

# Multivessel PCI in Patients with DM

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# DISCLOSURE

Relevant Financial Relationship(s)

None

# Single and Multivessel (Stable) CAD Revascularization to Improve Survival

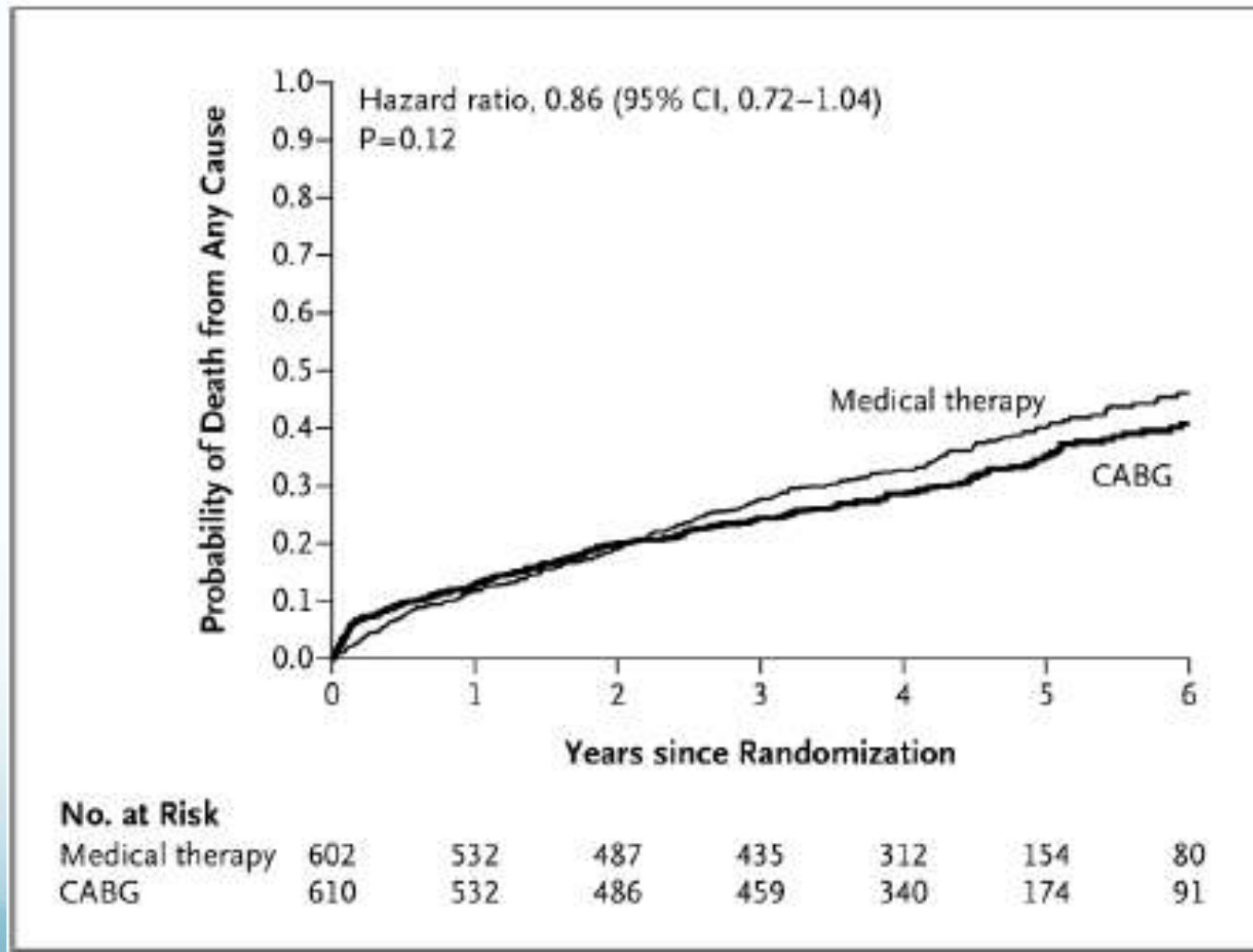
Anatomy	Revasc Method	COR	LOE
3 VD +/- Proximal LAD Disease*#	CABG	I	B
	PCI	IIb—Of uncertain benefit	B
2 VD With Proximal LAD Disease#	CABG	I	B
	PCI	IIb—Of uncertain benefit	B
2 VD Without Proximal LAD Disease#	CABG	IIa—With extensive ischemia	B
		IIb—Of uncertain benefit without extensive ischemia	C
	PCI	IIb—Of uncertain benefit	B
1 VD With Proximal LAD disease	CABG	IIa—With LIMA for long-term benefit	B
	PCI	IIb—Of uncertain benefit	B
1 VD Without Proximal LAD disease	CABG	III: Harm	B
	PCI	III: Harm	B
No anatomic or physiologic criteria for revascularization	CABG	III: Harm	B
	PCI	III: Harm	B

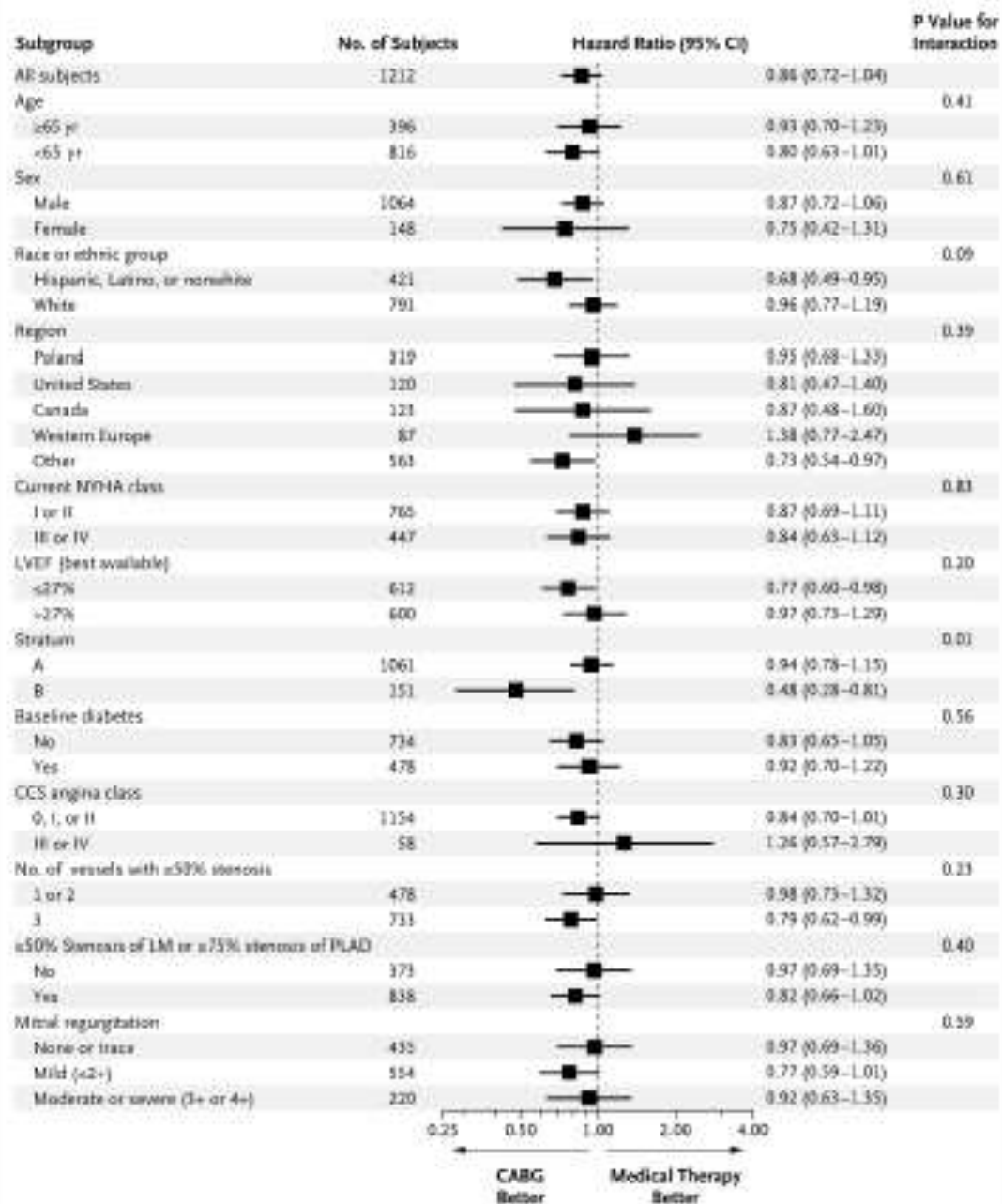
\*Reasonable to choose CABG over PCI for good CABG candidates with complex 3-vessel disease (e.g., SYNTAX score >22) (Class IIa; LOE:B)

#Reasonable to choose CABG over PCI for MVD in patients with DM (Class IIa; LOE:B)



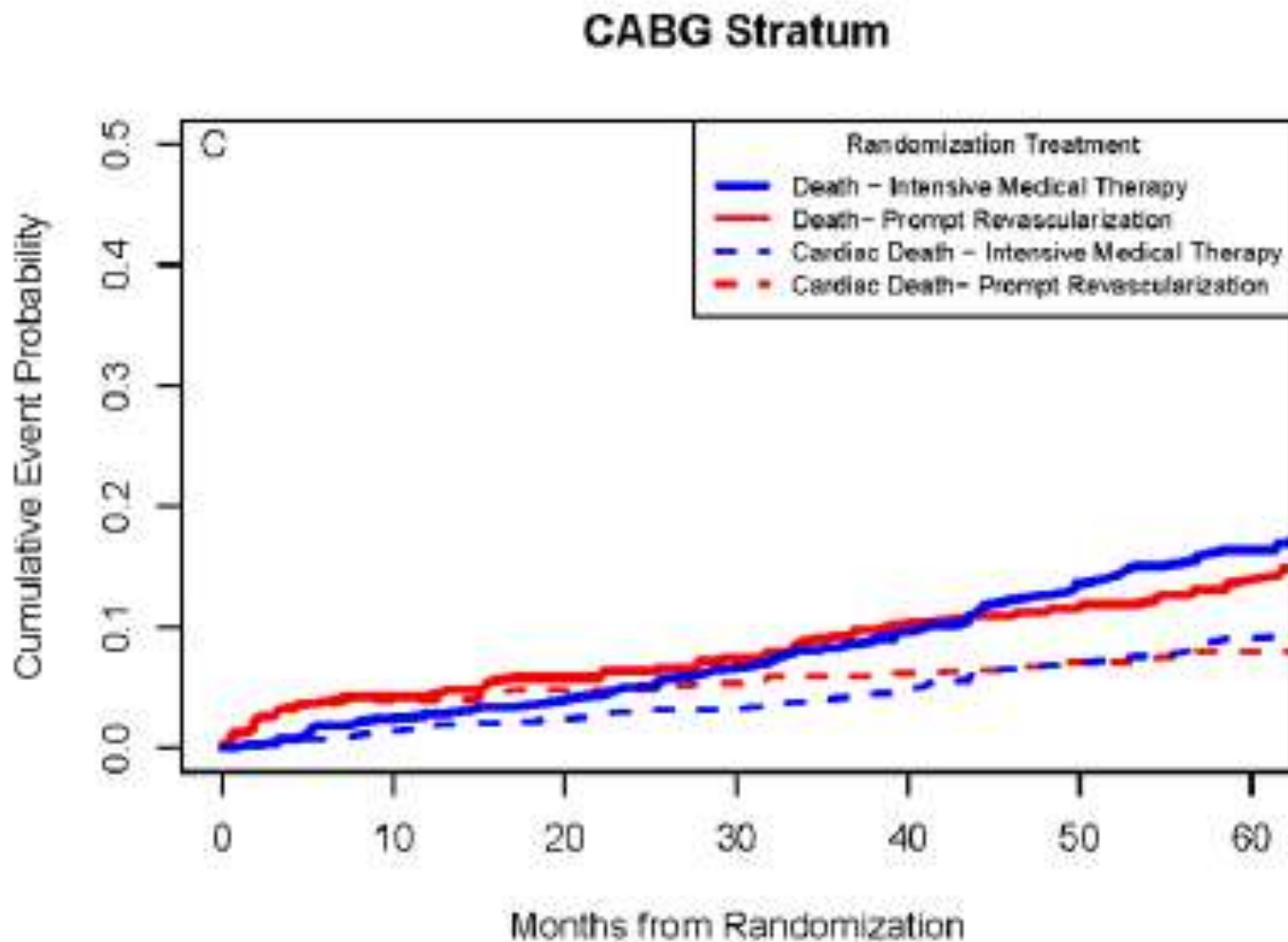
# CABG in Patients with MVD and LV Dysfunction



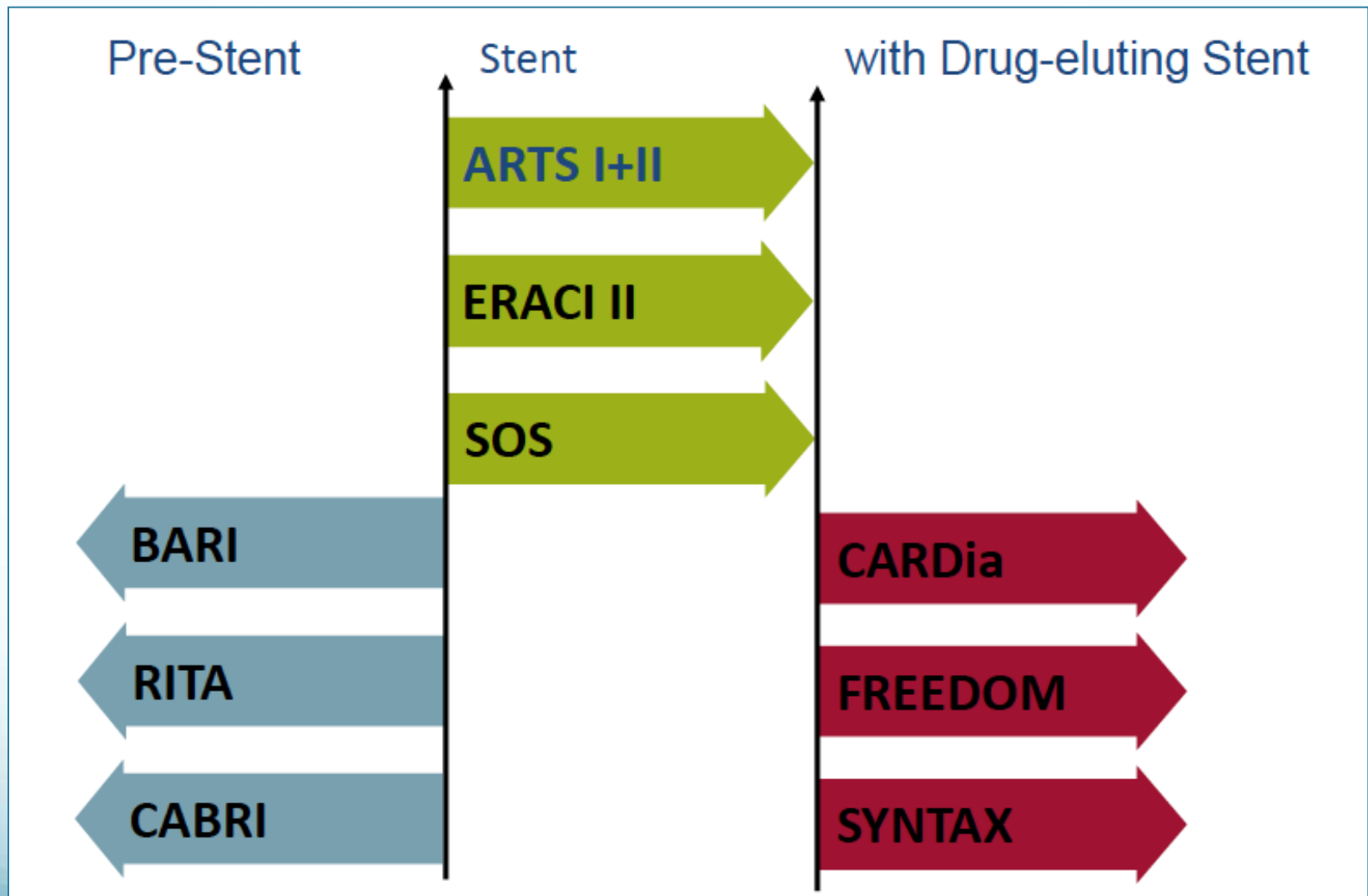


# BARI 2D

## CABG vs. Medical Therapy in Diabetics with MVD



# CABG vs. PCI Trials in Diabetes

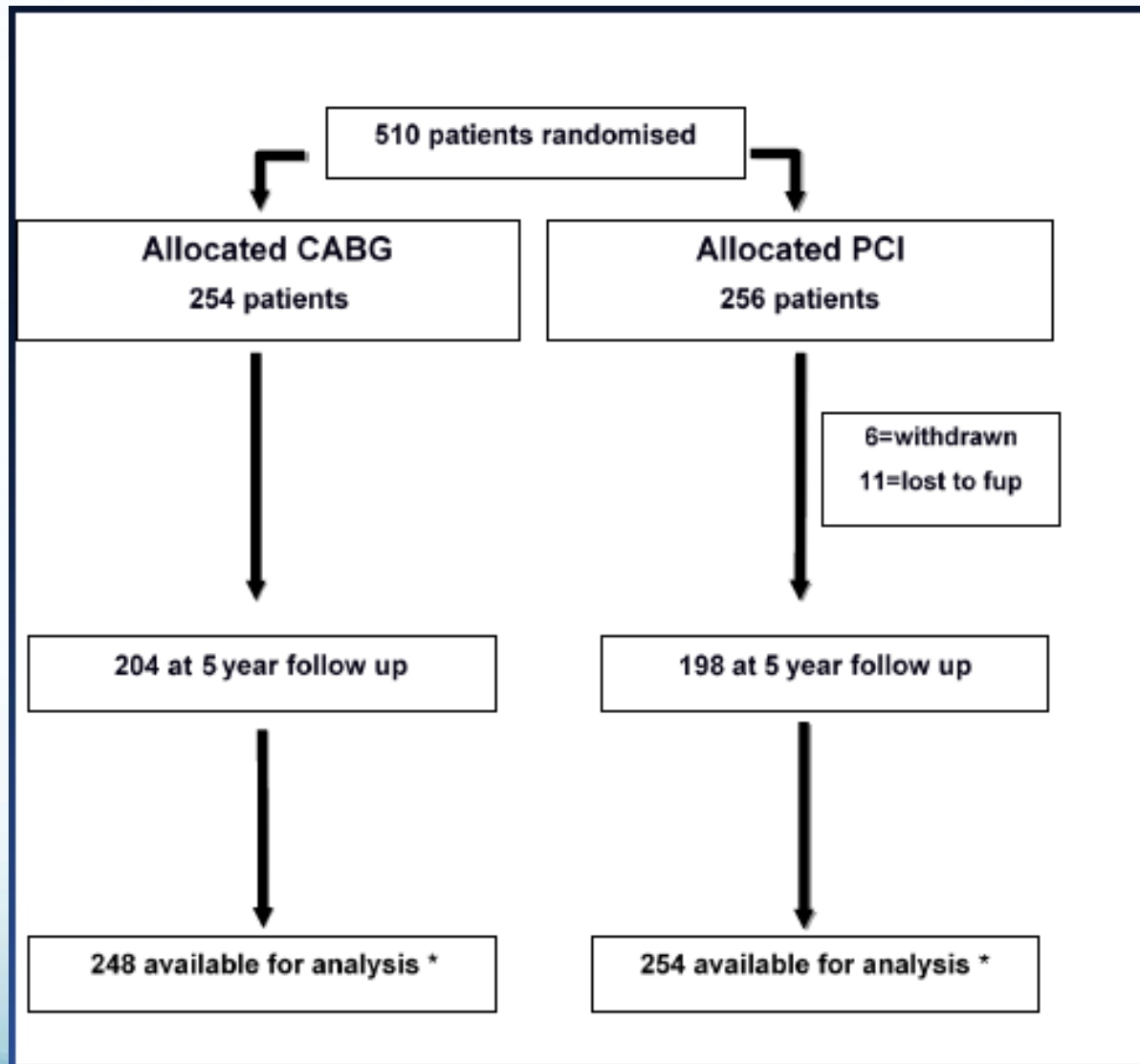


# PCI vs. CABG in Diabetics

- CARDia
  - No difference in mortality
- SYNTAX
  - Depends?
- FREEDOM
  - Higher all-cause mortality in PCI
  - No difference in cardiac mortality

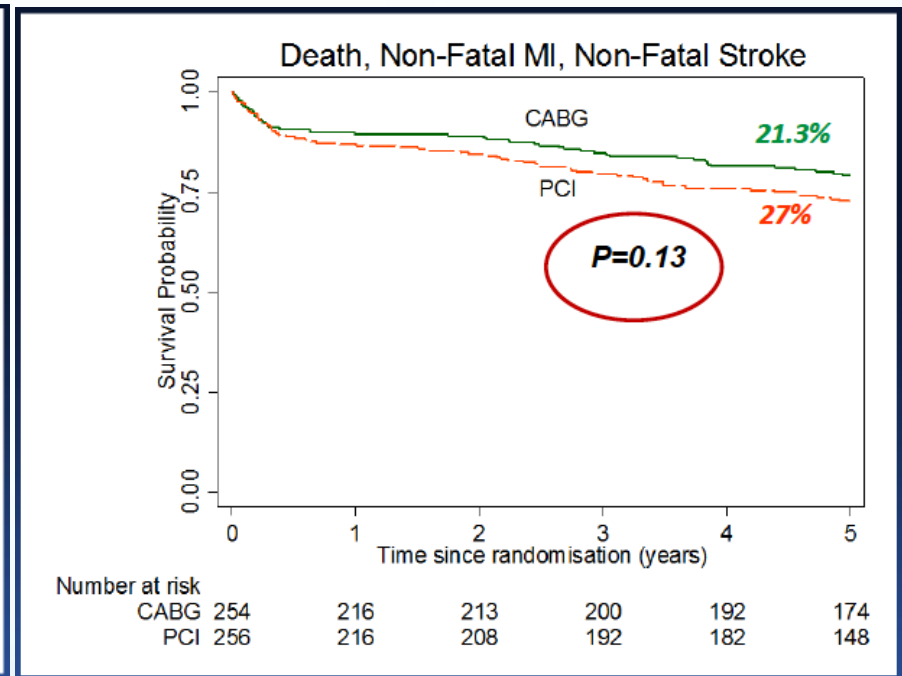
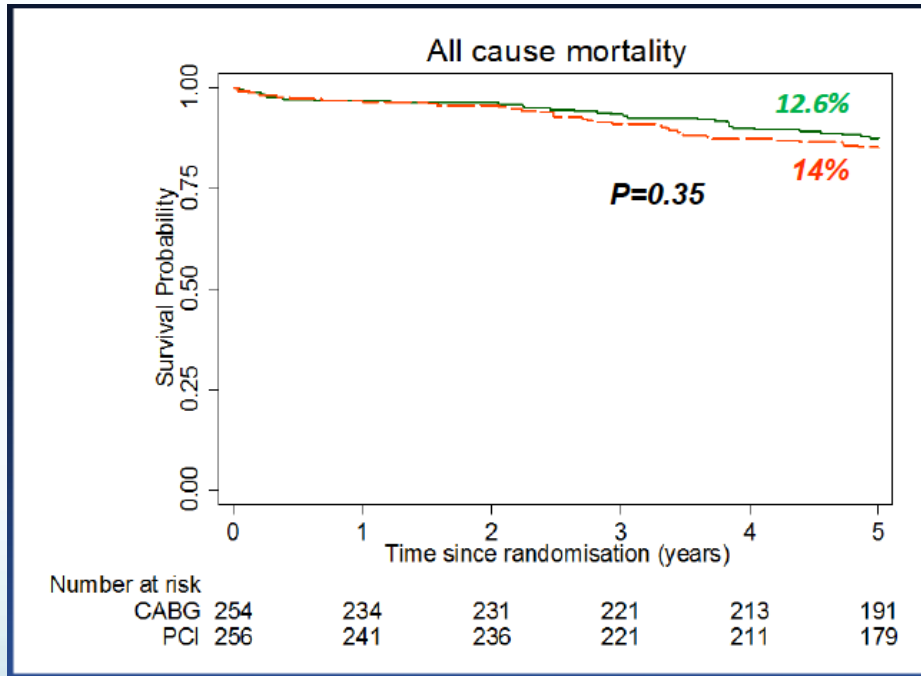


# CARDia



# CARDia

## 5-year outcome



# SYNTAX Trial Design



*De novo* disease (n=1 800)

## Limited Exclusion Criteria

- Previous interventions
- Acute MI with CPK > 2x
- Concomitant cardiac surgery

Left Main Disease  
(isolated, +1, +2 or +3 vessels)

**N=705**

**25% diabetes**

3 Vessel Disease  
(revasc all 3 vascular territories)

**N=1 095**

Primary endpoint = death/MI/stroke/repeat revasc at 1 year

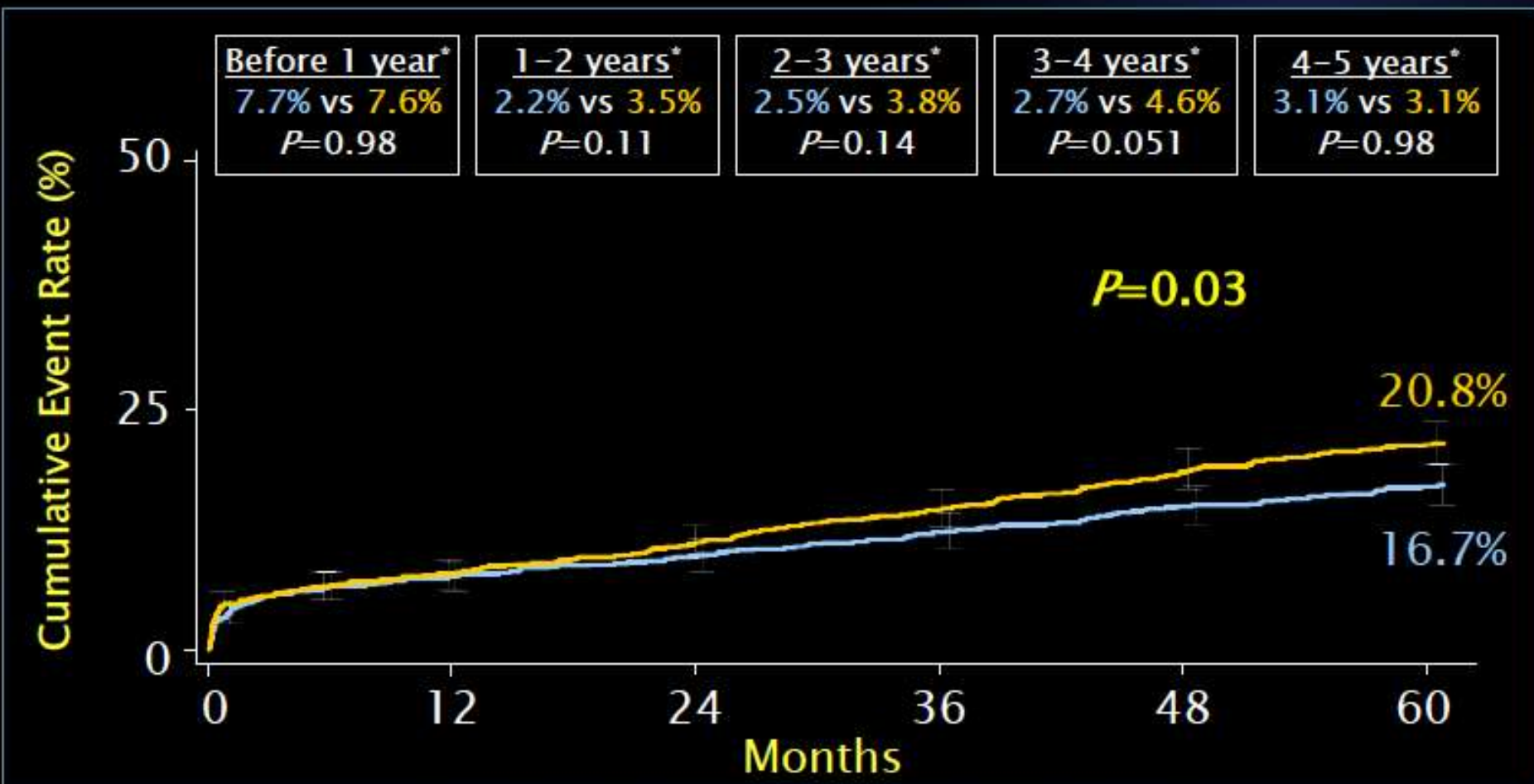
# SYNTAX

## All-Cause Death/CVA/MI to 5 Years



■ CABG (N=897)

■ TAXUS (N=903)



Mohr FW et al. Lancet 2013;381:629-38

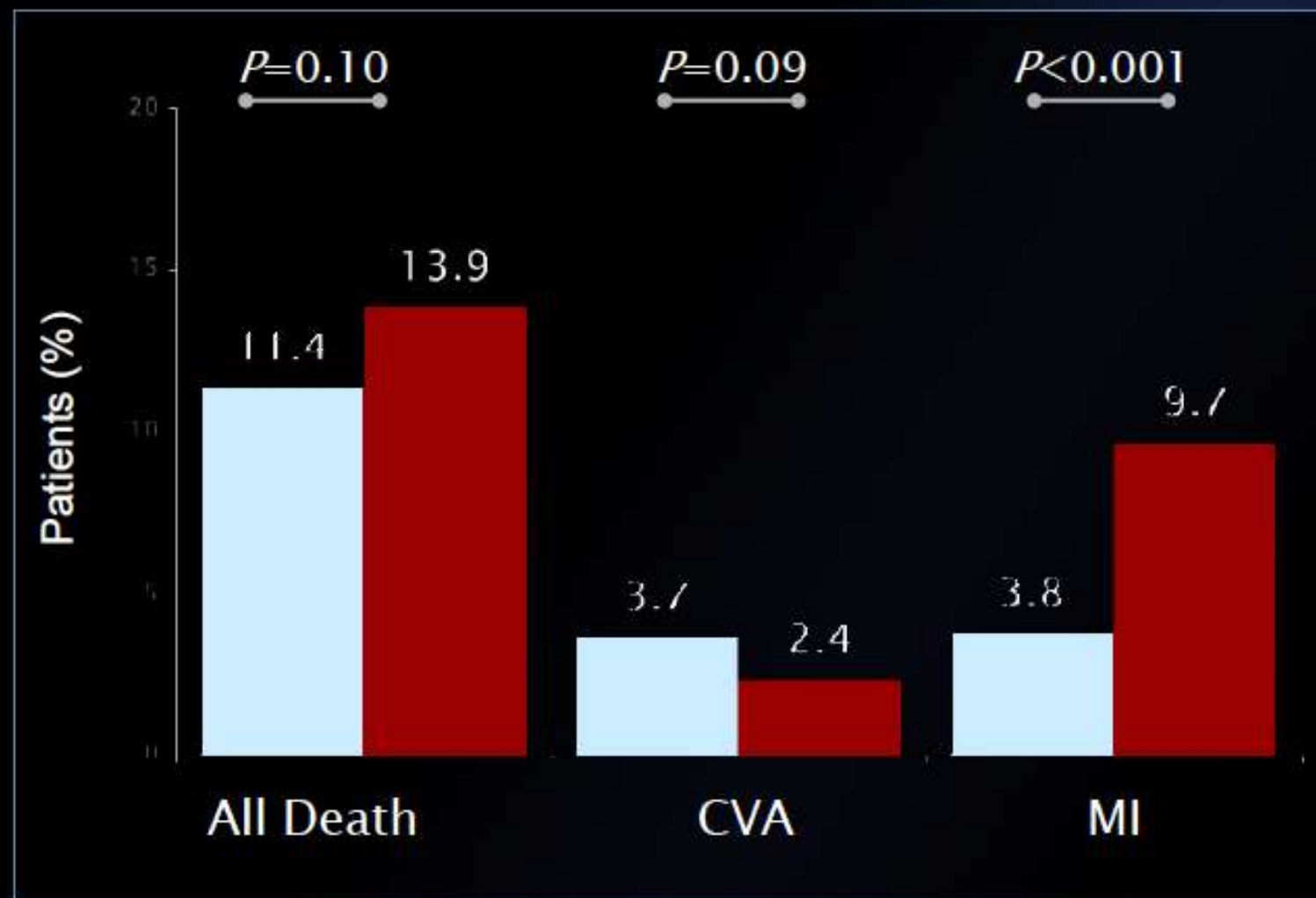
# SYNTAX

## 5-year Outcomes (N=1800)



■ CABG (n=897)

■ TAXUS (n=903)



Mohr FW et al. Lancet 2013;381:629-38



# Death, CVA, MI to 5 Years: *Impact of Diabetes*

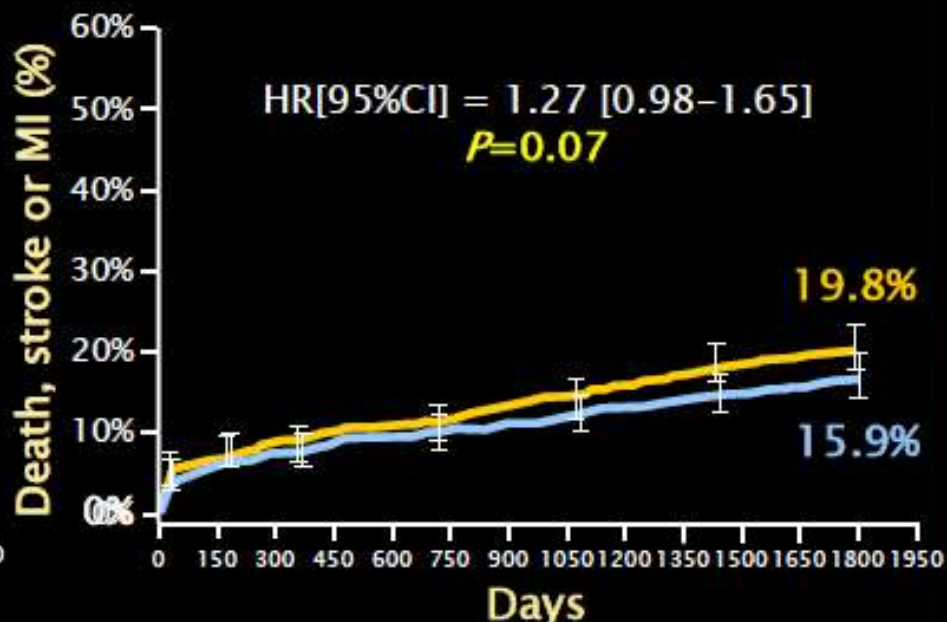
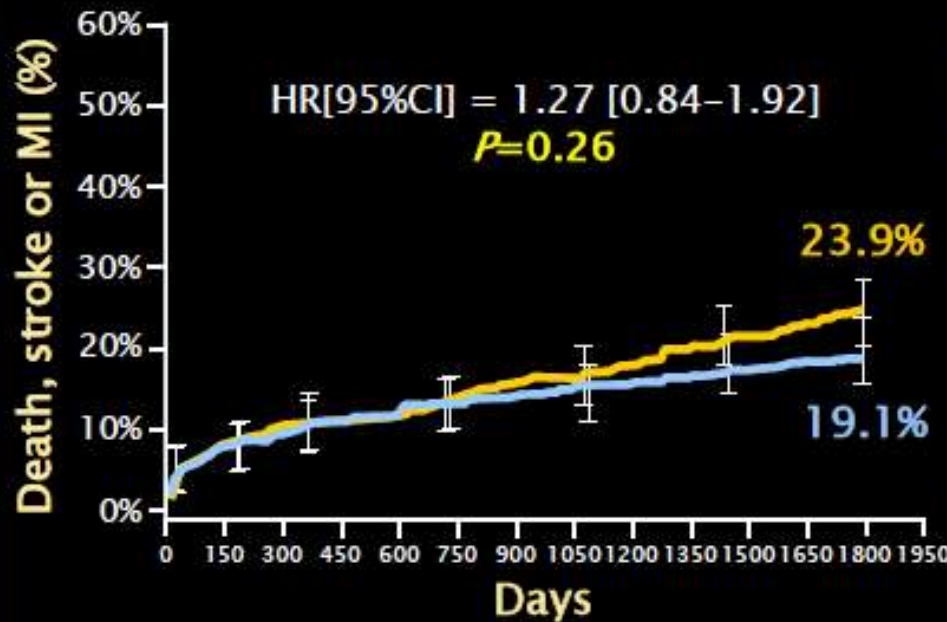


— CABG — TAXUS

**Diabetes**

$P_{int} = 0.76$

**No diabetes**



No. at risk:

Days	0	180	365	730	1095	1460	1825
PCI	231	217	206	205	197	188	178
CABG	221	198	187	183	175	169	160

No. at risk:

Days	0	180	365	730	1095	1460	1825
PCI	672	634	624	620	597	572	539
CABG	676	626	602	598	578	555	529

# Repeat Revasc to 5 Years: *Impact of Diabetes*

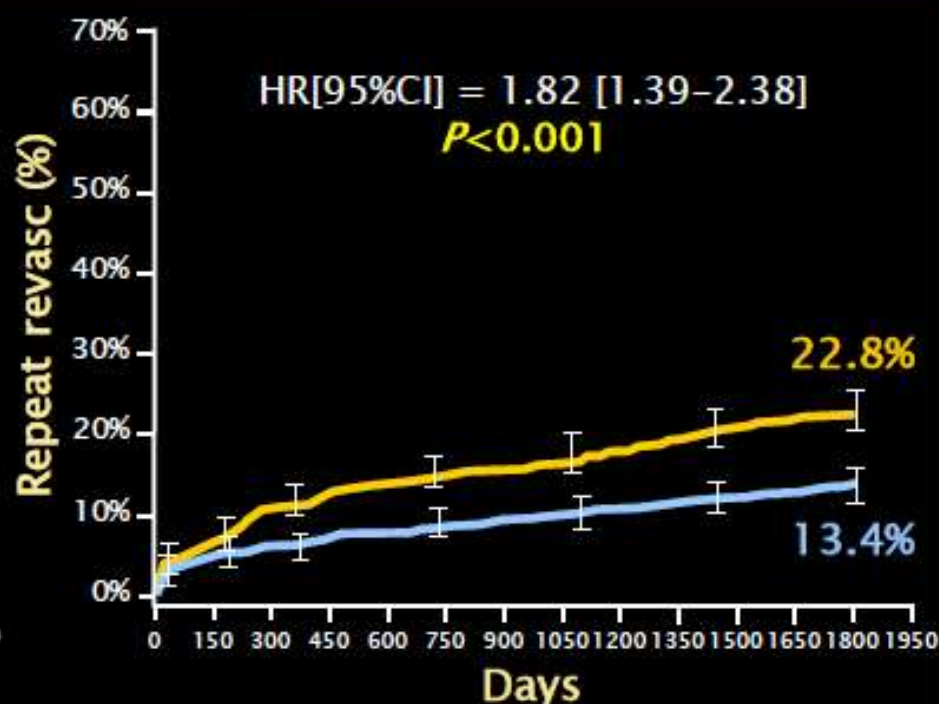
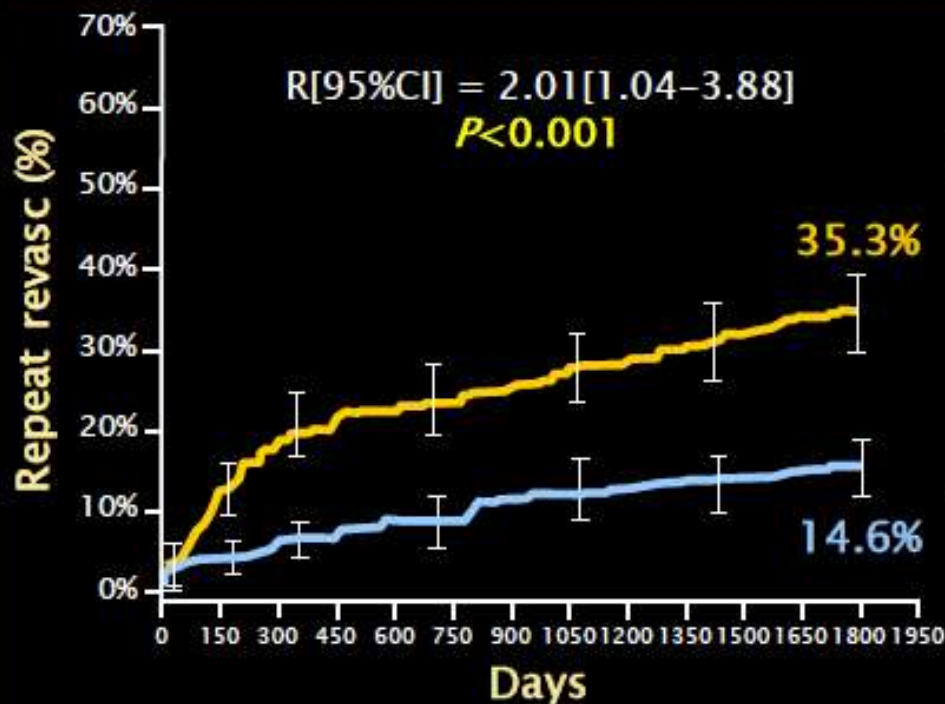


— CABG — TAXUS

**Diabetes**

$P_{int} = 0.08$

**No diabetes**



No. at risk:

Days	0	180	365	730	1095	1460	1825
PCI	231	212	179	172	158	142	131
CABG	221	198	183	180	168	156	150

No. at risk:

Days	0	180	365	730	1095	1460	1825
PCI	672	635	582	577	541	514	472
CABG	676	639	596	590	559	535	503

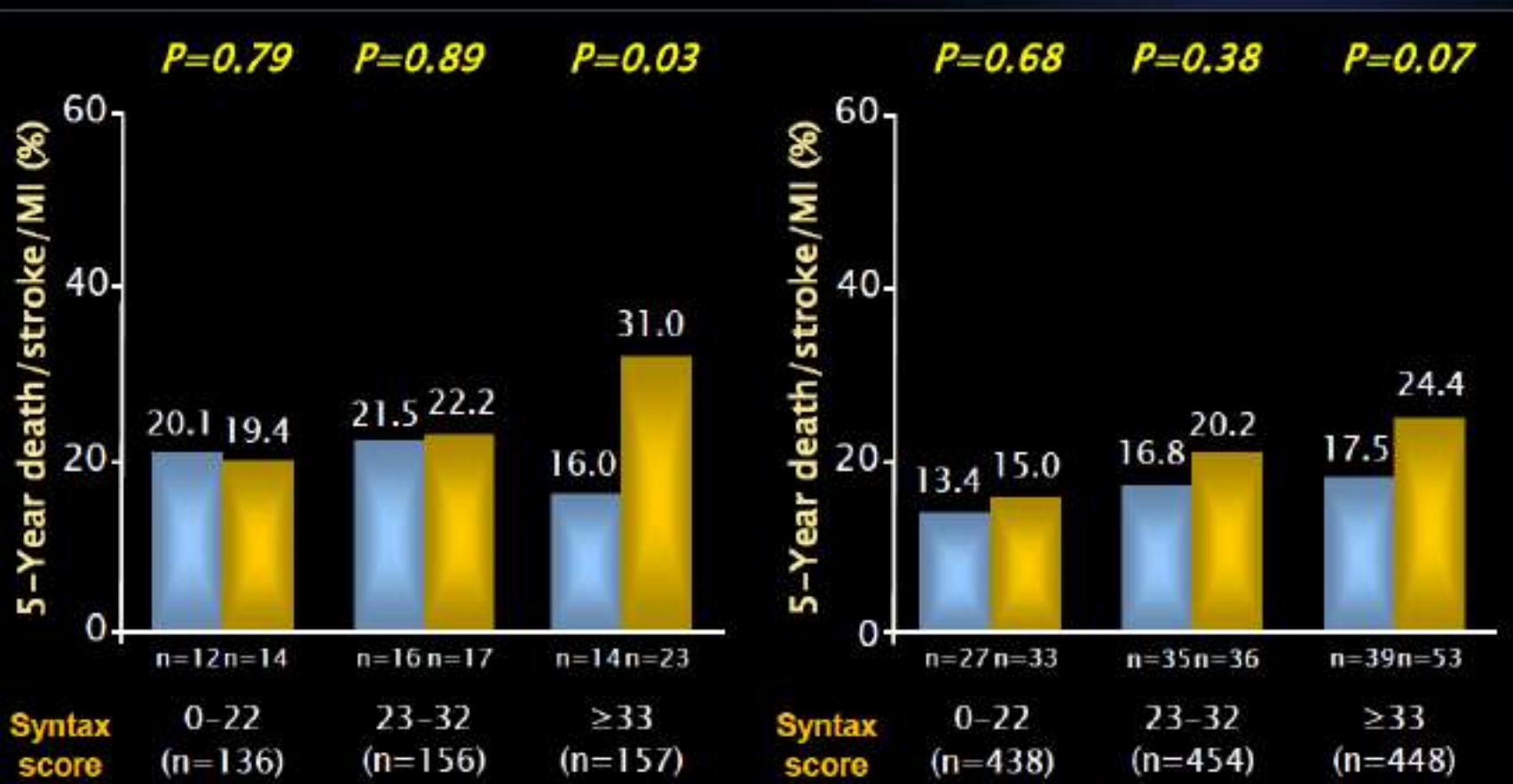
# Death, CVA, MI to 5 Years: Impact of Diabetes and Syntax Score

SYNTAX

CABG TAXUS

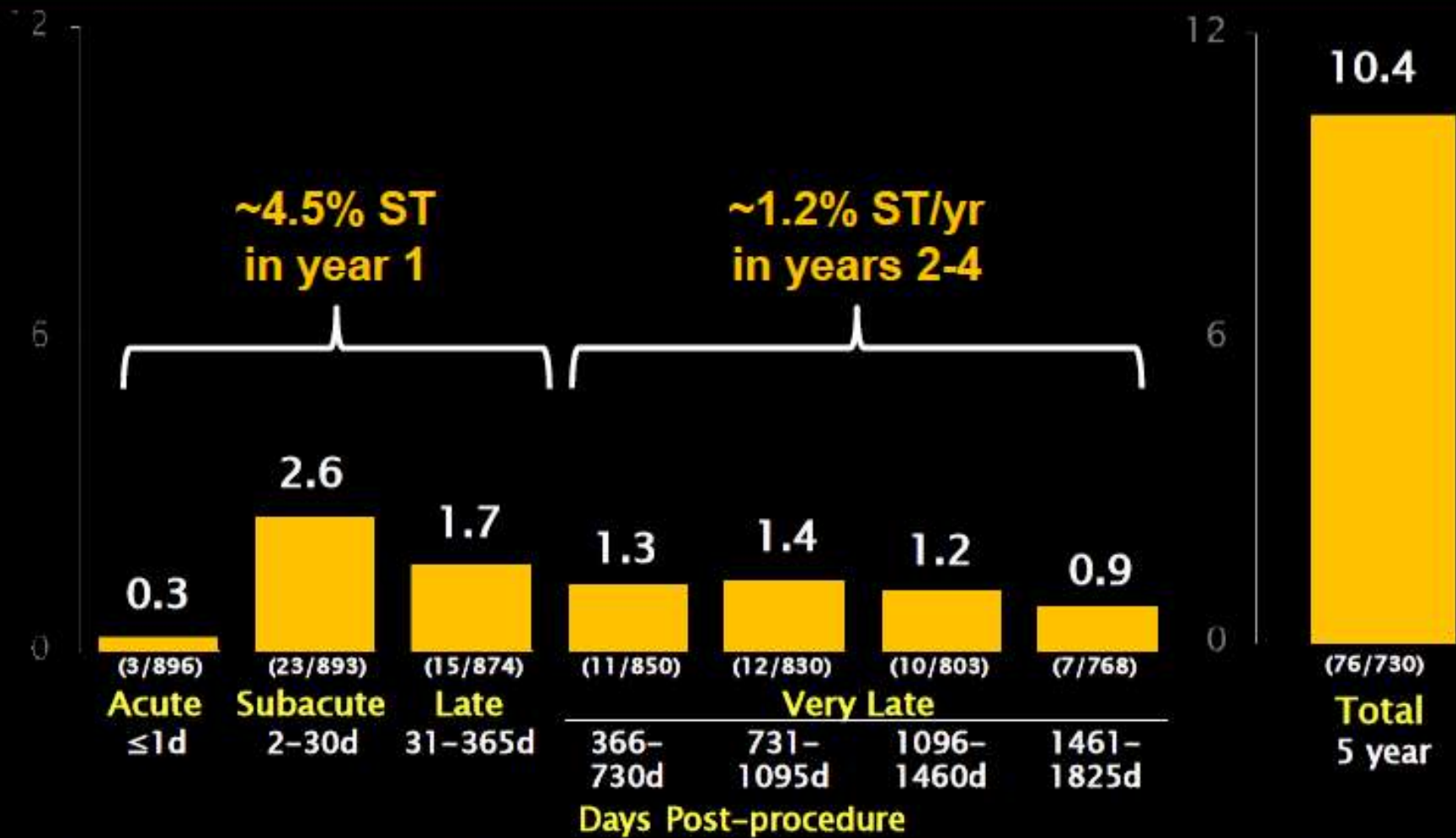
Diabetes

No diabetes





# SYNTAX: Definite/Probable ARC Stent Thrombosis to 5 Years (Per Patient)



Rate was ~ same in the LM and 3VD cohorts, and roughly independent of Syntax Score



## CABG Again Outshines Stenting for Some Patients With Coronary Artery Blockage

Mike Mitka, MSJ

LOS ANGELES—A study of patients with diabetes in need of multivessel revascularization has shown that coronary artery bypass graft (CABG) surgery produces better outcomes than percutaneous coronary intervention (PCI). The study, highlighted here in November during the annual Scientific Sessions of the American Heart Association (AHA), adds to the growing list of investigations showing superiority of CABG over PCI in a variety of patient populations.

Yet mounting evidence suggests that PCI continues to be performed at rates higher than is appropriate. So why does it remain difficult for interventional cardiologists to embrace this corner of the evidence-based medicine world?

At the AHA meeting, attendees heard the results from the Future Revascularization Evaluation in Patients With Diabetes Mellitus: Optimal Management of Multivessel Disease (FREEDOM) trial. The FREEDOM researchers randomized 1900 patients with diabetes and

“CABG surgery is the preferred intervention for patients with diabetes and multivessel disease,” said Valentin Fuster, MD, PhD, senior author of FREEDOM

103 549 patients who underwent PCI for treatment of 2-vessel or 3-vessel coronary artery disease without acute myocardial infarction from 2004 through 2008 (Weintraub WS et al. *N Engl J Med.* 2012;366[16]:1467-1476).

William S. Weintraub, MD, one of ASCERT's principal investigators and director of the Christiana Center for Outcomes Research in Wilmington, Del, said the FREEDOM trial should reinforce the superiority of CABG in revascularization of complicated patients. “Overall, surgery has been in decline for a number of years, and we’ve moved to less invasive procedures fairly easily,” said Weintraub in an interview. “But with FREEDOM, you are moving the needle back toward surgery.”

Fred H. Edwards, MD, another principal investigator with ASCERT and emeritus professor in the department of surgery at the University of Florida Academic Health Center in Jacksonville, said his trial and FREEDOM should give clinicians the evidence they need to make better-informed deci-



**New findings suggest that coronary artery bypass graft surgery produces better outcomes than stenting in patients with diabetes who require multivessel revascularization.**

Antonio Revere/www.sciencephoto.com

# **FUTURE REVASCULARIZATION EVALUATION IN PATIENTS WITH DIABETES: OPTIMAL MANAGEMENT OF MULTIVESSEL DISEASE**

## **FREEDOM Trial (NHLBI)**

**Eligibility: DM patients with MV-CAD eligible for stent or surgery**

**Exclude: Acute STEMI, cardiogenic shock**

**N=1900 at 100 centers from  
NA, SA, EU; Rand. 1:1**

**MV DES stenting  
(Cypher or TAXUS)**

**CABG**

**PRIMARY Endpoint: 3-year death, MI, stroke**

**SECONDARY Endpoints: 12-month MACCE, 3-year Quality of Life**



# Drug-eluting Stents: 1<sup>st</sup> Generation

TAXUS

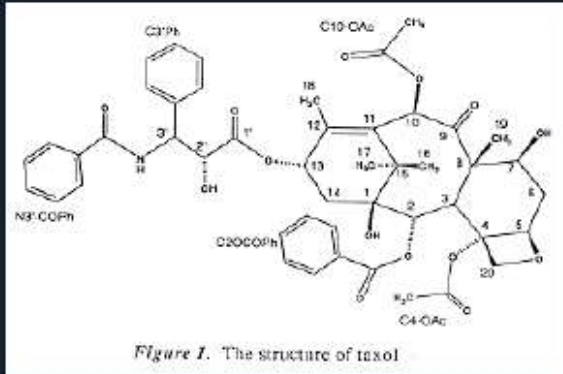
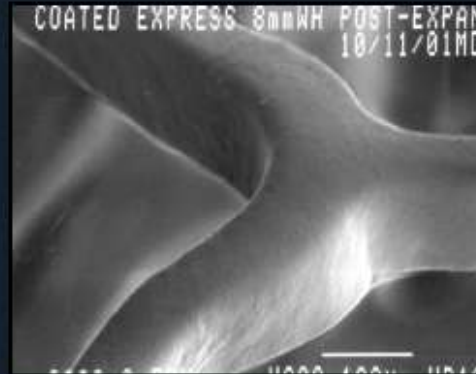
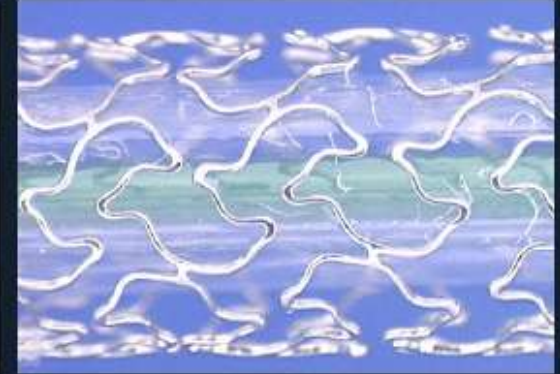


Figure 1. The structure of taxol

Paclitaxel  
Drug

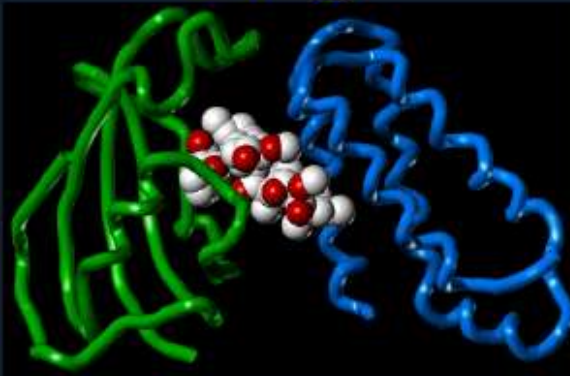


Polyolefin derivative  
Polymer

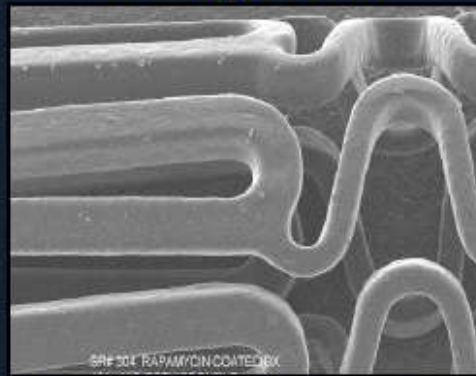


Liberté  
Stent

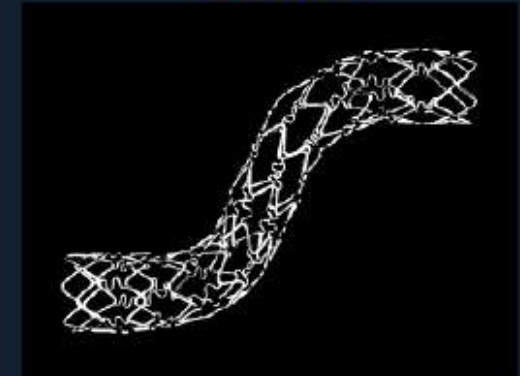
Cypher



Sirolimus



PEVA + PBMA blend



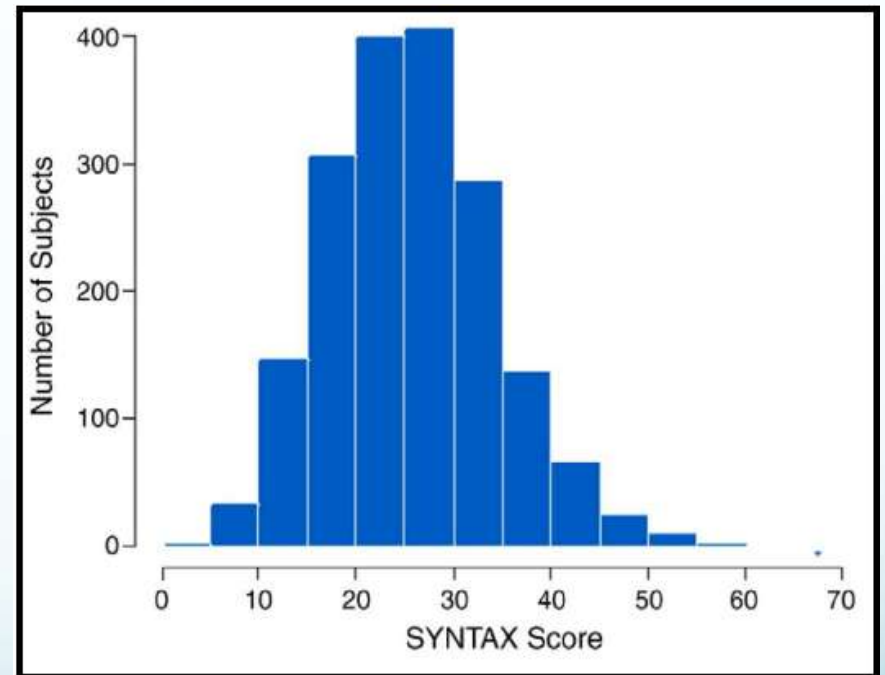
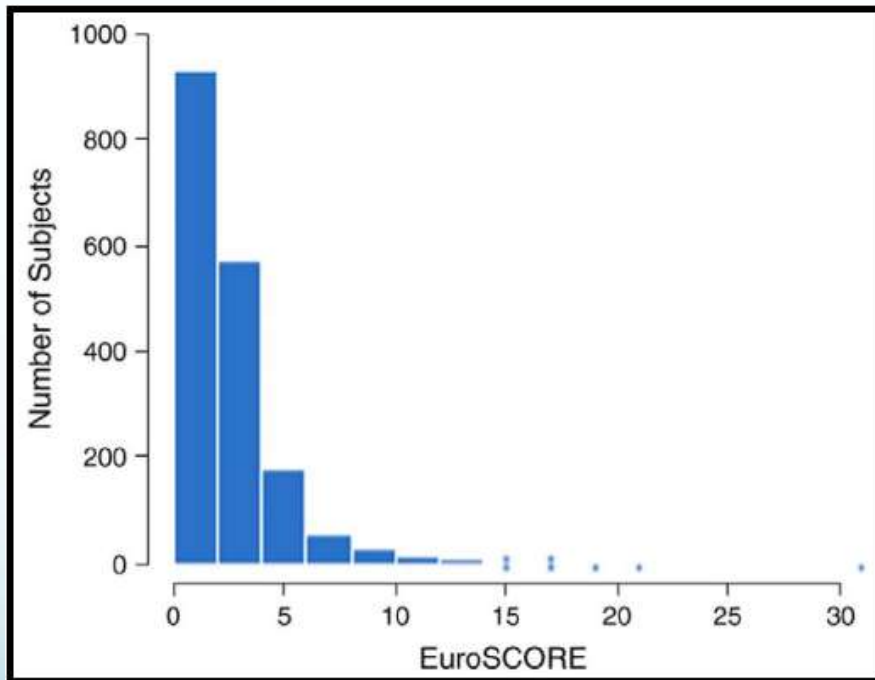
BX Velocity

# FREEDOM

<b>Characteristic</b>	<b>SES/PES (N=953)</b>	<b>CABG (N=947)</b>	<b>P-value</b>
Age (years)	63.2 ± 8.9	63.1 ± 9.2	0.78
Male sex	73.2%	69.5%	0.08
Use of insulin	33.8%	30.9%	0.19
Duration of diabetes – yrs	10.1 ± 8.9	10.31 ± 9.0	0.49
Hemoglobin A1c – %	7.8 ± 1.7	7.8 ± 1.7	0.86
Unstable angina	31.9%	29.5%	0.25
3VD	82.3%	84.5%	0.22
No. of lesions	5.7 ± 2.2	5.7 ± 2.2	0.33
SYNTAX score	26.2 ± 8.4	26.1 ± 8.8	0.77
EuroSCORE	2.7 ± 2.4	2.8 ± 2.5	0.52

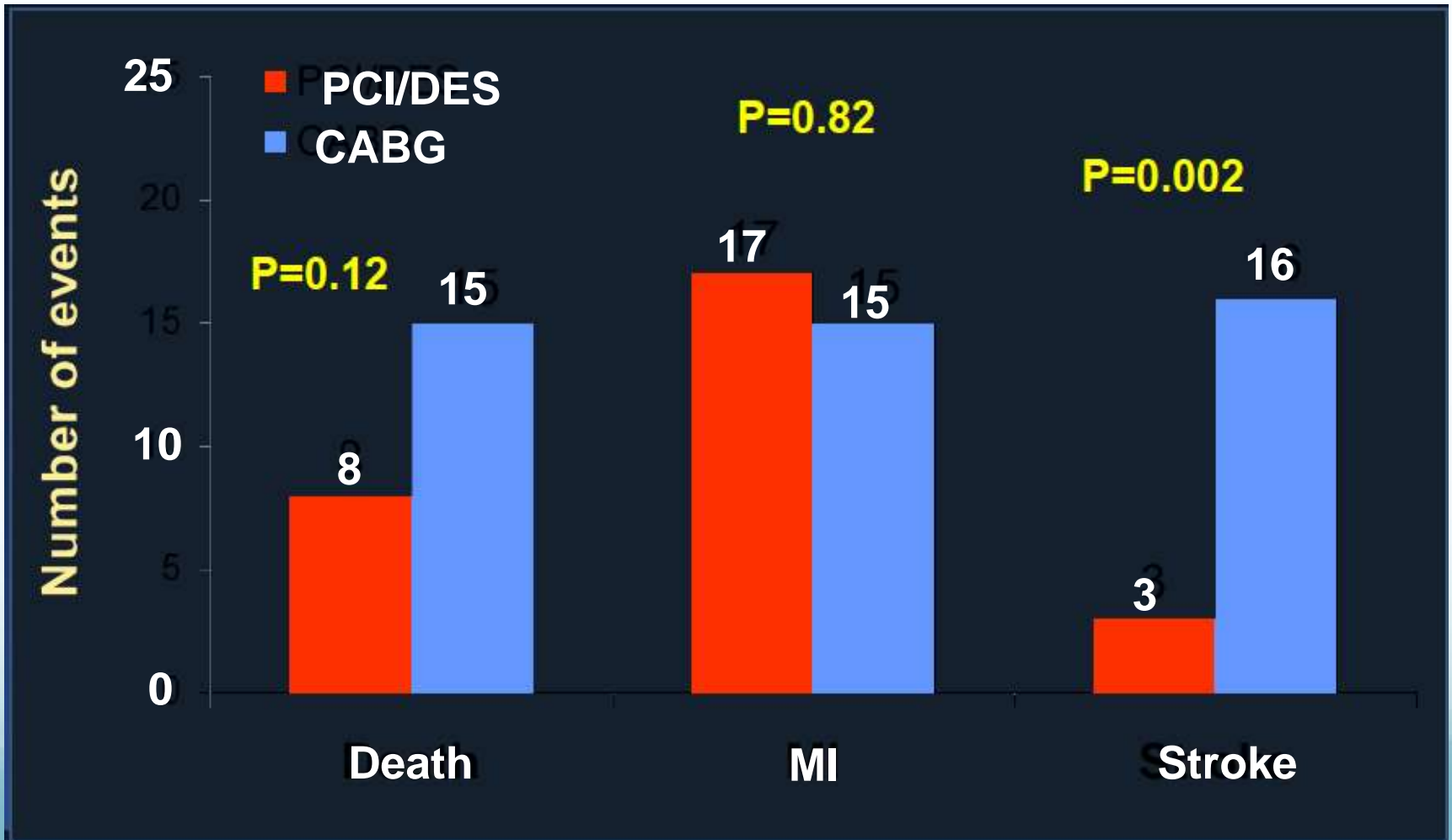
# FREEDOM

## Who Are These Patients



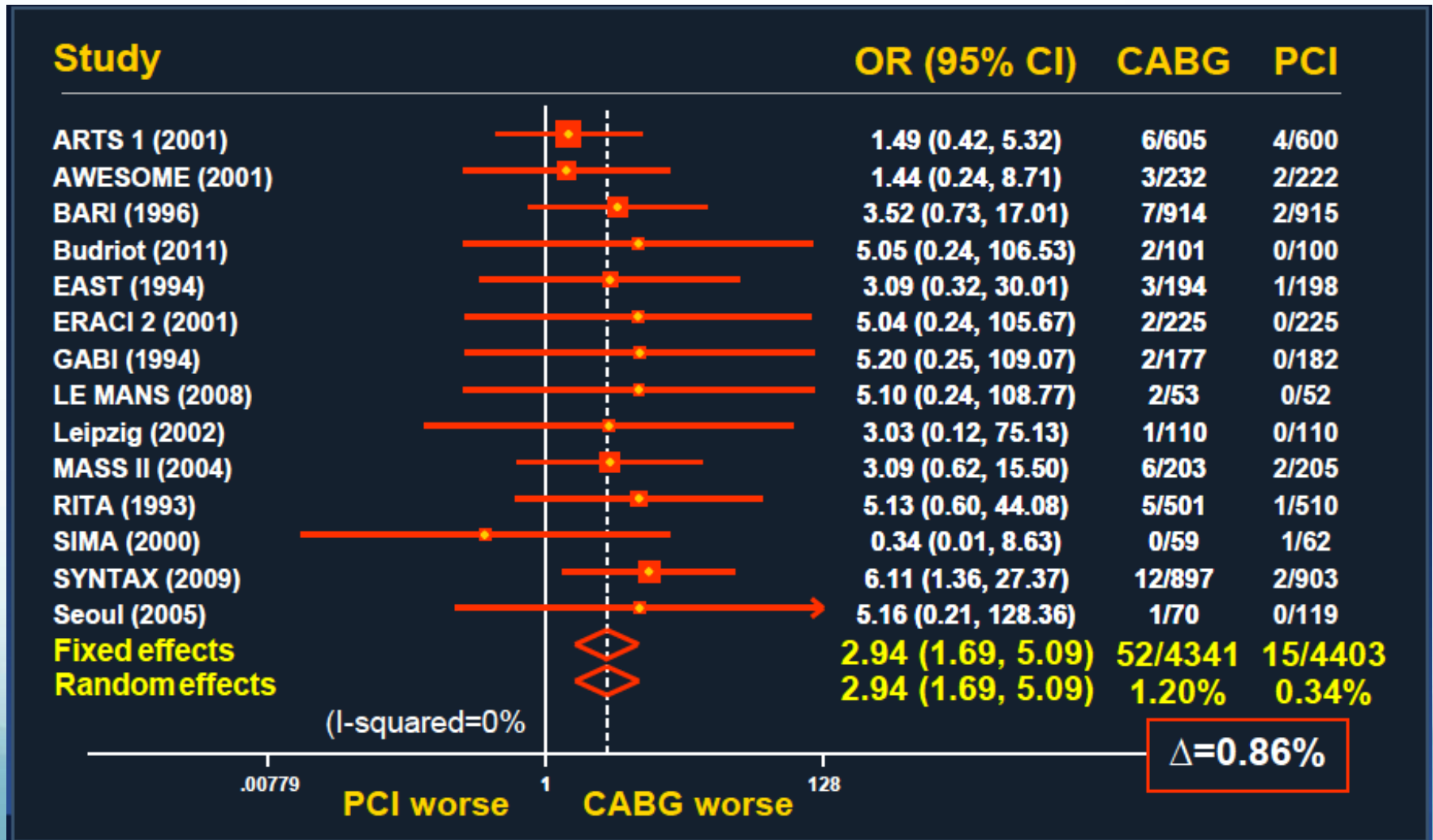
# FREEDOM

## SAFETY OUTCOMES (30 DAYS)



# Risk of Stroke with CABG vs. PCI

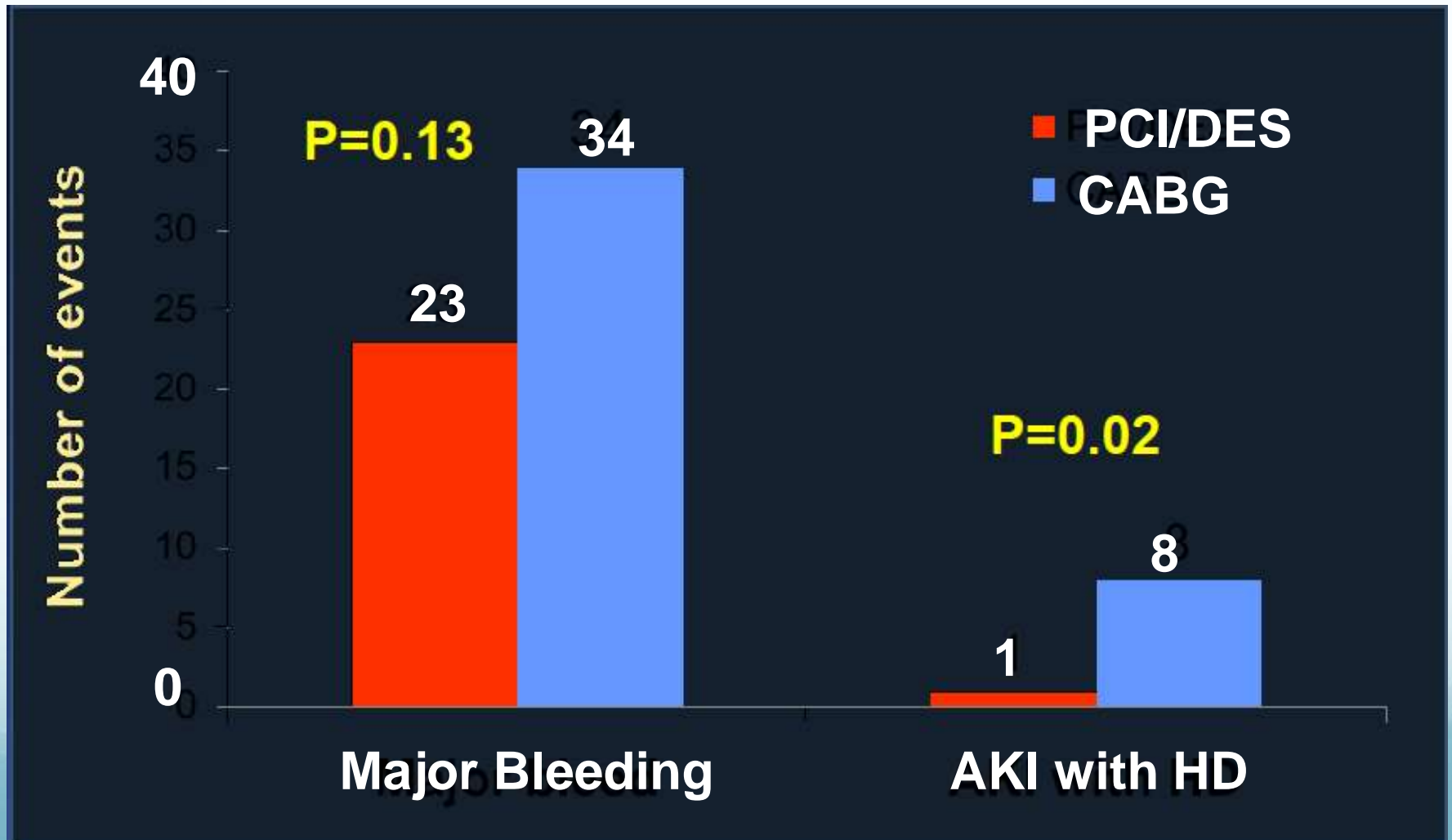
Meta-analysis of 19 randomized trials , 10.944 patients  
30-Day Outcome





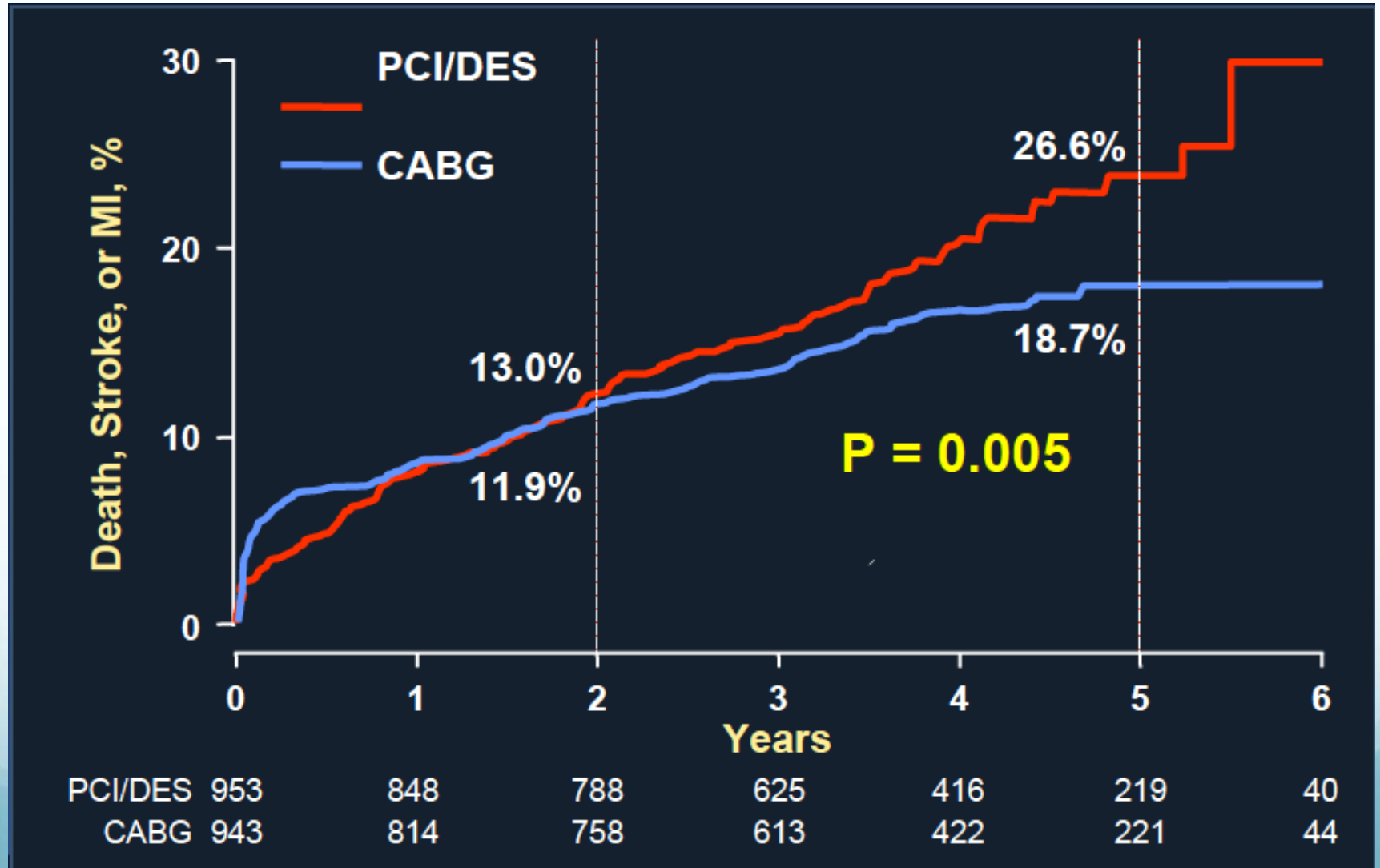
# FREEDOM

## SAFETY OUTCOMES (30 DAYS)



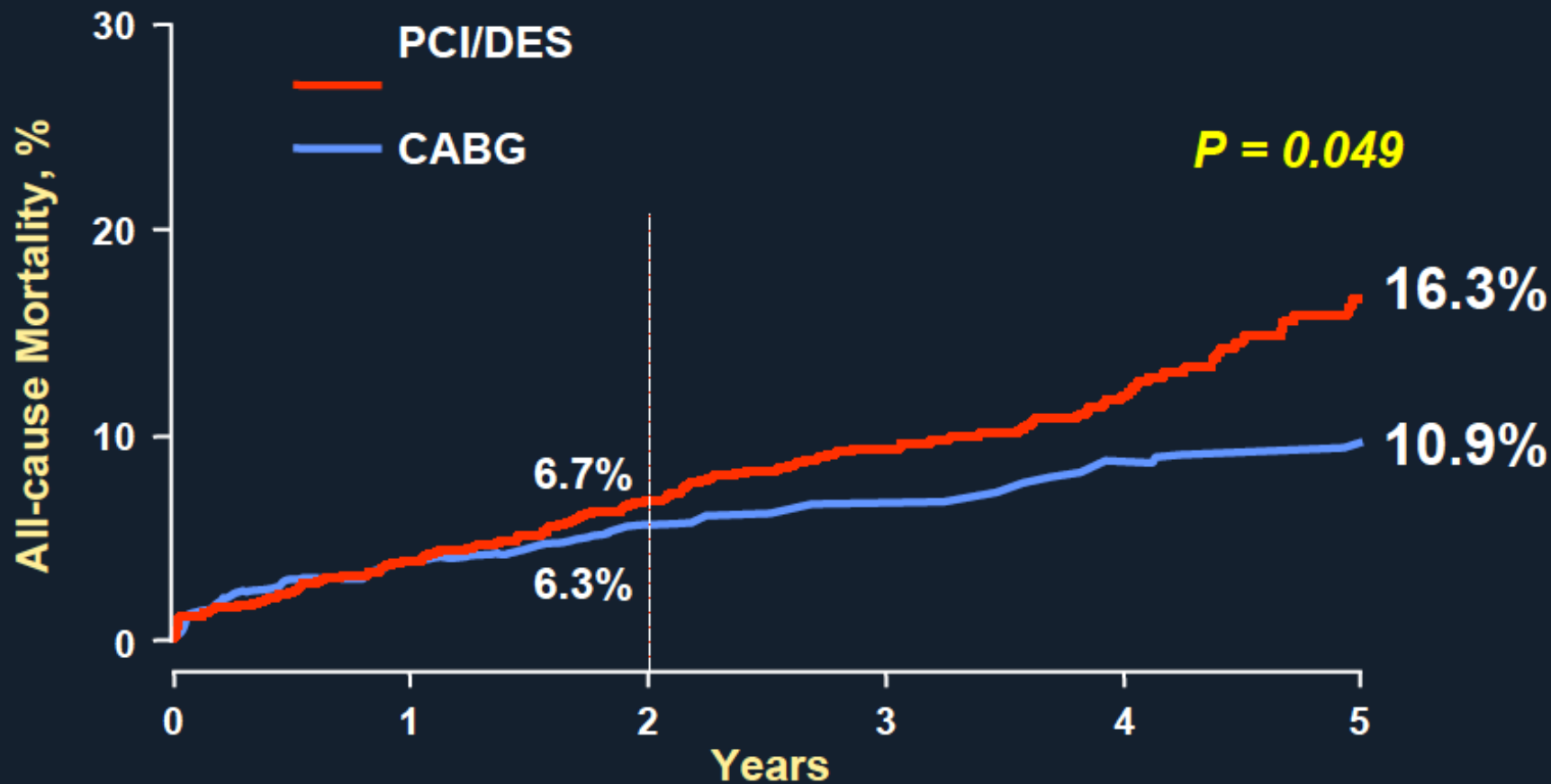
# FREEDOM

Primary Endpoint: Death, Stroke, or MI



# FREEDOM

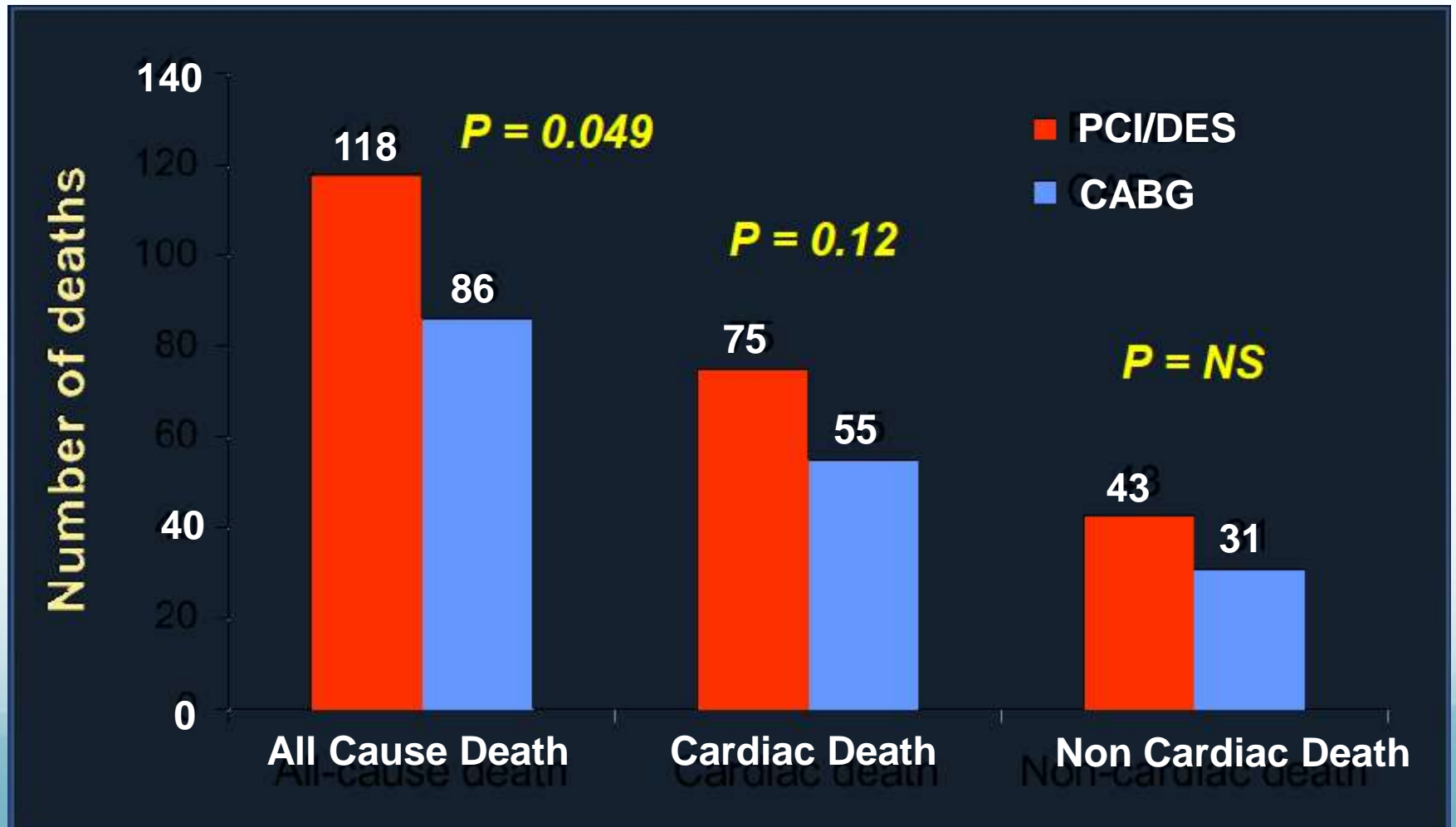
## All Cause Mortality



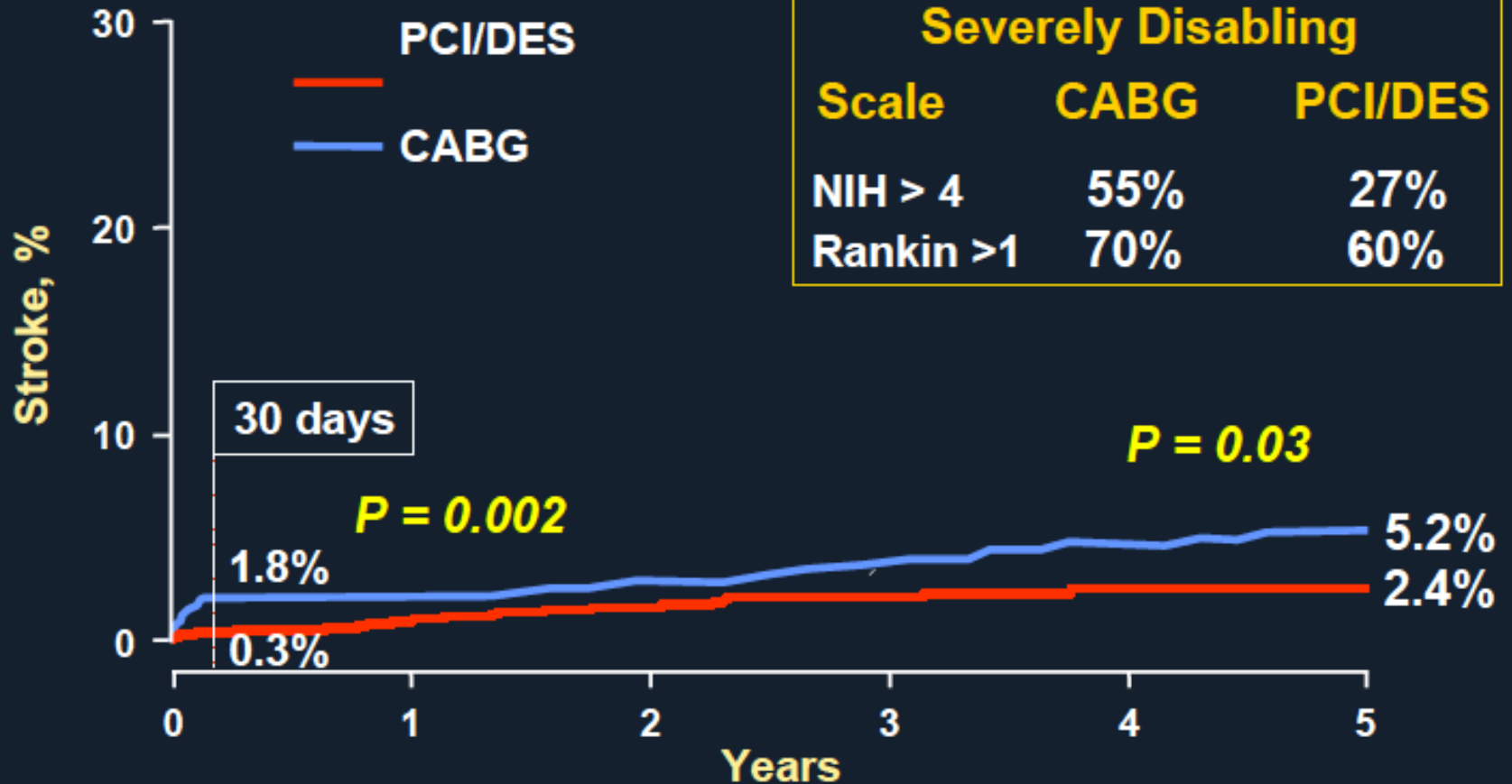
PCI/DES	953	897	845	685	466	243
CABG	947	855	806	655	449	238

# FREEDOM

## All Cause Mortality



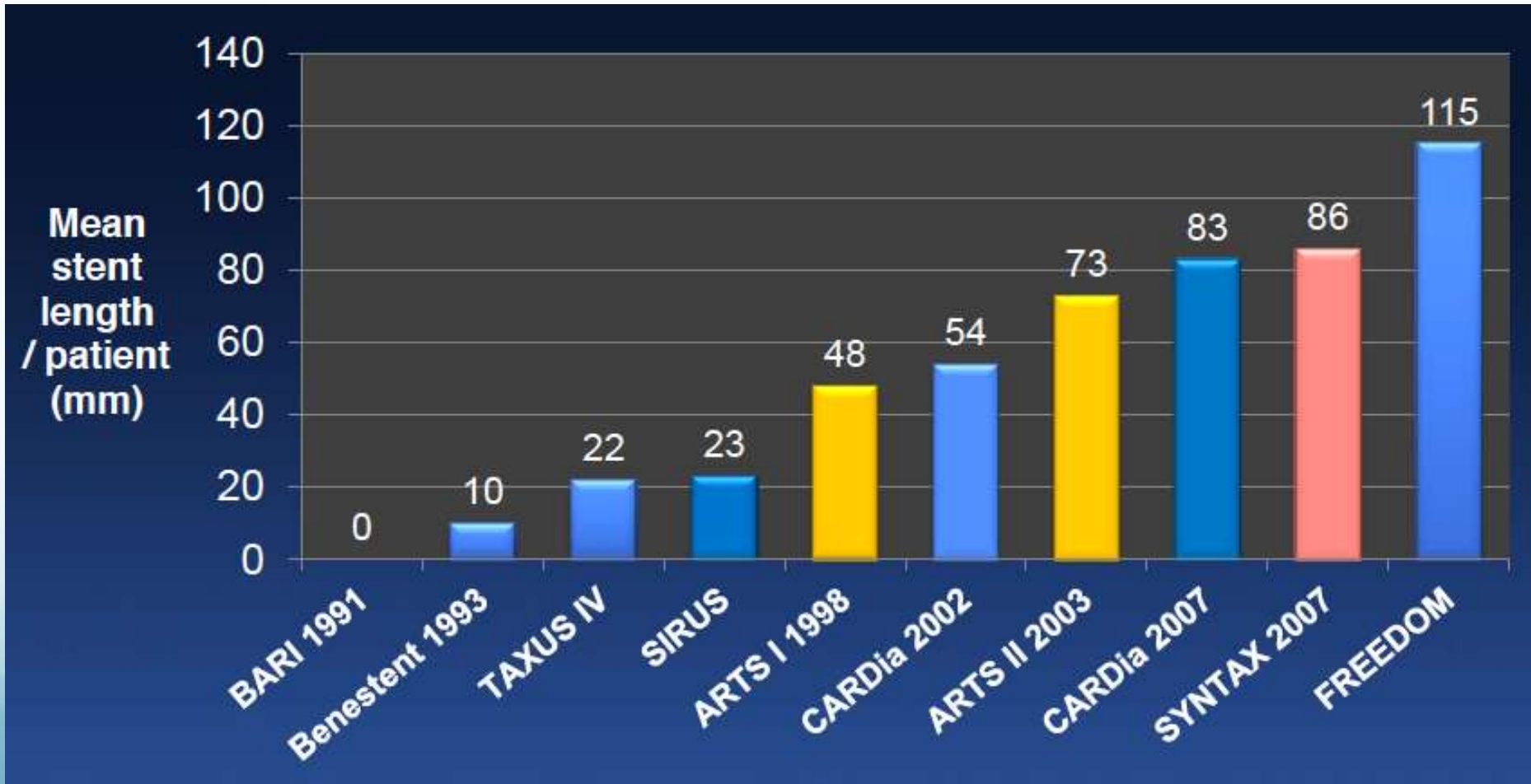
# Stroke



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

# Stent Usage Per Patients

A Marker of Lesion Complexity OR Over-Stenting?



# Conclusions

- The most contemporary RCTs of PCI vs. CABG in patients with MVD and diabetes mellitus do not show a consistent advantage for CABG in reduction of cardiac mortality, particularly in patients with lower/intermediate SYNTAX score.
- With current DES, the benefits of PCI compared to CABG in terms of lesser invasiveness, lower major procedural complications, better early QOF, and lower stroke rate outweigh the higher rate of repeat revascularization, as long as mortality is not increased.