Why PCI ?
Patients and Lesion Selection

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Why PCI ?

To Avoid the Surgery !

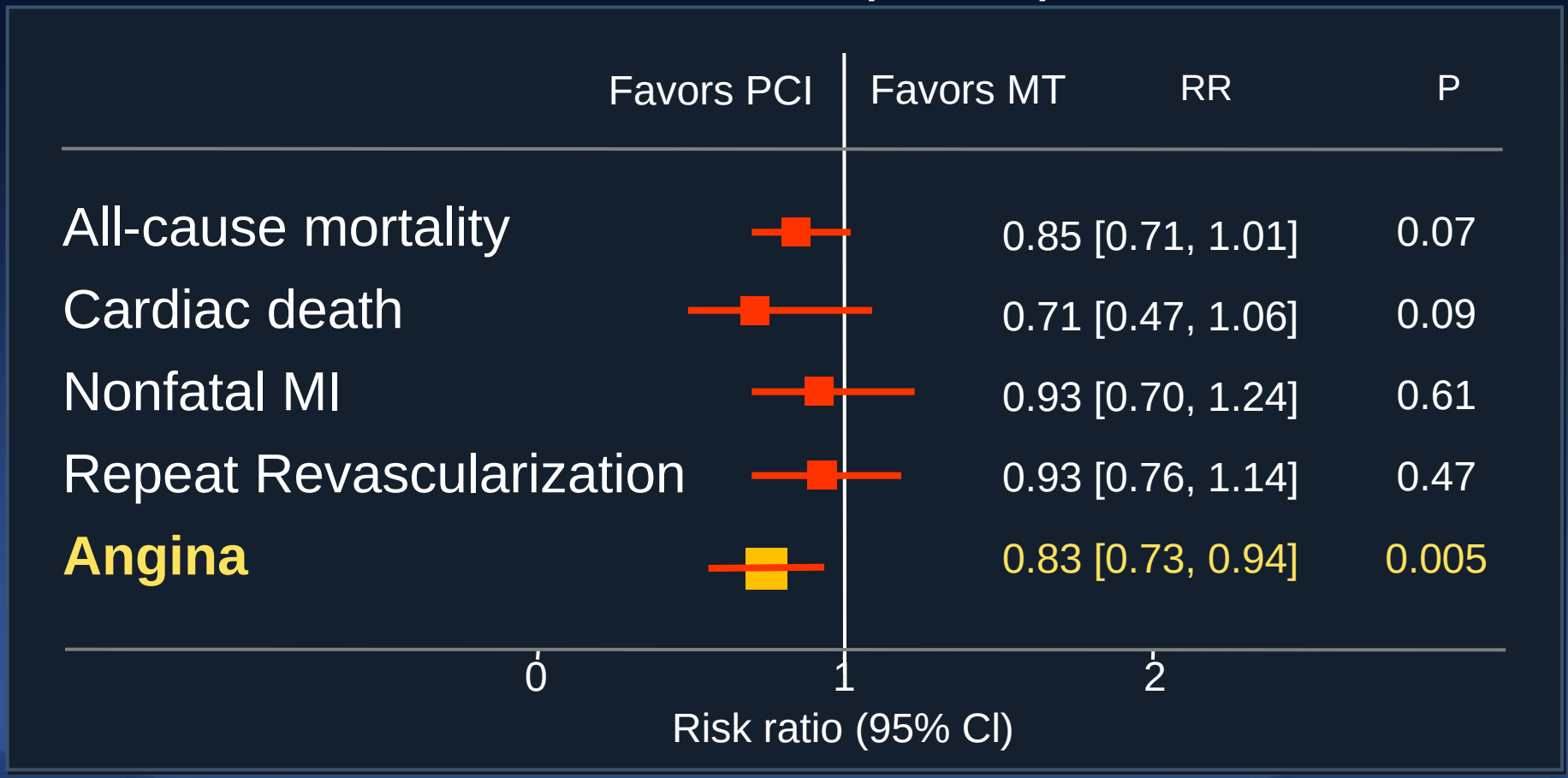
Survival Benefit of CABG
Over Medications in Stable Disease
2016

1. Left Main Disease,
2. 3 Vessel Disease with LV dysfunction, including Ischemic Cardiomyopathy

Velazquez EJ, et al. NEJM.org 2016, April 3
Caracciolo E A et al. Circulation 1995;91:2325-2334
CASS Investigators, Circulation 1983;68:939-950

No Survival Benefit of PCI
Over Medications in Stable Disease

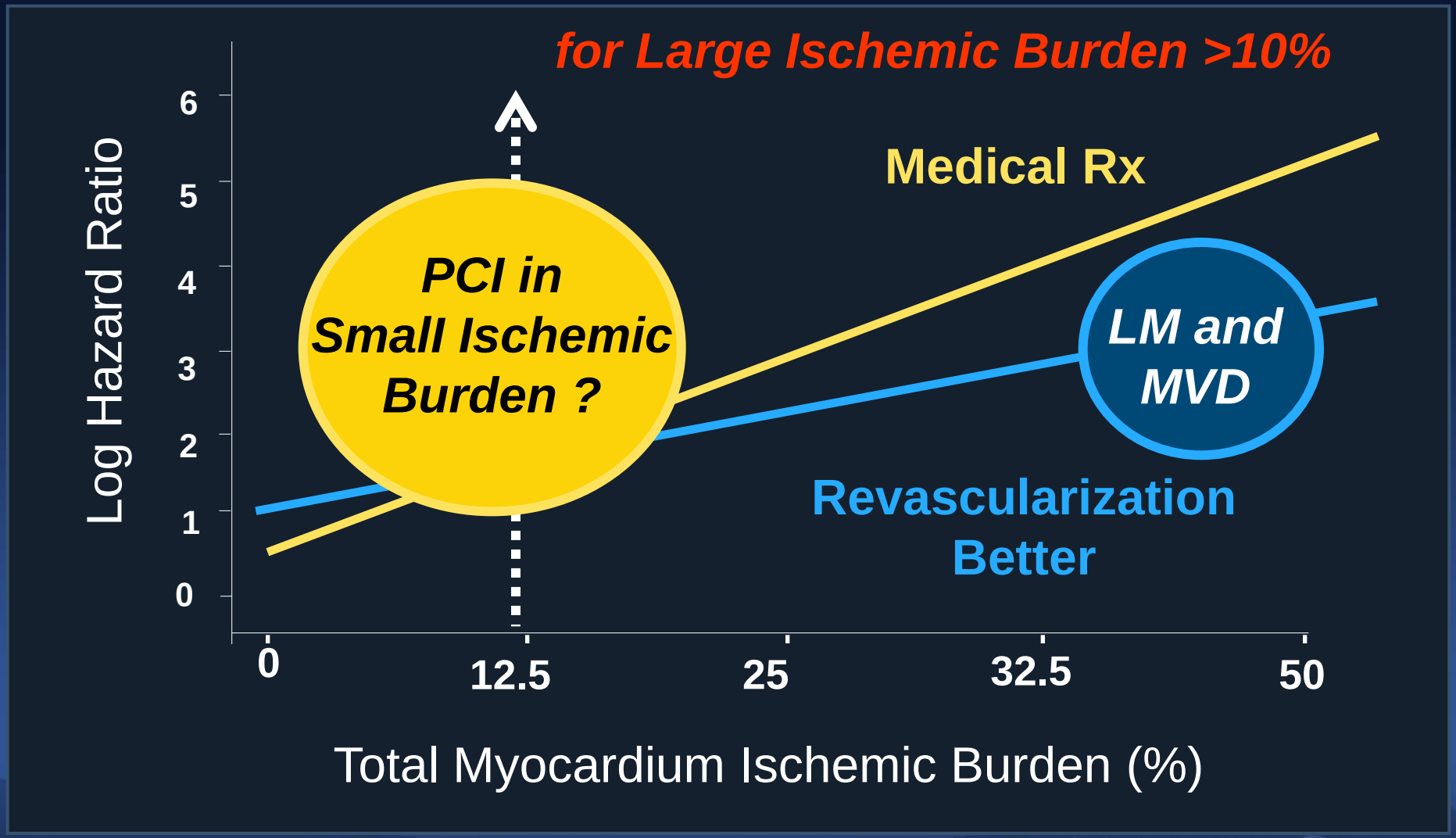
12 RCTs, 7182 participants



Pursnani et al, Circ CV Intv 2012

Why
No Survival Benefit of PCI ?

Survival Benefit of Revascularization



Hachamovitch R, Circulation. 2003;107:2900-2906

PCI Classification

Cosmetic Angioplasty	*Symptomatic Angioplasty*	*Survival Angioplasty*
Non-Viable, Asymptomatic, Small Ischemic Myocardium, FFR >0.80	For Angina Relieve	For Large Ischemic Burden, LM and 3 VD, 2 VD with pLAD Lesion

Inappropriate Angioplasty (50%)
JAMA 2011;306(1):53-61

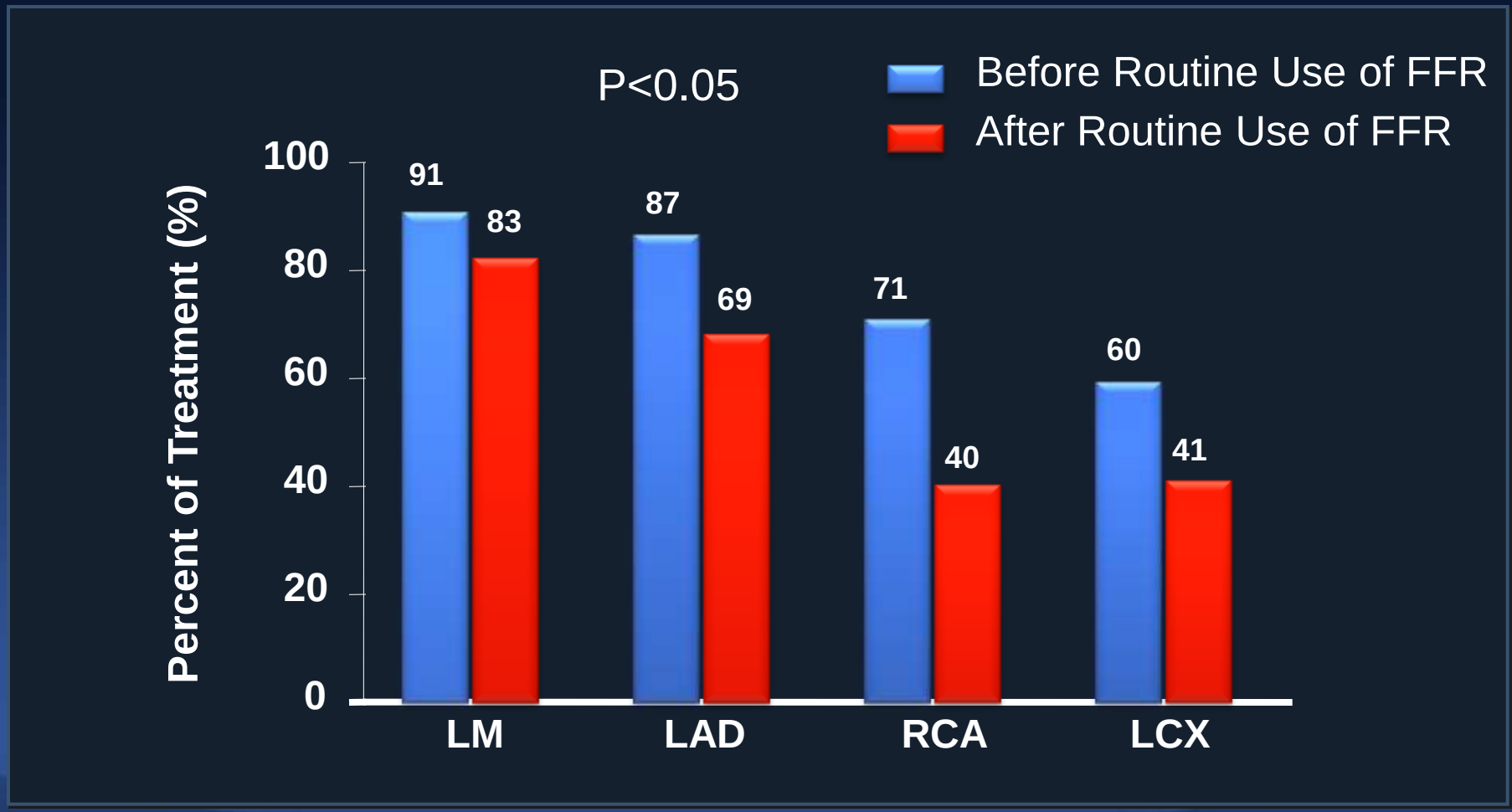
Patients Selection

Why PCI ?

1. Symptom Relieve
2. LM PCI, and Multi-Vessel PCI,
   for Survival Benefit Over Medication

Treated Vessel Territory in Recent Practice

Mainly, LM and LAD



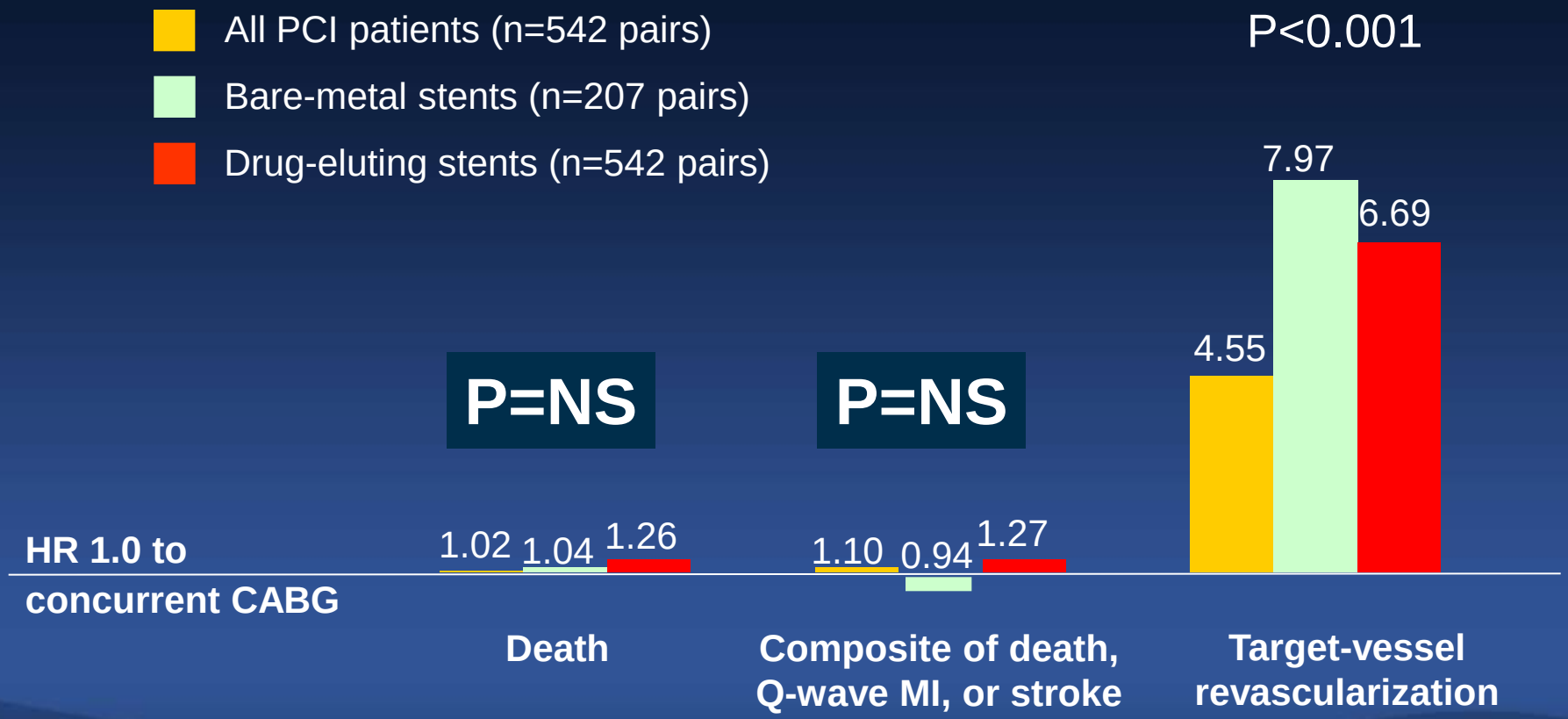
Park SJ, European Heart Journal. 2013 Nov;34(43):3353-61.

Current Status of Left Main PCI

LM PCI vs. CABG

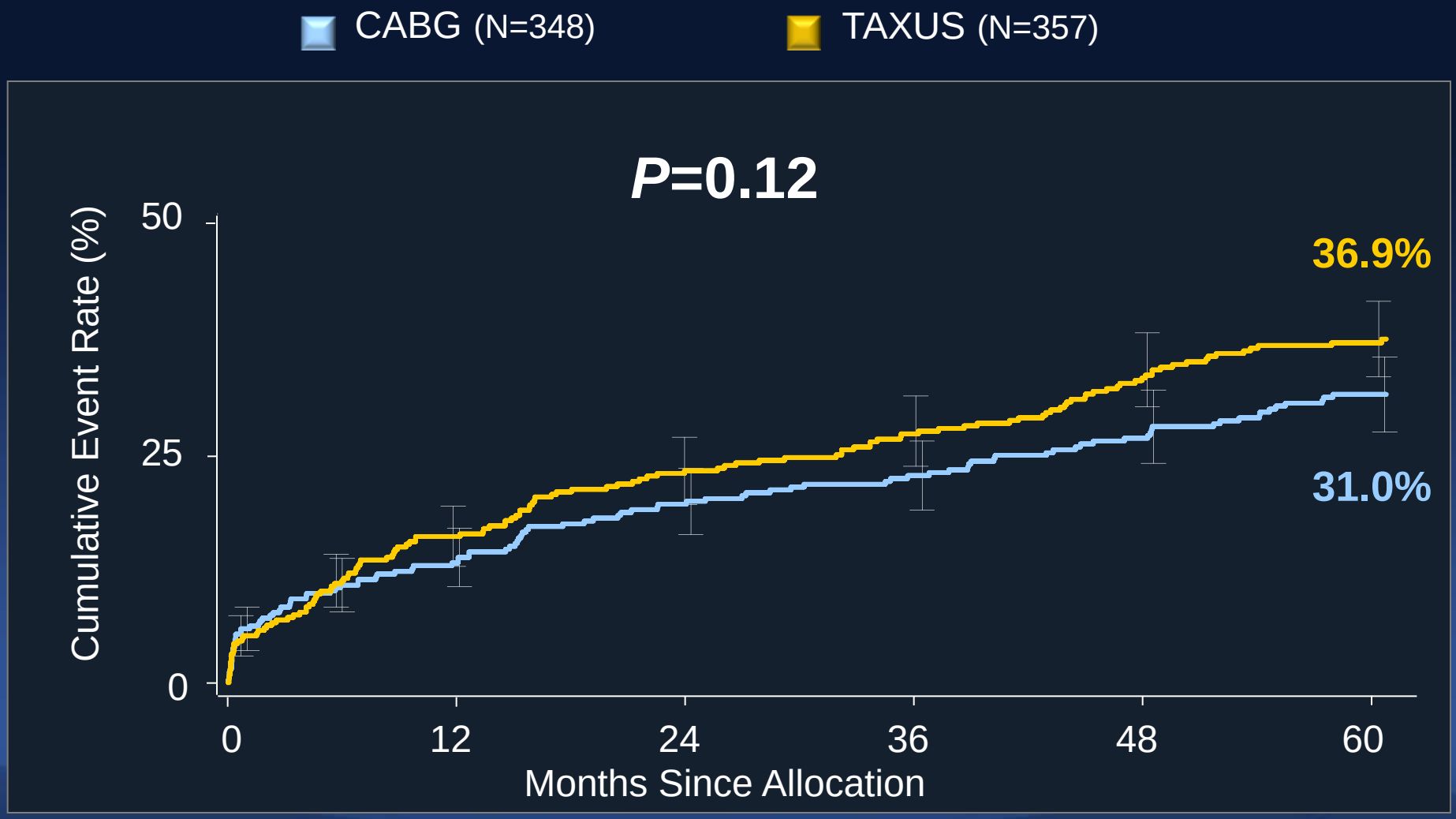
1. MAIN COMPARE Registry
2. SYNTAX, LM subgroup
3. PRECOMBAT
4. Combined Patient Level Meta-Analysis
5. EXCEL
6. NOBLE

MAIN COMPARE, 5 Year
Death /MI /Stroke



Park DW, et al. JACC 2010;56:117-24

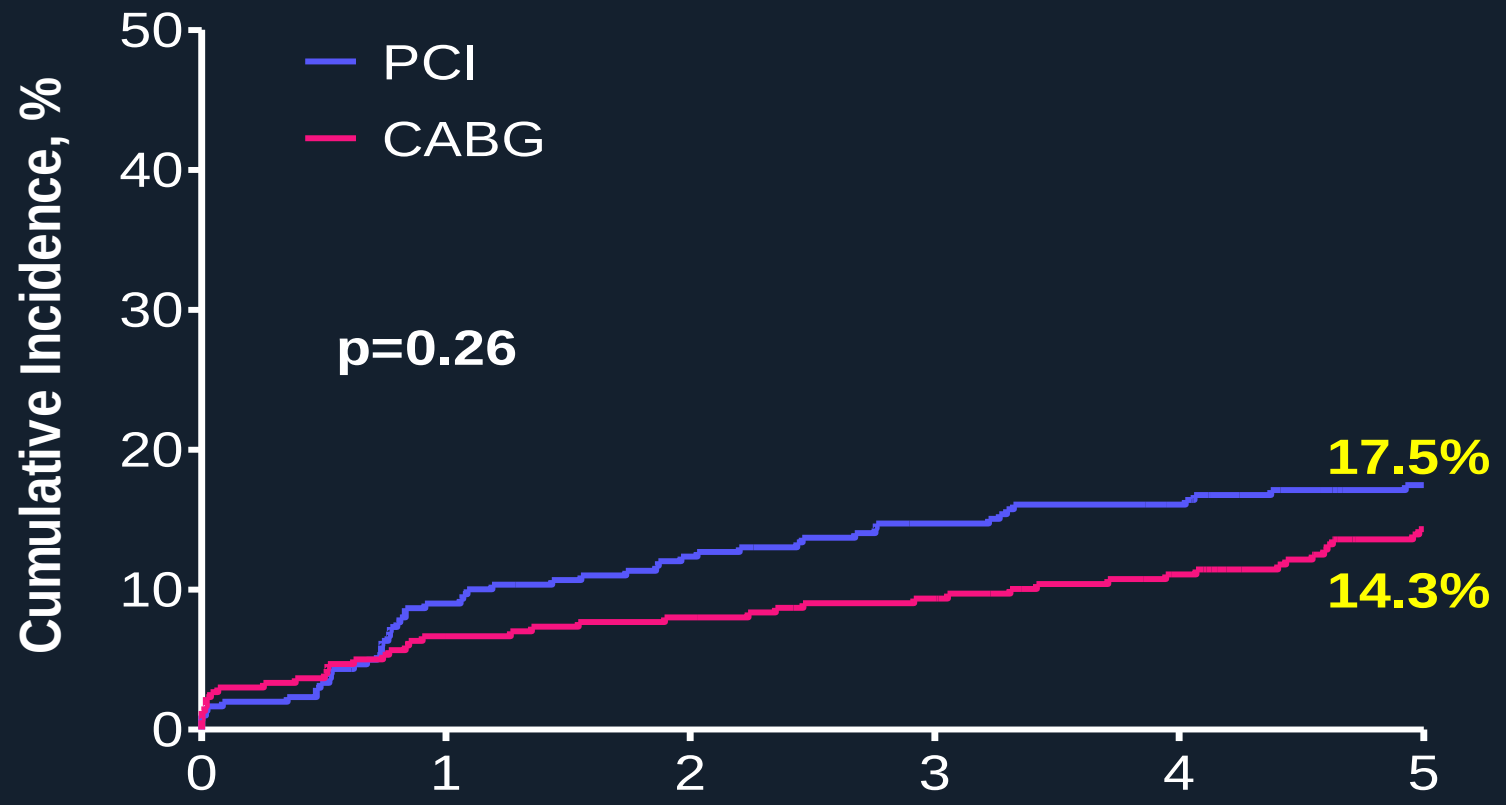
SYNTAX (LM Subset), 5 Year
Death /MI /Stroke /Repeat Revascularization



Cumulative KM Event Rate ± 1.5 SE; log-rank *P* value;*Binary rates

ITT population

PRECOMBAT, 5 Year
Death. MI, Stoke or iTVR



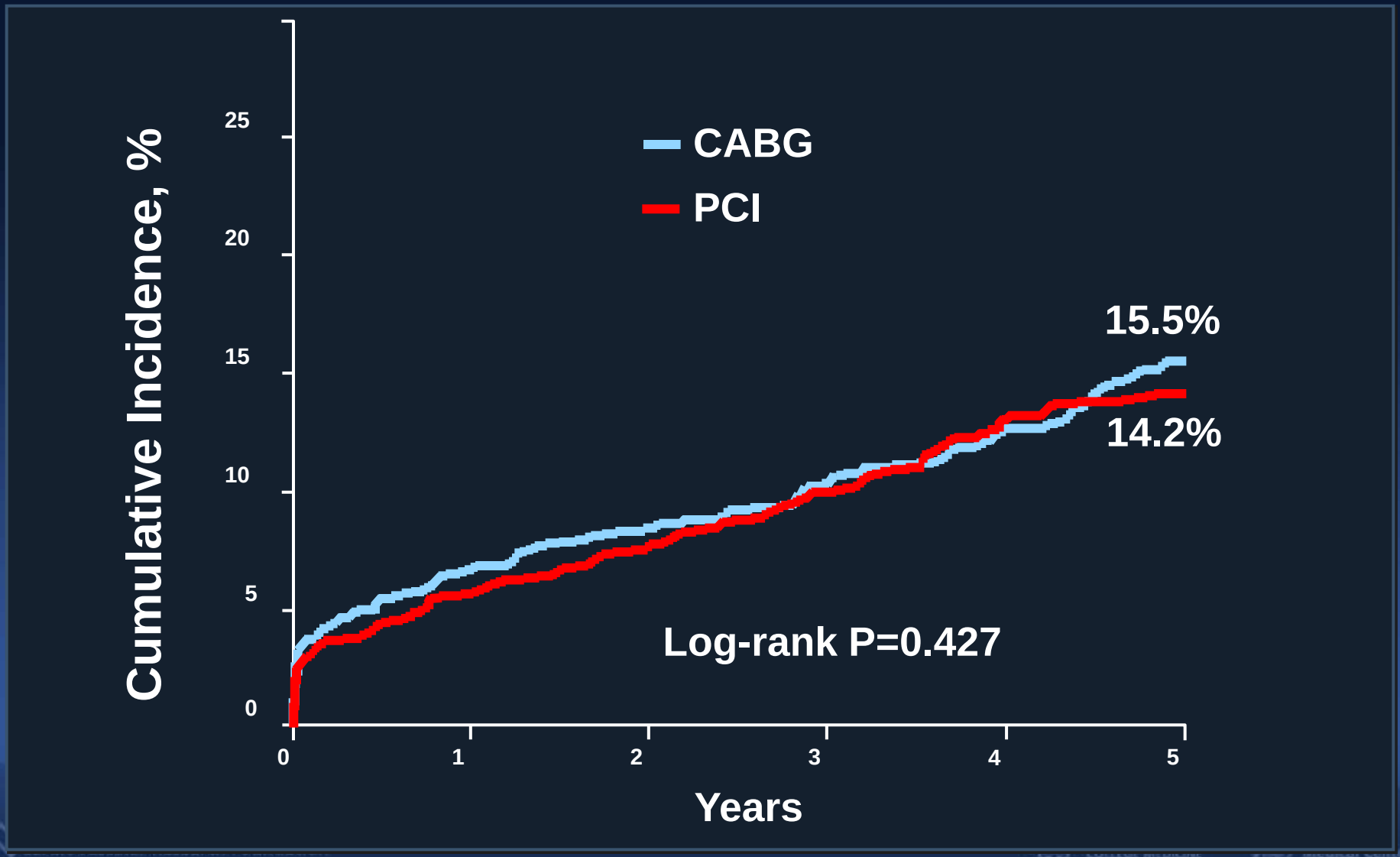
Patient at risk

PCI	300	272	261	252	246	231
CABG	300	279	274	267	256	235

Ahn JM et al, JACC. 2015 Mar 10.

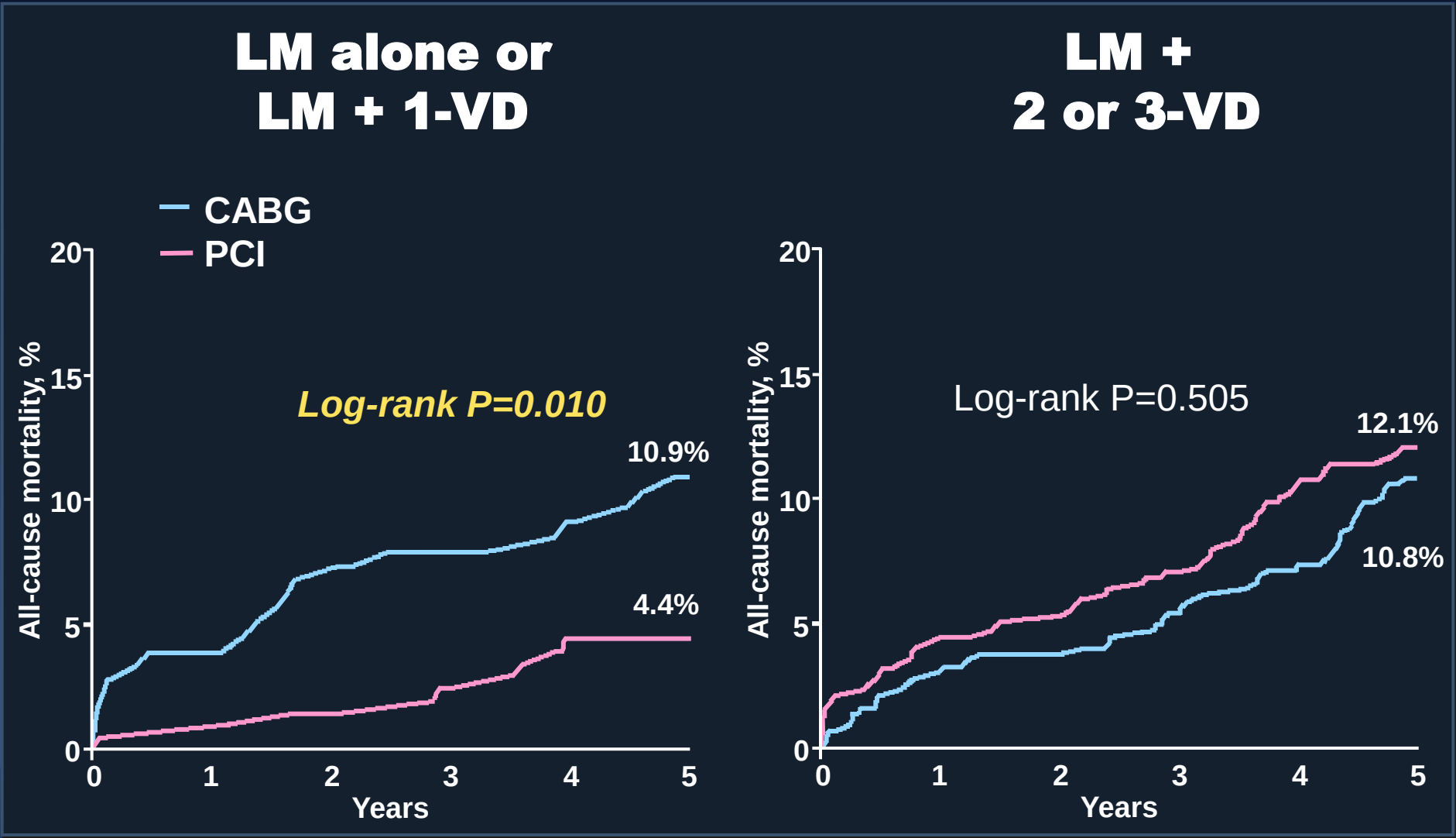
Patient-Level Meta-Analysis
(Syntax, PRECOMBAT and BEST; n=1,293)

LM Subset / Death, MI or Stroke



Patient-Level Meta-Analysis
(Syntax, PRECOMBAT and BEST; n=1,293)

LM Subset / All-cause Mortality



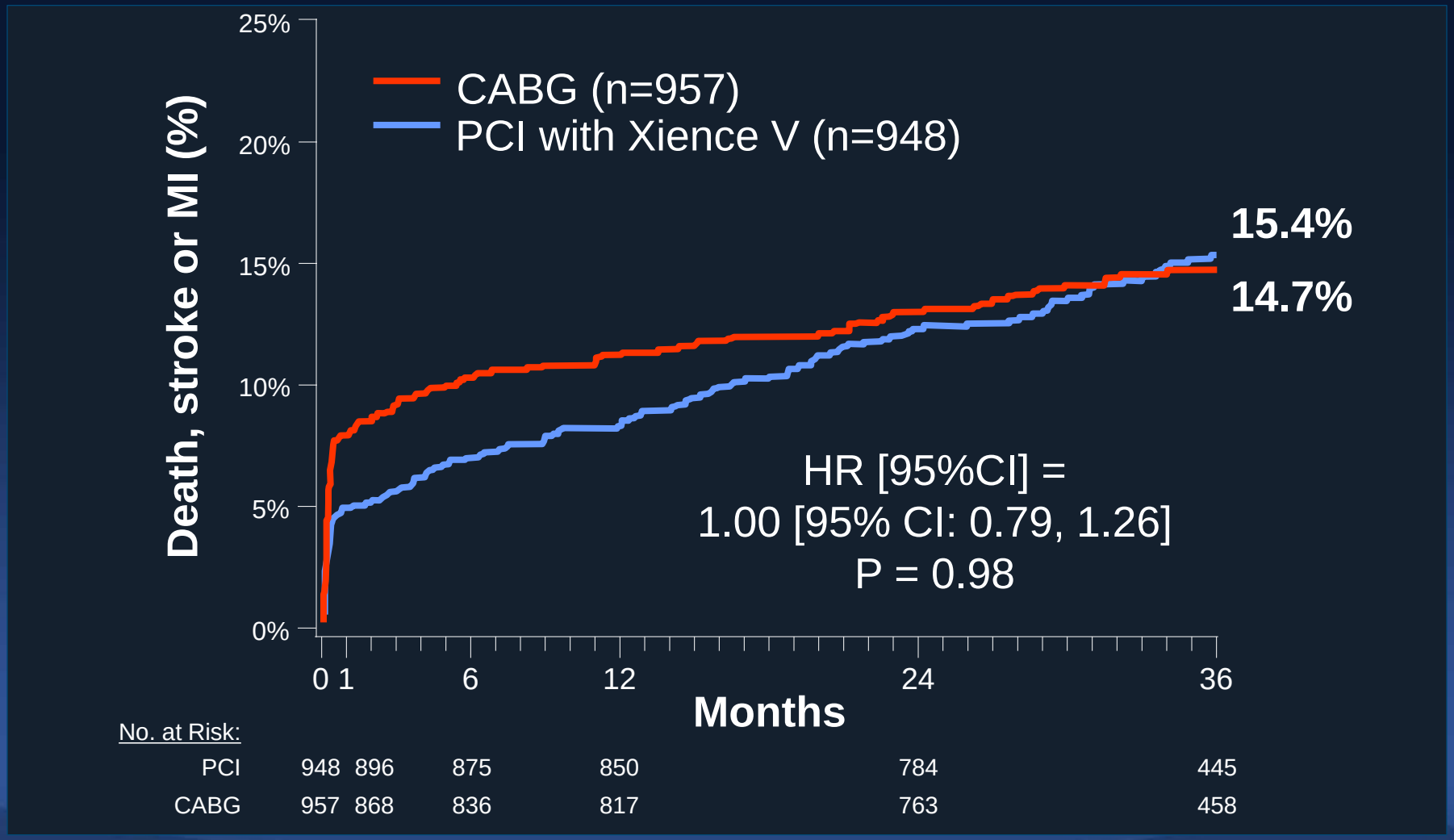
DES vs. CABG
for LM Disease 2016

1. Outcomes of PCI with DES is Comparable with CABG, *Even Better Survival in Selected Patients !*
2. CABG Is Still better In Patients with History of Heart failure, Chronic Kidney Disease and Low EF (<40%).

EXCEL

Primary Endpoint

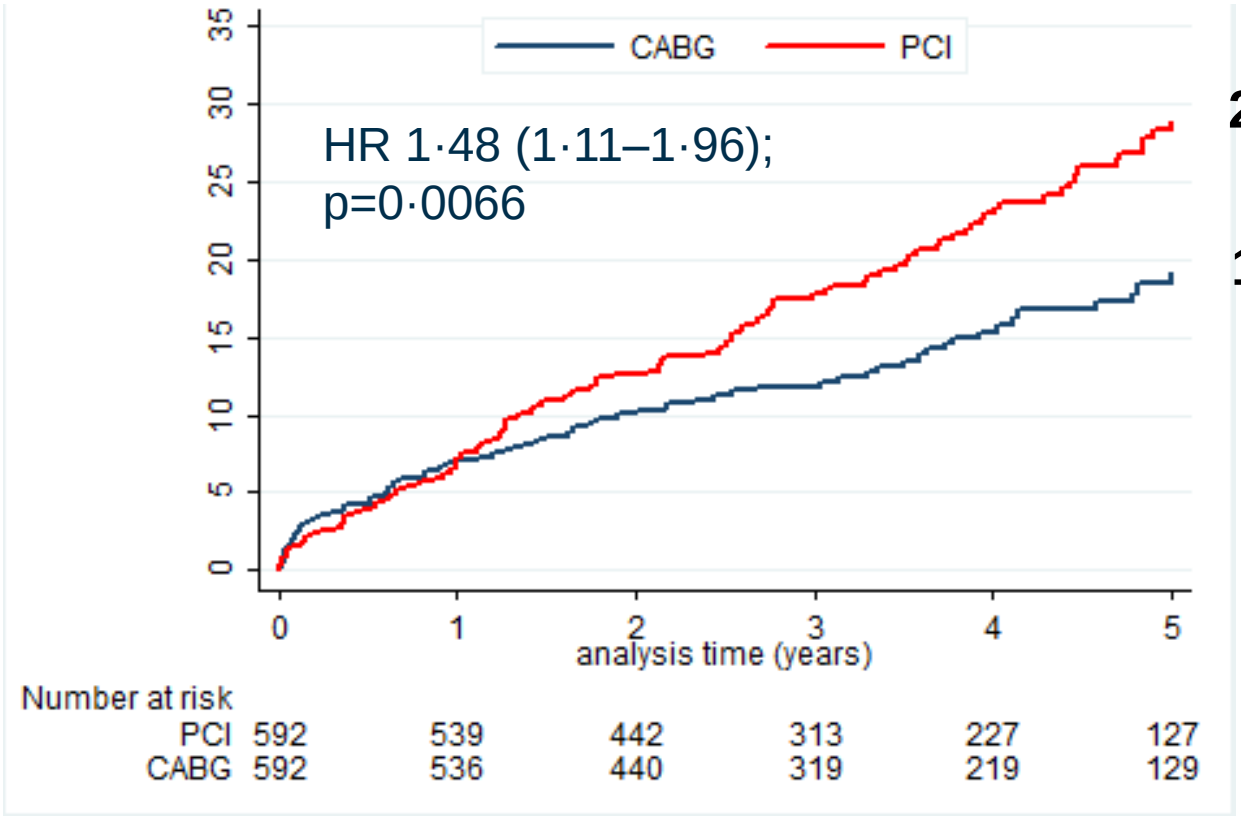
Death, Stroke or MI at 3 Years



NOBLE

Primary Endpoint

Death, Stroke, MI, Repeat Revascularization at 5 Years



Lancet, online 31 October 2016

ESC Guidelines 2014
Elective PCI for LM Stenosis

LM Disease is
Not Surgical Disease Anymore !

Reference; SYNTAX Study, PRECOMBAT study, MAINCOMPARE registry study and Meta-Analysis. *Patrick, SW et al, NEJM. 2009 March 5;360(10), Park SJ et al, NEJM. 2011 May 5;364(18):1718-27, Levin GN et al. ACC/AHA guidelines. JACC 2011;58:44-122, Capodanno et al, JACC 2011;58:1426-32*

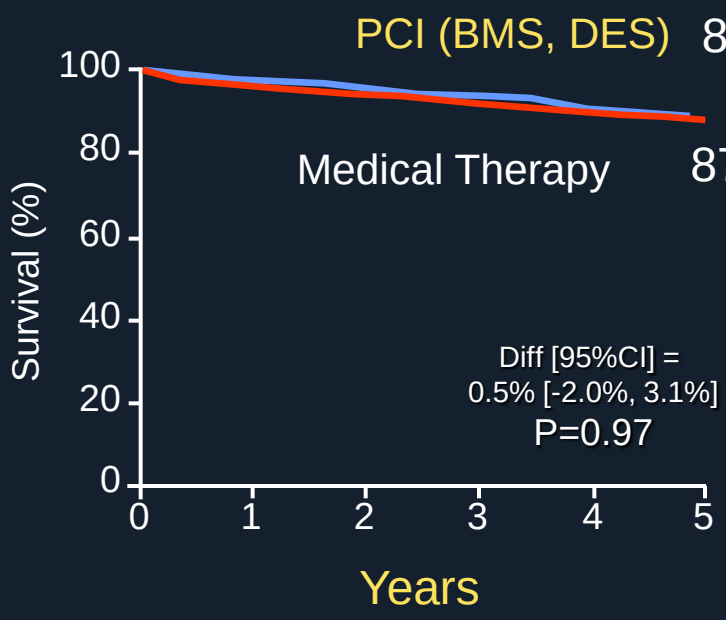
Current Status of Multi-Vessel PCI

Multi-Vessel PCI vs. CABG

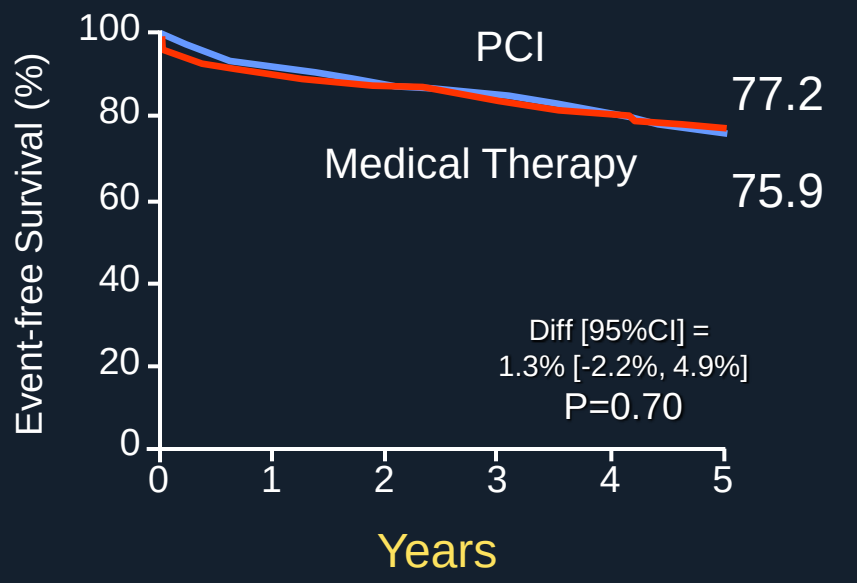
1. BARI 2D
2. FREEDOM
3. SYNTAX
4. BEST
5. Combined Patient Level Meta-Analysis

BARI 2D: PCI vs. Medical Treatment
(Lower Risk Diabetic Patients)

Survival

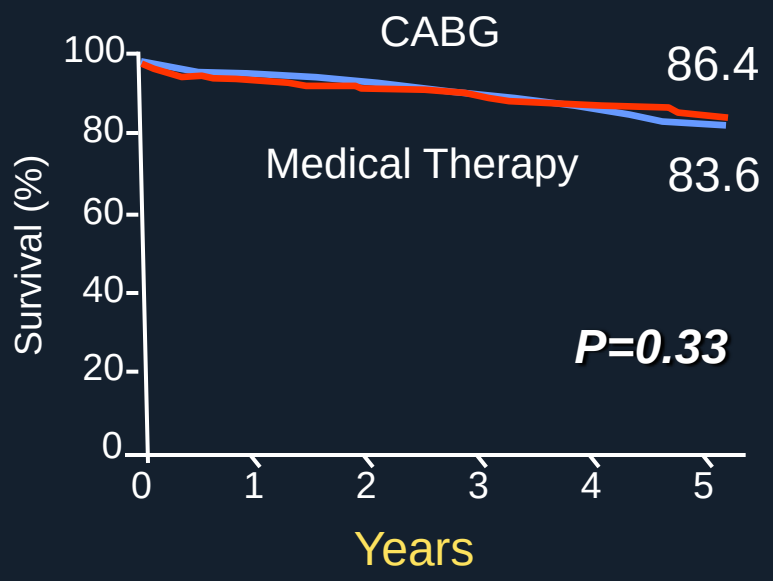


Freedom from MACE (death, MI, or stroke)

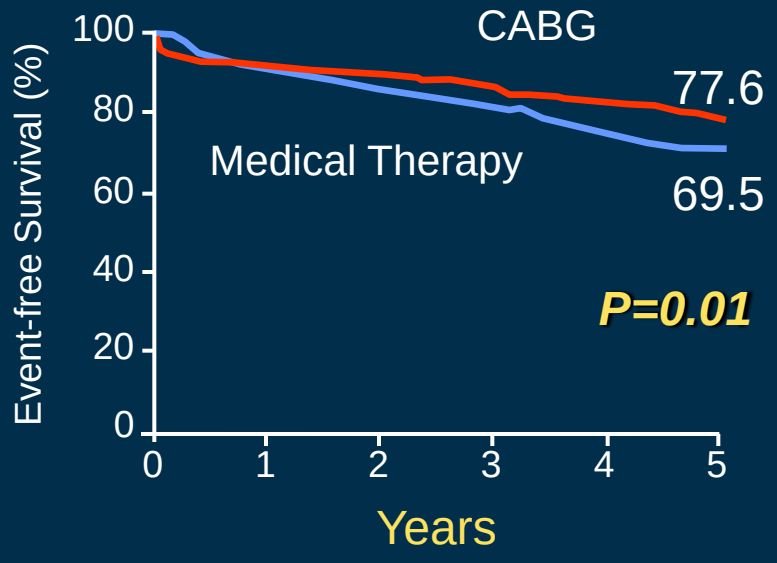


BARI 2D: CABG vs. Medical Treatment
(Higher Risk Diabetic Patients)

Survival

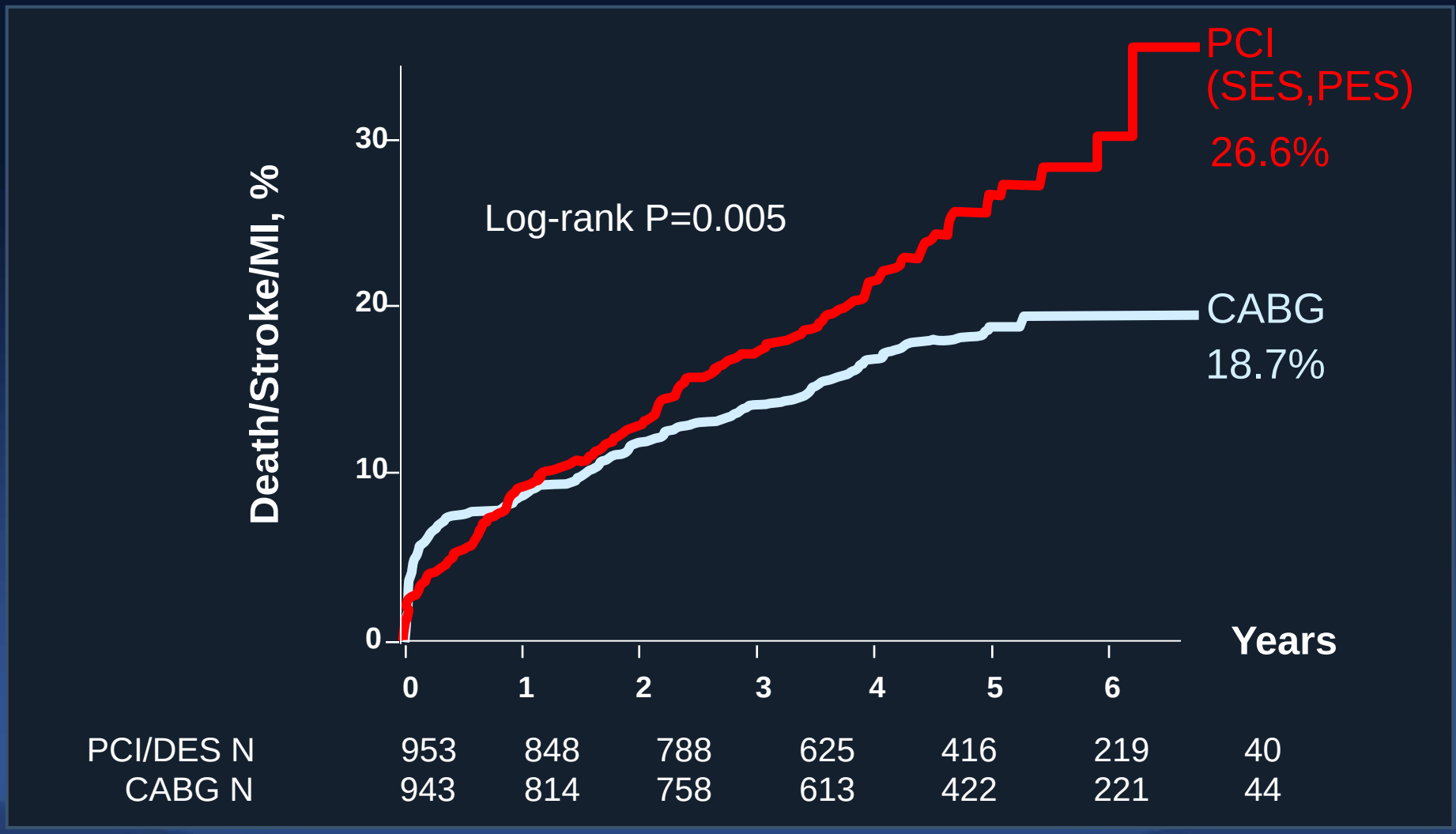


Freedom from MACE (death, MI, or stroke)

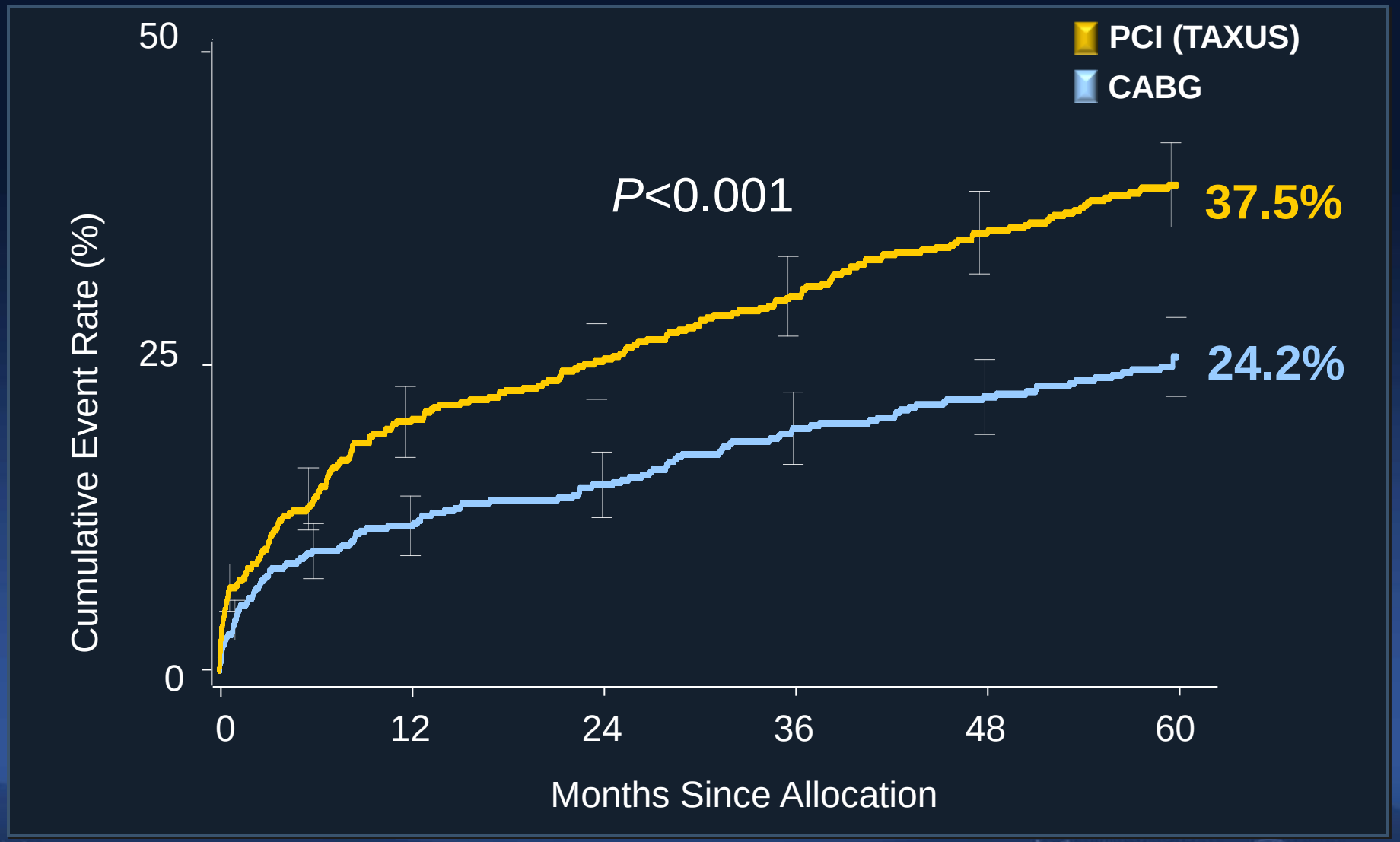


The BARI 2D Study Group. *NEJM* 2009;360:2503-15

FREEDOM *(Diabetics and MVD)*
Death / MI / Stroke at 5 Year

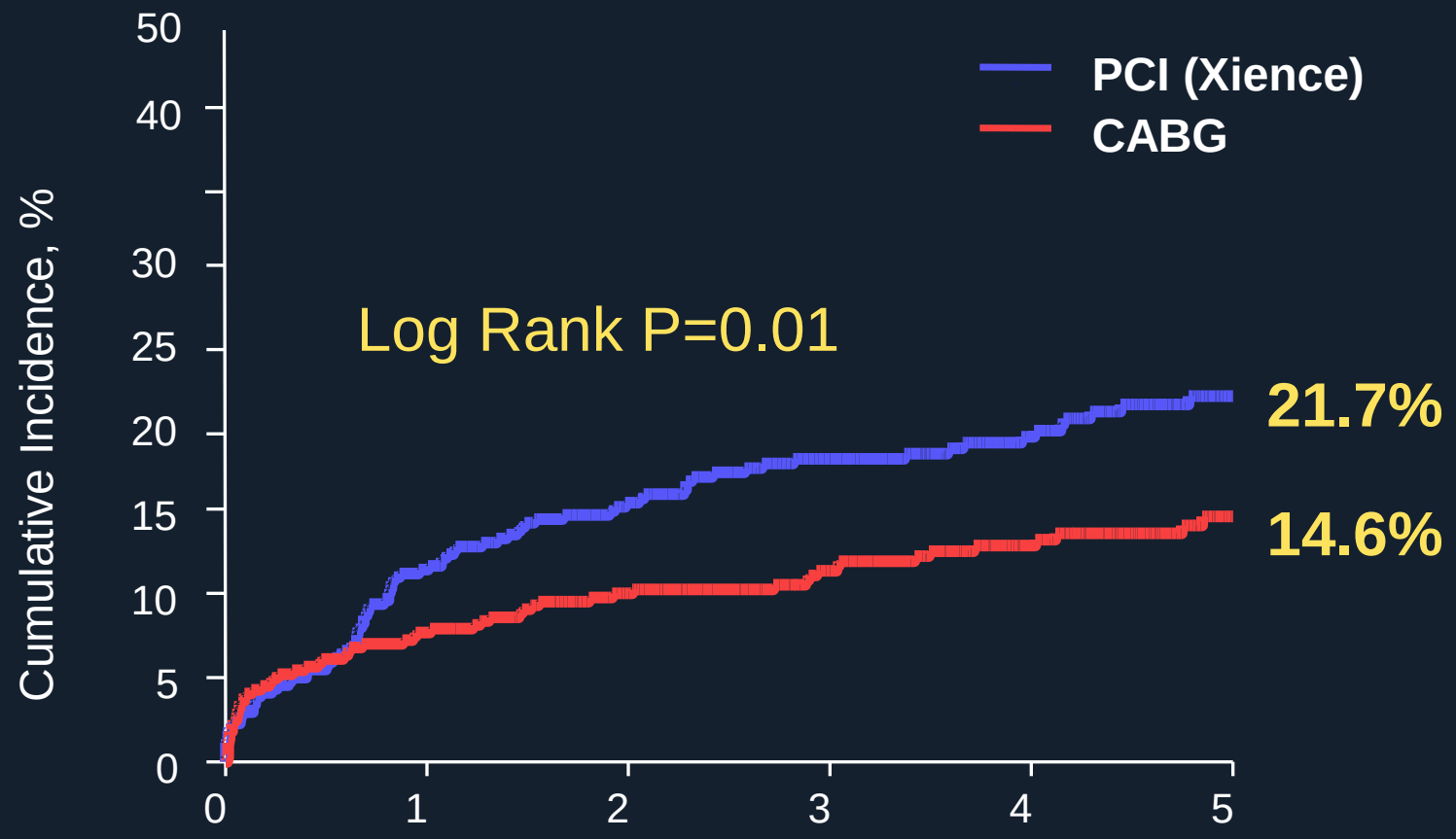


SYNTAX (3VD Subset) at 5 year
Death, MI, Stroke or Any RR



Mohr FW et al. Lancet 2013 Feb 23; 381:629

BEST at 5 year
Death, MI, Stroke or Any RR

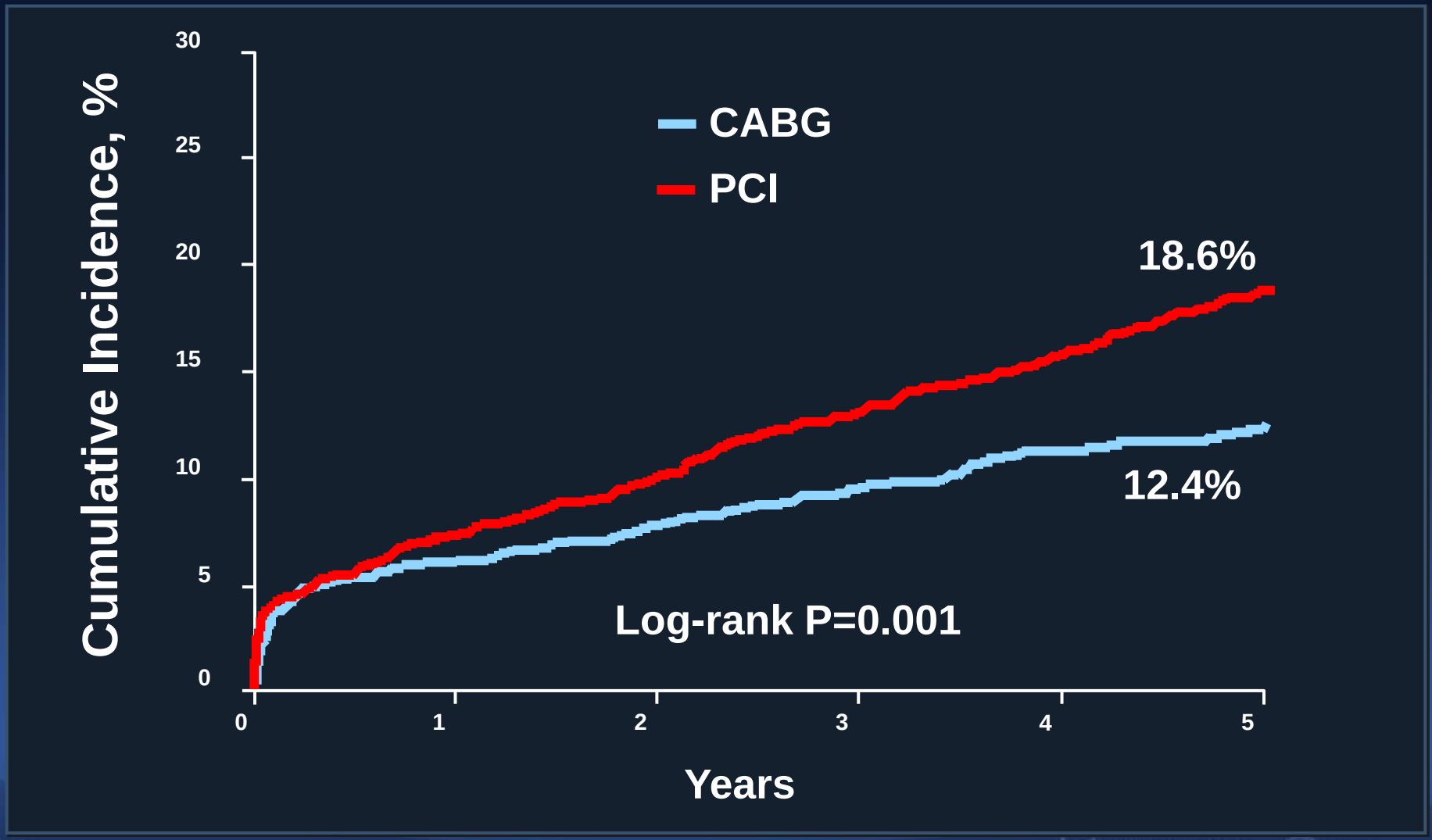


No. at Risk

PCI	438	389	341	288	229	117
CABG	442	409	368	317	250	137

Event rates were derived from Kaplan-Meier estimates

Patient-Level Meta-Analysis(n=3.280)
MVD Subset / **Death, MI or Stroke**



Meta-Analysis from SYNTAX, BEST and PRECOMBAT, 2016

Same Messages from New York State Registry

	PCI	CABG	HR (95% CI)	P value
	N=9223	N=9223		
Death at 3 year	3.1 %	2.86%	1.04 (0.93-1.17)	0.50
Myocardial infarction	1.87%	1.13%	1.51 (1.29-1.77)	<0.001
Stoke	0.72%	0.97%	0.62 (0.50-0.76)	<0.001
Revascularization	7.25%	3.10%	2.35 (2.14-2.58)	<0.001

Total 34,819 eligible patients, 9223 patients had similar propensity scores

DES vs. CABG
for Multi-Vessel Disease 2016

CABG was superior to PCI with DESs in patients with diabetes and advanced CAD (predominantly, 3 VD).

What We've Learned *from Current Data*

CABG Is Still Better for MVD !

Even After New DES (Xience) Use.

Park SJ et al, NEJM. 2015; 372: 1204-1212

Bangalore S et al. N Engl J Med 2015; 372:1213-1222

Impact of Complete Revascularization

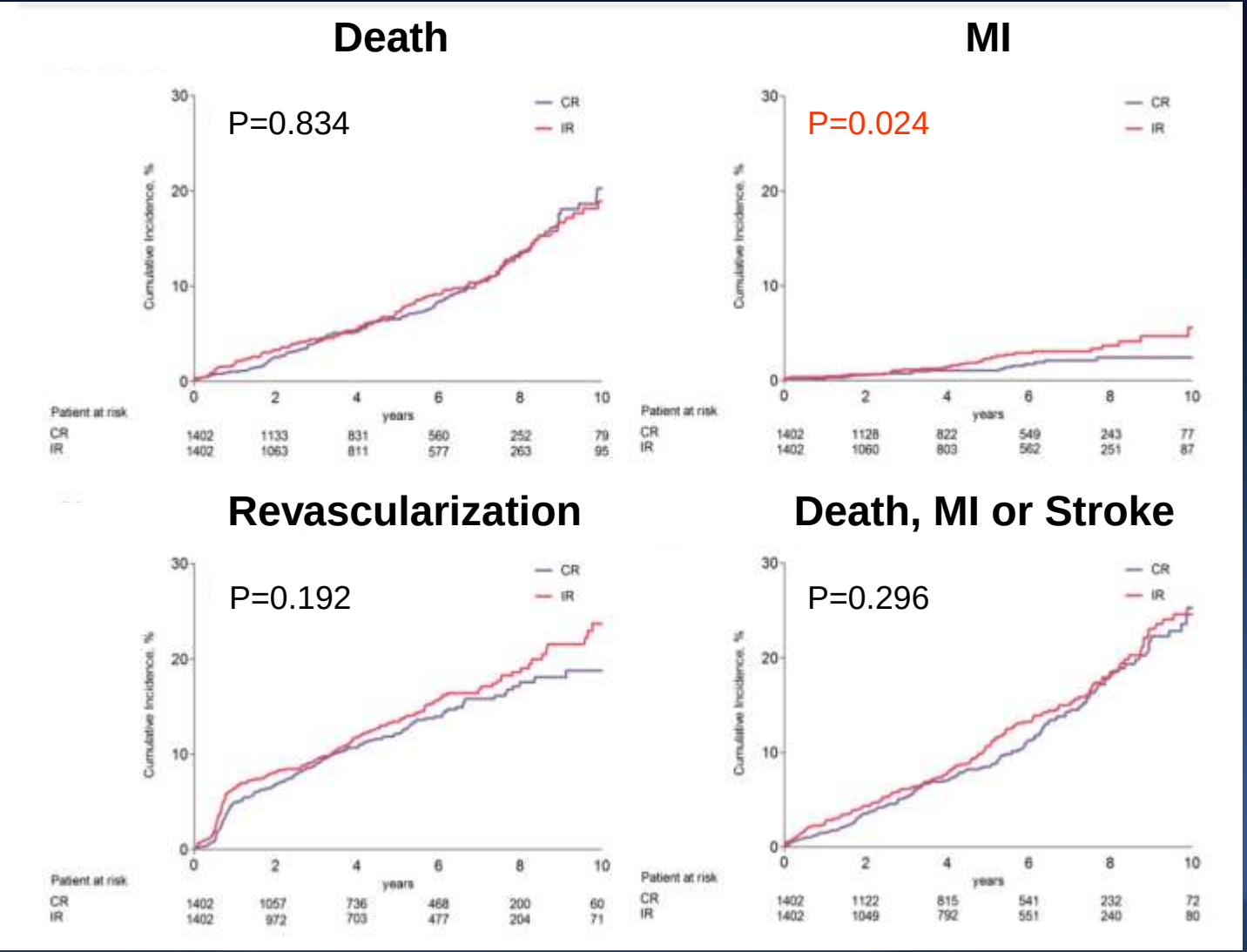
Complete vs Incomplete *from New York Registry*

	PCI	CABG	HR (95% CI)	P value
Complete Revascularization	N=1911	N=1911		
Death at 3 year	2.54 %	2.50 %	1.08 (0.82-1.42)	0.58
Myocardial infarction	1.43%	1.37%	1.02 (0.71-1.47)	0.93
Stoke	0.42%	0.84%	0.43 (0.24-0.75)	0.003
Revascularization	5.46%	3.40%	1.55 (1.26-1.90)	<0.001
Incomplete Revascularization	N=7312	N=7312		
Death	3.25%	2.96%	1.03 (0.91-1.17)	0.63
Myocardial infarction	1.98%	1.07%	1.66 (1.39-1.98)	<0.001
Stoke	0.80%	1.01%	0.66 (0.52-0.83)	0.0004
Revascularization	7.70%	3.03%	2.59 (2.34-2.88)	<0.001

Complete vs Incomplete
from BEST Study

	PCI	CABG	HR (95% CI)	P value
Complete Revascularization	N=215	N=295		
Death at 5 year	7.0%	4.4%	1.50 (0.71-3.15)	0.29
Myocardial infarction	2.3%	3.1%	0.75 (0.25-2.24)	0.60
Death, MI, or Stroke	11.6%	9.5%	1.18 (0.69-2.02)	0.55
Any repeat revascularization	6.5%	3.4%	1.89 (0.84-4.25)	0.13
MACCE	16.7%	12.2%	1.34 (0.84-2.13)	0.22
Incomplete Revascularization	N=215	N=122		
Death	6.5%	5.7%	1.22 (0.49-3.02)	0.68
Myocardial infarction	7.4%	1.6%	4.85 (1.11-21.1)	0.036
Death, MI, or Stroke	12.6%	9.0%	1.52 (0.75-3.07)	0.24
Any Repeat Revascularization	15.8%	10.7%	1.58 (0.83-3.00)	0.16
MACC	23.7%	16.4%	1.59 (0.94-2.66)	0.08

Complete vs Incomplete
from AMC MV Registry

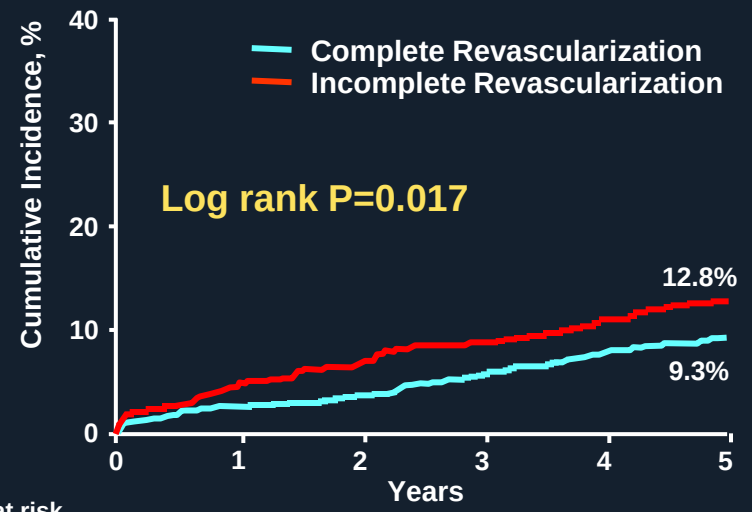


Chang MO, et al. AHJ 2016 Sep;179:157-65.

Complete vs Incomplete

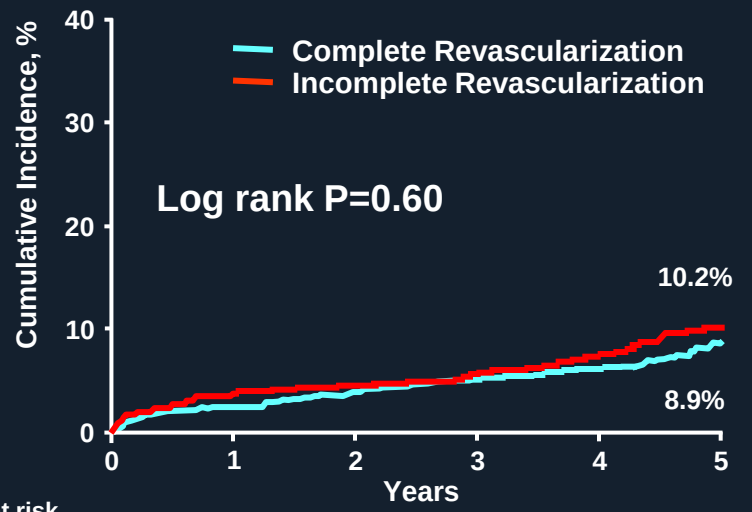
from Meta-Analysis from SYNTAX, BEST and PRECOMBAT

PCI



Patient at risk						
CR	968	911	918	875	819	398
IR	724	689	651	602	545	291

CABG

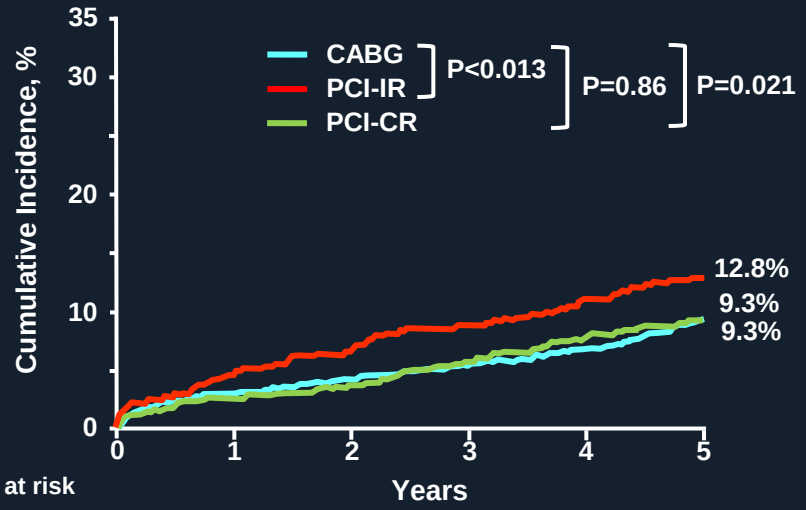


Patient at risk						
CR	1015	971	927	874	804	376
IR	505	474	461	437	411	221

Complete vs Incomplete

from Meta-Analysis from SYNTAX, BEST and PRECOMBAT

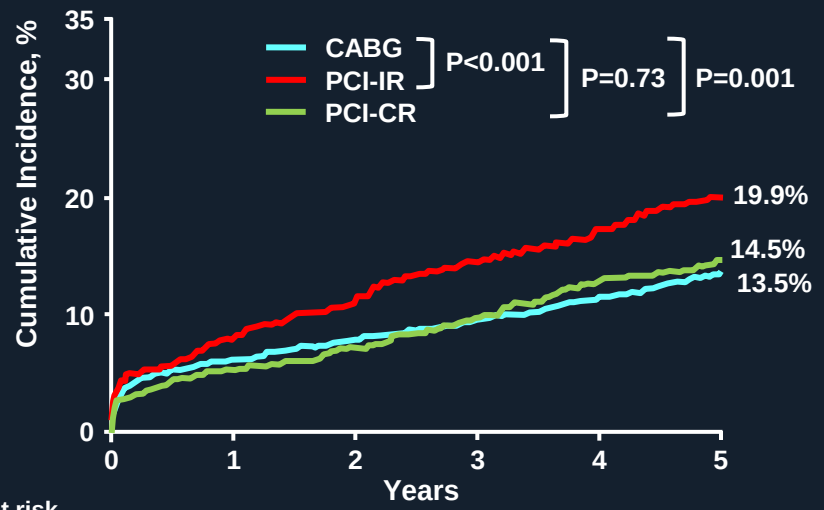
Death From Any Cause



Patient at risk

CABG	1538	1462	1403	1326	1224	549
PCI-IR	724	689	651	601	545	282
PCI-CR	968	941	918	875	819	389

Death, MI, or Stroke



Patient at risk

CABG	1538	1413	1349	1267	1160	565
PCI-IR	724	665	619	564	509	260
PCI-CR	968	916	886	839	776	373

What We've Learned *from Current Data*

***Complete Revascularization* Is Important Practical Issue !**

Park SJ et al, NEJM. 2015; 372: 1204-1212

Bangalore S et al. N Engl J Med 2015; 372:1213-1222

ESC Guidelines 2014
Elective PCI for 3 Vessel Disease

	CABG		PCI	
Recommendation according to extent of CAD	**Class**	**Level**	**Class**	**Level**
3 VD with a SYNTAX score ≤ 22	I	A	I	B
3 VD with a SYNTAX score 23 -32	I	A	III	B
3 VD with a SYNTAX score > 32	I	A	III	B

Reference; SYNTAX Study, .
Patrick, SW et al, NEJM. 2009 March 5;360(10)

SYNTAX Score Showed "Poor Discrimination Power"

Original Investigation | August 2014

Prognostic Value of *Site* SYNTAX Score and Rationale for Combining Anatomic and Clinical Factors in Decision Making

Insights From the SYNTAX Trial

Yao-Jun Zhang, PhD*; Javaid Iqbal, MRCP, PhD*; Carlos M. Campos, MD*; David V. Klaveren, MSc‡; Christos V. Bourantas, MD*; Keith D. Dawkins, MD§; Adrian P. Banning, MD‖; Javier Escaned, MD, PhD¶; Ton de Vries, MSc#; Marie-Angèle Morel, BSc#; Vasim Farooq, MD*; Yoshinobu Onuma, MD*; Hector M. Garcia-Garcia, MD, PhD*; Gregg W. Stone, MD**; Ewout W. Steyerberg, PhD‡; Friedrich W. Mohr, MD††; Patrick W. Serruys, MD, PhD*

Conclusions Appropriate training and unbiased assessment are needed when using SS in clinical decision making. sSS and tertiles based on sSS showed poor discrimination among low, intermediate, and high-risk groups. However, combining clinical factors with sSS retained the predictive performance of SS II. (SYNTAX Study: TAXUS Drug-Eluting Stent Versus Coronary Artery Bypass Surgery for the Treatment of Narrowed Arteries; NCT00114972)

Zhang YJ, Patrick SW et al. JACC 2014;64(5):423-432

Practical Guidelines, 2016
Elective PCI for 3 Vessel Disease

1. ***If*** *the Lesion is Favorable Anatomy for PCI, Complete Revascularization Should be Considered.*

2. ***If*** *the Lesion is Unfavorable Anatomy for PCI, Send the Patients to Surgery !*

Lesion Selection

Favorable Lesions for PCI

1. Functionally significant any coronary stenosis,
   QCA RVD >2.5 mm,
   Lesion length < 50 mm

2. In any lesions, after *stent MLD >2.5 mm and/or IVUS stent area >5.5 mm^2* could be achieved
   →TLR rate <2%

Thank You !!

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