Impact of Left Ventricular Ejection Fraction on 10-year Mortality after PCI or CABG in the SYNTAXES trial: CABG Safer than PCI in Reduced Ejection Fraction

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Disclosure

- I have no conflict of interest regarding this presentation.

Background

Indications for revascularization in patients with stable angina or silent ischaemia

Extent of CAD (anatomical and/or functional)		Class[a]	Level[b]
For prognosis	Left main disease with stenosis >50%.[c] [68–71]	I	A
	Proximal LAD stenosis >50%.[c] [62,68,70,72]	I	A
	Two- or three-vessel disease with stenosis >50% with impaired LV function (LVEF ≤35%).[c] [61,62,68,70,73–83]	I	A
	Large area of ischaemia detected by functional testing (>10% LV) or abnormal invasive FFR.[d] [24,59,84–90]	I	B
	Single remaining patent coronary artery with stenosis >50%.[c]	I	C
For symptoms	Haemodynamically significant coronary stenosis[c] in the presence of limiting angina or angina equivalent, with insufficient response to optimized medical therapy.[e] [24,63,91–97]	I	A

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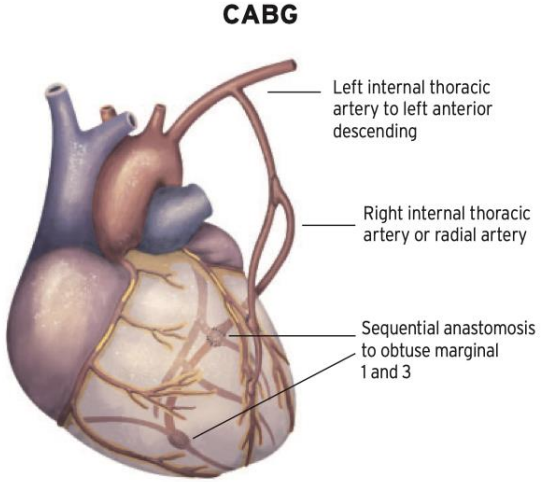
CAD = coronary artery disease; FFR = fractional flow reserve; iwFR = instantaneous wave-free ratio; LAD = left anterior descending coronary artery; LV = left ventricular; LVEF = left ventricular ejection fraction.
[a]Class of recommendation.
[b]Level of evidence.
[c]With documented ischaemia or a haemodynamically relevant lesion defined by FFR ≤0.80 or iwFR ≤0.89 (see section 3.2.1.1), or >90% stenosis in a major coronary vessel.
[d]Based on FFR <0.75 indicating a prognostically relevant lesion (see section 3.2.1.1).
[e]In consideration of patient compliance and wishes in relation to the intensity of anti-anginal therapy.

FAVOURS CABG

Clinical characteristics
- Diabetes
- Reduced LV function (EF ≤35%)
- Contraindication to DAPT
- Recurrent diffuse in-stent restenosis

Anatomical and technical aspects
- MVD with SYNTAX score ≥23
- Anatomy likely resulting in incomplete revascularization with PCI
- Severely calcified coronary artery lesions limiting lesion expansion

Need for concomitant interventions
- Ascending aortic pathology with indication for surgery
- Concomitant cardiac surgery



European Heart Journal 2019;40:87-165.

- Coronary artery bypass grafting (CABG) has been recommended in European Society of Cardiology (ESC) guidelines of myocardial revascularization as a standard treatment for patients with multivessel coronary artery disease (CAD) and severely impaired left ventricular ejection fraction (LVEF).
- Despite the Class IA recommendation, the impact on vital prognosis at very long-term (10 years) of percutaneous coronary intervention (PCI) and CABG in patients with reduced ejection fraction remains to be elucidated.

Objectives

- The purpose was to evaluate the impact of LVEF at baseline on the long-term mortality, and to evaluate the differences in 10-year survival of PCI versus CABG according to LVEF subgroups in the SYNTAX Extended Survival (SYNTAXES) trial.

Methods

- **Primary endpoint**: 10-year all-cause mortality

- **LVEF Classification**

All patients were categorized into three groups according to the current ESC guidelines.

(1) reduced ejection fraction (rEF; LVEF≤40%)

(2) mildly reduced ejection fraction (mrEF; LVEF 41-49%)

(3) preserved ejection fraction (pEF; LVEF≥50%)

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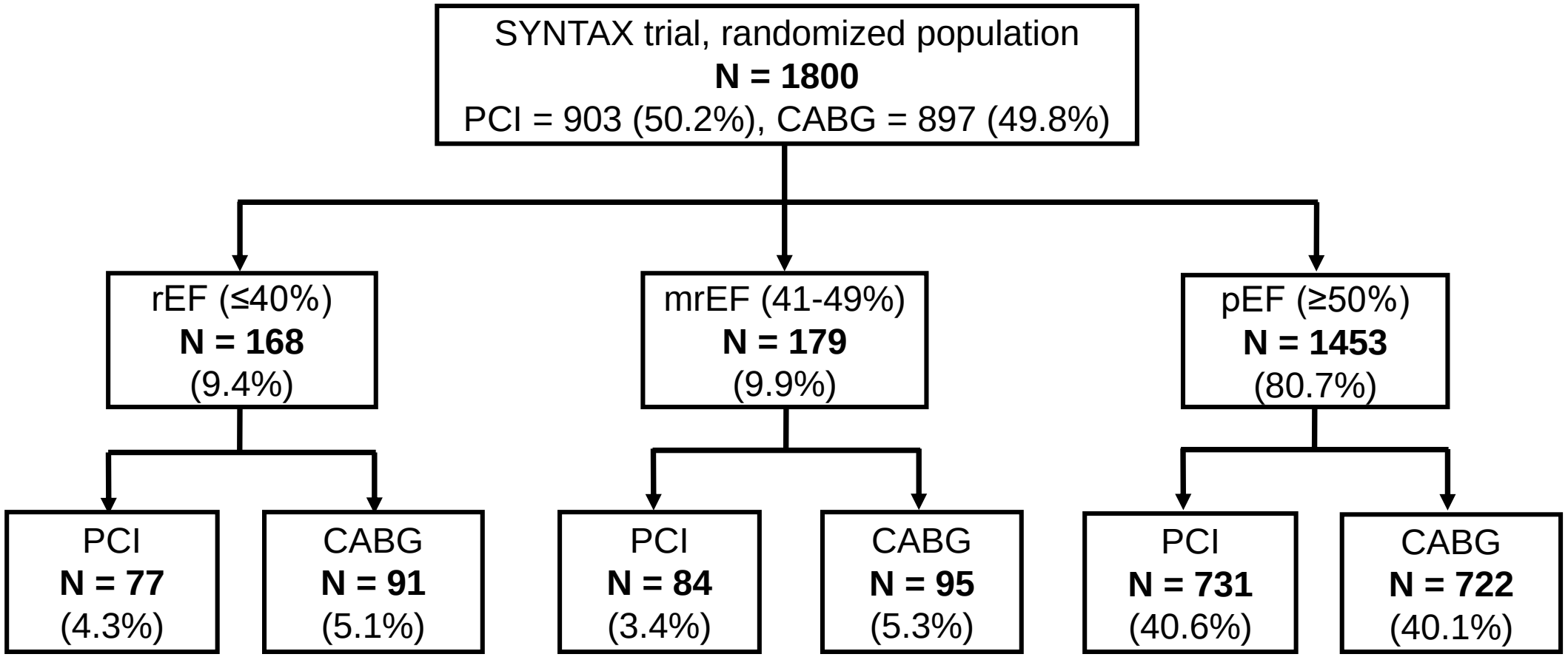
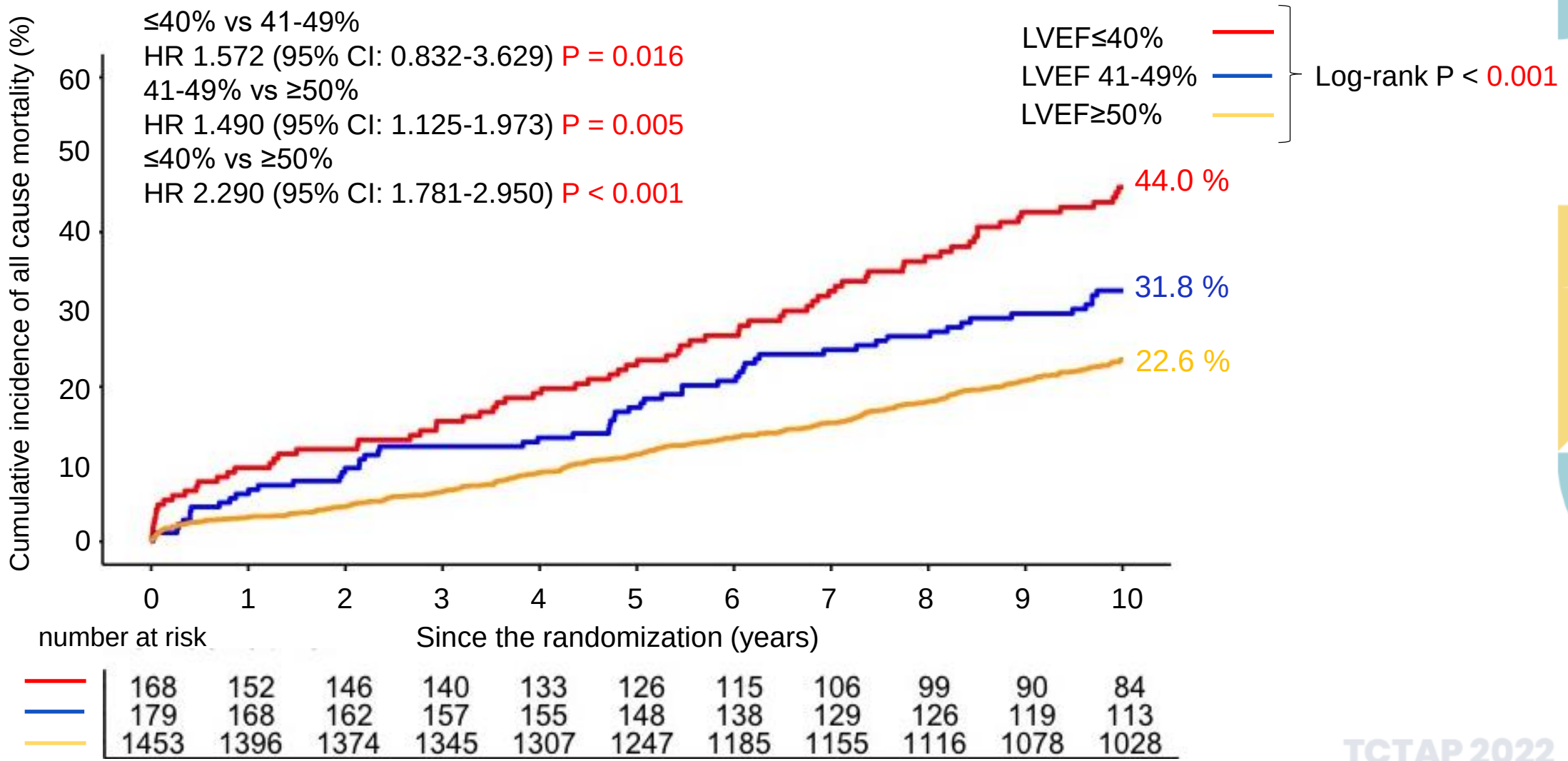
Study flow chart



Baseline patient characteristics

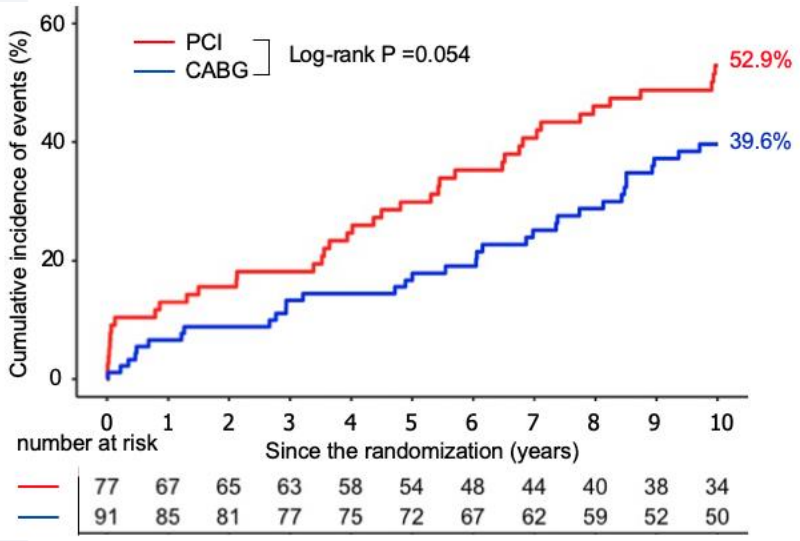
Characteristics n, (%)	rEF (≤40%) (N = 168)	mrEF (41-49%) (N = 179)	pEF (50%) (N = 1453)	P value
Age	65.0 ± 9.5	67.3 ± 9.7	65.1 ± 9.7	0.007
Male Sex	84.5 (142/168)	74.3 (133/179)	77.7 (1398/1453)	0.054
Hypertension	58.3 (98/168)	61.5 (110/179)	68.0 (988/1453)	0.014
Dyslipidemia	69.1 (114/165)	79.2 (141/178)	78.8 (1136/1442)	0.016
Diabetes	32.7 (55/168)	22.3 (40/179)	24.6 (357/1453)	0.046
Current smoking	29.9 (50/167)	17.9 (32/179)	19.4 (281/1447)	0.004
Chronic kidney disease	27.6 (42/152)	18.9 (30/159)	18.4 (244/1327)	0.023
Previous MI	51.5 (84/163)	56.4 (101/179)	27.8 (400/1438)	<0.001
LVEF (%)	33.7 ± 7.0	45.1 ± 2.0	63.1 ± 9.2	<0.001
PVD	13.7 (23/168)	9.5 (17/179)	9.4 (137/1453)	0.211
COPD	10.1 (17/168)	8.9 (16/179)	8.3 (121/1453)	0.721
Number of lesions	4.3 ± 1.7	4.5 ± 1.8	4.3 ± 1.8	0.735
SYNTAX score	31.0 ± 11.2	30.3 ± 28.3	28.3 ± 11.6	0.002
Left main disease	29.8 (50/168)	36.9 (66/179)	40.5 (589/1453)	0.020
Three vessel disease	70.2 (118/191)	63.1 (113/156)	59.5 (864/1453)	0.020

10-year all-cause mortality according to LVEF classification

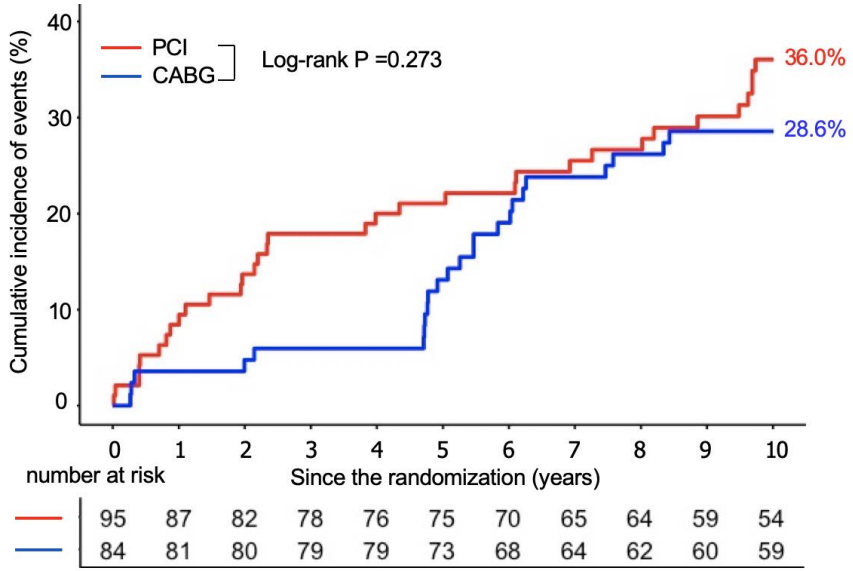


10-year all-cause mortality according to LVEF classification (PCI versus CABG)

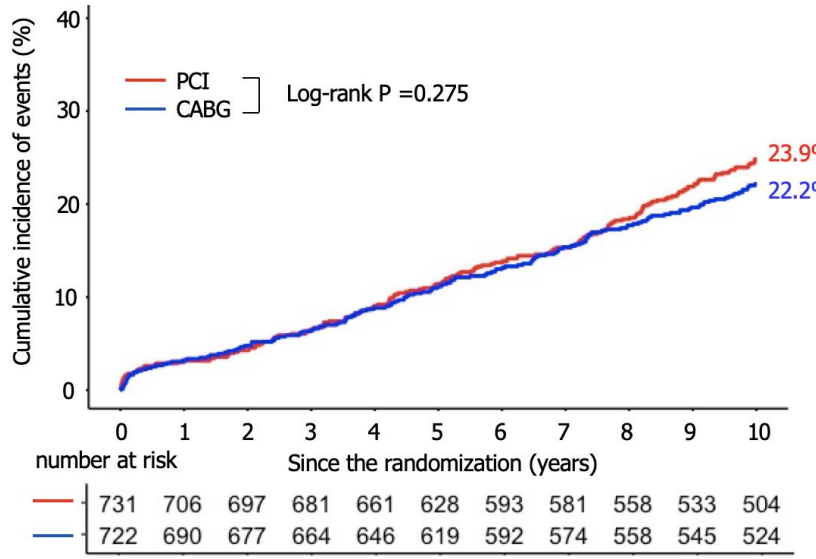
rEF (≤40%)



mrEF (41- 49%)

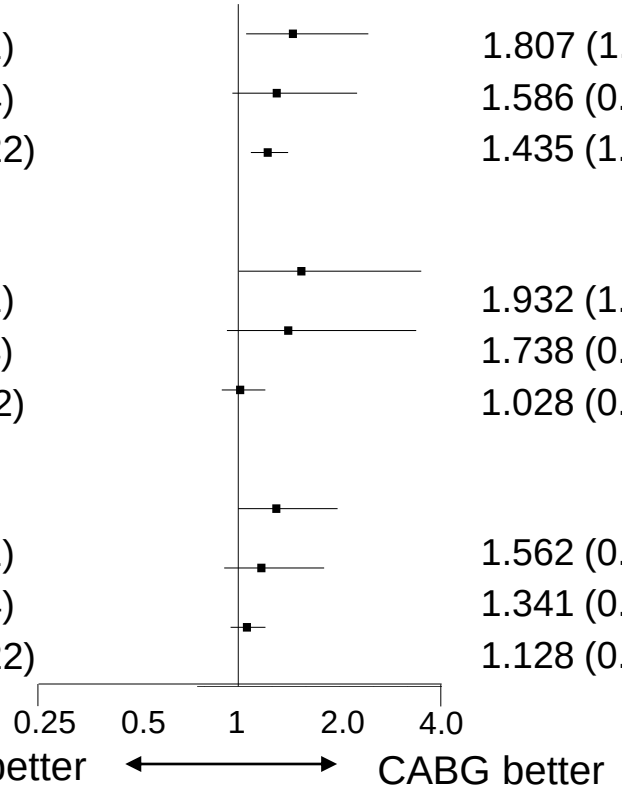


pEF (≥50%)



Hazard risks for long-term clinical outcomes

	Overall (n=1800)	PCI (n=903)	CABG (n=897)	Hazard ratio (95% CI)	P value	P for interaction
5-year MACCE						0.389
rEF (≤40%)	41.1 (69/168)	53.2 (41/77)	30.8 (28/91)	1.807 (1.117-2.922)	0.016	
mrEF (41-49%)	30.2 (54/179)	35.8 (34/95)	23.8 (20/84)	1.586 (0.913-2.756)	0.102	
pEF (≥50%)	30.1 (438/1453)	35.2 (257/731)	25.1 (181/722)	1.435 (1.186-1.736)	<0.001	
5-year all-cause mortality						0.049
rEF (≤40%)	22.6 (38/168)	29.9 (23/77)	16.5 (15/91)	1.932 (1.008-3.703)	0.047	
mrEF (41-49%)	17.3 (31/179)	21.1 (20/95)	13.1 (11/84)	1.738 (0.833-3.629)	0.141	
pEF (≥50%)	11.1 (162/1453)	11.4 (83/731)	10.9 (79/722)	1.028 (0.756-1.400)	0.858	
10-year all-cause mortality						0.183
rEF (≤40%)	44.0 (74/168)	51.9 (40/77)	37.4 (34/91)	1.562 (0.988-2.467)	0.056	
mrEF (41-49%)	31.8 (57/179)	34.7 (33/95)	28.6 (24/84)	1.341 (0.746-2.268)	0.275	
pEF (≥50%)	22.6 (329/1453)	23.9(175/731)	21.3 (154/722)	1.128 (0.886-1.401)	0.275	



Major adverse cardiac and cerebrovascular events (MACCE) at 5 years, defined as the composite of all-cause death, myocardial infarction, stroke, and any repeat revascularization.

Summary

- Ten-year all-cause mortality was significantly different between three LVEF subgroups (44.0% vs. 31.8% vs. 22.6%), in patients with rEF, mrEF and pEF, respectively ($P < 0.001$).

- Among the patients with rEF (≤40%), the incidence of 10-year all-cause mortality was comparable between PCI and CABG; however, there was a trend toward to higher mortality rate in PCI than CABG.

- Regarding the 10-year all-cause mortality, there was a significant interaction between LVEF subgroups and treatments at 5-year follow-up; however, the difference disappeared at 10-year follow-up.

Limitation

- The number of patients with reduced EF (≤40%) was only 9.4% of the entire population.
- There was no clinical follow-up data regarding medication and adverse events from 6 to 10 years since the randomization.
- In the SYNTAX study, patients underwent PCI with first-generation drug-eluting stent (DES), which are no longer commercially available; therefore, our results are only partially applicable to contemporary new-generation DES.

Conclusion

- SYNTAXES trial demonstrated that patients with mildly reduced/reduced EF had a worse prognosis than patients with preserved EF.

- Considering a significantly reduced mortality at 5 years and the numerical trend towards lower 10-year mortality in CABG than PCI among patients with reduced EF, CABG might be a safer revascularization strategy than PCI for patients with EF of less than 40%.