

How to Treat ISR DCB versus DES

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Biological and Mechanical Mechanisms of In-Stent Restenosis

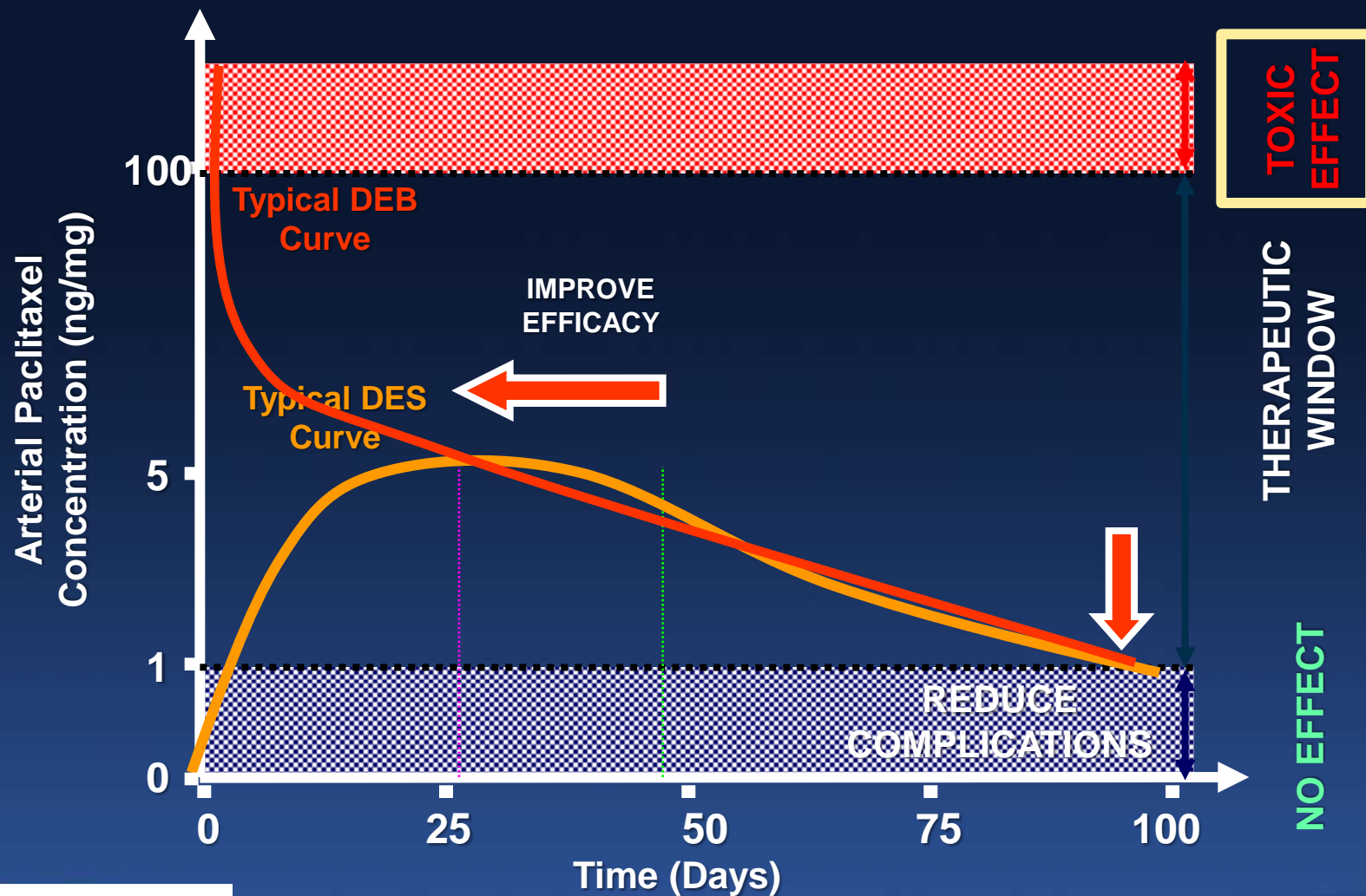
Majority of Predictors of DES Failures are Related to Technical Issues!

	DES Thrombosis	DES Restenosis
Under-Expansion	<ul style="list-style-type: none"> • Fujii et al. <i>J Am Coll Cardiol</i> 2005;45:995-8) • Okabe et al., <i>Am J Cardiol.</i> 2007;100:615-20 • Liu et al. <i>JACC Interventions</i>, in press 	<ul style="list-style-type: none"> • Sonoda et al. <i>J Am Coll Cardiol</i> 2004;43:1959-63 • Hong et al. <i>Eur Heart J</i> 2006;27:1305-10 • TAXUS IV, V, VI and ATLAS WH, LL, DS meta-analysis • Fujii et al. <i>Circulation</i> 2004;109:1085-1088
Edge problems (geographic miss, secondary lesions, large plaque burden, etc)	<ul style="list-style-type: none"> • Fujii et al. <i>J Am Coll Cardiol</i> 2005;45:995-8) • Okabe et al., <i>Am J Cardiol.</i> 2007;100:615-20 • Liu et al. <i>JACC Interventions</i>, in press 	<ul style="list-style-type: none"> • Sakurai et al. <i>Am J Cardiol</i> 2005;96:1251-3 • Liu et al. <i>Am J Cardiol</i> 2009;103:501-6 • Costa et al, <i>Am J Cardiol</i>, 2008;101:1704-11

Mechanism of Action of DCB and DES

Comparative PK Tissue Profiles

Balloon-Based Delivery versus DES



In-Stent Restenosis: Incidence is Lower!

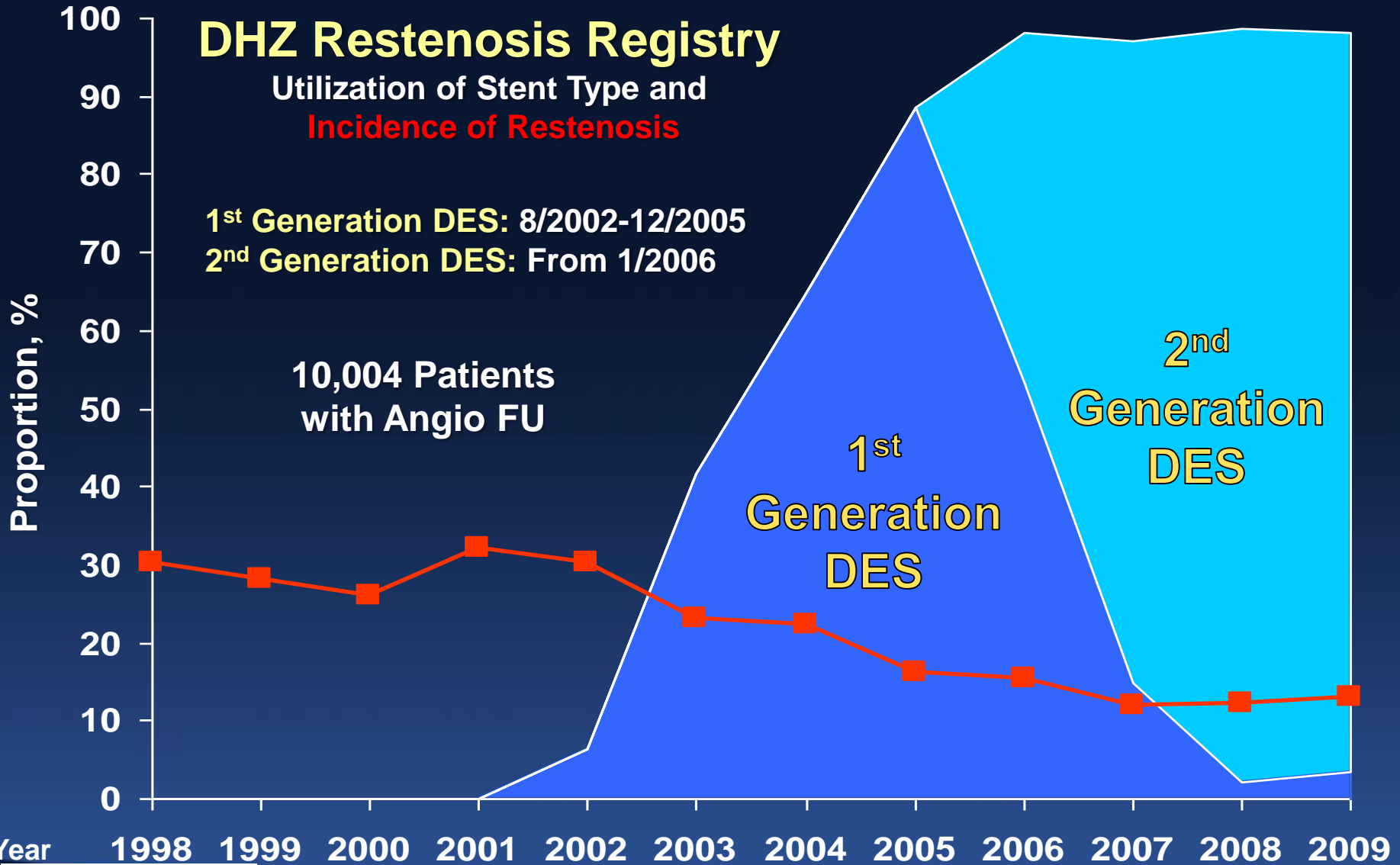
DHZ Restenosis Registry

Utilization of Stent Type and
Incidence of Restenosis

1st Generation DES: 8/2002-12/2005

2nd Generation DES: From 1/2006

10,004 Patients
with Angio FU



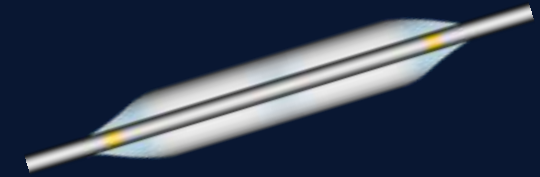
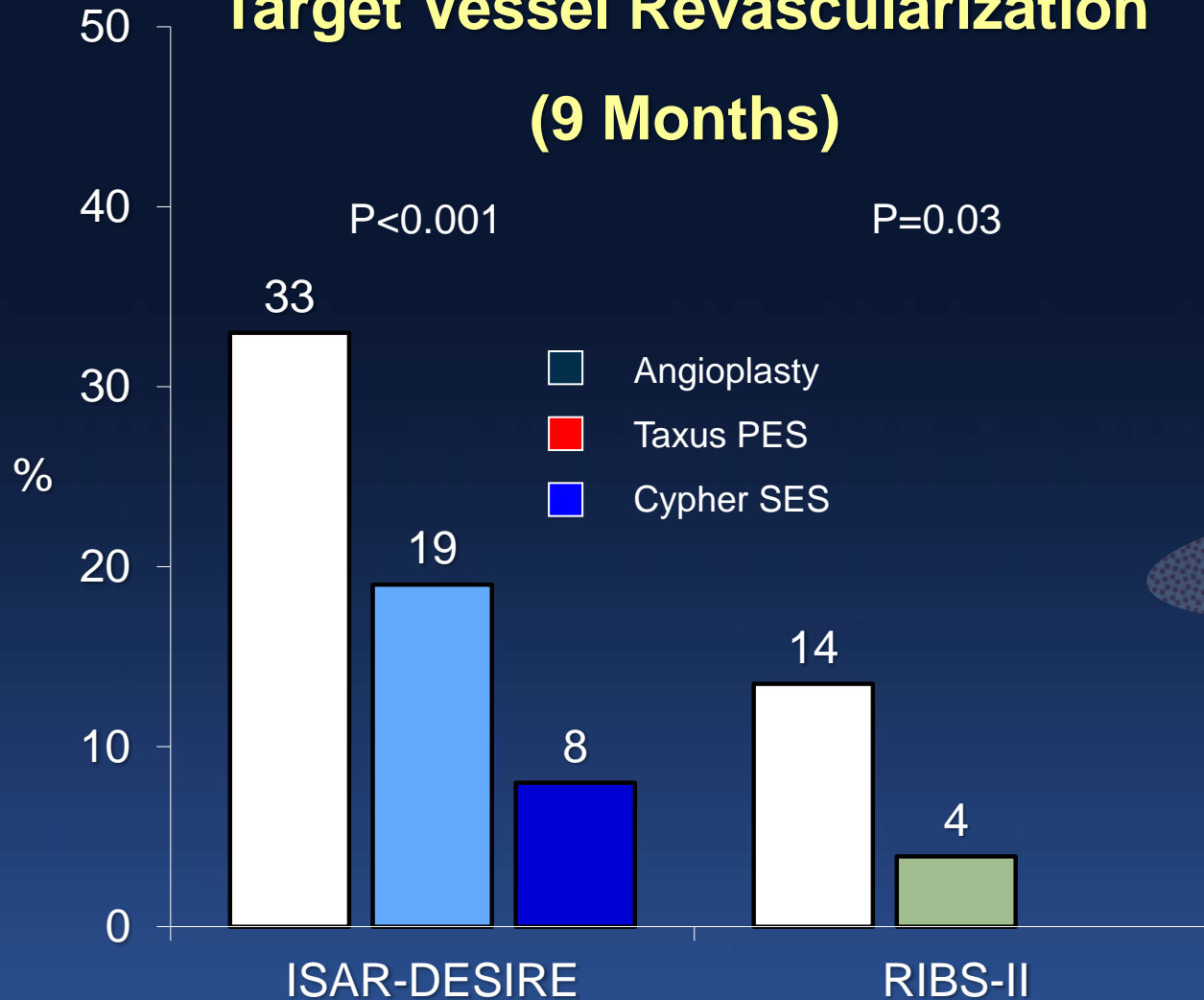
Year 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009

Efficacy in Coronary Bare Metal In-Stent Restenosis

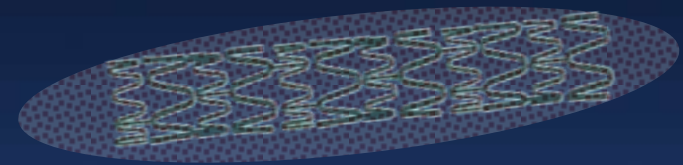
BMS-ISR: DES vs POBA

Target Vessel Revascularization

(9 Months)



Plain Balloon PTCA



Drug-Eluting Stent

BMS-ISR: DCB vs DES

PEPCAD II ISR Study: Study Design

131 patients \geq 18 years eligible for coronary revascularization for instent restenosis by means of PCI



SeQuent™ Please
Drug Eluting Balloon Catheter
n=66

Taxus
Drug Eluting Stent
n=65

6 Month, 1 and 3 year Follow-Up

- Primary Endpoint: 6 month late lumen loss
- Secondary Endpoint: Procedural success (\leq 30% stenosis), 6 month binary restenosis, 6 month MACE, MACE at 1 and 3 years

BMS-ISR: DCB vs DES

PEPCAD II ISR Study: Results

Late Loss

- DCB (SeQ Please)
- DES (Taxus)

Minimal Lumen Diameter

- DCB (SeQ Please)
- DES (Taxus)

In comparing modalities with different acute gain, late loss is not a valid endpoint



BMS-ISR: DCB vs G2 DES - RIBS V

*Inclusion Criteria
Informed Consent* →

189 Pts BMS ISR
Randomization

← *Rx Centralized
Stratification:
ISR Length & Edge*

Xience Prime
(Abbott Vascular)

94 Pts
EES

95 Pts
DCB

SeQuent Please
(B. Braun Surgical)

8 Refused

100% Angiographic Success

3 Died
1 Thrombosis
7 Refused

Mean: 270 days

86 Pts
Angio FU

*QCA
Primary
End-point*

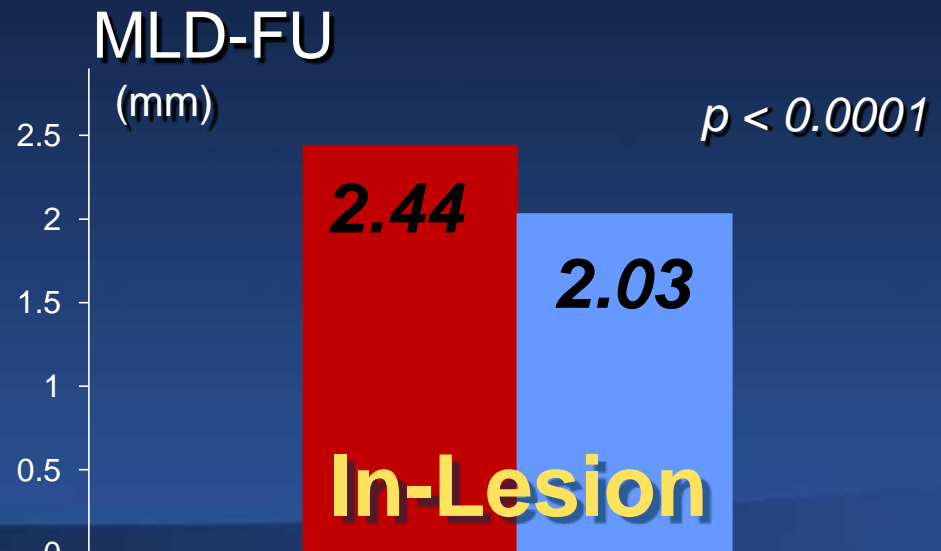
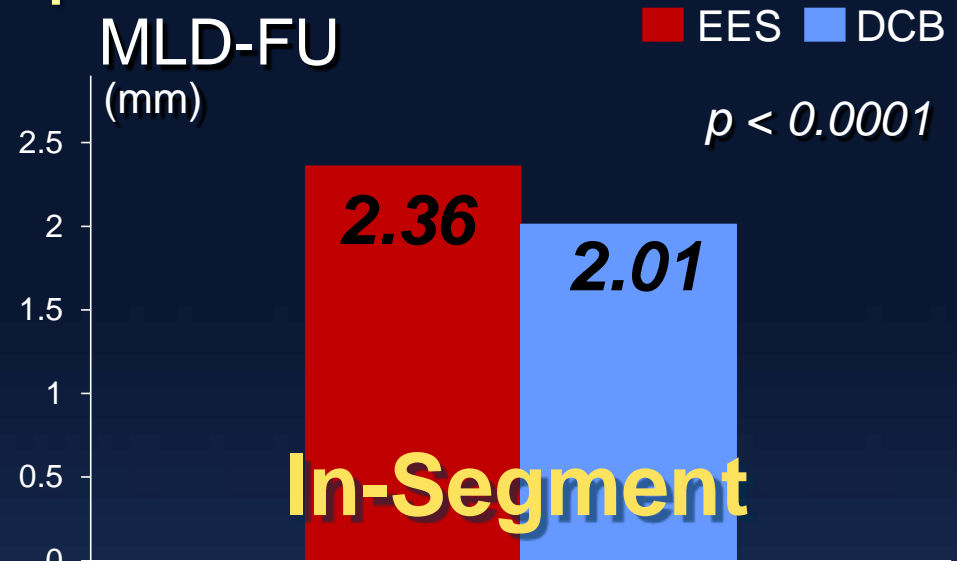
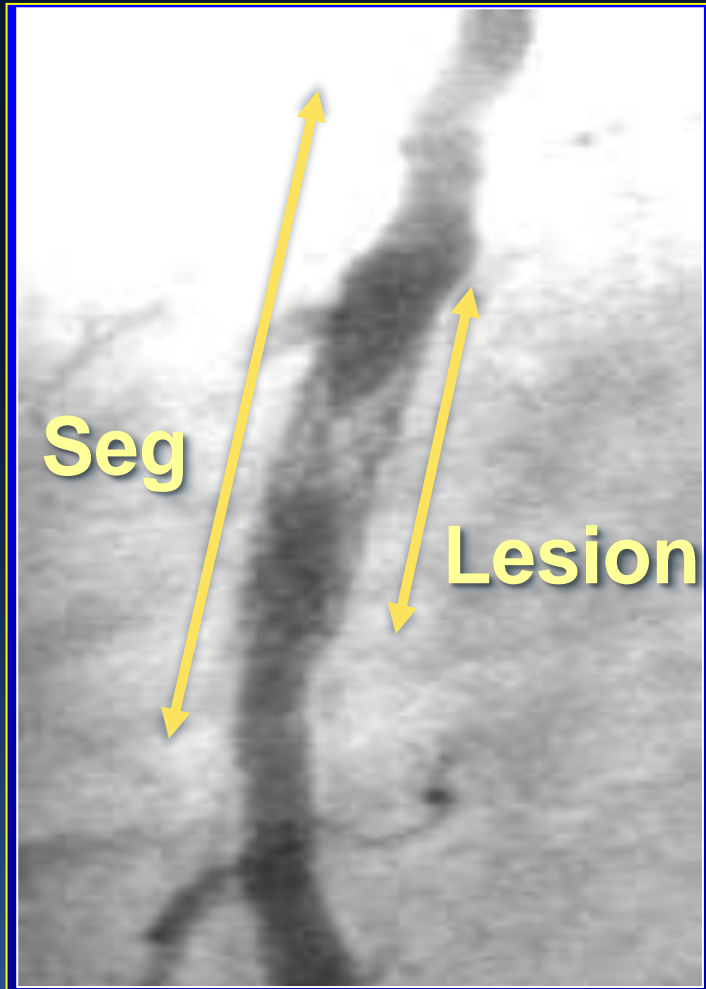
84 Pts
Angio FU

Mean: 271 days

(170 Patients: 92% of Eligible)

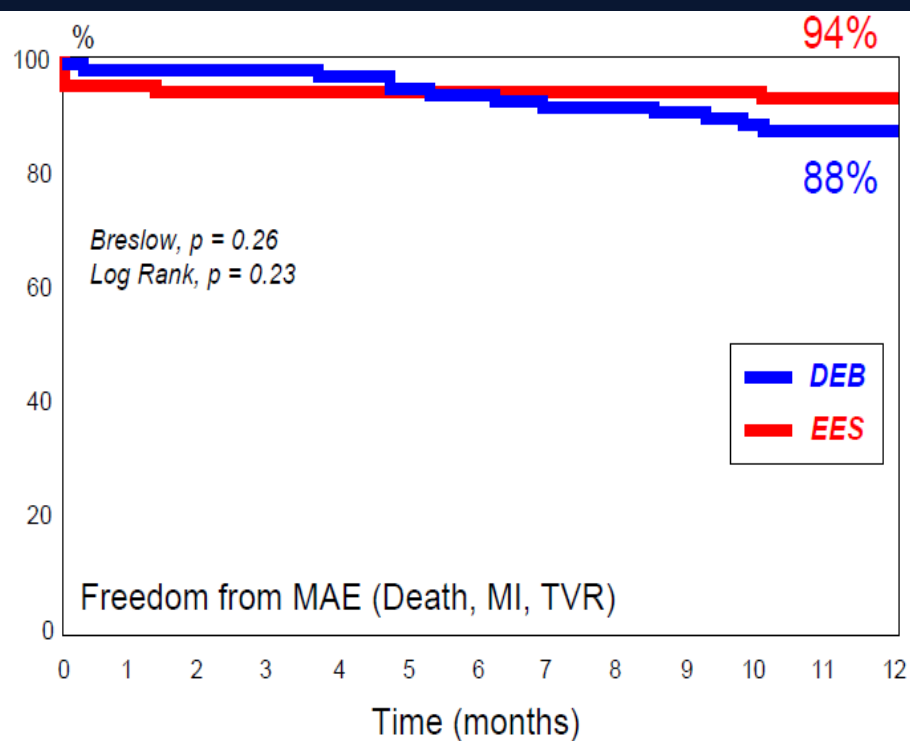
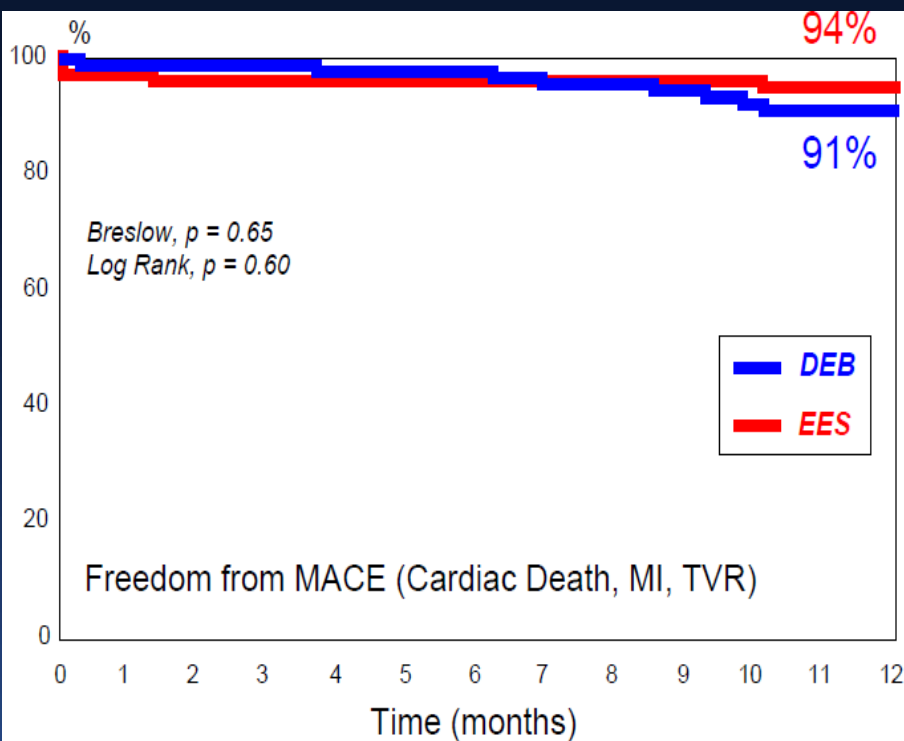
BMS-ISR: DCB vs G2 DES - RIBS V

Primary Endpoint: MLD at FU



BMS-ISR: DCB vs G2 DES - RIBS V

Clinical Outcomes at 12 Months



Alfonso et al. JACC 2014

Efficacy in Coronary Drug Eluting In-Stent Restenosis

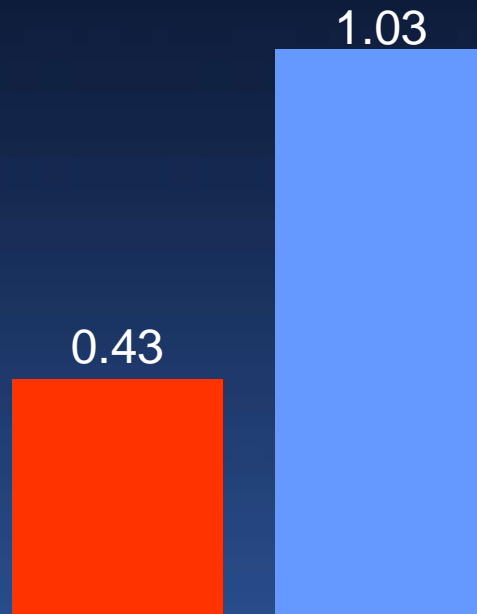
DES-ISR: DCB versus POBA

PEPCAD-DES: Primary Results

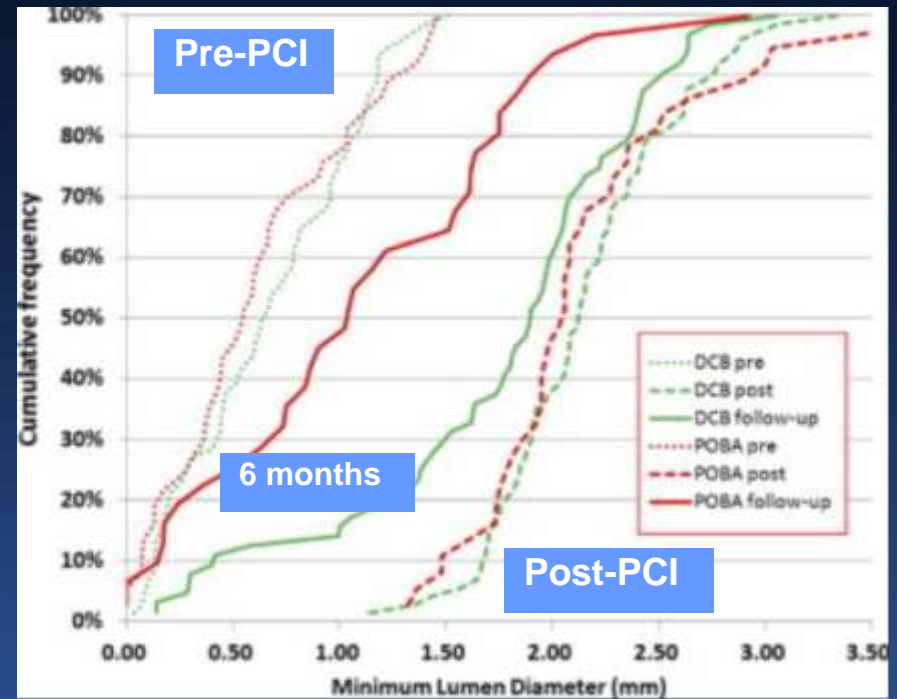
95/110 patients with angiographic follow-up

Late Loss (mm)

- DCB (SeQ Please)
- Plain Balloon



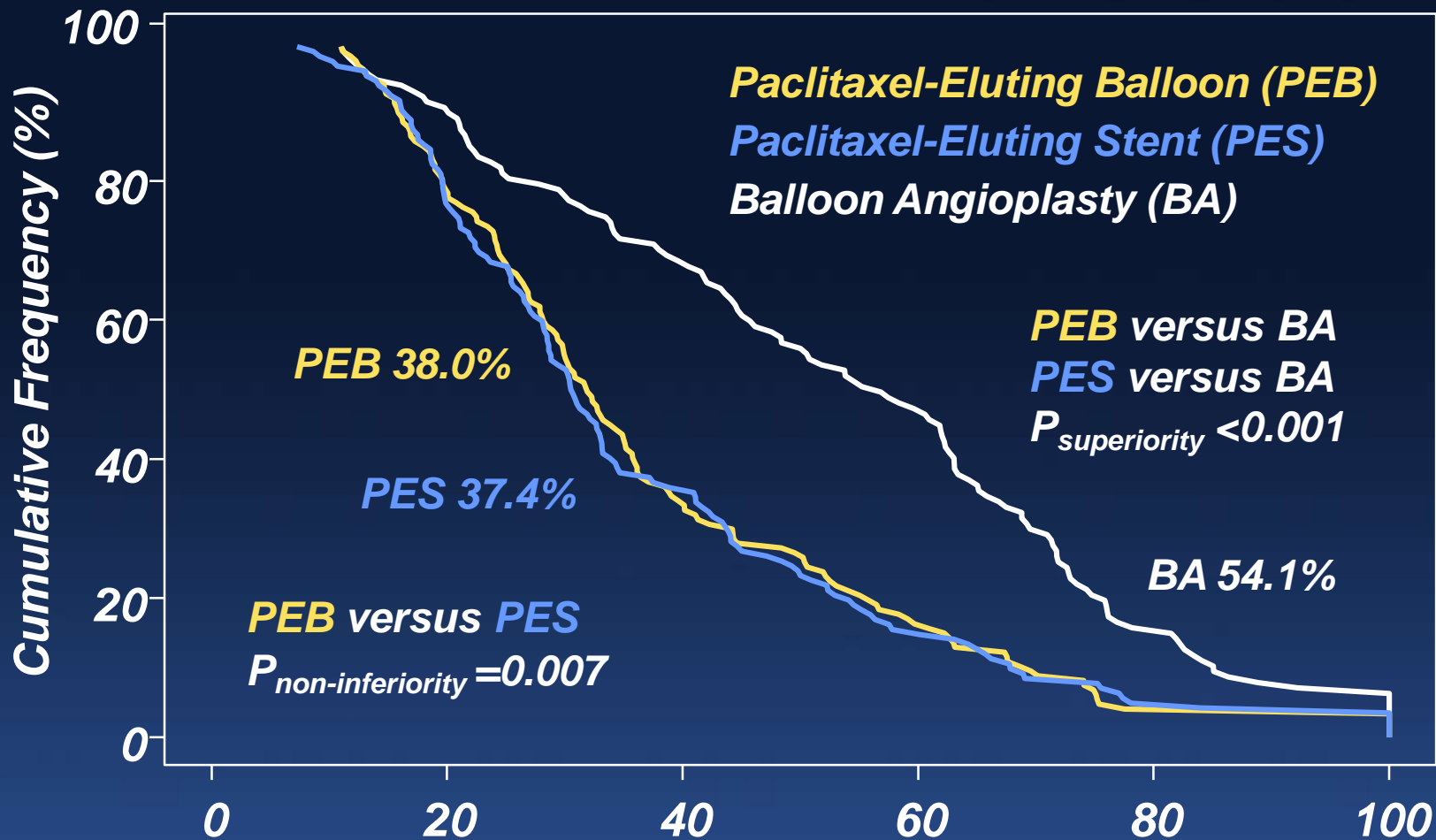
Min. Lumen Diameter (mm)



Rittger et al. A Am Coll Cardiol 2012

DES-ISR: DCB vs. 1st Gen. DES

Diameter Stenosis at Follow-up Angiography



Diameter Stenosis at Follow-up Angiography (%)

ISAR-DESIRE 3: Intracoronary Stenting and Angiographic Results: Drug Eluting Stents for In-Stent Restenosis: 3 Treatment Approaches; Byrne et al. Lancet 2013

DES-ISR: DCB vs. G2 DES: RIBS IV

(January 2010 – August 2013 at 23 centers)

Inclusion Criteria
Informed Consent



309 Pts DES-ISR
Randomization



Rx Centralized
Stratification:
ISR Length & Edge



Xience Prime
(Abbott Vascular)

155 Pts
EES

154 Pts
DEB

SeQuent Please
(B. Braun)

100% Angiographic Success

4 Died
18 Refused

3 Died
12 Refused

Mean: 279 days
(Median: 248)

133 Pts
Angio FU

QCA
Primary
End-point

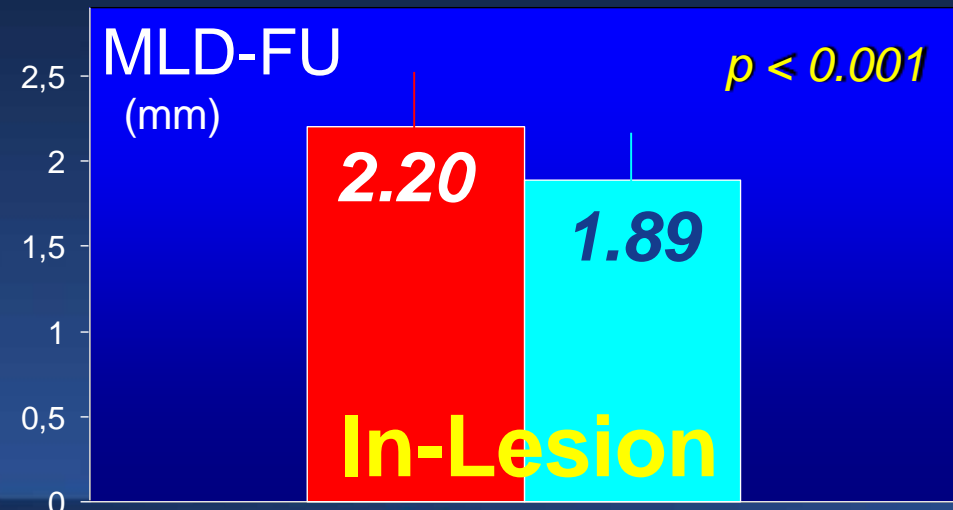
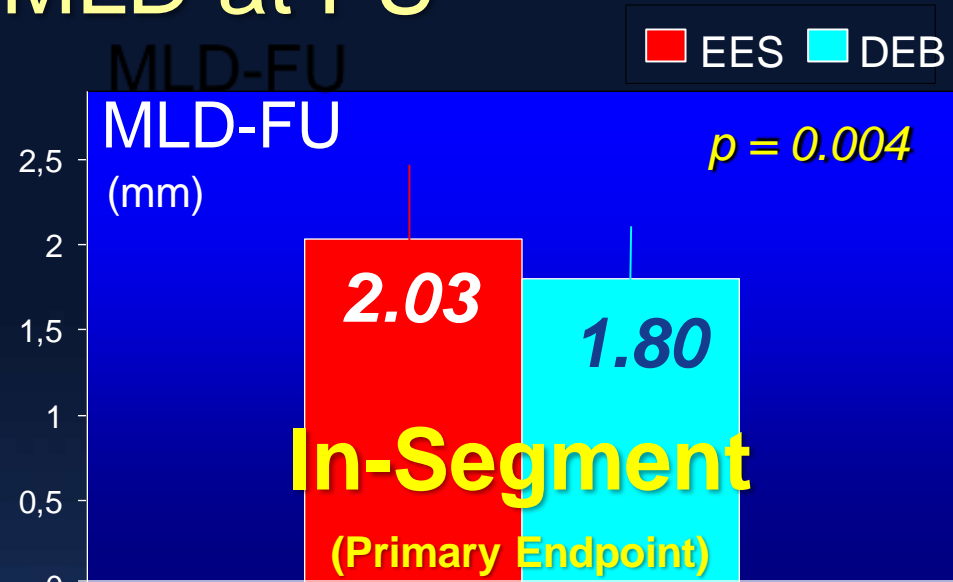
139 Pts
Angio FU

Mean: 266 days
(Median: 246)

(272 Patients: 90% of Eligible)

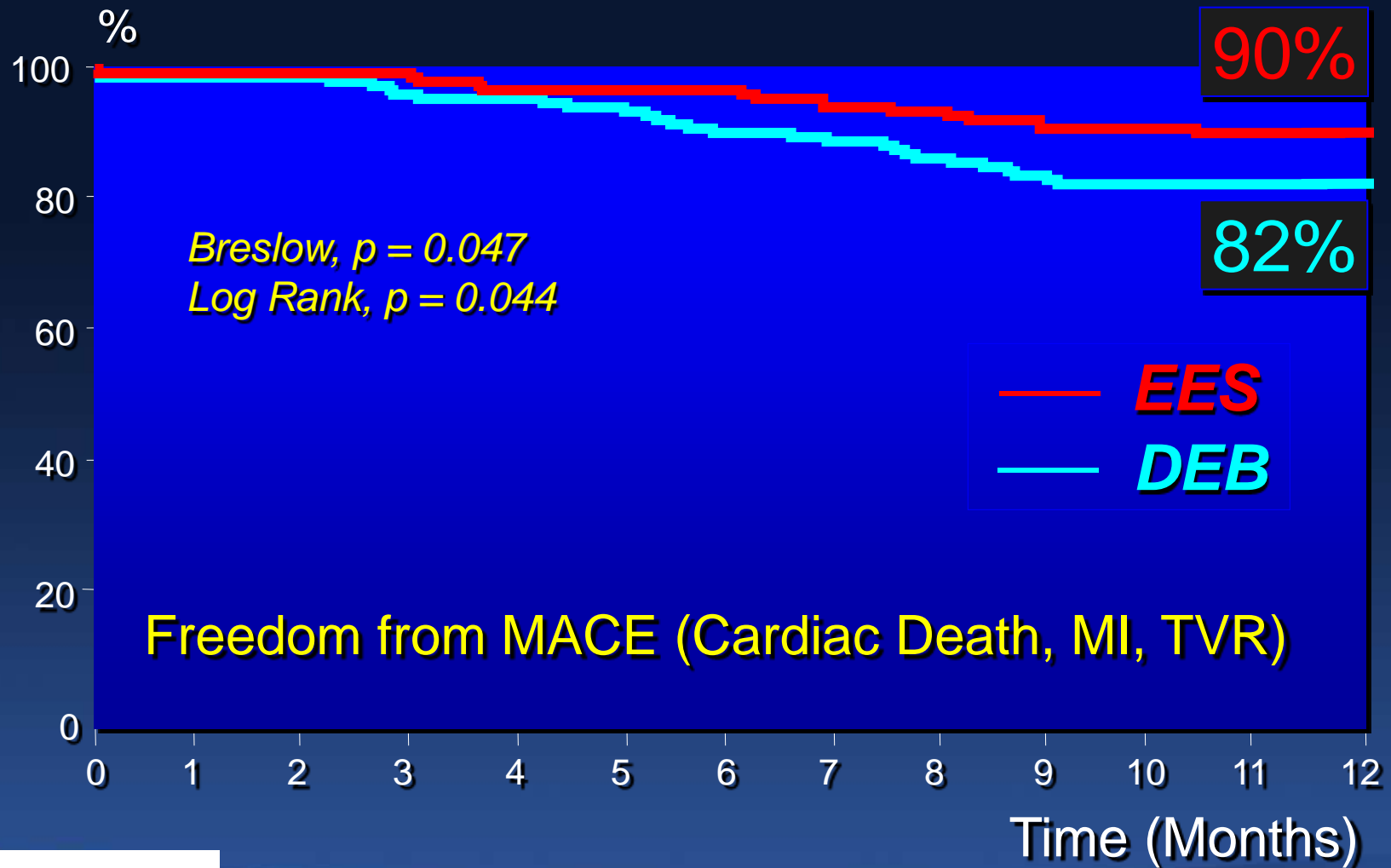
DES-ISR: DCB vs. G2 DES: RIBS IV

QCA: MLD at FU



DES-ISR: DCB vs. G2 DES: RIBS IV

Clinical Follow-up: 1-Year FU 309 P (100%); FU Time 360 \pm 35 Days



Recurrent DES-ISR: DCB vs. G2 DES

First PCI with BMS or DES Implantation

Second PCI with DES Implantation for ISR
746 Lesions (Between 2008 to 2013)

Third PCI with G2 DES Implantation or DCB for
ISR:180 Lesions (Between 2008 to 2013)

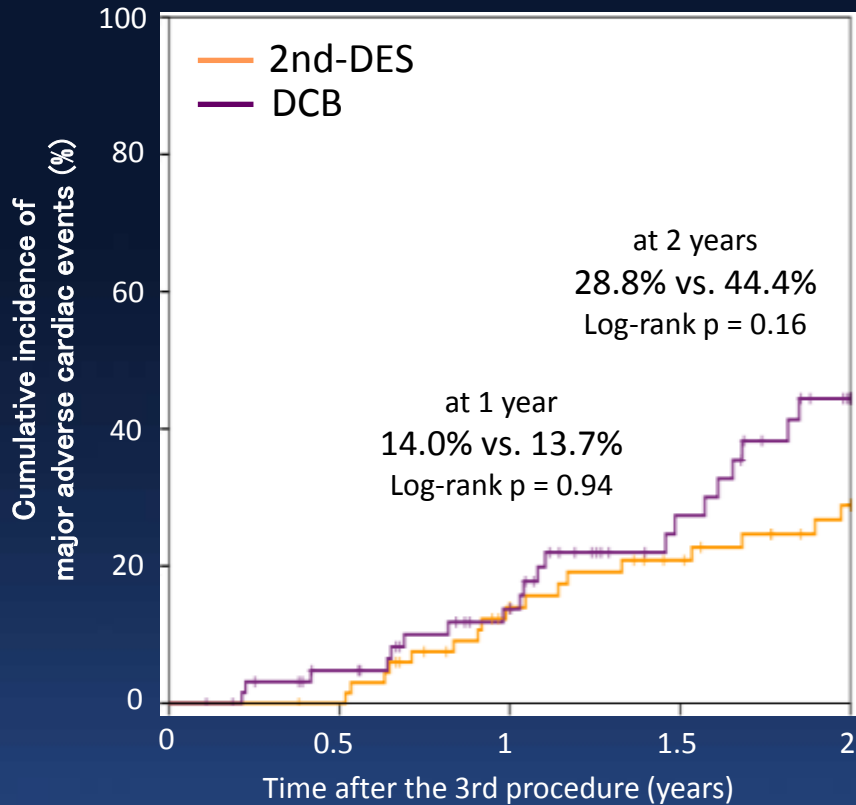
8 Lesions Excluded (Treated
with Both DES and DCB)

G2-DES Implantation
82 Lesions (68 Patients)

DCB
90 Lesions (66 Patients)

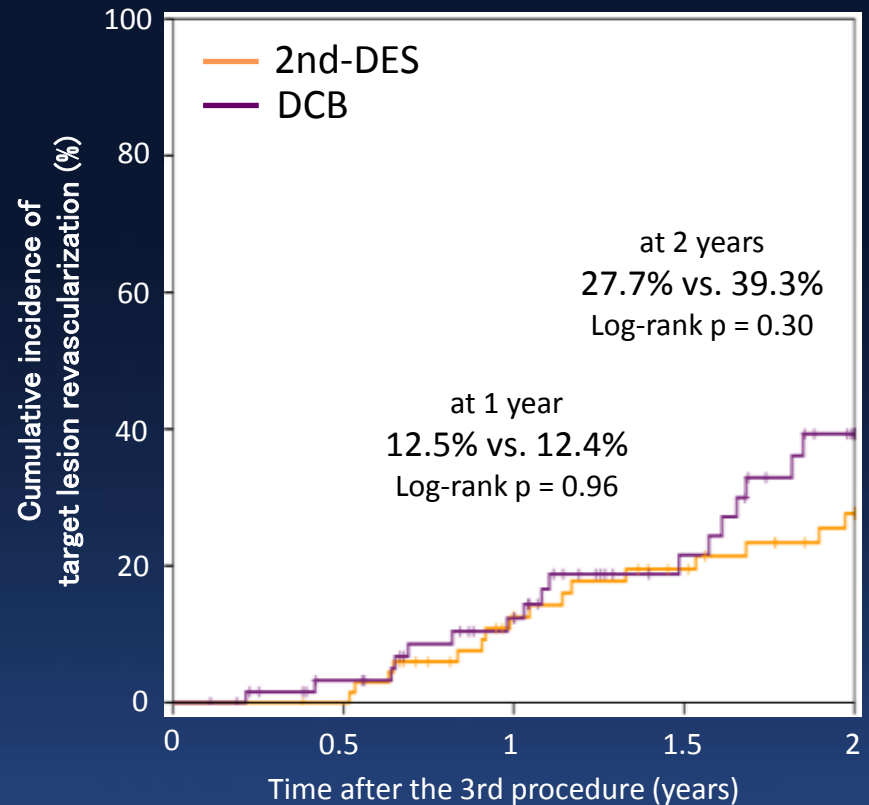
Recurrent DES-ISR: DCB vs. G2 DES

A. MACE (Overall)



Number at risk					
	0	0.5	1	1.5	2
2nd-DES	68	67	51	43	33
DCB	66	57	45	27	13

B. TLR (Overall)



Number at risk					
	0	0.5	1	1.5	2
2nd-DES	68	67	51	43	33
DCB	66	57	45	28	14

Bifurcation ISR: DCB vs. G2 DES

Drug-eluting balloon versus second-generation drug-eluting stent for the treatment of restenotic lesions involving coronary bifurcations

Toru Naganuma^{1,2}, MD; Azeem Latib^{1,2*}, MD; Charis Costopoulos^{1,2}, MD; Jacopo Oreglia³, MD; Luca Testa⁴, MD; Federico De Marco³, MD; Alessandro Candreva¹, MD; Alaide Chieffo¹, MD; Charbel Naim¹, MD; Matteo Montorfano¹, MD; Francesco Bedogni⁴, MD; Antonio Colombo^{1,2}, MD

**ISR Involving Bifurcation Lesions
(167 Bifurcation Restenosis in 158 Patients)**

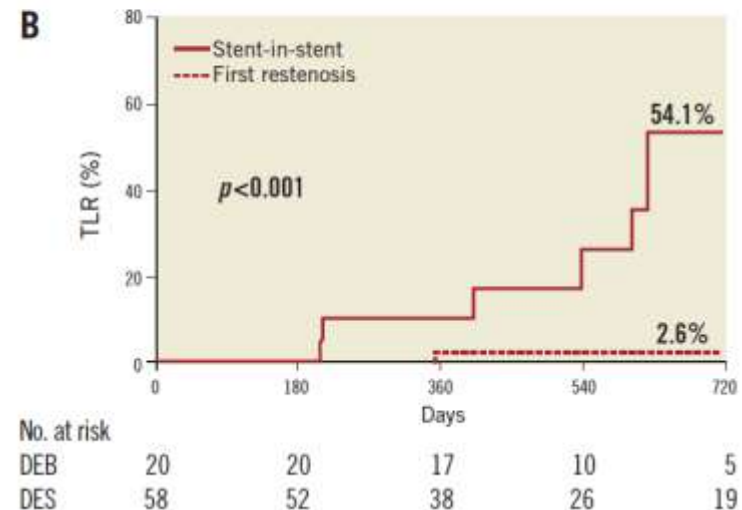
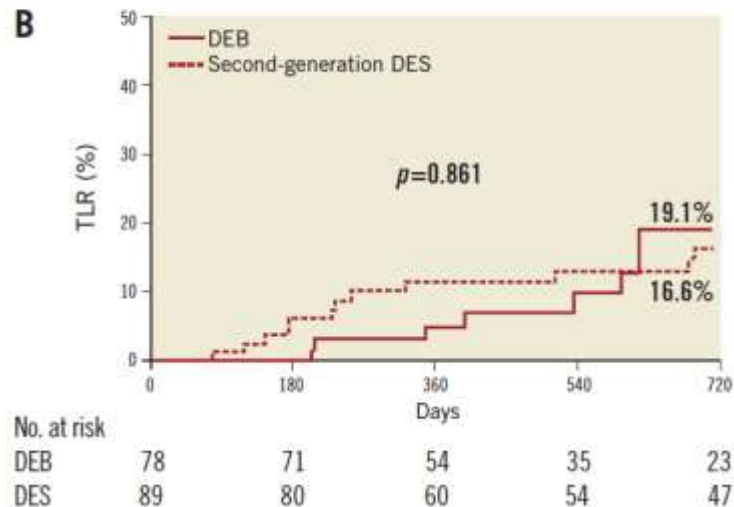
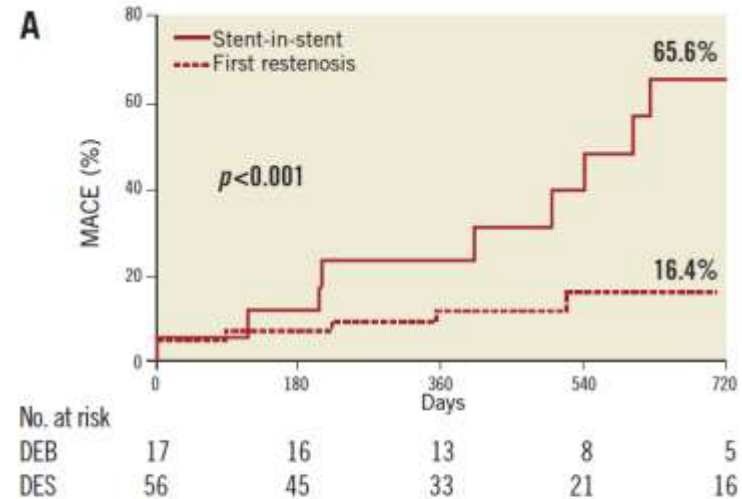
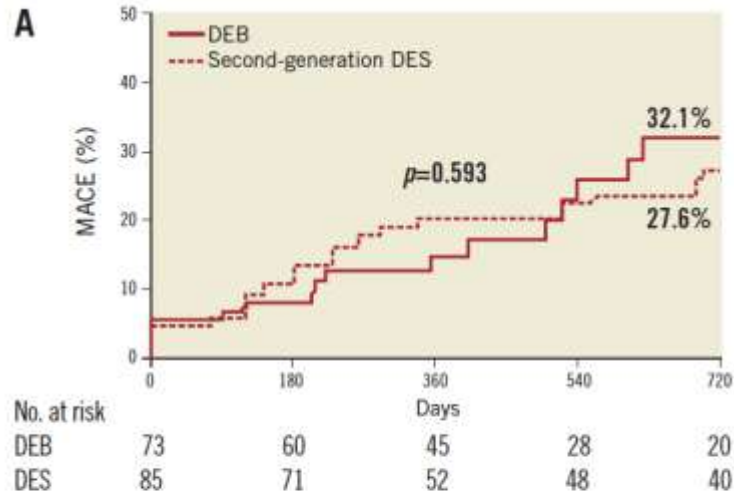
IN.PACT Falcon
(Medtronic, Inc., Santa Rosa, California)
(78 bifurcations in 73 patients)

DEB was used either on the main-branch and/or side-branch

Second Generation DES
(Xience Prime™ and Xience V® (Abbott Vascular, Santa Clara, CA), Promus™ and Promus Element (Boston Scientific Corp., Natick, MA) and Endeavor® Resolute (Medtronic, Santa Rosa, CA))
(89 Bifurcations in 85 Patients)

Naganuma T, Latib A, et al. EuroIntervention 2014

Bifurcation ISR: DCB vs. G2 DES



Naganuma T, Latib A, et al. EuroIntervention 2014

2014 ESC/EACTS

Guidelines on Myocardial Revascularization

Management of Restenosis

Repeat PCI is recommended, if technically feasible.	I	C
DES are recommended for the treatment of in-stent re-stenosis (within BMS or DES).	I	A
Drug-coated balloons are recommended for the treatment of in-stent restenosis (within BMS or DES).	I	A
IVUS and/or OCT should be considered to detect stent-related mechanical problems.	IIa	C

Windecker et al. Euro Heart J 2014

Conclusions

- Both DCB and G2 DES are safe and effective treatments for the management of ISR
- The marginally higher anti-restenotic efficacy of G2-DES must be weighed against the long-term implications of additional stent layers and DATP use
- In the first episode of DES-ISR:
 - G2-DES appear to be superior (vs. DCB)
 - However DCB must be consider first if: ISR is focal, stent under-expansion is a contributing factor or if there are contraindications to longer DATP therapy
- In recalcitrant DES-ISR situations:
 - G2-DES appear to have better long-term outcomes
 - Consider combination therapy (DCB+DES)
- Bifurcation DES-ISR:
 - DCB first to prevent excess metal at the carina