Should PCI be Offered Based on Symptoms or Stenosis?

Should we resist the Oculostenotic Reflex?

Retesh Bajaj MBBS PhD
Interventional Cardiologist, St. Michael's Hospital
Assistant Professor, University of Toronto

UNIVERSITY OF TORONTO
FACULTY OF MEDICINE

UNITY HEALTH
TORONTO

Presenter Disclosures

Relationships with financial sponsors:

- Grants/Research Support: None
- Speakers Bureau/Honoraria: None
- Consulting Fees: None
- Patents: None
- Other: None

Aims / Objectives

- Discuss considerations when considering PCI
  - Symptom relief
  - Prognosis (is it safe to leave stenosis alone?)
- Anatomic (and physician) biases
  - Chronic total occlusions
  - Diffuse disease
- Potential future developments

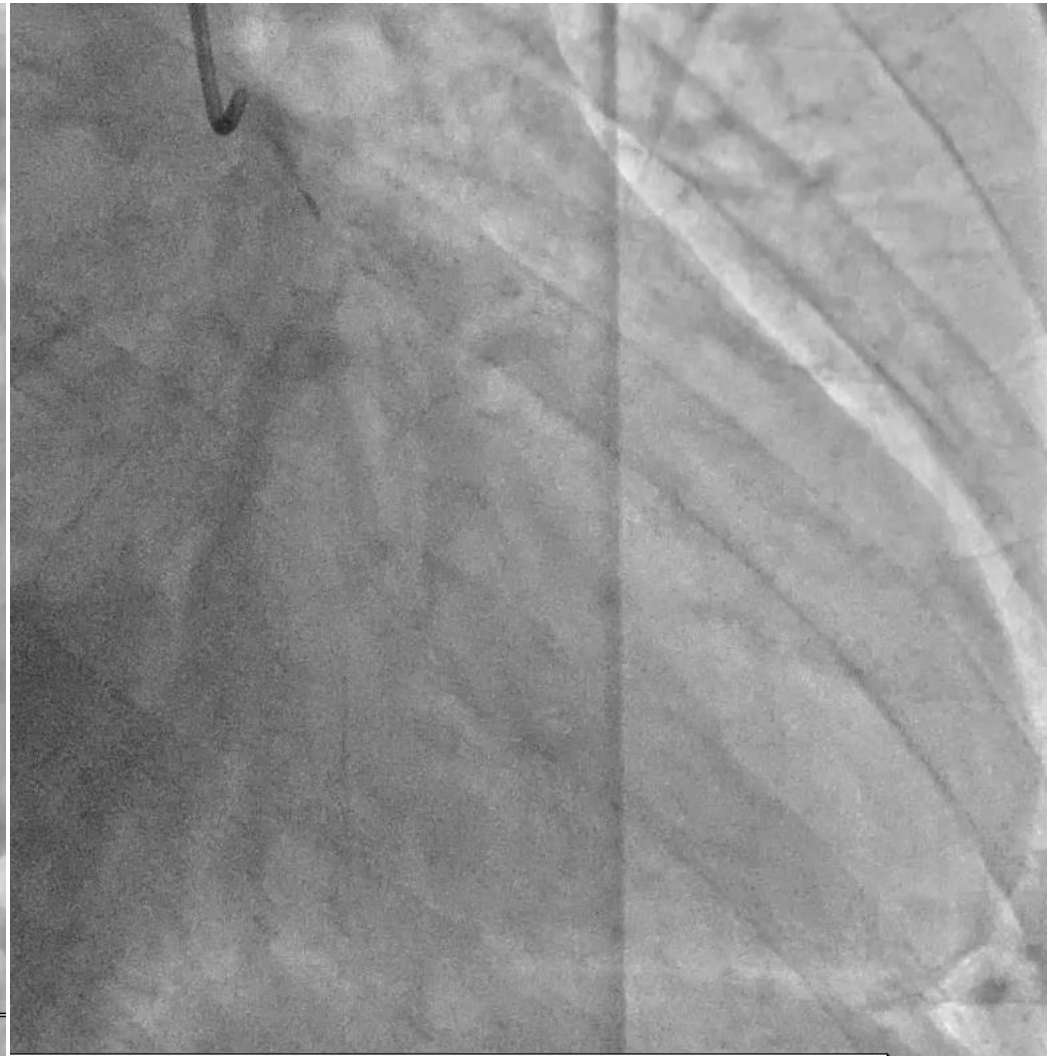
CASE

- 52 yo male, asymptomatic (elite marathon runner).
- Brother recently succumbed to acute MI (at same age)
- Diagnosed with dyslipidemia (LDL 5.1, Lpa 368)
- Referred to cardiology
  - Interested (and consented) to participate in clinical trial of novel drug to lower Lp(a) (Muvalaplin)
- As part of workup for clinical trial, referred for CTCA (performed at private scanner, images not available)
  - CAC score (Agatston) 1247
  - Calcified lesion in mid-LAD (at first diagonal) 70-99% severity

Stress Test

- >16 minutes of Bruce
- 105% age-predicted target HR
- No symptoms
- Upsloping ST depression anteriorly

- Stress test reassuring
- CTCA very un-reassuring
- Referred for invasive angiography



PCI for Stenosis or Symptoms

UNITY HEALTH TORONTO

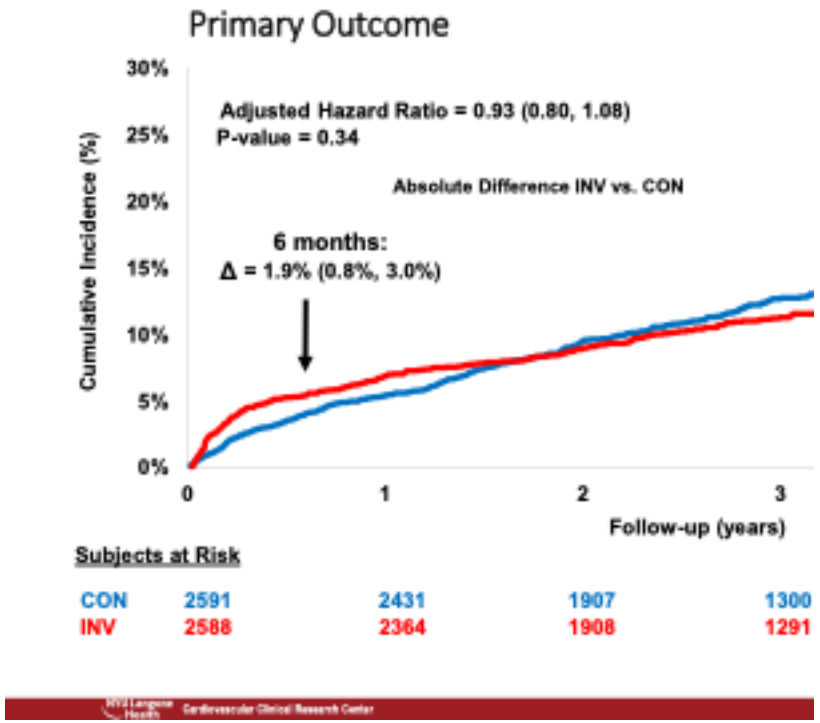
Coronary Angiogram

- Mild atherosclerosis RCA and LCx
- Severe mid-LAD disease (with plaque either side of this)
- Normal LV function

UNITY HEALTH TORONTO

What we know

- ISCHEMIA (Maron et al., NEJM 2020; n = 5,179)



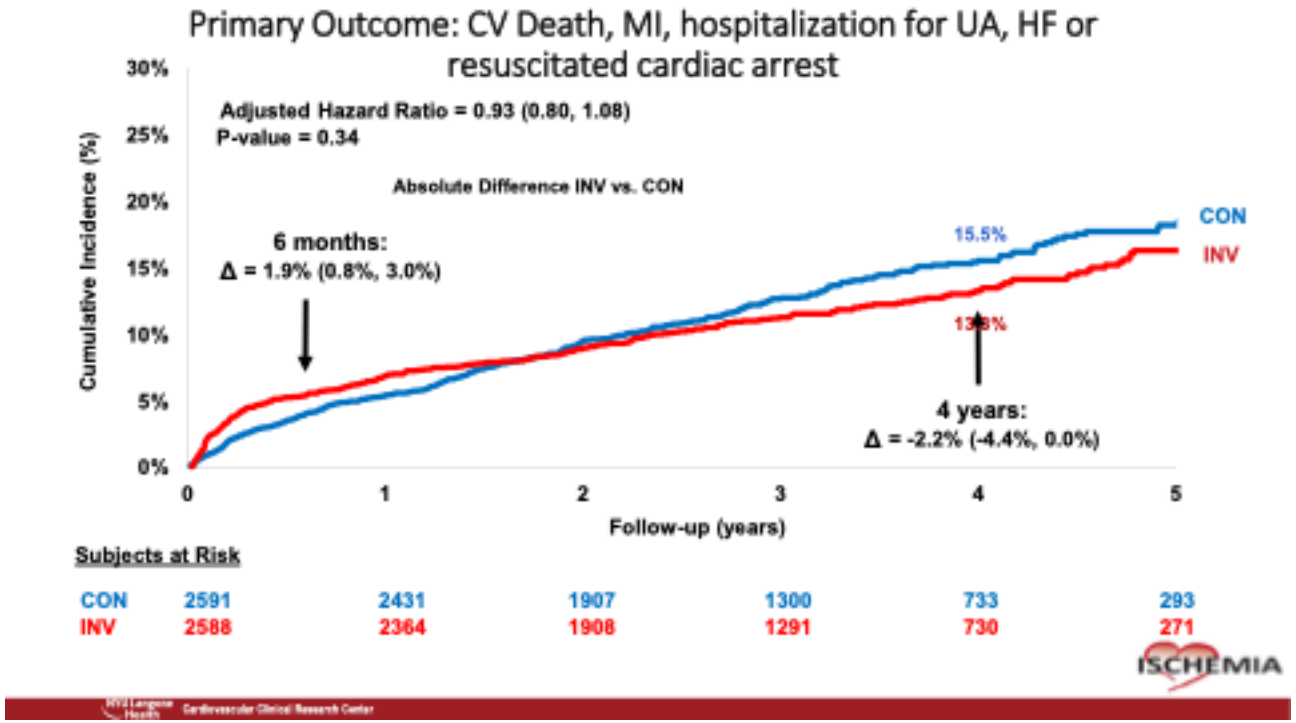
Selecting patients for moderate or severe ischaemia did not yield an overall benefit of an invasive strategy over conservative management.

No significant benefit to treating patients based on ischemia.

UNITY HEALTH TORONTO

What we know

- ISCHEMIA EXTEND (Hochman et al., Circulation 2023)

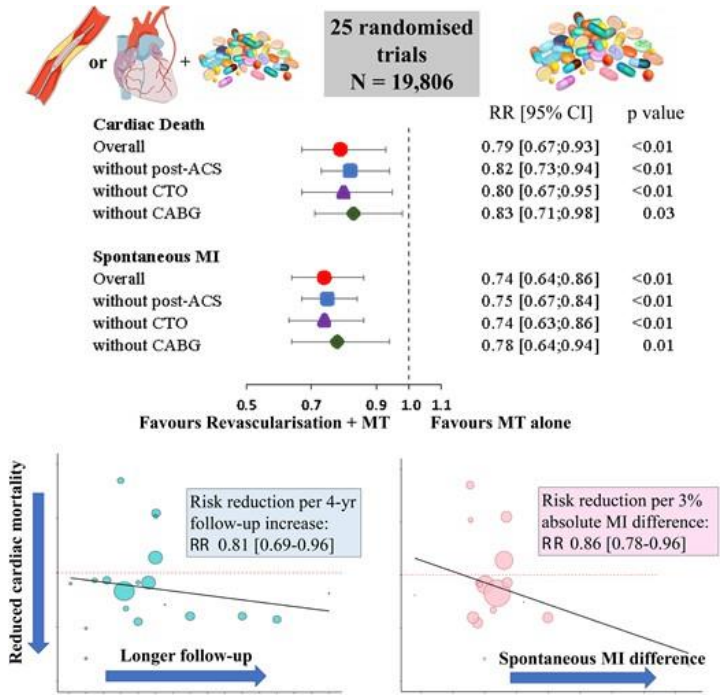


CV mortality 6.4% vs 8.6%, adjusted HR 0.78 (0.63–0.96)

Maybe there IS a benefit – but you need to follow patients long enough to see it

What we know

- Navarese meta-analysis (Hochman et al., EHJ 2021)



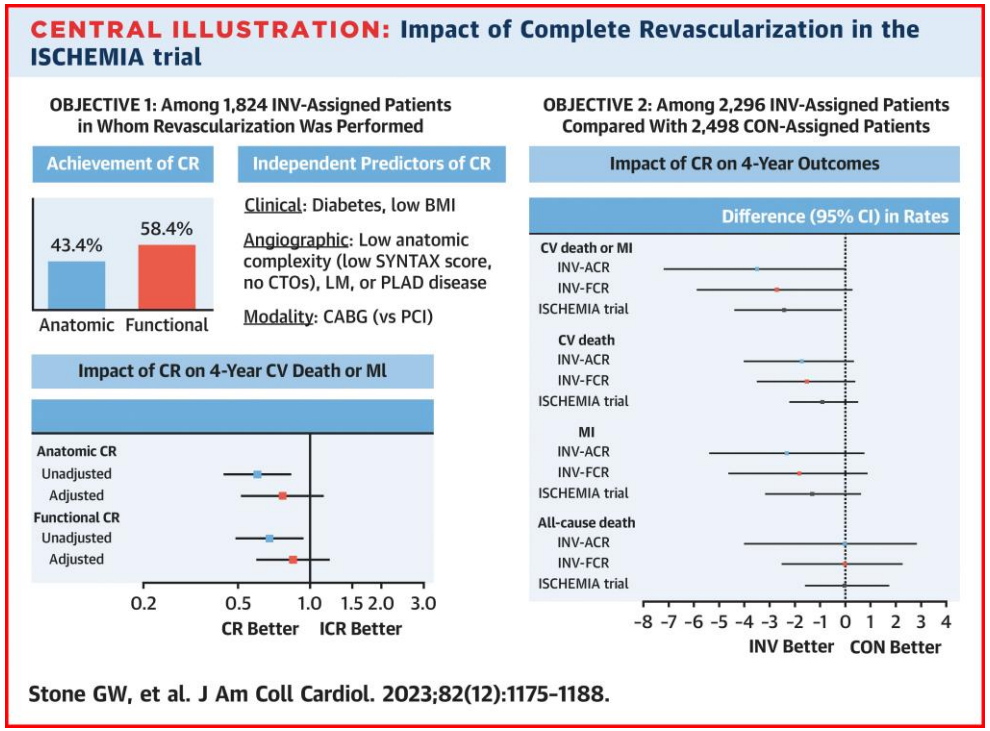
Incremental 19% improvement in RRR every 4 years

Maybe there IS a benefit – but you need to follow patients long enough to see it

What we know

- ISCHEMIA complete revascularization substudy (Stone et al., JACC 2023)

Complete revasc achieved in only 43.4% of invasive patients



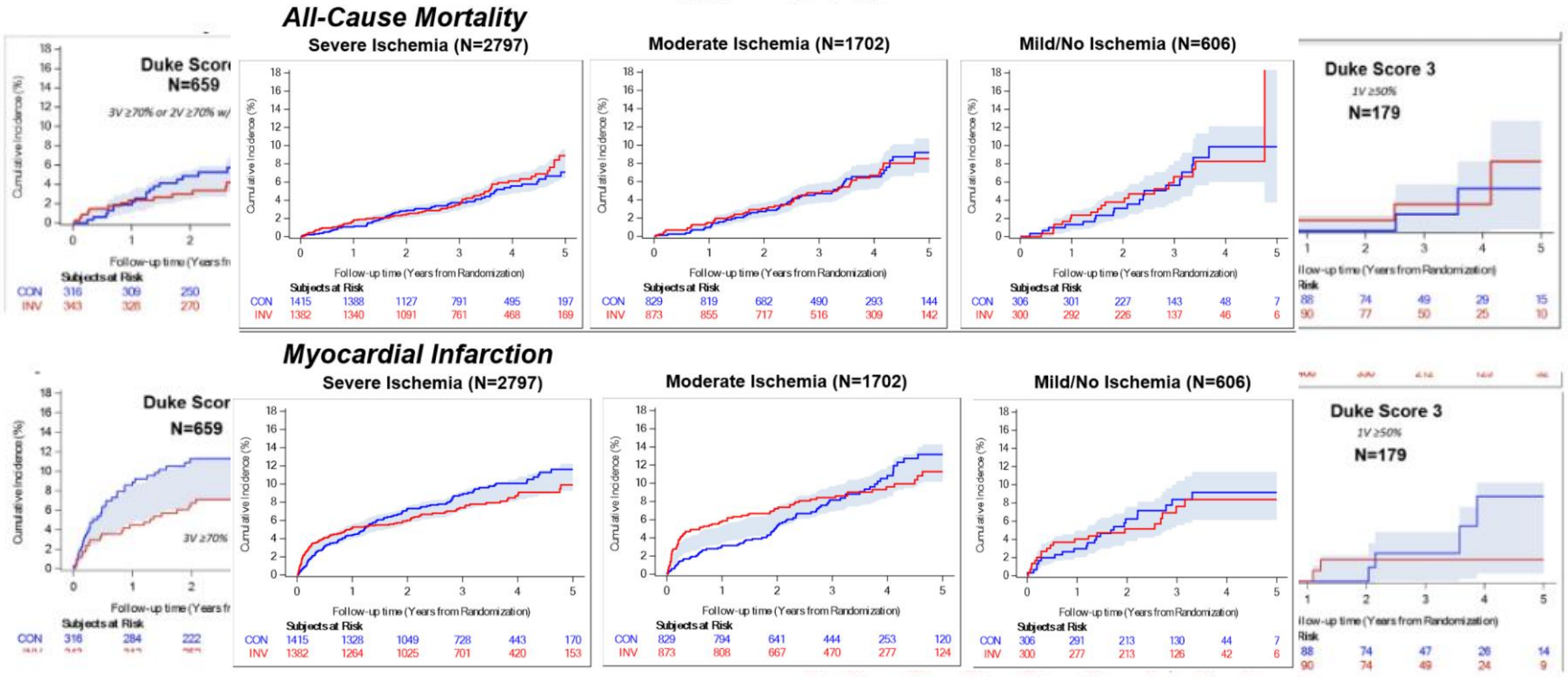
Complete revasc associated with 4-year CV death/MI rate difference of −3.5% (95% CI −7.2% to 0.0%) vs conservative

Could the "negative" result of ISCHEMIA may partly reflect suboptimal revascularisation completeness?

UNITY HEALTH TORONTO

What we know

- ISCHEMIA – anatomy or ischemia? (Reynolds et al., Circulation 2022)

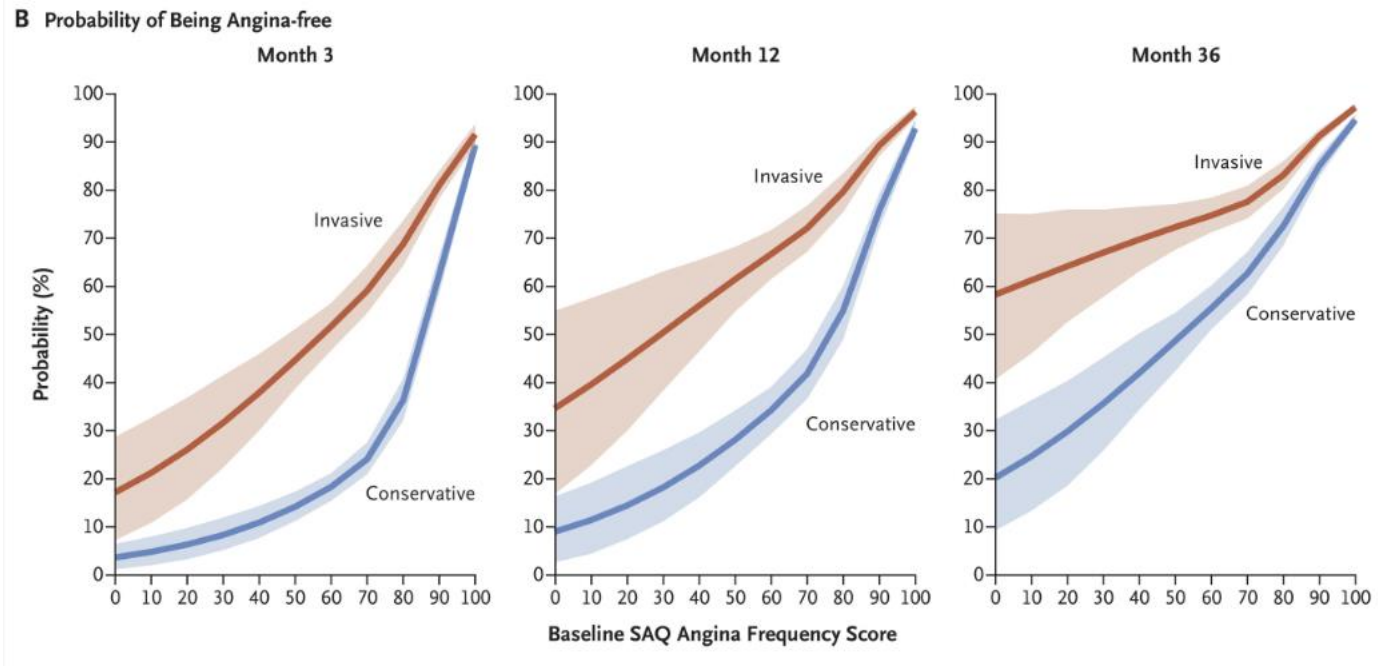


Increasing CAD severity was associated with death (HR 2.27, 95% CI 1.37–3.75) and MI (HR 1.69, 95% CI 1.17–2.45) for the most vs. least severe CAD subgroup.

Severity of stenosis predicts risk. Ischemia doesn't.

What we know

- ISCHEMIA health status outcomes (Spertus et al., NEJM 2020)



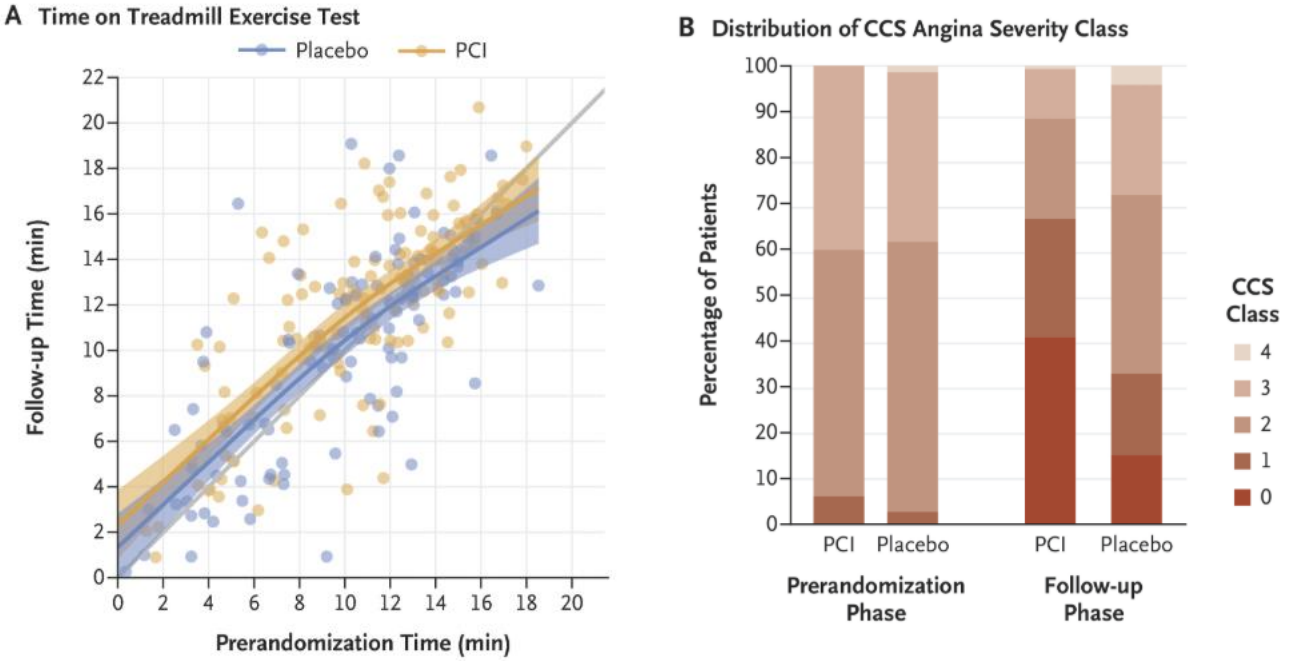
Invasive treatment improves symptoms

The greatest gains concentrate where symptoms are worst, not where stenosis is most severe.

Angina DOES get better with revascularization

What we know

- ORBITA-2 (Rajkumar et al., NEJM 2023)



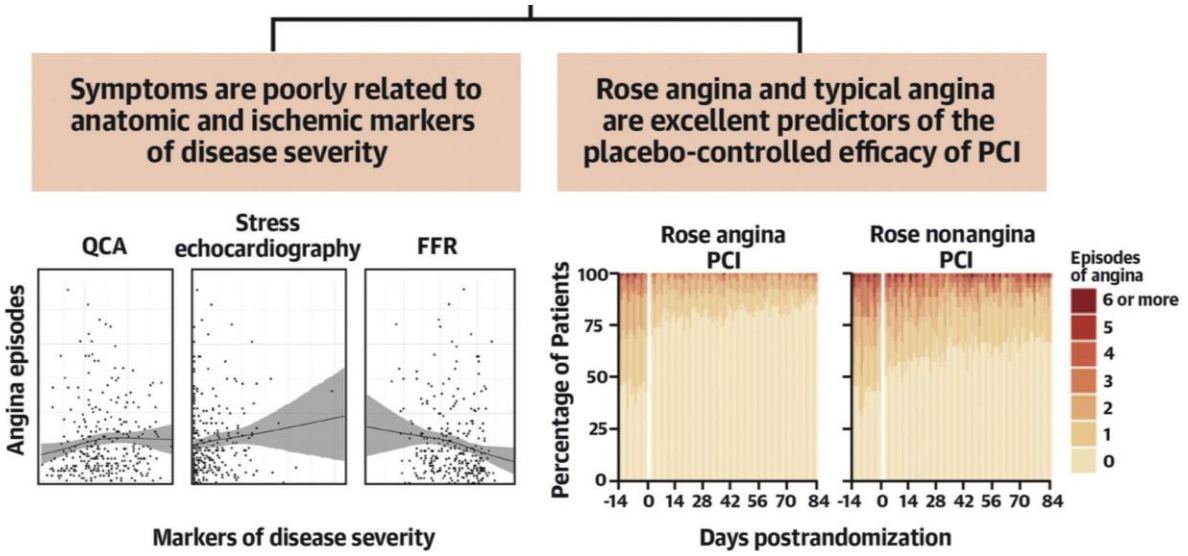
At the 12-week follow-up, the mean angina symptom score was 2.9 in the PCI group and 5.6 in the placebo group (odds ratio, 2.21; 95% confidence interval, 1.41 to 3.47; P<0.001)

Angina DOES get better with revascularization – even in a placebo-controlled trial

What we know

- ORBITA-2 (Rajkumar et al., NEJM 2023)

The correlation between angina symptom score and measures of disease severity was weak: QCA diameter stenosis r = 0.06; stress echocardiography r = 0.09; FFR r = 0.04; iFR r = 0.04



Symptom "typicality" strongly predicted the placebo-controlled efficacy of PCI, with interaction ORs of approximately 1.8–1.9

Simader FA, et al. J Am Coll Cardiol. 2024;84(1):13-24.

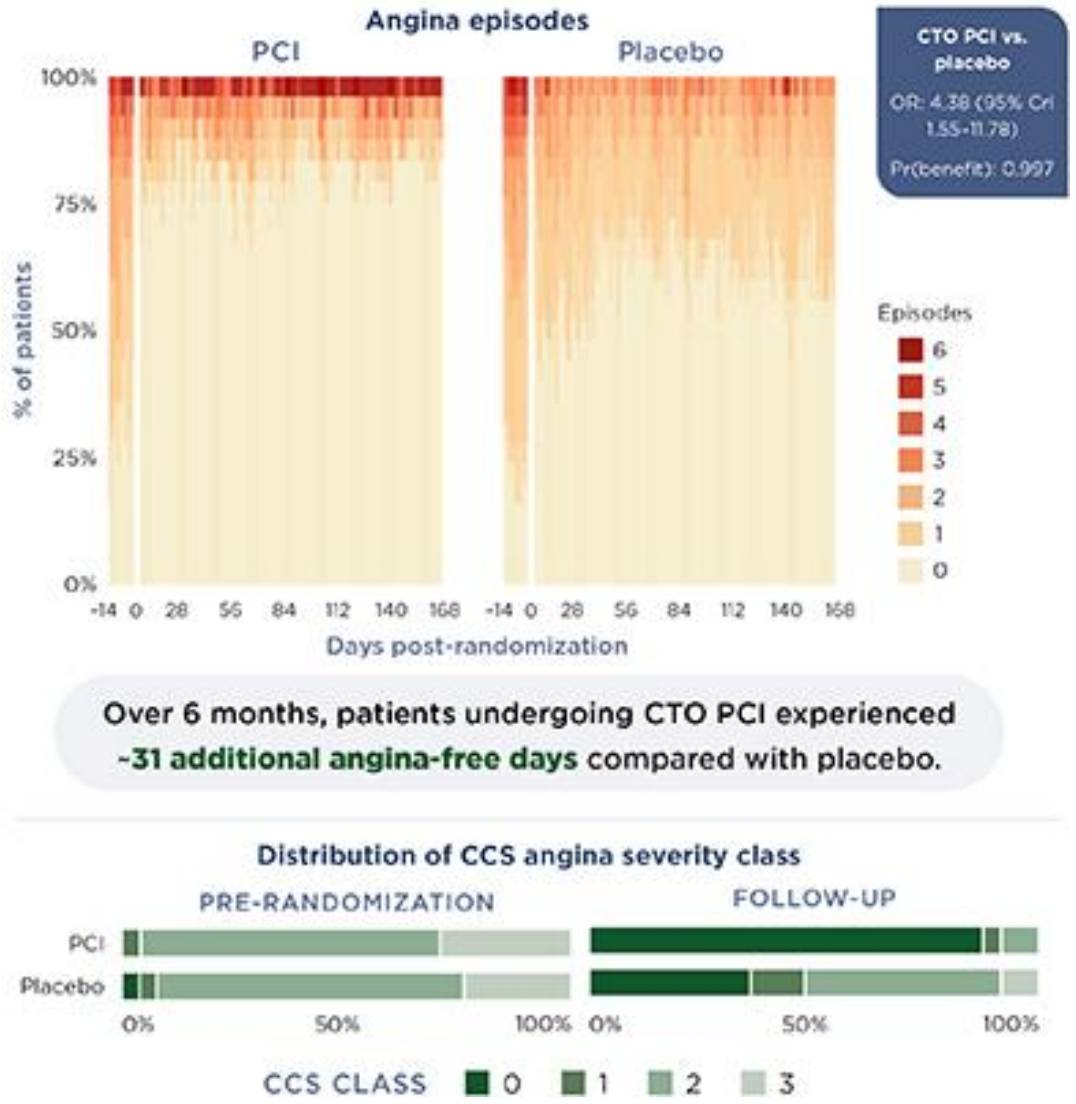
Angina DOES get better with revascularization – and this is predictable the more "classic" the angina is

UNITY HEALTH TORONTO

What we know

- ORBITA-CTO (Khan et al JACC 2026 & ACC 2026)

Angina symptom score OR 4.38 (95% credible interval 1.57–12.69; probability of benefit 99.6%).



Angina DOES get better with revascularization – even in CTOs.

UNITY HEALTH TORONTO

What is Risk of Marathon Running?

Rev Esp Cardiol. 2021;74(3):225–232

Original article

Sports-related sudden cardiac death in Spain. A multicenter, population-based, forensic study of 288 cases

Benito Morentin,[a,b,c] M. Paz Suárez-Mier,[d] Ana Monzó,[e] Javier Ballesteros,[f,g] Pilar Molina,[e] and Joaquín Lucena[h,*]

- Prospective registry in Spain
- Incidence 0.82/100,000/annum (general population 0.38/100000/pa)
- 99% men
- Commonly aerobic sports: cycling, football (ie soccer!), running

What is Risk of Marathon Running?

ORIGINAL ARTICLE

Cardiac Arrest during Long-Distance Running Races

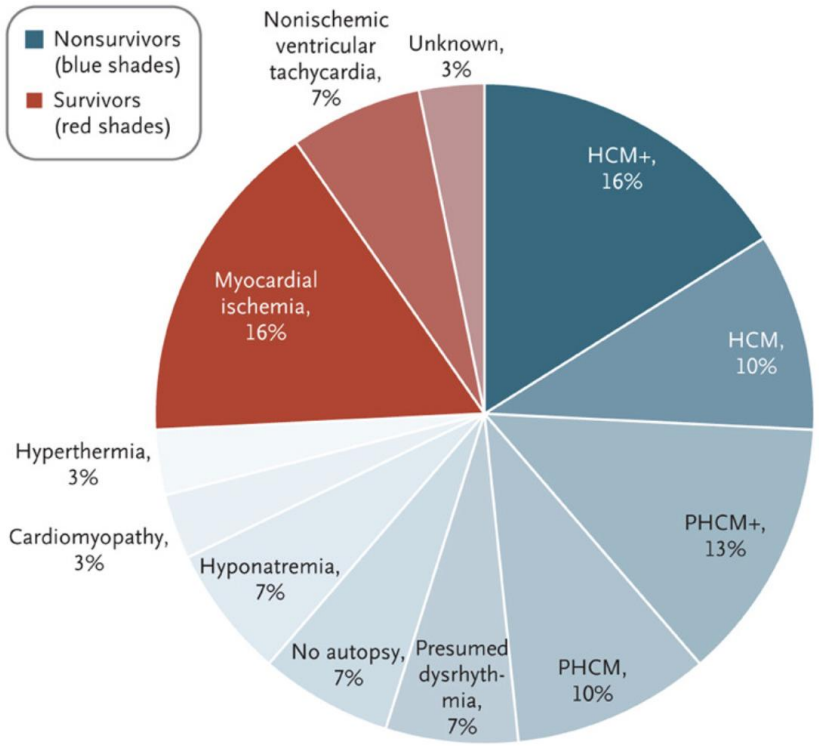
Authors: Jonathan H. Kim, M.D., Rajeev Malhotra, M.D., George Chiampas, D.O., Pierre d'Hemecourt, M.D., Chris Troyanos, A.T.C., John Cianca, M.D., Rex N. Smith, M.D., Thomas J. Wang, M.D., William O. Roberts, M.D., Paul D. Thompson, M.D., and Aaron L. Baggish, M.D., for the Race Associated Cardiac Arrest Event Registry (RACER) Study Group Author Info & Affiliations

Published January 12, 2012 | N Engl J Med 2012;366:130-140 | DOI: 10.1056/NEJMoa1106468 | VOL. 366 NO. 2

- Prospective database of marathon-related cardiac arrests in US
- Within 1 hour of race completion
- Interview of survivors/next of kin, review of records and autopsy data
- 59 cases out of 10.9 million runners

UNITY HEALTH TORONTO

Cause of OOHA in Marathon Running?



ORIGINAL ARTICLE

Cardiac Arrest during Long-Distance Running Races

Authors: Jonathan H. Kim, M.D., Rajeev Malhotra, M.D., George Chiampas, D.O., Pierre d'Hemecourt, M.D., Chris Troyanos, A.T.C., John Cianca, M.D., Rex N. Smith, M.D., Thomas J. Wang, M.D., William O. Roberts, M.D., Paul D. Thompson, M.D., and Aaron L. Baggish, M.D., for the Race Associated Cardiac Arrest Event Registry (RACER) Study Group Author Info & Affiliations

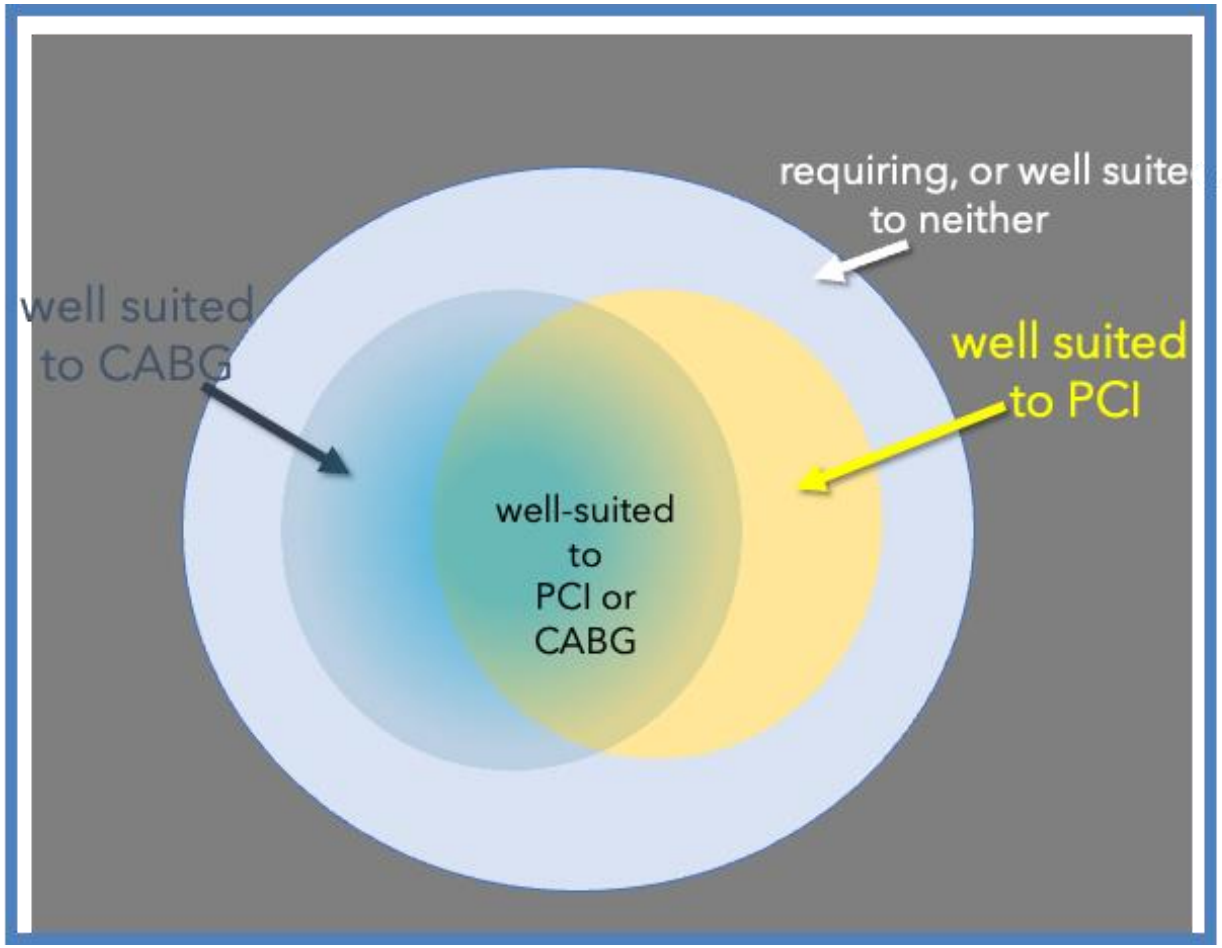
Published January 12, 2012 | N Engl J Med 2012;366:130-140 | DOI: 10.1056/NEJMoa1106468 | VOL. 366 NO. 2

- HCM (with/without other conditions) was commonest cause
- No ACS (from autopsy)

Evidence summary

- The best evidence for PCI in stable CAD is to be guided by symptoms, not stenosis alone
- Revascularization only one aspect of their care
- Disease modifying drugs at least as important
- Perfectly reasonable to manage “non-high-risk anatomy” medically with no revascularization if there are no symptoms
  - High risk: LMS, proximal LAD, multi-vessel disease
- Patient involvement crucial in all aspects of care
  - Decision to perform angio
  - Revascularization
  - PCI vs CABG

Multi-Vessel Coronary Artery Disease



Diffuse Coronary Artery Disease

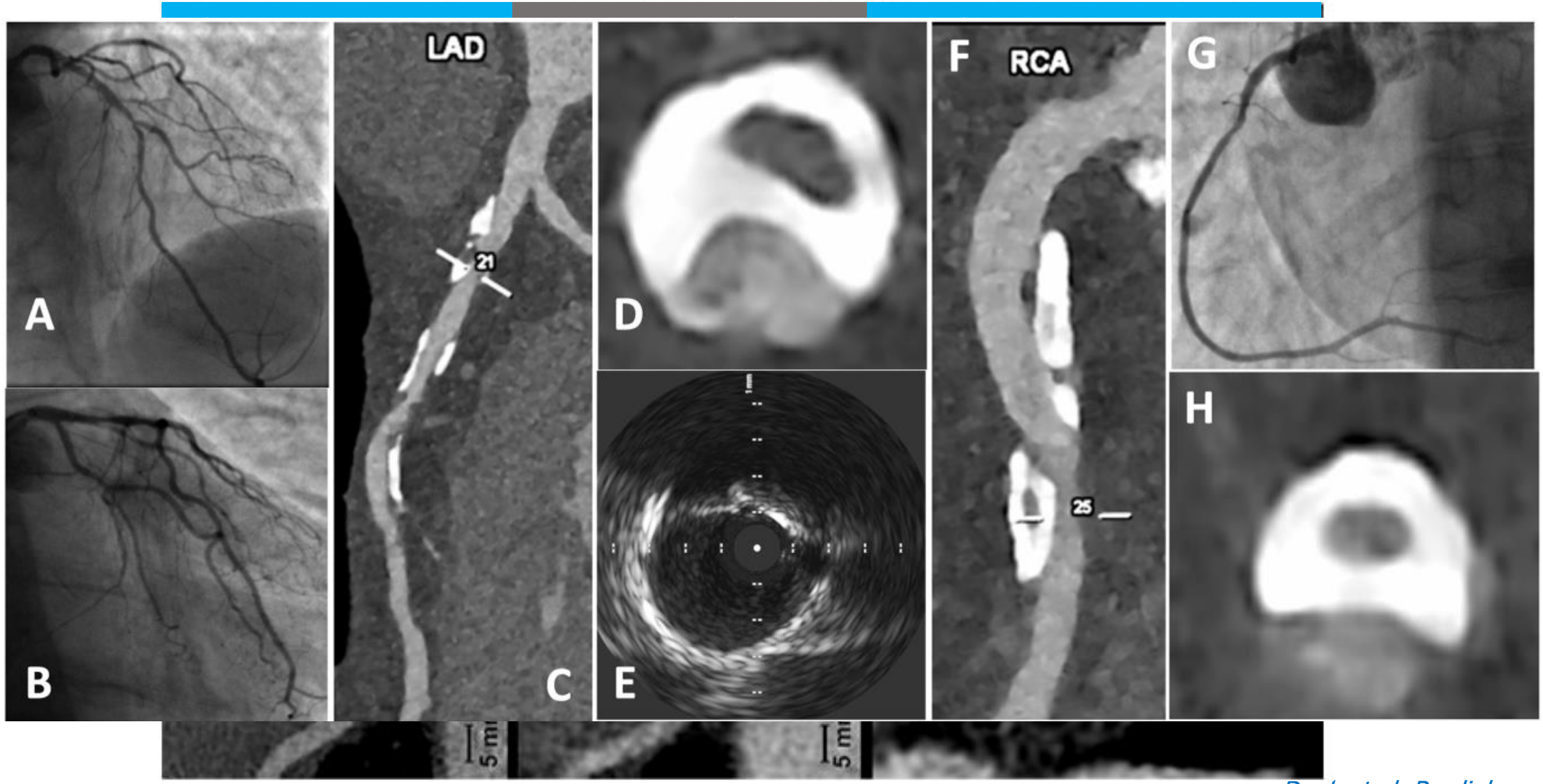
- Long been the 'heartsink' condition of the cath lab: difficult to treat and render symptom free (ORBITA and TARGET-FFR)
- No 'ideal' revascularization method
  - CABG – difficult to implant graft onto diffusely diseased vessel. Higher failure rates
  - PCI – extensive stenting (the "Full Metal Jacket") – and higher failure rates of metal scaffold: ---- **may** be avoided by newer DCBs (more evidence - long term efficacy)

Closing

Revascularization by PCI should be performed to improve symptoms

- True for chronic stenotic **and CTO disease**
- Often considered (not discussed today) for bystander disease in ACS – to reduce future events

- In asymptomatic patients there is nuance
  - Activity level of patient (and potential for ischemia)
  - Location of disease
  - Complexity of disease (often equates to risk of procedure itself)
- Importance of patient involvement in all of these discussions



Duek et al. Rardiology 2023
Revaiah et al. Under submission

THANK YOU

Retesh.bajaj@unityhealth.to

@workhorsewire