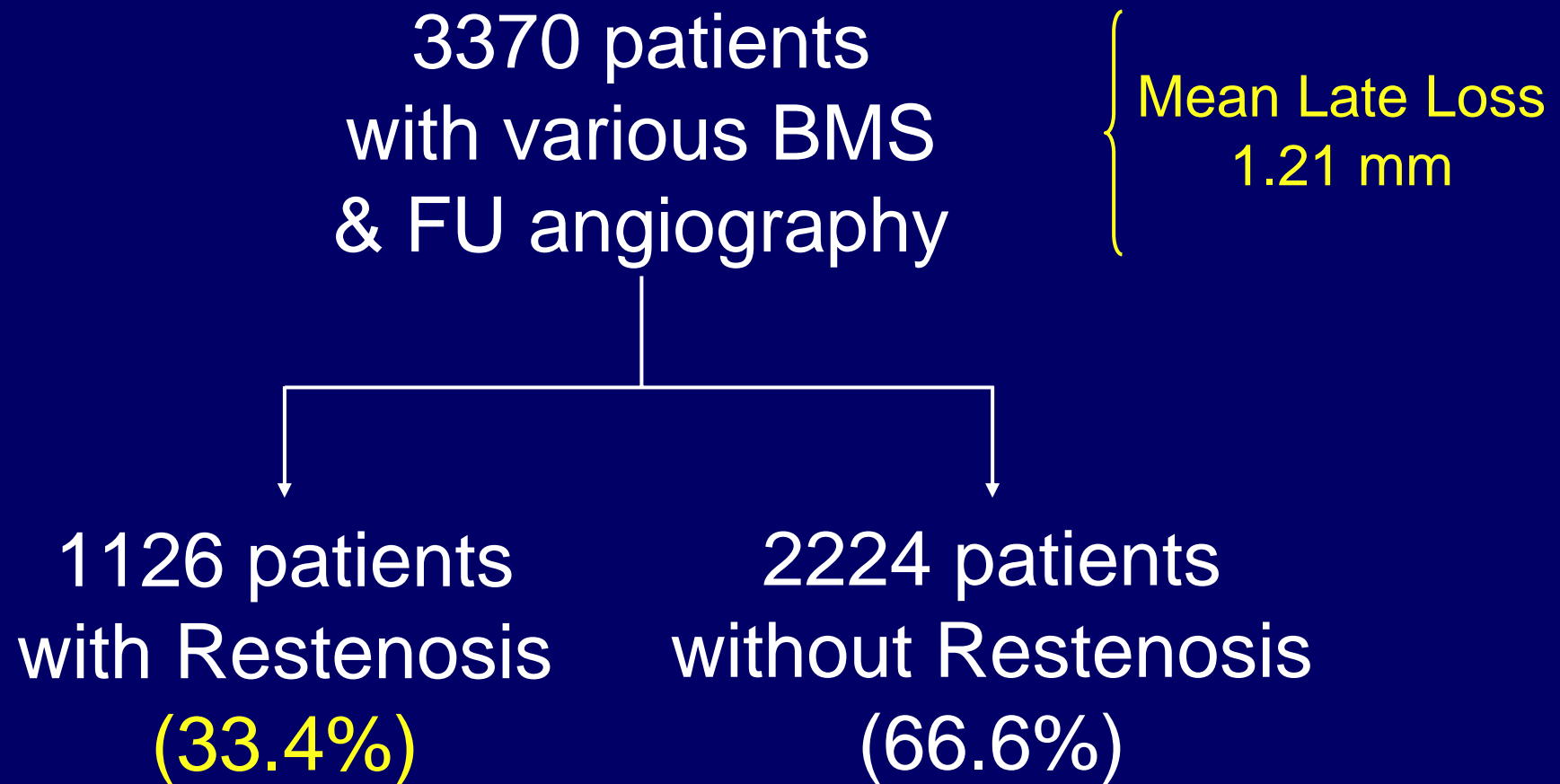# Predictors of DES Restenosis: Results from a Large Database

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Restenosis in the BMS Era

3370 patients
with various BMS
& FU angiography

Mean Late Loss
1.21 mm

1126 patients
with Restenosis
(33.4%)

2224 patients
without Restenosis
(66.6%)

Kastrati et al, AJC 2001

Independent Factors of Restenosis in the BMS Era

	Restenosis Rate (%)		Multivariate Analysis		
	Factor Present	Factor Absent	Chi Square*	p Value	Adjusted Odds Ratio (95% CI)
Clinical variables					
Diabetes	41.6	32.0	16	0.0001	1.43 (1.20–1.70)
Arterial hypertension	35.4	30.7	7	0.0090	1.21 (1.05–1.39)
Lesion variables					
Complex lesions (B2/C)	36.0	27.5	14	0.0002	1.39 (1.17–1.65)
Chronic occlusions	48.2	33.0	5	0.0208	1.43 (1.06–1.94)
Restenotic lesions	39.1	32.3	14	0.0002	1.35 (1.15–1.57)
Lesion length >10 mm	36.1	31.6	5	0.0260	1.11 (1.01–1.21)
Vessel size <3 mm	40.7	27.0	84	<0.0001	1.79 (1.59–2.04)
Diameter stenosis before intervention >78%	38.4	29.3	12	0.0005	1.22 (1.09–1.36)
Procedural variables					
Stented segment length >15 mm	39.6	29.0	29	<0.0001	1.20 (1.12–1.28)
Stent type			61	<0.0001	
MULTI-LINK	20.0	-			1
JOSTENT	25.8	-			1.26 (0.72–2.20)
Palmaz-Schatz	29.0	-			1.66 (1.11–2.48)
PURA-A	30.9	-			1.72 (1.12–2.64)
Inflow steel	37.3	-			1.98 (1.30–3.02)
NIR	37.8	-			2.07 (1.31–3.27)
Inflow gold	50.3	-			3.35 (2.20–5.10)

Kastrati et al, AJC 2001

Restenosis in the DES Era DHZ&RdI Database

2119 patients with Cypher or Taxus & FU angiography

Age	66±10 years
Women	21%
Diabetics	27%
Multivessel disease	84%
History of CABG	11%
History of MI	37%
Complex lesion (B2/C)	75%
Cypher	56%
Taxus	44%

Circ 2006, JACC 2006

Restenosis in the DES Era

2119 patients
with Cypher or Taxus
& FU angiography

Mean Late Loss
0.34 mm

295 patients
with Restenosis
(13.9%)

1824 patients
without Restenosis
(86.1%)
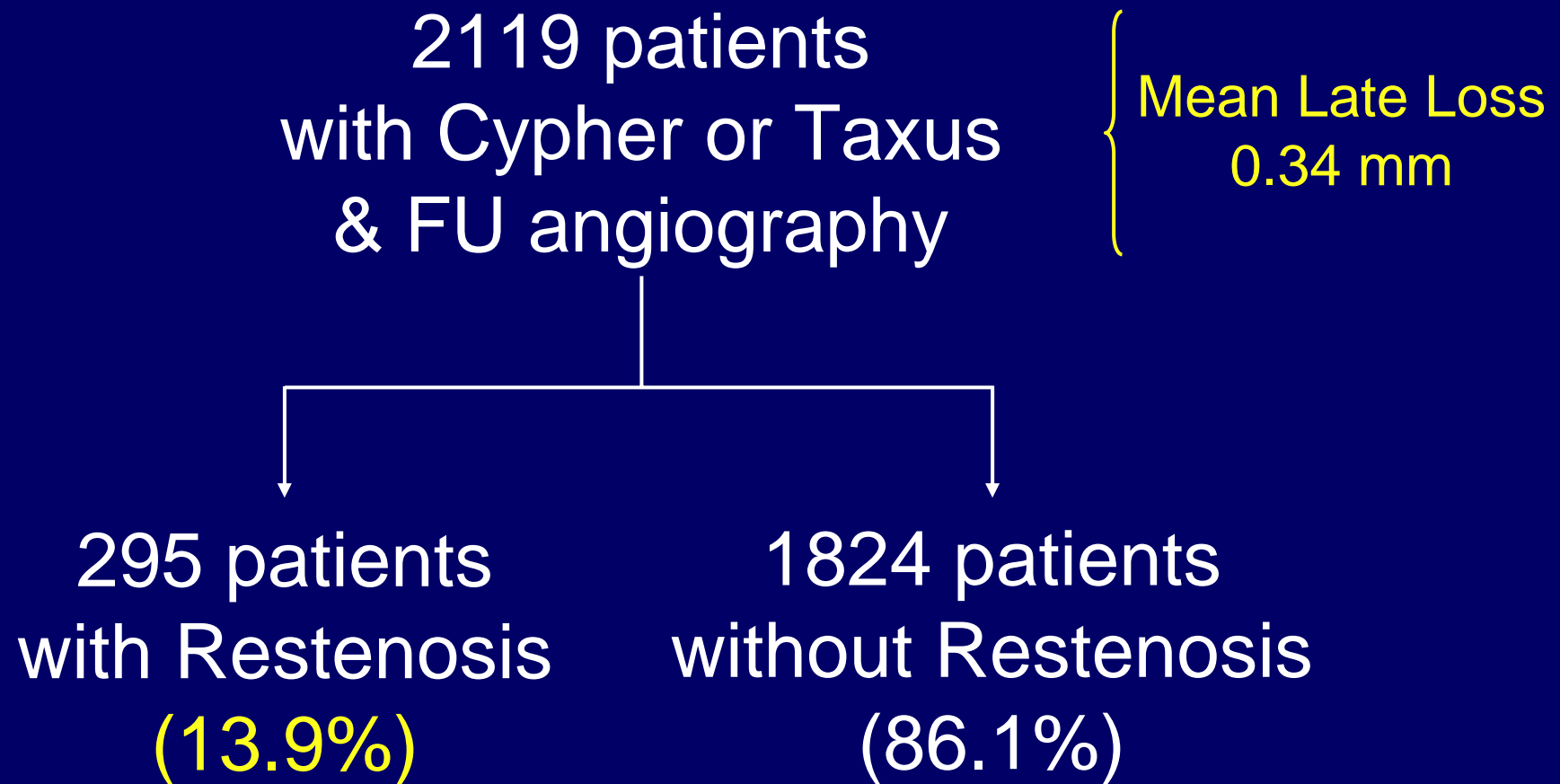
Are All Old Factors of the BMS Era Still Relevant?

Diabetes

Angiographic Restenosis

P=.32

	With Diabetes	Without Diabetes
%	15.2	13.5
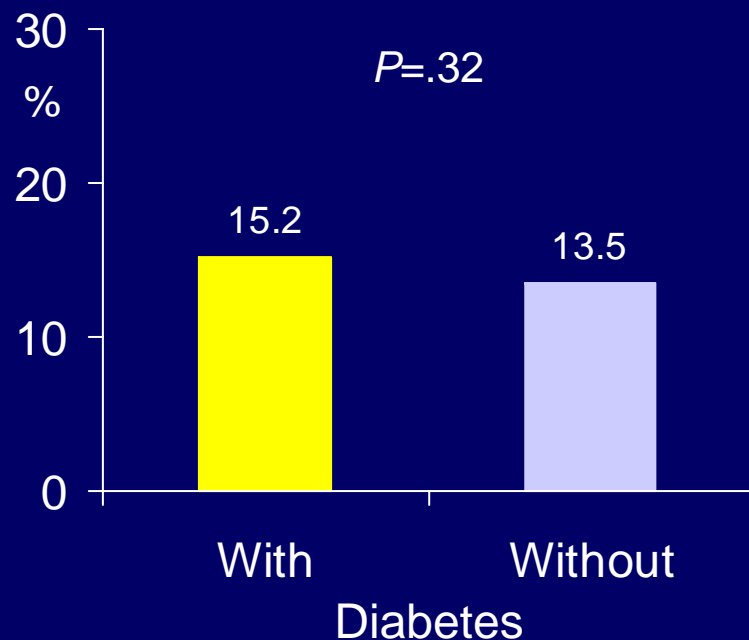
Arterial Hypertension

Angiographic Restenosis

P=.23

	With Hypertension	Without Hypertension
%	14.7	12.9
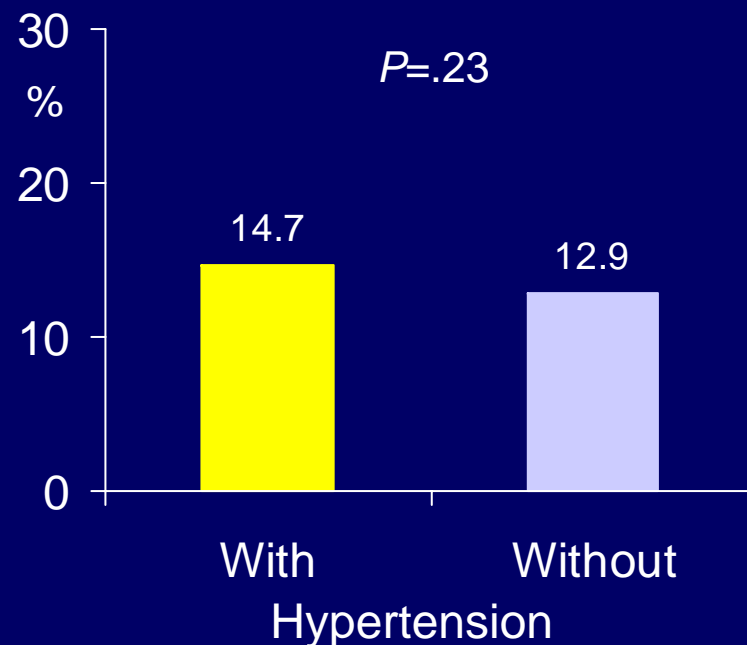
Are All Old Factors of the BMS Era Still Relevant?

Lesion Complexity

Angiographic Restenosis

P=.006

- Complex: 15.1
- Noncomplex Lesions: 10.3
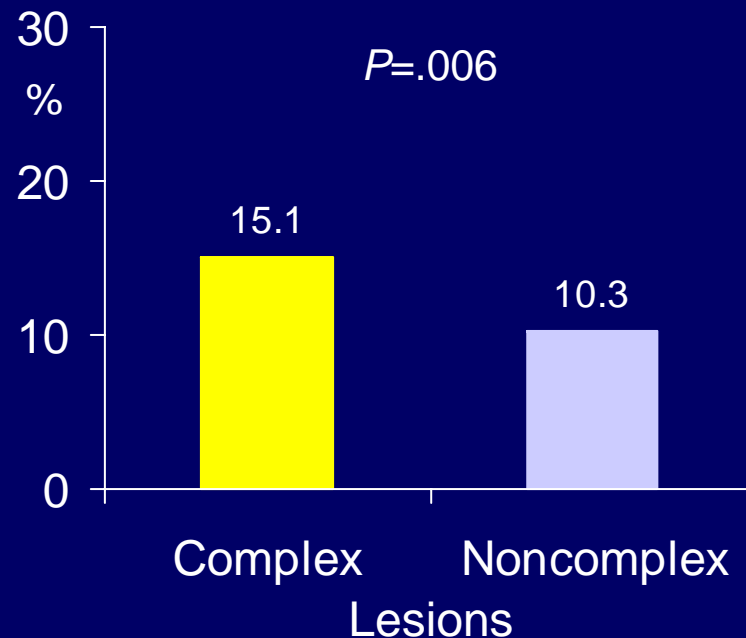
Chronic Occlusions

Angiographic Restenosis

P=.0001

- Occlusion: 24.2
- No Occlusion: 13.1
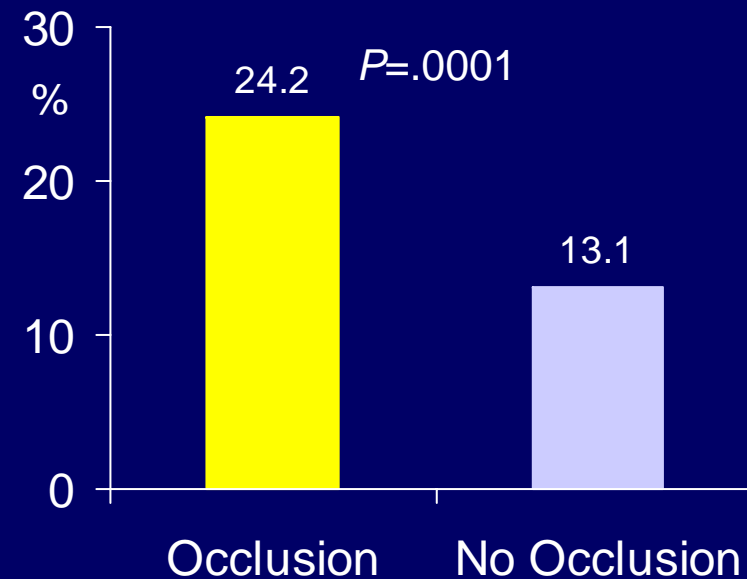
Are All Old Factors of the BMS Era Still Relevant?

Restenotic Lesion

Angiographic Restenosis

$P=.018$

- Restenotic Lesion: 16.5
- De Novo: 12.7

(Y-axis: %, 0, 10, 20, 30)
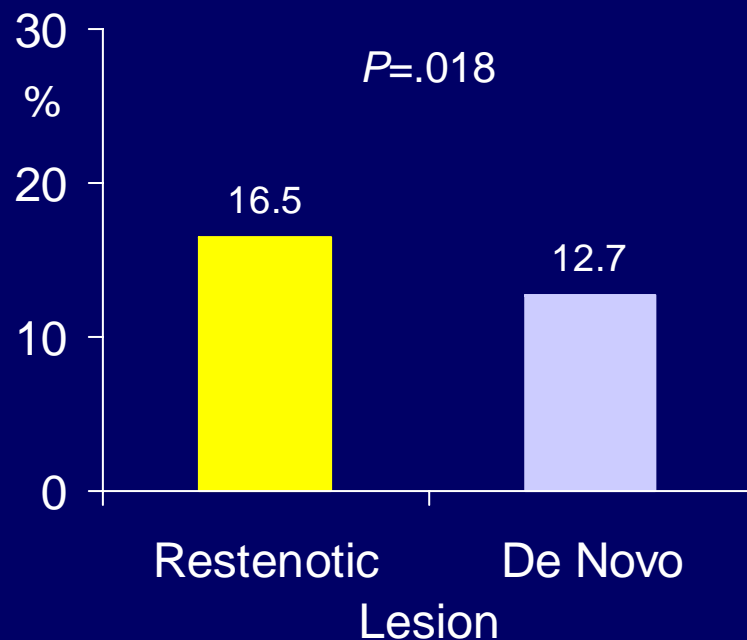
Lesion Length

Angiographic Restenosis
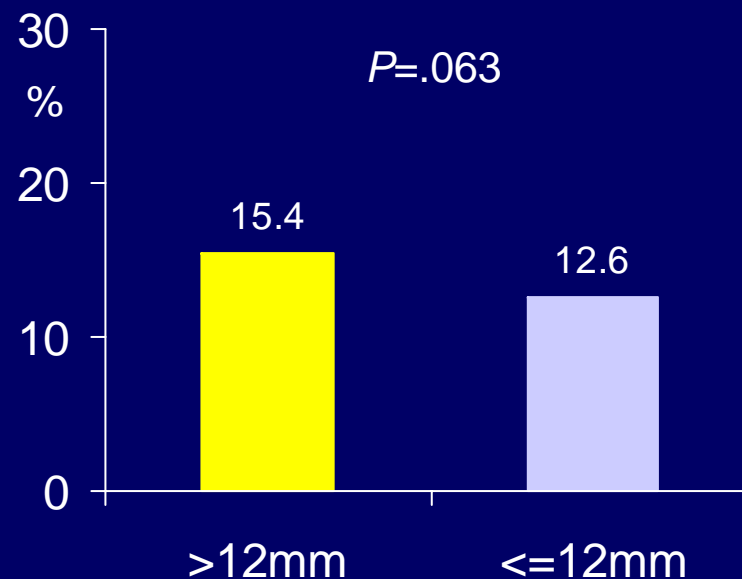
$P=.063$

- >12mm: 15.4
- <=12mm: 12.6

(Y-axis: %, 0, 10, 20, 30)
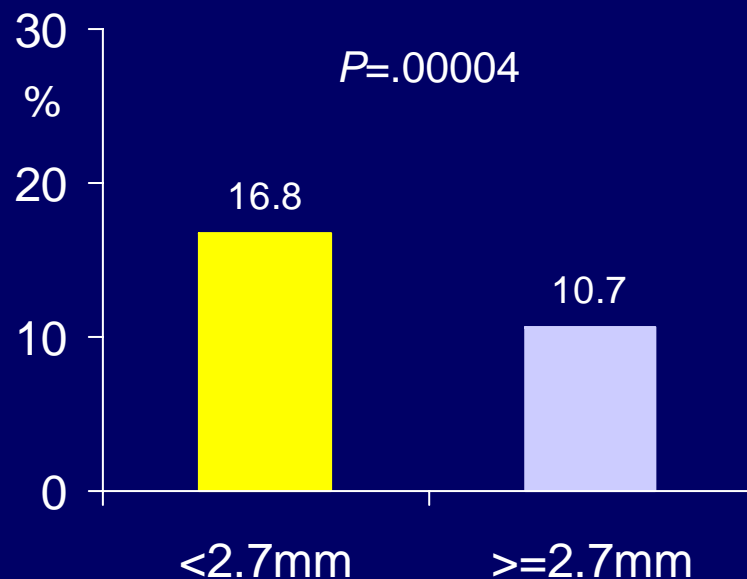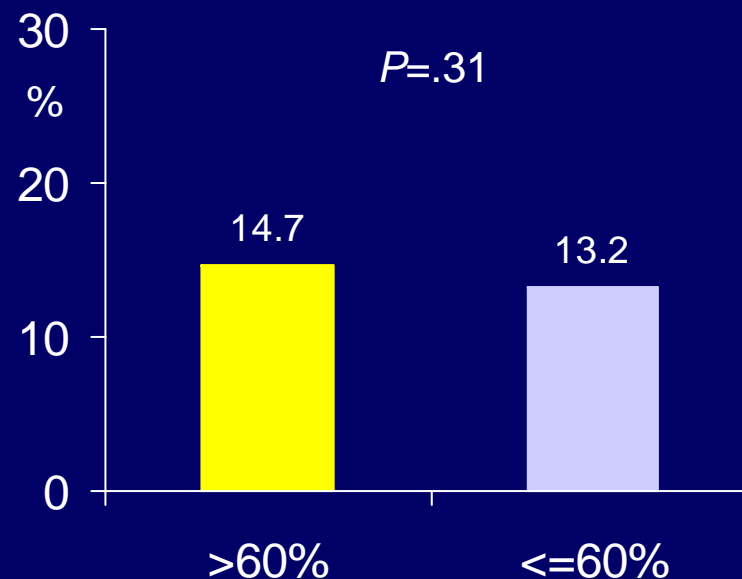
Are All Old Factors of the BMS Era Still Relevant?

Stented Length

Angiographic Restenosis

P=.004

- 16.1 (>20mm)
- 11.8 (<=20mm)

%: 0, 10, 20, 30

>20mm   <=20mm
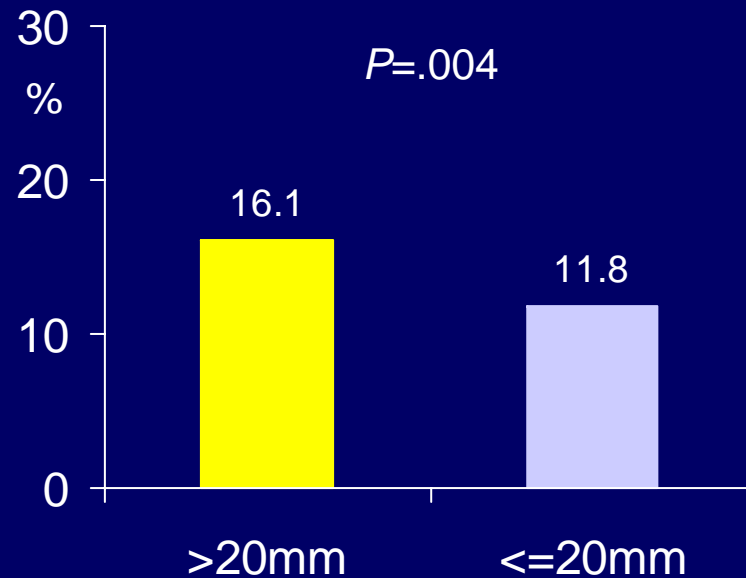
Stent Type

Angiographic Restenosis

P=.02

- 12.4 (Cypher)
- 15.9 (Taxus)

%: 0, 10, 20, 30

Cypher   Taxus
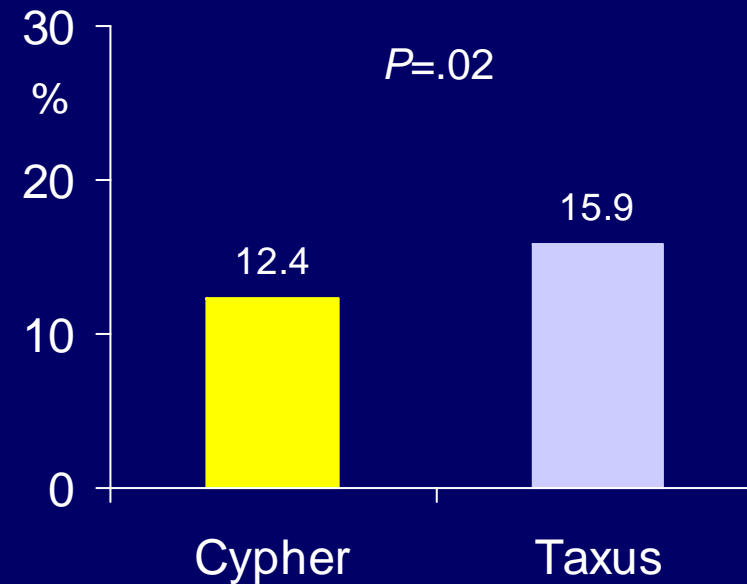
Independent Factors of Restenosis in the DES Era

Factor	P value	OR [95% CI]
Clinical variables		
Diabetes	.75	
Arterial Hypertension	.39	
Lesion Variables		
Complex lesions (B2/C)	.06	
Chronic occlusions	.006	1.81 [1.18-2.77]
Restenotic Lesion	.16	
Lesion length >12mm	.20	
Vessel size < 2.7mm	.001	1.61 [1.20-2.16]
Initial diameter stenosis >60%	.34	
Procedural variables		
Stented length >20mm	.08	
DES type (Cypher)	.01	0.72 [0.56-0.93]

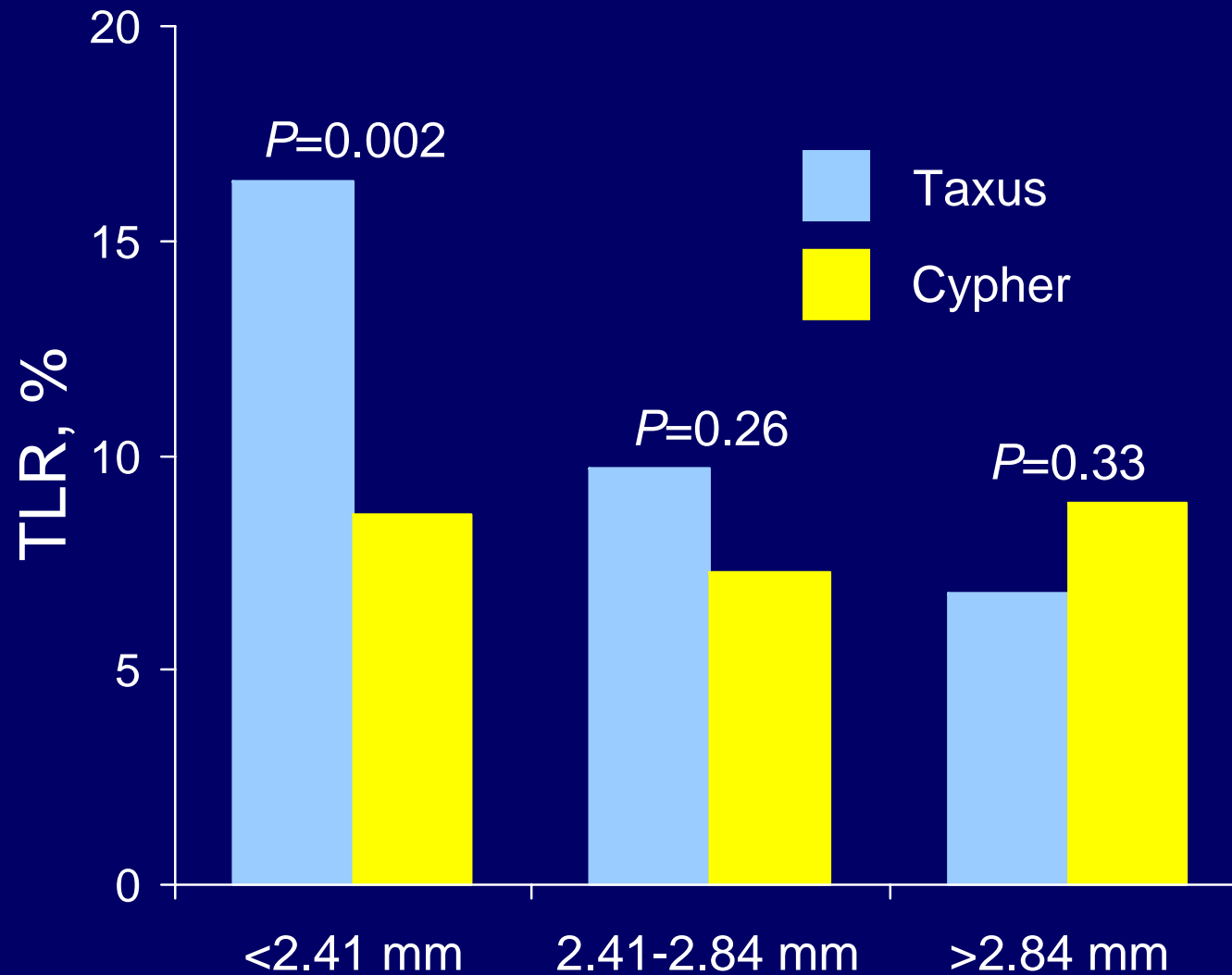# Is There An Interaction Between Risk Factors and Type of DES ?

DES Type and Vessel Size

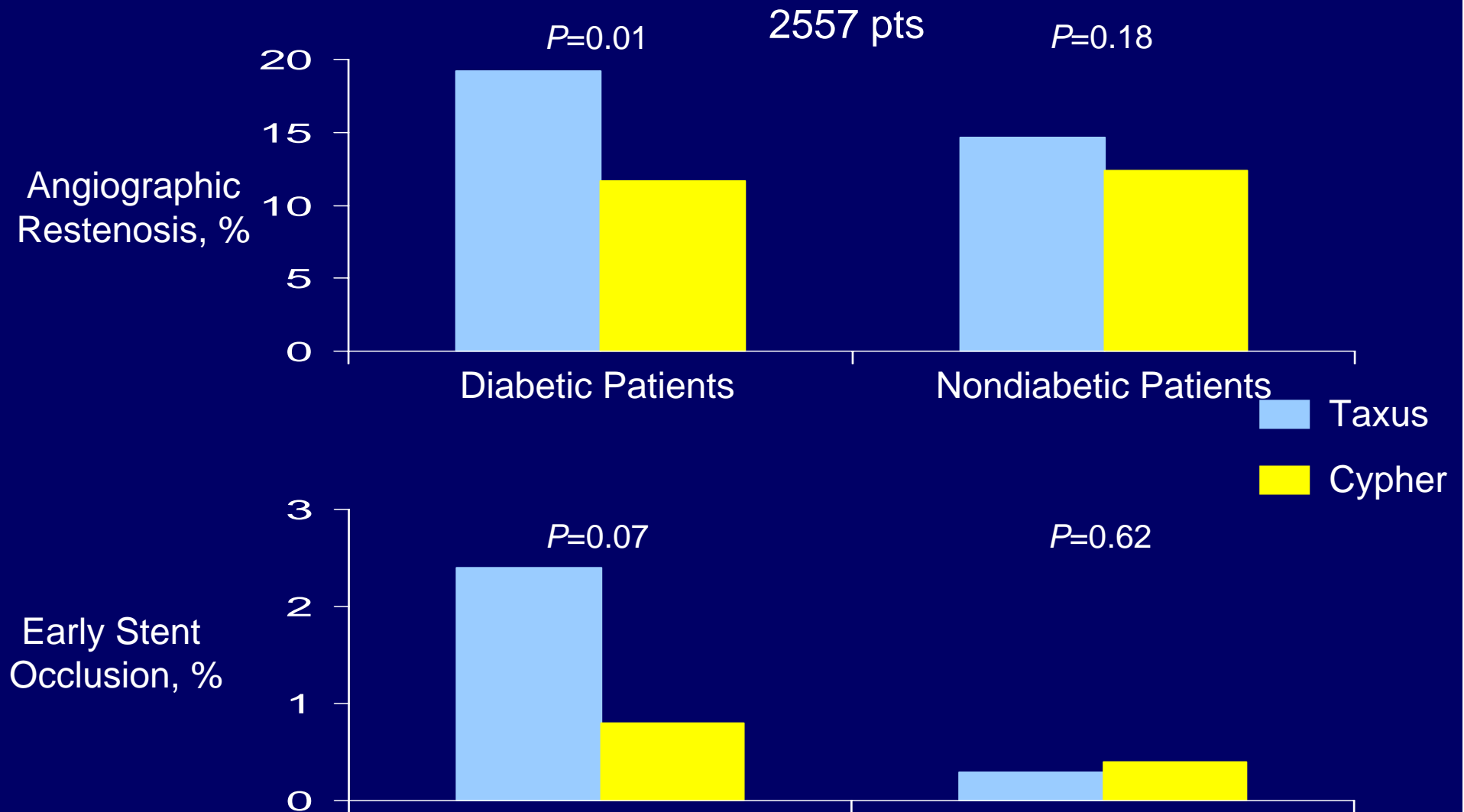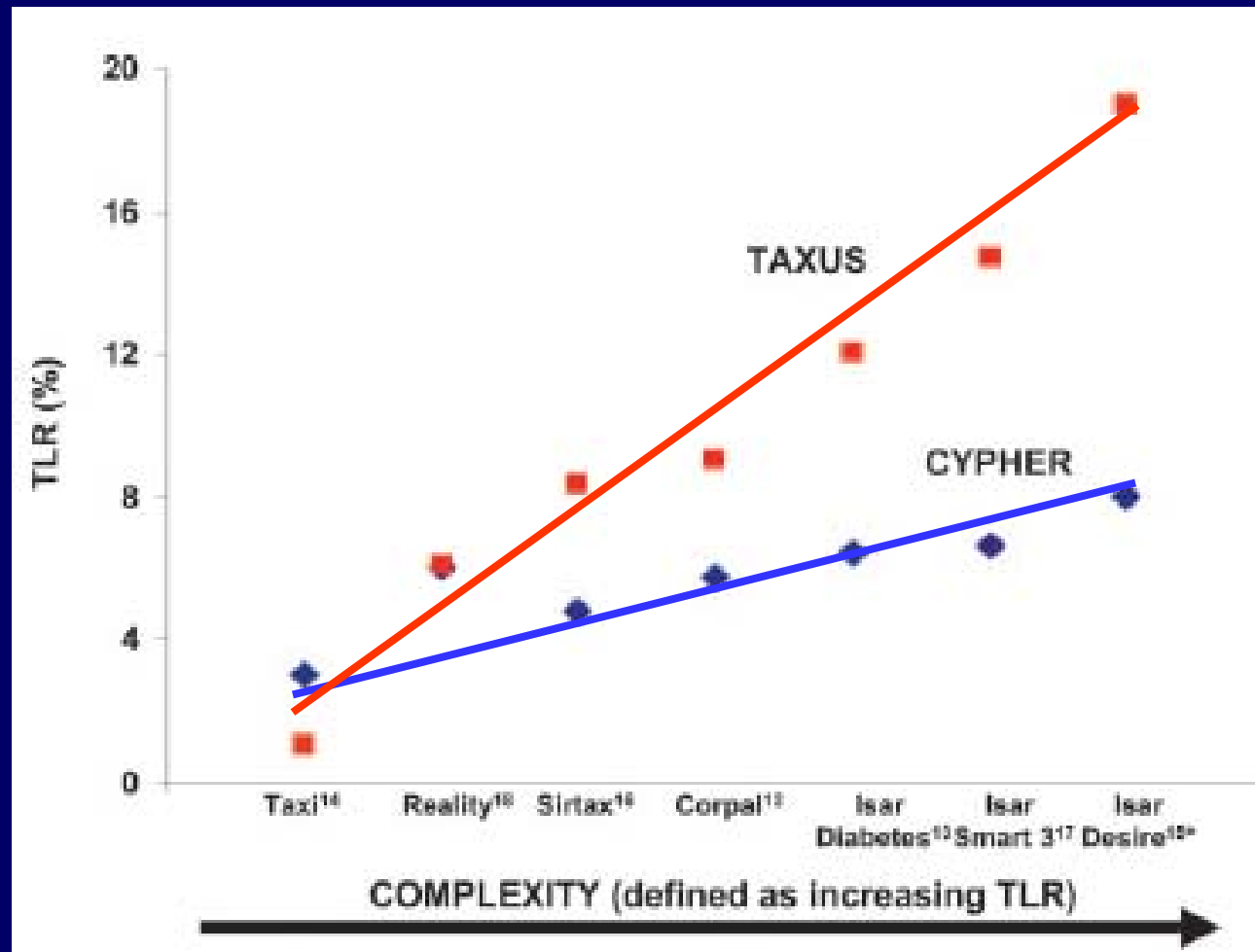*Kastrati et al, Circ 2006*

1845 patients

9.2% TLR

Vessel size ≥2.6 mm

Vessel size <2.6 mm

7.2%

11.3%

Cypher   Taxus

Cypher   Taxus

7.2%

7.2%

7.8%

15.6%

DES Type and Vessel Size

Elezi et al, JACC 2006

DES Type and Diabetes

2557 pts

Angiographic Restenosis, % (top chart, y-axis 0 to 20)
- Diabetic Patients: P=0.01
- Nondiabetic Patients: P=0.18

Early Stent Occlusion, % (bottom chart, y-axis 0 to 3)
- Diabetic Patients: P=0.07
- Nondiabetic Patients: P=0.62

Legend: Taxus (light blue), Cypher (yellow)
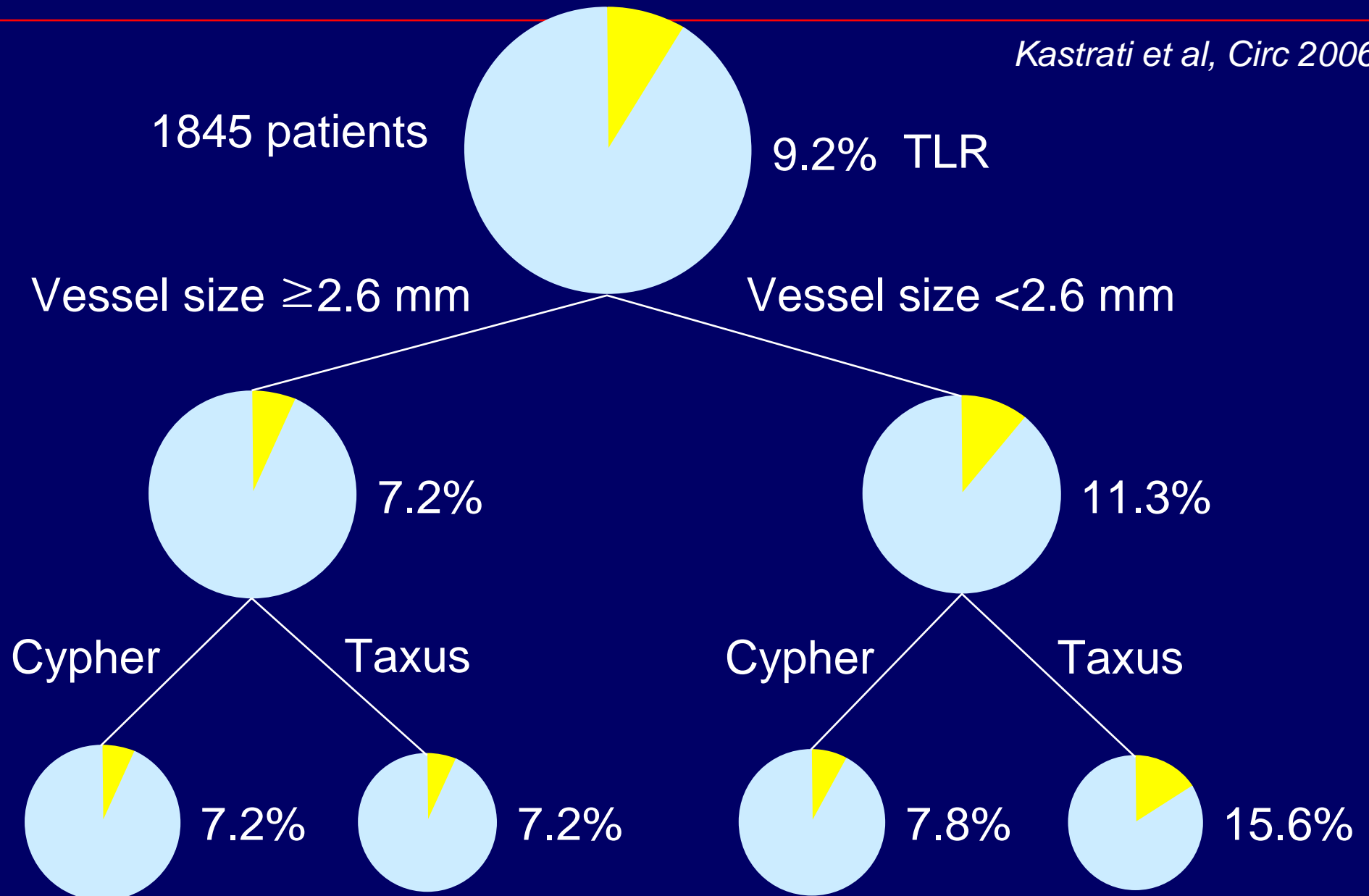
Case Complexity and Restenosis

Rogers&Edelman, Circ 2006

Conclusions, I

DES have reduced the impact of some traditional risk factors for restenosis, including diabetes.

Vessel size, chronic occlusion and stent type remain the most important independent predictive factors of restenosis in the DES era.

Conclusions, I

Characteristics that increase the risk of restenosis may make more evident differences in DES performance.

Development of new DES technologies should better target the safe reduction of restenosis in high-risk subsets.