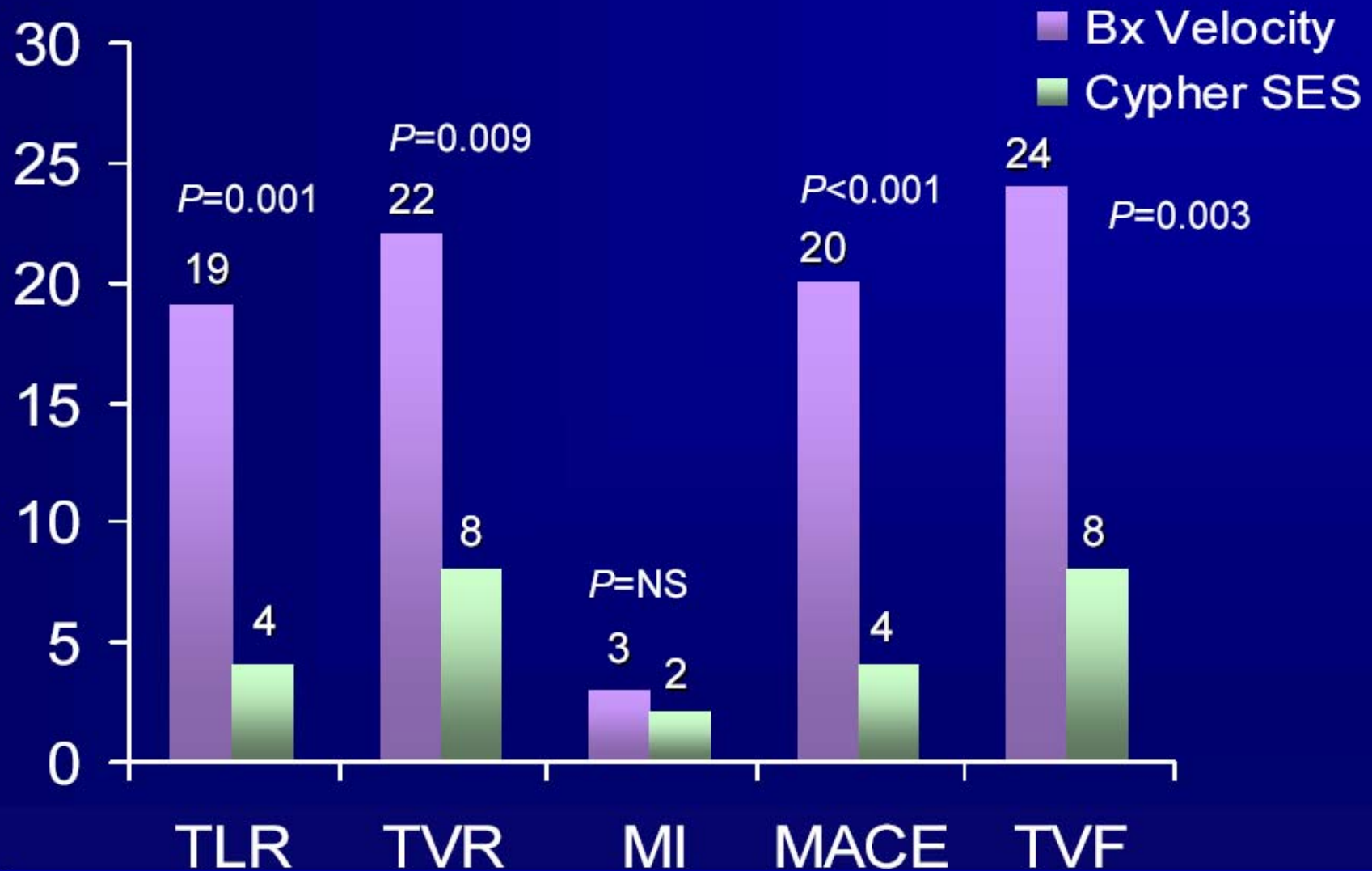
PRISON II

	Bx Velocity N=100	Cypher SES N=100
Diabetes mellitus (%)	16	10
LVEF>50% (%)	82	76
CTO> 3 mos (%)	44	46
TIMI 0 (%)	64	69
Lesion length (mm)	16.3	16.0
Stent length (mm)	28.9	31.9
Stent/patient	1.4	1.4

PRISON II



PRISON II



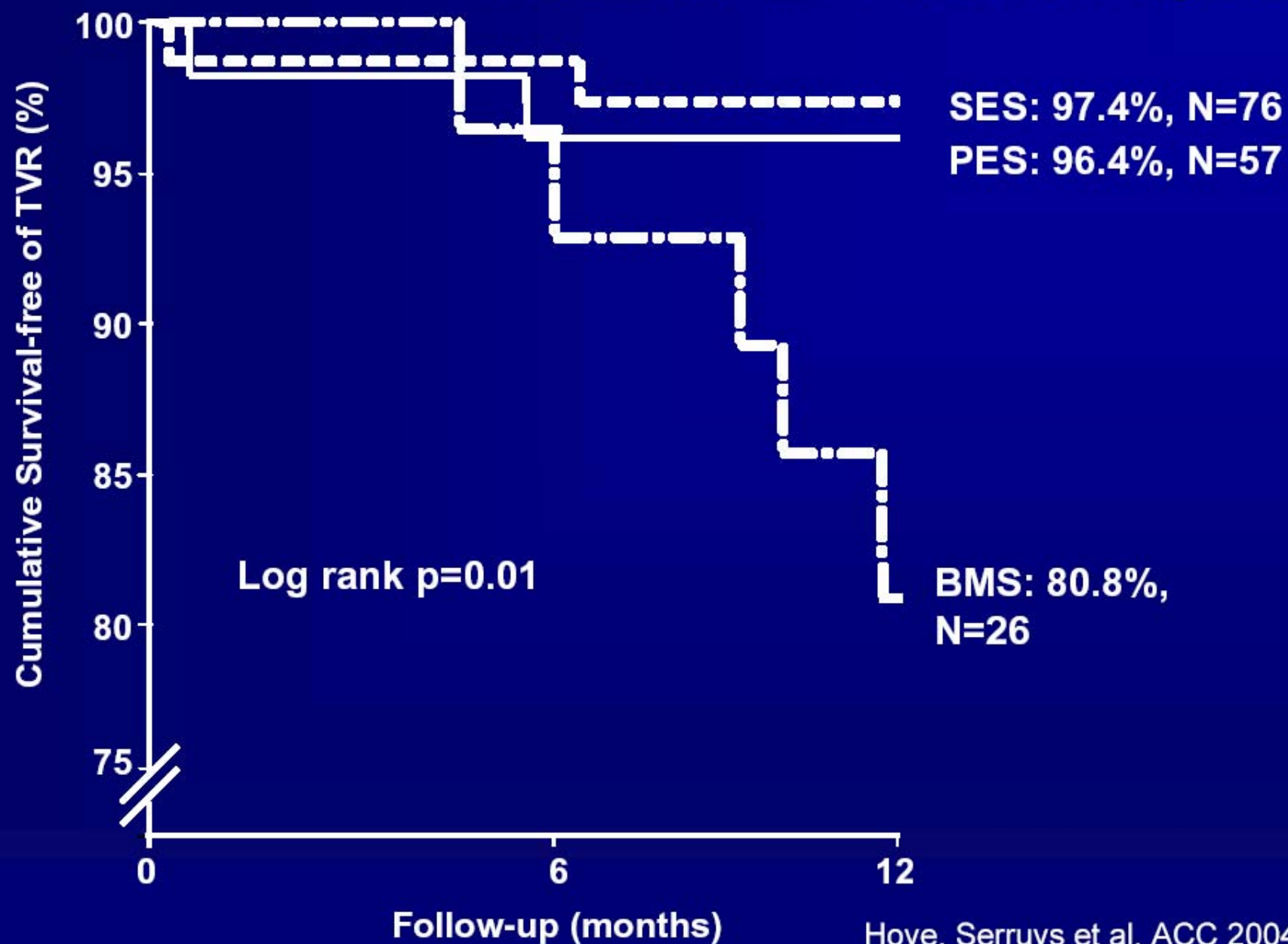
Procedural and Angiographic Outcomes

DES in CTO Revascularization

RESEARCH and T-SEARCH Registries

	Bare Metal	Sirolimus	Paclitaxel
	N=26	N=76	N=58
Occlusion length	13.0 ± 7.2	10.3 ± 5.9	11.2 ± 6.6
Reference diameter*	2.34 ± 0.43	2.35 ± 0.51	2.60 ± 0.49
Number of stents*	1.8 ± 0.8	2.2 ± 1.2	2.6 ± 1.3
Total stent length*	41.5 ± 23.3	48.8 ± 27.4	58.0 ± 32.8

RESEARCH and T-SEARCH Registries



Approaches to ChRonic Occlusions With Sirolimus Stents ACROSS-Cypher™/Total Occlusion Study of Coronary Arteries (TOSCA 4)



250 patients with *de novo* total
coronary occlusions
17 sites within North America
Single-arm trial design

Clinical Follow-up

30 d

6 mo

12 mo

2 yr

3 yr

4 yr

5 yr

Angiographic Follow-up

Primary Endpoints: Angiographic restenosis at 6 months compared with TOSCA-1

Secondary Endpoints: Angiographic in-segment restenosis at 6 months; TVF, MACE and TLR at 6 and 12 months; late loss at 6 months

Stent Sizes: Cordis Cypher™ 2.5-3.5 mm x 8-33 mm

Pre- and post-dilatation specified with balloon length < stent length

Antiplatelet therapy for ≥ 3 months

Influence of Follow-up Patency on Improvement in LV Function

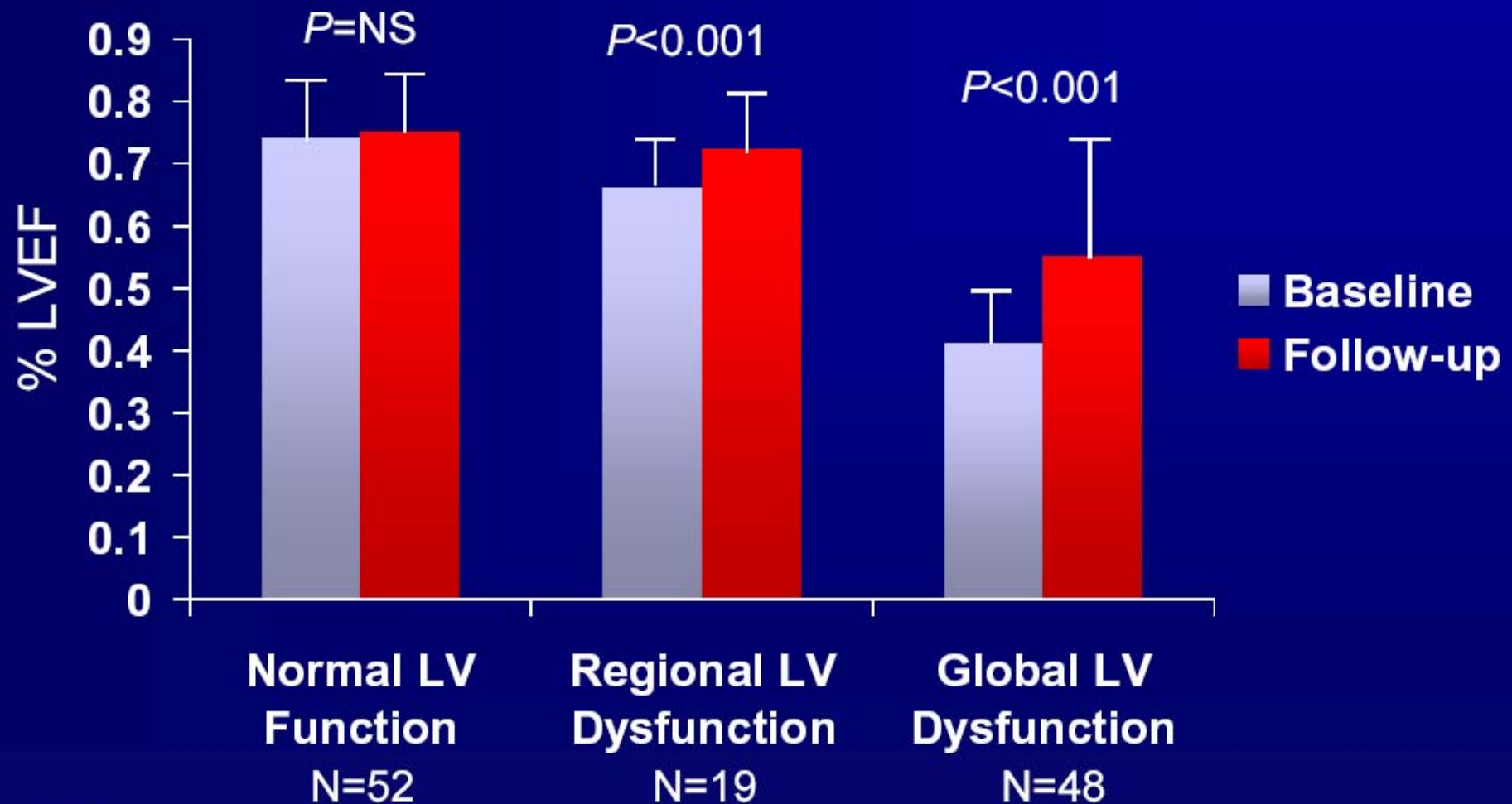
TOSCA 1

	Baseline	% Change	<i>P</i> value
TIMI 0-2 (N=39)	59.4 ± 11.4	-0.6 ± 6.1	0.067
TIMI 3 (N=205)	59.4 ± 12.0	2.0 ± 8.1	

Values expressed as mean ± SD

Recovery of LV Function After CTO Recanalization

Most Improvement with Baseline LV Dysfunction



Recovery of LV Function After CTO Recanalization

Predictors of Improvement in LV Function

Positive

- **Baseline LV dysfunction**
- **Preserved microvasculature**

No Effect

- **Collateral development**
- **Prior MI**
- **Duration of occlusion**
- **Nonocclusive restenosis**

Negative

- **Reocclusion**

Unresolved Issues in Use of DES in CTO Lesions

- Long-term patency especially in very long CTO lesions
- Duration of dual antiplatelets therapy
- Outcome of DES placement in false lumen
- Incidence of stent fractures with Cypher stents
- Stent malapposition and aneurysms

DES for CTO Revascularisation 2007

Summary

- Several trials with DES in CTO revascularization have demonstrated significant reductions in ABR and TLR
 - Several indirect comparisons with BMS historical controls
 - 1 RCT of DES vs. BMS.....'Class Ib' recommendation
- Aside from ↓ABR, long term patency with DES may be associated with preservation of improved LV function
- Duration of dual antiplatelet therapy uncertain
 - ↓restenotic occlusions offset by ↑thrombotic reocclusions with extensive DES placement?
- Need for systematic evaluation of DES to expand indication to CTOs