PCI vs. CABG in Diabetic and Non-diabetic Patients with Multivessel or Left Main Disease

Not Over till Over, PCI Is Getting Better!

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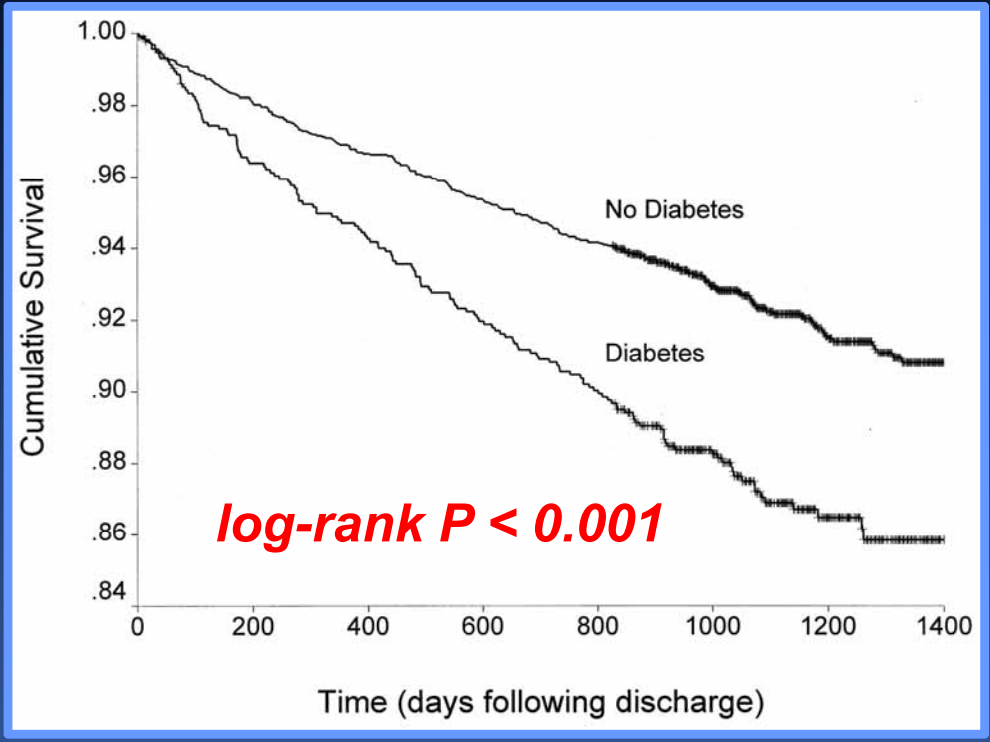
Disclosure Statement of Financial Interest

I, (Seung-Whan Lee) DO NOT have a financial interest/arrangement or affiliation with one or more organizations that could be perceived as a real or apparent conflict of interest in the context of the subject of this presentation.

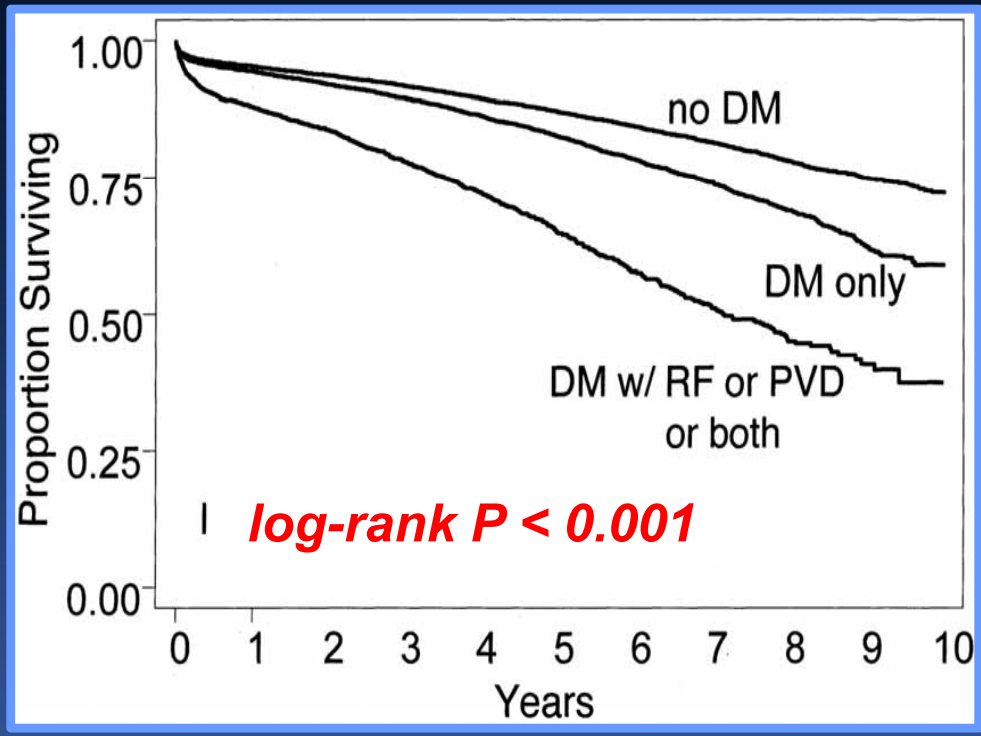
Diabetic Impact on PCI and CABG outcomes

Mortality after PCI



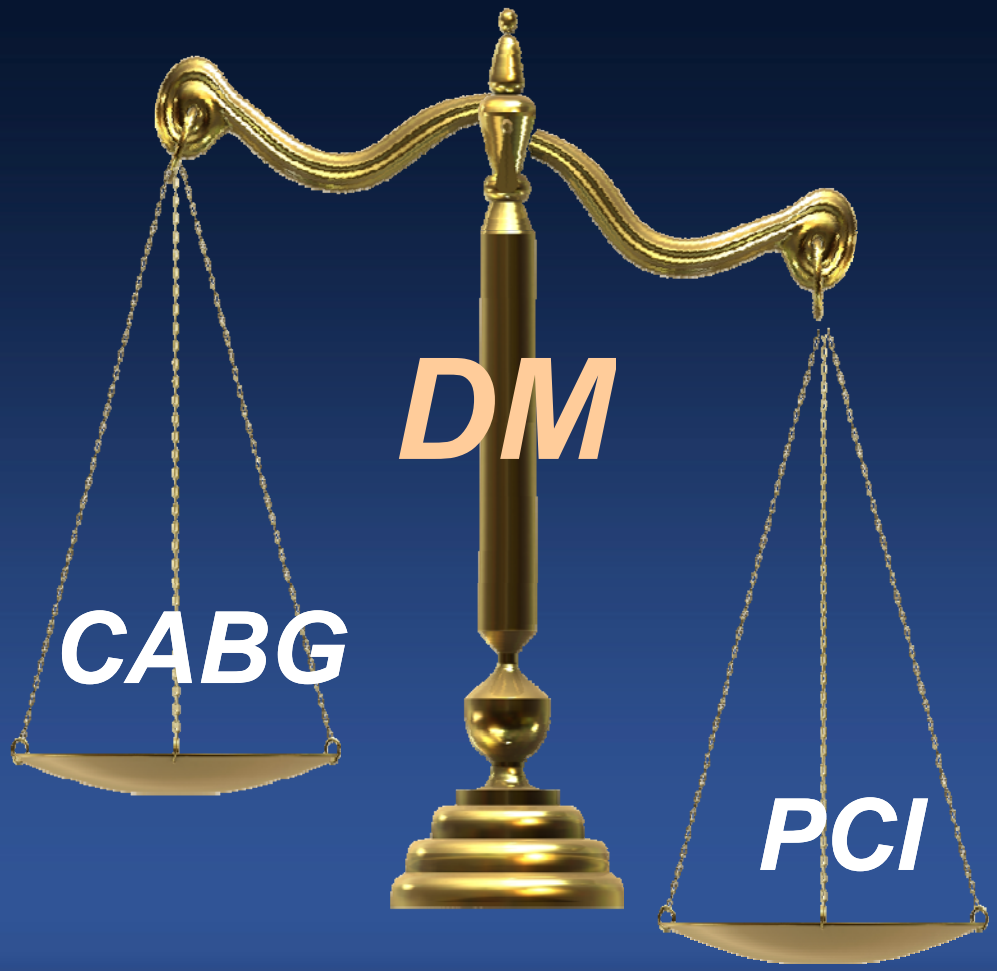
Wilson S R et al. Dia Care 2004;27:1137-1142

Mortality after CABG

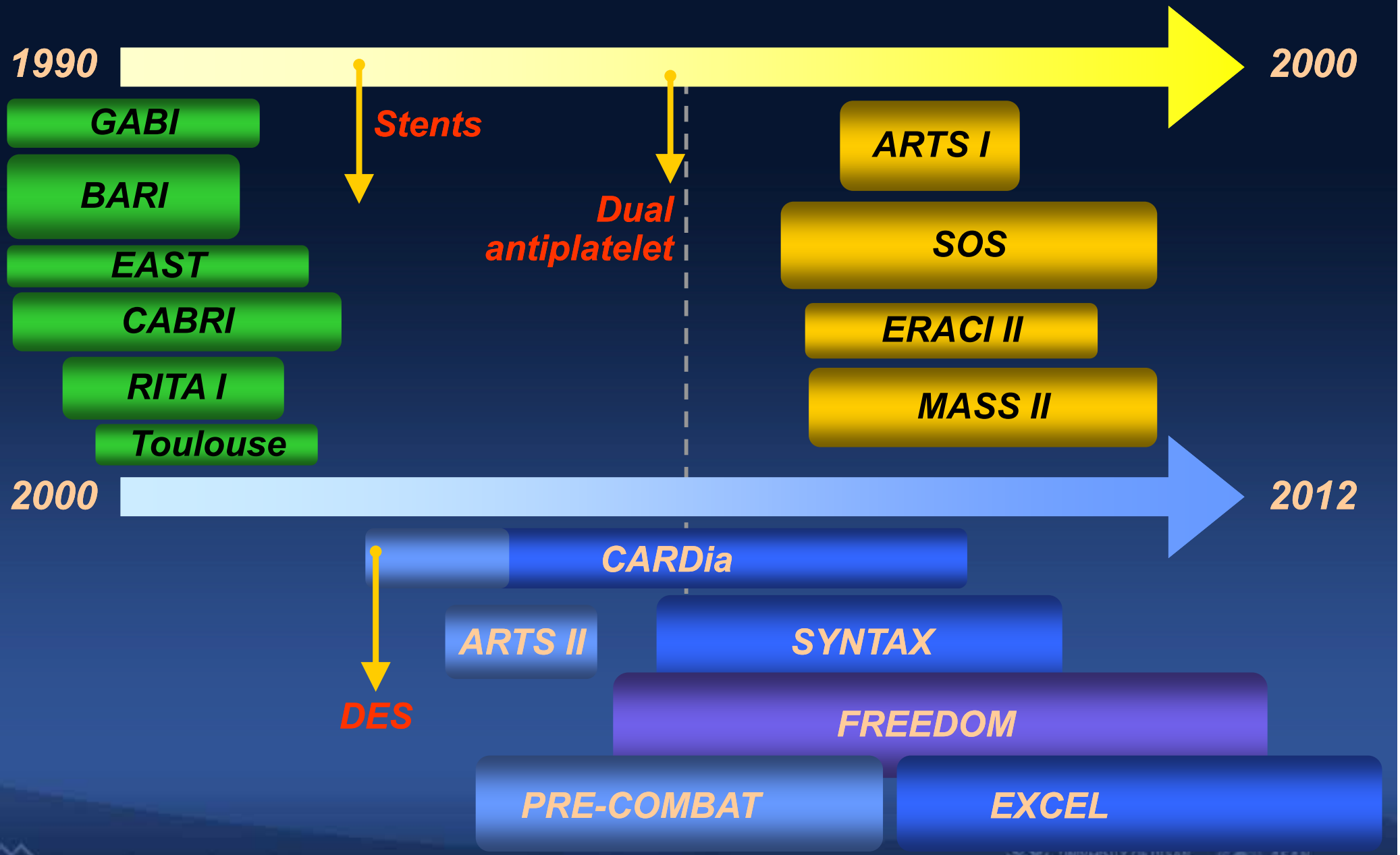


Leavitt BJ et al. Circulation 2004;110:II-41-44

DM Influence on Comparative Effectiveness & Choice of Treatment

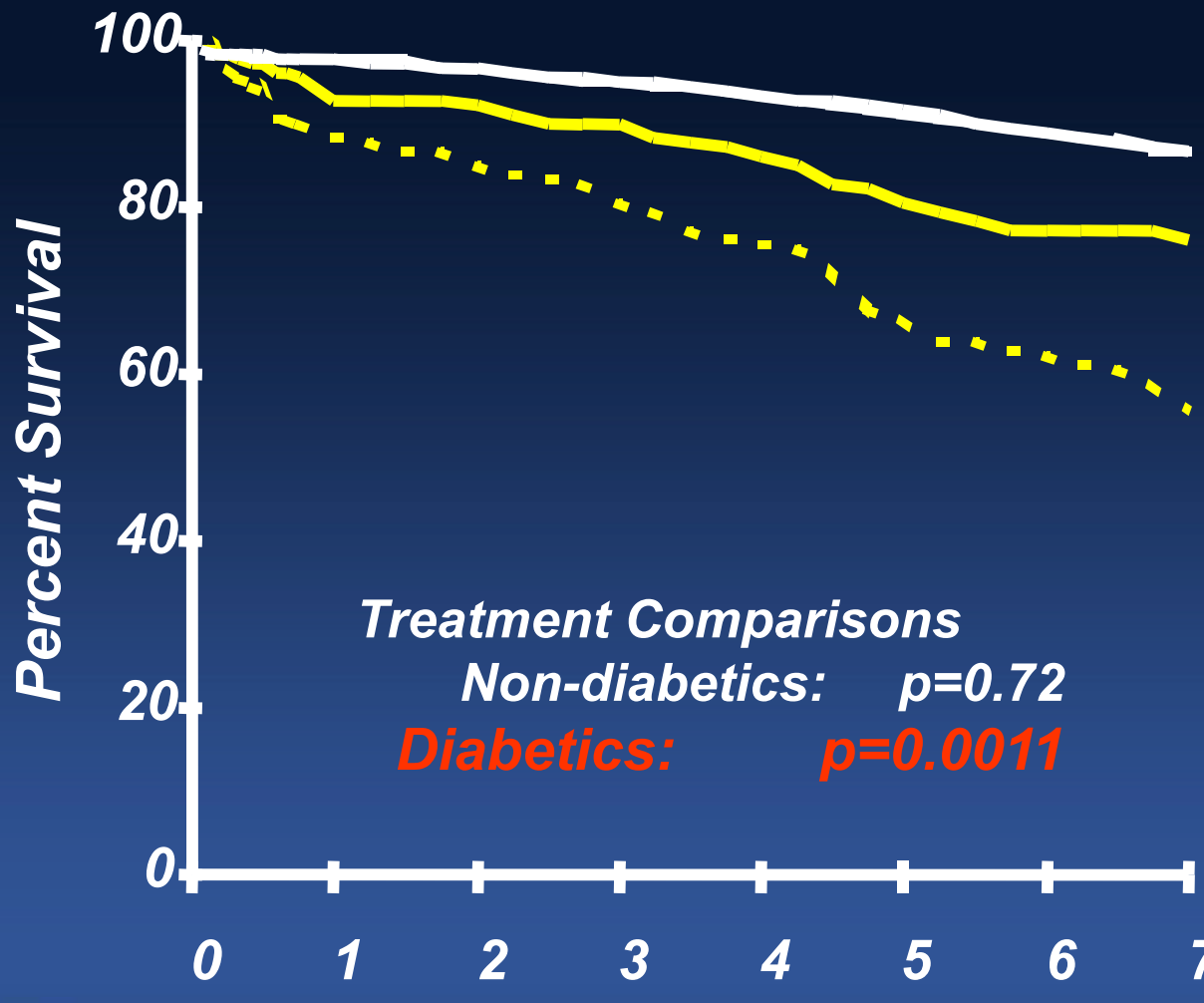


CABG vs. PCI Trials over time



BARI Trial

7-Year Results By Diabetic Status

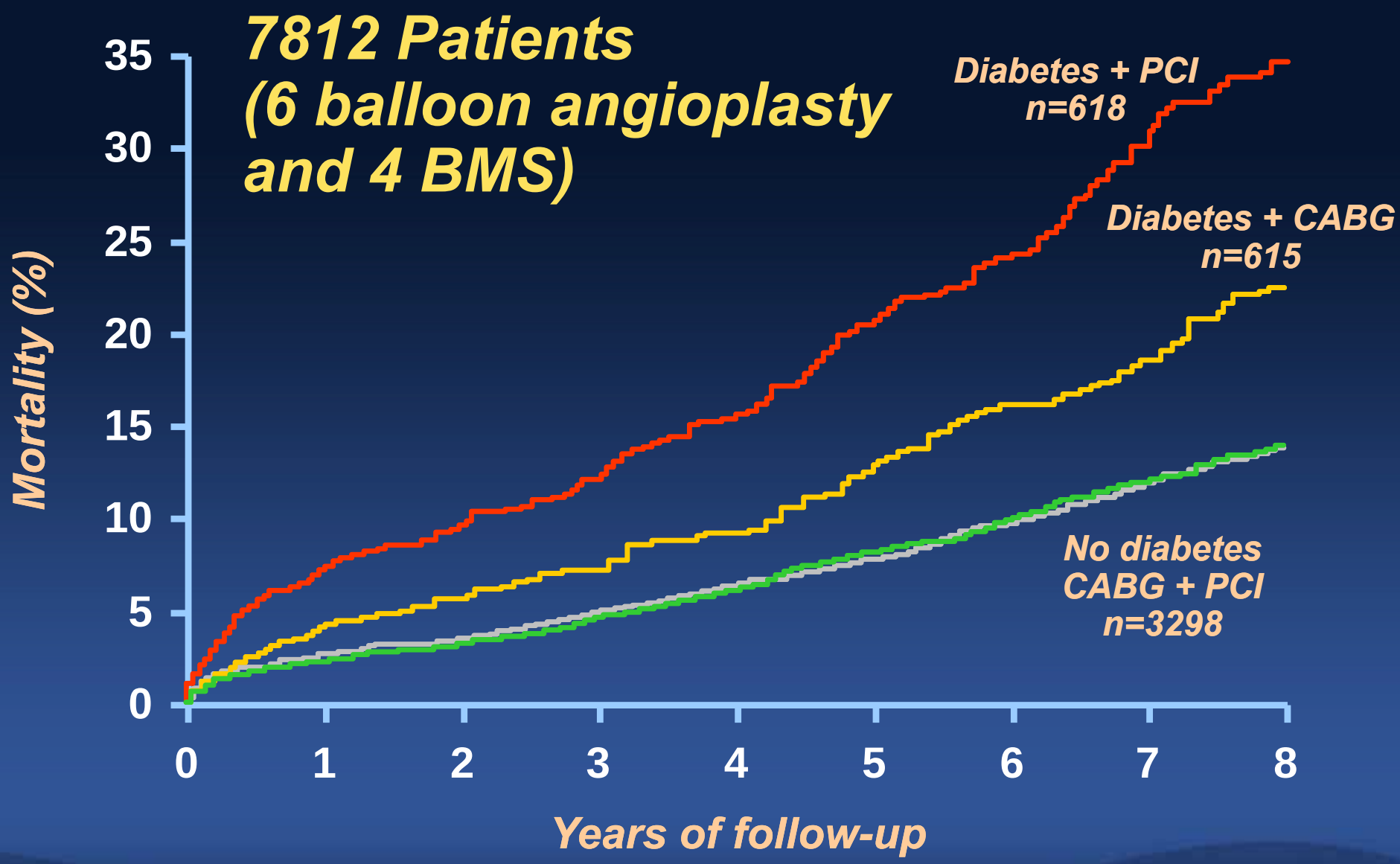


Non Diabetic PTCA 86.8%
Non Diabetic CABG 86.4%
Diabetic CABG 76.4%
Diabetic PTCA 55.7%

Treatment Comparisons
Non-diabetics: p=0.72
Diabetics: p=0.0011

The BARI Investigators. J Am Coll Cardiol. 2000;35:1122-9.

Pooled Analysis of 10 RCTs of CABG vs. PCI in Multivessel Disease

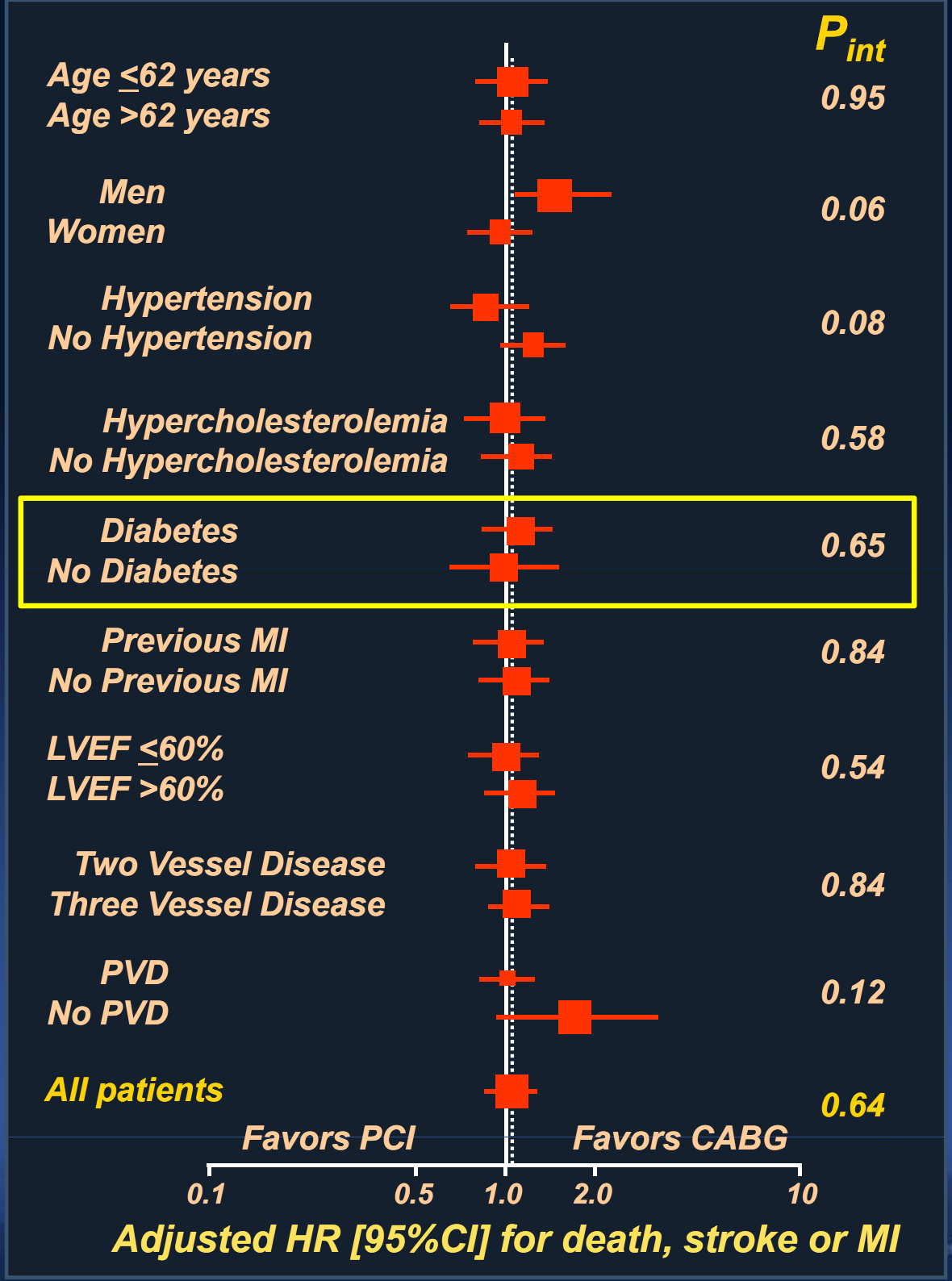


Hlatky ML et al. Lancet 2009;373:1190-7.

BMS vs. CABG

4 RCTs (n=3,051), 5-year follow-up

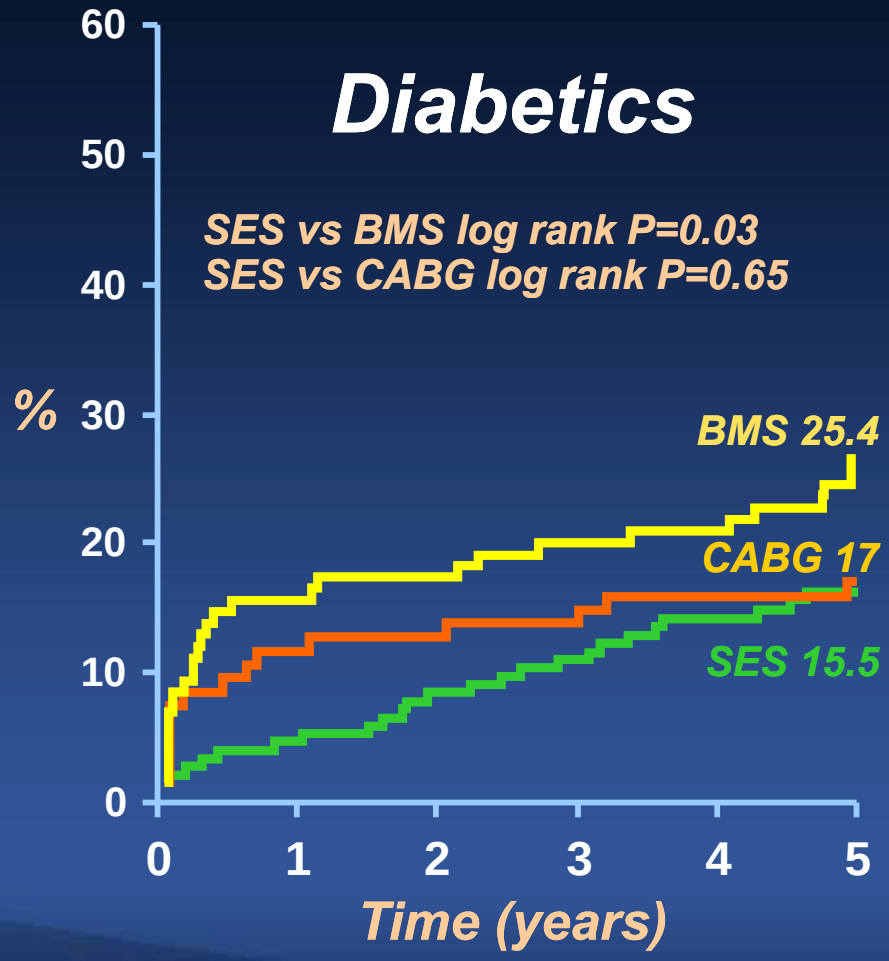
Death, stroke or MI

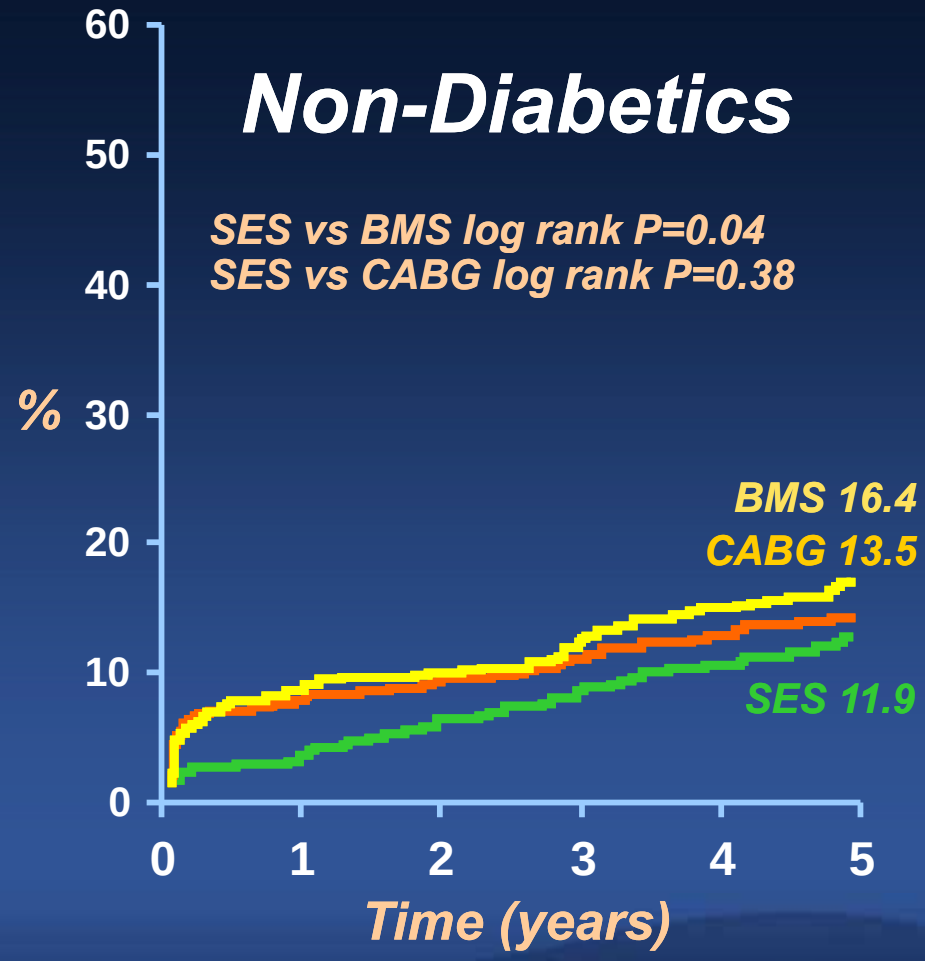


Daemon J et al.
Circulation 2008;118:1146-1154

Transition from BMS to DES

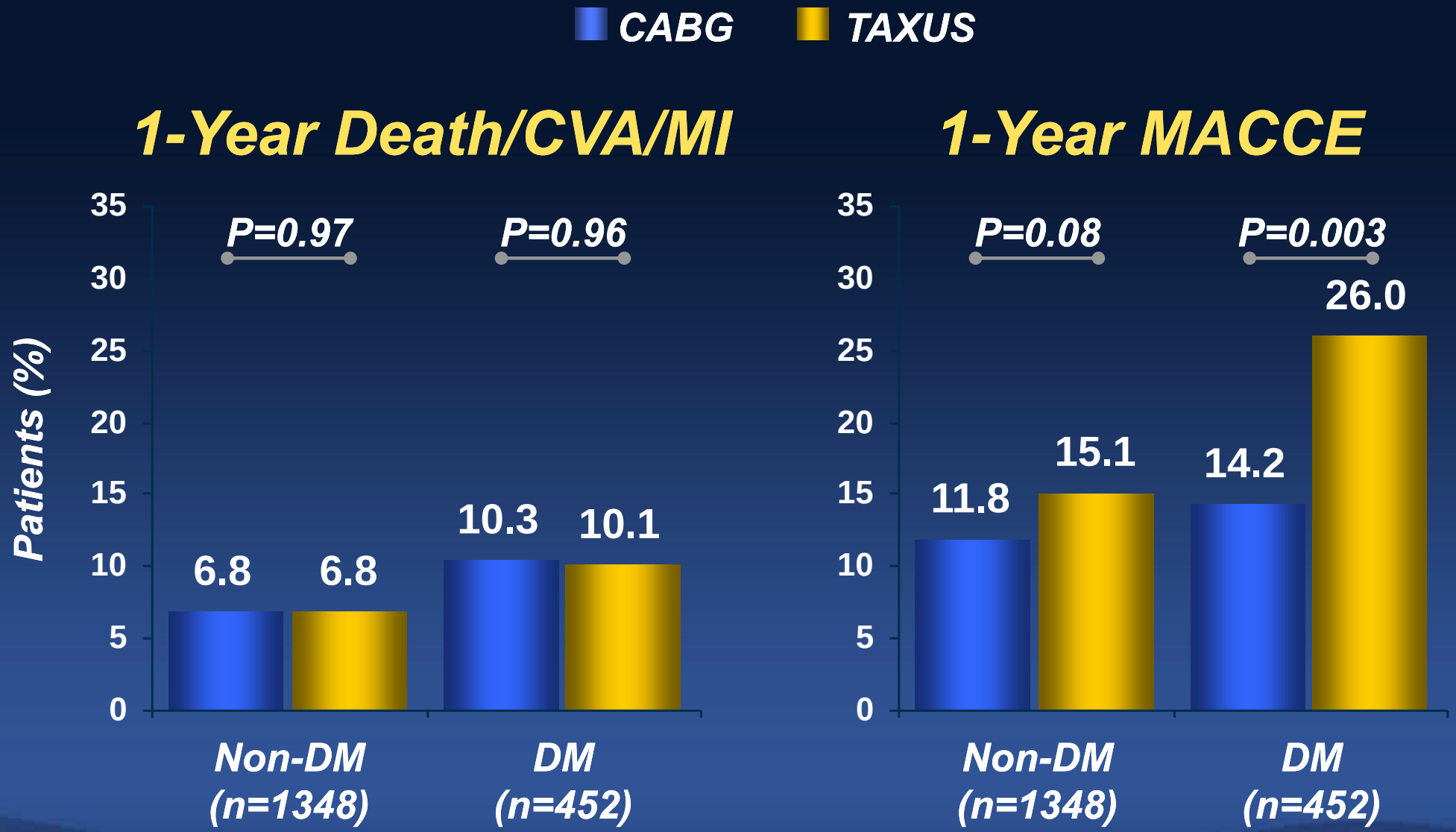
ARTS II; 367 diabetic patients
Hard endpoints (death, stroke, or MI)





Onuma Y: J Am Coll Cardiol Intv 4:317-23, 2011

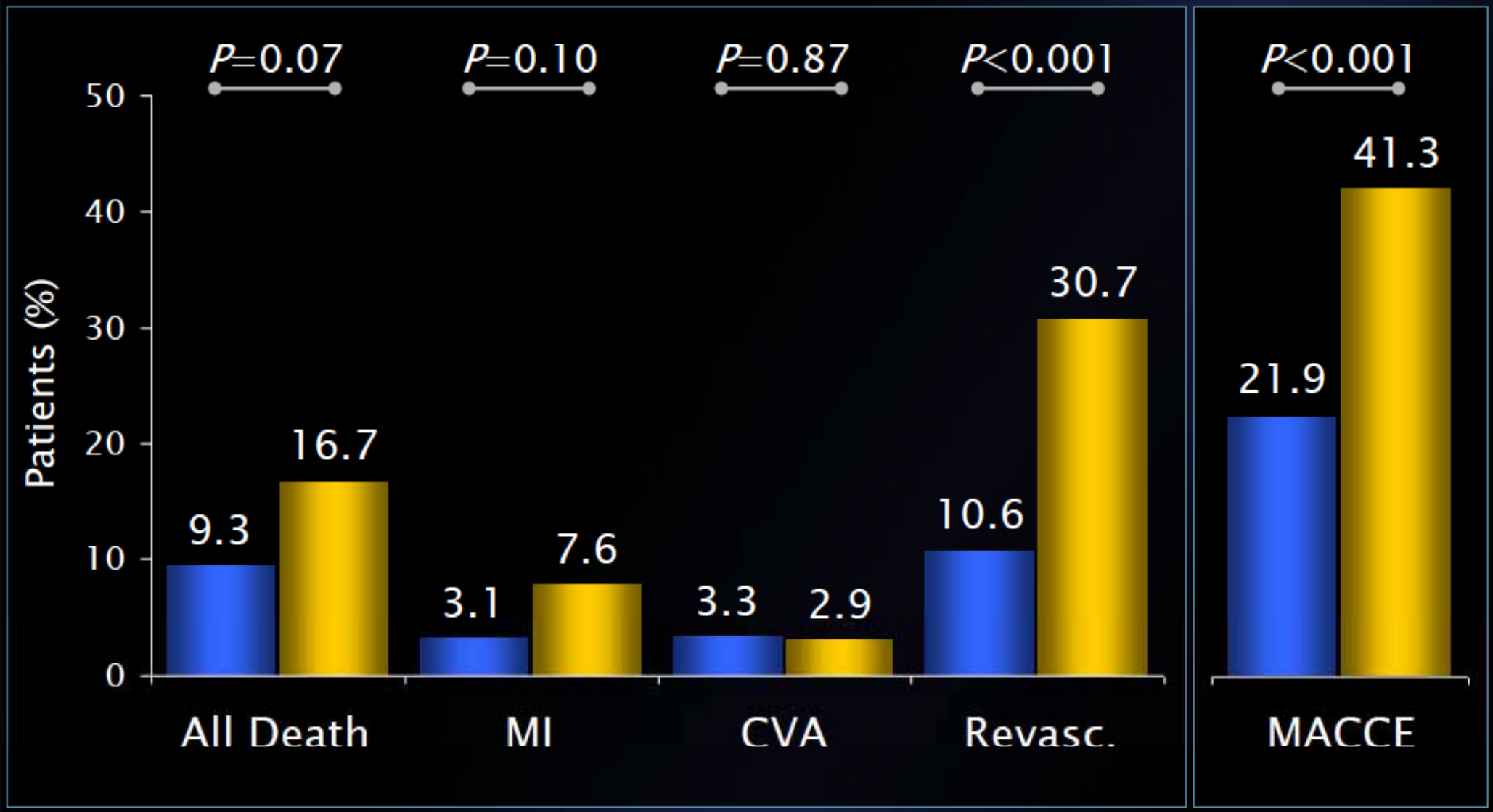
Subgroup Analysis of Diabetes in SYNTAX (452 DM; CABG 221 and TAXUS 231)



Banning A et al: JACC 2012;55:1067

3VD Subset With Medically Treated Diabetes

4-year Outcomes (N=296)



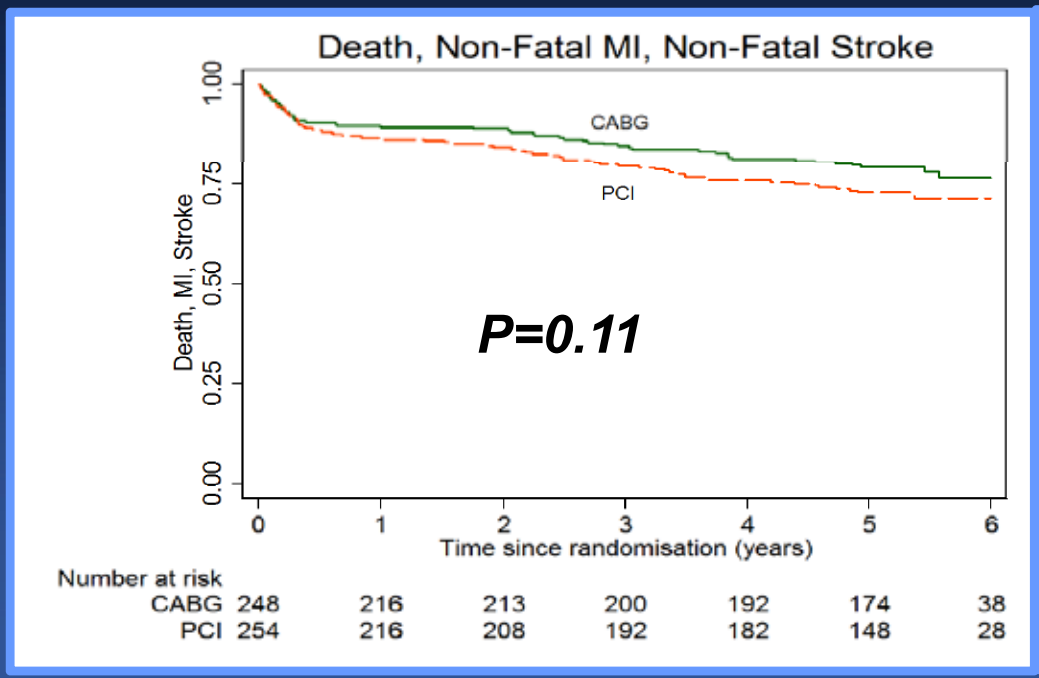
Cumulative KM Event Rate; log-rank *P* value

ITT population

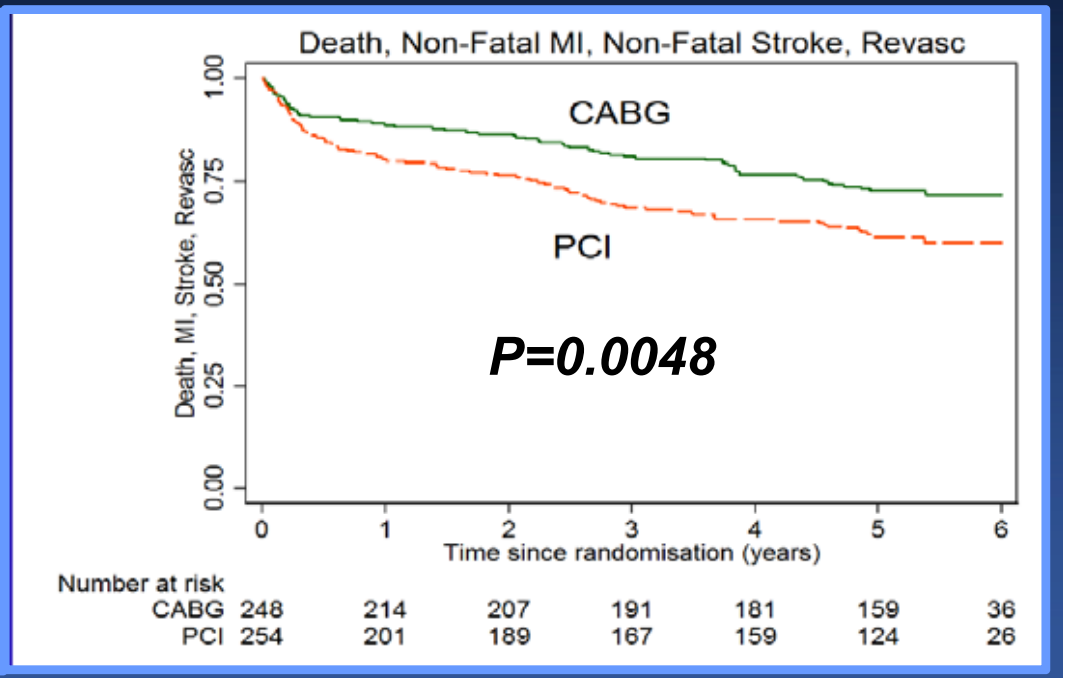
5-Year Follow-Up of CARDia Trial

510 Diabetic Patients Randomized; CABG 254 and PCI 256 (DES 69%)

Primary endpoint (death, MI, stroke)



Primary endpoint plus revascularization



Hall R et al. 2012 ESC

FREEDOM Design

Eligibility: DM patients with MV-CAD eligible for stent or surgery
Exclude: Patients with *acute STEMI* and *left main disease*

Randomized 1:1

MV-Stenting
With Drug-eluting

CABG
With or Without CPB

All concomitant Meds shown to be beneficial were encouraged,
including: clopidogrel, ACE inhib., ARBs, b-blockers, statins

Farkouh ME, et al. N Engl J Med 2012;367:2375-84

TRIAL SCREENING & ENROLLMENT

32,966 Patients were screened for eligibility

3,309 were eligible (10%)

1,409 did not consent

1,900 consented (57%)

953 Randomized to PCI/DES*

5 underwent CABG
3 withdrew prior to procedure
3 died prior to procedure
3 underwent neither PCI/DES or CABG

16 withdrew post-procedure
43 were lost to follow-up

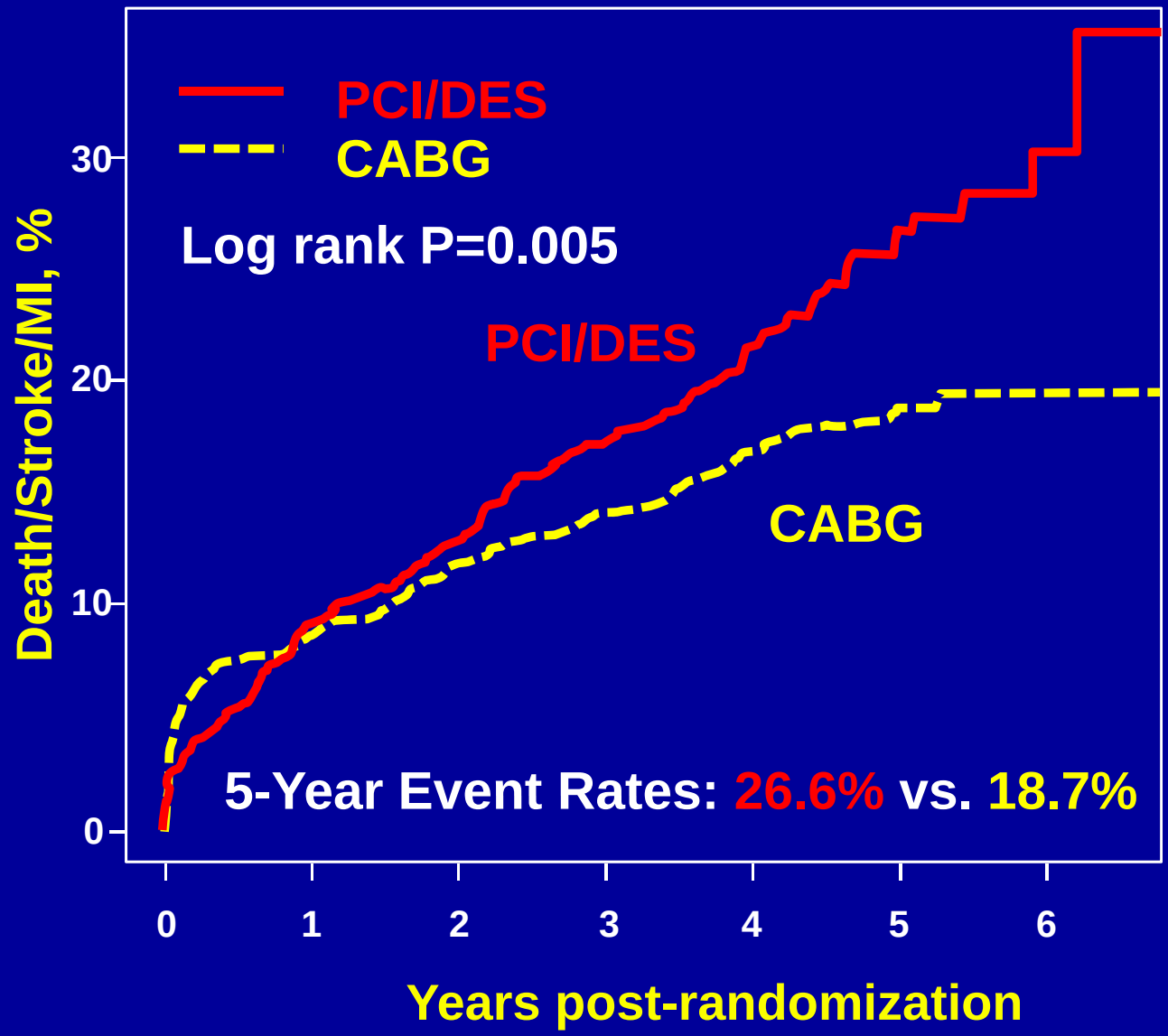
947 Randomized to CABG

18 underwent PCI/DES
26 withdrew prior to procedure
3 died prior to procedure
7 underwent neither PCI/DES or CABG

36 withdrew post-procedure
51 were lost to follow-up

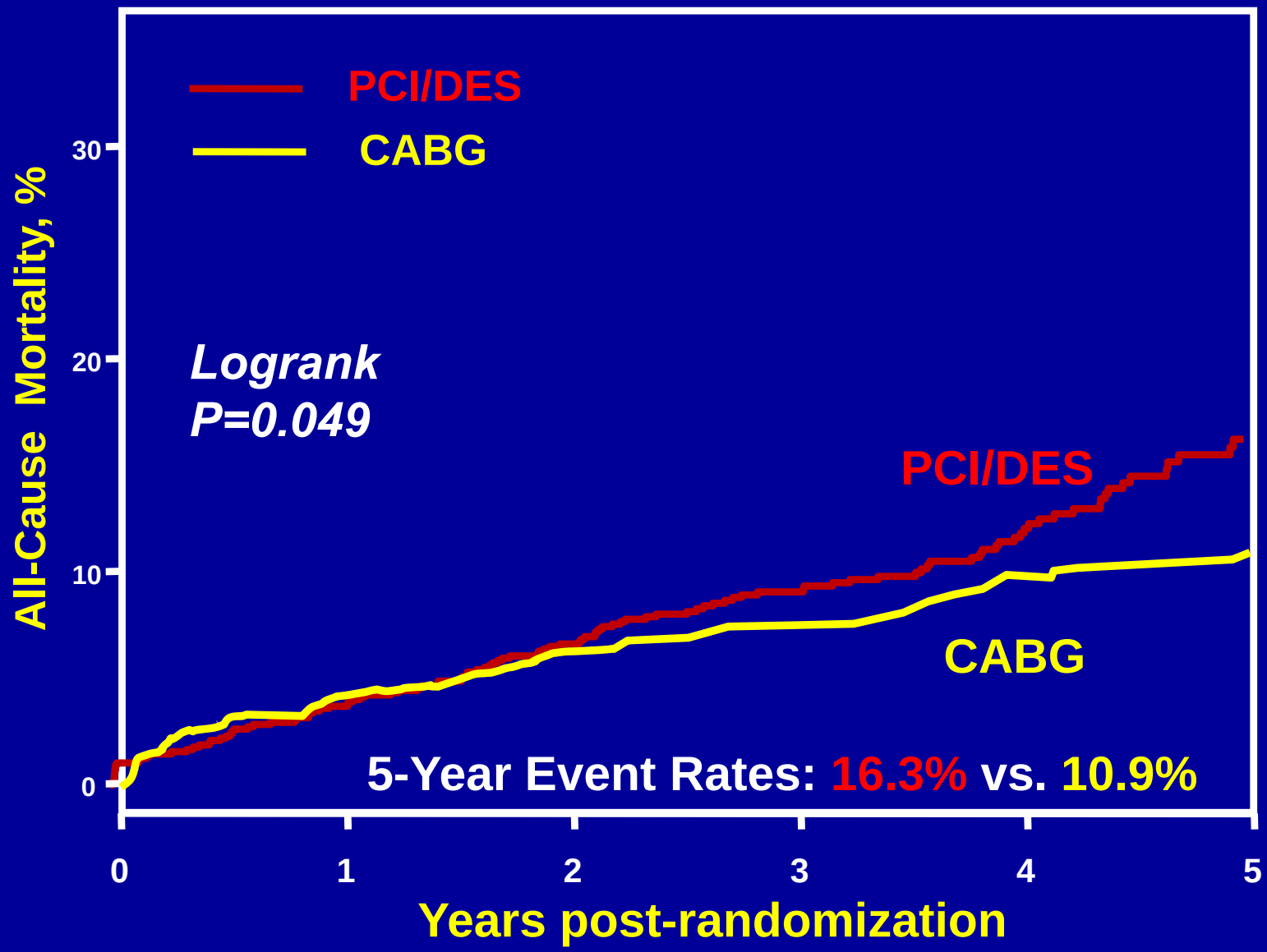
*953 and 947 included ITT analysis using all available follow-up time post-randomization

PRIMARY OUTCOME – DEATH / MI / STROKE



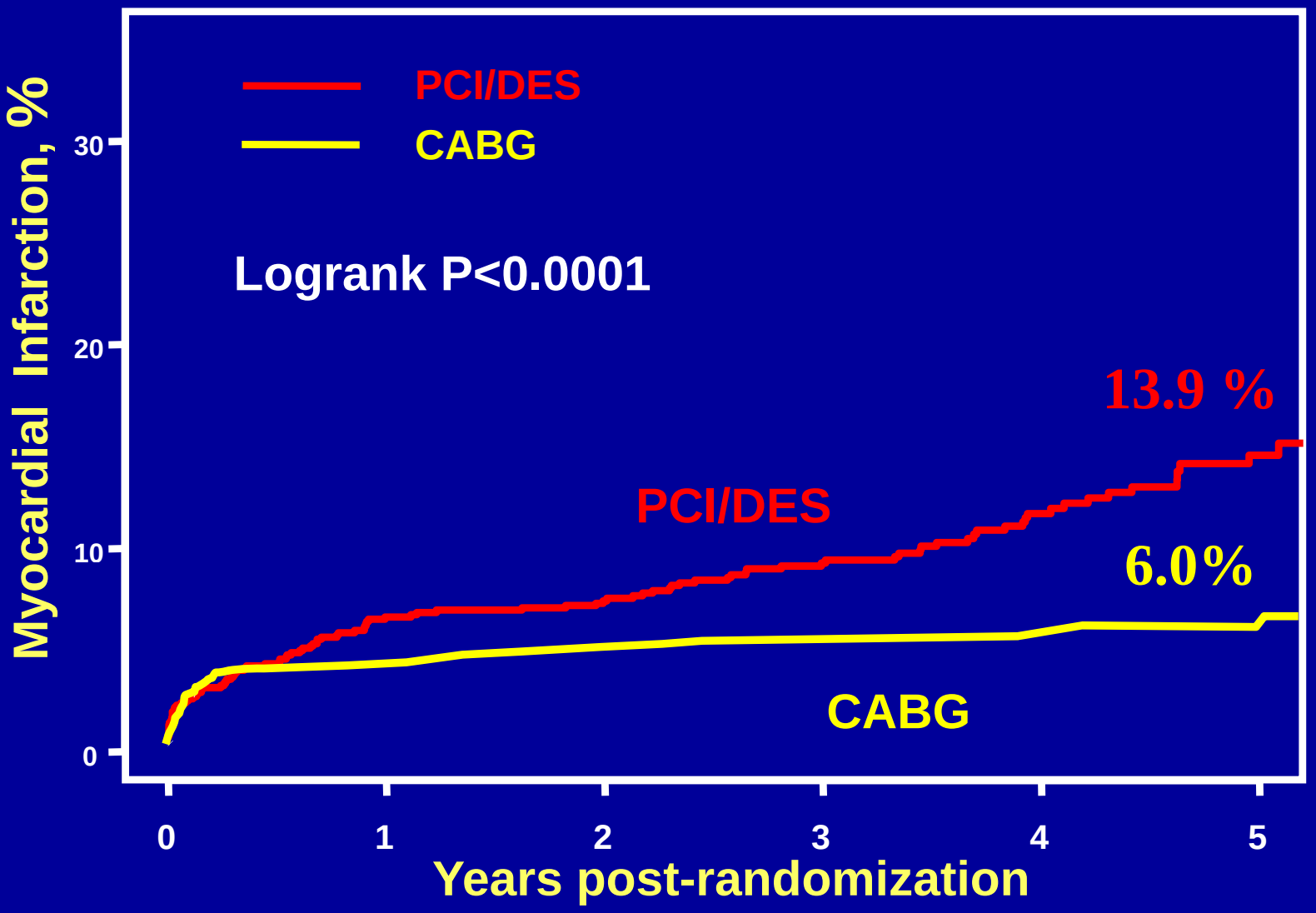
PCI/DES N	953	848	788	625	416	219	40
CABG N	943	814	758	613	422	221	44

ALL-CAUSE MORTALITY



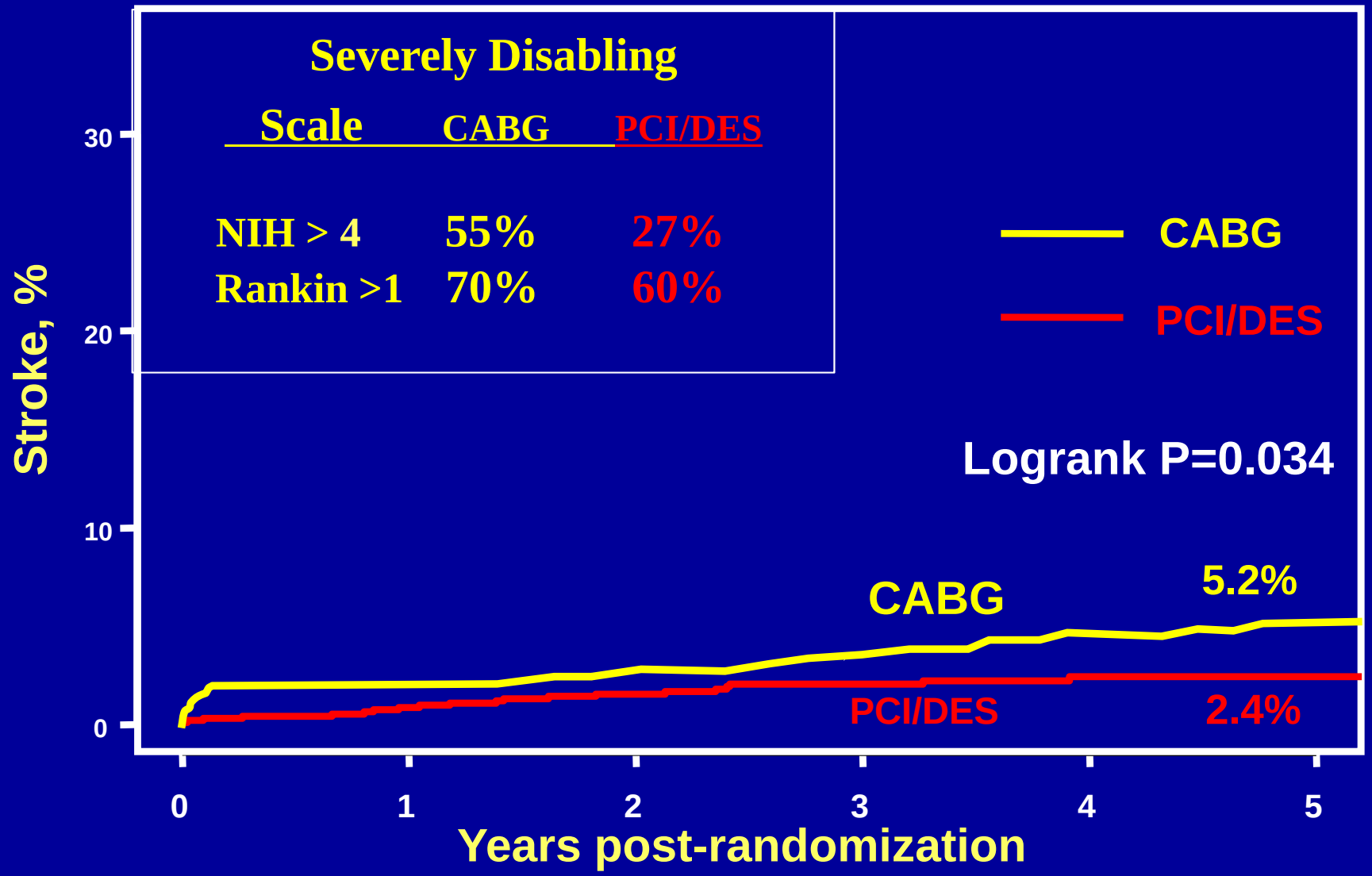
PCI/DES N	953	897	845	685	466	243
CABG N	947	855	806	655	449	238

MYOCARDIAL INFARCTION



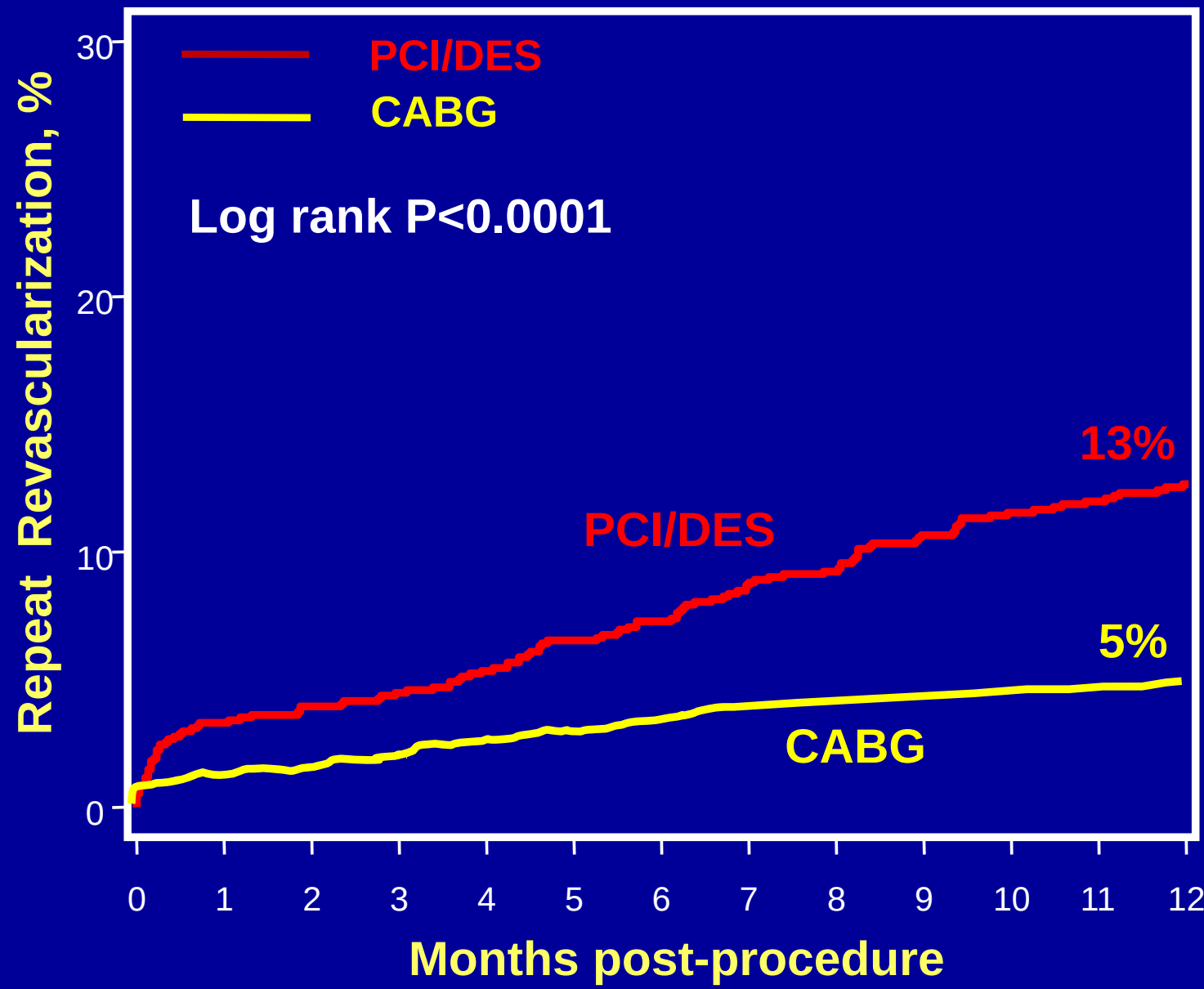
PCI/DES N 953	853	798	636	422	220
CABG N 947	824	772	629	432	229

STROKE



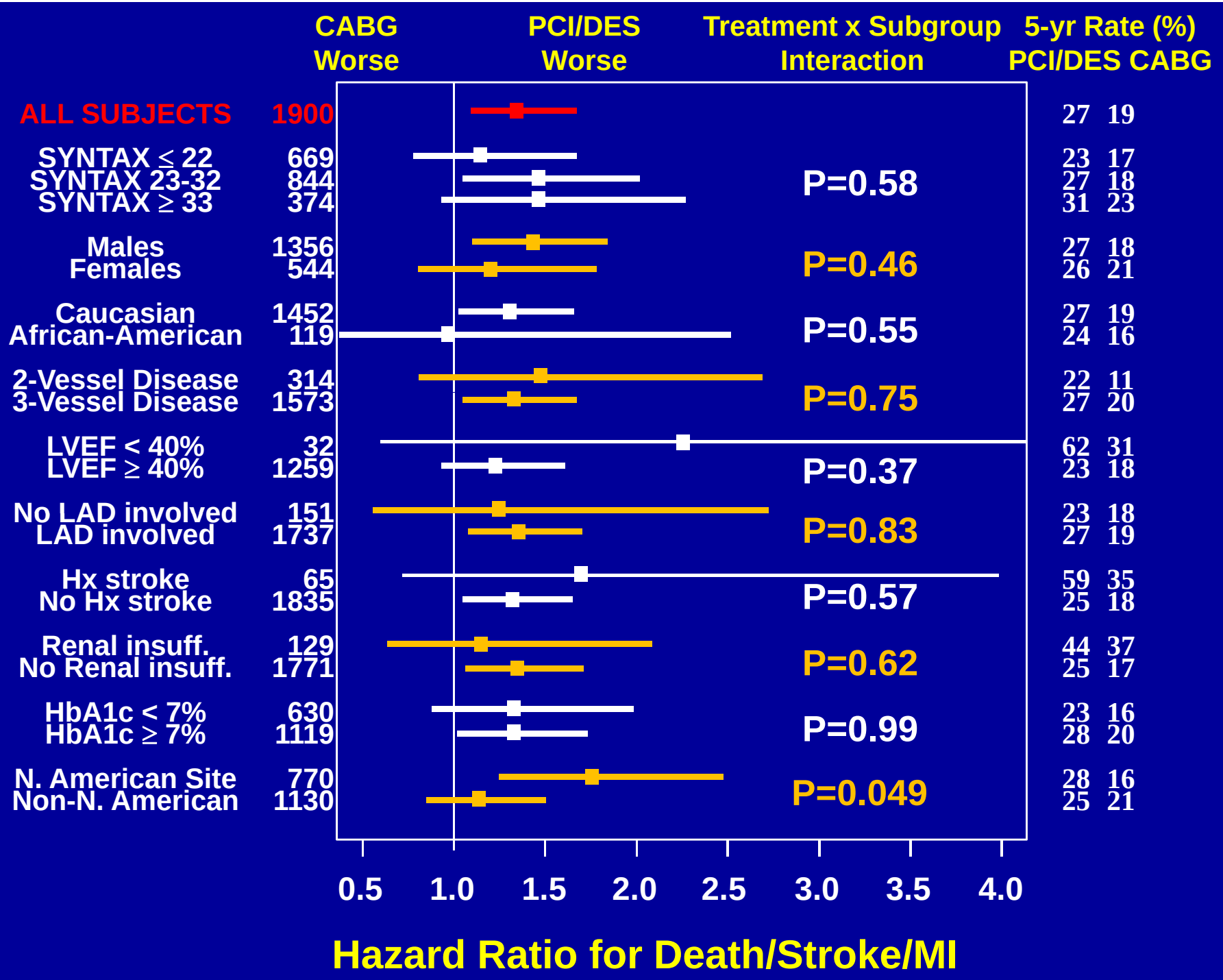
PCI/DES N	953	891	833	673	460	241
CABG N	947	844	791	640	439	230

REPEAT REVASCULARIZATION

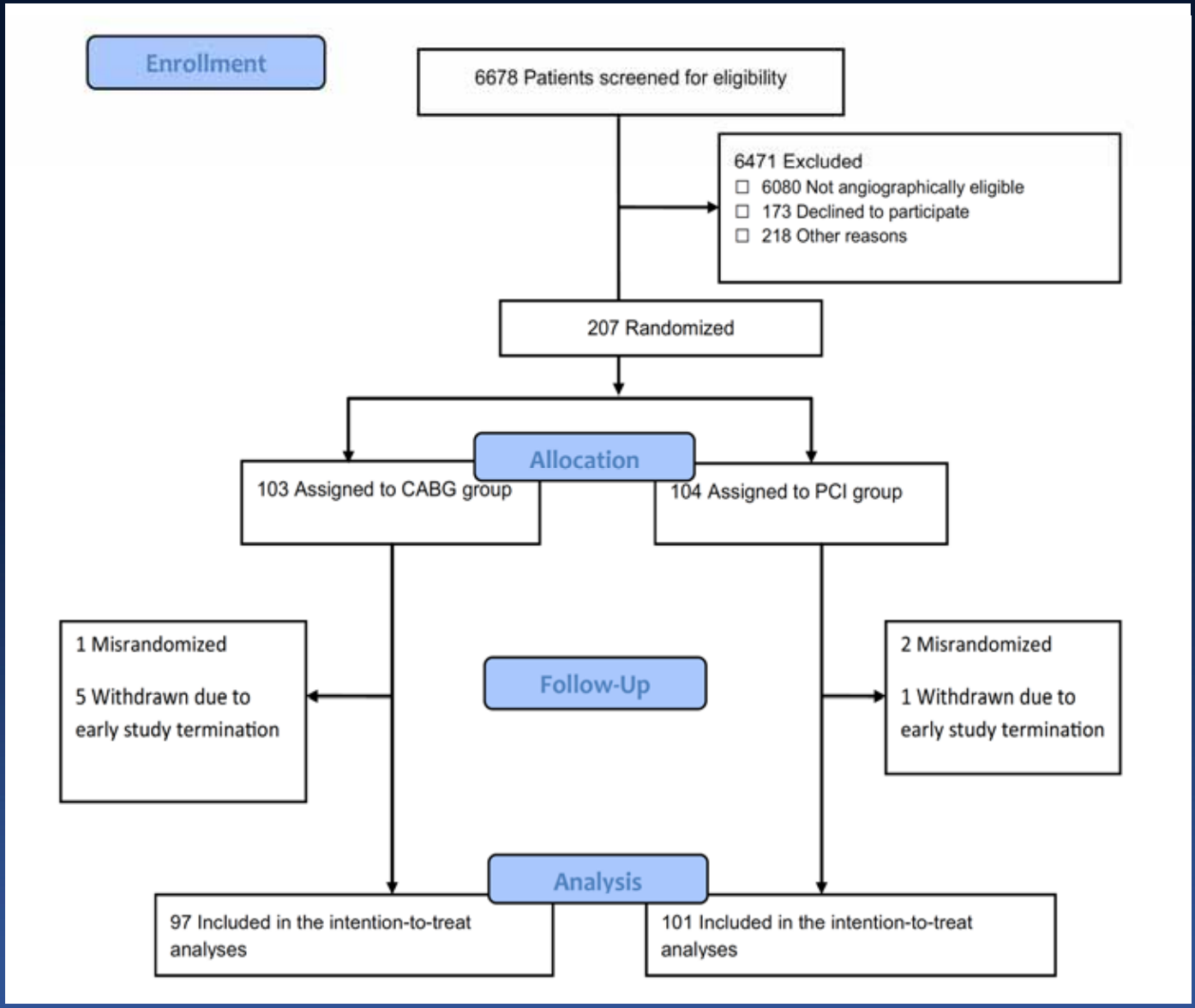


PCI/DES №944	887	856	818	792
CABG №911	858	836	825	806

SUBGROUP ANALYSES



VA CARDS Trial



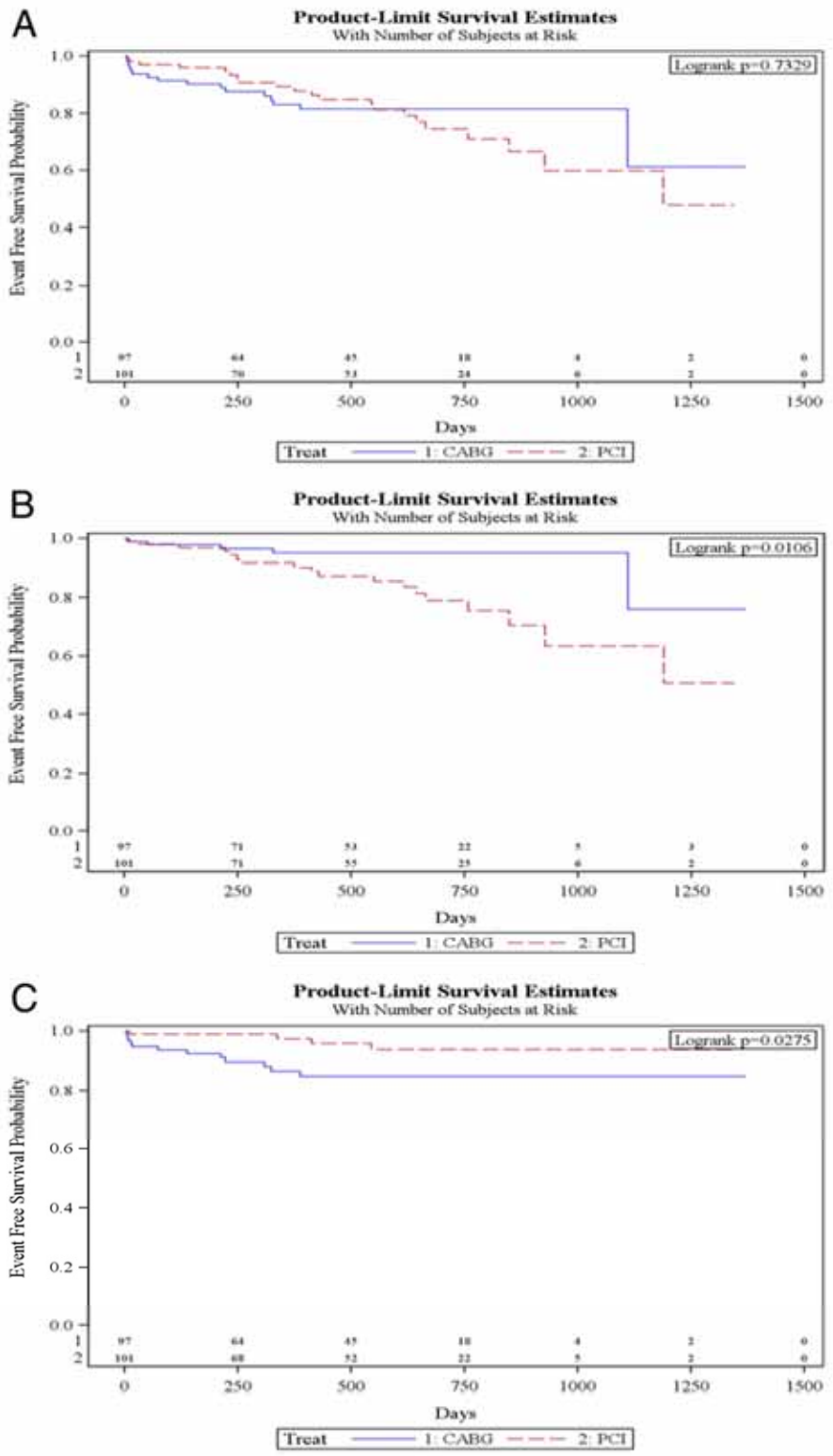
Initial Planned Sample Size; N=790

J Am Coll Cardiol 2013;61:808–16

Death or MI rate;
CABG = PCI

Death rate;
CABG < PCI

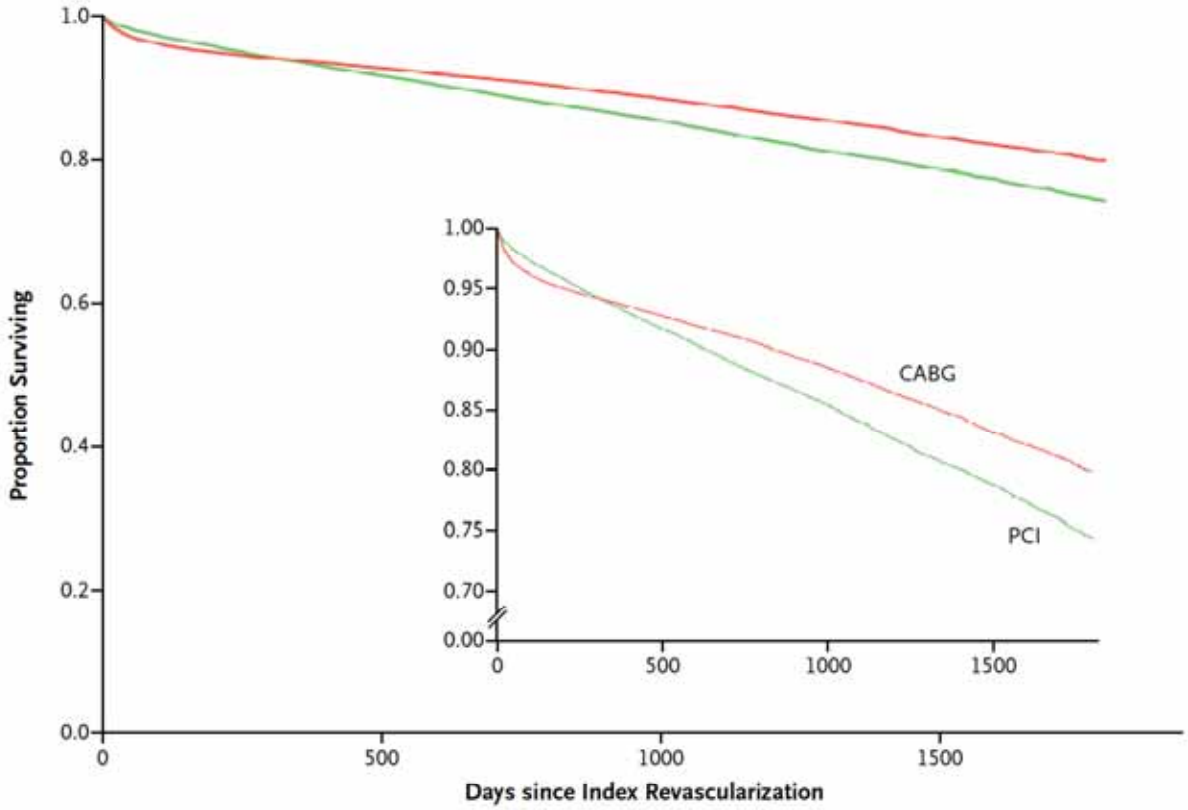
MI rate;
CABG > PCI



Observational Studies beyond RCT

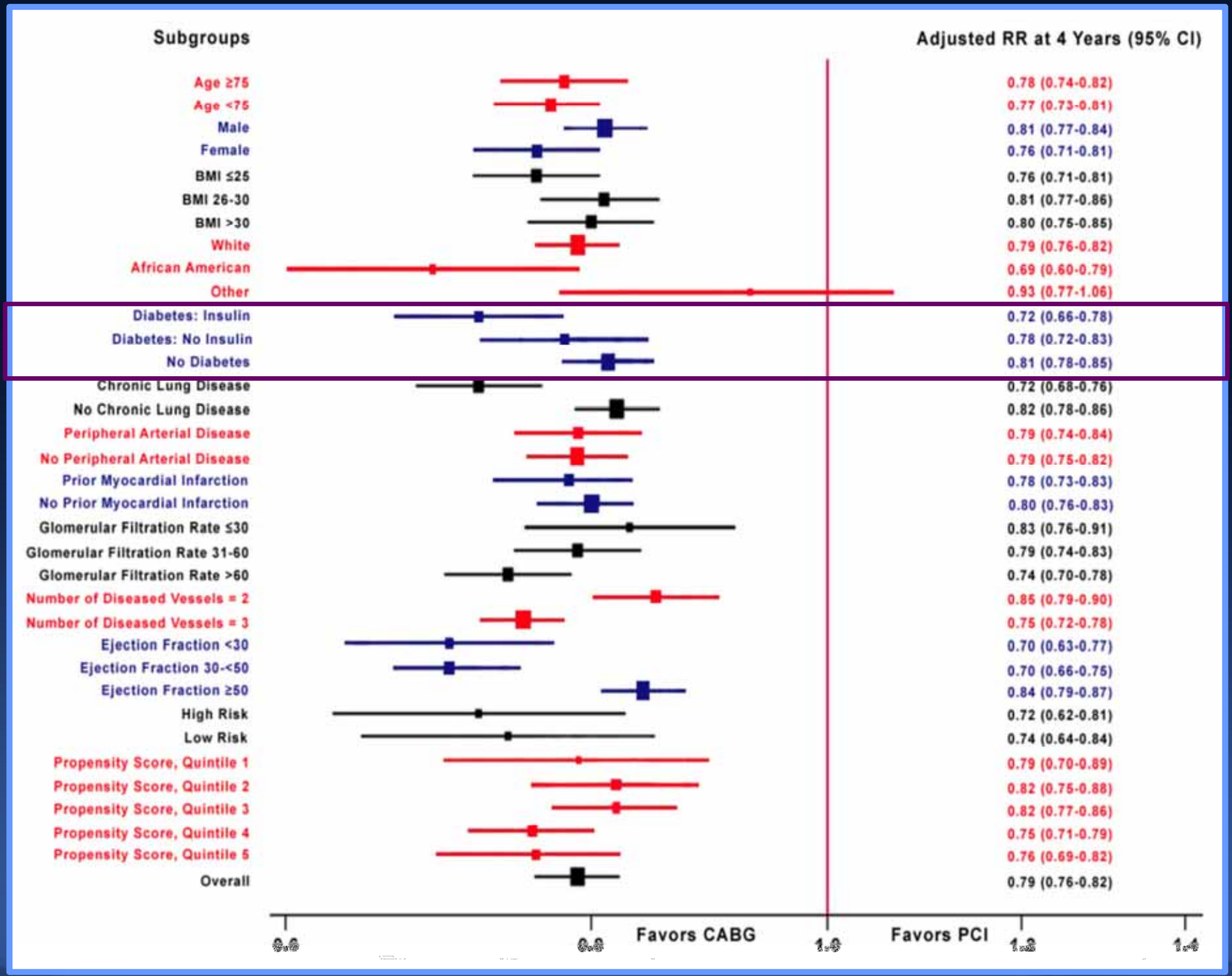
ASCERT study

CER on Revascularization Strategy; NCDR an STS database (65 years or older; 86,244 CABG & 103,549 PCI)



	30-Day	1-Yr	2-Yr	3-Yr	4-Yr
Mortality after CABG, % (95% CI)	2.25 (2.09–2.41)	6.24 (5.97–6.50)	8.98 (8.68–9.29)	12.4 (12.0–12.8)	16.4 (15.9–16.9)
Mortality after PCI, % (95% CI)	1.31 (1.21–1.41)	6.55 (6.35–6.76)	11.3 (11.0–11.6)	15.9 (15.6–16.3)	20.8 (20.4–21.2)
Relative risk with CABG (95% CI)	1.72 (1.52–1.89)	0.95 (0.90–1.00)	0.79 (0.76–0.83)	0.78 (0.75–0.81)	0.79 (0.76–0.82)

Weintraub WS et al; N Engl J Med. 2012;366:1467-76.



Weintraub WS et al; N Engl J Med. 2012;366:1467-76.

A Pooled Analysis of 3 Registry (5775 Individual Patient Data)

	MAINCOMPARE Registry	ASAN-Multivessel Registry	ASAN-MAIN Registry
Study type	Multi-center, observation	Single-center, observation	Single-center, observation
# of patients	PCI 1102 CABG 1138	PCI 1547 CABG 1495	PCI 276 CABG 469
Target subjects	Left main	Multivessel	Left main
Age	62	63	61
Male	72%	71%	72%
Diabetes	**32%**	**29%**	**32%**
Duration (median)	5.2 years	5.6 years	7.5 years
Publications	NEJM 2008;358:1781-92 JACC 2010;56:117–124	Circulation 2008;117:2079-86 JACC 2011;57:128-37	JACC 2010;56:1366–75

Adjusted Outcomes

Subjects	HR	95% CI	P-value	Interaction P (DM vs. NON-DM)
Death				
Non-DM	1.15	0.88-1.50	0.39	**0.27**
DM	1.15	0.88-1.51	0.30	
DM, insulin	0.88	0.48-1.62	0.68	
DM, non-insulin	0.89	0.58-1.39	0.61	
Death, Q-MI, Stroke				
Non-DM	0.99	0.78-1.26	0.96	**0.97**
DM	1.00	0.79-1.26	0.97	
DM, insulin	0.89	0.51-1.56	0.68	
DM, non-insulin	1.05	0.70-1.58	0.81	
Repeat revascularization				
Non-DM	3.55	2.61-4.83	<0.001	**0.08**
DM	3.56	2.62-4.83	<0.001	
DM, insulin	6.42	2.83-14.53	<0.001	
DM, non-insulin	5.71	3.50-9.31	<0.001	

Park DW et al; Circ Cardiovasc Interv. 2012;5:467-475

MAIN-COMPARE Registry ; DM and Left Main Revascularization

Outcomes	Crude		Multivariate Adjusted			Inverse Probability of Treatment Weighted		
	HR (95% CI)	p Value	HR (95% CI)	p Value	Interaction p for Diabetic Status	HR (95% CI)	p Value	Interaction p for Diabetic Status
Overall								
Death	0.747 (0.507–1.101)	0.14	1.109 (0.735–1.674)	0.621†	0.902	0.954 (0.623–1.462)	0.828	0.156
Death, QMI, or stroke	0.737 (0.518–1.048)	0.089	1.070 (0.735–1.556)	0.724‡	0.684	0.962 (0.652–1.419)	0.846	0.934
TVR	3.863 (2.344–6.367)	<0.0001	5.102 (2.973–8.756)	<0.0001§	0.233	4.309 (2.278–8.151)	<0.0001	0.919
Diabetic patients								
Death	0.744 (0.391–1.417)	0.369	0.793 (0.396–1.586)	0.511		0.547 (0.24–1.245)	0.150	
Death, QMI, or stroke	0.764 (0.434–1.345)	0.351	0.926 (0.522–1.644)	0.793¶		0.782 (0.377–1.621)	0.509	
TVR	5.898 (2.277–15.275)	0.0003	6.213 (2.397–16.106)	0.0002#		7.668 (2.757–21.32)	<0.0001	
Nondiabetic patients								
Death	0.755 (0.464–1.229)	0.258	1.05 (0.623–1.768)	0.856**		1.004 (0.586–1.718)	0.989	
Death, QMI, or stroke	0.733 (0.467–1.149)	0.176	1.030 (0.636–1.670)	0.903††		0.963 (0.586–1.583)	0.882	
TVR	3.168 (1.758–5.710)	0.0001	4.273 (2.264–8.066)	<0.0001‡‡		2.943 (1.357–6.384)	0.006	

EDITORIAL COMMENT

Diabetes Mellitus Does Not Unsweeten Left Main Intervention*

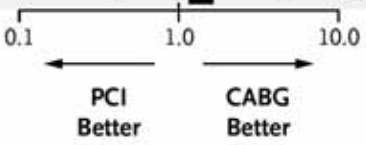
David O. Williams, MD,† J. Dawn Abbott, MD‡

Boston, Massachusetts; and Providence, Rhode Island

unprotected LMCA disease. First, in the subset of patients that had LMCA disease, there was no significant difference in composite rate of major adverse cardiac or cerebrovascular events at 1 year between the PCI and coronary artery bypass grafting (CABG) groups (15.8% vs. 13.7%, p = 0.44, respectively). Rates of repeat revascularization, however, were significantly higher among PCI patients (11.8% vs. 6.5%, p = 0.02), whereas stroke was more common among CABG patients. These data support the use of PCI with drug-eluting stents (DES) as a reasonable alternative to CABG for patients with LMCA disease. A second observation, however, qualifies this conclusion. When SYNTAX investigators analyzed outcomes according to LMCA disease involvement and the extent of associated coronary

PRECOMBAT findings according to DM

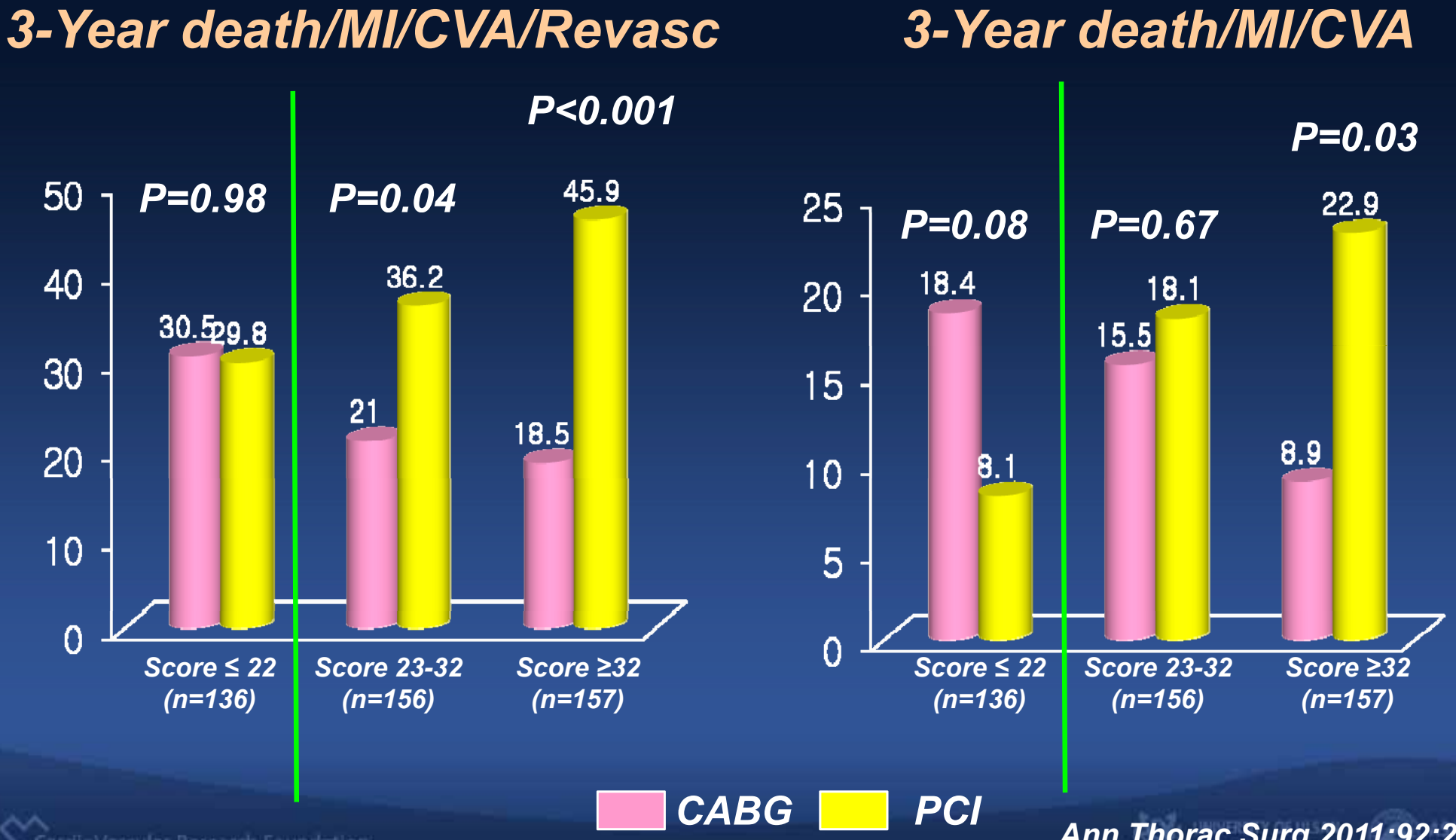
Subgroup	PCI	CABG	Hazard Ratio (95% CI)	P Value	P Value for Interaction
	no./total no. (%)				
Overall	36/300 (12.2)	24/300 (8.1)	1.50 (0.90–2.52)	0.12	
Age					0.44
≥65 yr	15/129 (11.9)	14/149 (9.7)	1.87 (0.88–3.97)	0.10	
<65 yr	21/171 (12.5)	10/151 (6.7)	1.24 (0.60–2.56)	0.57	
Sex					0.59
Male	26/228 (11.7)	16/231 (7.0)	1.65 (0.88–3.07)	0.12	
Female	10/72 (13.9)	8/69 (11.7)	1.22 (0.48–3.08)	0.68	
Left main coronary artery stenosis					0.63
>70%	15/140 (10.8)	14/159 (9.0)	1.19 (0.57–2.47)	0.64	
50–70%	21/160 (13.6)	10/141 (7.1)	1.90 (0.89–4.03)	0.10	
Coronary artery disease distribution					0.14
Left main only	1/27 (3.8)	3/34 (8.8)	0.39 (0.04–3.72)	0.41	
Left main with single-vessel disease	2/50 (4.1)	3/53 (5.8)	0.70 (0.11–4.16)	0.69	
Left main with double-vessel disease	13/101 (13.0)	11/90 (12.2)	1.04 (0.47–2.32)	0.93	
Left main with triple-vessel disease	20/122 (16.8)	7/123 (5.8)	3.05 (1.29–7.21)	0.01	
Bifurcation involvement					0.83
Yes	23/200 (11.8)	13/183 (7.3)	1.62 (0.82–3.20)	0.16	
No	13/99 (13.2)	10/111 (9.1)	1.46 (0.64–3.32)	0.37	
Right coronary artery involvement					0.27
Yes	3/149 (15.8)	13/159 (8.3)	1.95 (0.99–3.84)	0.05	
No	13/151 (8.7)	11/141 (7.9)	1.07 (0.48–2.40)	0.86	
Acute coronary syndrome					0.44
Yes	21/140 (15.1)	19/163 (11.7)	1.34 (0.70–2.55)	0.38	
No	15/160 (9.6)	5/137 (3.9)	2.07 (0.85–5.02)	0.11	
Diabetes					0.92
Yes	16/102 (16.3)	10/90 (11.1)	1.43 (0.65–3.16)	0.37	
No	20/198 (10.2)	14/210 (6.8)	1.51 (0.76–2.99)	0.24	
SYNTAX score					0.80
>29	14/89 (15.9)	10/91 (11.1)	1.60 (0.73–3.54)	0.24	
>19 to ≤29	14/105 (13.9)	5/93 (5.7)	2.32 (0.82–6.57)	0.11	
≤19	8/95 (8.5)	5/85 (5.9)	1.38 (0.40–4.21)	0.57	



Park SJ et al; J Am Coll Cardiol Intv 2009;2:956–63

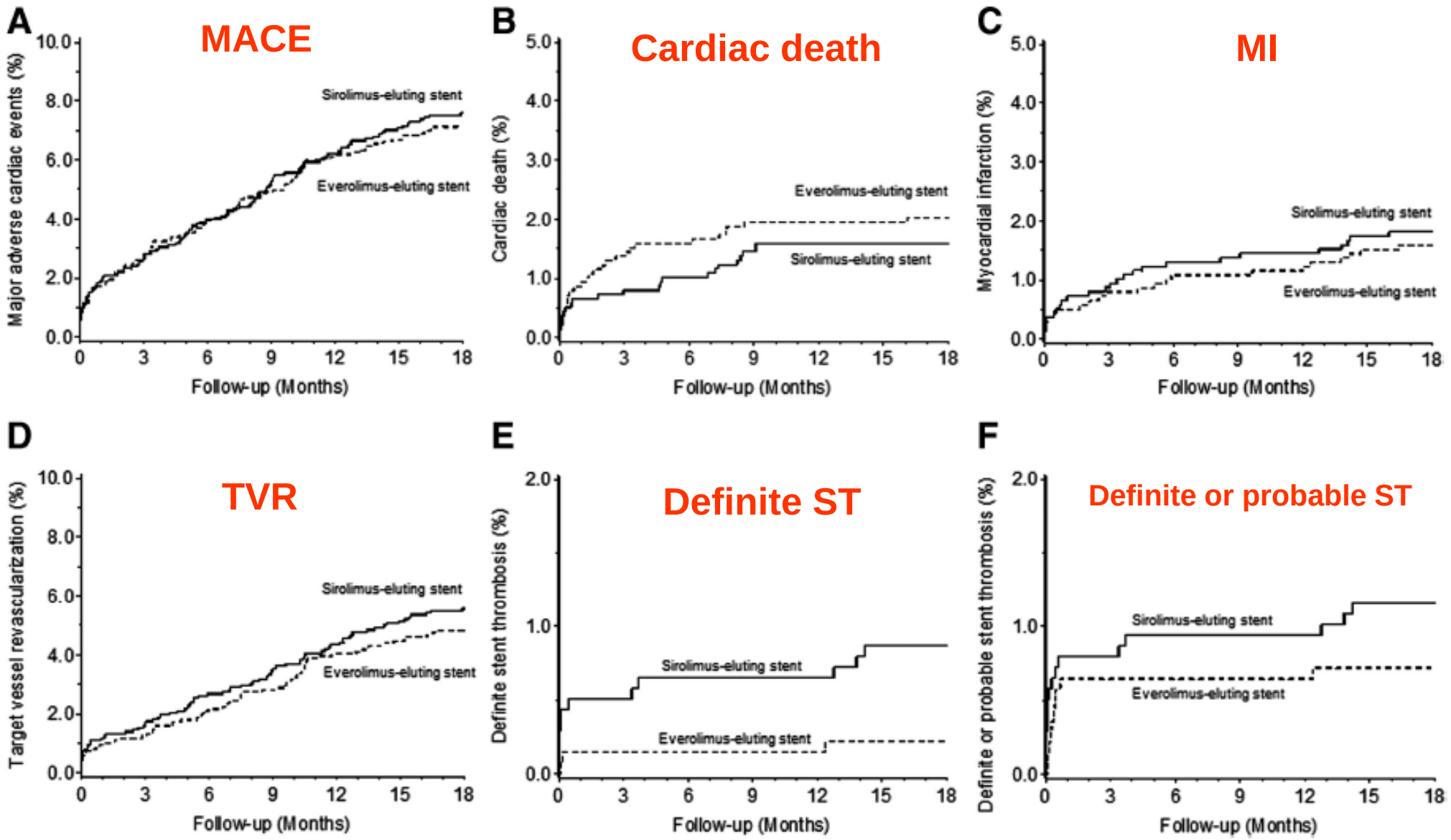
SYNTAX trial

3-Year outcomes in Diabetic Patients According to SYNTAX score



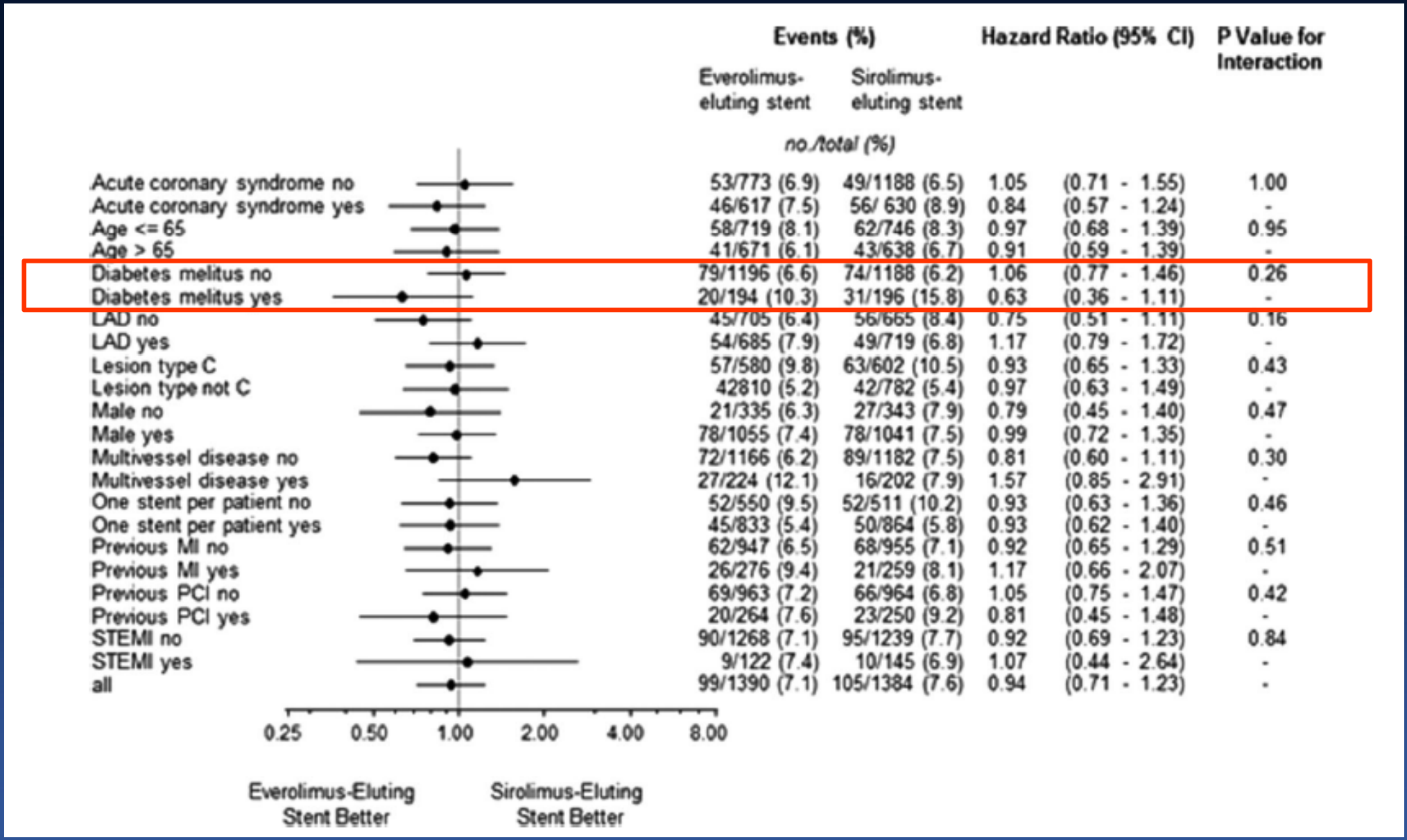
Ann Thorac Surg 2011;92:2140–6

SORT OUT IV



Circulation. 2012;125:1246-1255

SORT OUT IV



Circulation. 2012;125:1246-1255

Summary

- For diabetic patients with MVD and/or LM disease, several small-sized RCT and observational studies showed conflicting results comparing PCI with first-generation DES and CABG.

- As a landmark RCT in diabetic population, compelling evidence from the FREEDOM trial showed a superiority of CABG with lower mortality and fewer MI, but more strokes.

Summary

- As compared with first-generation DES, second- and newer-generation DES has shown better efficacy and safety outcomes.
- Further studies are still required (1) to evaluate comparative effectiveness of newer DES and CABG in DM and (2) to assess whether DM itself is a remarkably crucial factor in selecting CABG instead of PCI regardless of lesion complexity.