CT-FFR: Is There Still a Role for Nuclear Stress Testing

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Disclosure Information

Consultant/advisory board:

- *Pfizer*
- *Alnylam*

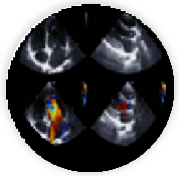
- **Speakers bureau:**

- *Pfizer*
- *Astellas*
- *Alnylam*

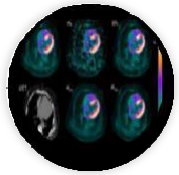
IT'S TIME TO REWRITE THE PATIENT PATHWAY

Conventional methods...

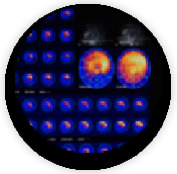
Stress EKG



Stress Echo



SPECT



PET

Direct to Cath

lead to:

20-30%

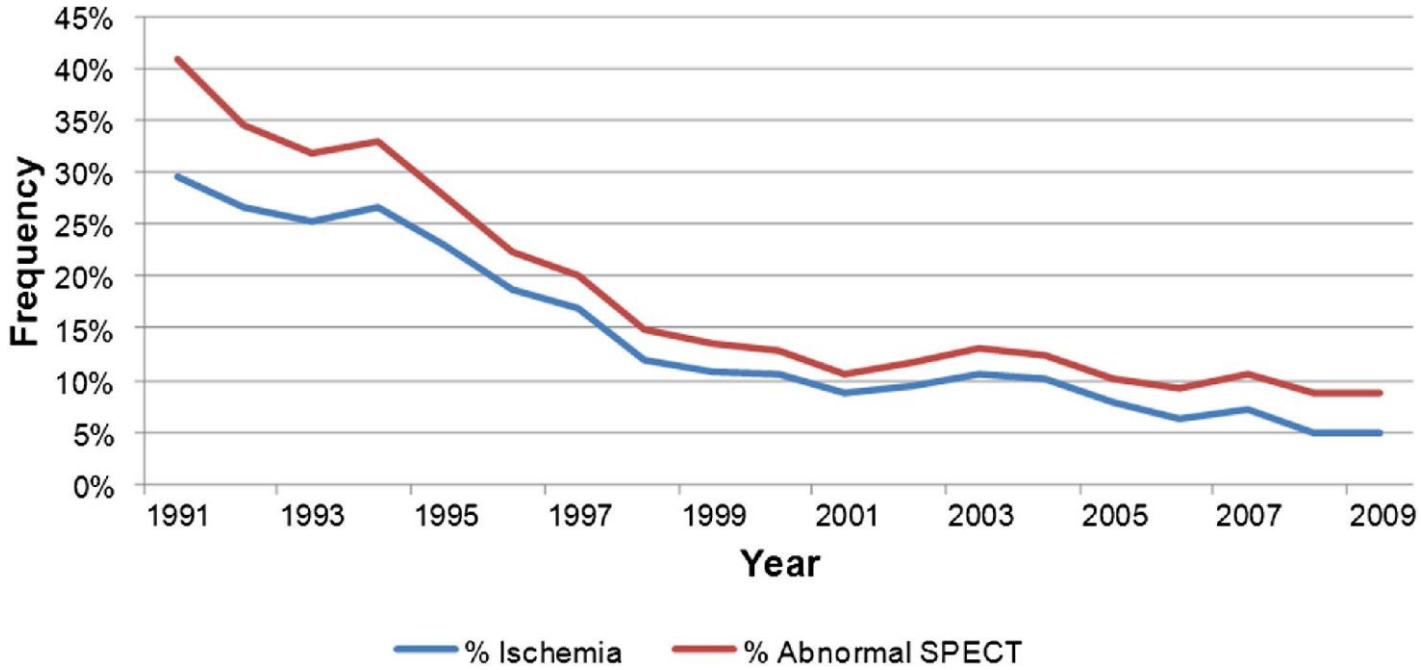
FALSE NEGATIVES
that lead to undetected disease[1]

55%

FALSE POSITIVES
that lead to unnecessary procedures[2]

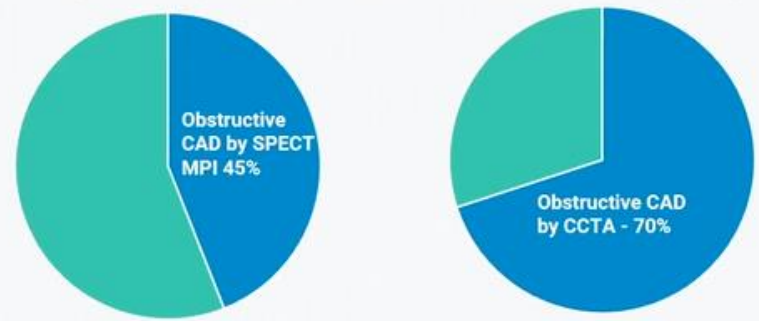
- Layered Testing Delays in Treatment
- Increased risk of complications
- Poor Patient Experience
- Increased cost to healthcare system

1. Arbab-Zadeh, Heart Int 2012. Yokota, et al. Neth Heart J 2018. Nakanishi, et al. J Nucl Cardiol 2016. 2. Patel et al. NEJM 2010



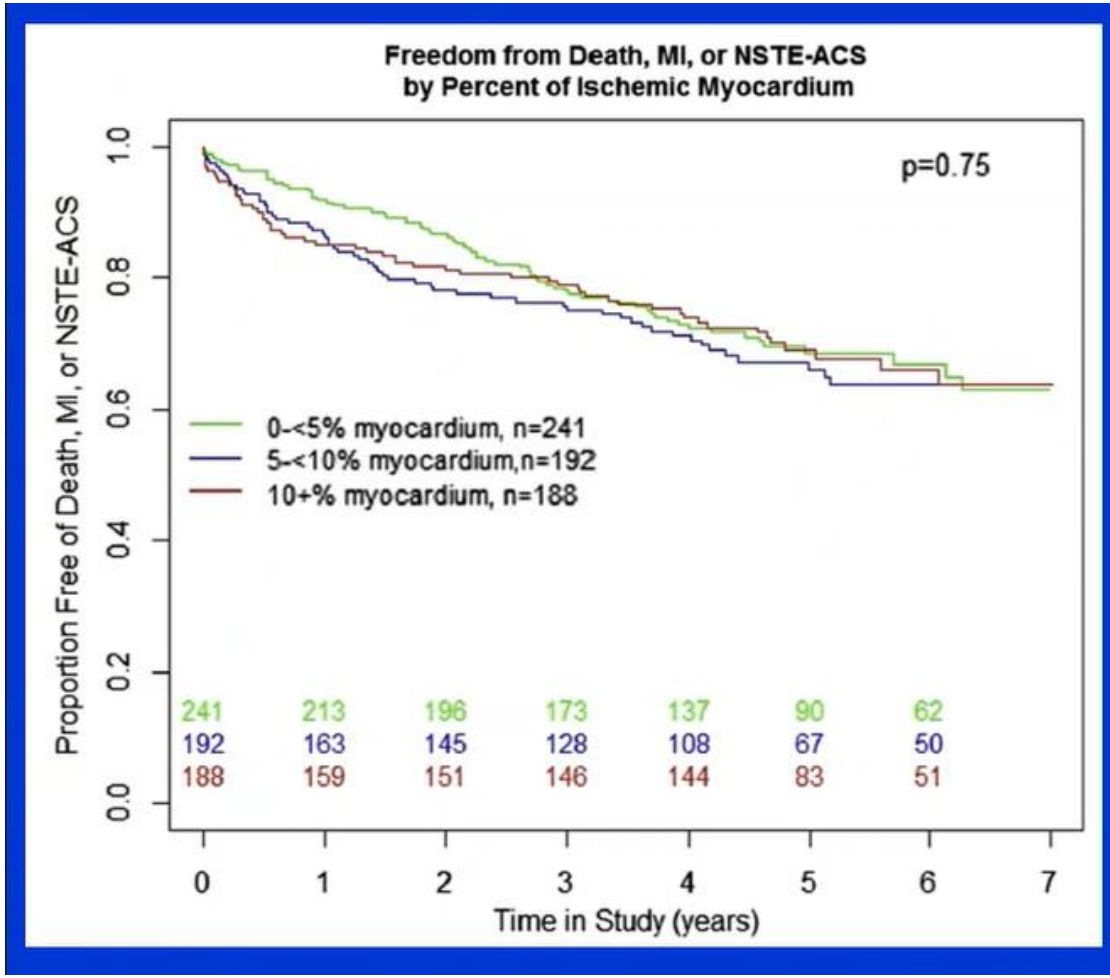
We overutilize stress testing!

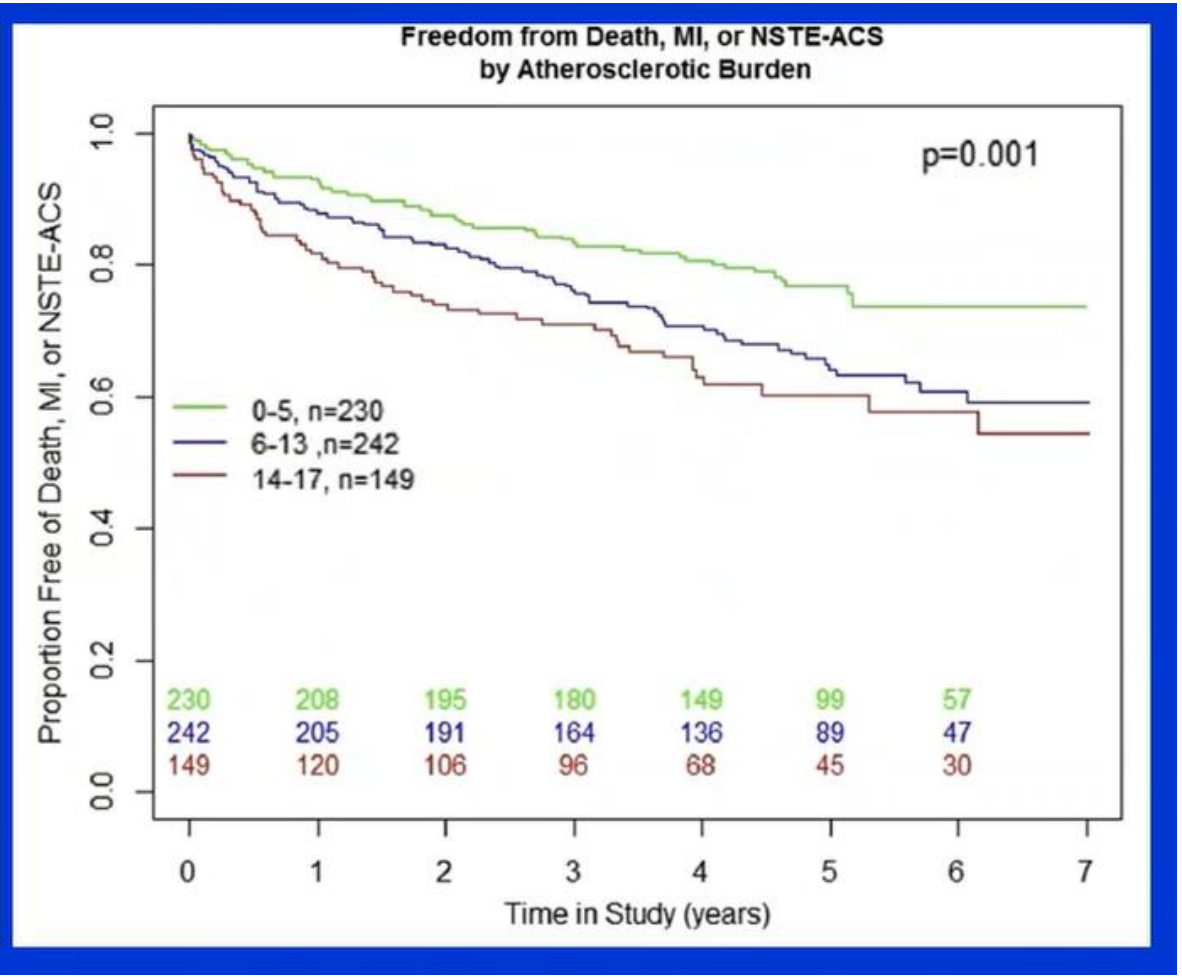
Diagnostic yield for patients sent to invasive angiography is poor



Patel MR, et al. Am Heart J. 2014 167(6):846-52.e2.
Cury RC. Journal of Cardiovascular Computed Tomography 8(2014): 480-82.

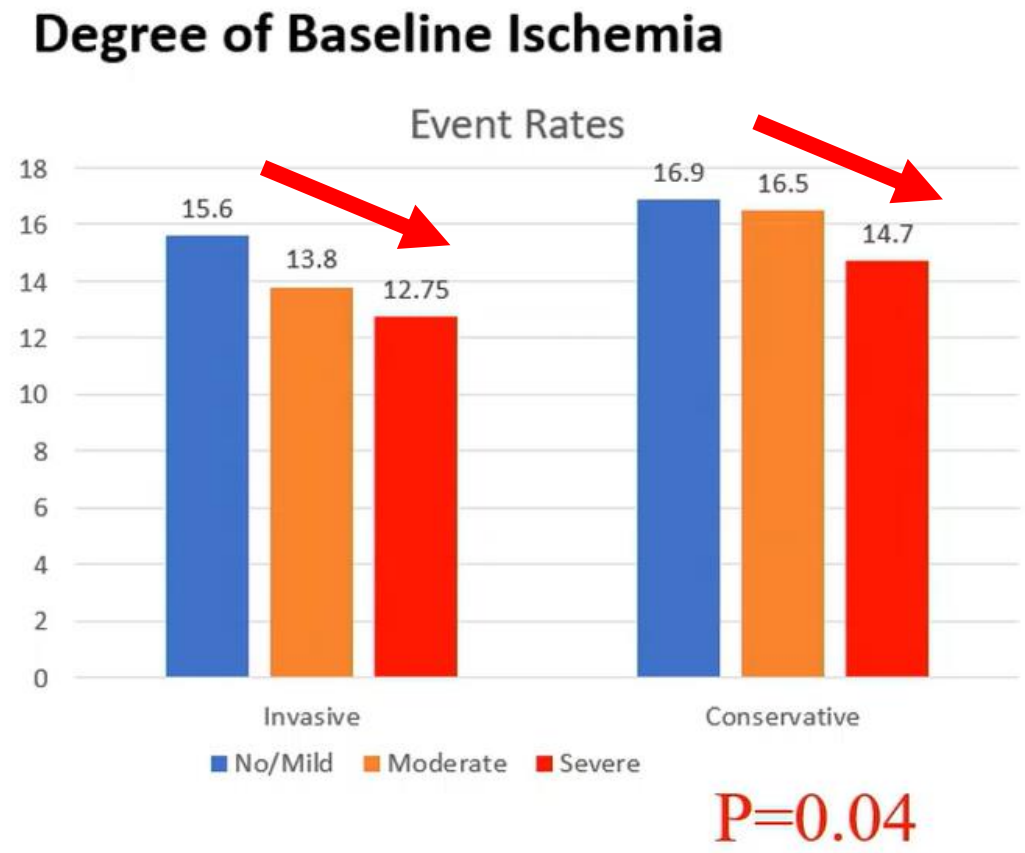
Courage Trial

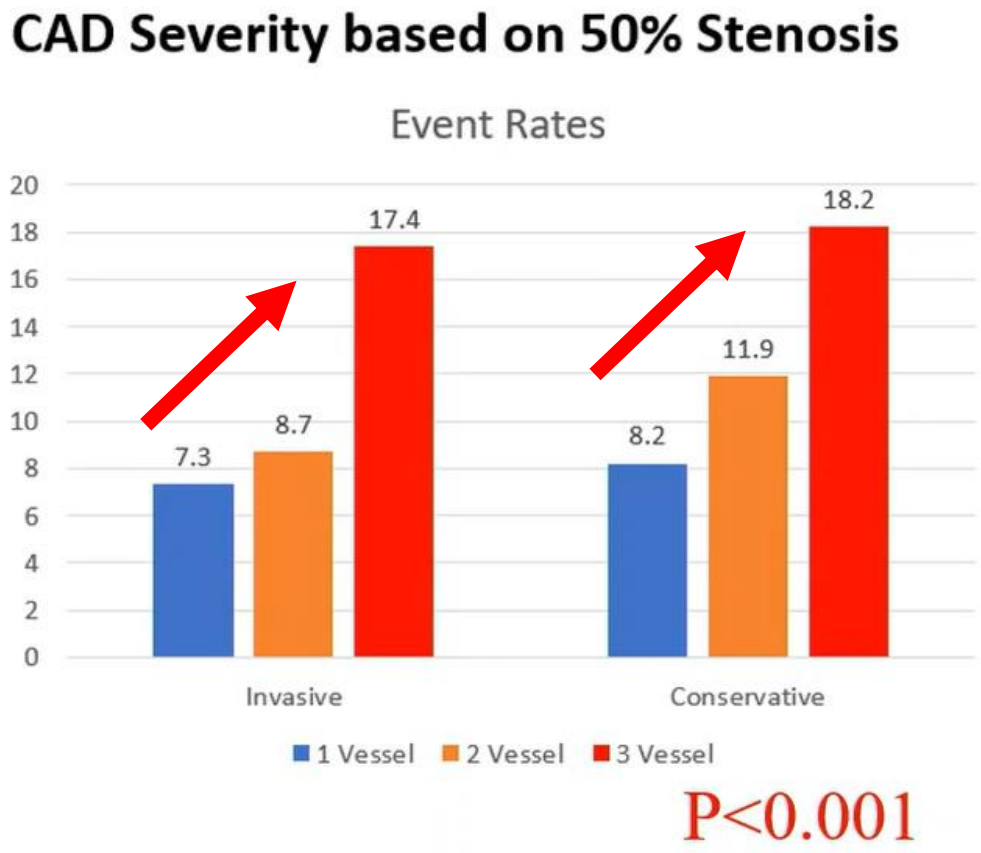




Mancini et al, JACC: Cardiovascular Intervention 2014

ISCHEMIA TRIAL

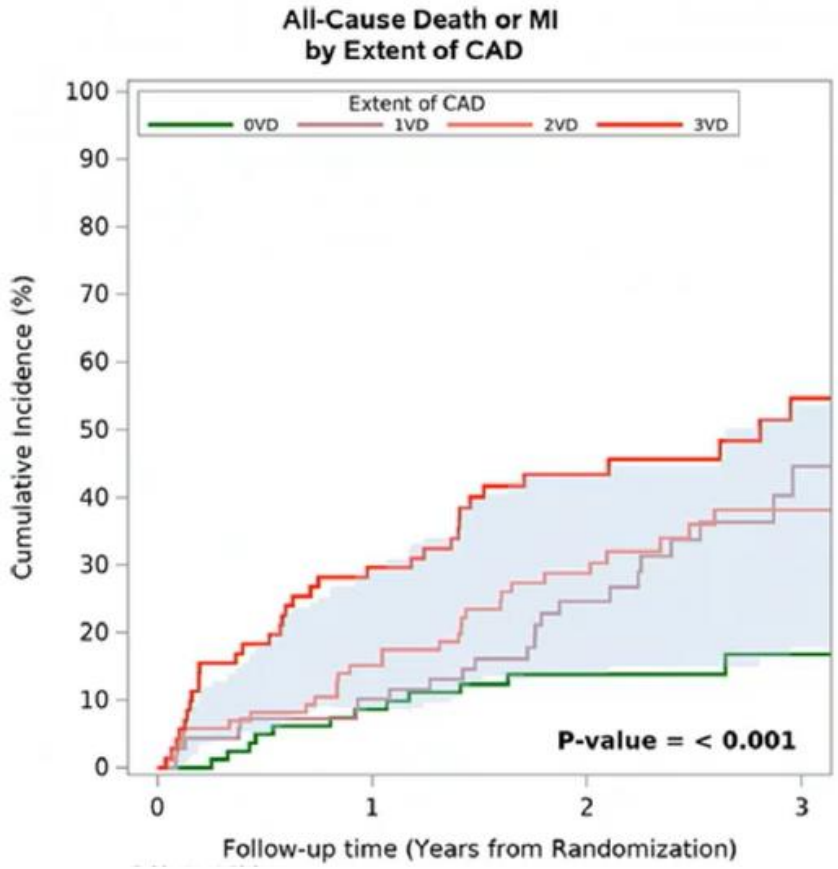


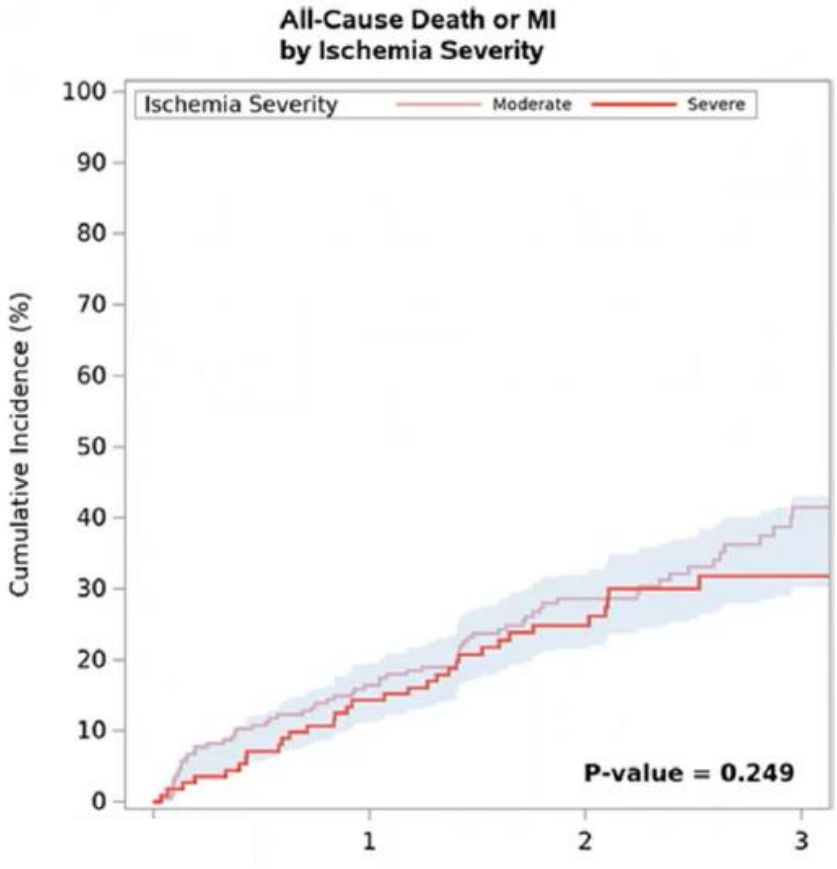


These ISCHEMIA sub studies reinforce the growing consensus that ischemia testing is a suboptimal surrogate measure of coronary artery disease severity and that anatomic imaging, preferably with noninvasive coronary computed tomography angiography, provides superior diagnostic information and risk stratification in patients with atherosclerotic coronary artery disease.

Reynold Circulation 2021

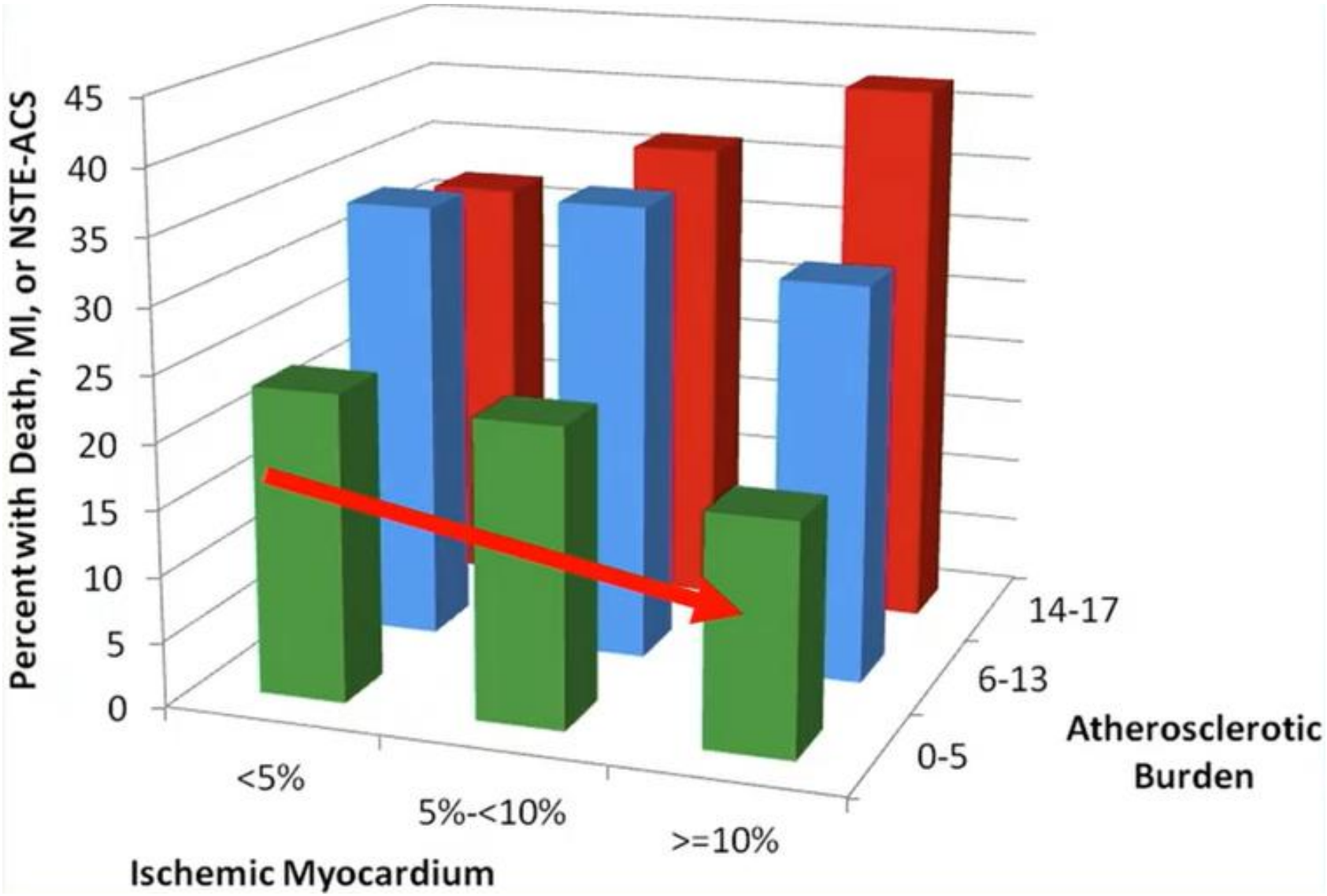
Ischemia CKD Study





Bainey et al, Am Heart J 2022

Anatomy informs prognosis, physiology does not



RESEARCH SUMMARY

CT or Invasive Coronary Angiography in Stable Chest Pain

The DISCHARGE Trial Group. DOI: 10.1056/NEJMoa2200963

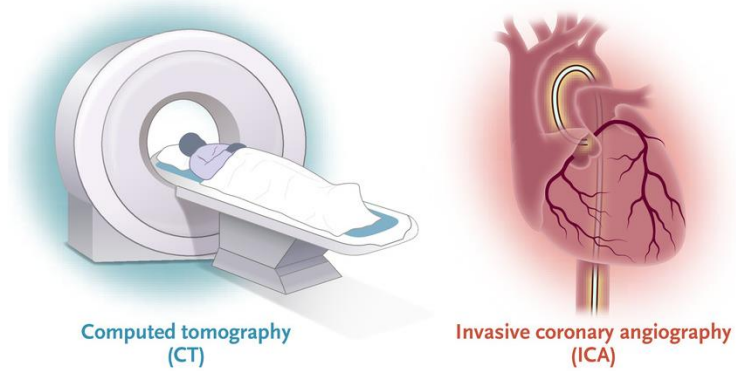
CLINICAL TRIAL

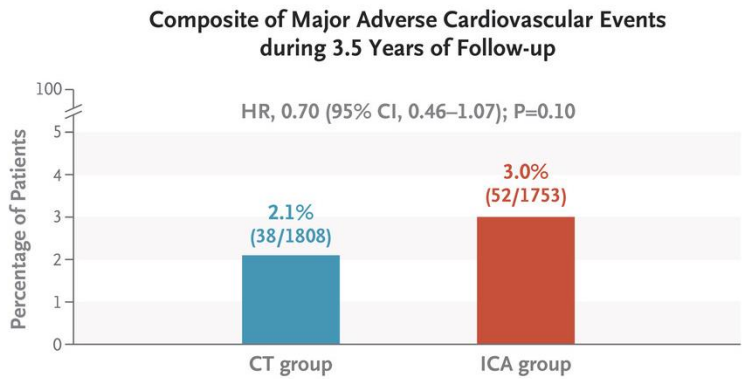
Design: A pragmatic, randomized, superiority trial in 16 European countries compared CT and ICA as initial diagnostic strategies in the guideline-directed management of stable chest pain.

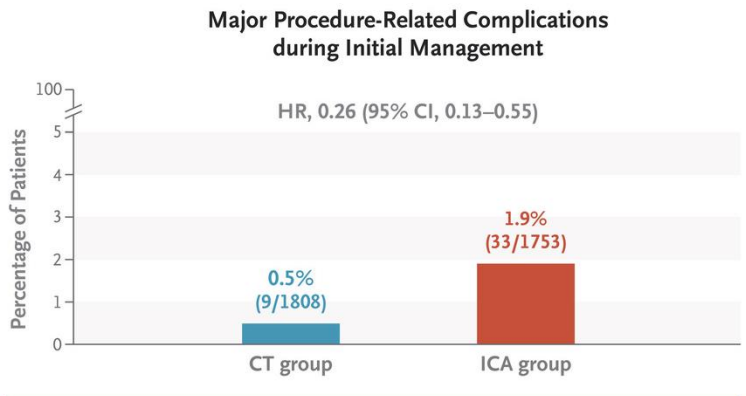
Intervention: 3667 patients 30 years of age or older who were referred for ICA because of stable chest pain and had an intermediate pretest probability of obstructive CAD were randomly assigned to undergo either CT or ICA; 3561 patients were included in the modified intention-to-treat analysis. Those who received a diagnosis of obstructive CAD were treated according to European guidelines. The primary outcome was major adverse cardiovascular events, defined as a composite of cardiovascular death, nonfatal myocardial infarction, or nonfatal stroke.

CONCLUSIONS

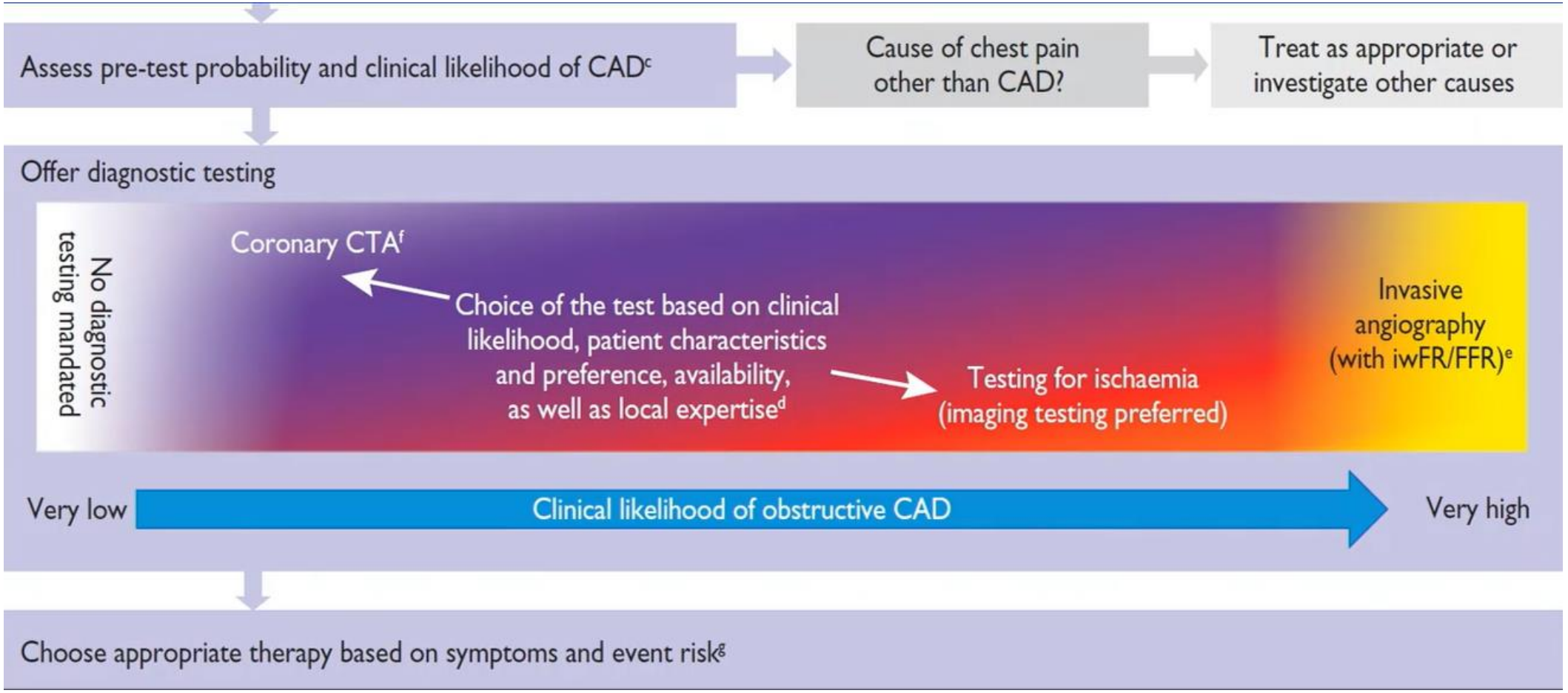
Among patients referred for ICA for stable chest pain, an initial CT diagnostic strategy led to a risk of major adverse cardiovascular events similar to that of initial ICA but was associated with fewer major procedure-related complications.







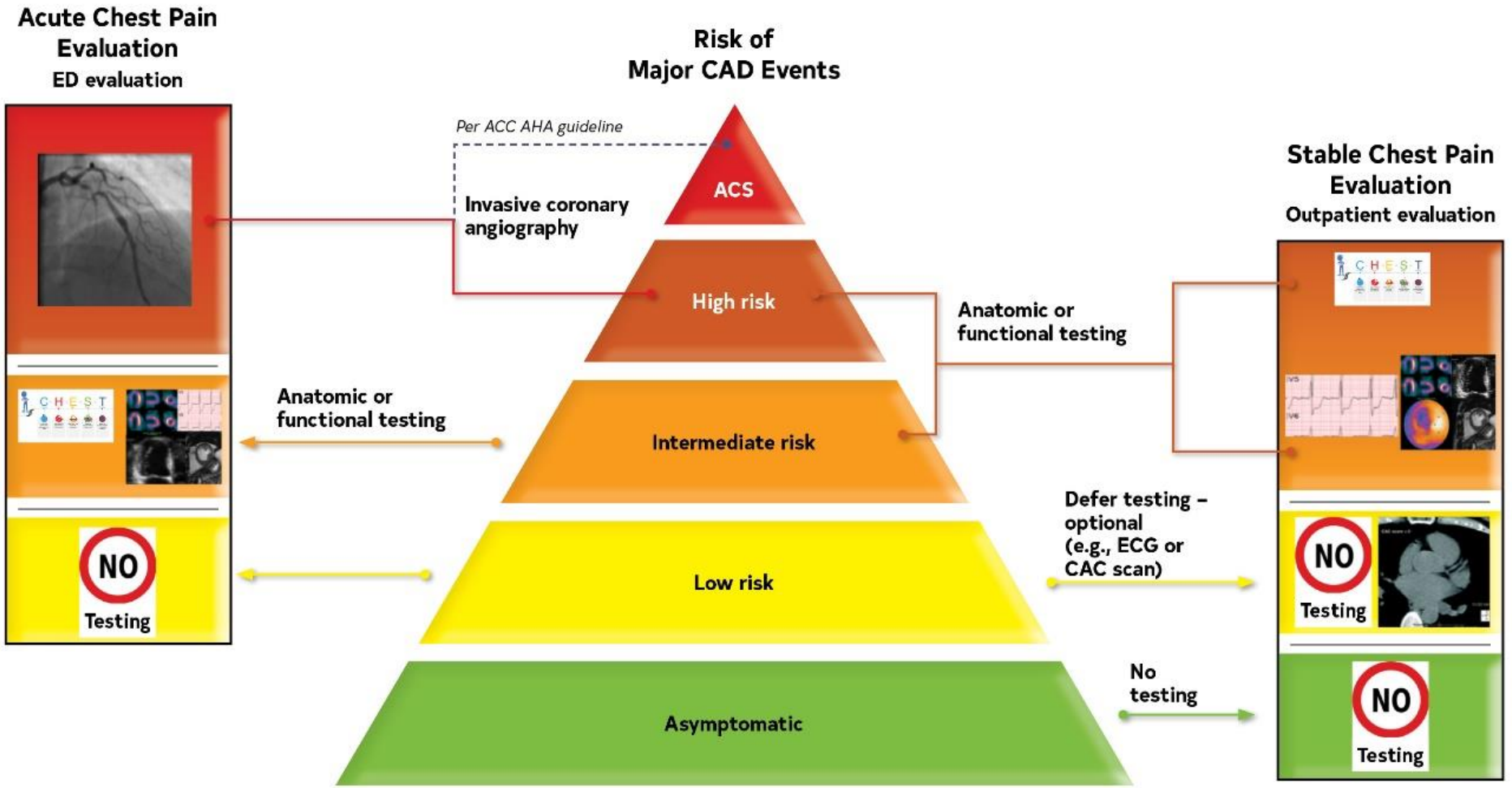
ESC Guidelines 2019



2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR Guideline for the Evaluation and Diagnosis of Chest Pain

Endorsed by the American Society of Echocardiography, American College of Chest Physicians, Society for Academic Emergency Medicine, Society of Cardiovascular Computed Tomography, and Society for Cardiovascular Magnetic Resonance

Chest Pain and Cardiac Testing Considerations



2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR Guideline for the Evaluation and Diagnosis of Chest Pain

ACC/AHA Guideline
Intermediate / High Risk Patients

Coronary CTA

To **diagnose** CAD and **guide treatment decisions**

Class 1 Recommendation
Level A Evidence

40-90% stenosis

FFR_{CT}

To help **guide treatment decisions**

Class 2a Recommendation
Level B Evidence

Stress Testing

To **diagnose** ischemia **ONLY**

Class 1 Recommendation
Level B evidence

Clinical Evidence

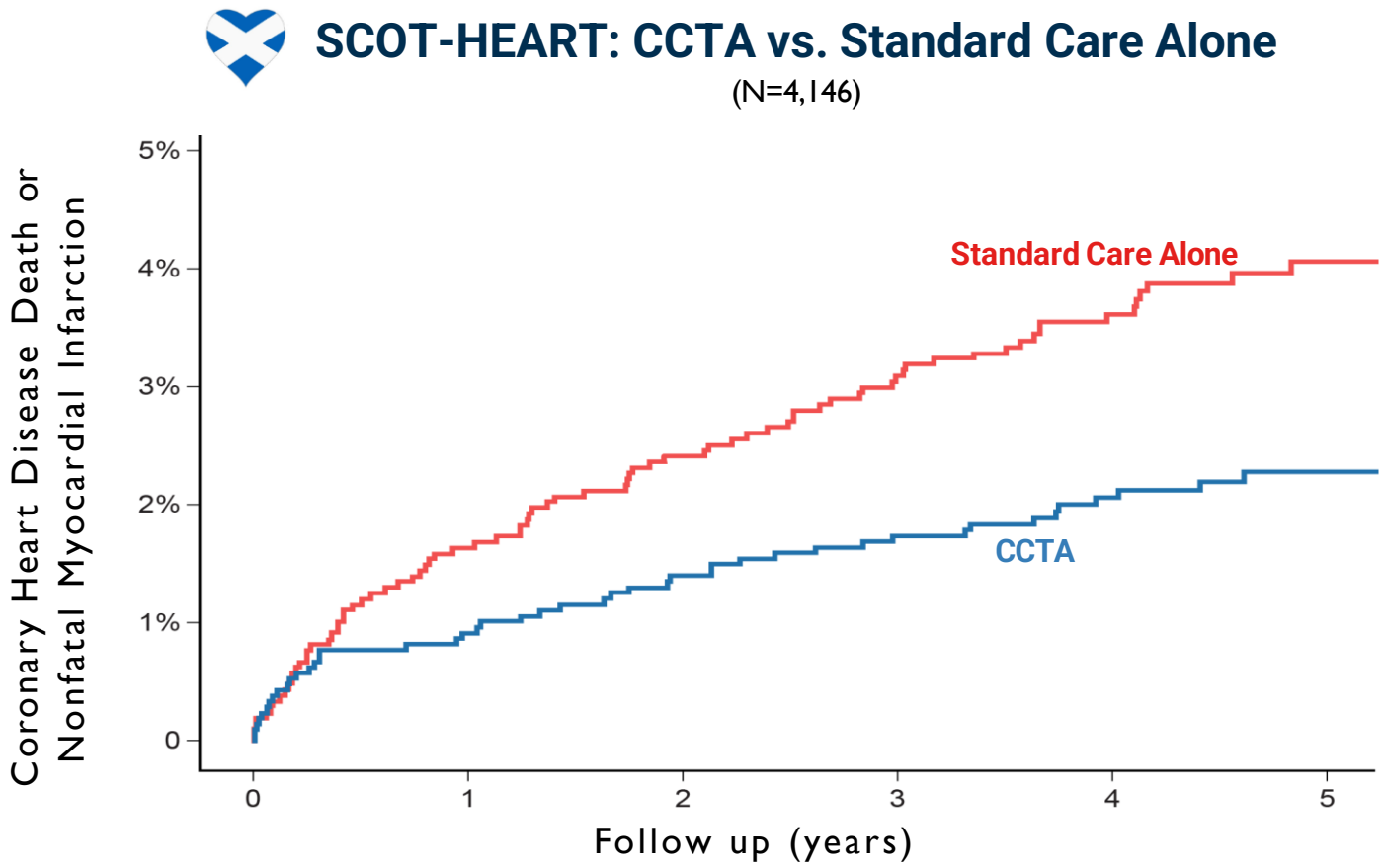
PRECISE

The Scot-Heart Trial

ADVANCE Registry

PLATFORM

CCTA LEADS TO IMPROVED LONG-TERM OUTCOMES



With CCTA:

- Understand anatomy
- Identify CAD earlier
- Improve long-term outcomes via informed clinical decisions

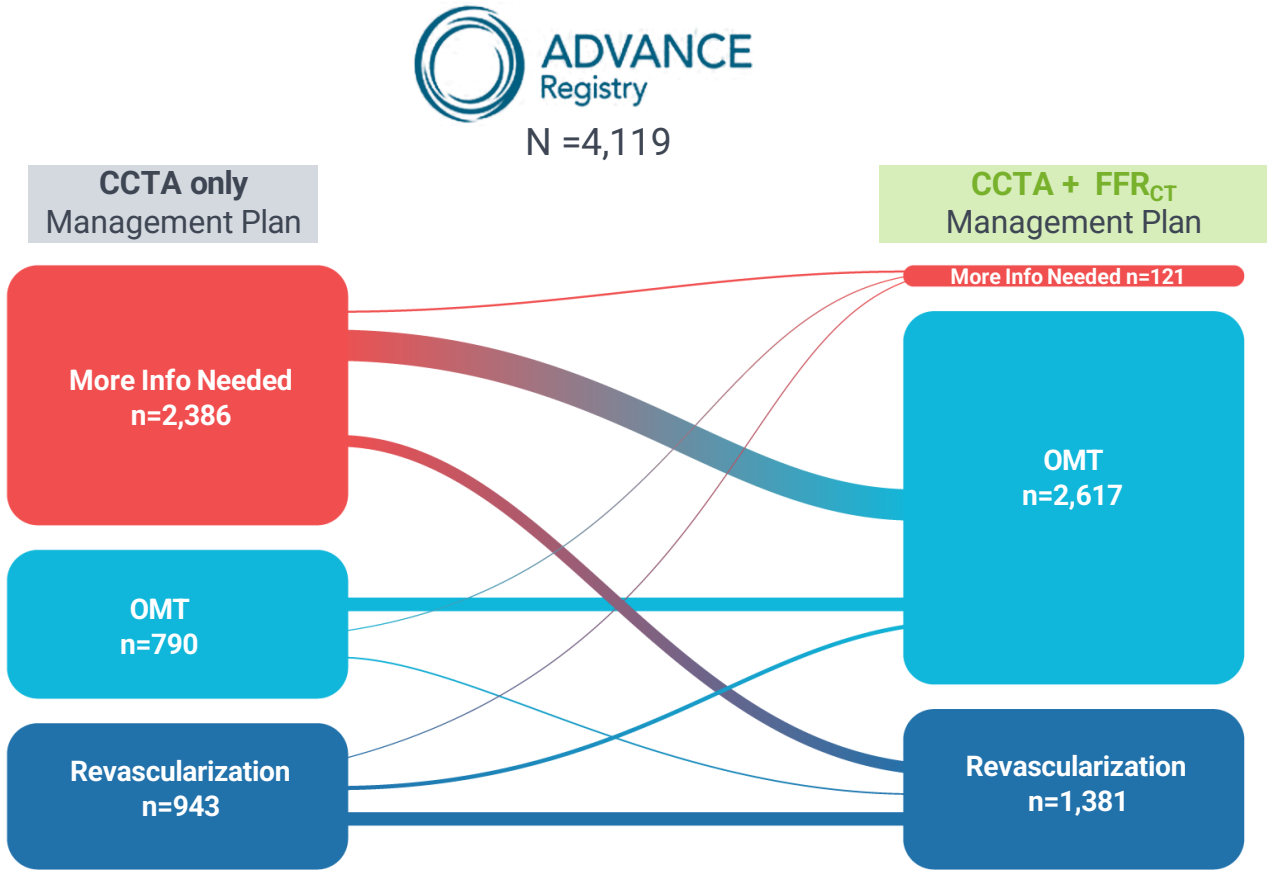
41%

DECREASE

In CV death and MI rate at 5 Years

Newby, et al. N Engl J Med 2018.

FFR_{CT} PROVIDES INCREASED CLARITY



Patients with Clear Treatment Plan

CCTA only	42%
CCTA + FFR_{CT}	97%

CCTA + FFR_{CT} provides the actionable information clinicians need to guide decisions for optimal treatment.

Fairbairn, et al. Euro Heart J 2018. Patel, et al. JACC CV Imaging 2019.

CCTA+FFR$_{CT}$: A NON-INVASIVE DIAGNOSIS THAT'S MORE ACCURATE

PRECISE Trial Overview

1st global, prospective, randomized controlled trial comparing diagnostic & treatment pathways for stable symptomatic patients with suspected CAD

Precision Pathway		Traditional Testing
Risk scoring to defer testing for low-risk patients.[2]	vs	**Functional testing** (stress nuclear and stress echo) and **Invasive Coronary Angiography** (ICA).
CCTA with selective FFR $_{ct}$[3] for elevated risk patients.		

Level 1 Evidence

65 Global Sites

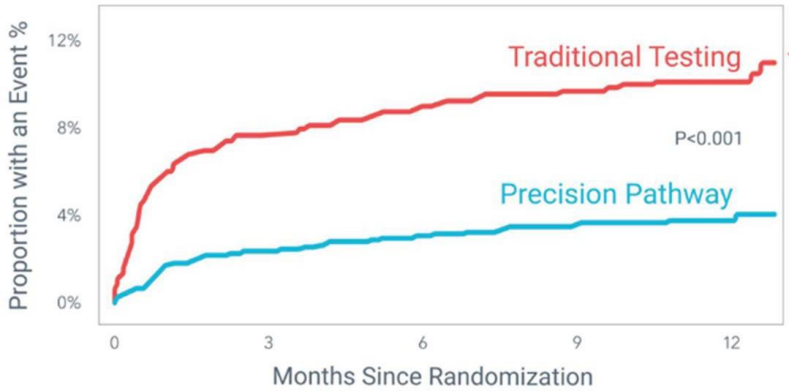
2103 Participants

Adjudicated Core Lab, CEC

Prospective RCT

1 year Follow-up

Key Results



70%

Reduction in the primary endpoint

Composite:
All-Cause Death,
Nonfatal MI,
ICA w/o Obstructive CAD

Fewer False Negatives

78%

more likely to identify patients in need of revascularization

Fewer False Positives

4x

less likely to have ICA without obstructive disease (p<0.001)

Diagnostic Cath Yield for Revascularization

2x

yield of ICA leading to revascularization (p<0.001)

Douglas, et al. The PRECISE Trial. Presented at AHA Scientific Sessions 2022.

PRECISE

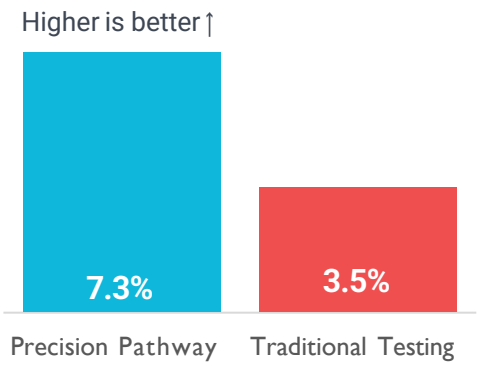
93951672 V7

INCREASE CATH LAB VALUE AND EFFICIENCY

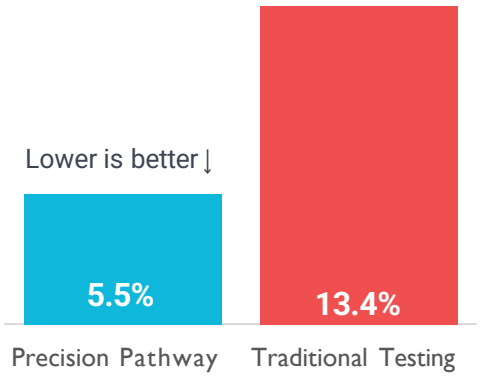
PRECISE

Compared to Traditional Testing, the Precision Pathway has positive net impact for the cath lab

~100% increase
Rate of subsequent PCI



~60% decrease
Diagnostic-only ICAs



~20%

INCREASE IN TOTAL CATH LAB REVENUE[1]

Net Revenue to Hospitals for PCI is approximately **3x** the Net Revenue for Diagnostic-only ICAs

Douglas, et al. The PRECISE Trial. Presented at AHA Scientific Sessions 2022

1. Calculation does not include CABG (paid via inpatient DRG – total reimbursements ranging from $24k to $52k for Medicare). Assumes a 25% Medicare, 25% Medicare Advantage, and 50% commercial payer mix; results vary by location and payer contracting. Values are rounded to nearest 500.
Note: Patient Numbers have been rounded based on the 100 patient population to Illustrate deferred ICAs in the Precision Arm are replaced in a 1:1 manner by increased PCIs/CABG

Payers Easing PA Requirement

United Healthcare's policy update will make it easier for providers to offer a coronary CTA ahead of a stress test for quantifying patients. As part of the stress test pre-authorization process, providers will be prompted to instead utilize coronary CTA. If the provider accepts the suggestion, they will receive automatic approval and an authorization number for the coronary CTA. If the provider insists on stress test, they must go through the normal prior-authorization process.

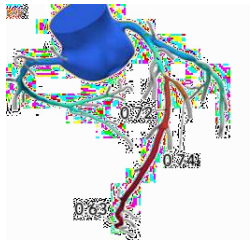
GET THE WHOLE STORY WITH CCTA

Anatomy

RoadMap Analysis

Helps physicians detect or rule out CAD

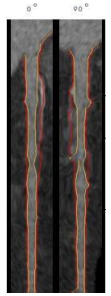
Physiology



FFR_{CT}

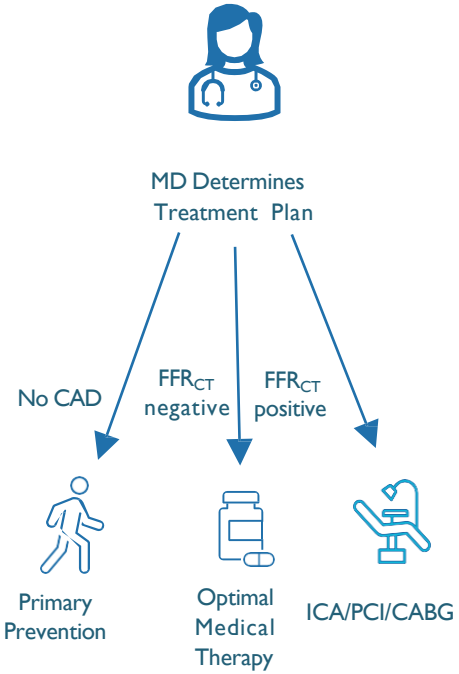
Determines the significance of CAD and inform treatment plans

Plaque

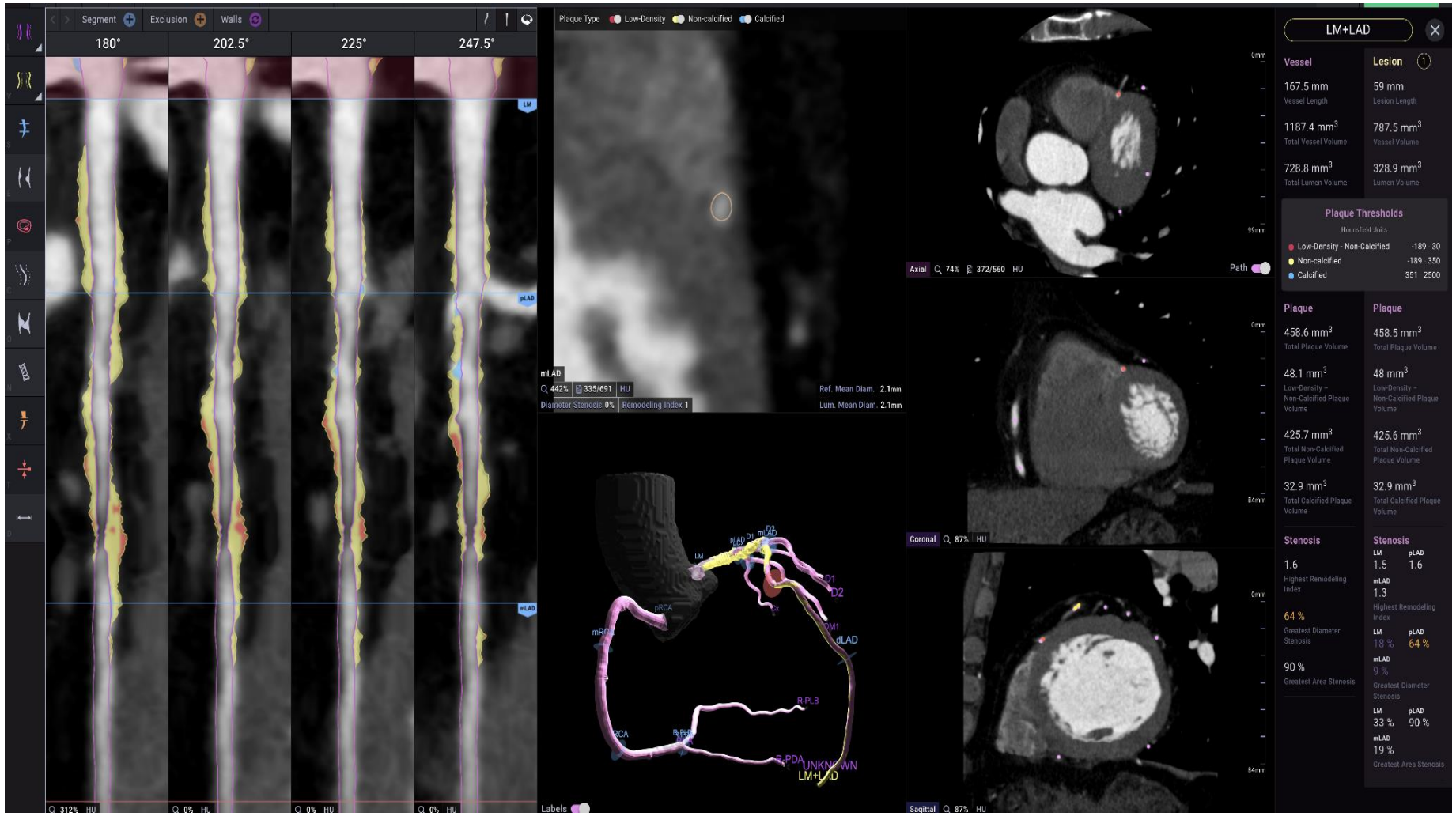


Plaque Analysis

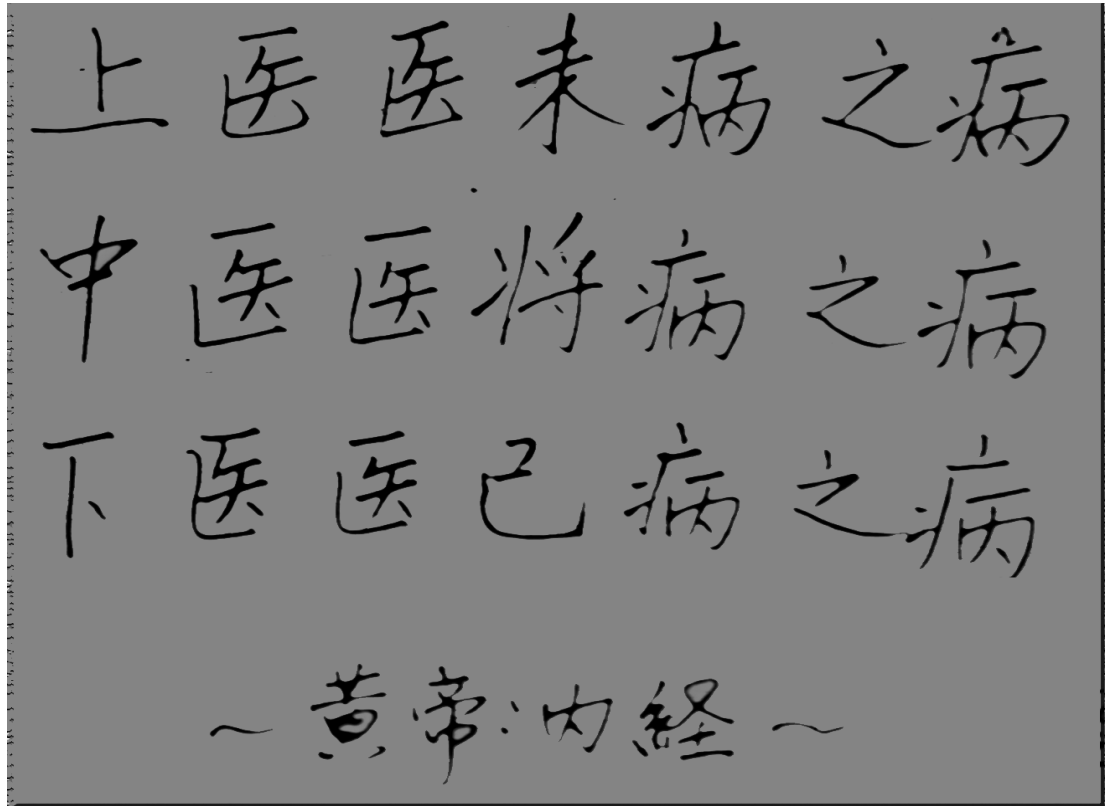
Informs risk and prognosis of CAD by showing atherosclerosis



Plaque Imaging



It is highly likely that measures of plaque burden and type will further enhance risk prediction and may be a future method of determining the intensity of therapies and interventions for the prevention of MI



Superior doctors prevent the disease.
Mediocre doctors treat the disease
before evident.
Inferior doctors treat the full-blown disease.
--Huang Dee: Nai-Ching
(2600 BC First Chinese Medical Text)

Thank you for listening!