Revascularization Guidelines

Interventionalist Perspective

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I HAVE NO DISCLOSURES PERTAINING TO THIS TALK

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HEART TEAM

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The Heart Team

- Treating cardiologist
- Interventional Cardiologist
- CTO/CHIP Operators
- Nuclear/Imaging Cardiologist
- Cardiovascular Surgeons
- Advanced Heart Failure Specialist
- Fellows

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The Heart Team

RECOMMENDATION FOR THE HEART TEAM

REFERENCED STUDIES THAT SUPPORT THE RECOMMENDATION ARE SUMMARIZED IN ONLINE DATA SUPPLEMENT 2.

COR	LOE	Recommendation
1	B-NR	1. In patients for whom the optimal treatment strategy is unclear, a Heart Team approach that includes representatives from interventional cardiology, cardiac surgery, and clinical cardiology is recommended to improve patient outcomes.

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MEDICAL THERAPY WORKS

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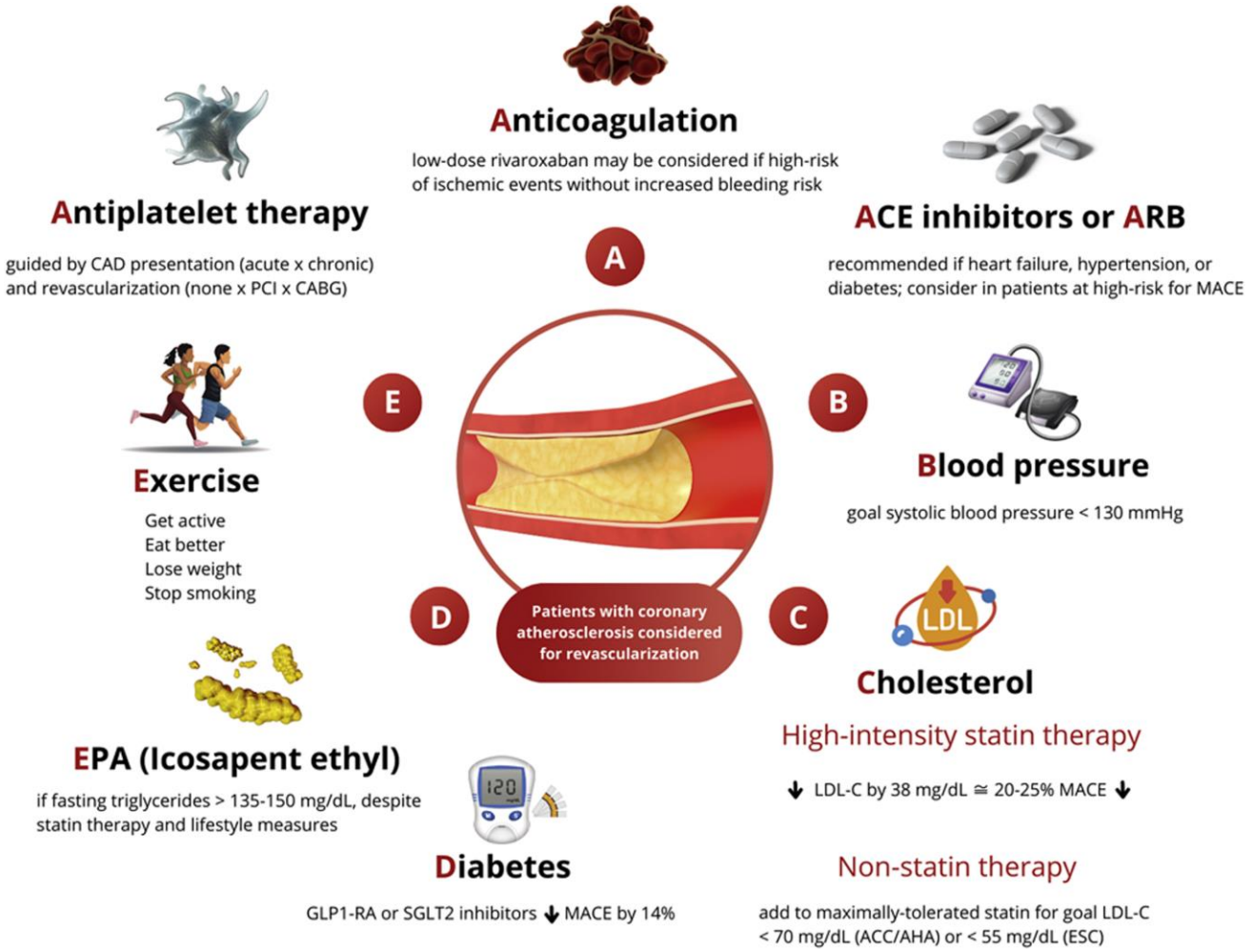
Disease Modifying Treatment



Antianginal Treatment

- Beta blockers
- Ca Channael Blockers
- Nitrates
- Ranalazine
- Cholchicine

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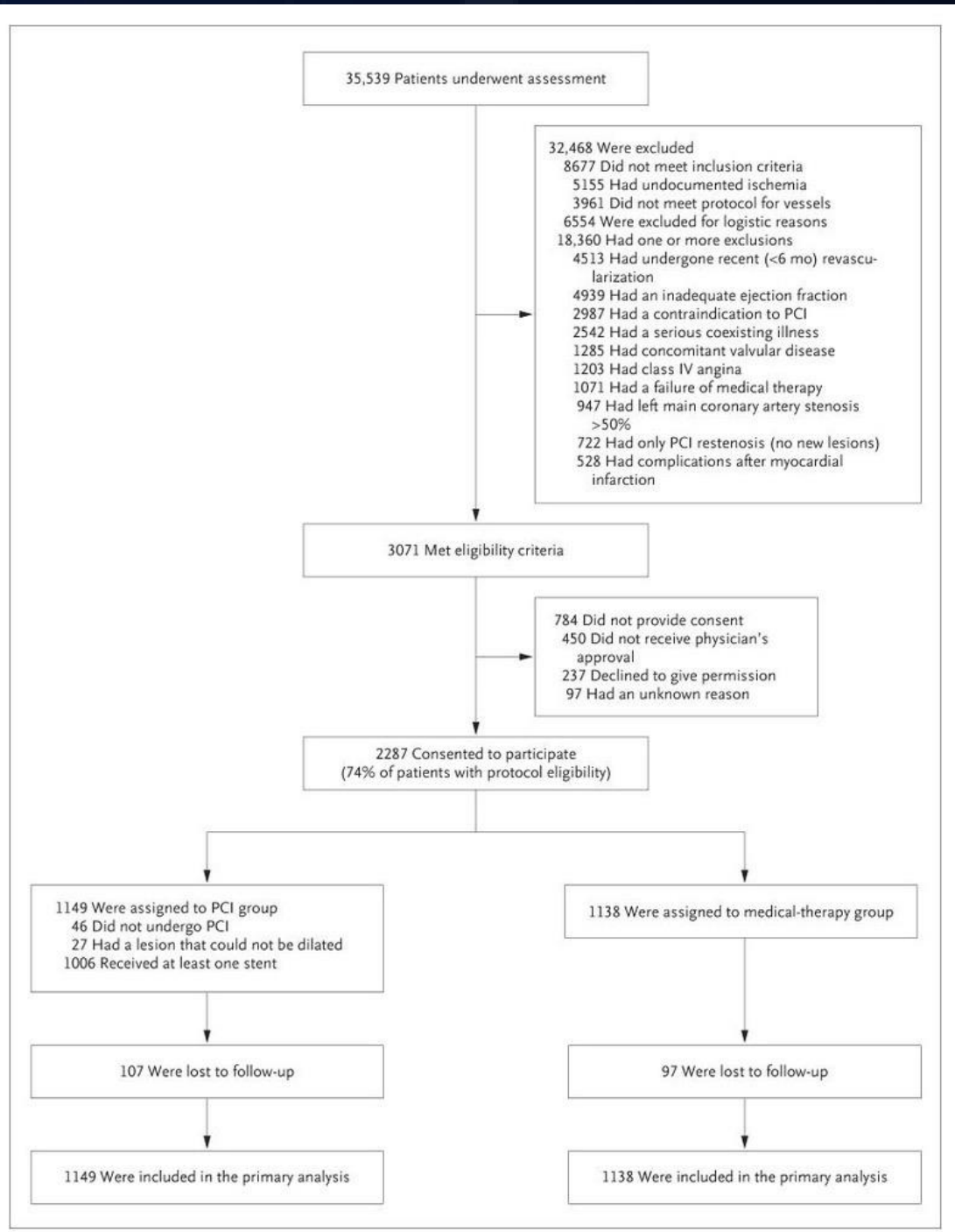
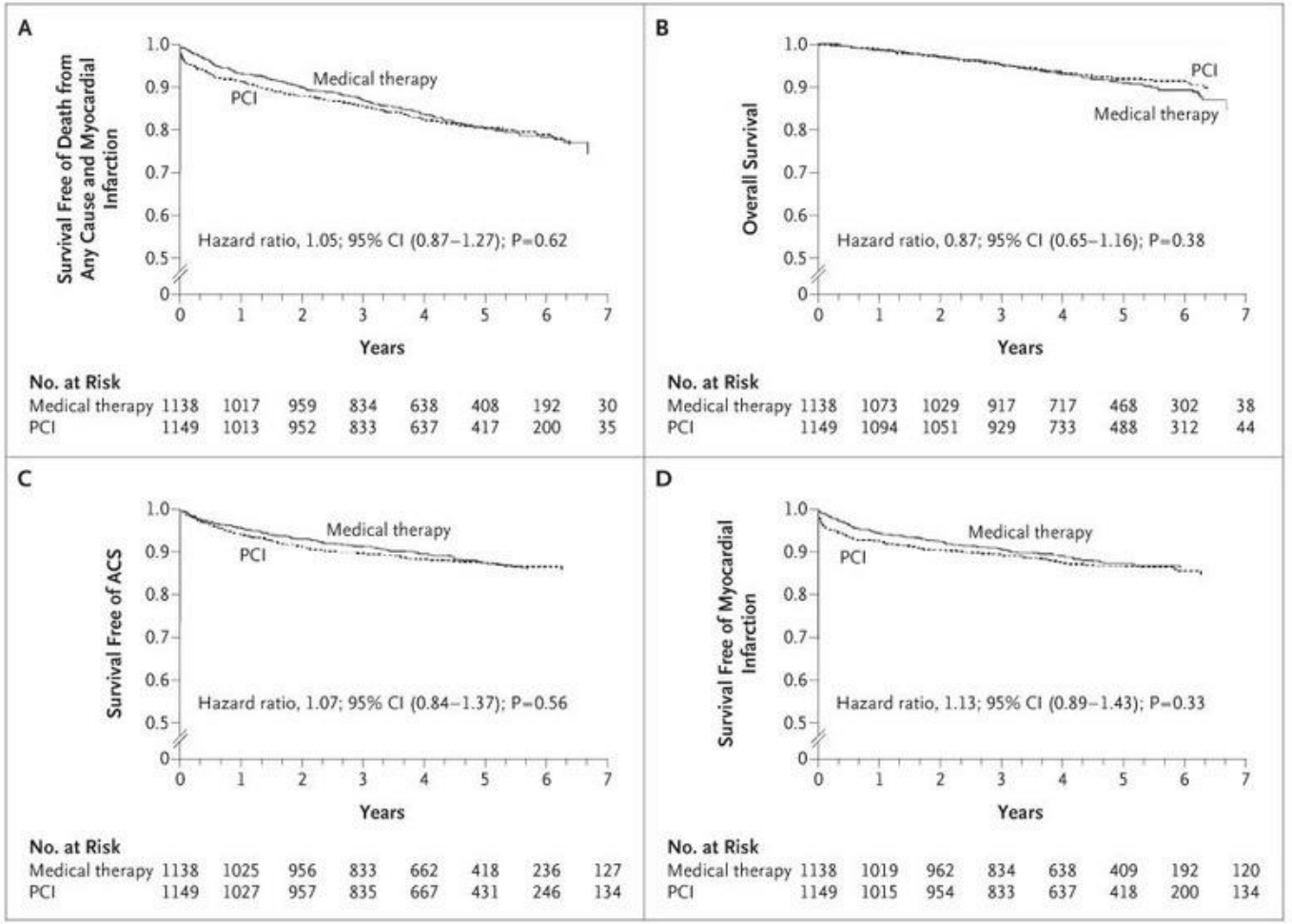

35,539 Patients underwent assessment
32,468 Were excluded
8677 Did not meet inclusion criteria
5155 Had undocumented ischemia
3961 Did not meet protocol for vessels
6554 Were excluded for logistic reasons
18,360 Had one or more exclusions
4513 Had undergone recent (<6 mo) revascularization
4939 Had an inadequate ejection fraction
2987 Had a contraindication to PCI
2542 Had a serious coexisting illness
1285 Had concomitant valvular disease
1203 Had class IV angina
1071 Had a failure of medical therapy
947 Had left main coronary artery stenosis >50%
722 Had only PCI restenosis (no new lesions)
528 Had complications after myocardial infarction
3071 Met eligibility criteria
784 Did not provide consent
450 Did not receive physician's approval
237 Declined to give permission
97 Had an unknown reason
2287 Consented to participate
(74% of patients with protocol eligibility)
1149 Were assigned to PCI group
46 Did not undergo PCI
27 Had a lesion that could not be dilated
1006 Received at least one stent
1138 Were assigned to medical-therapy group
107 Were lost to follow-up
97 Were lost to follow-up
1149 Were included in the primary analysis
1138 Were included in the primary analysis

Courage Trial

- Low risk Patients
- Annual cardiac mortality 0.4%
- 42% no significant angina
- No FFR
- DES only 2.7%
- Incomplete revascularization
- 32% crossover



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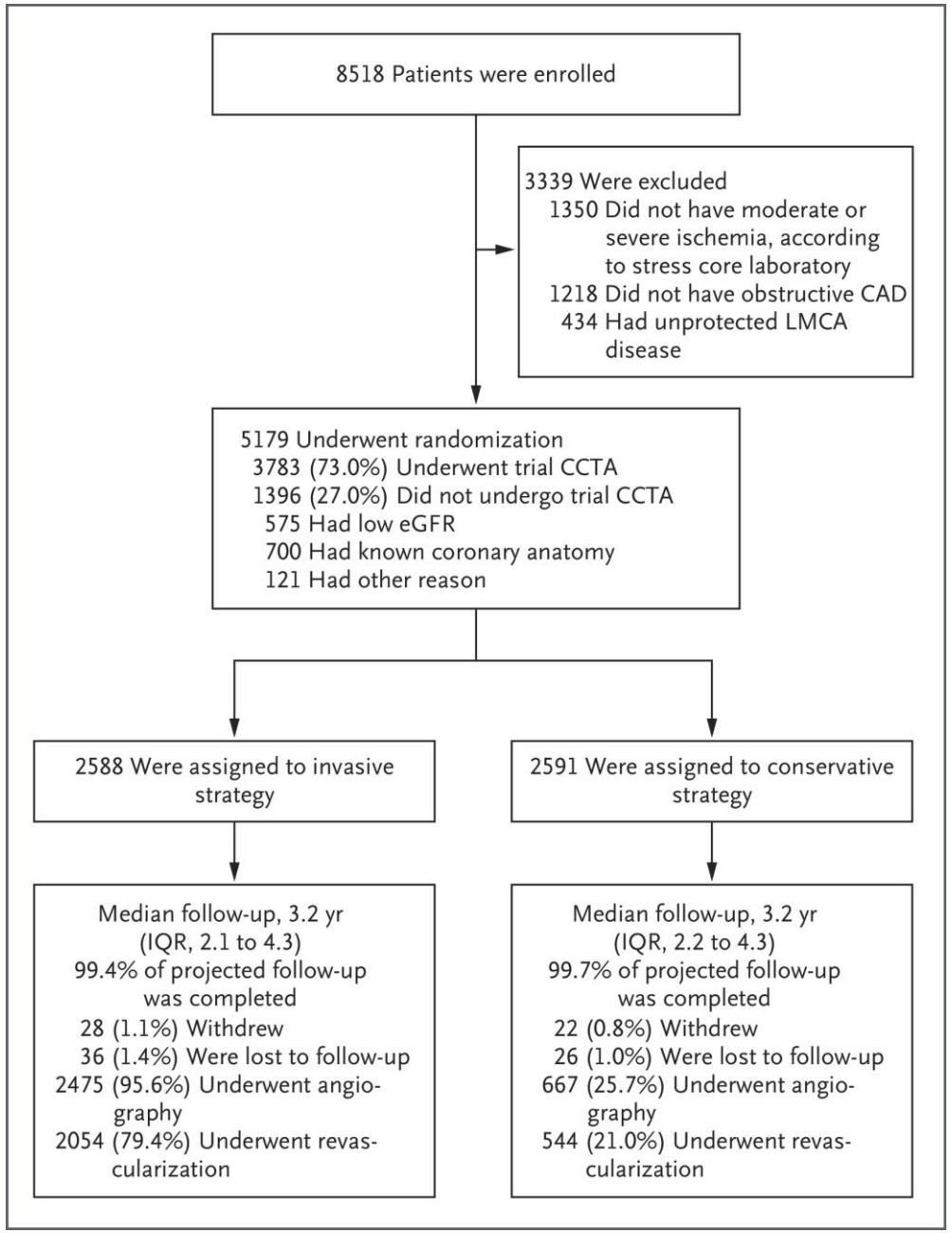
ISCHEMIA TRIAL

Ischemia Trial

- **21% in conservative group undervent revascularization**
- **79% in invasive group was revascularized**
- **PCI 76%**
- **CABG 24%**



Maron, D. J., Hochman, J. S., Reynolds, H. R., Bangalore, S., O'Brien, S. M., Boden, W. E., ... & Rosenberg, Y. (2020). Initial invasive or conservative strategy for stable coronary disease. New England Journal of Medicine, 382(15), 1395-1407.

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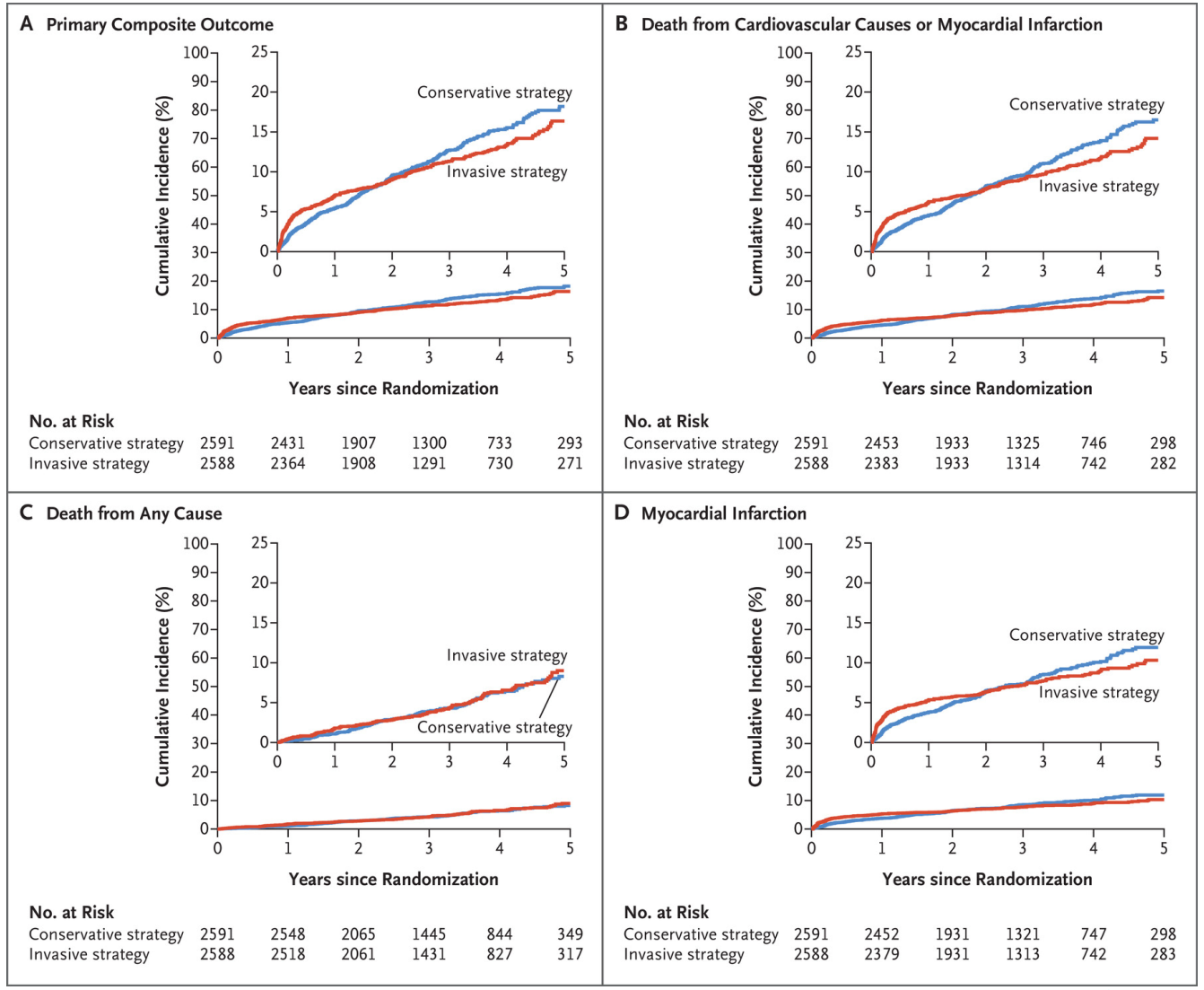
Ischemia Trial

- No Left Main disease and LV Dysfunction
- NYHC 3&4 Angina excluded
- Unacceptable angina after medical Rx
- 1/3 Patient enrolled had no angina
- 10% had mild ischemia

- PCI was not FFR guided

- SIHD After Optimal medical Rx if Symptoms persist
- Revascularization will improve symptoms and quality of life
- Without improvineg Survival
- with possibe protection from future MI



Maron, D. J., Hochman, J. S., Reynolds, H. R., Bangalore, S., O'Brien, S. M., Boden, W. E., ... & Rosenberg, Y. (2020). Initial invasive or conservative strategy for stable coronary disease. New England Journal of Medicine, 382(15), 1395-1407.

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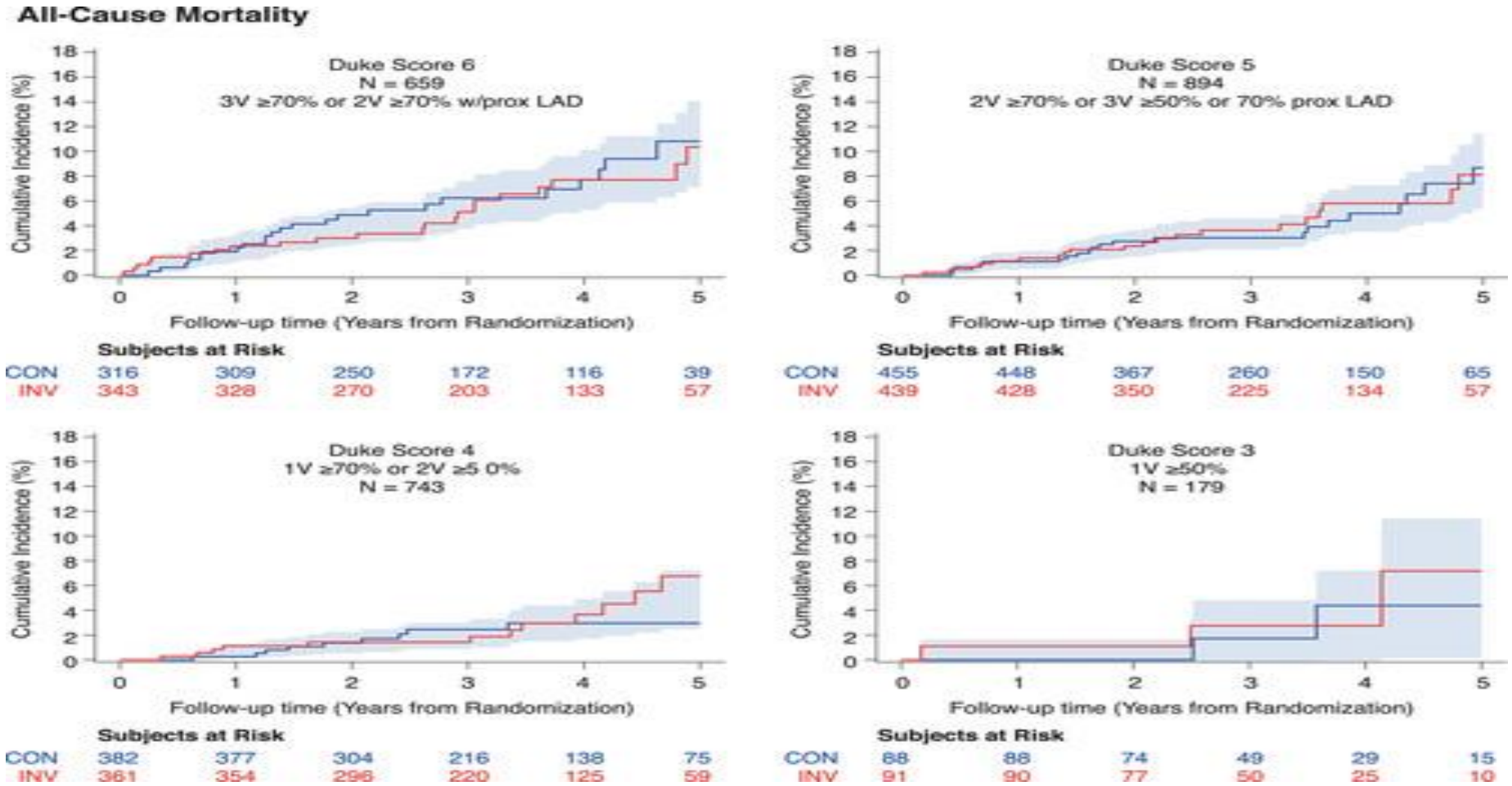
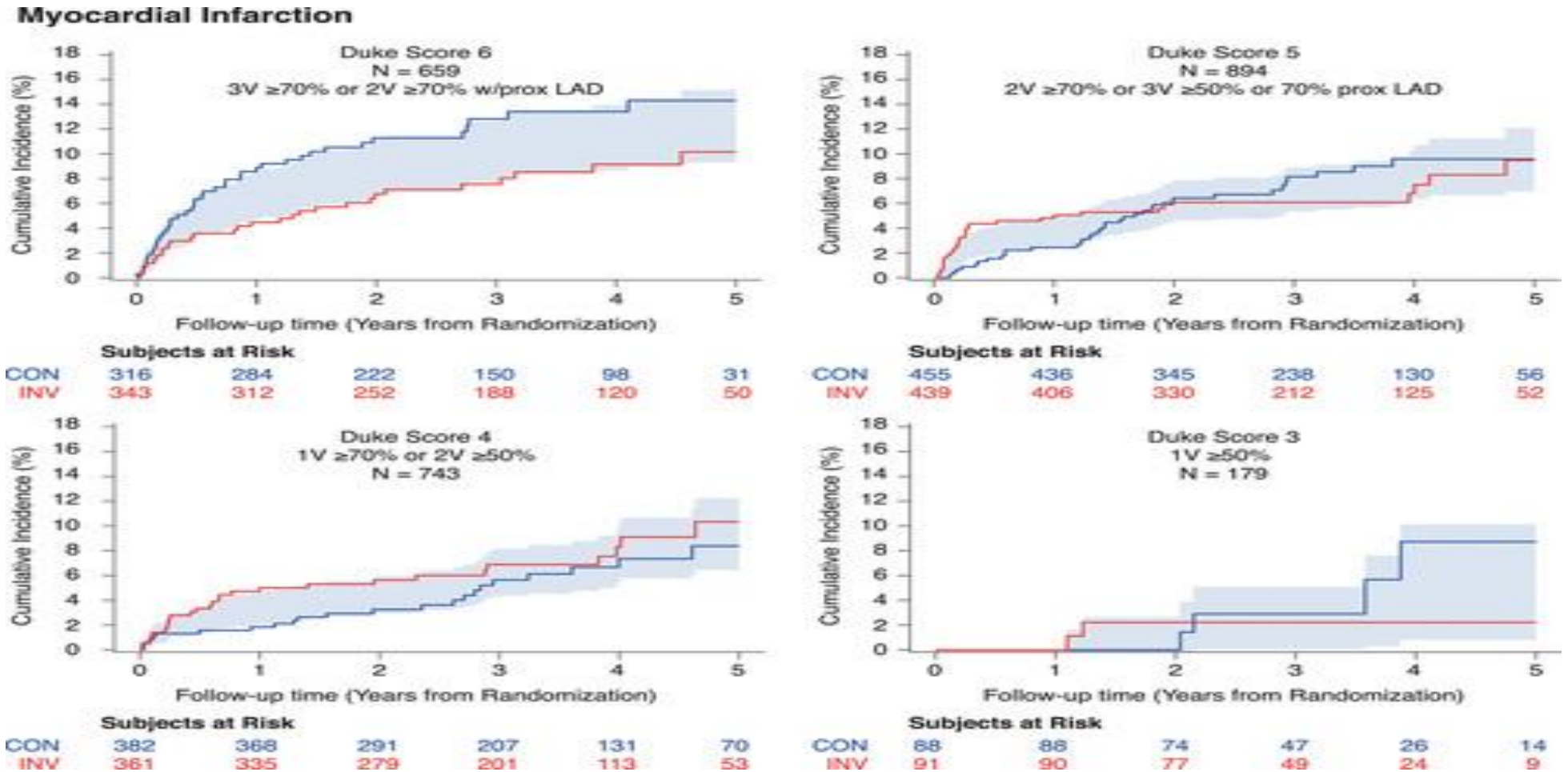
All Cause Mortality-Based on Coronary Artery Disease and Ischemia Severity



Harmony R. Reynolds. Circulation., Volume: 144, Issue: 13, Pages: 1024-1038,

Myocardial Infarction- Based on Coronary Artery Disease & Ischemia Severity



Harmony R. Reynolds. Circulation., Volume: 144, Issue: 13, Pages: 1024-1038,

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Revascularization to Improve Survival in SIHD Compared With Medical Therapy (con't.)

Multivessel CAD		
2b	**B-R**	**5. In patients with SIHD, normal ejection fraction, significant stenosis in 3 major coronary arteries (with or without proximal LAD), and anatomy suitable for CABG, CABG may be reasonable to improve survival.**
2b	**B-R**	**6. In patients with SIHD, normal ejection fraction, significant stenosis in 3 major coronary arteries (with or without proximal LAD), and anatomy suitable for PCI, the usefulness of PCI to improve survival is uncertain.**

CAN PCI PREVENT HEART ATTACKS?

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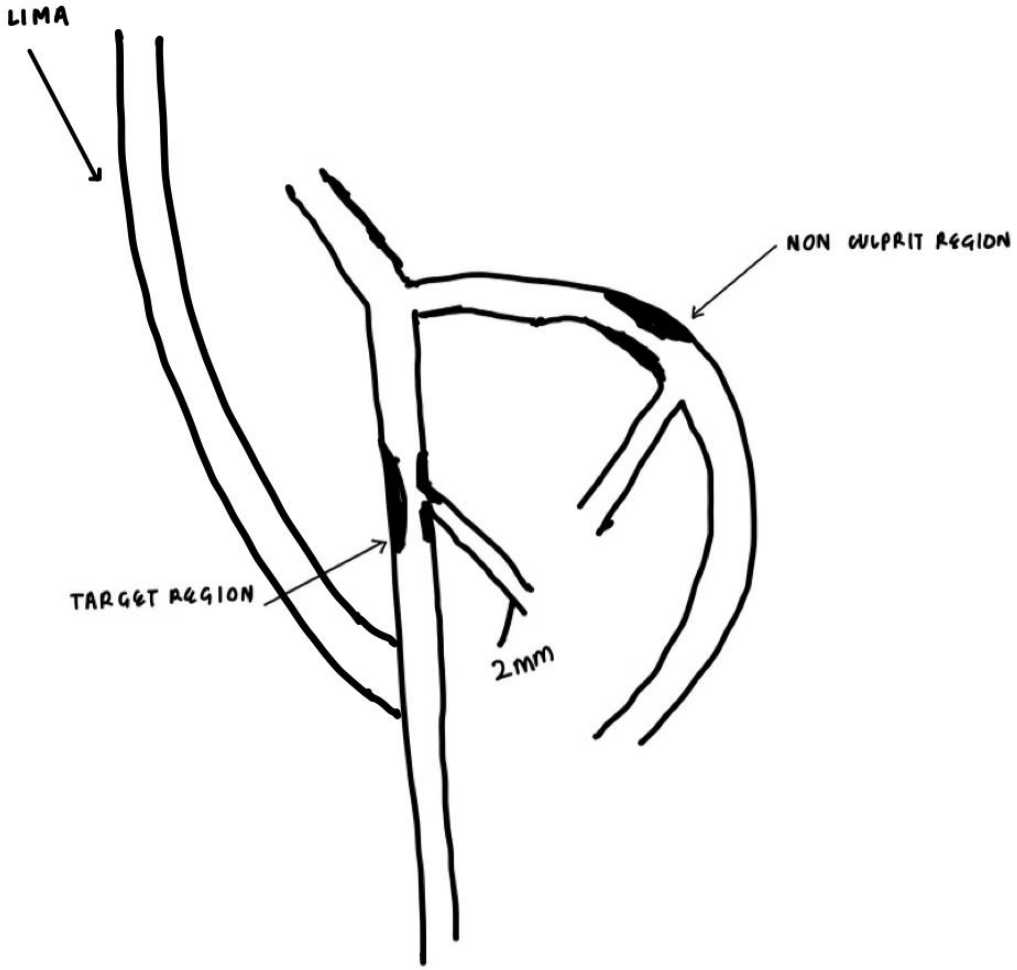
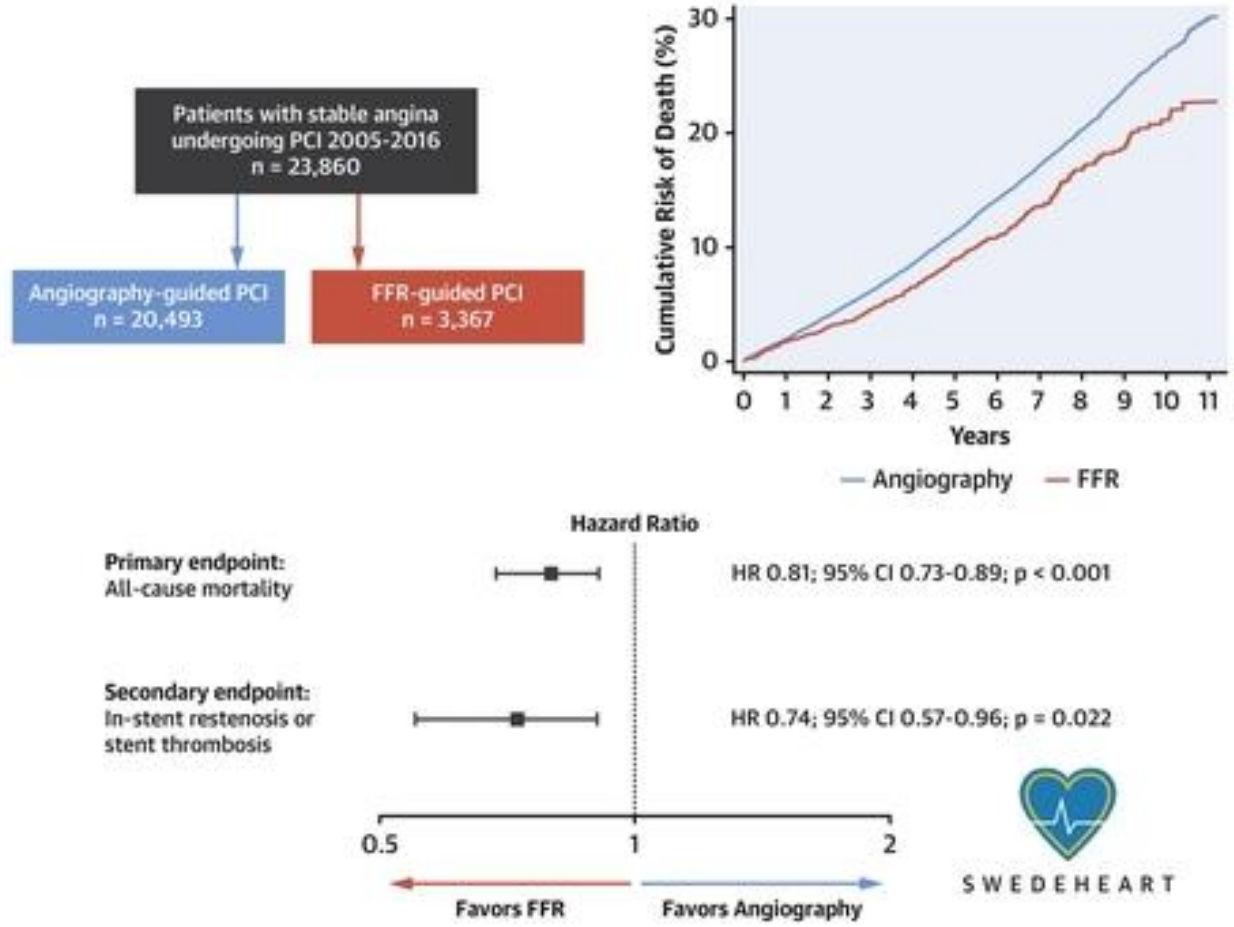
Can PCI prevent Heart Attacks?



PCI Guided by Physiology

- DEFER
- FAME 1
- FAME 2
- iFR-SWEDEHEART
- DEFINE-FLAIR
- FRAME-AMI
- COMBINE



Völz, S. et al. J Am Coll Cardiol. 2020;75(22):2785-99.

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Use of Coronary Physiology to Guide Revascularization With PCI

Recommendations for the Use of Coronary Physiology to Guide Revascularization With PCI Referenced studies that support the recommendations are summarized in Online Data Supplement 5.		
COR	**LOE**	**Recommendations**
1	**A**	**1. In patients with angina or an anginal equivalent, undocumented ischemia, and angiographically intermediate stenoses, the use of fractional flow reserve (FFR) or instantaneous wave-free ratio (iFR) is recommended to guide the decision to proceed with PCI.**
3: No benefit	**B-R**	**2. In stable patients with angiographically intermediate stenoses and FFR >0.80 or iFR >0.89, PCI should not be performed.**

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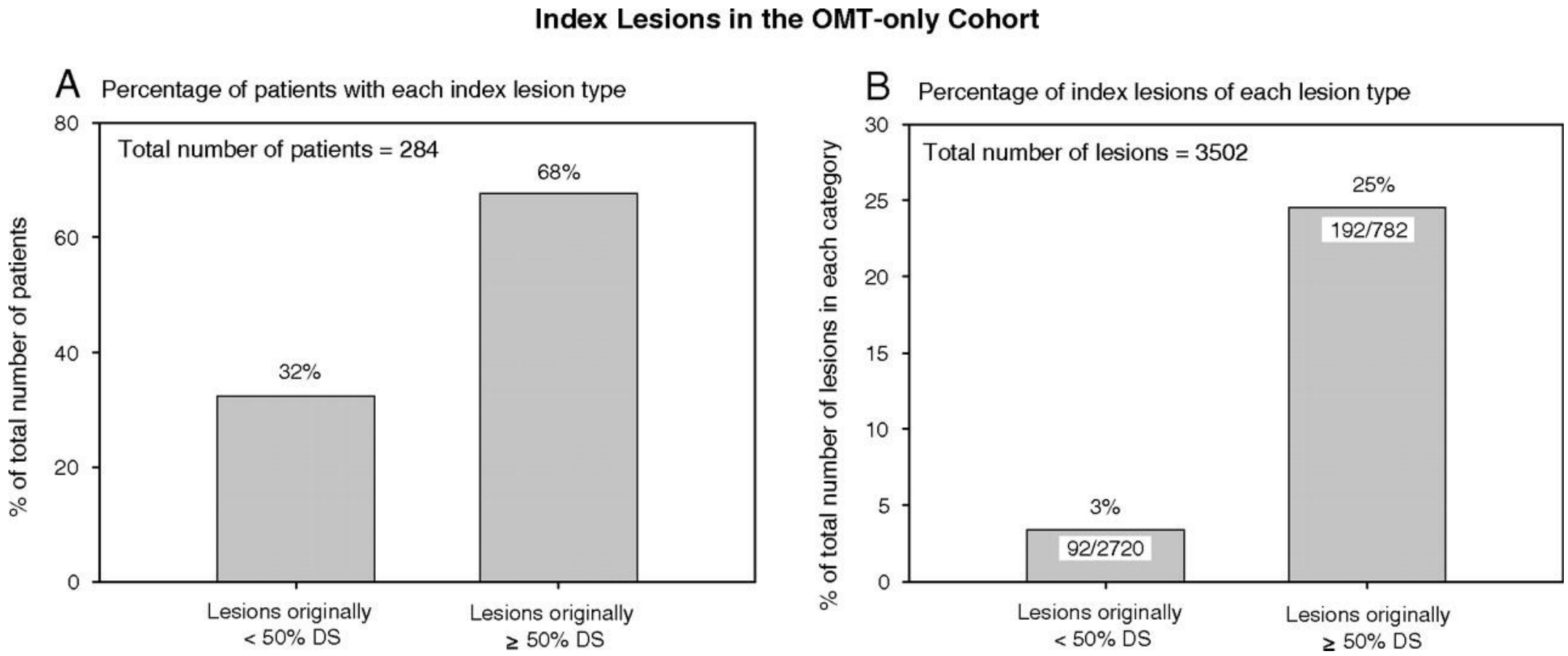
Angiographic Disease Progression and Residual Risk of Cardiovascular Events While on Optimal Medical Therapy



G.B. John Mancini. Circulation: Cardiovascular Interventions. Angiographic Disease Progression and Residual Risk of Cardiovascular Events While on Optimal Medical Therapy, Volume: 4, Issue: 6, Pages: 545-552, DOI: (10.1161/CIRCINTERVENTIONS.110.960062)

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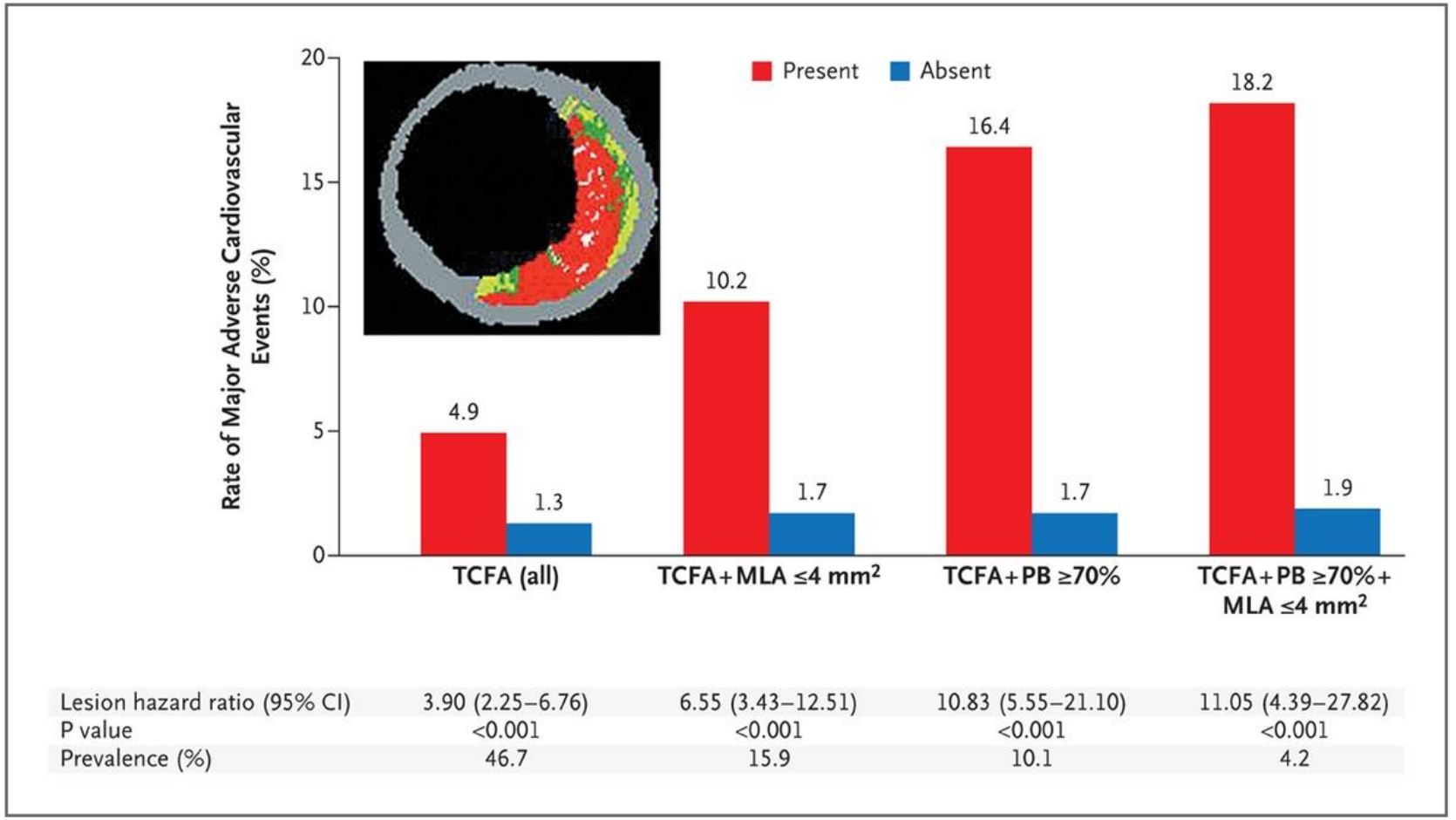
Event Rates for Lesions That Were and Those That Were Not Thin-Cap Fibroatheromas, at a Median Follow-up of 3.4 Years



Lesion hazard ratio (95% CI)	3.90 (2.25–6.76)	6.55 (3.43–12.51)	10.83 (5.55–21.10)	11.05 (4.39–27.82)
P value	<0.001	<0.001	<0.001	<0.001
Prevalence (%)	46.7	15.9	10.1	4.2

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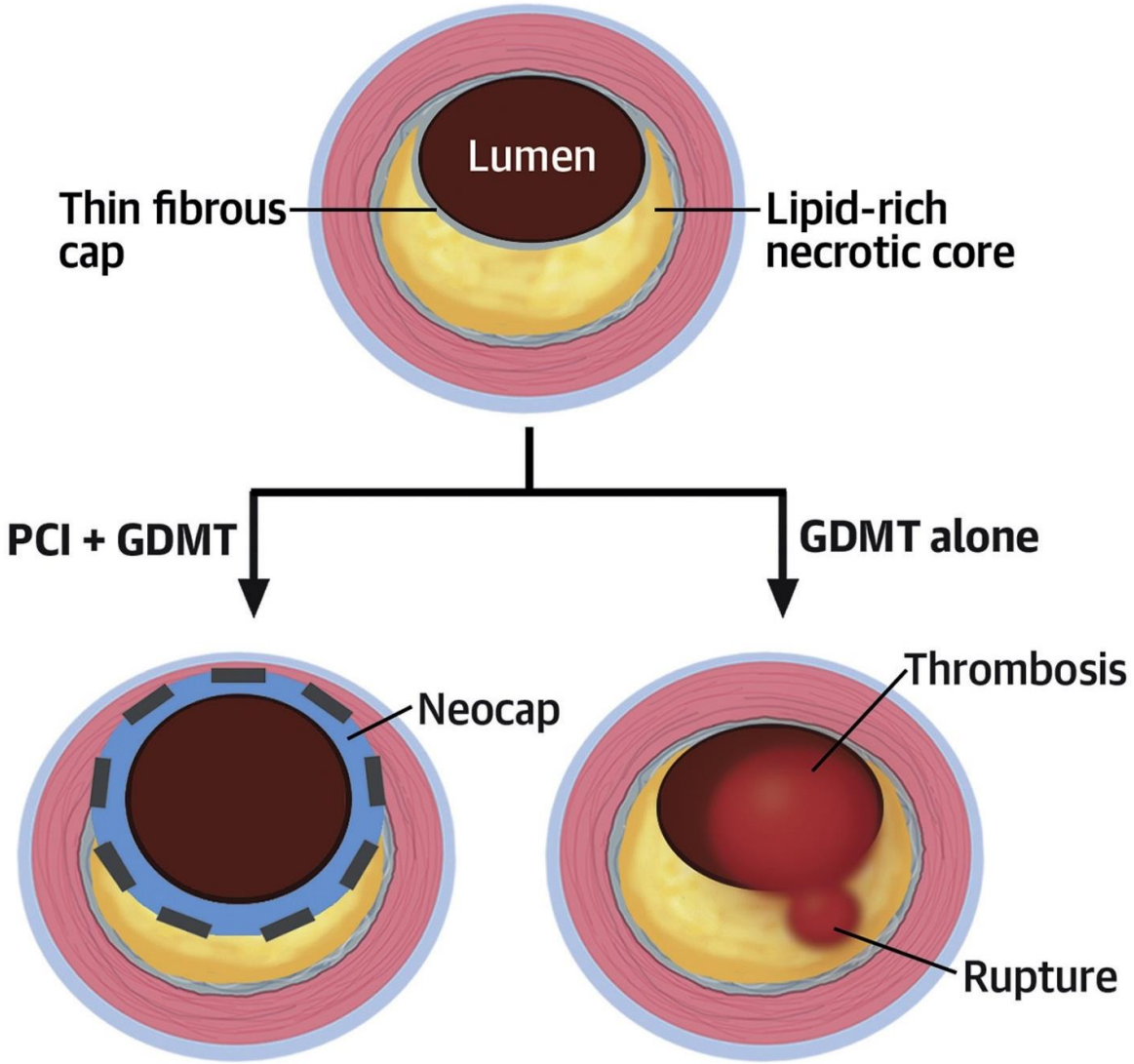

Gregg W. Stone et al. *J Am Coll Cardiol* 2020; 76:2289-2301.

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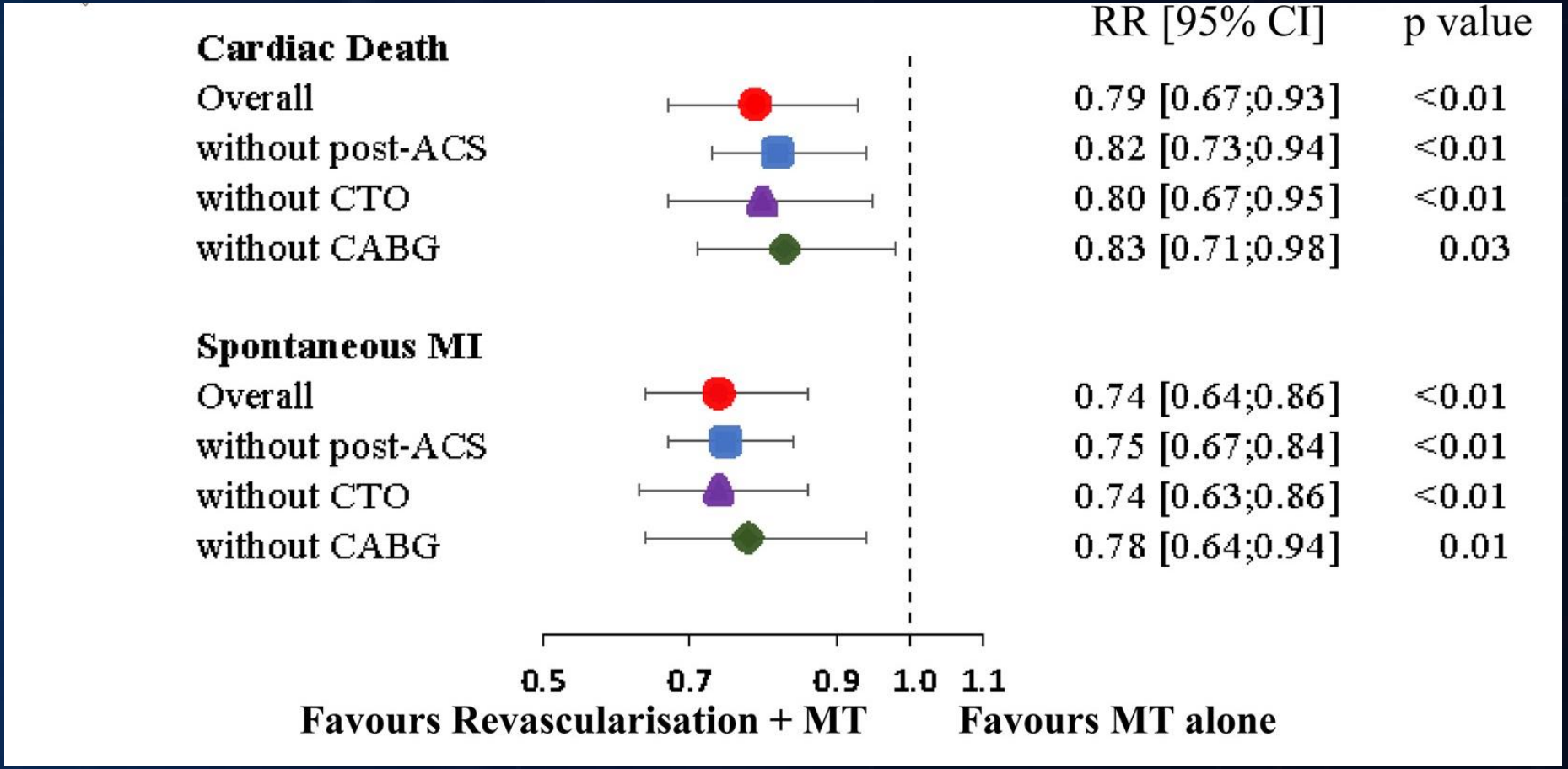
Revascularization Vs Medical Rx for Reduction of MI and Cardiac death



Eur Heart J, Volume 42, Issue 45, 1 December 2021, Pages 4638–4651

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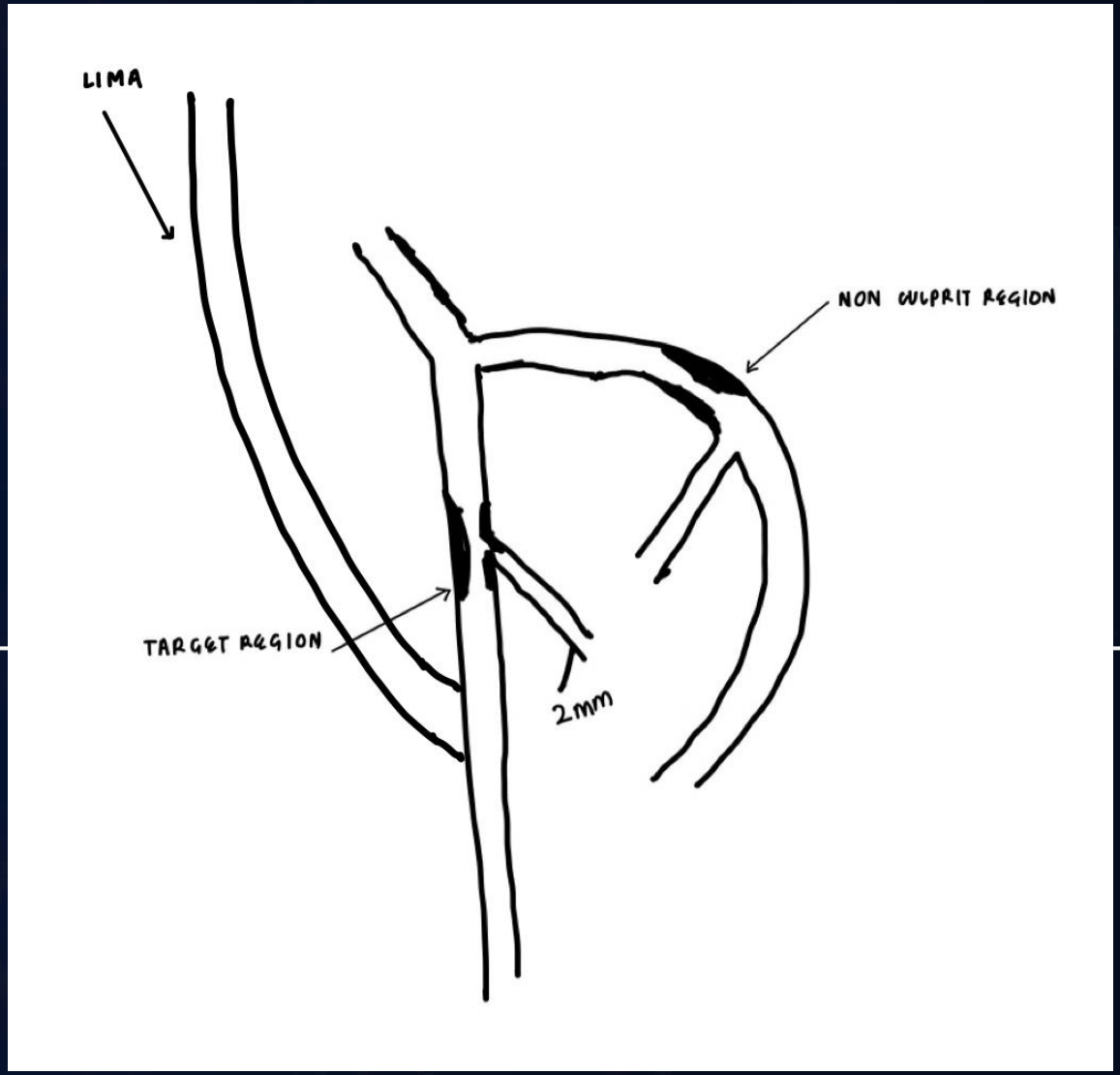
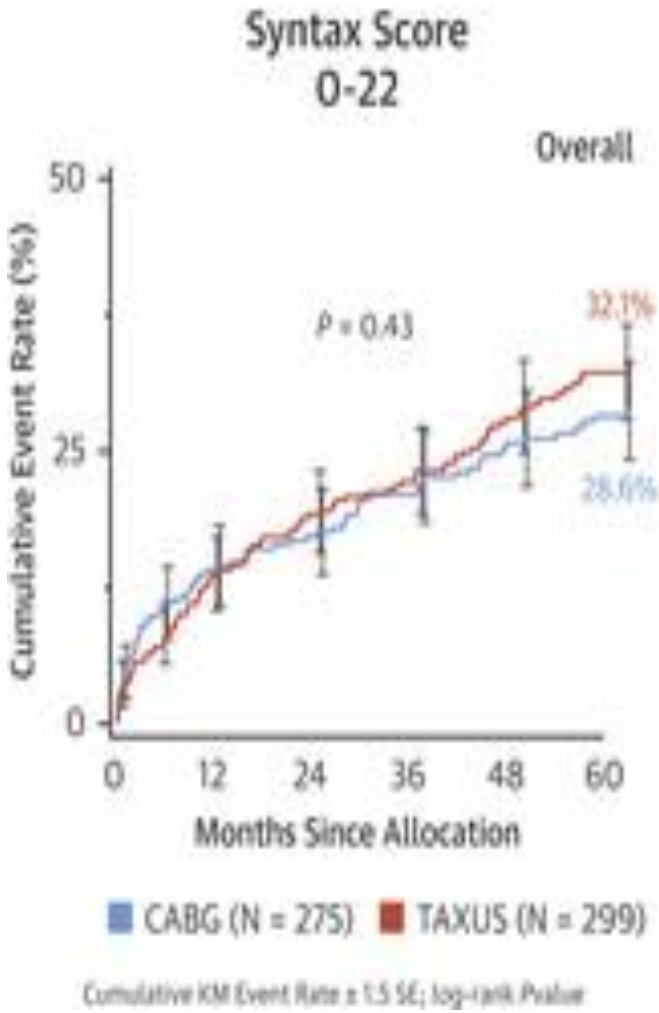
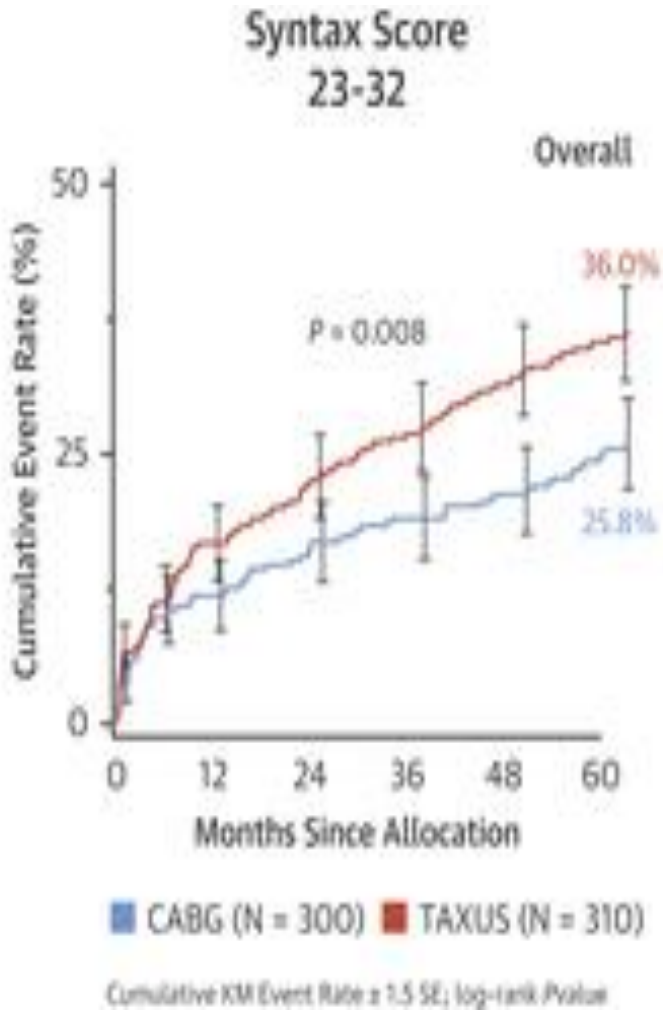
Revascularization to reduce cardiovascular events in SIHD compared with medical therapy

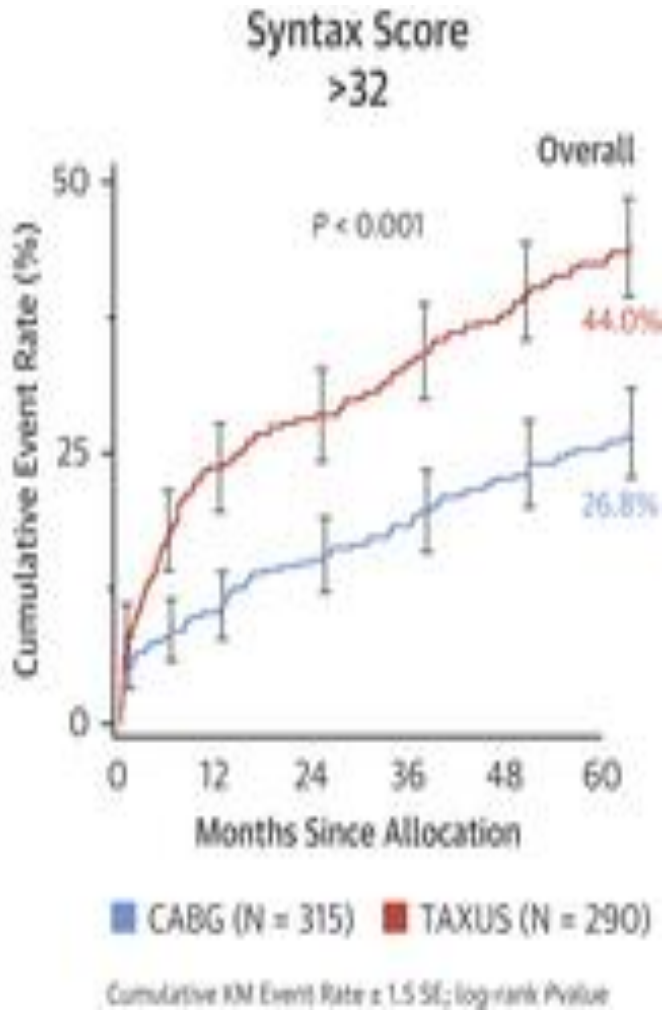
Recommendations for Revascularization to Reduce Cardiovascular Events in SIHD Compared with Medical Therapy Referenced studies that support the recommendation are summarized in Online Data Supplement 11.		
COR	**LOE**	**Recommendations**
Multivessel CAD		
2a	**B-R**	**1. In patients with SIHD and multivessel CAD appropriate for either CABG or PCI, revascularization is reasonable to lower the risk of cardiovascular events such as spontaneous MI, unplanned urgent revascularizations, or cardiac death.**

CABG IS BETTER THAN PCI









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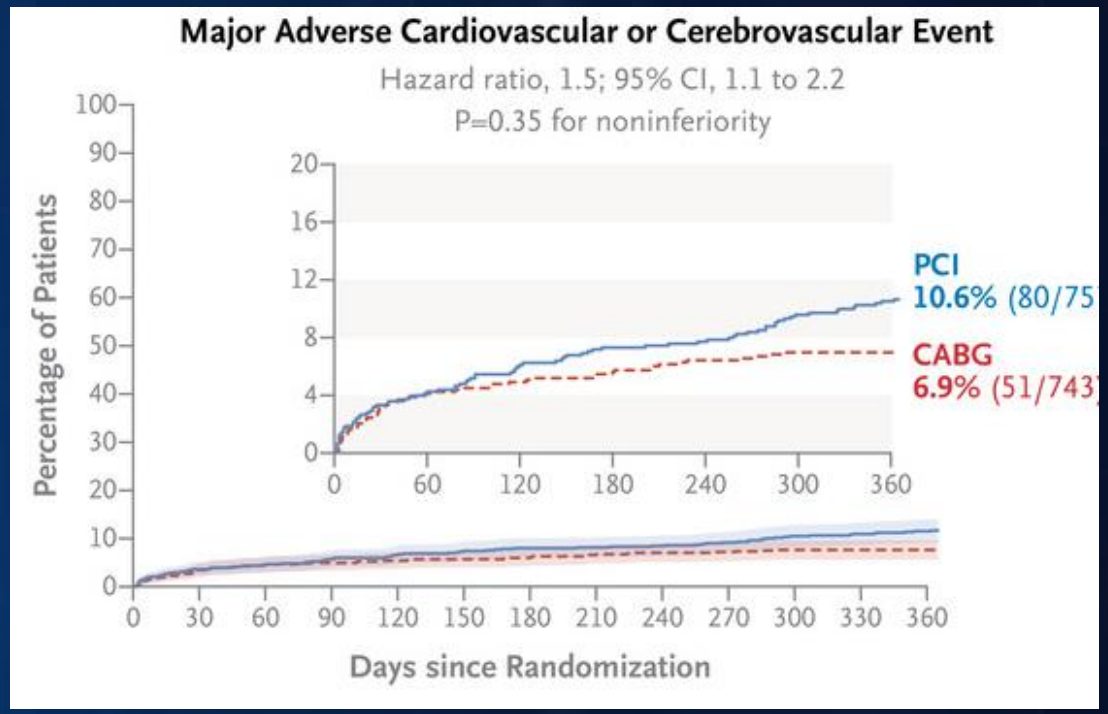
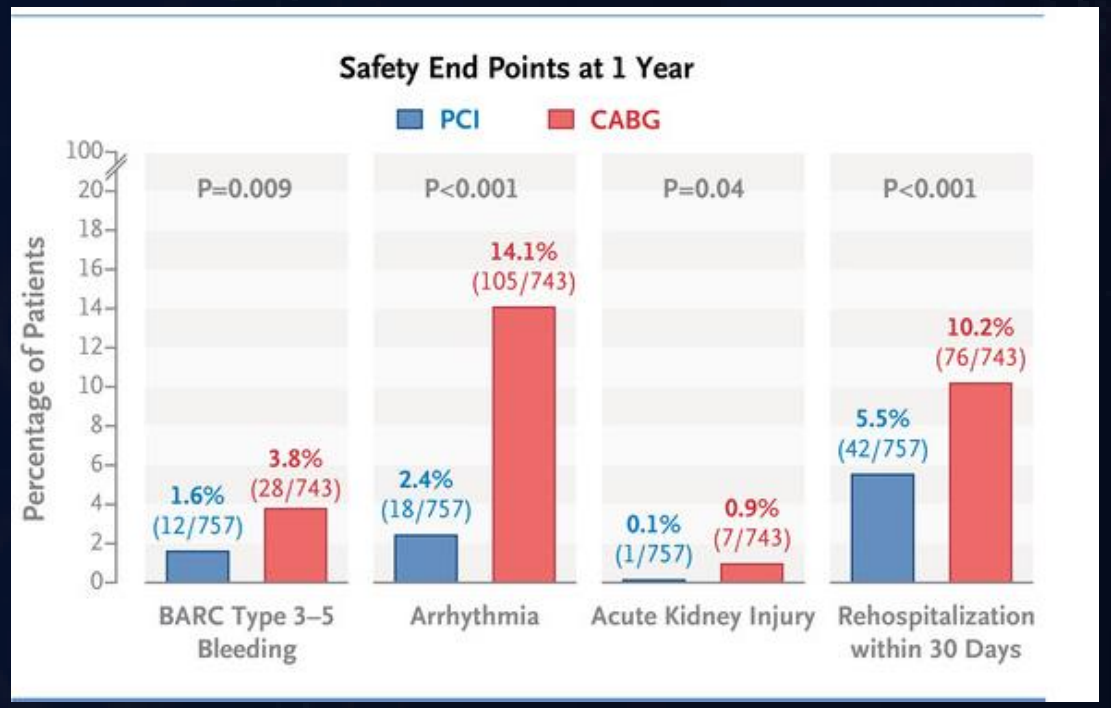
FAME 3 PCI vs CABG





Fearon WF et al. DOI: 10.1056/NEJMoa2112299

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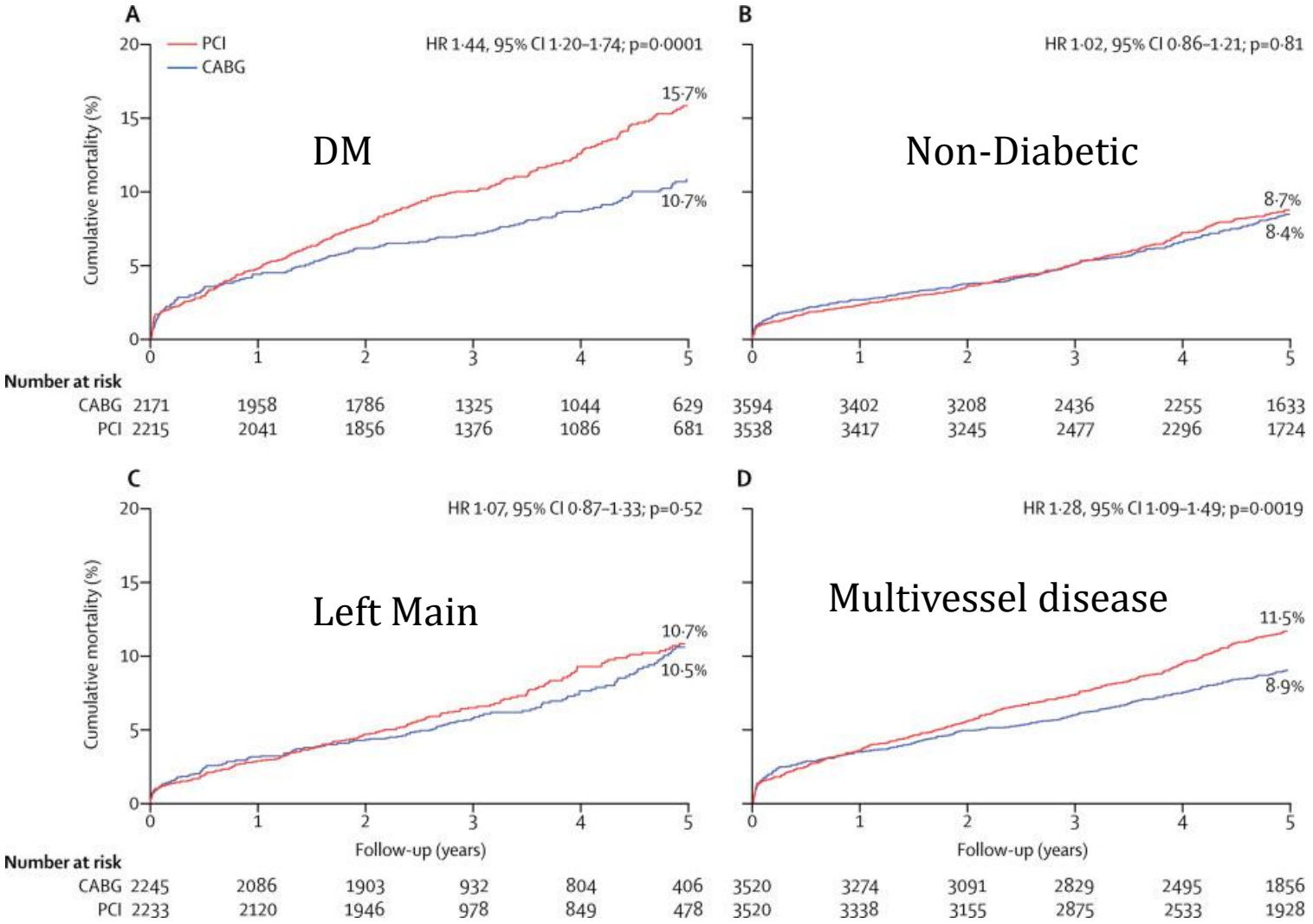
Mortality after CABG versus after PCI during 5 years follow-up of patients - Meta-analysis



S. Head, M. Milojevic, +22 authors A. Kappetein, The Lancet

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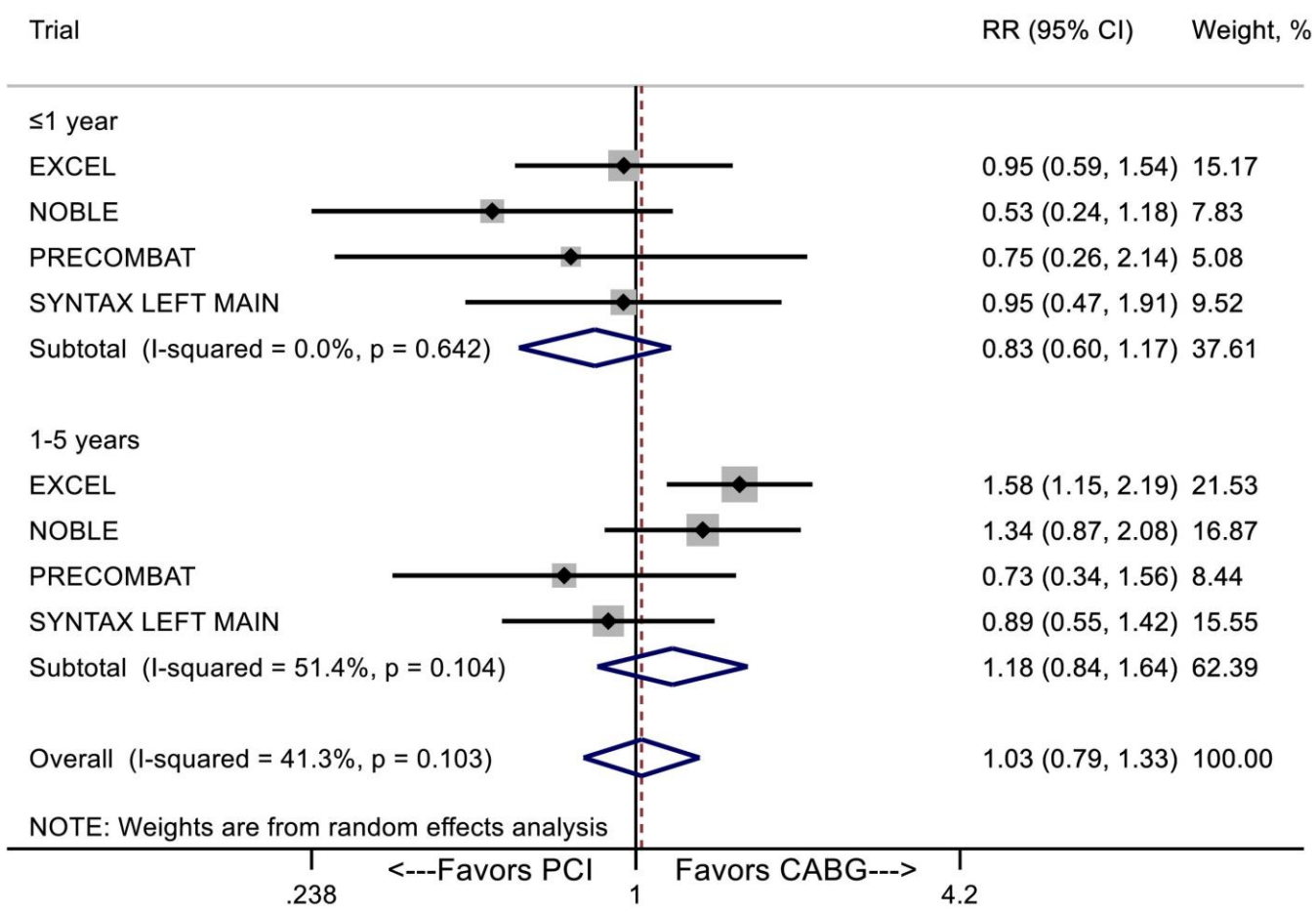
Mortality difference after PCI vs CABG among RCTs of unprotected left main disease



Akintoye, E., Salih, M., Olagoke, O., Oseni, A., Sistla, P., Alqasrawi, M., ... & Sellke, F. (2021). Intermediate and Late Outcomes With PCI vs CABG for Left Main Disease—Landmark Meta-Analysis of Randomized Trials. Cardiovascular Revascularization Medicine, 23, 114-118.

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Revascularization to Improve Survival in SIHD Compared With Medical Therapy (con't.)

Left main CAD		
1	**B-R**	**3. In patients with SIHD and significant left main stenosis, CABG is recommended to improve survival.**
2a	**B-NR**	**4. In selected patients with SIHD and significant left main stenosis for whom PCI can provide equivalent revascularization to that possible with CABG, PCI is reasonable to improve survival.**

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CABG THROUGH 6Fr SHEATH

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Predicting Patient Risk of Death With CABG

Recommendation for Predicting Patient Risk of Death With CABG Referenced studies that support the recommendation are summarized in Online Data Supplements 3.		
COR	**LOE**	**Recommendation**
1	**B-NR**	**1. In patients who are being considered for CABG, calculation of the Society of Thoracic Surgeons (STS) risk score is recommended to help stratify patient risk.**

Assessment of Risk Factors Not Quantified in the STS Score

Risk Factor	Assessment Tool
Cirrhosis	Model for End-Stage Liver Disease (MELD)
Frailty	Gait speed
Malnutrition	Malnutrition Universal Screening Tool (MUST)

STS indicates Society of Thoracic Surgeons.

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Factors to be considered by the Heart Team

Coronary Anatomy

- Left main disease
- Multivessel disease
- High anatomic complexity (i.e., bifurcation disease, high SYNTAX score)

Procedural Factors

- Local and regional outcomes
- Access site for PCI
- Surgical risk
- PCI risk

Patient Factors

- Unstable presentation or shock
- Patient preferences
- Inability or unwillingness to adhere to DAPT
- Patient social support
- Religious beliefs
- Patient education, knowledge, and understanding

Comorbidities

- Diabetes
- Systolic dysfunction
- Coagulopathy
- Valvular heart disease
- Frailty
- Malignant neoplasm
- End-stage renal disease
- Chronic obstructive pulmonary disease
- Immunosuppression
- Debilitating neurological disorders
- Liver disease/cirrhosis
- Prior CVA
- Calcified/Porcelain aorta
- Aortic Aneurysm

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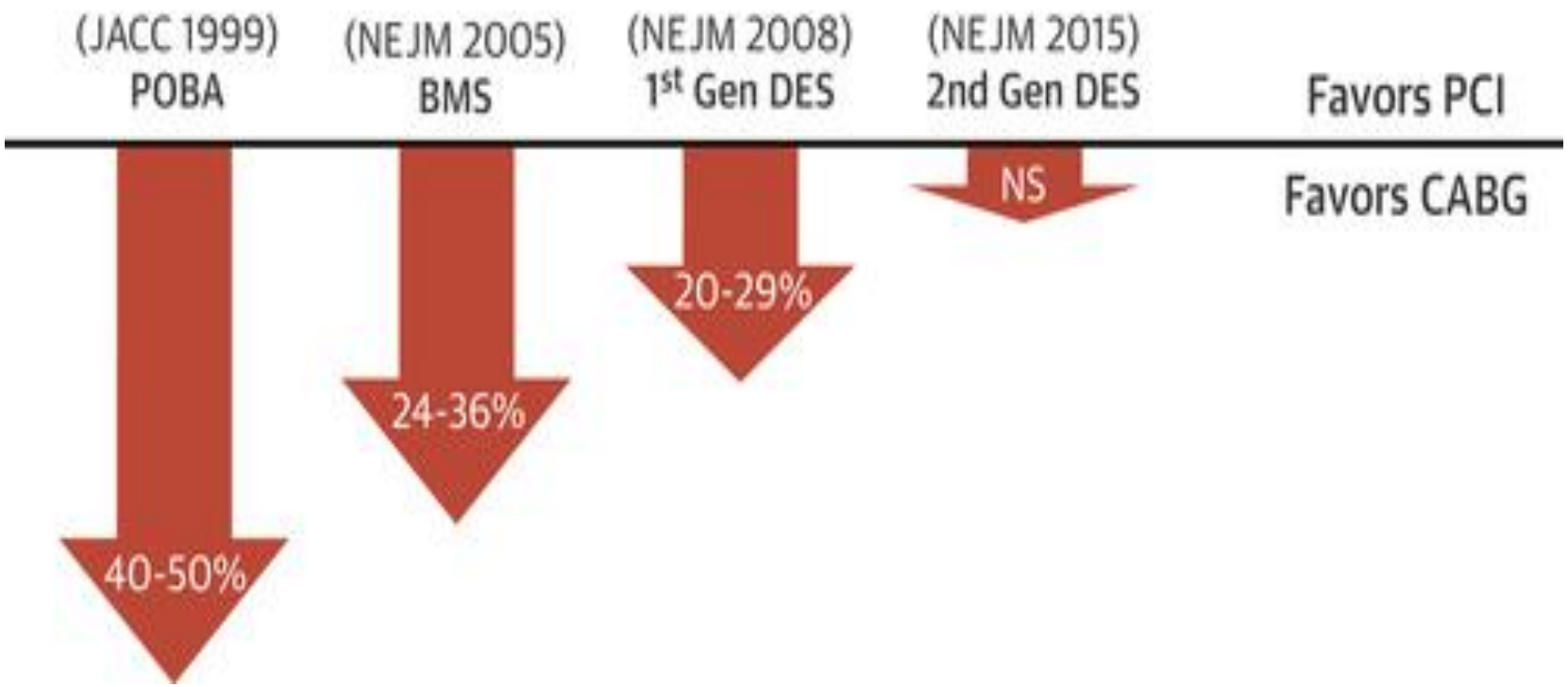
New York state registry mortality data between PCI and CABG



Sripal Bangalore et al. *J Am Coll Cardiol* 2016; 68:996-998.

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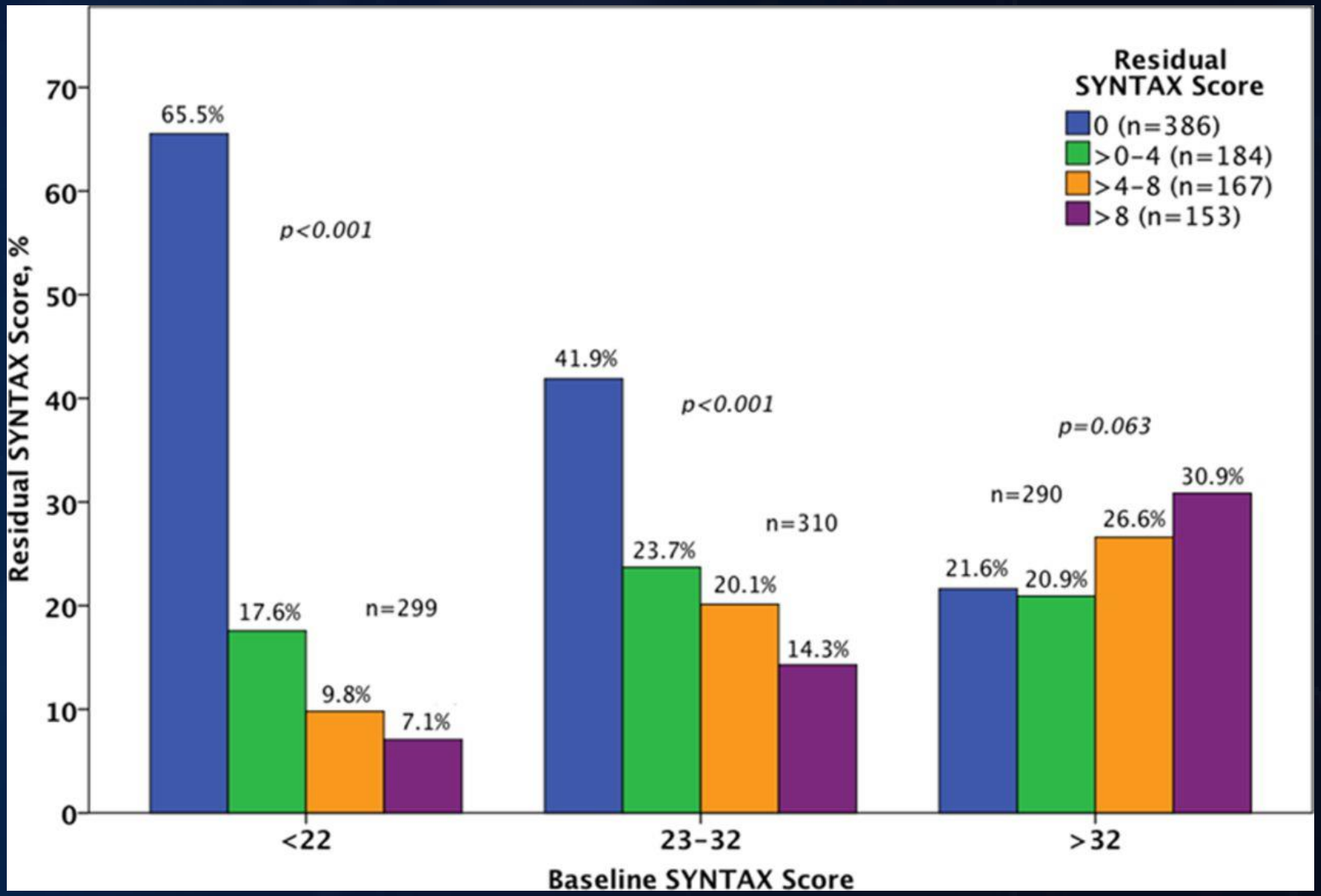
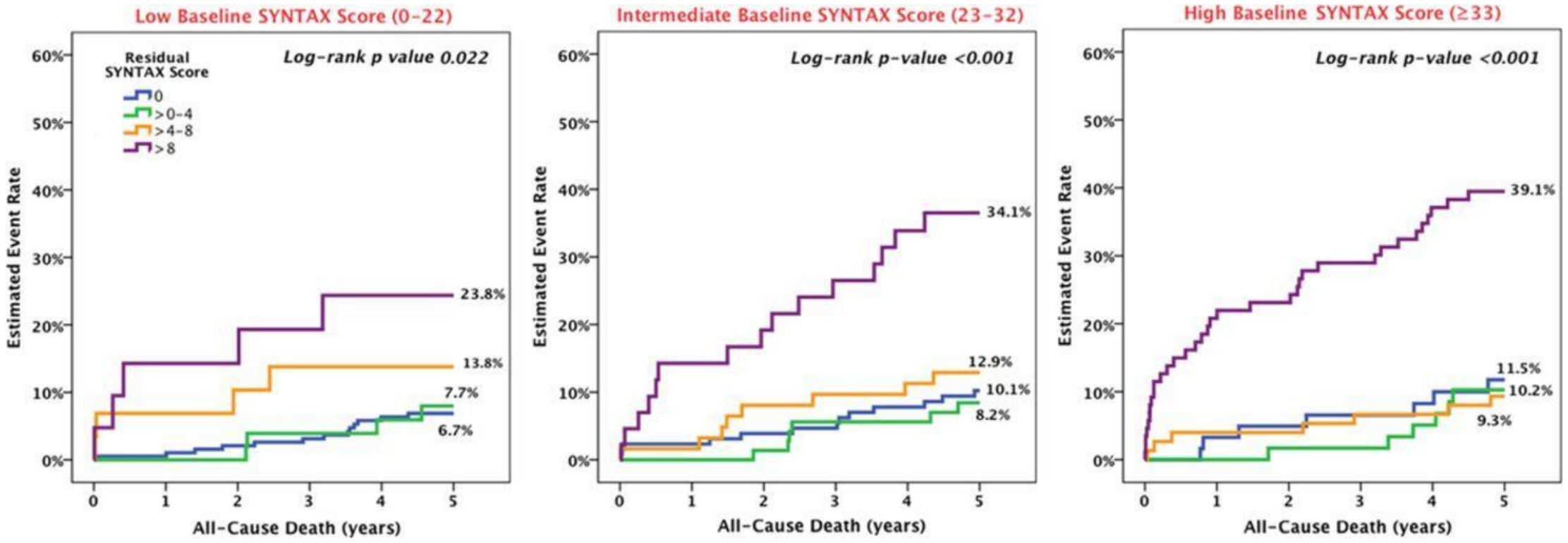


Farooq, V., Serruys, P. W., Bourantas, C. V., Zhang, Y., Muramatsu, T., Feldman, T., ... & Mohr, F. W. (2013). Quantification of incomplete revascularization and its association with five-year mortality in the synergy between percutaneous coronary intervention with taxus and cardiac surgery (SYNTAX) trial validation of the residual SYNTAX score. Circulation, 128(2), 141-151.

Residual Syntax Score



Farooq, V., Serruys, P. W., Bourantas, C. V., Zhang, Y., Muramatsu, T., Feldman, T., ... & Mohr, F. W. (2013). Quantification of incomplete revascularization and its association with five-year mortality in the synergy between percutaneous coronary intervention with taxus and cardiac surgery (SYNTAX) trial validation of the residual SYNTAX score. Circulation, 128(2), 141-151.

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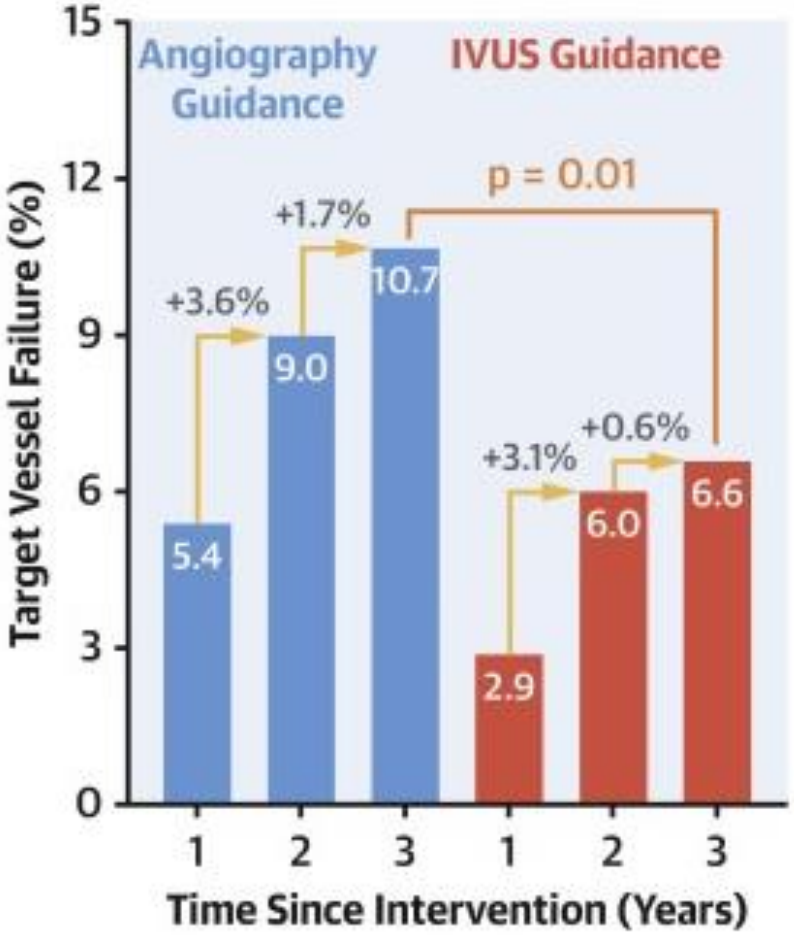
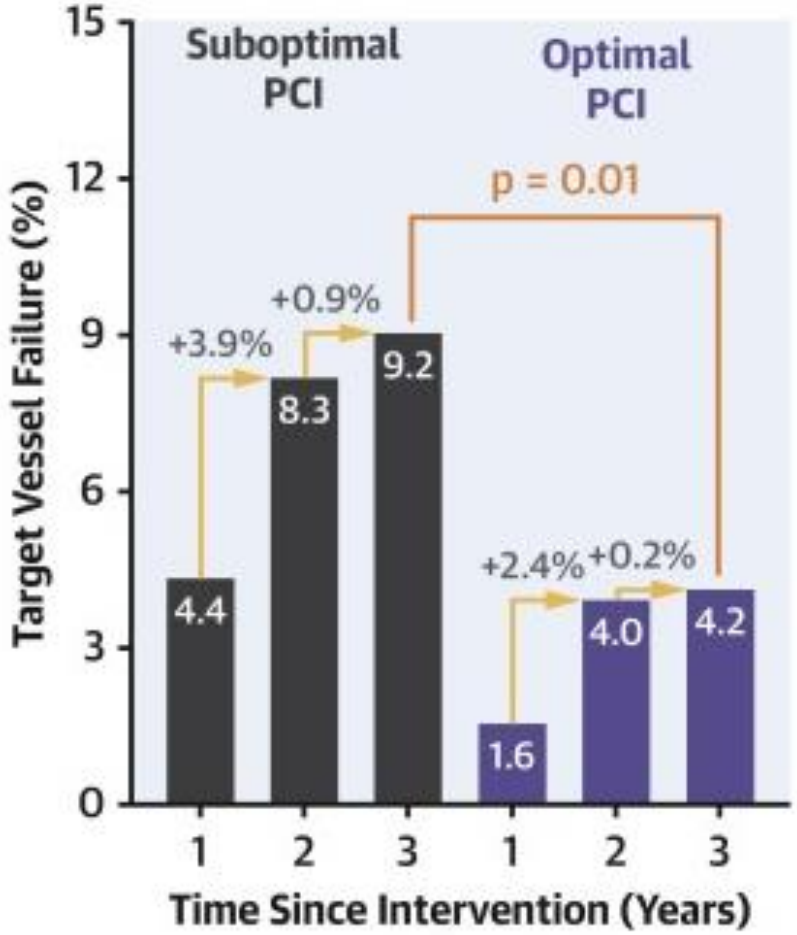
IVUS Guided PCI in "All-Comers"





Xiao-Fei Gao et al. *J Am Coll Cardiol Intv* 2021; 14:247-257.

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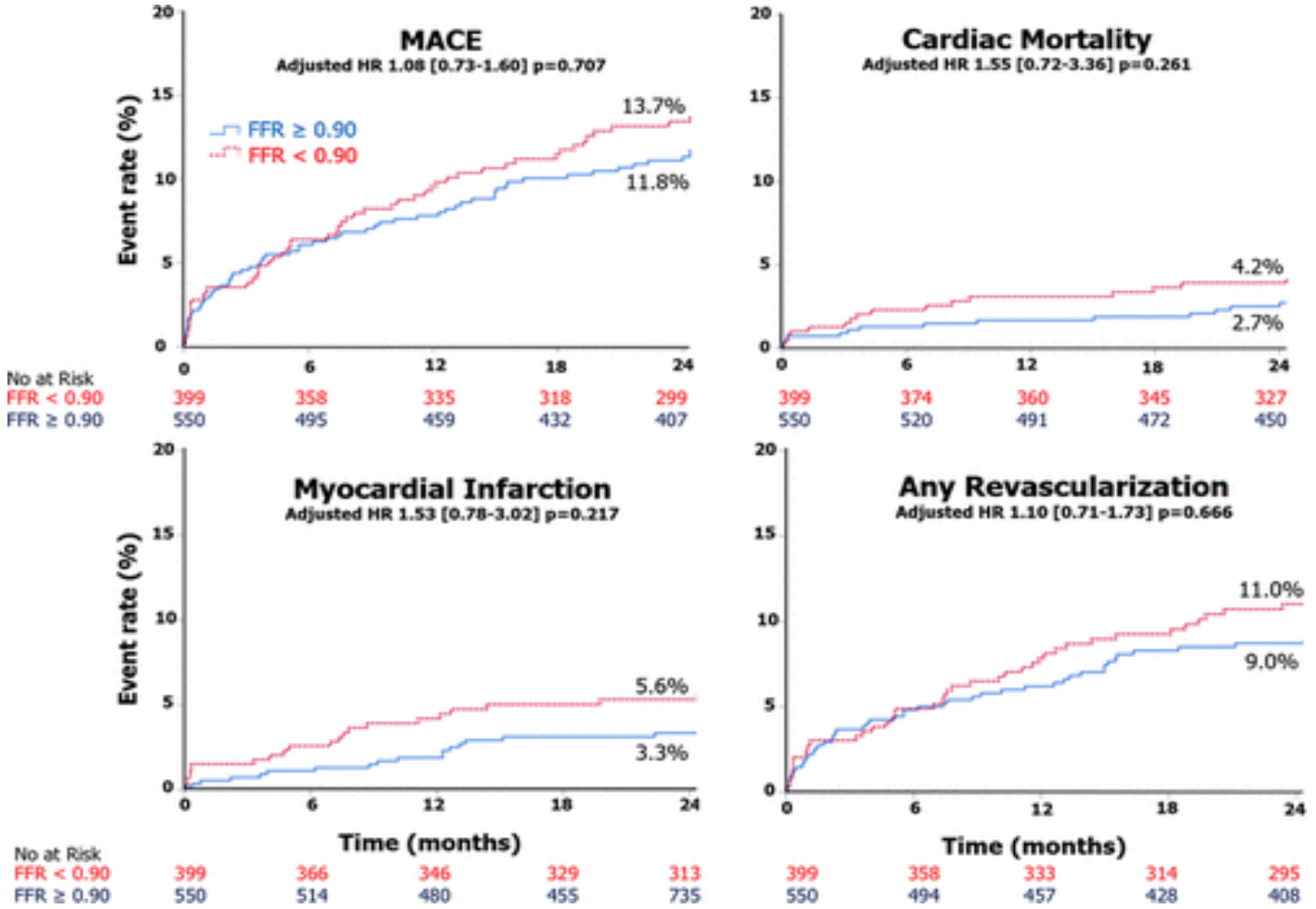
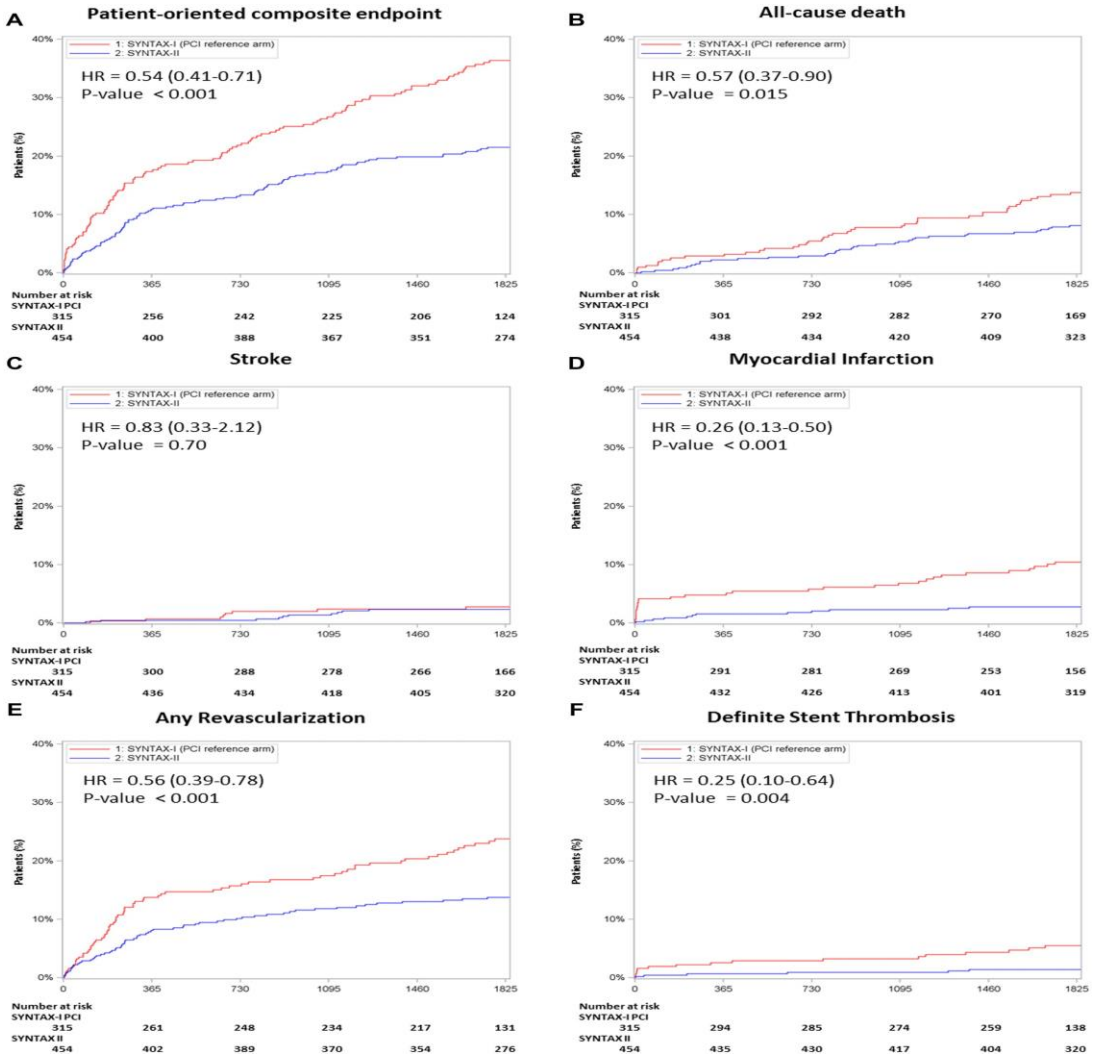
Impact of Poststenting Fractional Flow Reserve on Long-Term Clinical Outcomes



Roberto Diletti. Circulation: Cardiovascular Interventions. Volume: 14, Issue: 3,

Clinical outcomes comparing the SYNTAX II study vs. the equipoise-derived SYNTAX I



OPTIMAL PCI
Radial Access
FFR guided
IVUS/OCT
Post FFR
Staged CTO PCI

Eur Heart J, Volume 43, Issue 13, 1 April 2022, Pages 1307–1316

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Main Takeaways

1. Treatment should be patient centered
2. All therapies are complementary
3. All patients with CAD should be on guideline directed medical therapy
4. Revascularization decisions should be guided by Heart Team
5. PCI should be guided by FFR
6. Optimize PCI result with Imaging IVUS/OCT
7. Check post PCI FFR

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Which Statement is True in SIHD?

1. Asymptomatic patient with severe Triple vessel disease including Proximal LAD , CABG improves survival
2. Patient with Triple Vessel disease, PCI improves symptoms with no improvement in survival
3. CABG and PCI may be considered for reduction of future MI and cardiac death in patient with SIHD
4. PCI in isolated Left main disease improves survival
5. Medical Rx is preffered over revacularization in asymptomatic patient with triple vessel disease and LV dysfunction

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