Stents versus Surgery for Left Main or MVD
Insights from A Patient-Level Meta-analysis

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The Journey

Before DES Era

Long-term mortality is similar after CABG and PCI in most patient with multivessel CAD. CABG may be a better option for patients with diabetes because of a lower mortality .

DES Era

	Death/MI	Stroke	TVR
PRECOMBAT	No difference	No difference	CABG
SYNTAX	CABG	PCI	CABG
FREEDOM	CABG	PCI	CABG
BEST	No difference	No difference	CABG

Individual trials are not large enough to resolve the uncertainties on optimal treatment for these diseases.

Which one is better?

The Challenge

Stents versus Surgery for Left Main or MVD

Insights from A Patient-Level Meta-analysis

This is it!

Why Individual Patient Data Analysis?

- Most RCTs have limited power to assess the clinical equipoise between CABG & PCI with DES regarding hard outcomes.

- Pooling of patient-level data from RCTs increases the statistical power and allows time-to-event analysis, and its separate effects among specific subgroups.

Database Pooling

- We combined the database from the BEST (n=880, EES), PRECOMBAT (n=600, SES) and SYNTAX (n=1800, PES) trials.
- Unless specified, previously reported definitions from each study were used for variables.

Study Outcomes

- **Primary Outcome:**
  A composite of all-cause death, MI, or stroke over all available follow-up.

- **Secondary Outcomes:**
  Death from any causes, cardiac death, MI, stroke, any coronary revascularization, a composite of death or MI

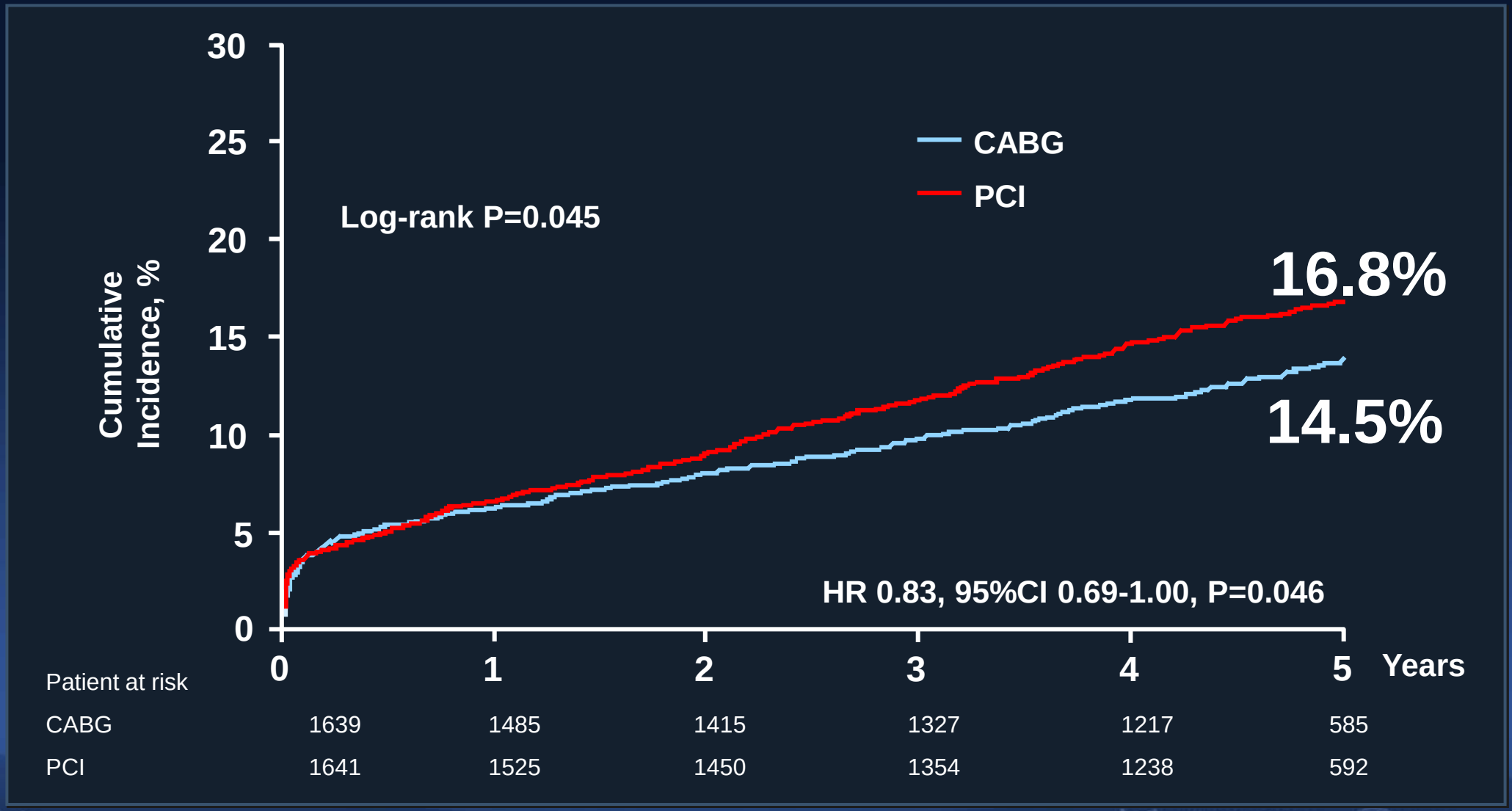
Statistical Analysis

- All analyses were performed according to the intention-to-treat principle.
- The stratified cox proportional hazards models was used to analyze the impact of revascularization strategy on clinical outcomes and to determine whether merging of the data from 3 trials would influence the primary outcome. A likelihood-ratio test was performed to assess the homogeneity of the data and the assumption of homogeneity was not violated (P=0.17).
- Analyses were performed by an independent statistician who was unaware of the treatment assignments. All reported P values are 2 sided, and values of P<0.05 were considered to indicate statistical significance.

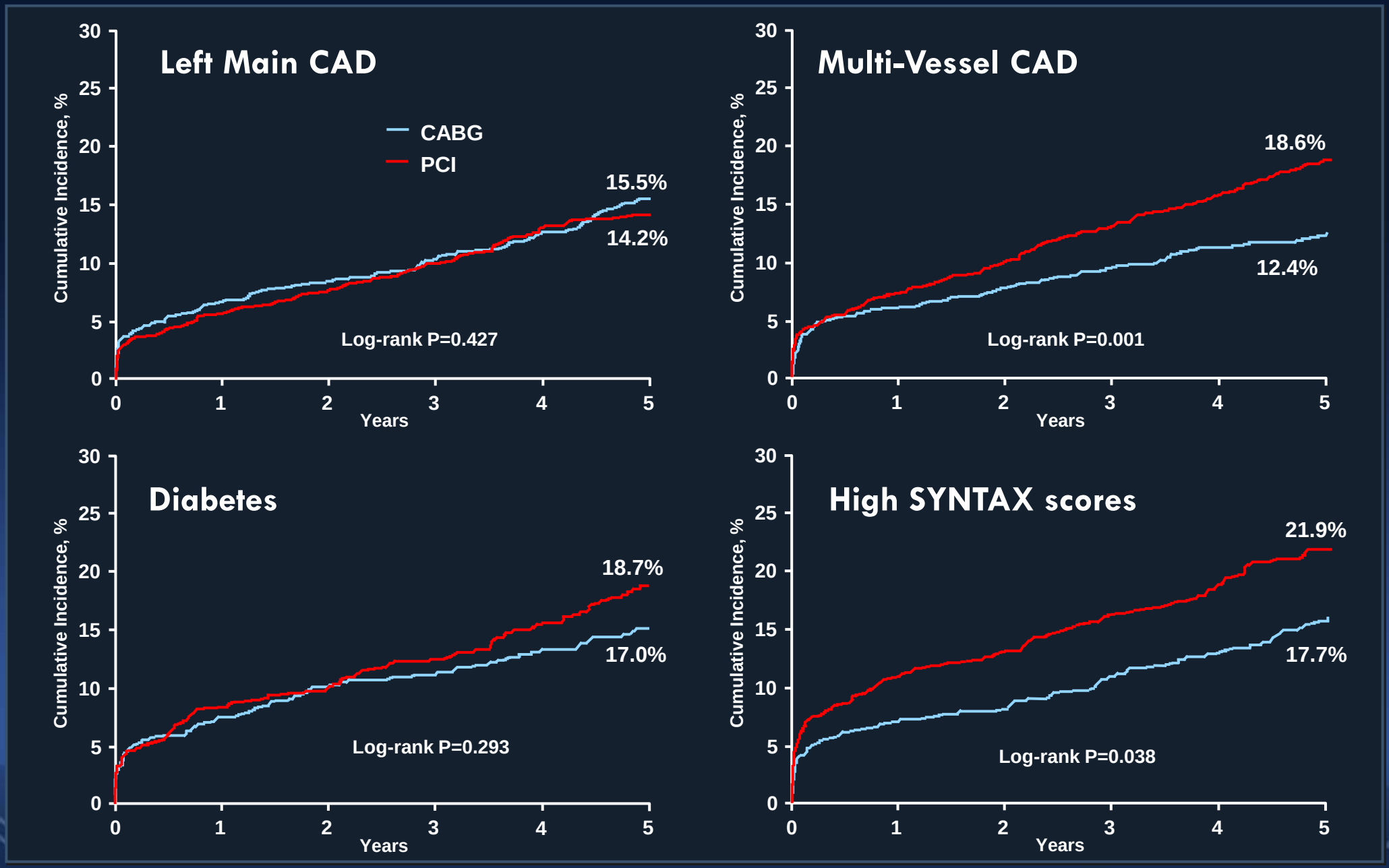
Baseline Characteristics

	CABG (n=1639)	PCI (n=1641)
Age (years)	64.5±9.7	64.2±9.7
Men	1264 (77.1%)	1222 (74.5%)
Current smoking	368 (22.5%)	344 (21.0%)
Diabetes	532 (32.5%)	534 (32.5%)
Stable CAD	987 (60.2%)	1030 (62.8%)
Previous MI	349 (21.4%)	323 (19.8%)
Previous stroke	76 (4.6%)	72 (4.4%)
LM	649 (39.6%)	657 (40.0%)
MVD	991 (60.5%)	984 (60.0%)
SYNTAX score	27.3±10.7	26.7±10.3
Follow-up (years)	4.4±1.4	4.4±1.3

Primary Outcome: Death, MI or Stroke

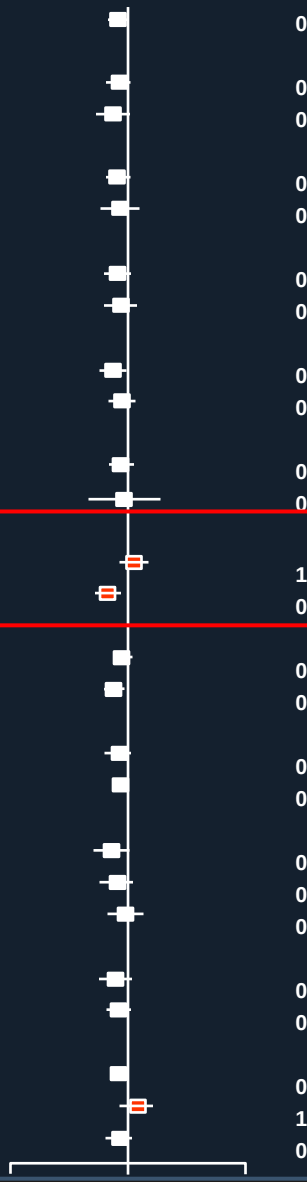


Primary Outcome in Major Subgroups



Primary Outcome: Subgroup Analysis

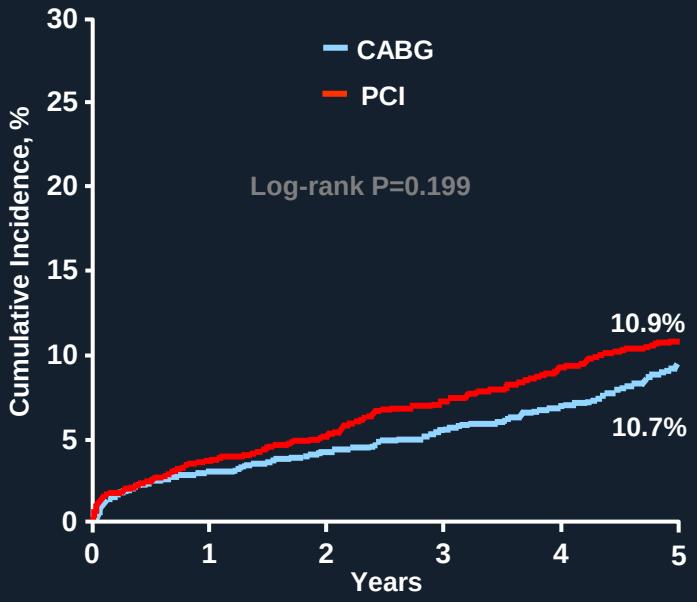
Subgroup	Primary Endpoint CABG	Primary Endpoint PCI		P value	P value for Interaction
	n / total n (%)				
Overall	213/1639 (13.0)	262/1641 (16.1)	0.83 (0.68-0.99)	0.039	-
Age					0.553
≥65 yr	154/898 (17.1)	179/864 (20.7)	0.85 (0.68-1.05)	0.127	
<65 yr	58/741 (8..0)	83/777 (10.7)	0.75 (0.54-1.05)	0.089	
Sex					0.883
Male	161/1264 (12.7)	192/1222 (15.7)	0.82 (0.67-1.01)	0.067	
Female	52/375 (13.9)	70/149 (16.7)	0.85 (0.59-1.21)	0.369	
Diabetes					0.817
Yes	78/352 (14.7)	94/534 (17.6)	0.85 (0.63-1.15)	0.287	
No	135/1107 (12.2)	168/1107 (15.2)	0.81 (0.65-1.02)	0.075	
ACS					0.421
Yes	89/652 (13.7)	113/630 (17.9)	0.76 (0.57-1.00)	0.048	
No	124/987 (12.6)	149/1011 (14.7)	0.88 (0.69-1.12)	0.288	
Ejection fraction					0.827
≥40%	141/1225 (11.5)	160/1202 (13.3)	0.86 (0.70-1.10)	0.247	
<40%	16/66 (24.2)	19/68 (27.9)	0.92 (0.47-1.78)	0.795	
Left main disease					0.009
Yes	98/648 (15.1)	92/657 (14.0)	1.12 (0.84-1.49)	0.427	
No	115/991 (11.6)	170/984 (17.3)	0.68 (0.53-0.86)	0.001	
pLAD involvement					0.332
Yes	134/1006 (13.3)	153/1012 (15.1)	0.89 (0.70-1.12)	0.304	
No	79/625 (12.6)	109/623 (17.5)	0.74 (0.56-0.99)	0.045	
Era of DES					0.800
new DES	42/442 (9.5)	52/438	0.79 (0.53-1.19)	0.265	
Previous DES	171/1197 (14.3)	210/1203 (17.5)	0.84 (0.69-1.03)	0.087	
SYNTAX score					0.455
Score ≥33	71/462 (15.4)	88/413 (21.3)	0.72 (0.53-0.98)	0.039	
Score 23-32	74/574 (12.9)	97/599 (16.2)	0.81 (0.60-1.10)	0.179	
Score ≤22	66/57 (11.6)	77/613 (12.6)	0.95 (0.68-1.32)	0.763	
EuroSCORE					0.791
≥6	74/306 (24.2)	91/292 (31.2)	0.79 (0.58-1.08)	0.136	
<6	139/1333 (10.4)	171/1349 (12.7)	0.83 (0.67-1.04)	0.111	
Trial					0.499
SYNTAX	143/897 (15.9)	185/903 (20.5)	0.80 (0.65-1.00)	0.047	
PRECOMBAT	28/300 (9.3)	25/300 (8.3)	1.13 (0.66-1.94)	0.661	
BEST	42/442 (9.5)	52/48\38 (11.9)	0.79 (0.53-1.19)	0.265	



Secondary Outcomes:

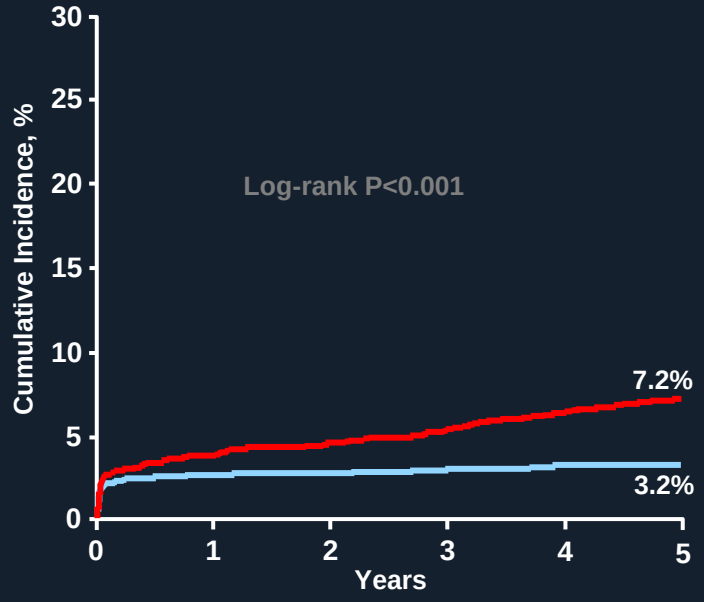
Individual Components of Primary Outcome

Death



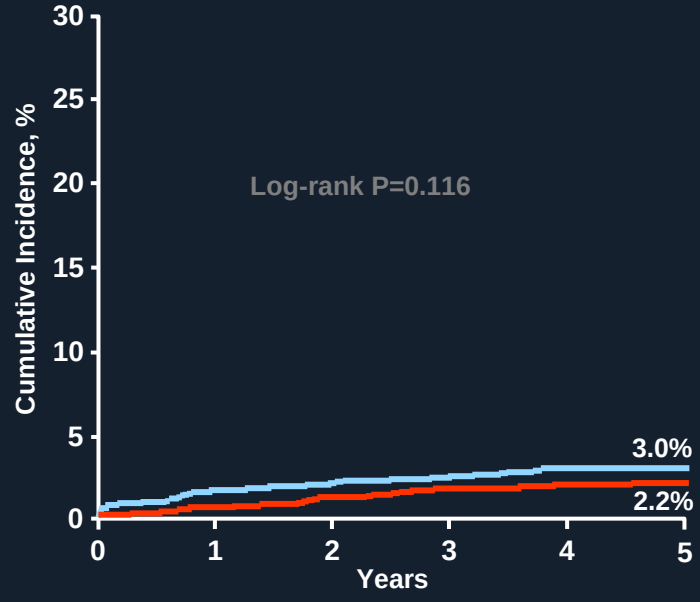
HR 0.86, 95%CI, 0.69-1.08, P=0.199

MI



HR 0.46, 95%CI, 0.33-0.64, P<0.001

Stroke



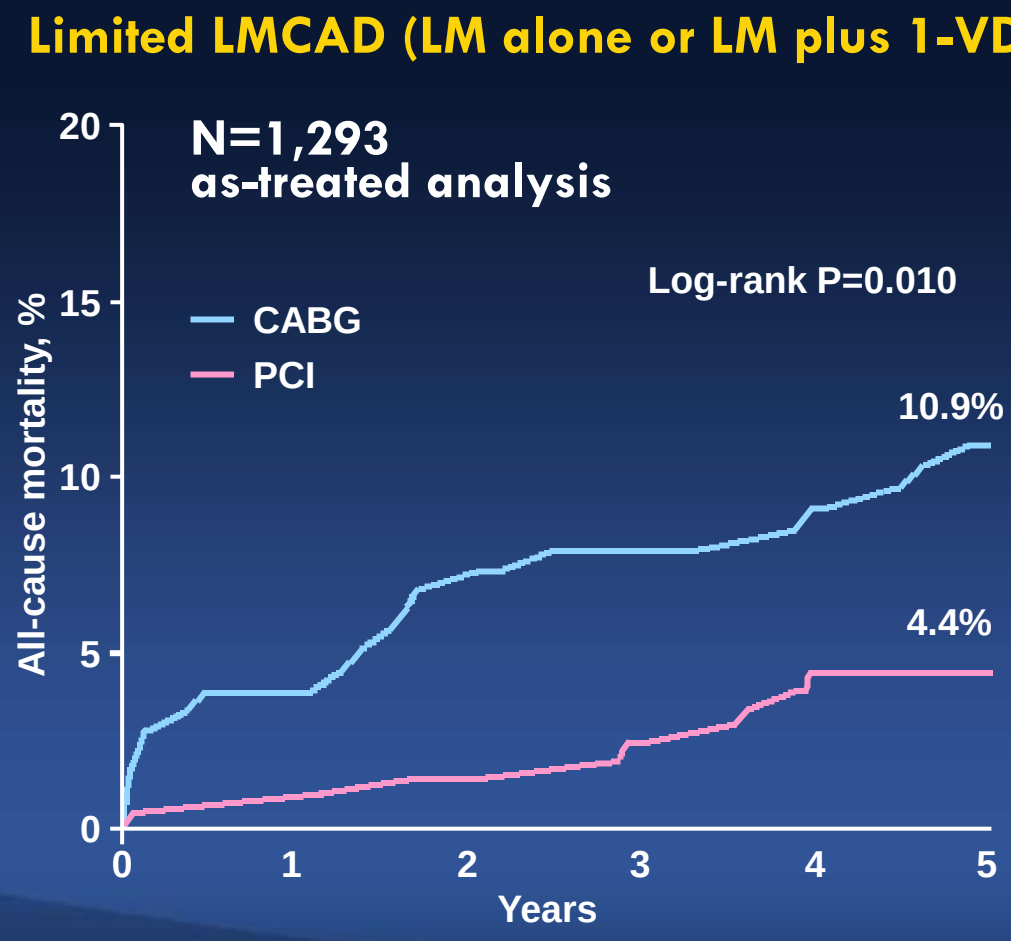
HR 1.43, 95%CI, 0.92-2.24, P=0.116

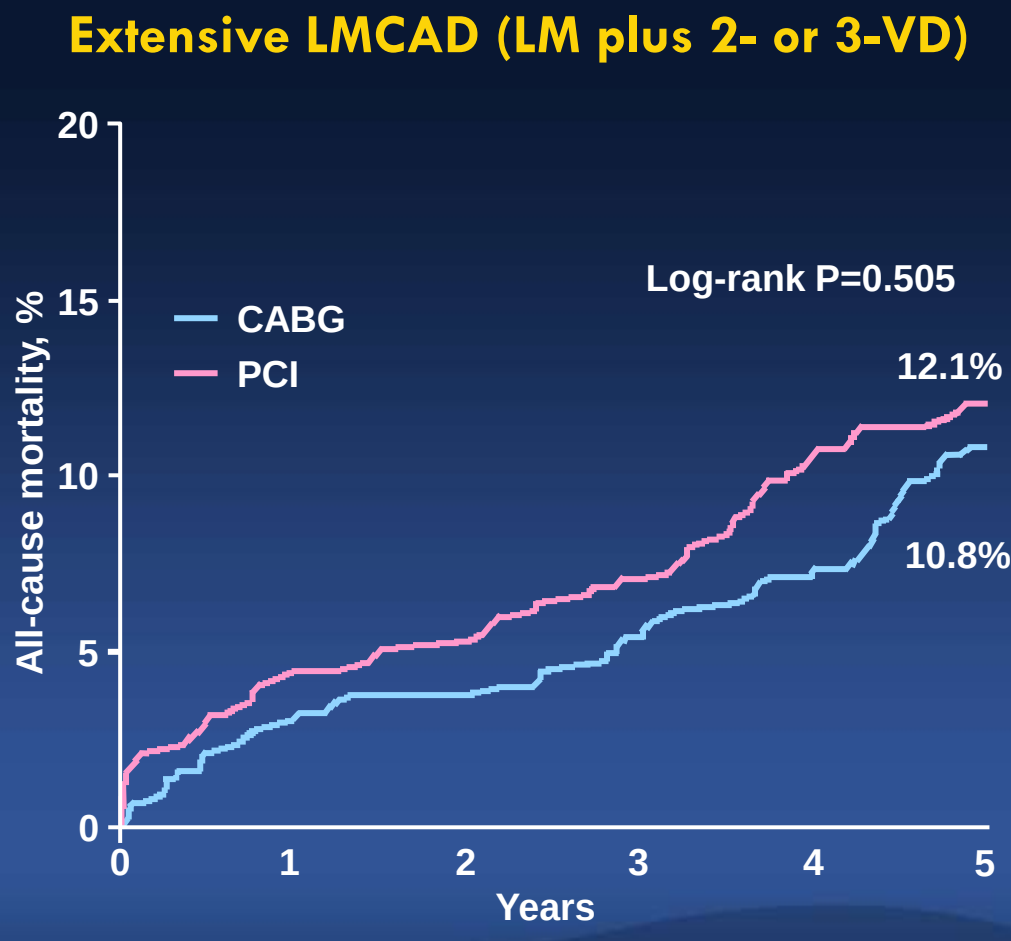
Conclusions

- CABG, as compared to PCI with DES, significantly reduced the risk of all-cause death, MI, or stroke in patients with left main or multivessel CAD.
- The benefit of CABG was particularly pronounced in patients with multivessel CAD, but not in those with left main CAD.

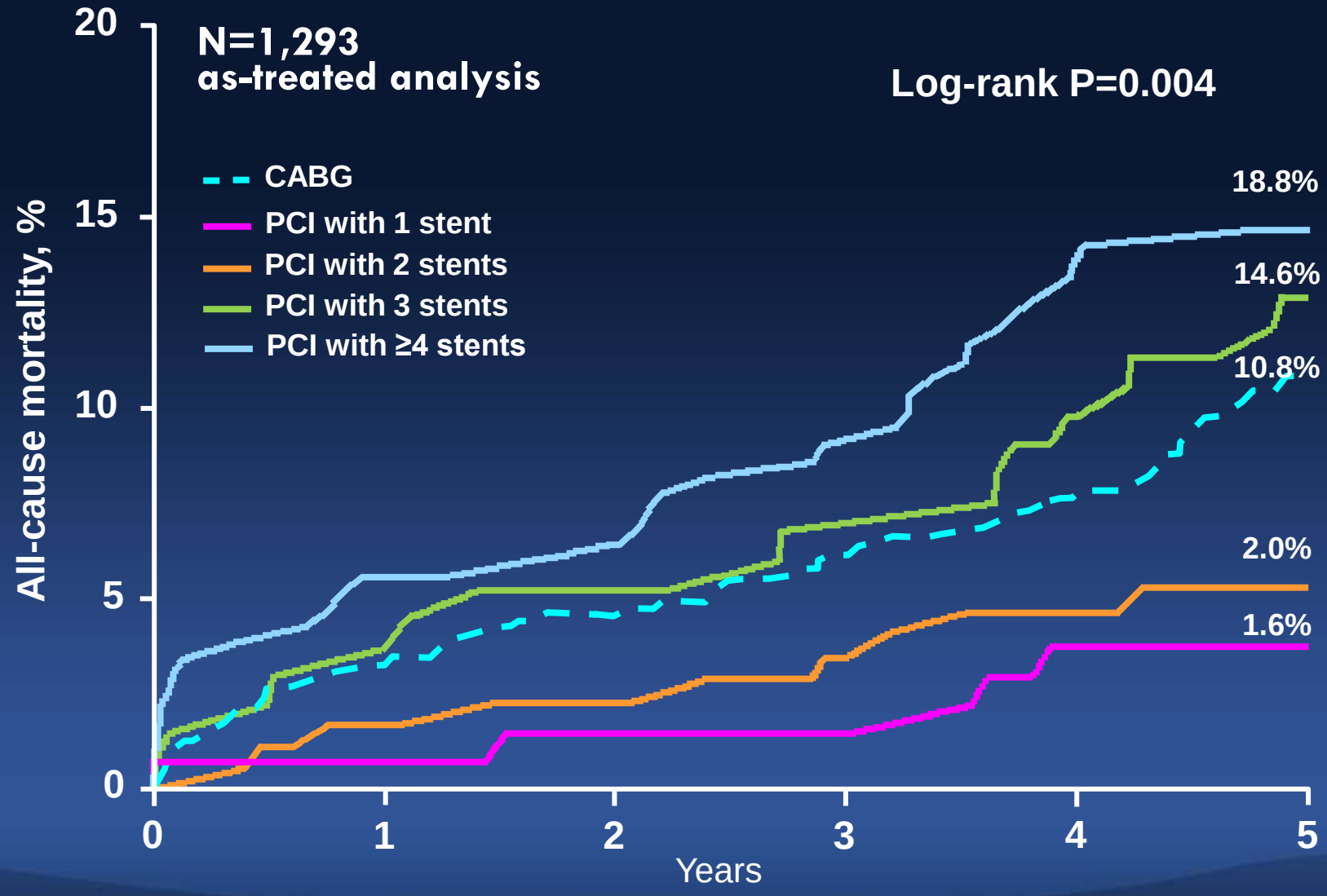
Further Insights into Mortality

Death in LM Disease: "Extent of Disease"

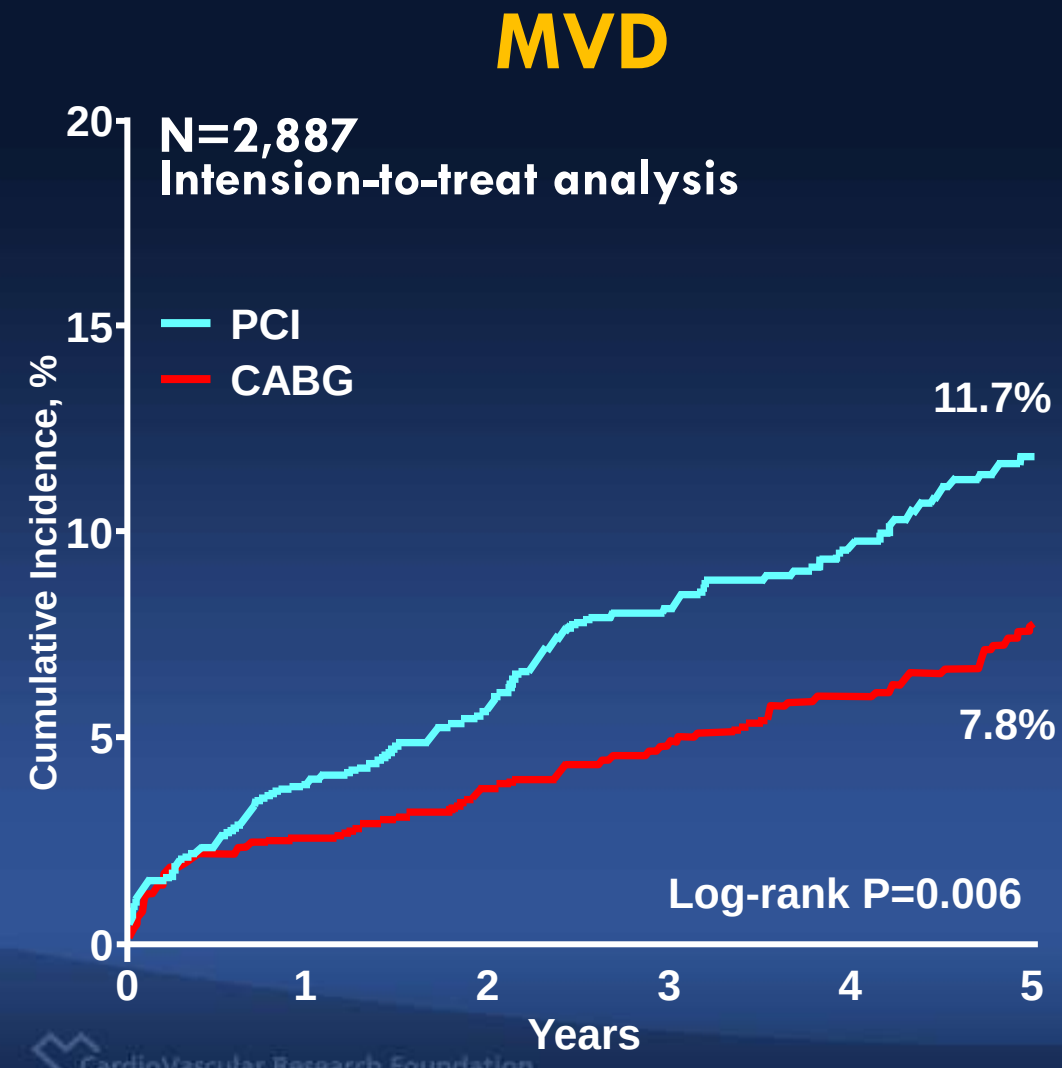


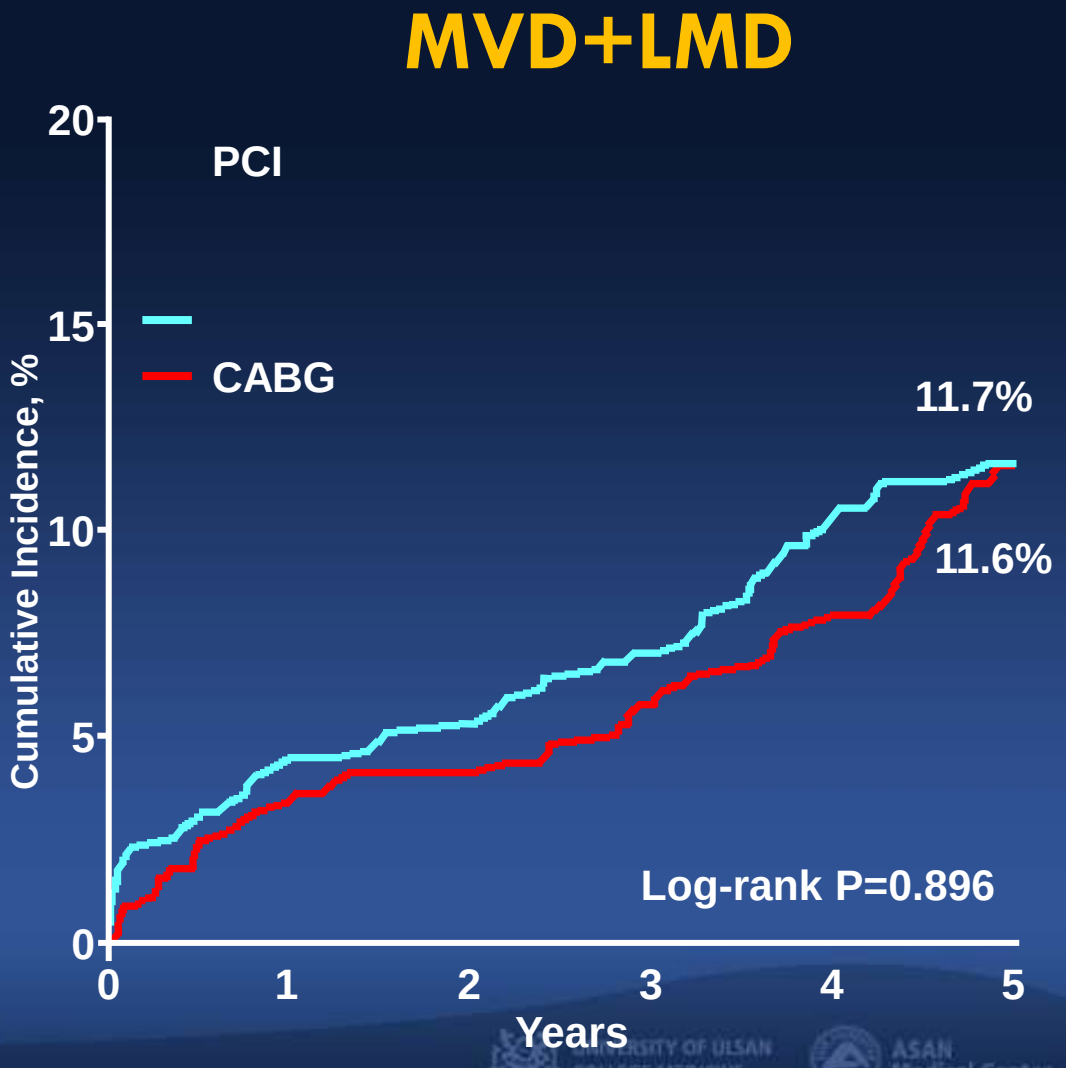


Death in LM Disease: "Number of Stents"



Death in MVD with or without LM Disease

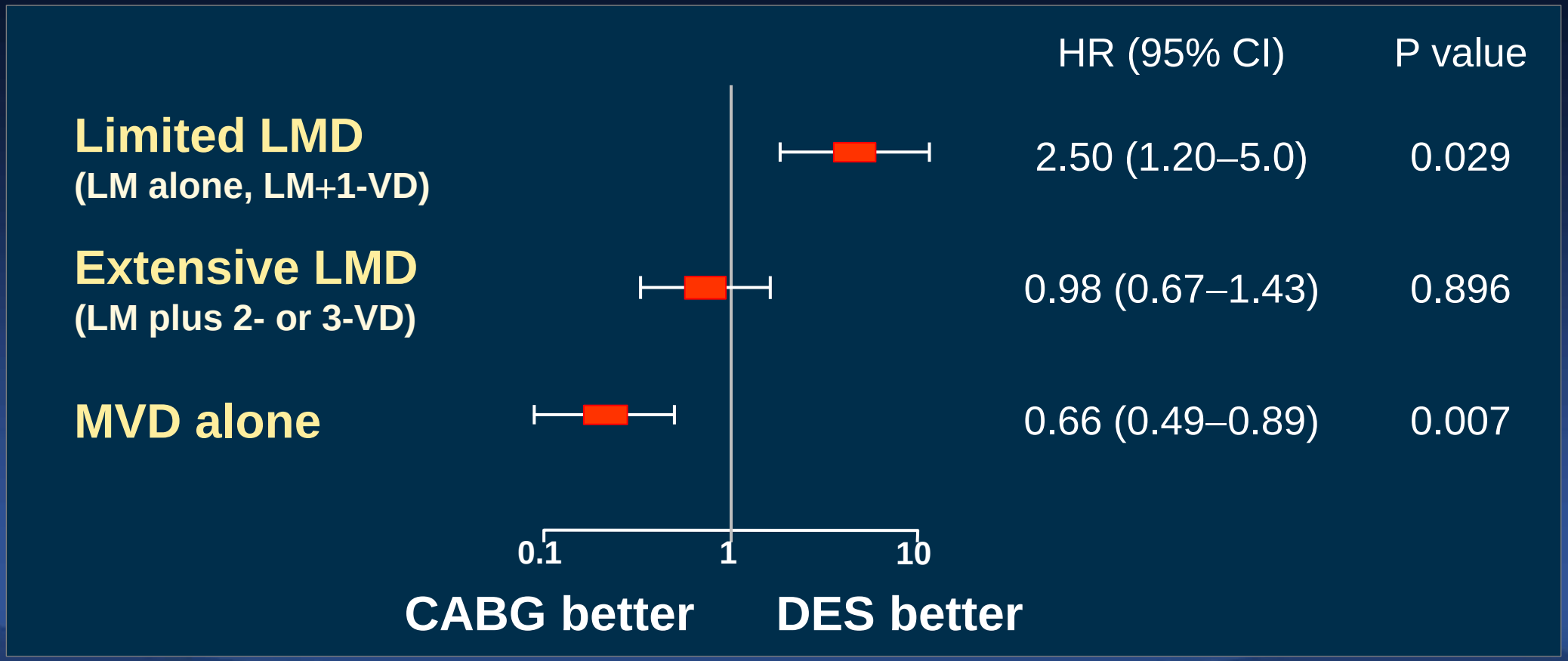




BEST, PRECOMBAT and SYNTAX Trial

All-Cause Mortality

P for Interaction <0.001



Possible Explanations

What's Different between LM and MVD?

- **The left main coronary artery is large and short, leading to a lower rate of target lesion failure.**

- **The advantage of CABG over PCI seems to be attenuated in the presence of concomitant left main CAD (LM total: a large ischemic island, graft dependent).**

Ongoing Trials

EXCEL (NCT01205776; LM, n=1905): CABG vs. EES

NOBLE (NCT01496651; LM, n=1200): CABG vs. DES

FAME 3 (NCT02100722; MVD, n=1500):

CABG vs. FFR-guided ZES

More PCI or More CABG?

The final winner here will be
a simple, effective and durable treatment!

Thanks