Debates for Left Main & Multi-Vessel Disease 2024:

PCI Is Enough. - When PCI Should Not Be Standard Treatment

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Disclosure

Within the prior 24 months, I have had a relevant financial relationship(s) with an ineligible company(ies) listed below.

Nature of Financial Relationship	Ineligible Company
Grant/Research Support	Abbott
	Medtronic
	Boston Scientific
	Daiichi-Sankyo
	Edwards Lifescience
	Daewoong Pharm
	HK InnoN
	ChongKunDang Pharm

ESC European Society of Cardiology

European Heart Journal (2022) **43**, 2729–2750
https://doi.org/10.1093/eurheartj/ehac105

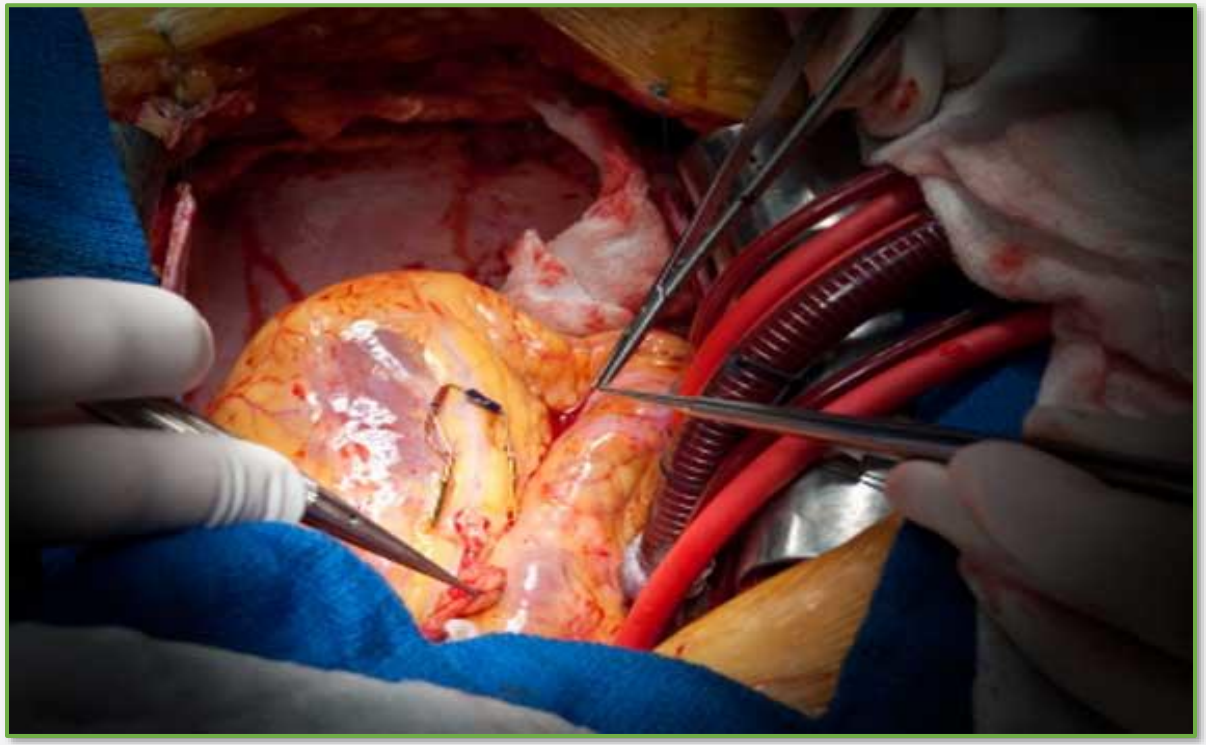
STATE OF THE ART REVIEW
Valvular heart disease

Which patients with left main or multivessel disease should be referred to surgery rather percutaneous coronary intervention?

Stephan Windecker [1]*, Taishi Okuno [1], Axel Unbehaun [2,3], Michael Mack [4], Samir Kapadia [5], and Volkmar Falk [2,3,6,7]

PCI Is the Routine Strategy for LM or MVD

Two Very Different Procedures for Left Main or Multivessel Disease



CABG

PCI

Tir

CABG

CABG introdu

First CABG in a h

19

First selective corona angiograp

1950–60

Indirect myocardial revascularisation

1935

PCI

CI

CI vs CABG)

2016

EXCEL and NOBLE trials (PCI vs CABG)

2020

2018

Short DAPT regimen

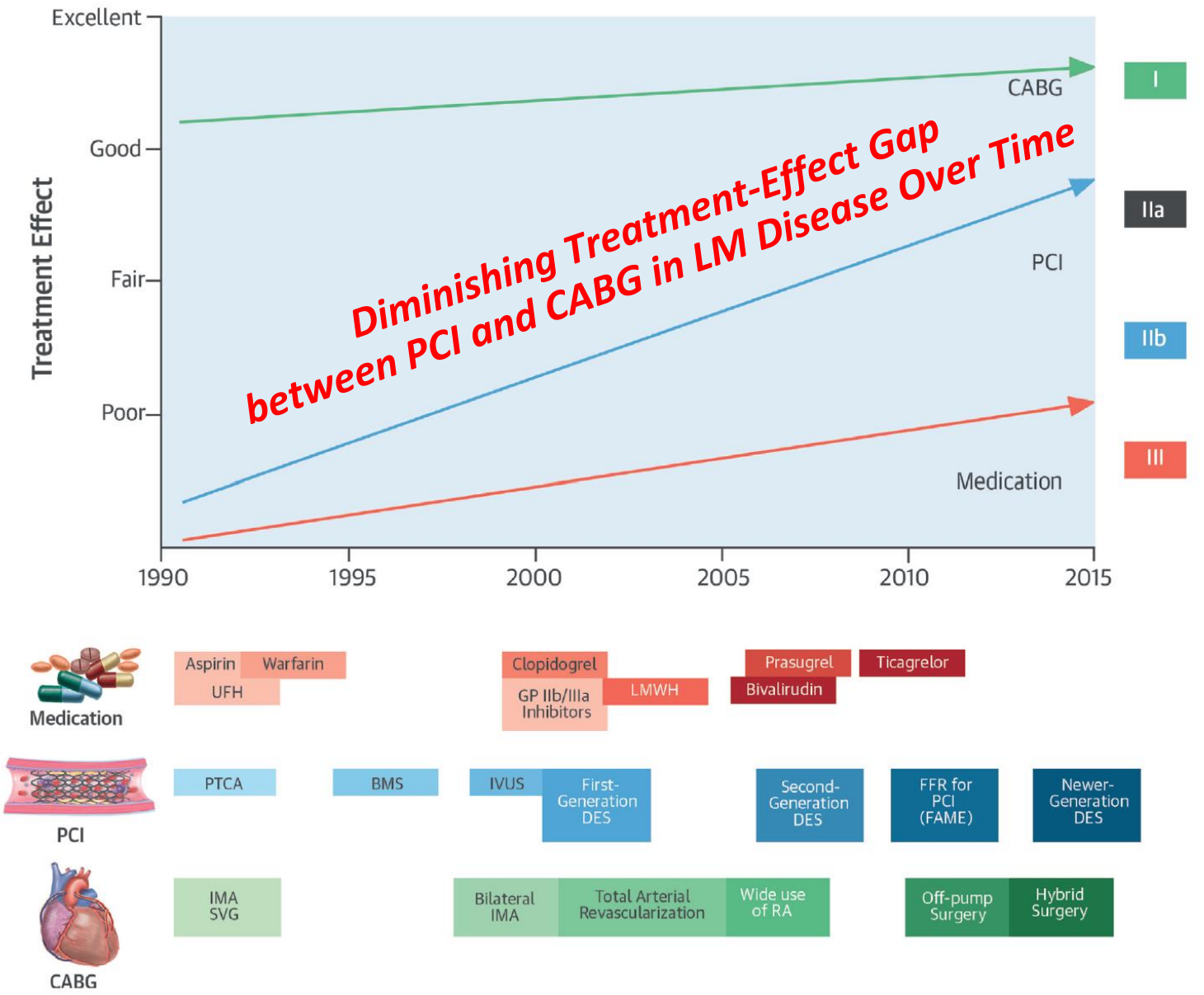
015

gh bleeding

k concept

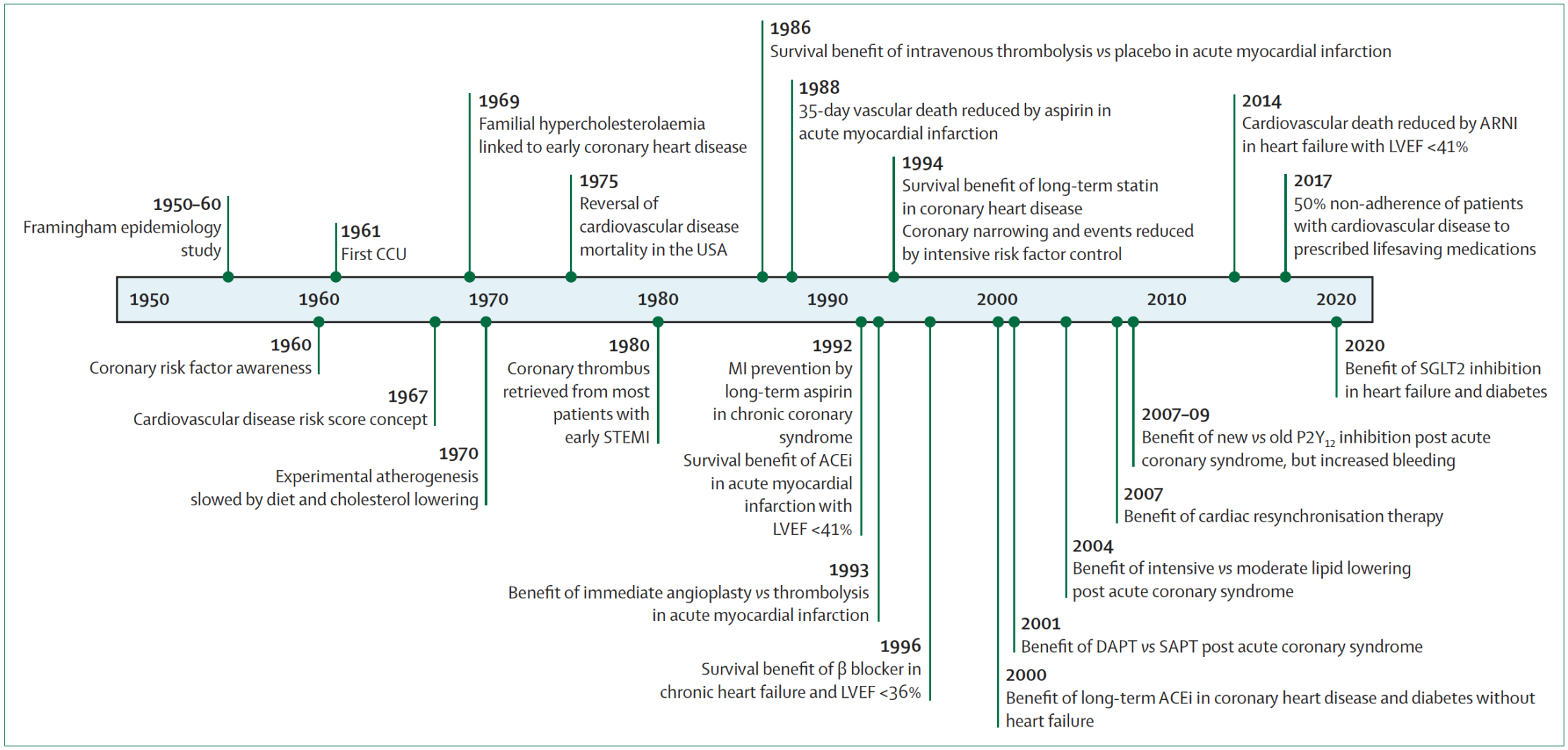
PCI

CENTRAL ILLUSTRATION Secular Changes of Treatment Effect and Guideline Recommendations in Relation to Medical Advances of Each Treatment Stratum for Left Main Coronary Artery Disease



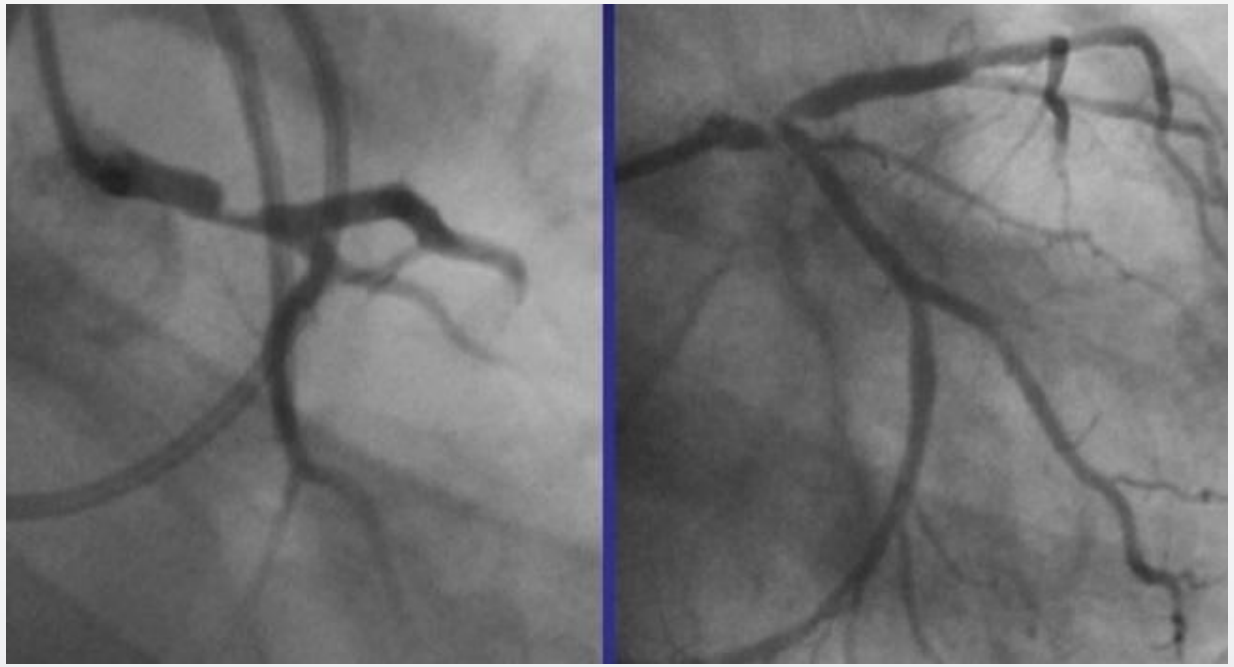
Park DW, Park SJ et al. JACC 2016;68:233-46

Timeline of key advancements in OMT; This was the hidden helper of ISCHEMIA Trial

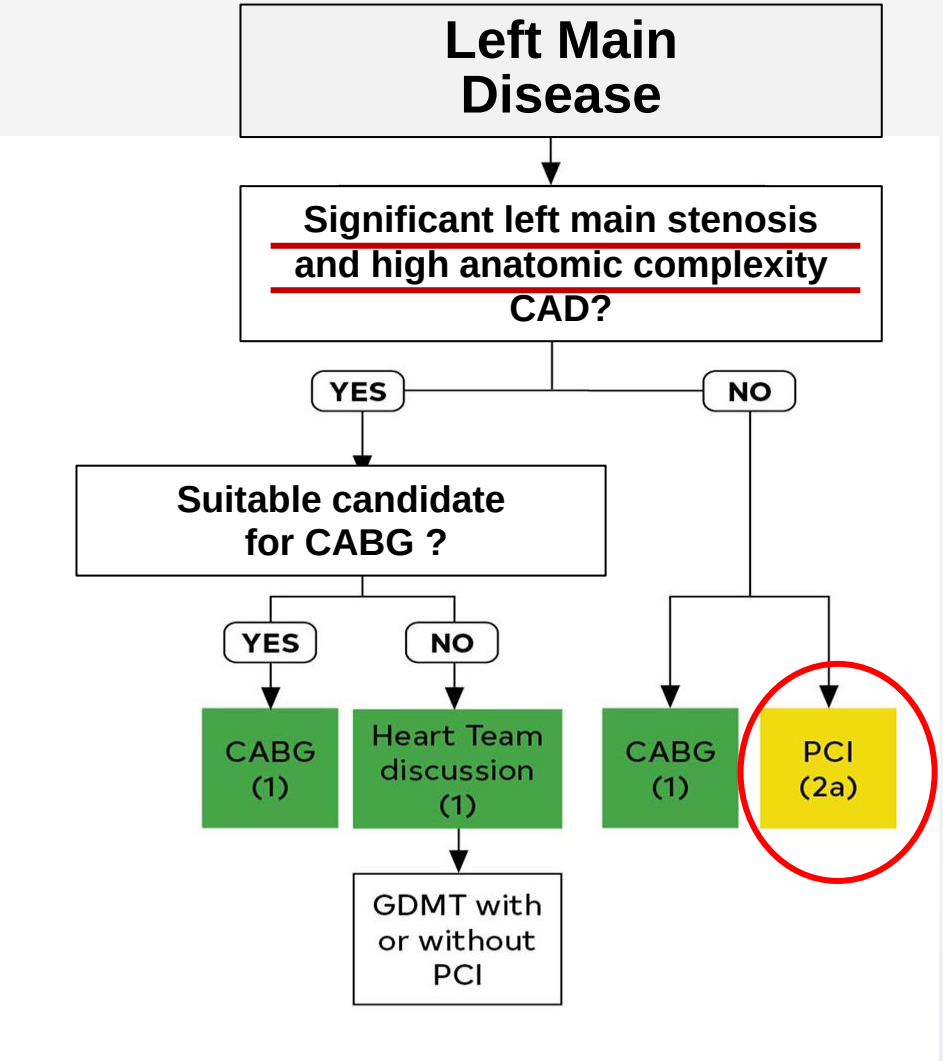


Mario Gaudino, et al. Lancet 2023; 401: 1611–2

PCI vs. CABG
for LM Disease



2021 ACC/AHA/SCAI, Guideline for Coronary Artery Revascularization



Jennifer S. Lawton. Circulation. 2021 ACC/AHA/SCAI Guideline for Coronary Artery Revascularization:

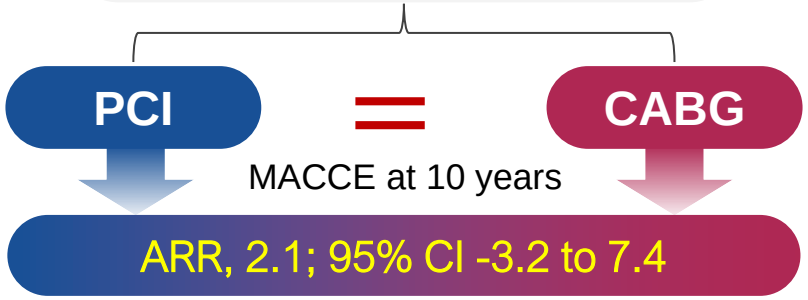
Recent Key Data

PCI vs. CABG for LM Disease

1. SYNTAX 10 years (n=1,800)
2. PRECOMBAT 10 years (n=600)
3. NOBLE 5 Year (n=1,200)
4. EXCEL 5 Year (n=1,900)
5. Combined Patient Level Meta-Analysis, 2021

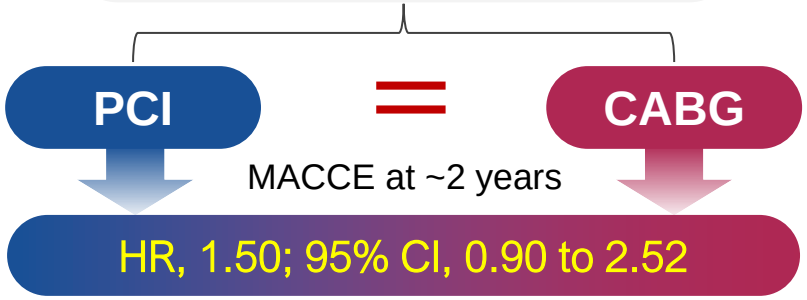
PCI vs. CABG for left main disease

SYNTAX-LM



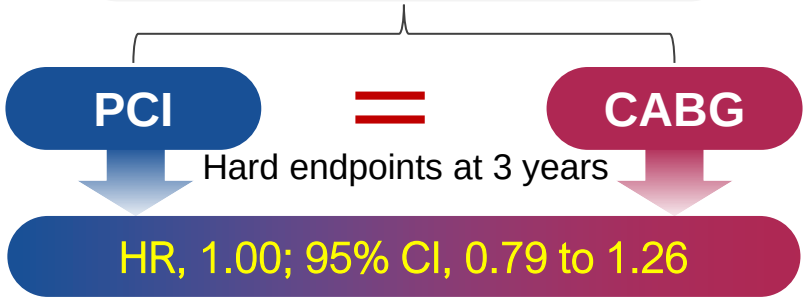
Circulation. 2010;121:2645-2653

PRECOMBAT



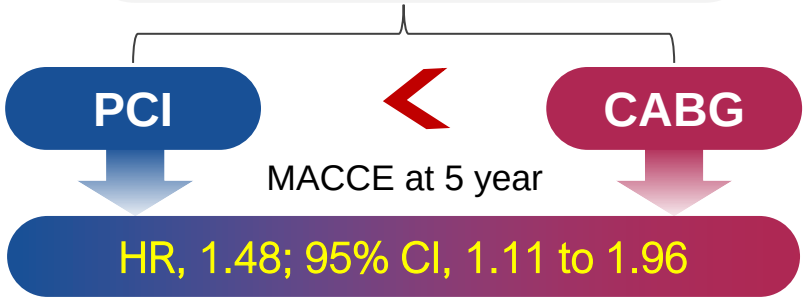
N Engl J Med 2011;364:1718-27

EXCEL



N Engl J Med 2016;375:2223-2235

NOBLE



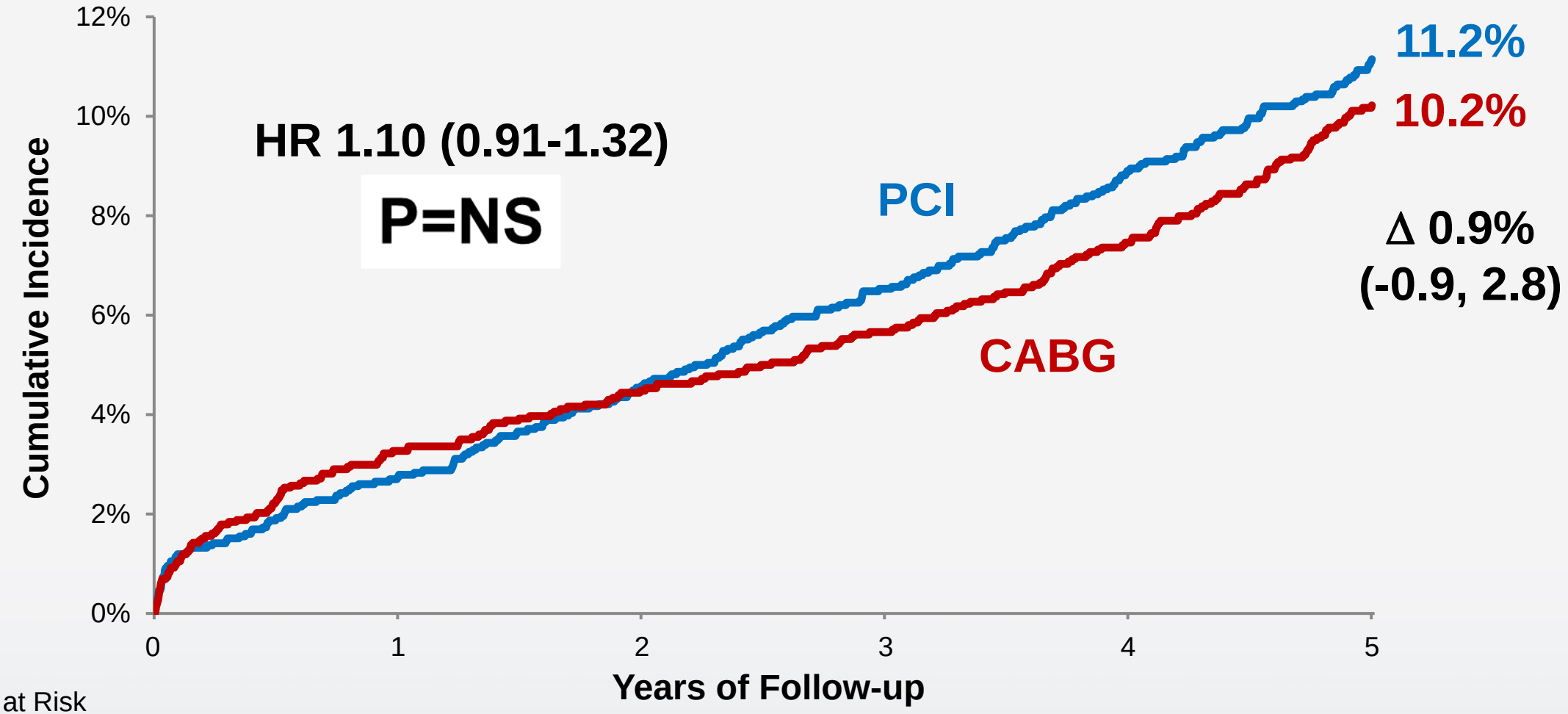
Lancet 2016; 388):2743-2752

Meta-Analysis of 4 Randomized Trials SYNTAX, PRECOMBAT, NOBLE, and EXCEL

4394 patients, were randomly assigned to PCI (n=2197) or CABG (n=2197) with a median SYNTAX score of 25·0 (IQR 18·0-31·0)

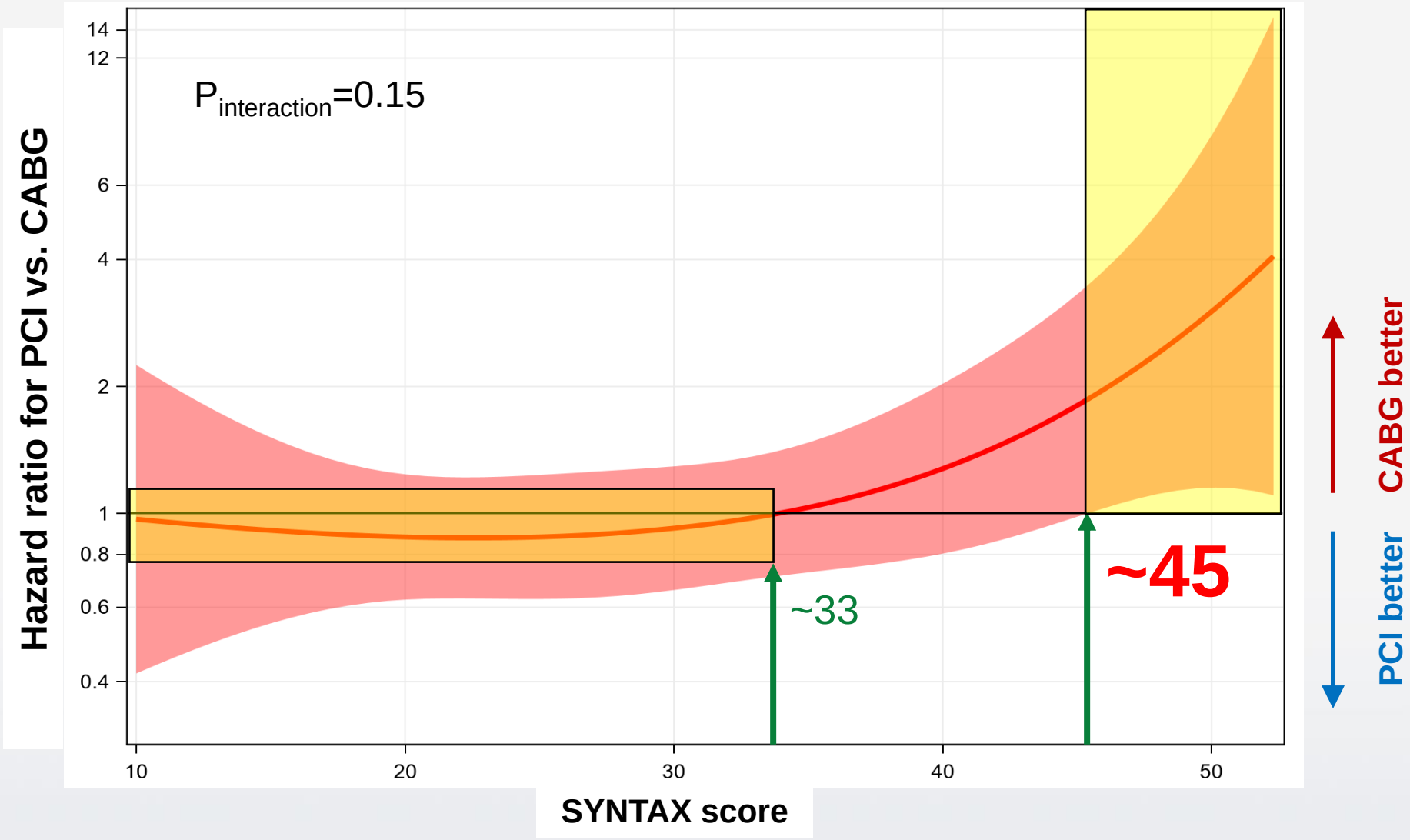
Sabatine MS et al. Lancet 2021;398:2247-57

All Death at 5-Year (4 trials)



Number at Risk						
CABG	2197	2085	2042	2002	1939	1585
PCI	2197	2120	2068	2015	1942	1539

CV Mortality and SYNTAX Score: Spline analysis



Sabatine MS et al. Lancet 2021;398:2247-57

Known Knowledge

PCI vs. CABG for Left Main Disease

1. *No Mortality Difference !*
2. *PCI Has Lower Peri-procedural Complications*
   (stroke, large MI, atrial fibrillation, bleeding, AKI, etc)
3. *CABG* Has *Lower* Spontaneous MI and Repeat revascularization

ESC European Society of Cardiology

European Heart Journal (2023) **44**, 4310–4320
https://doi.org/10.1093/eurheartj/ehad476

SPECIAL ARTICLE
Interventional cardiology

2022 Joint ESC/EACTS review of the 2018 guideline recommendations on the revascularization of left main coronary artery disease in patients at low surgical risk and anatomy suitable for PCI or CABG

Robert A. Byrne [1,2*†], Stephen Fremes [3,4*†], Davide Capodanno [5], Martin Czerny [6,7], Torsten Doenst[8], Jonathan R. Emberson [9], Volkmar Falk[10,11,12,13], Mario Gaudino [14], John J. V. McMurray [15], Roxana Mehran [16], Milan Milojevic [17,18], and Miguel Sousa Uva [19,20]

ESC/EACTS Task Force Recommends Downgrading PCI in Left Main CAD

For those with LM CAD and a low SYNTAX score, PCI should be no longer be a class I recommendation, the group says.

by Michael O'Riordan | SEPTEMBER 05, 2023

AMSTERDAM, the Netherlands–A new task force is recommending that PCI for the treatment of left main CAD in patients at low surgical risk be downgraded from its current place in the European revascularization guidelines.

Table 1 Suggested recommendation for type of revascularization in stable patients with left main disease, coronary anatomy suitable for both procedures and low predicted surgical mortality

Recommendation	CABG		PCI	
	Class[a]	Level[b]	Class[a]	Level[b]
Left main disease with low or intermediate SYNTAX score (0–32).	I	A	IIa	A

CABG, coronary artery bypass graft; PCI, percutaneous coronary intervention; SYNTAX, Synergy Between Percutaneous Coronary Intervention with TAXUS and Cardiac Surgery.

[a]Class of recommendation.

[b]Level of evidence.

Practical Recommendations for Left Main Revascularization (PCI or CABG)

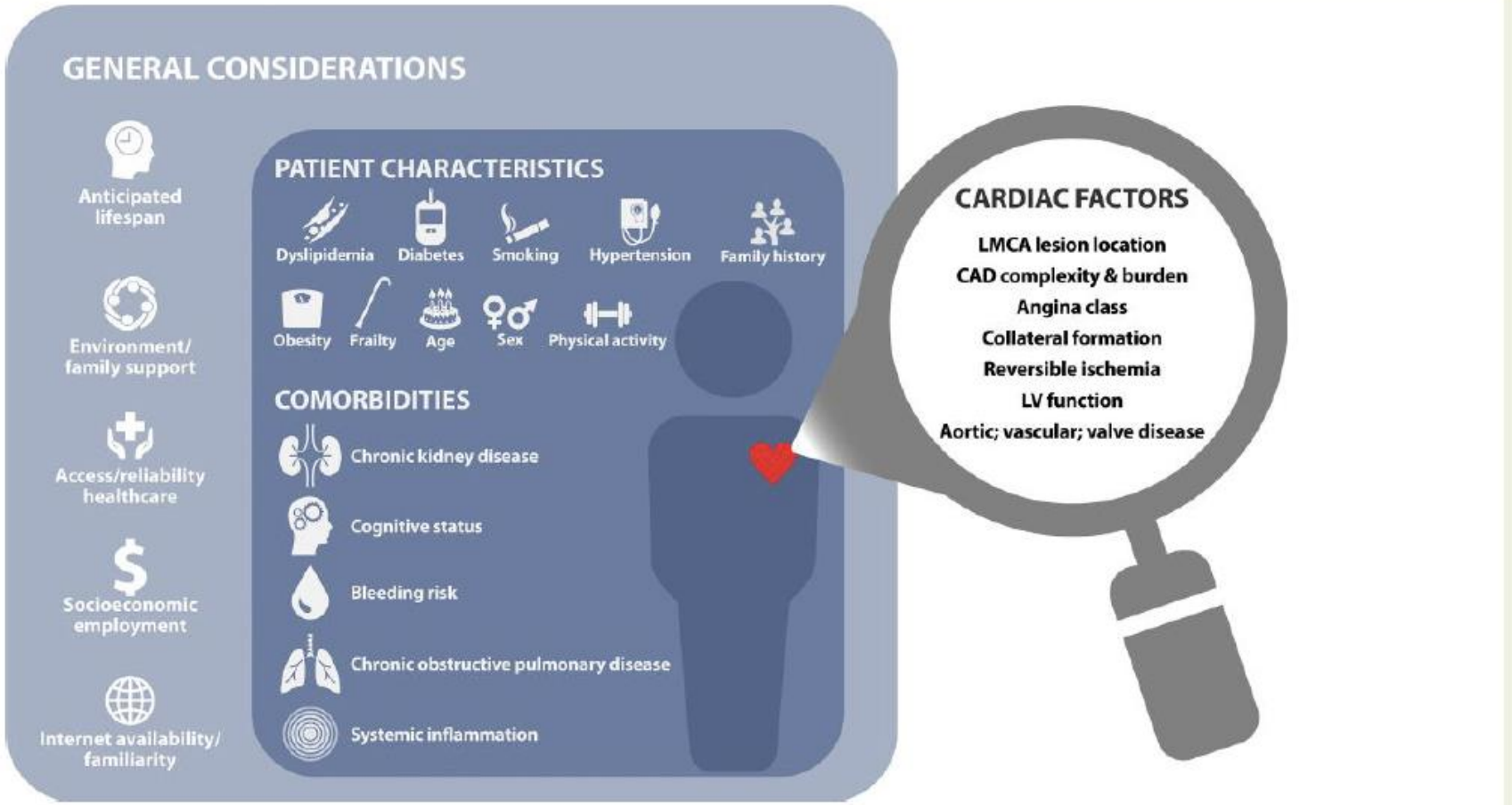
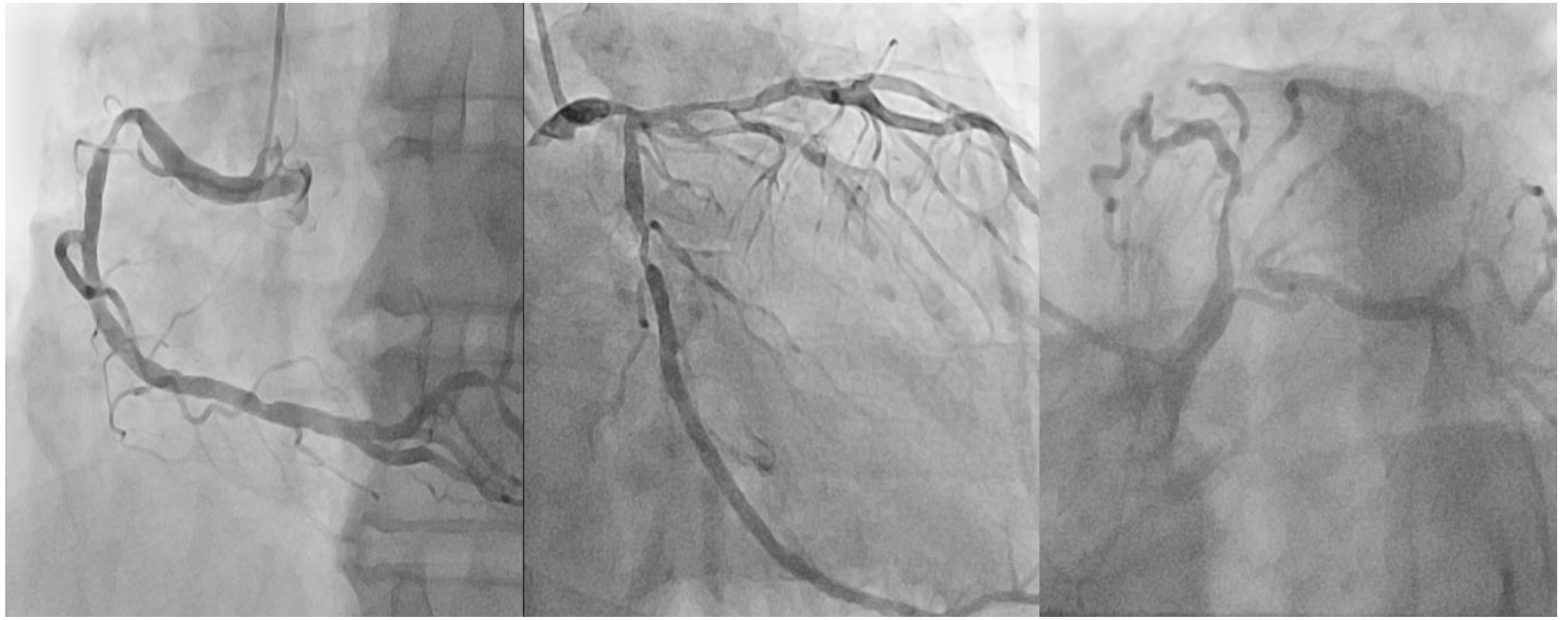


Figure 1 Profiling risk in patients with stable ischaemia and left main coronary disease. General considerations provide context for individual patient characteristics and comorbidities which then converge into the LMCA and cardiac-specific modulating factors. LMCA, left main coronary artery; CAD, coronary artery disease; LV, left ventricular.

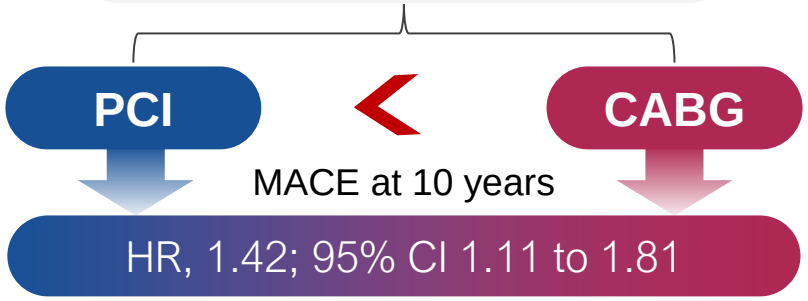
European Heart Journal (2023) 44, 4310–4320

PCI vs. CABG
for Multi-Vessel Disease



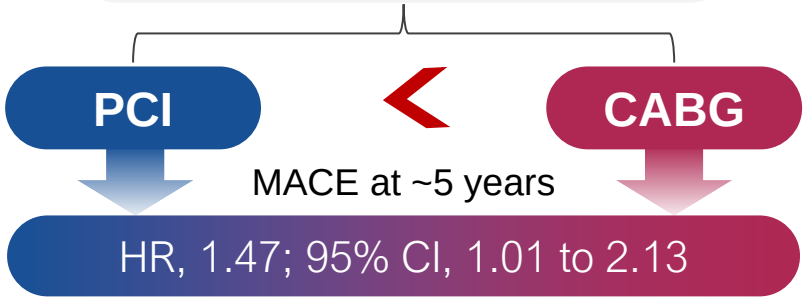
PCI or CABG for multivessel disease

SYNTAX: PES



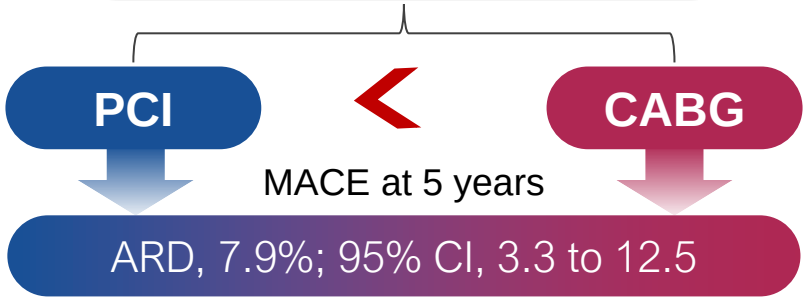
Lancet 2019;394;1325-1334

BEST: EES



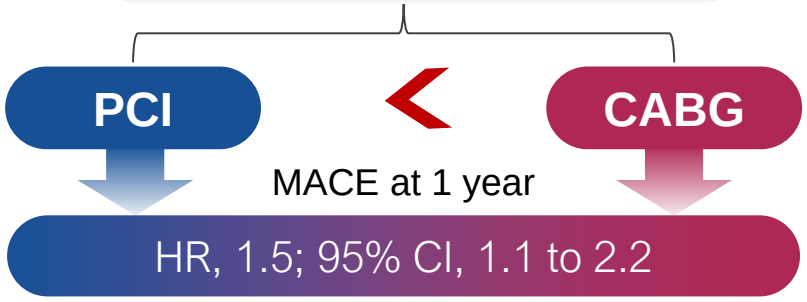
N Engl J Med 2015;372:1204-1212

FREEDOM: DM



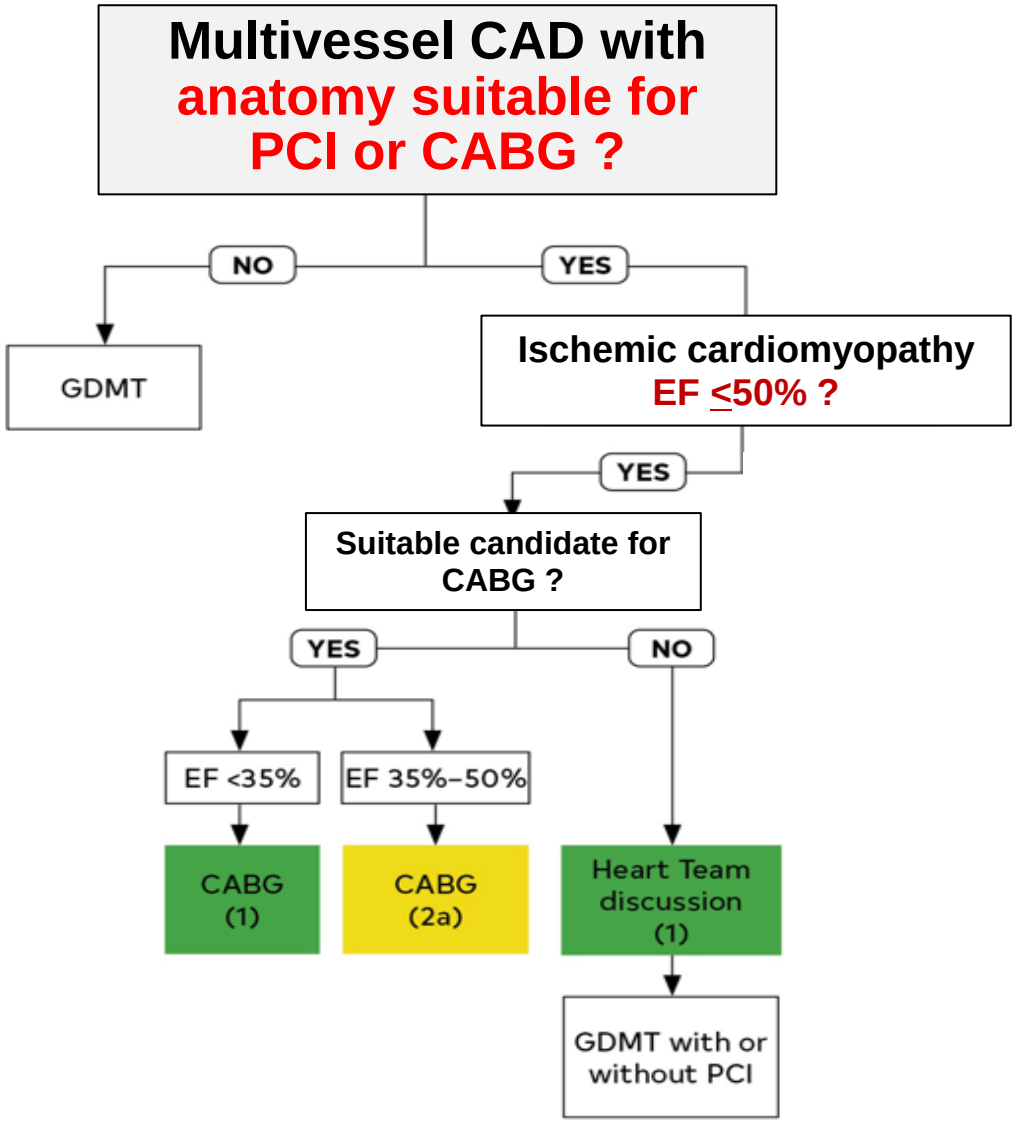
N Engl J Med 2012;367:2375-2384

FAME-3: FFR



N Engl J Med 2022;386:128-137

2021 ACC/AHA/SCAI, Guideline for Coronary Artery Revascularization

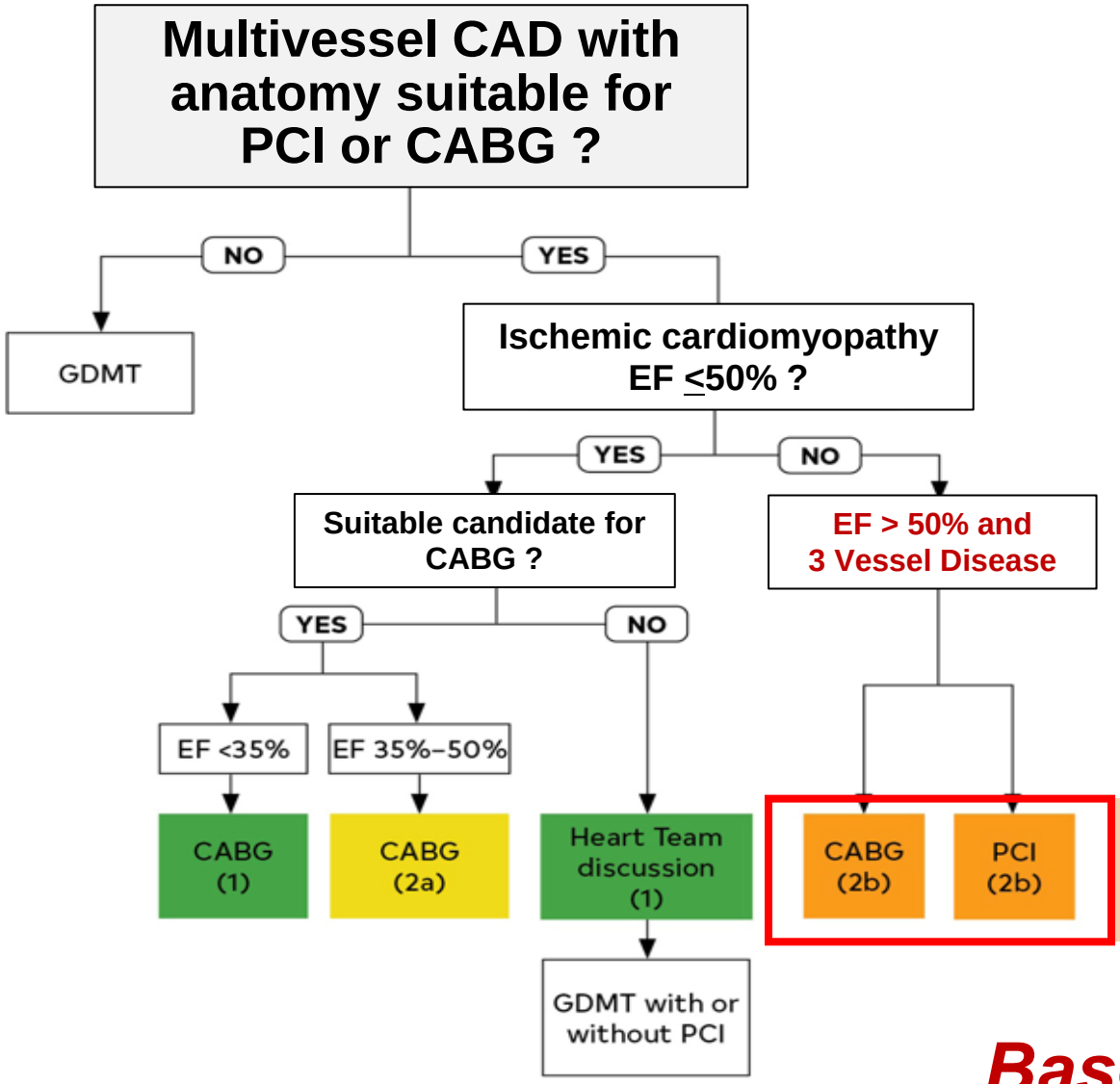


EF ≤50% and 3 Vessel Disease

CABG Is Better !

Based on STICH Trial….

2021 ACC/AHA/SCAI, Guideline for Coronary Artery Revascularization



Any Revascularizations (2b)

Based on ISCHEMIA Trial….

Future Perspective on Left Main or Multivessel PCI

What Are Next Step?

Contemporary PCI Concept and Techniques : “State-of-the-Art PCI”

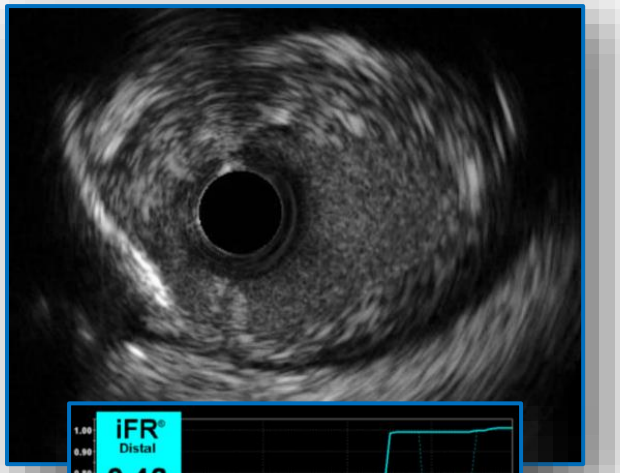
1. Widespread use of imaging- and physiology-guided PCI
2. Smart, new-generation DES combined with DCB
3. Advanced new PCI techniques
4. Evolving OMT
5. Patient-orient decision-making with evolving algorithm (risk score, AI-assisted, etc).

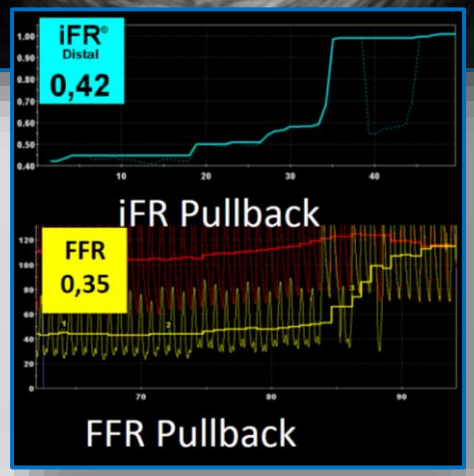
DRIVING THE FUTURE of PRECISION MEDICINE

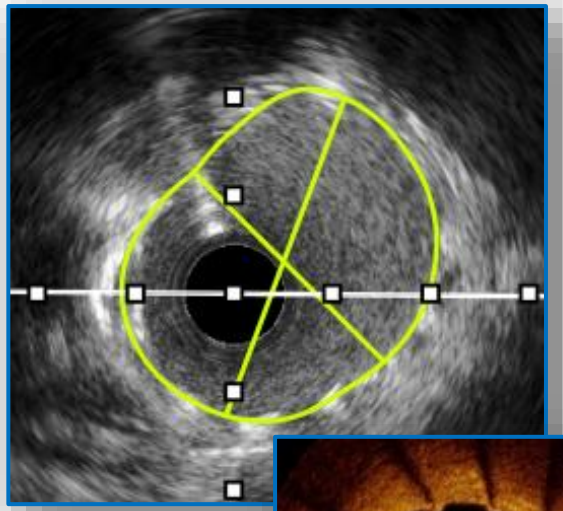
For LM&MVD PCI

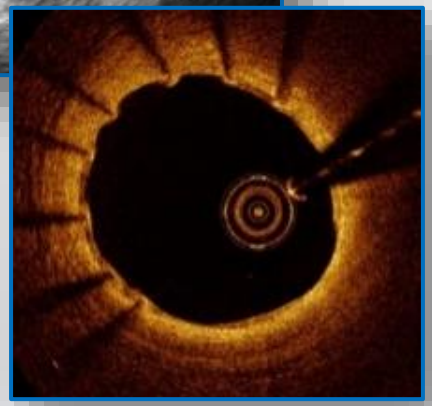
DIAGNOSIS INTERVENTION

Assessment Guidance Optimization

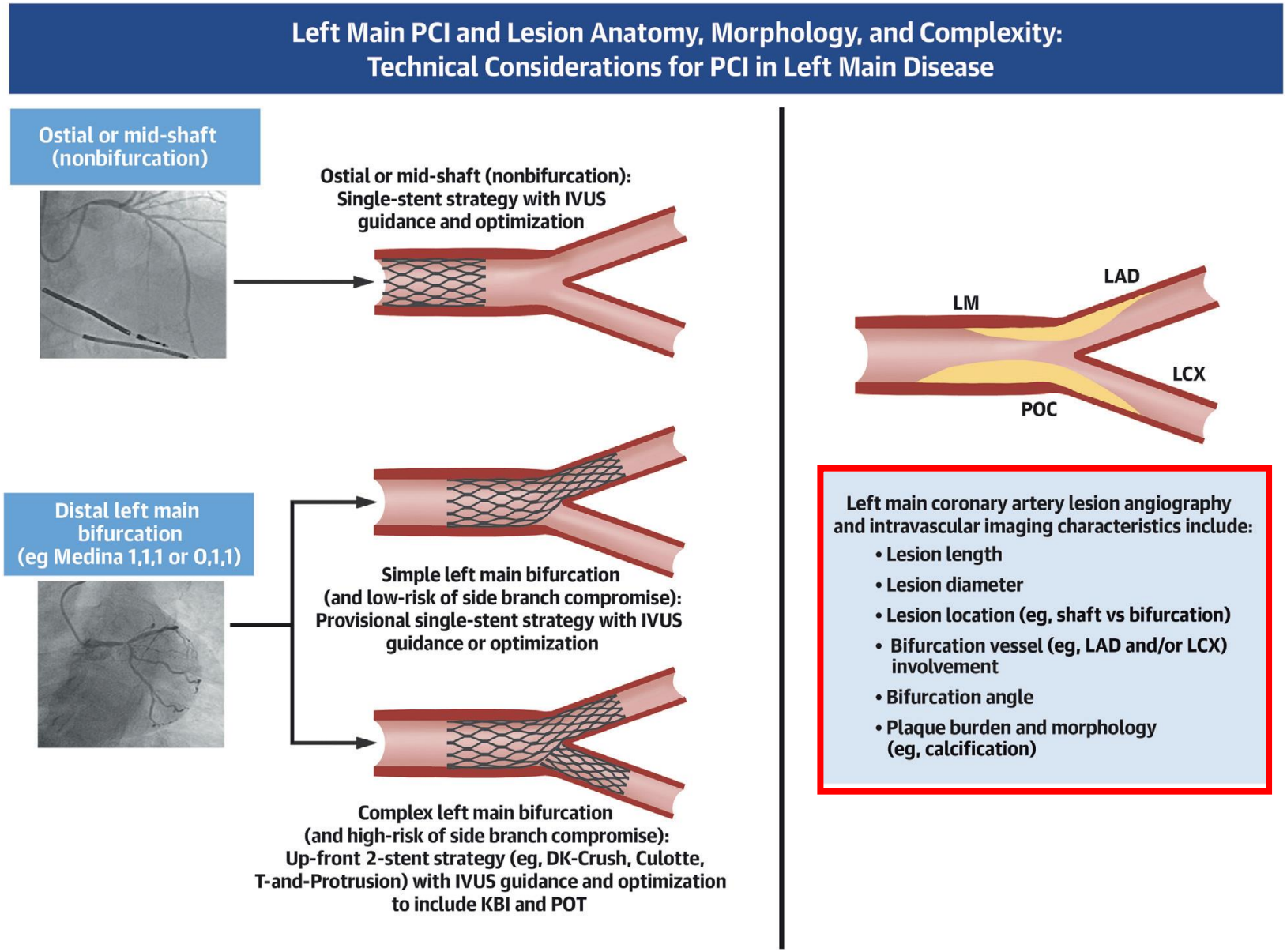






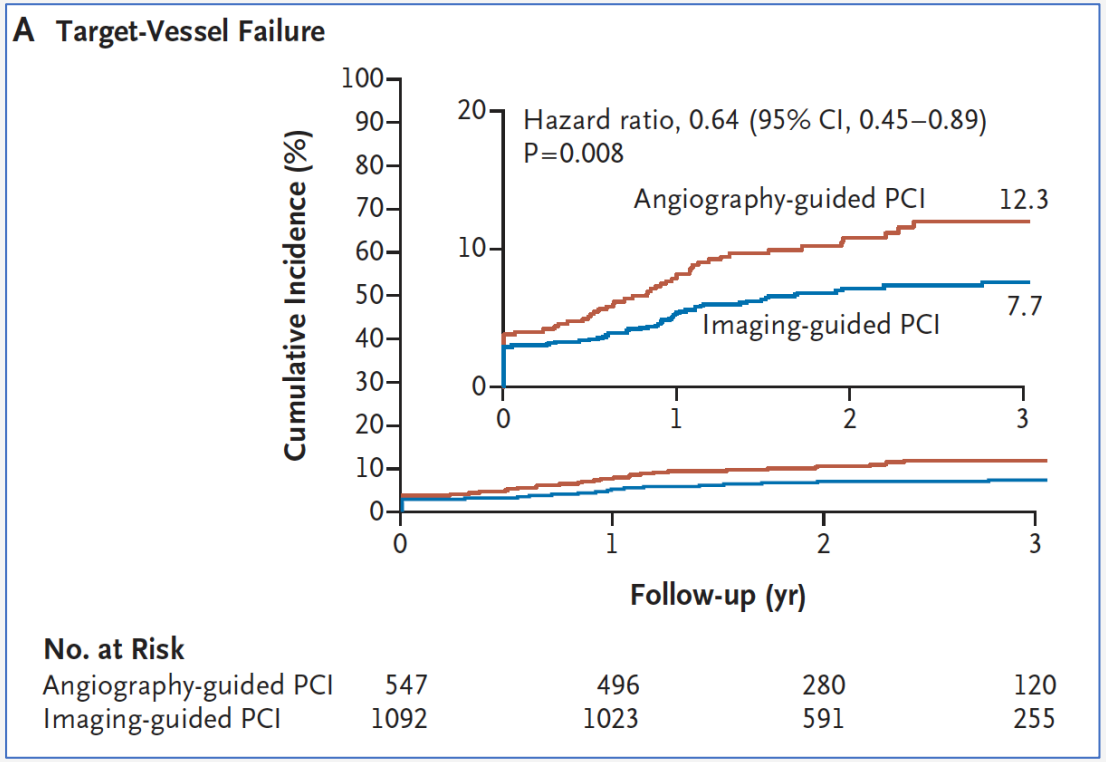


Left Main Technical Considerations with Imaging-Guided PCI



Davidson, LJ; Malaisrie SC et al. JACC 2022;80:2119–2134

RENOVATE-COMPLEX-PCI: Complex PCI IVUS 73%, OCT 26%

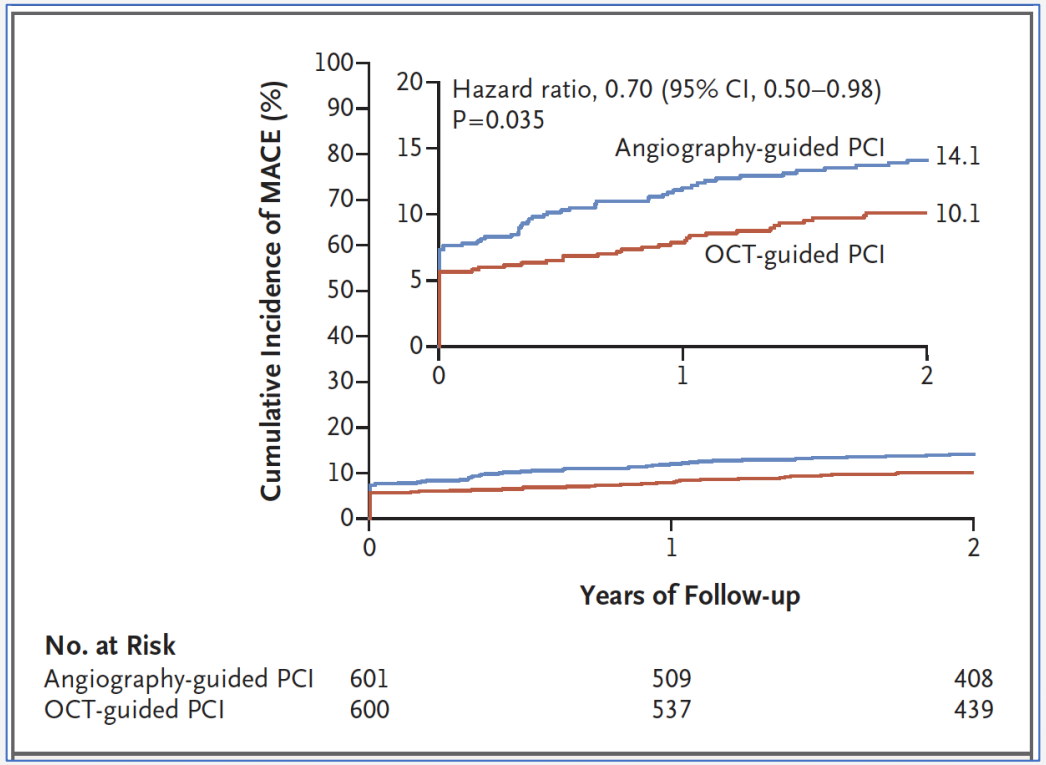


Type of complex coronary lesions			
True bifurcation	23/233 (10.3)	13/126 (11.8)	0.97 (0.49–1.93)
Chronic total occlusion	9/220 (5.0)	13/99 (14)	0.30 (0.13–0.71)
Unprotected left main coronary artery disease	9/138 (6.8)	11/54 (25)	0.31 (0.13–0.76)

N Engl J Med 2023;388:1668-1679

OCTOBER: True Bifurcation Lesions (19% Left Main involvement)

TLF (Cardiac Death, TV-MI, or TLR)



Left main coronary artery as trial bifurcation			
Yes	15/111 (14)	20/116 (19)	0.78 (0.40–1.51)
No	44/489 (9)	63/485 (13)	0.68 (0.46–1.00)

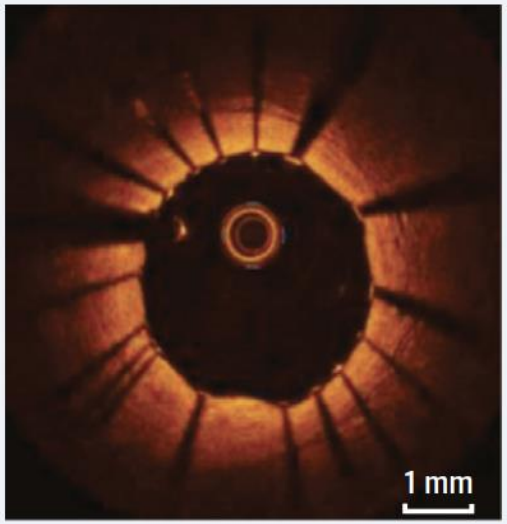
N Engl J Med . 2023 Oct 19;389(16):1477-1487

OCTIVUS Trial: All-Comer Settings

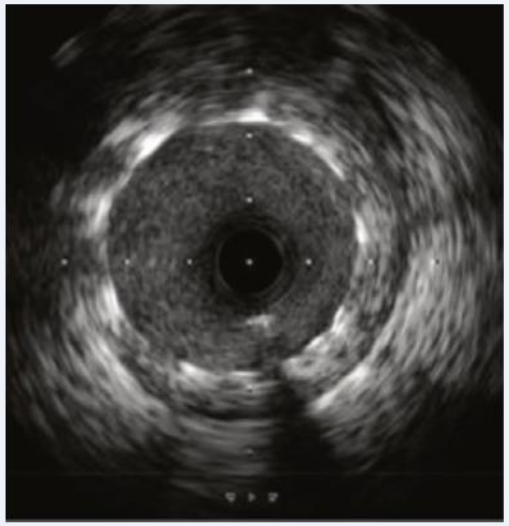
TVF (Cardiac Death, TV-MI, or TVR)

1,475 Patients With Complex Coronary Lesions in the OCTIVUS Trial

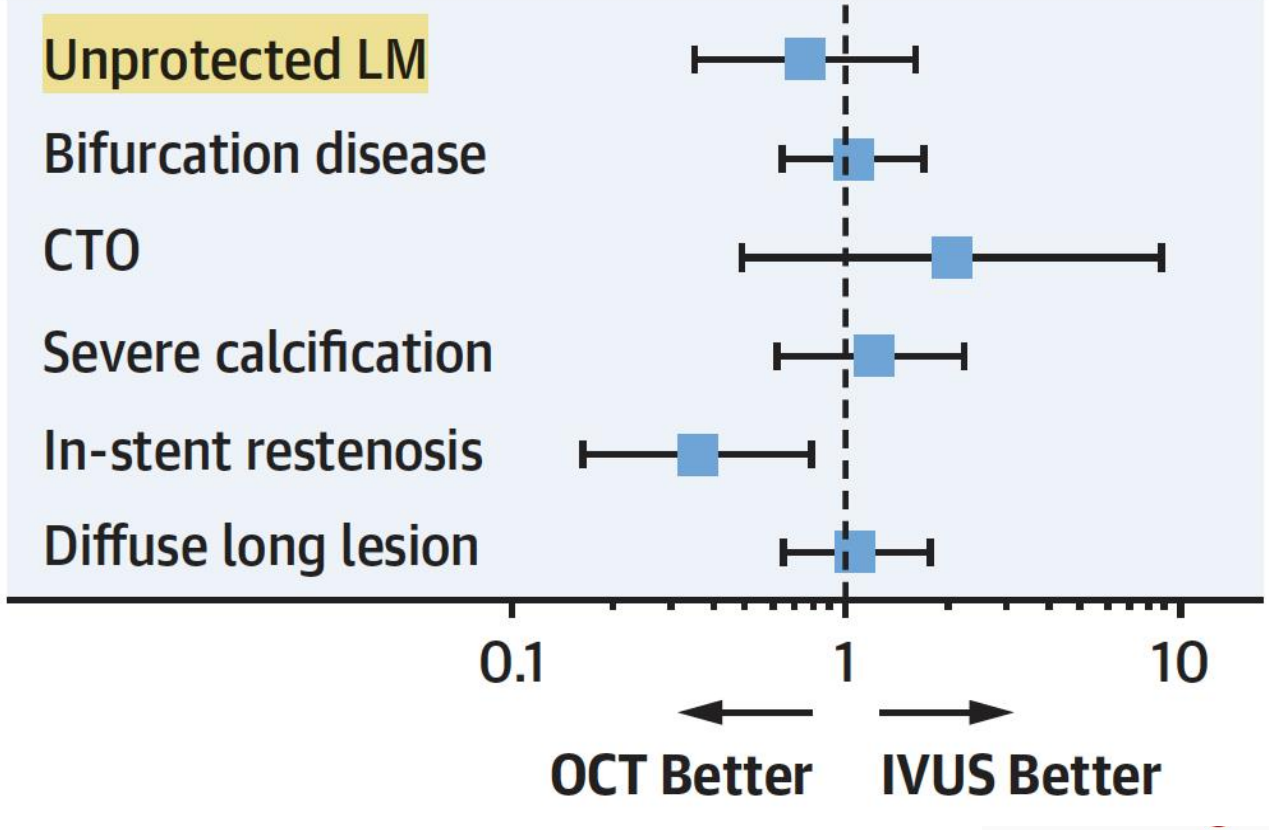
719
OCT-Guided PCI



756
IVUS-Guided PCI



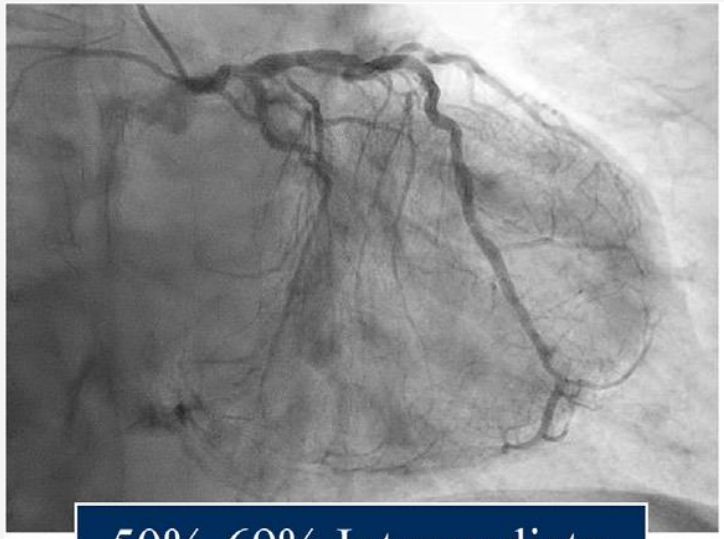
Analysis for Each Complex Lesion



Kang D-Y, et al. J Am Coll Cardiol. 2024;83(3):401–413.

Left Main Coronary Artery Stenosis Severity

: Significant stenosis defined as luminal diameter reduction of >50%

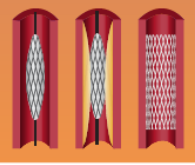


Davidson, LJ; Malaisrie SC et al. J Am Coll Cardiol 2022;80:2119–2134

“Treatment pathways” for left main coronary stenosis

Factors that favor choices between treatment pathways for left main coronary stenosis in patients with stable ischemic heart disease

Favors OMT	Favors PCI	Favors CABG
• Minimal symptoms • Good quality of life • Tolerates medical therapy and reaches target goals • Adheres to careful follow-up • Patient preference	• High surgical risk • Low complexity plaques • Low quality CABG conduits • Elderly patients with serious comorbidities • Preference for fast recovery	• Diabetes • Complex MVD • Moderate/severe LV dysfunction • Requires concomitant cardiac surgery • Long term survival

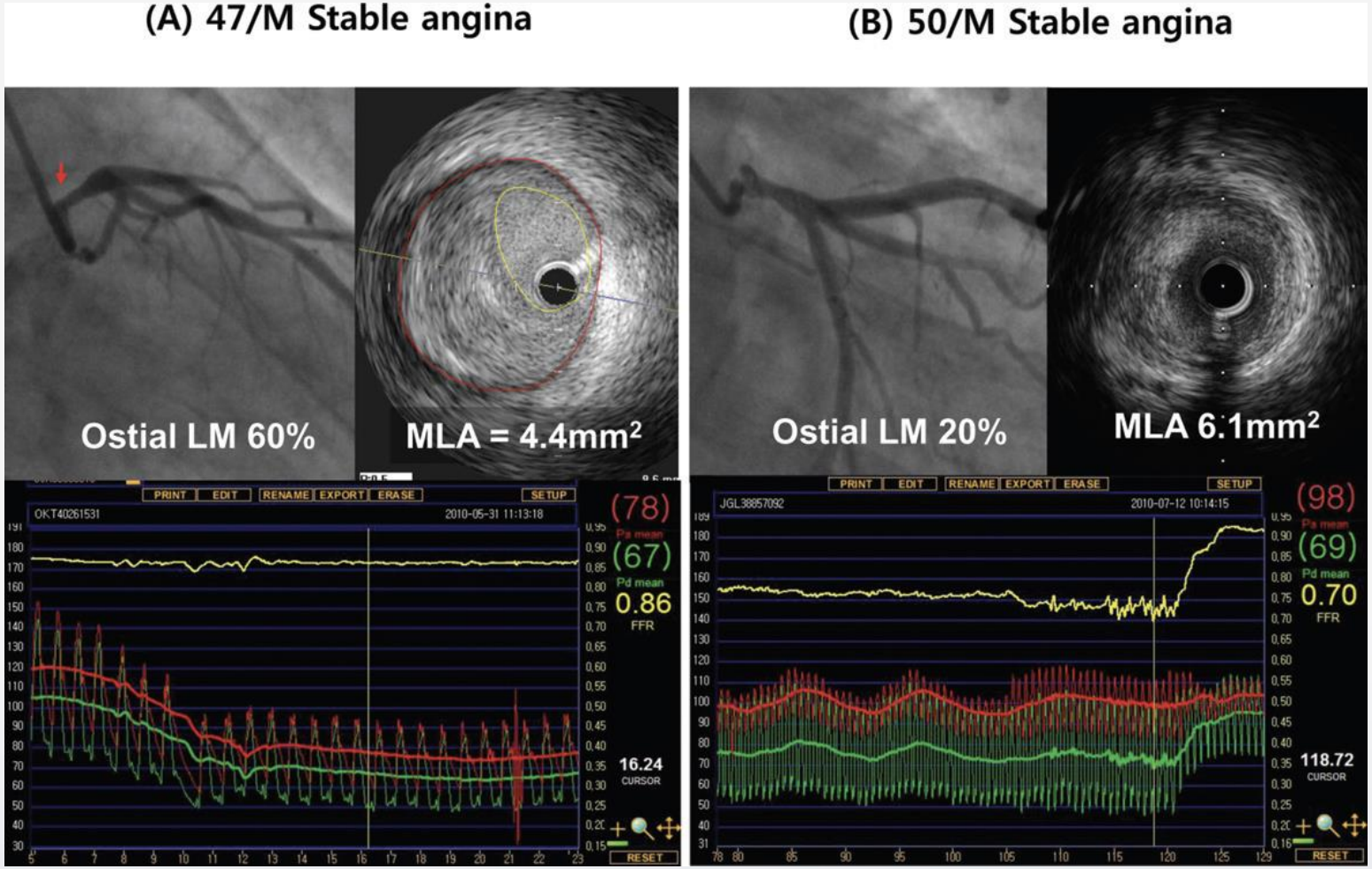


It is still unknown whether OMT permits safe deferral of revascularization for LCMA stenosis < 70%.

Armstrong, PW et al. European Heart Journal (2022) 43, 4635–4643

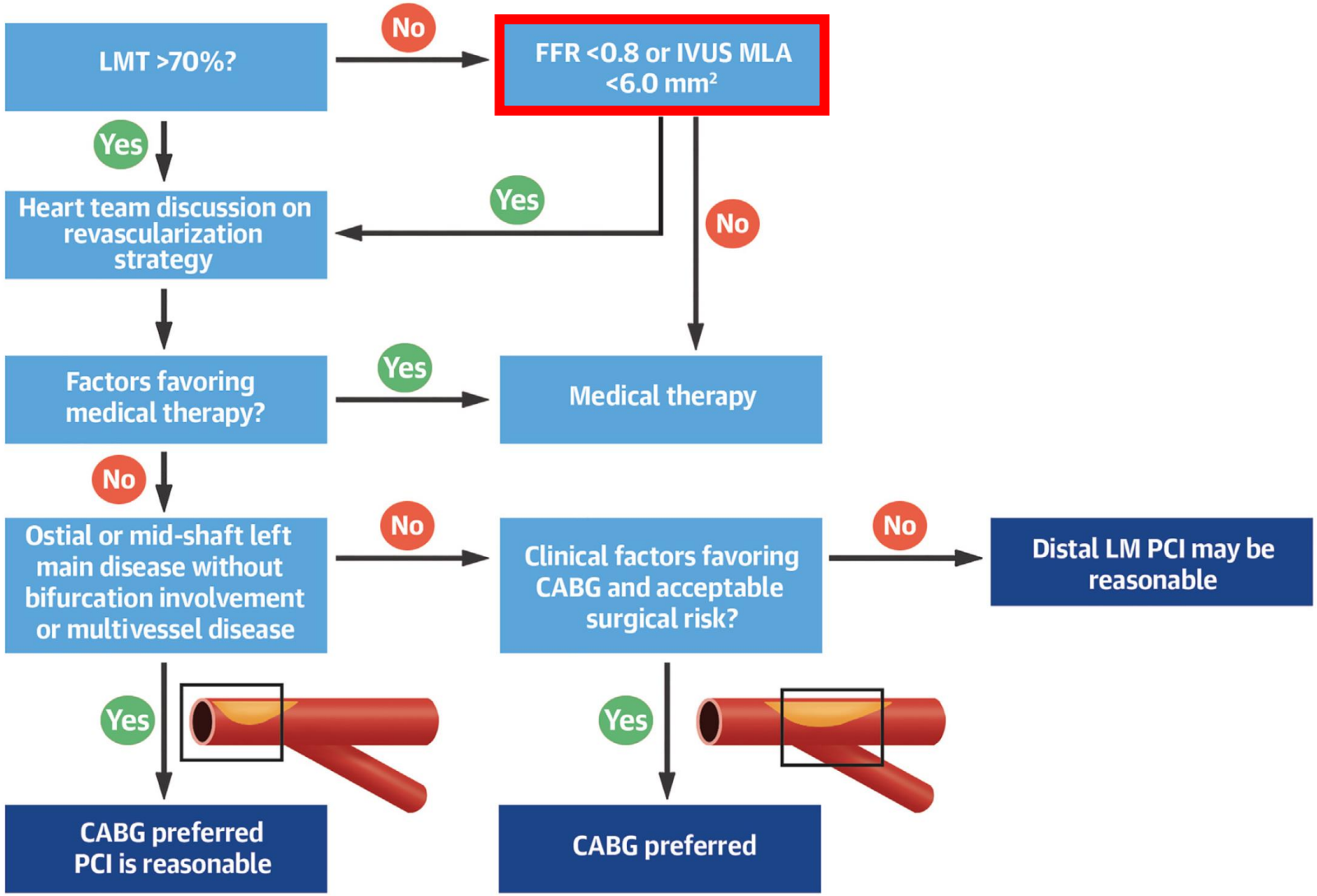
Representative case of visual–functional mismatch in Left Main stenosis:

Don’t believe your eye too much !!!



Park SJ, Park DW et al. JAHA 2012 Dec;1(6):e004556

CENTRAL ILLUSTRATION Left Main Coronary Artery Disease Clinical Decision-Making Algorithm

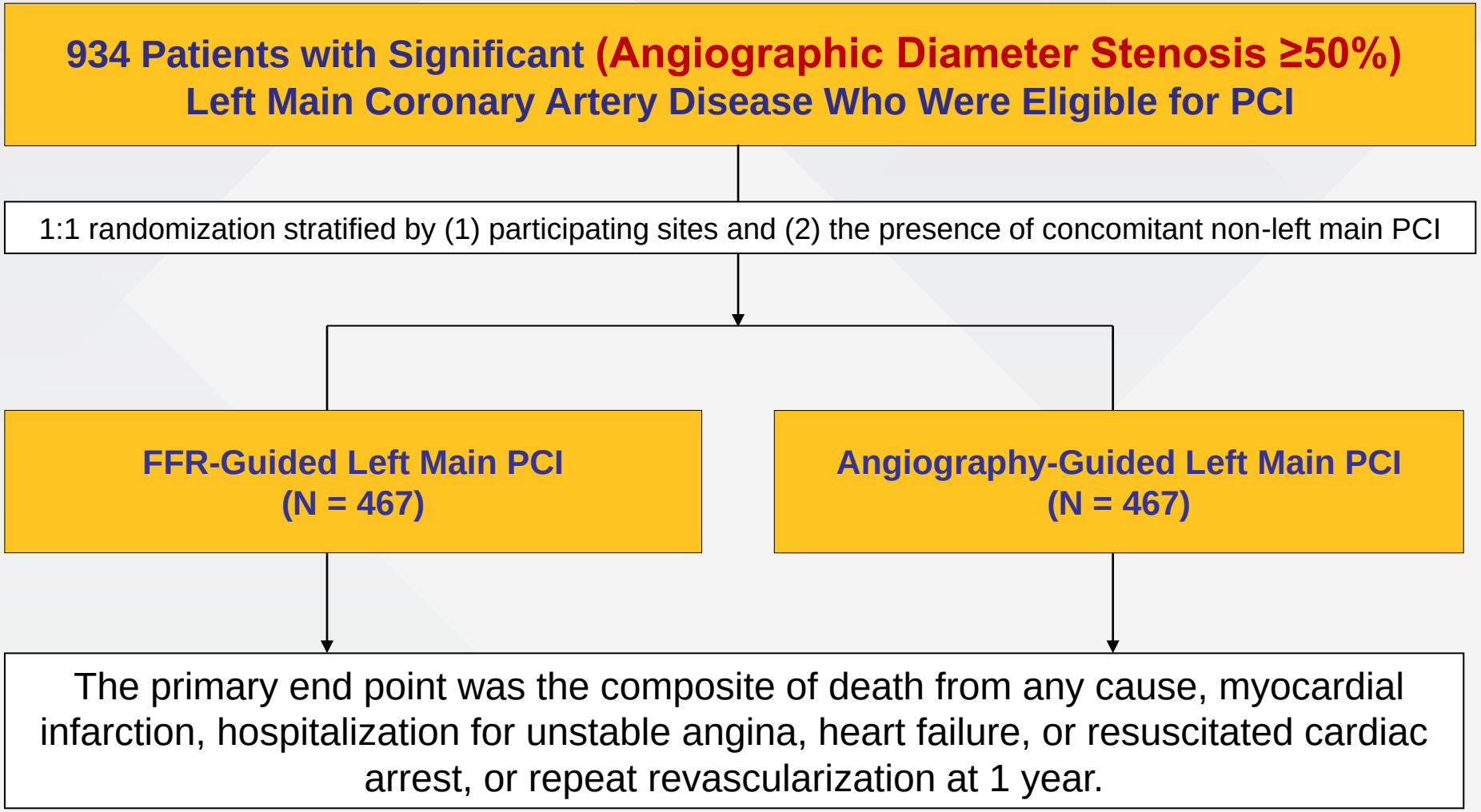


Davidson LJ, et al. J Am Coll Cardiol. 2022;80(22):2119-2134.

This algorithm outlines a clinical approach that may be utilized by clinicians to assist with decision-making for patients who present with left main coronary artery disease. Medical therapy, percutaneous coronary intervention (PCI), or coronary artery bypass grafting (CABG) may be reasonable strategies depending on each patient's clinical history, anatomy, and preferences.

Fractional Flow Reserve versus Angiography for Treatment-Decision and Evaluation of Significant Left MAIN Coronary Artery Disease

FATE-MAIN Trial



Still Remaining Important Issues for Multivessel Disease,

1. ***Contemporary PCI* vs. CABG for Multivessel Disease Patients with *Ischemic Cardiomyopathy (<50% EF) – STICH 3C***
2. ***Contemporary PCI* vs. CABG for Multivessel Disease Patients with *Diabetes – DEFINE-DM***

We Need More New Data!!!

2021 ACC/AHA/SCAI, Guideline for Diabetic Multivessel Disease

1. **Patients with Diabetes who Have 3 VD *Should Undergo CABG (1A).***
2. ***If they are Poor Candidates for CABG, PCI May be Considered (2A, B-NR).***

J Am Coll Cardiol. Dec 09, 2021

Very Old Data *for Diabetic Concerns,*

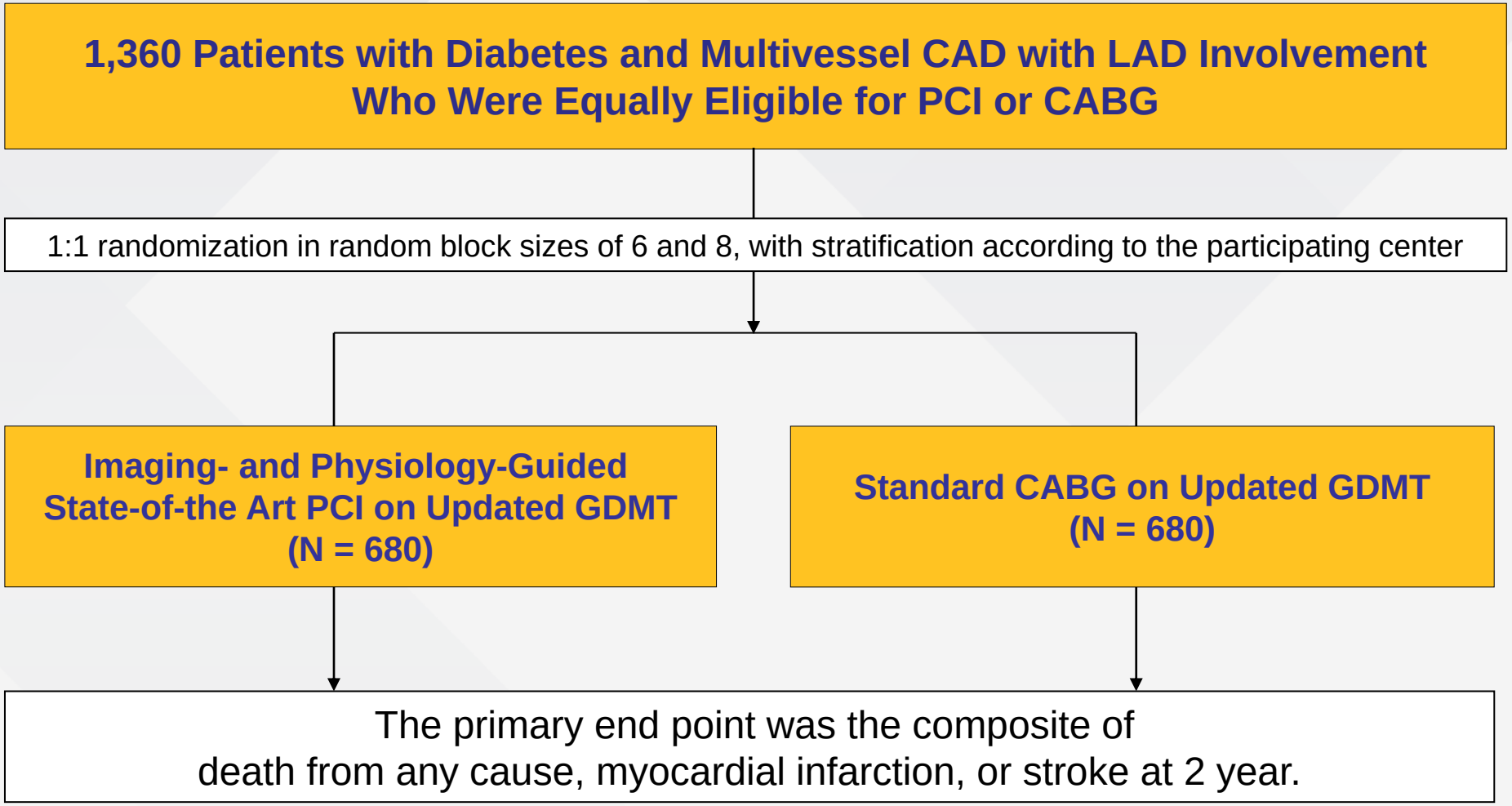
Recommending CABG for Multi-Vessel Disease Over 20 Years

1. BARI-2D
2. FREEDOM

1. No use of imaging- and physiology-guided PCI
2. No use of 2nd or 3rd generation contemporary DES
3. No use of CV-beneficial DM drugs (SGLT-2 inhibitors/GLP-1 agonists) and full-updated OMTs (high-dose statins, antithrombotic, and other potent CV medications)

Diabetes-Centered Evaluation of Functional and Imaging-CombiNEd State-of-the-Art Percutaneous Coronary Intervention or Coronary-Artery Bypass Grafting in Patients with Diabetes Mellitus and Multi-Vessel Coronary Artery Disease

DEFINE-DM Trial



Summary: “State-of-Art” Left Main or Multi-vessel PCI

- The issue of LM or MVD revascularization is a still a topic of considerable debate in our professional societies.
- Although RCTs and recent guidelines are crucial to inform clinical decisions, enrolled patients reflect only a small portion encountered in clinical practice; the clinical circumstances accompanying LM or MVD are difficult to quantify in practice.
- “State-of-art PCI” (with advanced imaging/physiology concept, newer DES or technologies, and evolving antithrombotic drugs) make the treatment-effect of PCI comparable to CABG.
- Some important issues (i.e., FFR role in LM PCI, new contemporary RCTs for diabetic MVD) should be confirmed through further new RCTs (**FATE-MAIN** and **DEFINE-DM**).