

Left Main PCI

Current Status

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*“You have to know the
past to understand the
present”*

- Carl Sagan (1934-1996)

The First Angioplasty for Left Main CAD; 40 Years Ago

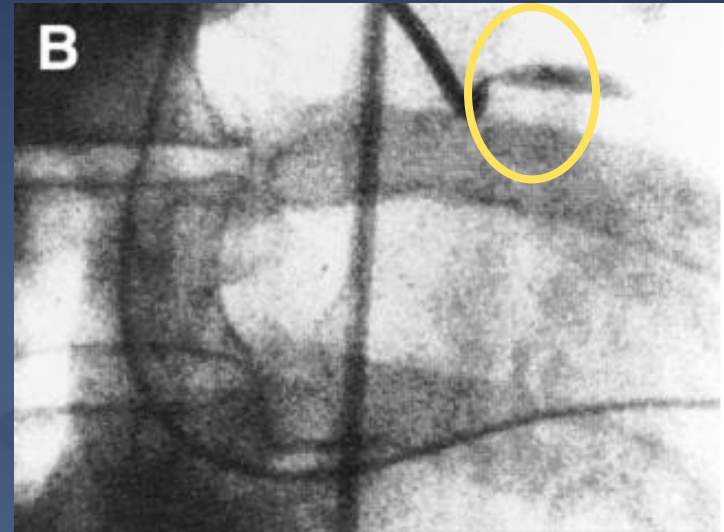
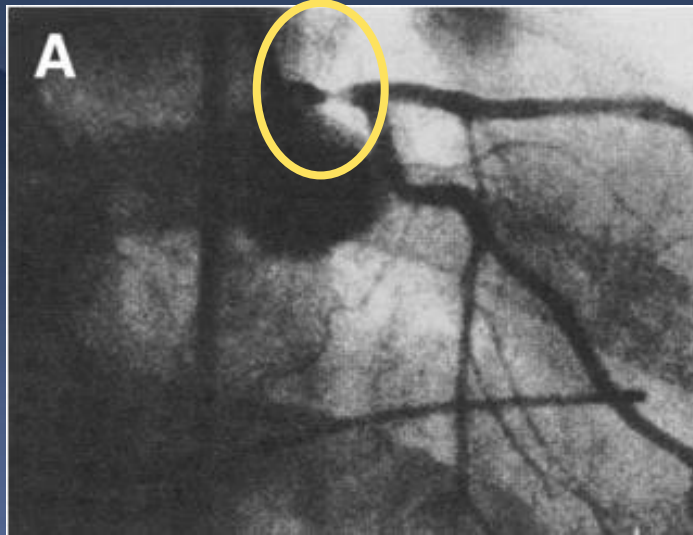
A 44-year-old man with stable angina and a positive EST because of a stenosis of the left main stem (LM) with an additional stenosis of the RCA was the world's second patient to undergo PCI. On 18 October 1977, Grüntzig performed the procedure together with Martin Kaltenbach in Frankfurt, Germany. The LM lesion resisted maximum balloon pressure (about 5 Bar at the time), and the procedure was abandoned unsuccessfully. The patient refused coronary artery bypass grafting (CABG), and therefore M.K. re-attempted PCI in January 1978.

This was again unsuccessful, but the RCA was successfully dilated. Although the symptoms improved they did not abate, and so the patient underwent CABG a few months later with saphenous vein bypass grafts to the LAD and the left circumflex coronary artery (LCX). He became symptom free, albeit not completely. A follow-up coronary angiogram after several months showed an excellent PCI result of the RCA and a patent LAD bypass graft. The LCX bypass graft was occluded.

Twenty years later, in 1997, repeat coronary angiography for recurrent limiting angina showed disease progression in all three coronary arteries. Both vein grafts were now closed. Re-CABG with three arterial grafts was performed. Elective angiography 5 years later in 2002 showed all three arterial grafts patent, and the patient was asymptomatic. Currently, at 84 years, he is in good general health and symptom free.

Oct/18/1977

The First *Successful* Angioplasty for Left Main CAD; 40 Years Ago

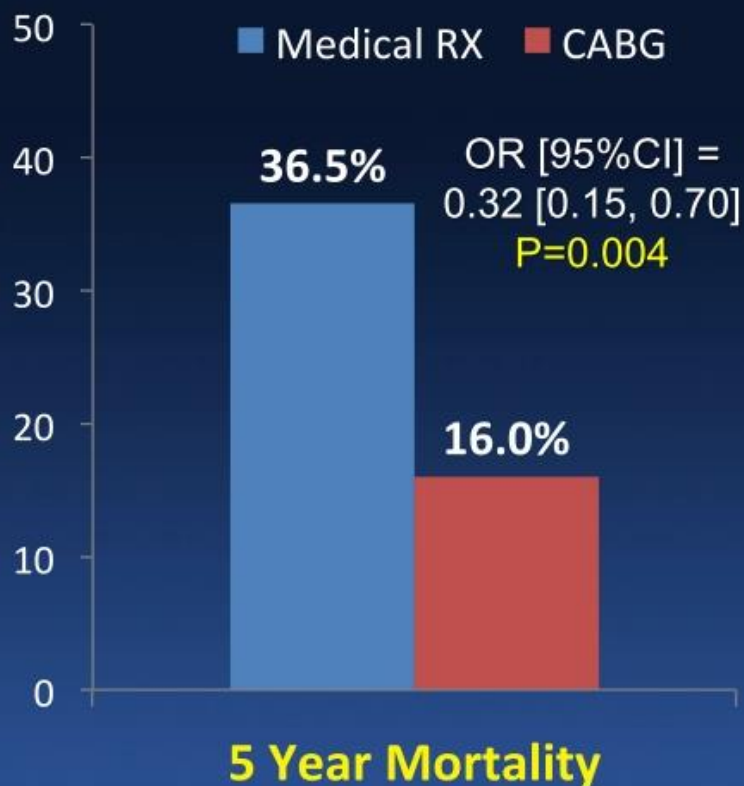


Nov/24/1977

A Singular Option for Left Main CAD

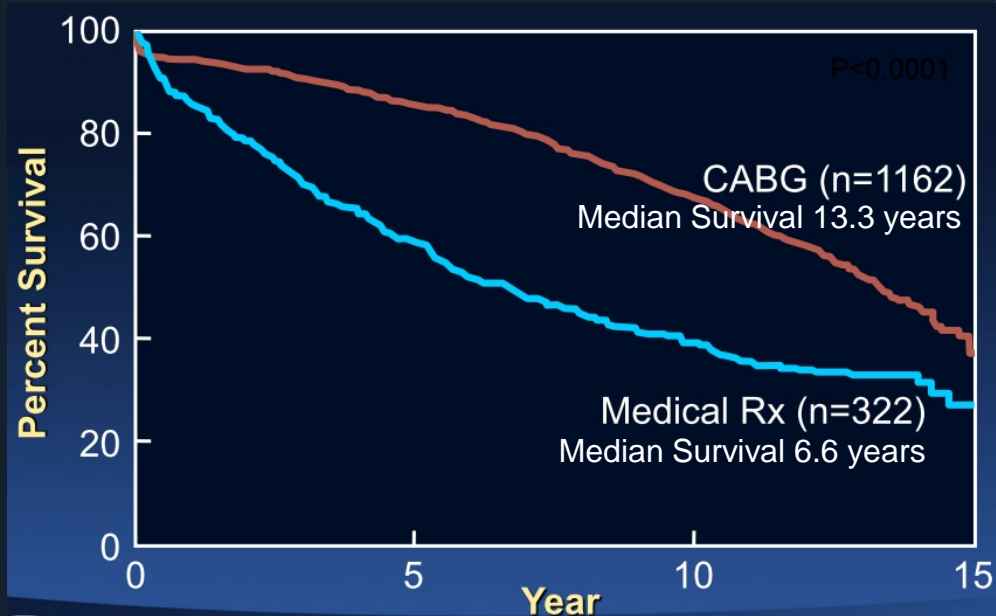
CABG; ~30 years

CABG vs. Medical Rx (150 pts, VA and EU RCT)



Yusuf S et al. Lancet 1994; 344: 563-70

CABG vs. Medical Rx (1484 pts, CASS Registry)



Yusuf S et al. Lancet 1994; 344: 563-70

Looking for the Possibility of LM PCI as a comparator of CABG

**Inoperable
High Operative
Risk**

**PTCA
BMS**

**Low to intermediate
Operative Risk**

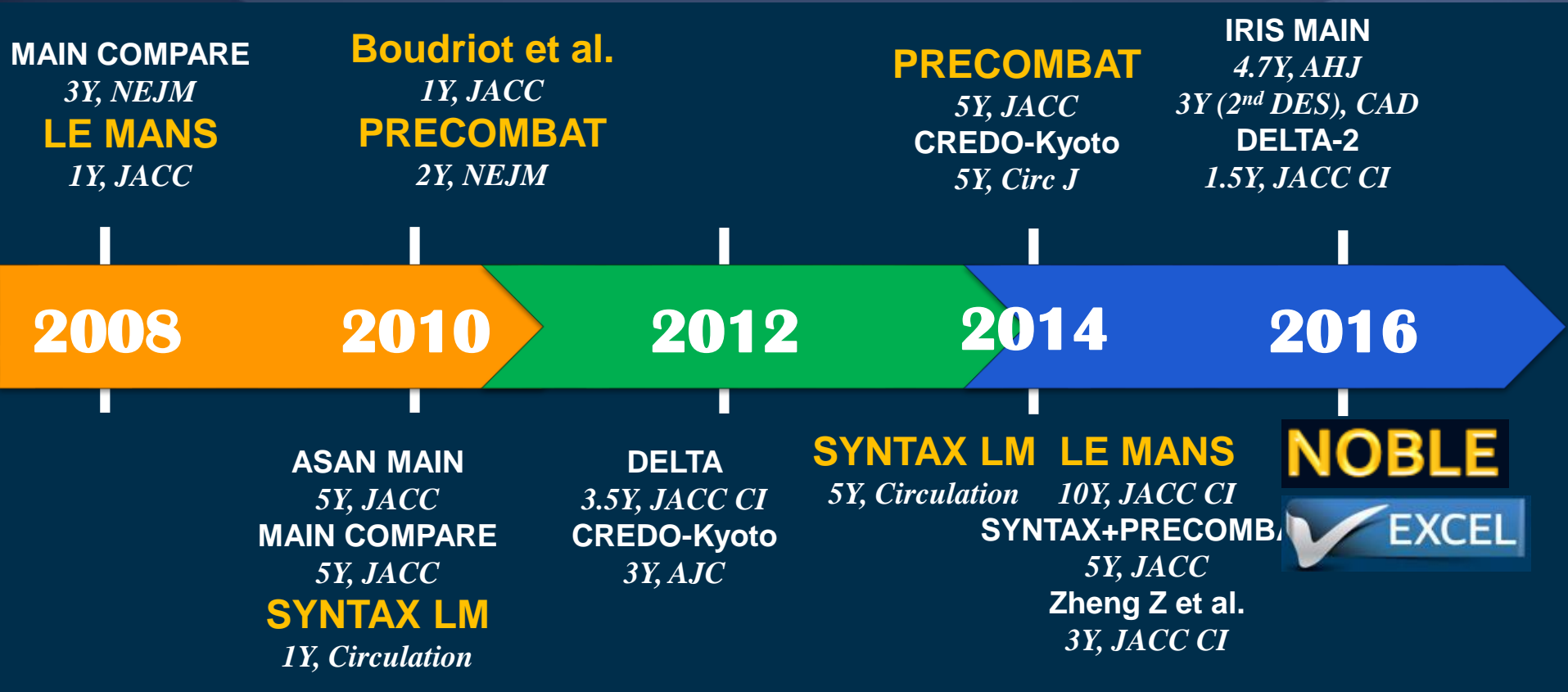
**Low to
Intermediate
PCI risk,
Favorable
Anatomy**

**BMS
DES**

“Clinical Equipose for either PCI or Surgery”

PCI vs. CABG

Comparative effectiveness

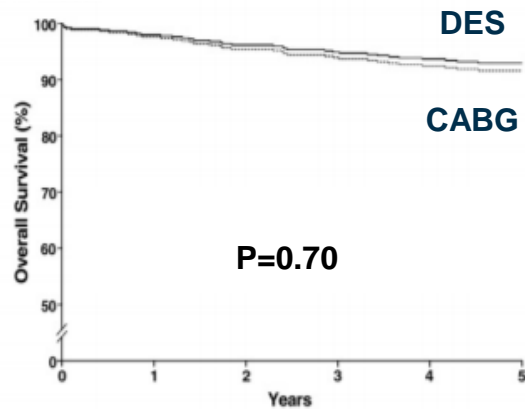


 RCTs

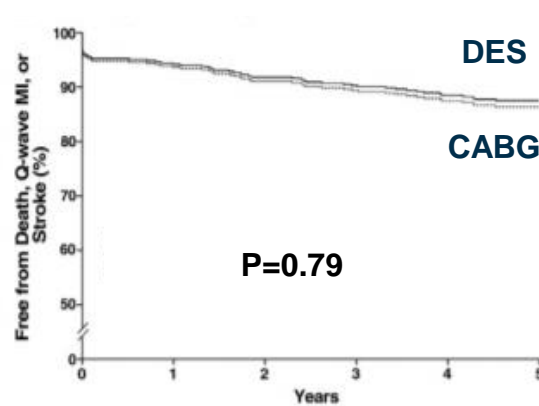
MAIN COMPARE, 5 Year Propensity Match Patients (n=542)

DES vs. CABG

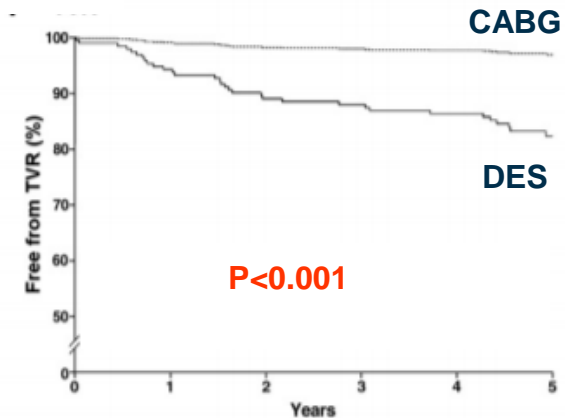
Death



Death/MI/Stroke



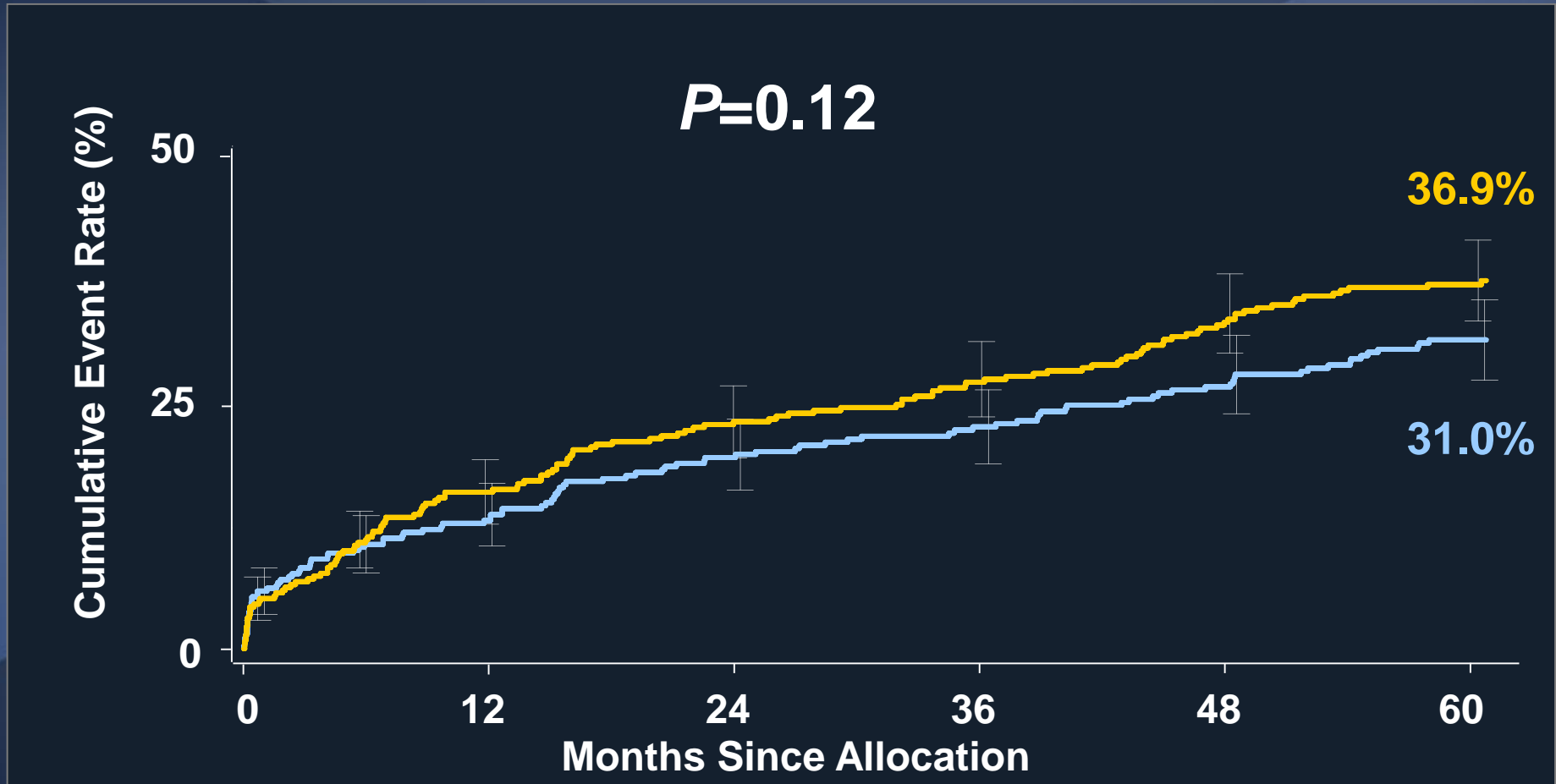
TVR



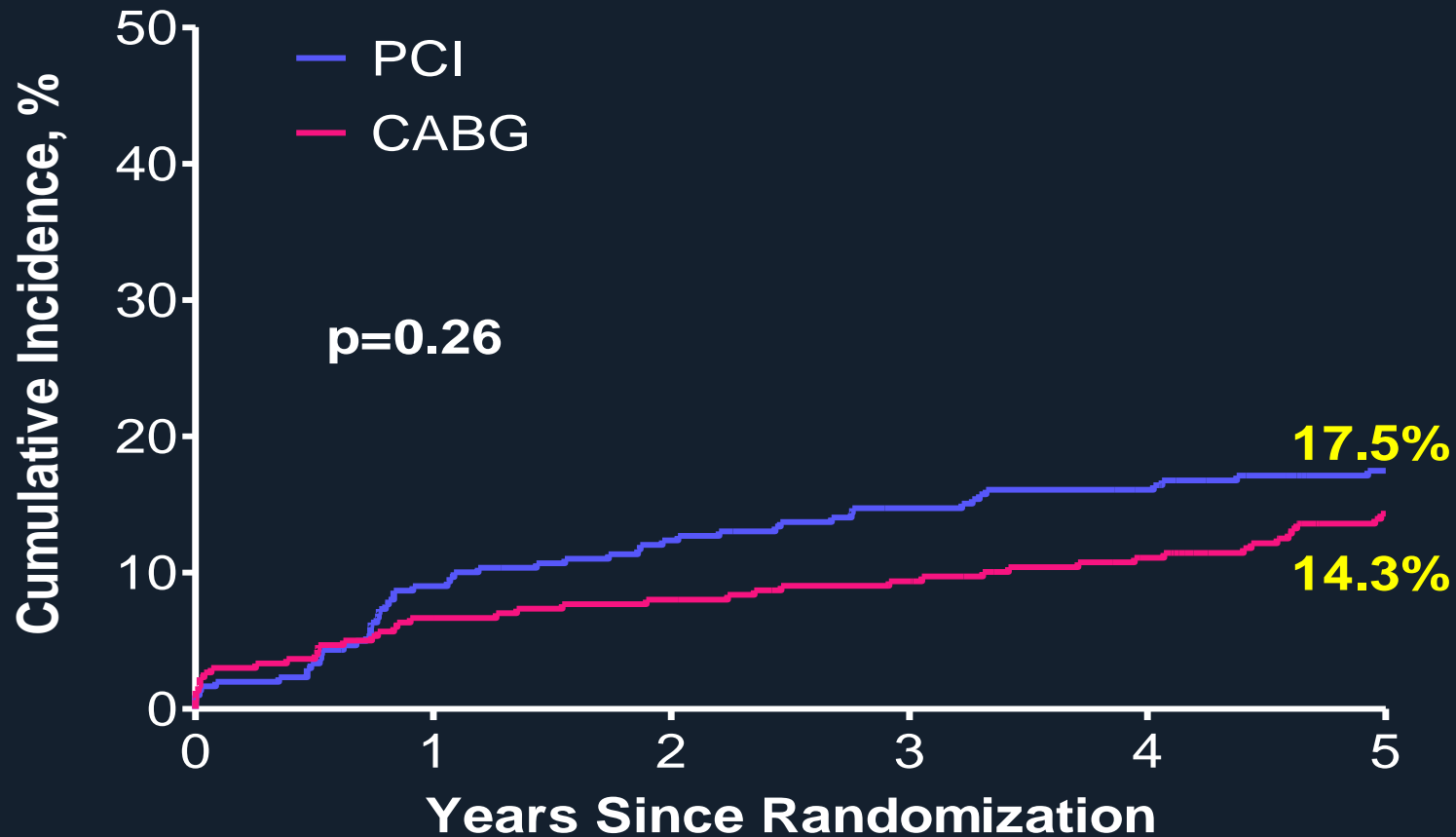
SYNTAX (LM Subset), 5 Year Death /MI /Stroke /Repeat Revascularization

■ CABG (N=348)

■ TAXUS (N=357)



PRECOMBAT, 5 Year **Death, MI, Stroke or iTVR**



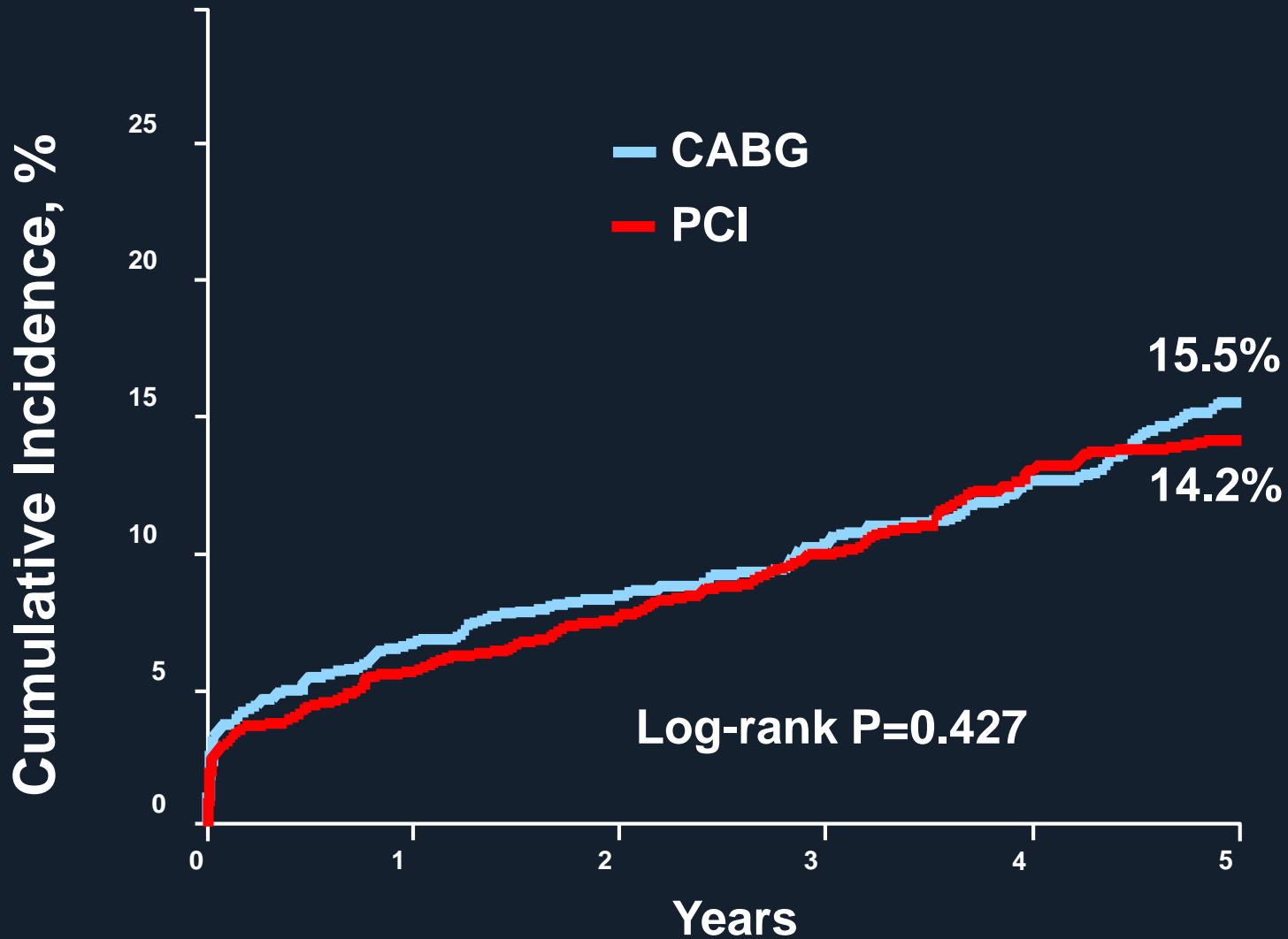
Patient at risk

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

Patient-Level Meta-Analysis (n=3,280)

Database Pooling of
SYNTAX (n=1800, PES),
BEST (n=880, EES), and
PRECOMBAT (n=600, SES) trials.

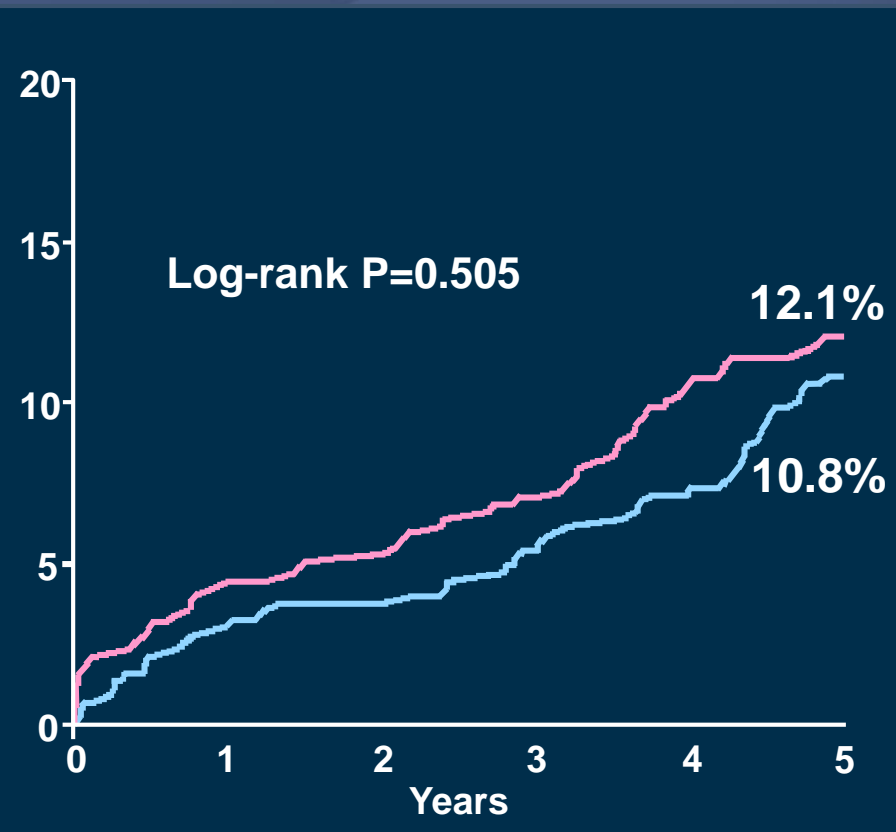
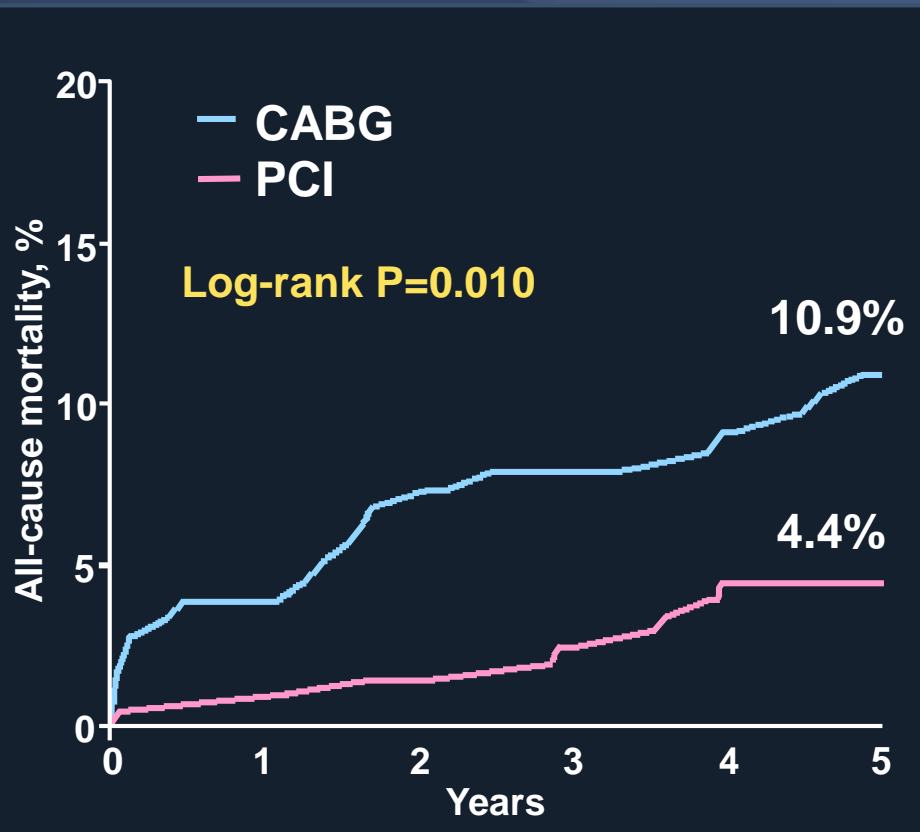
Patient-Level Meta-Analysis (n=1,293) LM Subset / Death, MI or Stroke



Patient-Level Meta-Analysis (n=1,293) LM Subset / All-cause Mortality

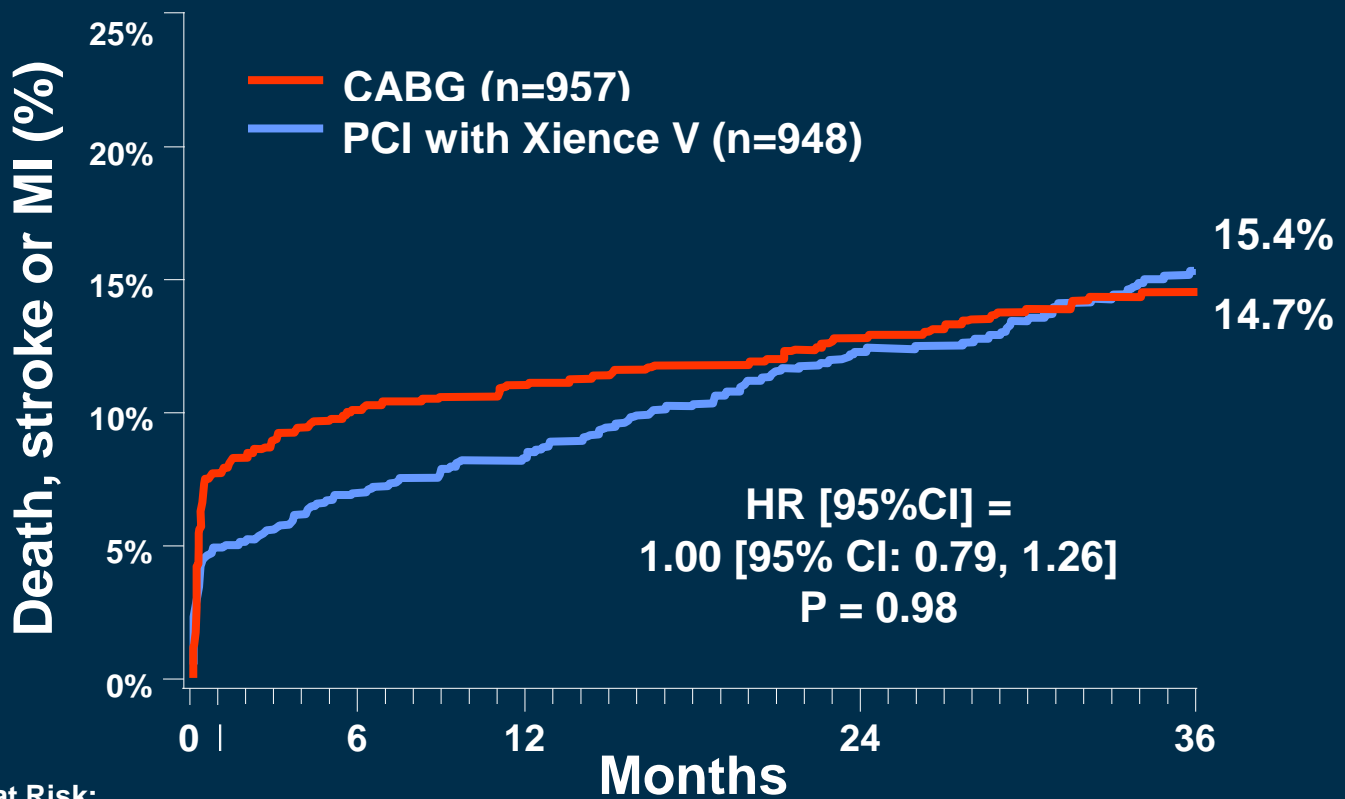
LM alone
or LM + 1-VD

LM with
2-VD or 3-VD



Primary Endpoint

Death, Stroke or MI at 3 Years

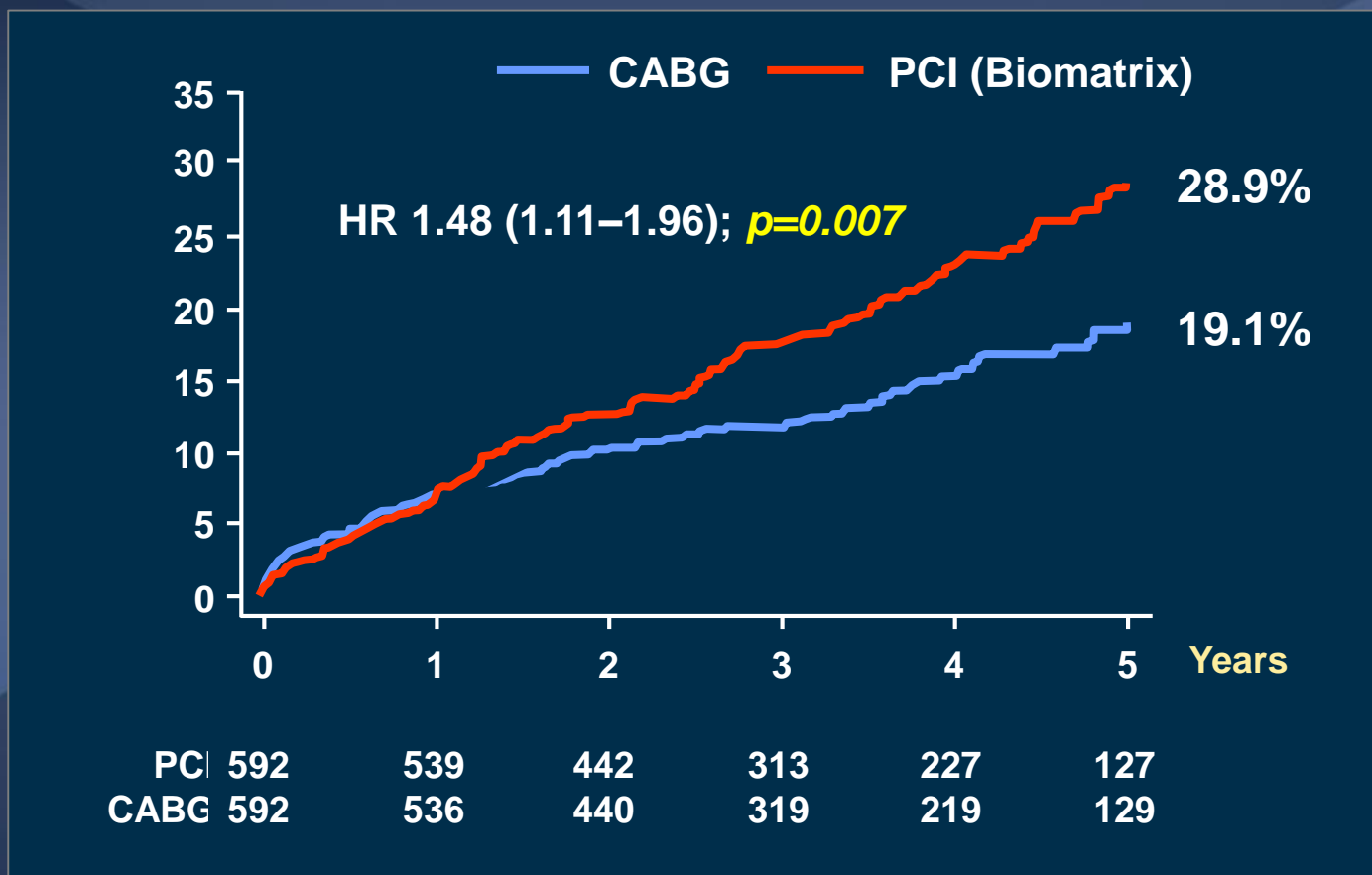


No. at Risk:

PCI	948	896	875	850	784	445
CABG	957	868	836	817	763	458

Primary Endpoint

Death, non-procedural MI, repeat Revascularization and Stroke at 3 Years



Updated Meta-analysis PCI vs. CABG at 5 year

PCI vs. CABG	HR (95% CI)	P
All-cause death	0.99 (0.76-1.30)	0.74
Cardiac death	1.01 (0.72-1.42)	0.83
MI	1.33 (0.84-2.11)	0.11
Stroke	0.71 (0.34-1.49)	0.31
All-cause death or MI	1.11 (0.86-1.44)	0.26
All-cause death, MI or stroke	1.06 (0.82-1.37)	0.39
Revascularization	1.74 (1.47-2.07)	<0.0001

6 RCTs, n=4,686 pts, Boudriot, LE MANS, PRECOMBAT, SYNTAX, NOBLE, EXCEL

Revascularization Strategy

For Left Main CAD

**Inoperable
High Operative
Risk**

*Low to
intermediate PCI
risk, Favorable
Anatomy*

PCI

**Low to
intermediate
Operative Risk**

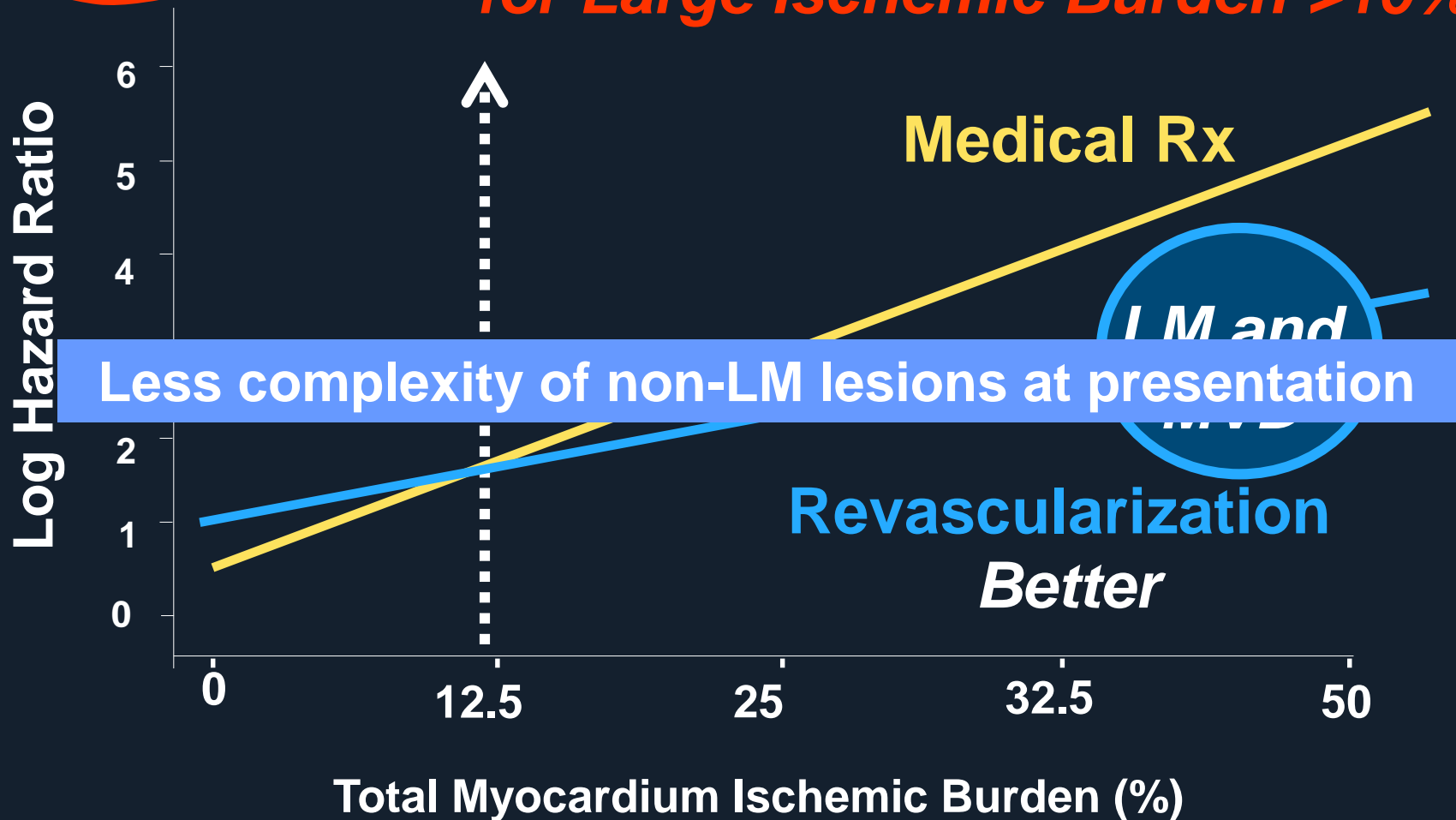
*Low to
intermediate
PCI risk,
Favorable
Anatomy*

**PCI
CABG**

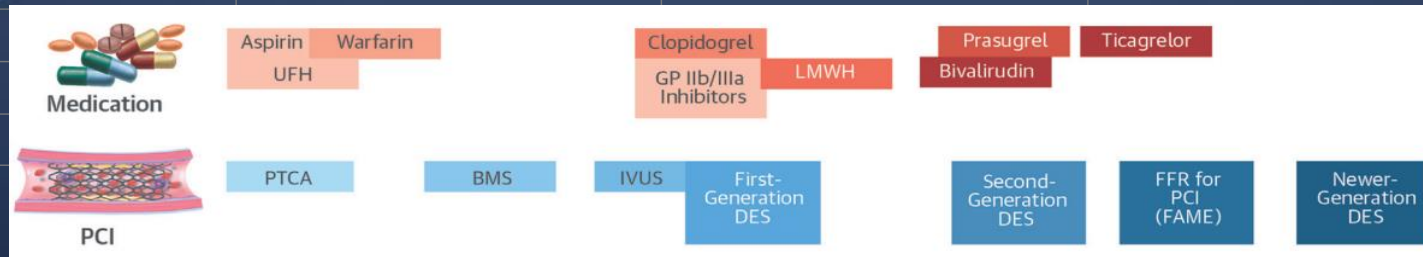
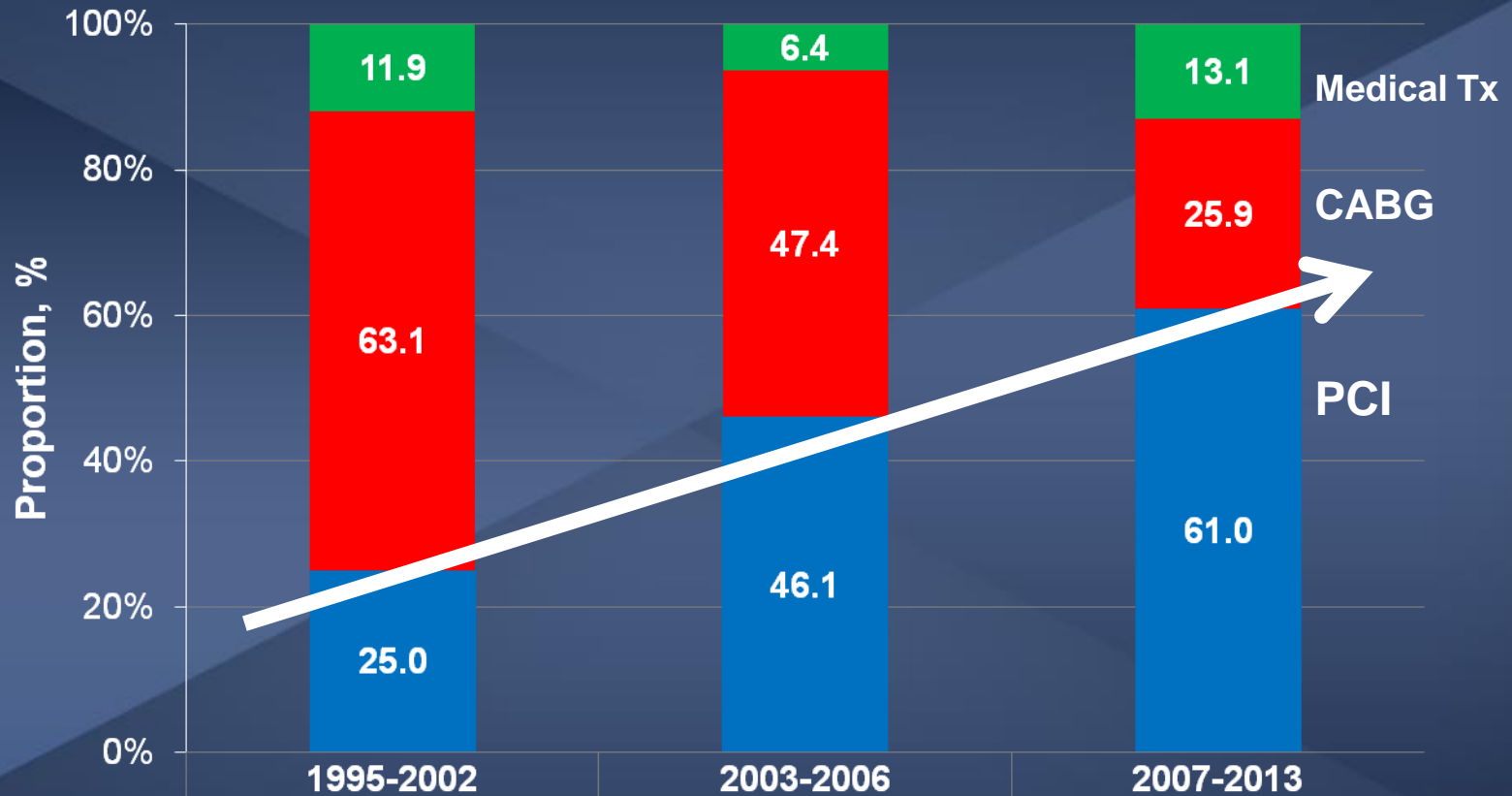


Left Main CAD an 'inflow track' disease

for Large Ischemic Burden >10%

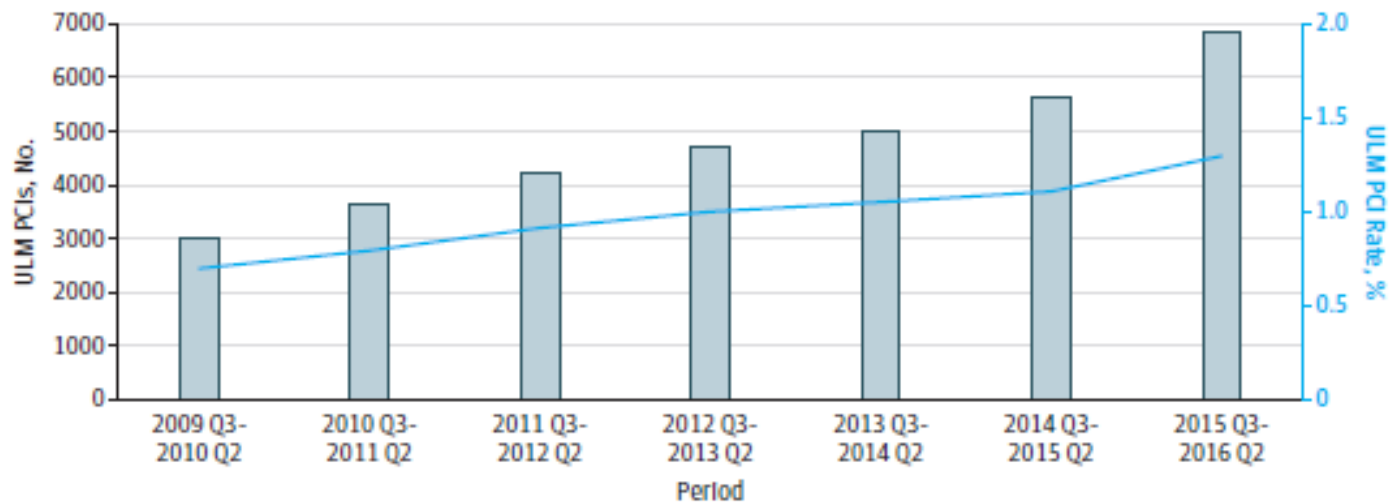


Temporal Trends of LM Revascularization, (IRIS LM Registry n=5,883), 2017

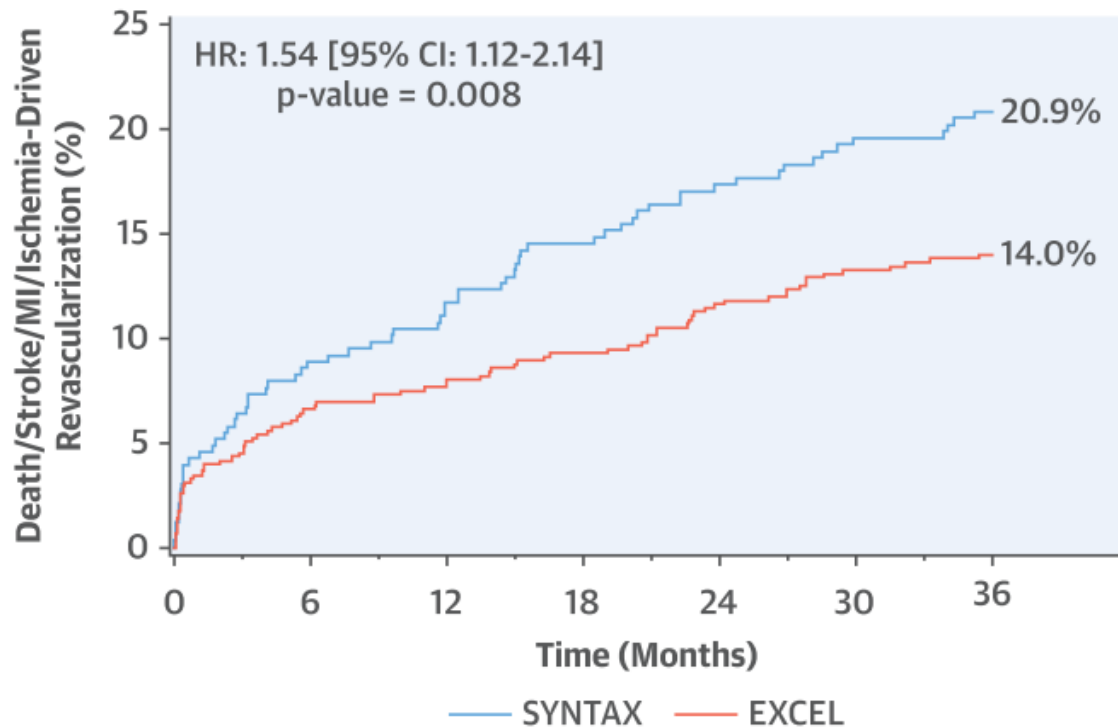


Left Main PCI in the US (NCDR) 3,342,162 Patients 33,128 PCI

Figure 1. Temporal Trends in Unprotected Left Main (ULM) Percutaneous Coronary Intervention (PCI)



Outcome After CABG also Improved Over Time

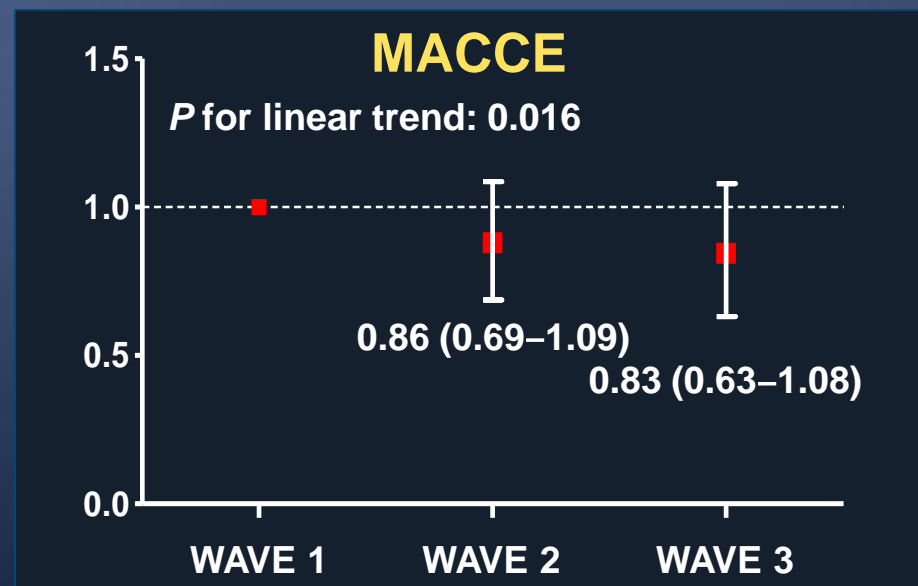
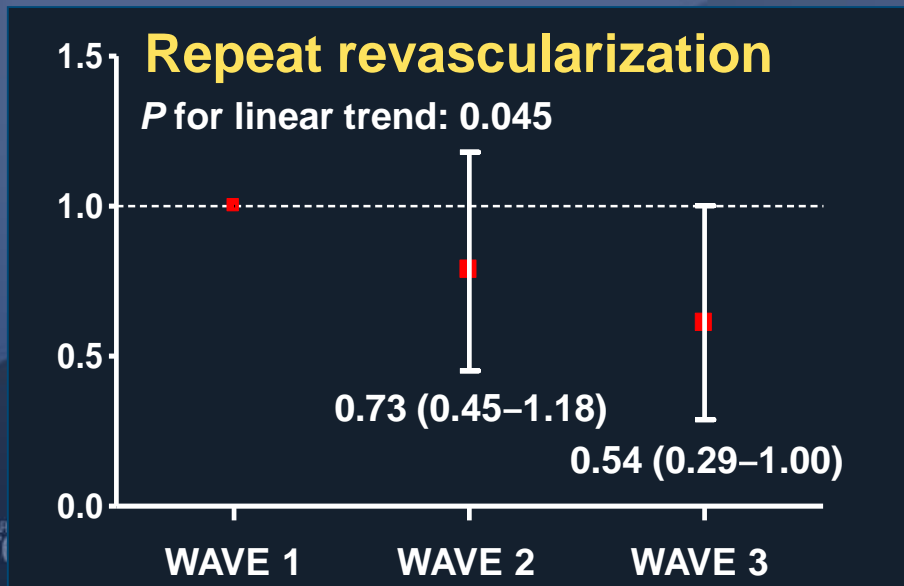
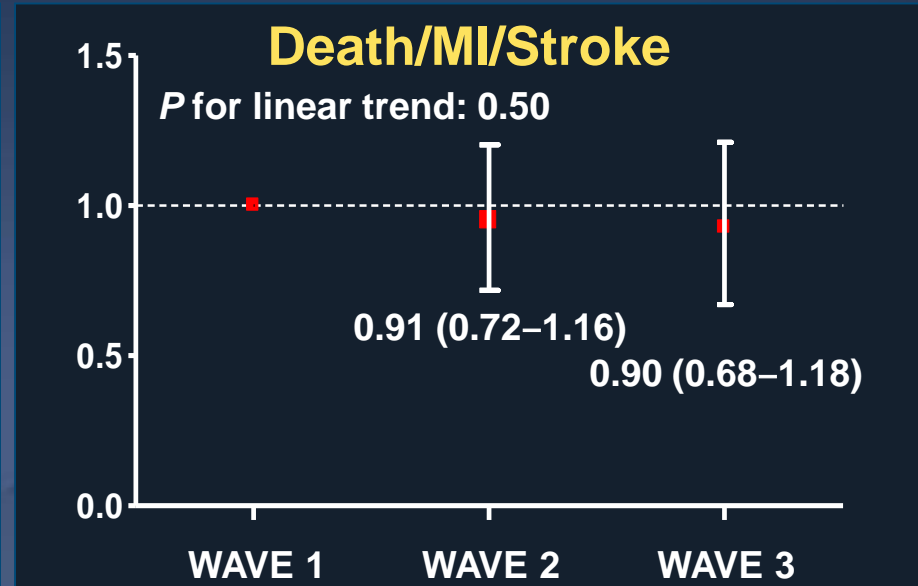
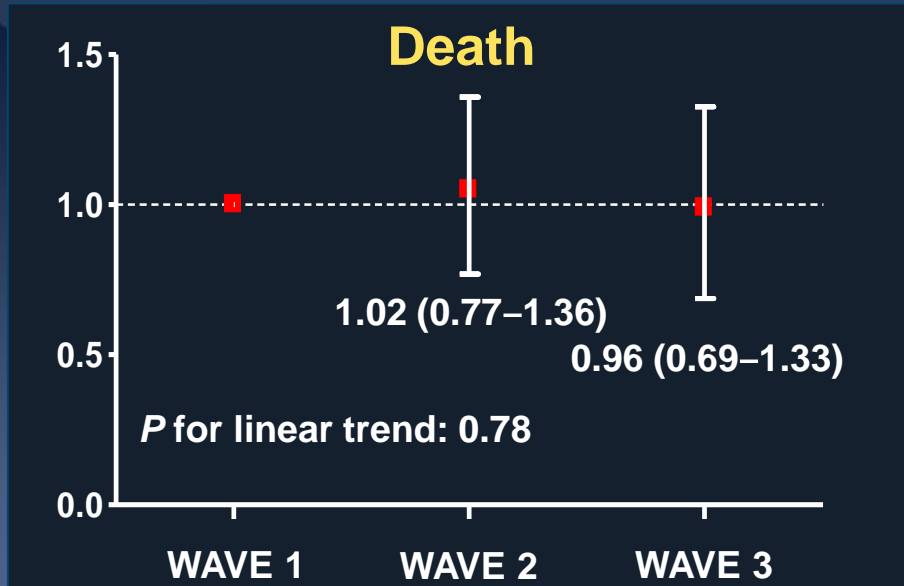


Number at risk:

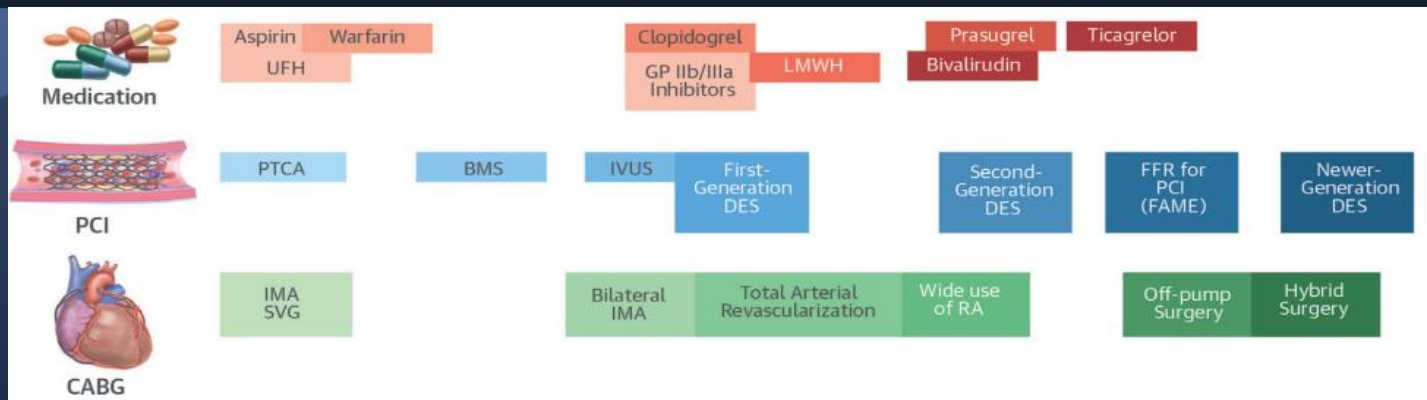
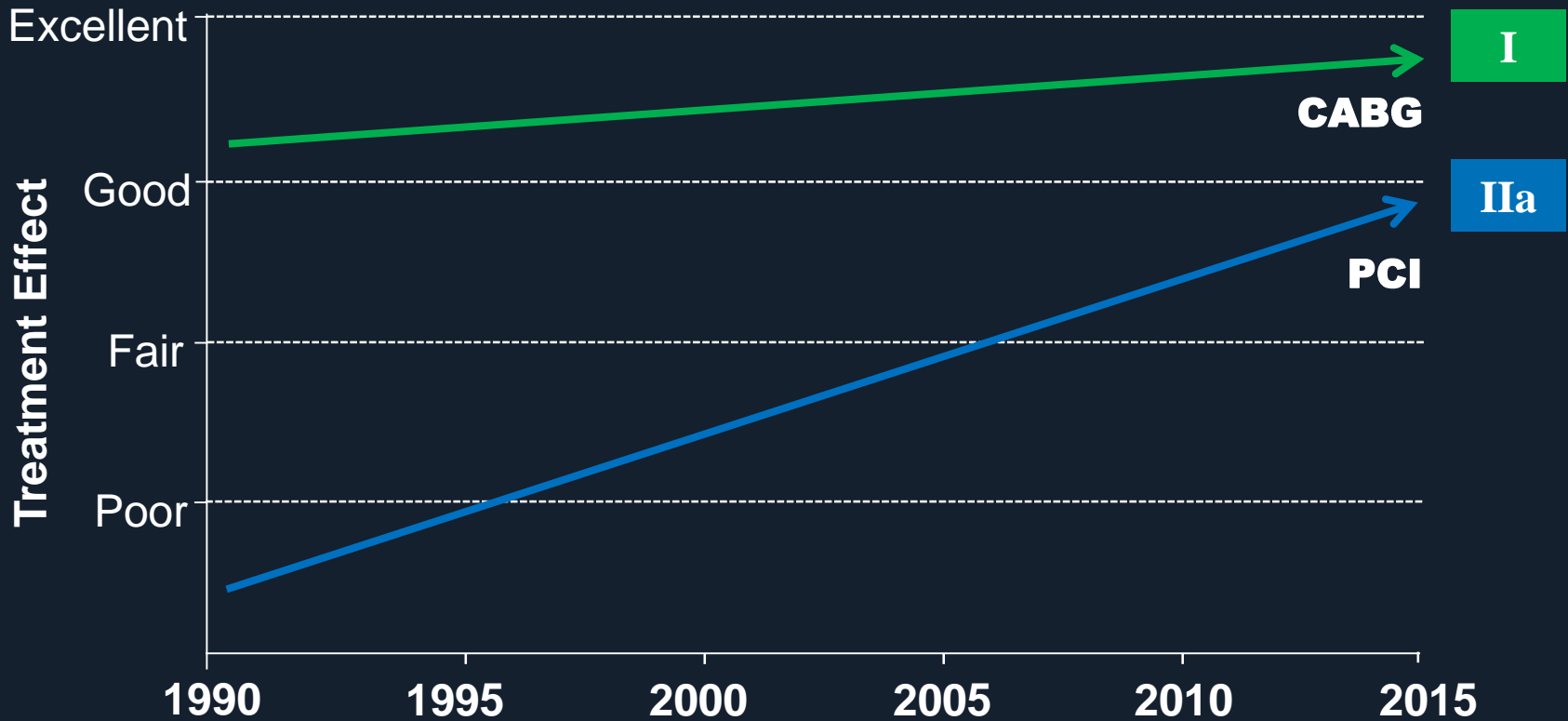
SYNTAX	329	294	282	272	261	252	248
EXCEL	580	530	519	506	492	476	461

CABG Group (IRIS-LM registry)

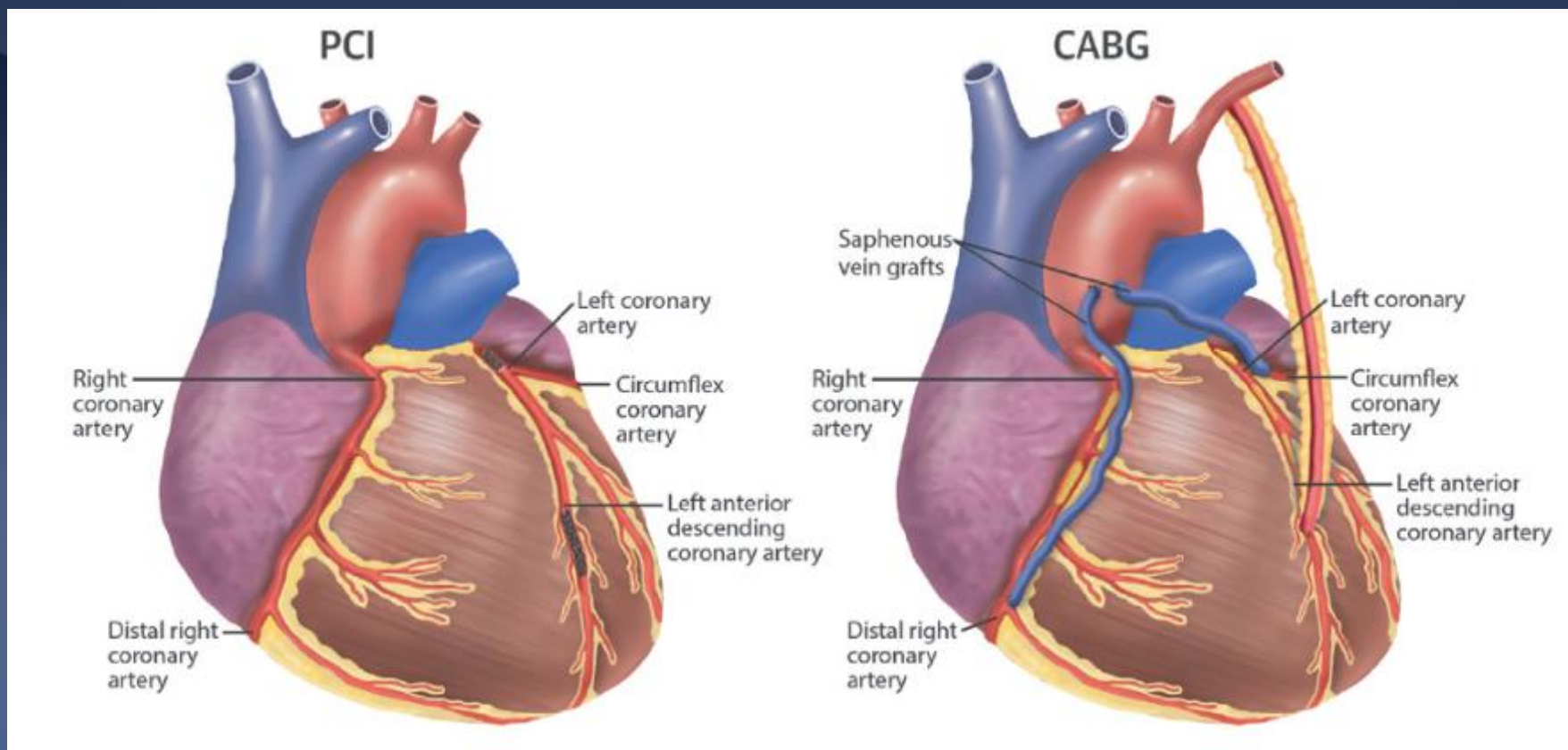
Risk-adjusted trends of HRs for outcomes



Evidence-Based Changes of Treatment Effect of PCI and CABG for Left Main CAD



Fundamental Differences in the Methodologies of PCI and CABG



PCI

Less invasive and shorter hospitalization
Lower risk of periprocedural adverse events
Long-term durability due to low risk of disease progression

CABG

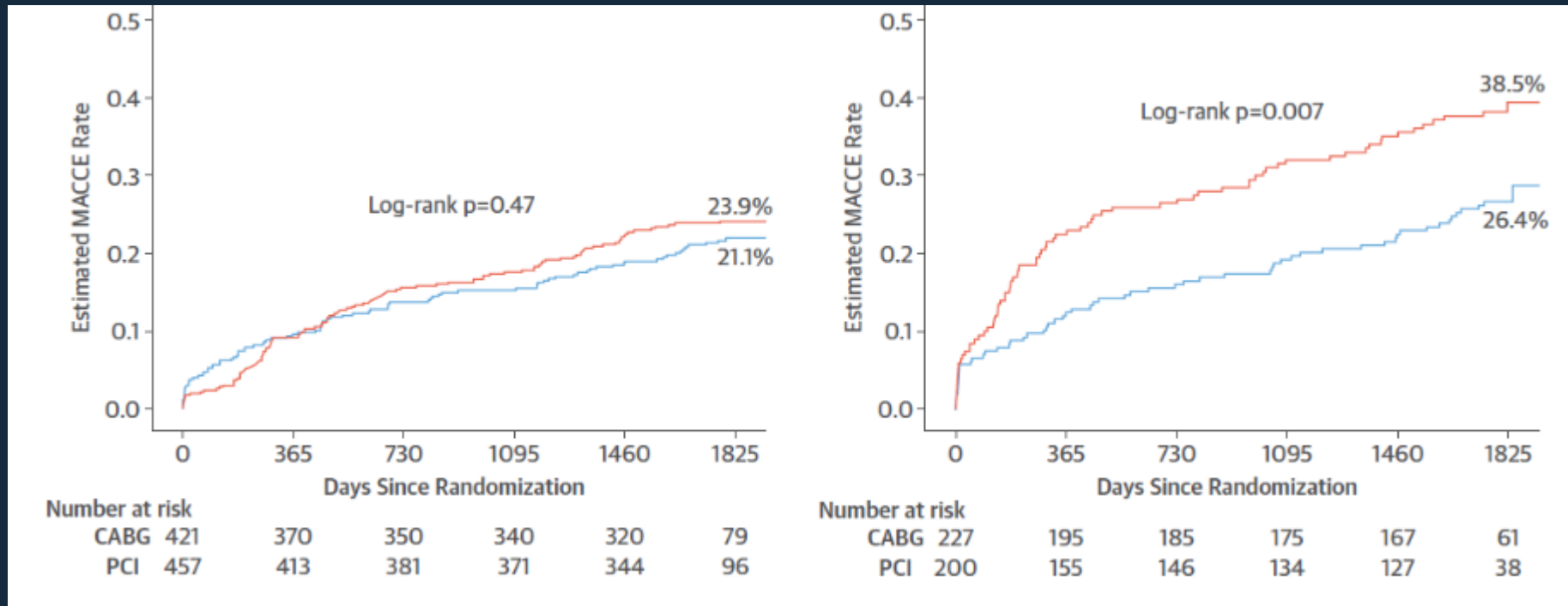
Lower risk of MACCE and repeat revascularization
More complete revascularization
Protection against events arising from proximal segments

Differential Outcome According to the Anatomical complexity

Pooled analysis of SYNTAX LM and PRECOMBAT (N=1,305)

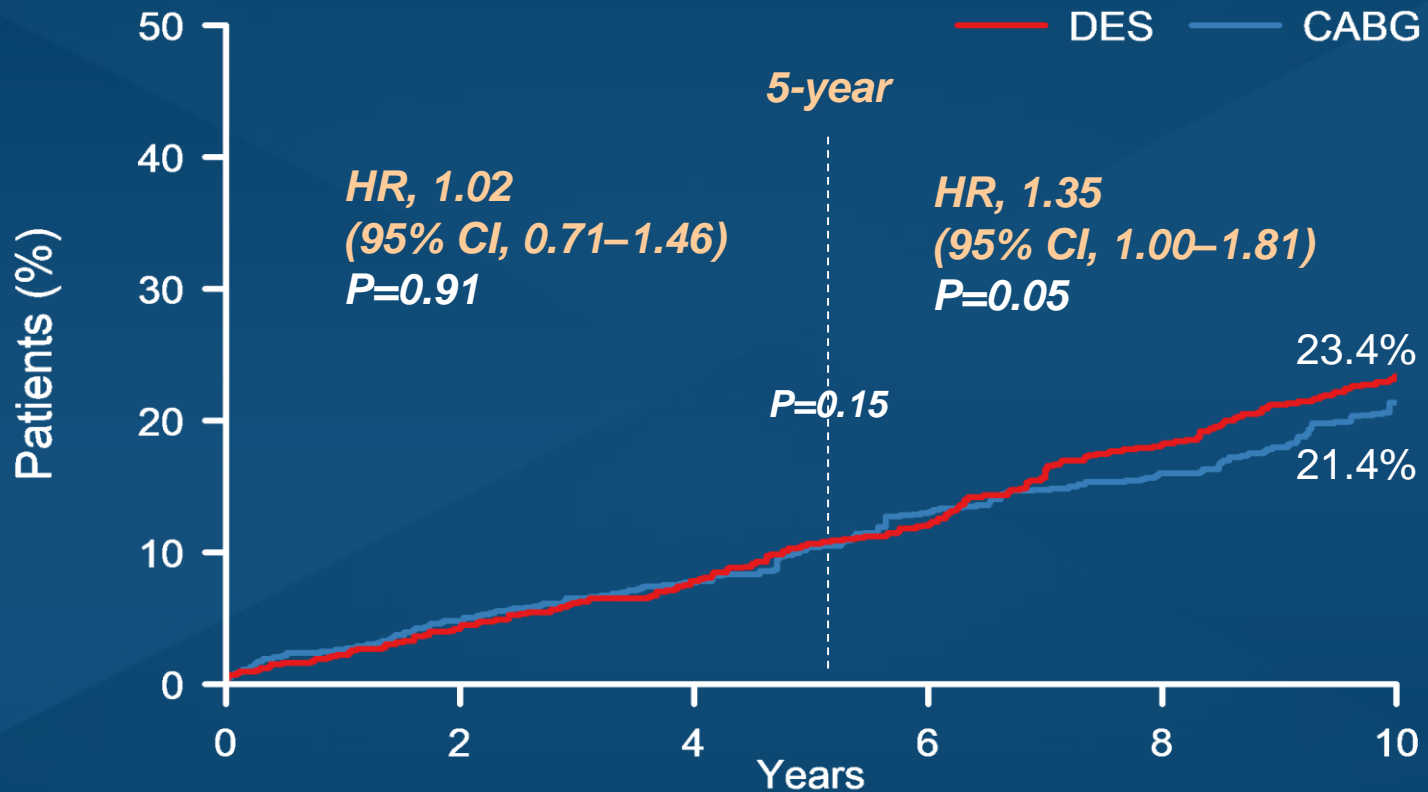
**Low to Intermediate (0-32)
SYNTAX Scores**

**High (≥ 33)
SYNTAX Scores**



MAINCOMPARE

10 Year All-Cause Mortality

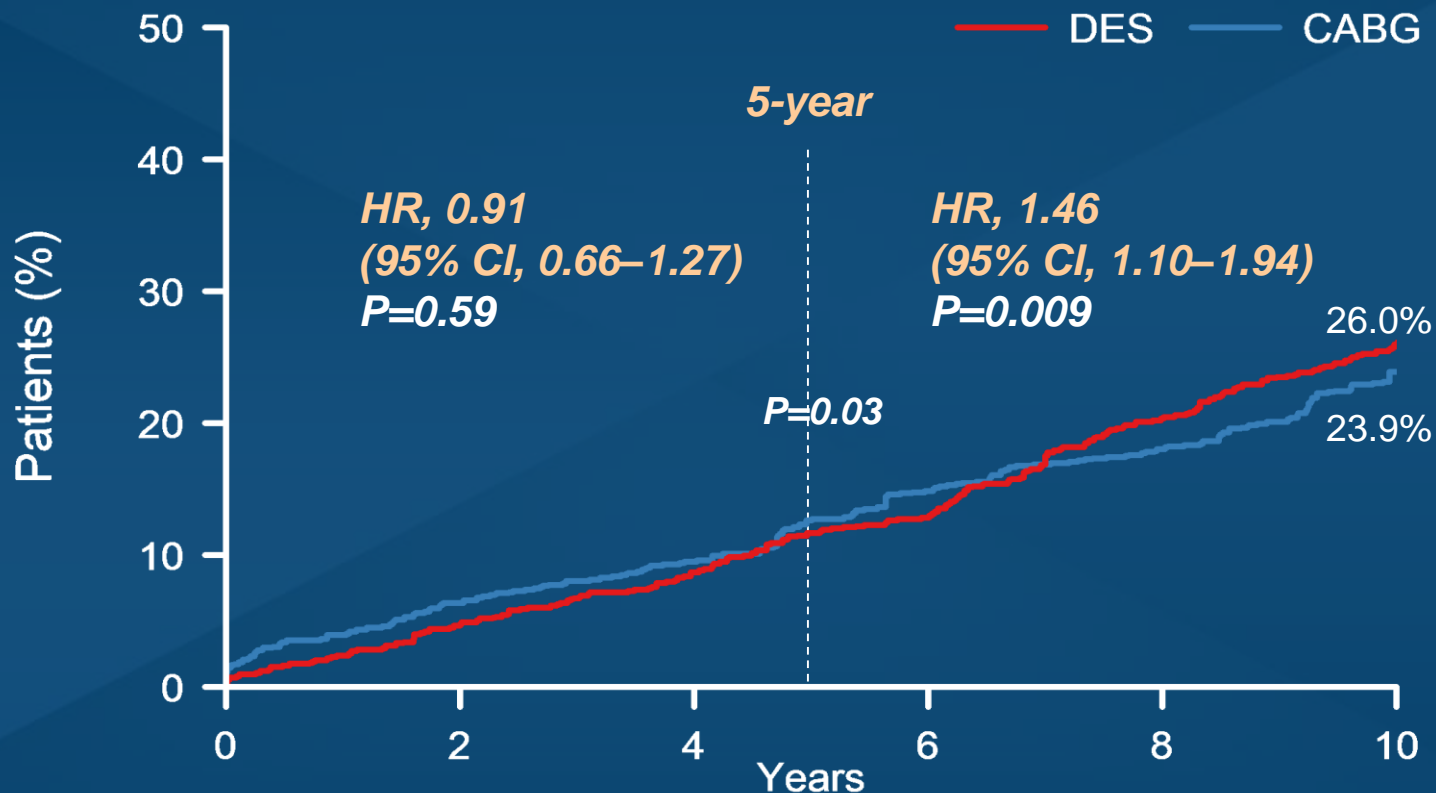


Number at risk

DES	784	750	723	689	641	601
CABG	690	657	636	600	579	541

MAINCOMPARE

Death, Q-MI, or Stroke



Number at risk

DES	784	747	716	683	624	580
CABG	690	646	624	587	565	524

Revascularization Strategy

For Left Main CAD

**Inoperable
High Operative Risk**

*Low to intermediate
PCI risk, Favorable
Anatomy*

PCI

**Low to
Intermediate
Operative Risk**

*Low to
intermediate
PCI risk,
Favorable
Anatomy*

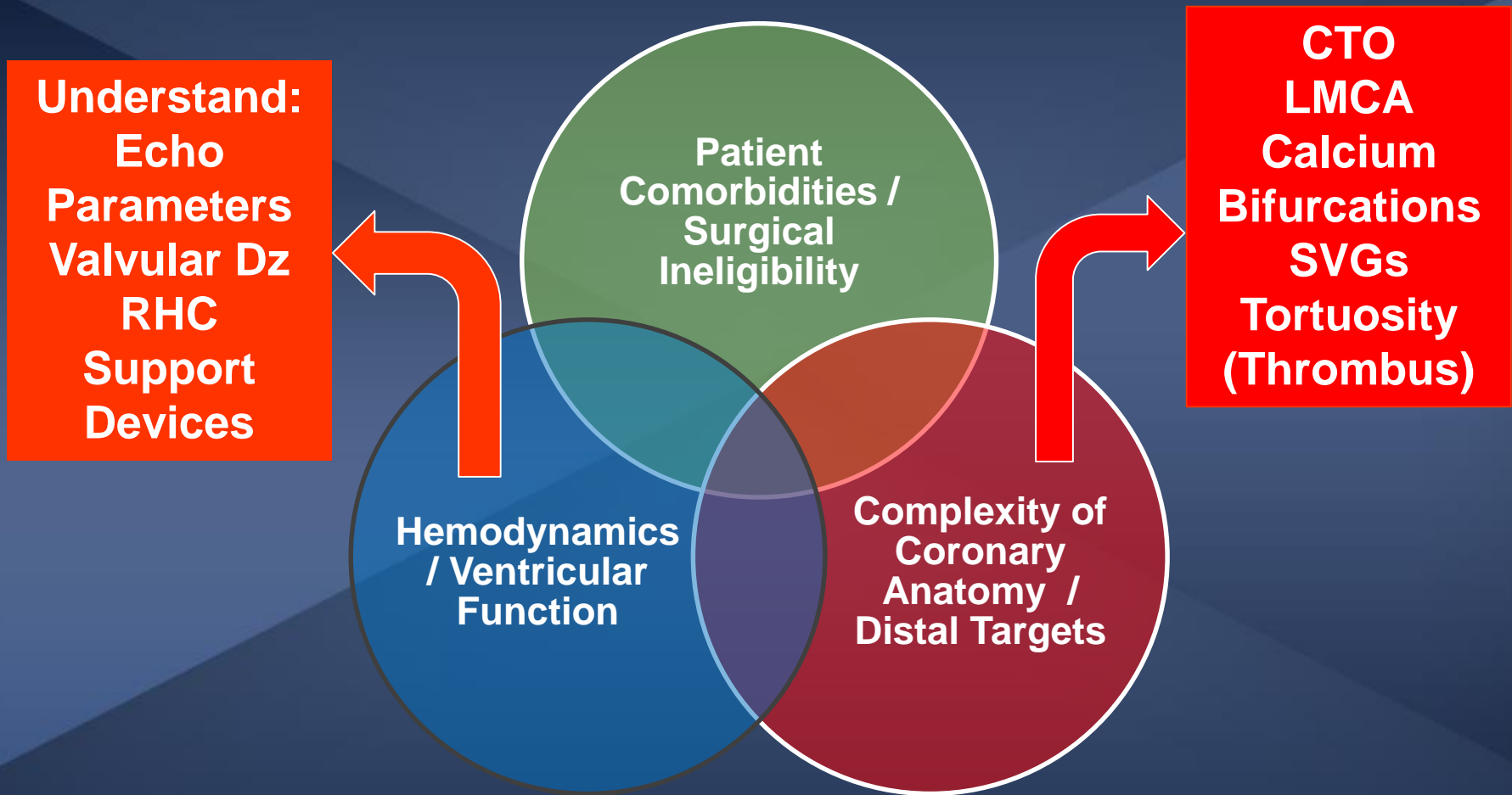
**PCI
CABG**

**Low to Intermediate
Operative Risk**

*High PCI risk,
Unfavorable Anatomy
Pts who need long term
prevention of
myocardial damage*

CABG

Treat the CHIP Population: Complex Higher-Risk (and Indicated) Patients



Treat the undertreated!

Revascularization Strategy

For Left Main CAD

**Inoperable
High Operative Risk**

*Low to intermediate
PCI risk, Favorable
Anatomy*

PCI

**Low to
Intermediate
Operative Risk**

*Low to
intermediate
PCI risk,
Favorable
Anatomy*

**PCI
CABG**

**Low to Intermediate
Operative Risk**

*High PCI risk,
Unfavorable Anatomy*

CABG

High Operative Risk

**High PCI risk,
Unfavorable Anatomy**

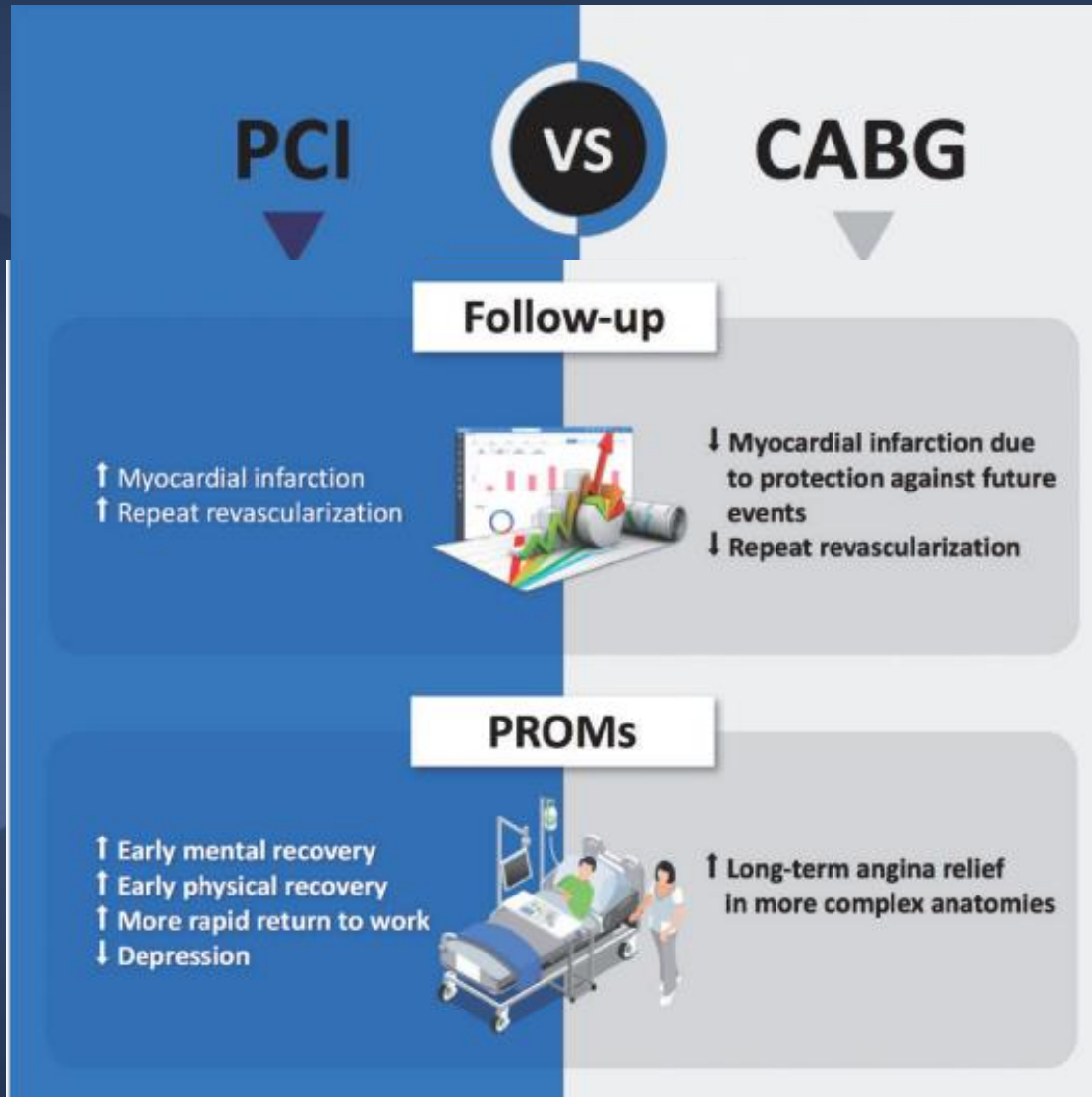
PCI (CHIP)

Current Status of LM PCI

PCI; important position for LM CAD

CABG is CABG (LIMA to LAD)

Decision-Making for Left Main CAD



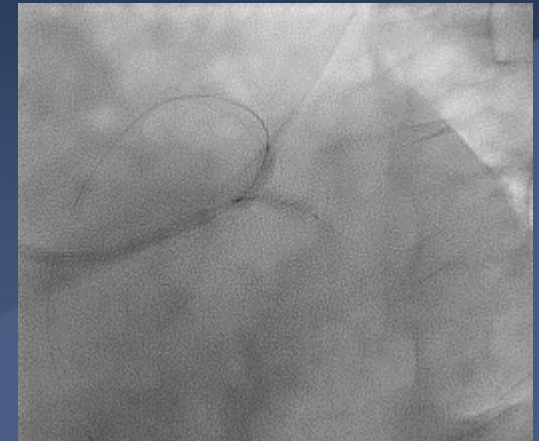
If we opt to do LM PCI



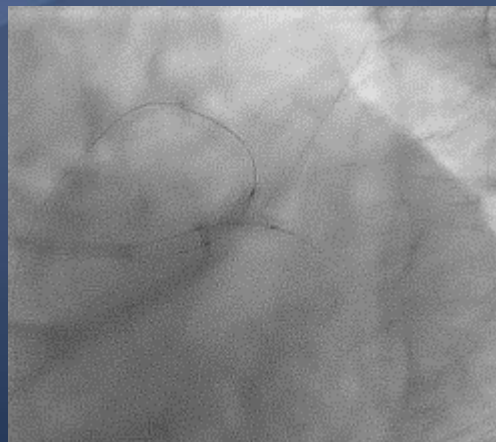
Elective Situation



Angio-guided



Kissing stent

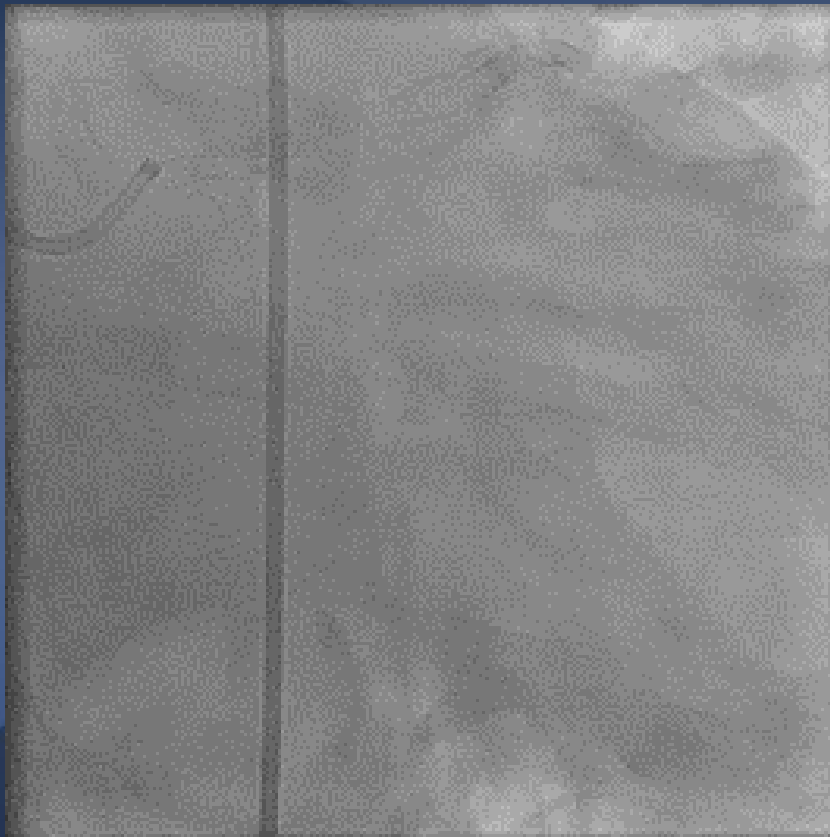


Final

If we opt to do LM PCI

We have to do it right

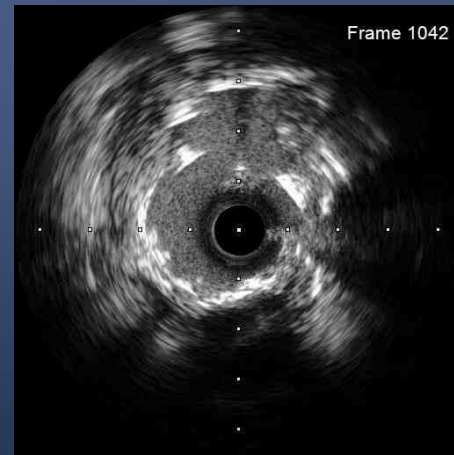
8 Months Later
Chest pain, Heart Failure, EF 35%



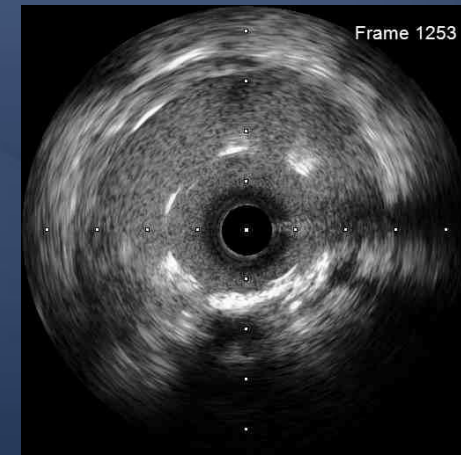
LAD



LCX



LM bifurcation



LM shaft

TCTAP 2019

