Evaluation and Management of Coronary Artery Disease:

A Practical Guide for Primary Care Providers

Matthew A. Cavender, MD, MPH
Associate Professor of Medicine
Director, Cardiovascular Clinical Trials
Therapeutic Area Director, UNC Clinical Research Alliance
University of North Carolina
Chapel Hill, NC

Continuing Education Company

1

Disclosure

Consultant: AbbVie; Corcept; Novo Nordisk

Research Grant: Cleerly; Janssen; Massachusetts General Hospital/PCORI; Novartis; Novo Nordisk

Continuing Education Company

2

Overview

School of Medicine

1. **Stress Testing in Patients Without Symptoms**
   Why more testing is not better care
2. **Approach to the patient with chest pain**
   2021 ACC/AHA chest pain guideline
3. **Medical therapy for coronary artery disease**
   Focus on anti-anginal therapy and lipid lowering
4. **Who benefits from revascularization**
   Symptoms, survival, and the evidence for each
5. **Therapies needed after revascularization**
   Anti-platelets, which one and how long?

3

OUR PATIENT

A 43-Year-Old Physician Establishing Care

School of Medicine

History

- Presents to establish care for prevention
- No known medical history
- No current complaints, specifically no chest pain, no dyspnea
- Wants to start exercising and “wants to get checked out” before starting
- Father had a myocardial infarction at 61
- Never smoker

Physical exam and baseline data

- BMI 28 kg/m², BP 126/82, pulse 74
- Normal rhythm; short systolic murmur at the LLSB
- Lungs clear; radial pulses normal; no edema
- LDL-C 142 mg/dL, HDL-C 44 mg/dL
- A1c 5.8%
- ECG: normal sinus rhythm, no ST-T abnormality

He asks: “Shouldn’t I get a stress test before I start running?”

4

Overview

School of Medicine

1. **Stress Testing in Patients Without Symptoms**
   Why more testing is not better care
2. **Approach to the patient with chest pain**
   2021 ACC/AHA chest pain guideline
3. **Medical therapy for coronary artery disease**
   Focus on anti-anginal therapy and lipid lowering
4. **Who benefits from revascularization**
   Symptoms, survival, and the evidence for each
5. **Therapies needed after revascularization**
   Anti-platelets, which one and how long?

5

Overview of Modalities for Evaluation of CAD

School of Medicine

Test	Advantages	Disadvantages
Stress Echocardiography	• Can access other conditions (valves, EF, etc) • Non-invasive • Can use dobutamine or exercise	• Limited acoustic windows • Inter-reader variability
SPECT	• Stress testing with vasodilator or exercise • Location and extent of ischemia	• Attenuation and motion artifacts underestimate disease • Radiation
PET	• Stress testing with vasodilator or exercise • Location and extent of ischemia • More sensitive than SPECT	• Not available with exercise • Radiation
Cardiac MRI	• Wall motion, ischemia, and infarction in one study • Viability testing	• Claustrophobia, artifacts • Caution with metallic devices
Coronary Calcium (CAC)	• Amount of calcified plaque but not percent stenosis • Strong prognostic value • No contrast agent	• Radiation • Functional status unknown
CCTA	• Obstructive and nonobstructive plaque • CT-FFR and stress perfusion assess ischemia	• Degraded by obesity, high or irregular heart rate, heavy calcium • Radiation
Invasive angiography	• Plaque plus physiology (FFR) • Intravascular imaging, spasm and hemodynamic testing	• Procedural complications • Radiation

J Am Coll Cardiol. 2023;81(25):2445-2467.

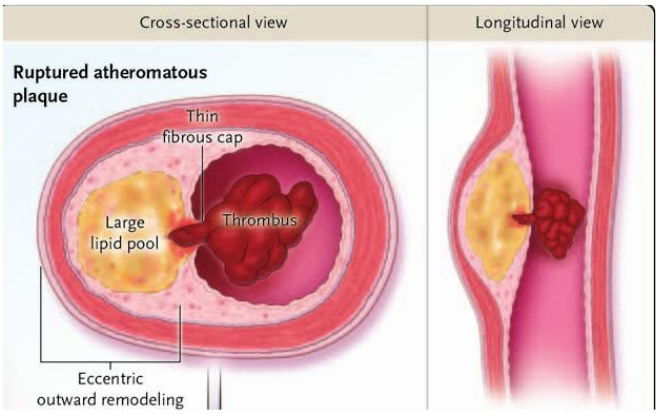
6

Stress Test in Patients Without Symptoms

School of Medicine

Observations……

- **Most patients who will have events will have negative stress tests**



Libby P. N Engl J Med 2013;368:2004-13.

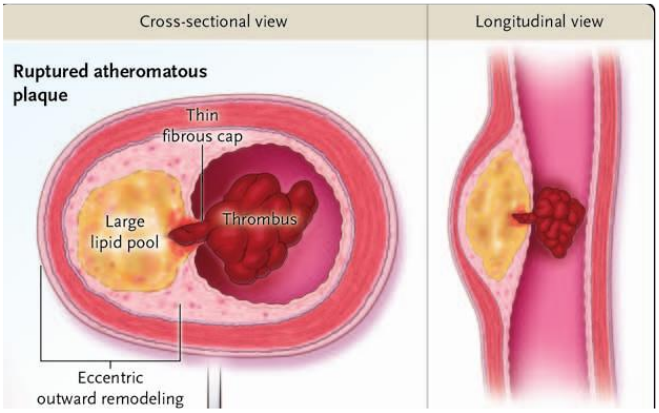
7

Stress Test in Patients Without Symptoms

School of Medicine

Observations……

- **Most patients who will have events will have negative stress tests**
- **False positive are much more common than false negative tests**



Libby P. N Engl J Med 2013;368:2004-13.

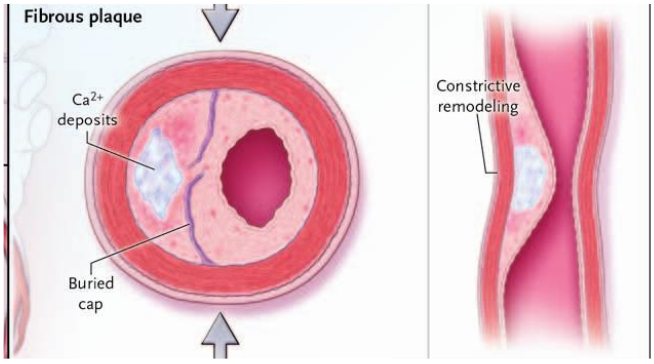
8

Stress Test in Patients Without Symptoms

School of Medicine

Observations……

- **Most patients who will have events will have negative stress tests**
- **False positive are much more common than false negative tests**
- **Even patients with positive tests have a low rate of events**
- **No evidence that screening improves outcomes**



Libby P. N Engl J Med 2013;368:2004-13.

9

Why Screening Asymptomatic Patients Fails

School of Medicine

Stress test find…flow limiting stenoses

- ✓ Typically, ≥70% diameter stenosis
- ✓ Mature, stable, fibrotic plaques
- ✓ Limit flow under demand and cause angina

Infarction caused by….. Plaque rupture or erosion

- ✓ Most often in a lipid-rich, thin-capped plaque causing < 50% stenosis which are not flow limiting

A stress test is a test for flow-limiting disease.
It is not a test for the plaques that cause myocardial infarction.

Libby P. N Engl J Med. 2013;368:2004-2013.

10

What the Guidelines Say About Asymptomatic Patients

School of Medicine

No known CAD

Stress myocardial perfusion imaging is not indicated for cardiovascular risk assessment in low- or intermediate-risk asymptomatic adults.

Class III: No Benefit | LOE C

Greenland P, et al. Circulation. 2010;122:e584-e636

Known CAD, no change in symptoms

Routine periodic testing with coronary CTA or stress testing, with or without imaging, is not recommended to guide therapeutic decision-making.

Class III: No Benefit | LOE B-R

Virani SS, et al. Circulation. 2023;148:e9-e119.

Routine periodic invasive coronary angiography should not be performed to guide therapeutic decision-making in patients with chronic coronary disease. Virani SS, et al. Circulation. 2023;148:e9-e119.

Class III: No Benefit

Greenland P, et al. Circulation. 2010;122:e584-e636.
Virani SS, et al. Circulation. 2023;148:e9-e119.

11

2023 MULTIMODALITY AUC - ASYMPTOMATIC PATIENTS

Appropriate Use Criteria

School of Medicine

TABLE 2.1 Asymptomatic Patients Without Known ASCVD

Clinical Scenario Text	ECG Treadmill	Stress Nuclear MPI	Stress Echo	Stress CMR	CAC	CCTA	Cath	No Test
34. ■ Low ASCVD risk <5%*	R (2)	R (1)	R (1)	R (1)	M (4)	R (1)	R (1)	A (8)
35. ■ Borderline ASCVD risk 5% to 7.5%	M (4)	R (2)	R (2)	R (2)	A (7)	R (2)	R (1)	A (7)
36. ■ Borderline ASCVD risk 5% to 7.5% with risk-enhancing factors†	M (4)	R (3)	R (3)	R (3)	A (7)	R (3)	R (1)	A (7)
37. ■ Intermediate ASCVD risk 7.5% to 20% with or without risk-enhancing factors†	M (5)	R (3)	R (3)	R (3)	A (8)	R (3)	R (1)	M (5)
38. ■ High ASCVD risk >20%	M (5)	M (4)	M (4)	M (4)	M (6)	M (4)	R (2)	M (5)

Winchester DE, et al. J Am Coll Cardiol. 2023;81(25):2445-2467.

12

2023 MULTIMODALITY AUC - ASYMPTOMATIC PATIENTS

"But He Wants to Start Exercising"

School of Medicine

TABLE 2.3 Asymptomatic Patients Undergoing Assessment of an Exercise Program or Cardiac Rehabilitation

Clinical Scenario Text	Exercise ECG	Stress Nuclear MPI	Stress Echo	Stress CMR	CAC	CCTA	Cath	No Test
48. ■ Prior to initiation of an unsupervised exercise program, without known CCD	M (6)	R (3)	R (3)	R (3)	R (3)	R (1)	R (1)	A (7)
49. ■ Prior to initiation of an unsupervised exercise program, with known CCD	A (7)	M (5)	M (5)	M (4)	R (1)	R (2)	R (1)	M (4)
50. ■ Prior to cardiac rehabilitation	A (7)	M (4)	M (4)	M (4)	R (1)	R (2)	R (1)	M (5)

Without known coronary disease

- Exercise ECG: May be appropriate (6)
- All imaging modalities: Rarely appropriate
- No test: Appropriate (7)

How to handle….

Starting a moderate-intensity exercise program does not require a stress test in an asymptomatic adult without known coronary disease. Counsel a graded start and advise him to report exertional symptoms.

Winchester DE, et al. J Am Coll Cardiol. 2023;81(25):2445-2467.

13

RISK ASSESSMENT, NOT ISCHEMIA TESTING

What to Do Instead

School of Medicine

1. **Estimate Risk with PREVENT**
   The 2026 dyslipidemia guideline replaces the pooled cohort equations with the PREVENT equations for adults 30–79.
2. **Measure lipoprotein(a) once**
   New in 2026: measure Lp(a) at least once in every adult's lifetime. ≥125 nmol/L is risk-enhancing.
3. **Consider coronary artery calcium**
   Appropriate at borderline and intermediate risk to reclassify. Men ≥40, women ≥45. A score of zero is reassuring.
4. **Treat what you find**
   Lipids, blood pressure, glucose, weight, tobacco, activity.

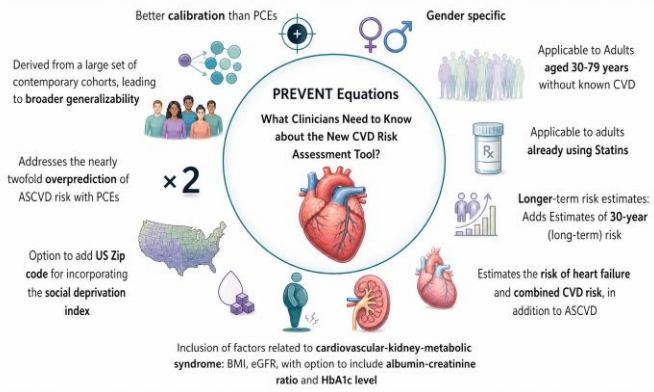
2026 ACC/AHA Dyslipidemia Guideline. Circulation. 2026;153:e—.
Winchester DE, et al. JACC. 2023;81:2445-2467.

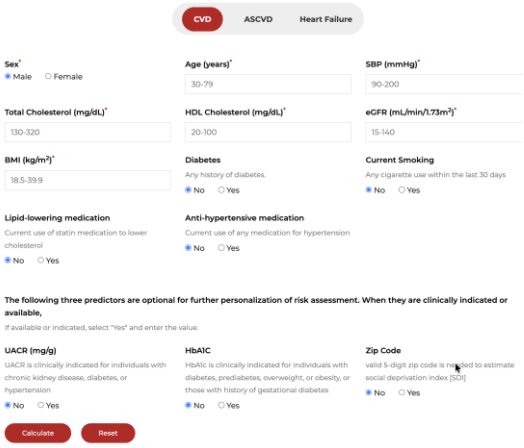
14

PREVENT-ASCVD EQUATIONS

PREVENT Calculator

School of Medicine





AHA PREVENT calculator (professional.heart.org)
Abdul Jabbar A, et al. Curr Atheroscler Rep. 2025;27:73.

15

PREVENT-ASCVD EQUATIONS

PREVENT: Risk from Age 30, Without Race

School of Medicine

1 Calculate
10- and 30-year ASCVD risk for adults 30–79. Adds BMI, eGFR and statin use to the familiar inputs, and drops race.

2 Read the band
Low <3%, borderline 3–<5%, intermediate 5–<10%, high ≥10%. LDL-lowering is reasonable at borderline, recommended at intermediate.

3 Personalize
PREVENT leaves out Lp(a), premature family history, inflammatory disease, HIV and adverse pregnancy outcomes. Adjust upward when present.

4 Reclassify
CAC when the decision is still uncertain: men ≥40, women ≥45 at borderline or intermediate risk. A score of zero supports deferring.

2026 ACC/AHA Dyslipidemia Guideline. Circulation. 2026;153:e—. | Khan SS, et al. Circulation. 2024;149:430-449.

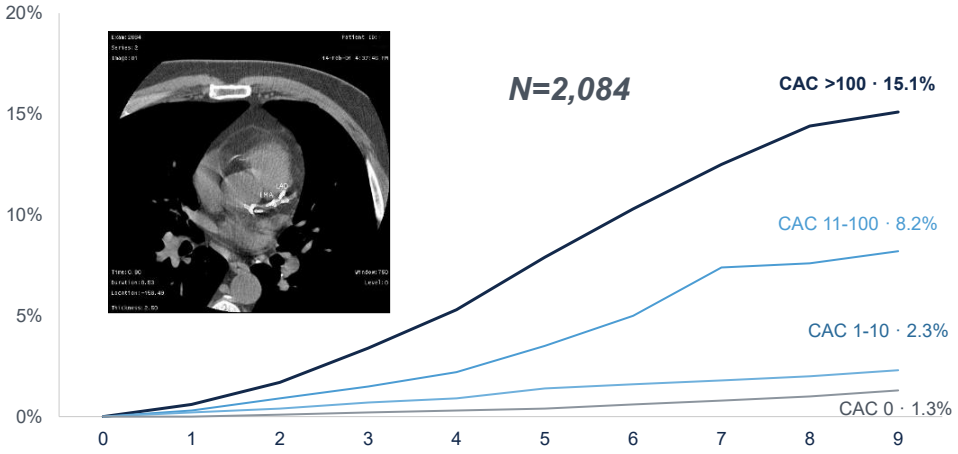
16

DALLAS HEART STUDY

Coronary Calcium Tracks Coronary Events

School of Medicine

Cumulative incidence of CHD events, %, by years since baseline



Paixao A, Khera A, et al. JACC Cardiovasc Imaging. 2015;8:1285-1293.

17

ARS Question #1

An Asymptomatic 52-Year-Old Man
Wants a Stress Test to Check His Heart.

What Do You Do?

A. Exercise treadmill test today, since he is motivated

B. Stress echocardiogram if he has two or more risk factors

C. No ischemia testing: estimate risk with PREVENT, consider CAC if uncertain

D. Coronary CT angiography as a one-time anatomic survey

Gulati M, et al. Circulation. 2021;144:e368-e454. | 2026 ACC/AHA Dyslipidemia Guideline.

TWO YEARS LATER

He Comes Back with Symptoms

School of Medicine

An update….

- Now 45 years old; running three times weekly
- Six weeks of chest pressure at about one mile into his run
- Substernal, described as “a weight,” radiates to the left arm
- Resolves within 3–5 minutes of stopping
- Reproducible at the same level of exertion each time
- No rest symptoms, no nocturnal symptoms

Today in the office

- Comfortable, chest pain free at rest
- BP 132/84, pulse 68, exam unchanged
- ECG: normal sinus rhythm, no ST-T changes
- On atorvastatin 20 mg since the last visit; LDL-C now 96 mg/dL
- A1c 6.0%

19

Overview

School of Medicine

1. **Stress Testing in Patients Without Symptoms**
   Why more testing is not better care
2. **Approach to the patient with chest pain**
   2021 ACC/AHA chest pain guideline
3. **Medical therapy for coronary artery disease**
   Focus on anti-anginal therapy and lipid lowering
4. **Who benefits from revascularization**
   Symptoms, survival, and the evidence for each
5. **Therapies needed after revascularization**
   Anti-platelets, which one and how long?

20

School of Medicine

CLINICAL PRACTICE GUIDELINE: FULL TEXT

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

A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines

Gulati M, et al. 2021 AHA/ACC Chest Pain Guideline. Circulation. 2021;144:e368-e454.

21

TERMINOLOGY

Change the Words You Use

School of Medicine

RETIRE

- "Atypical chest pain"
- "Typical chest pain"
- "Noncardiac chest pain" used to mean "not classic"

"Atypical" has been read as benign. More common in women, older adults, and people with diabetes.

USE

- Cardiac
- Possibly cardiac
- Noncardiac (when cardiac disease is not suspected)

These three terms correlate with an action. "Possibly cardiac" is the group in whom testing changes management.

What counts as chest pain — and who presents differently

- Discomfort in the chest, shoulders, arms, neck, back, upper abdomen, or jaw
- Dyspnea and fatigue are anginal equivalents
- Women more often report nausea, palpitations, and dyspnea
- Older adults and those with diabetes may have no chest discomfort

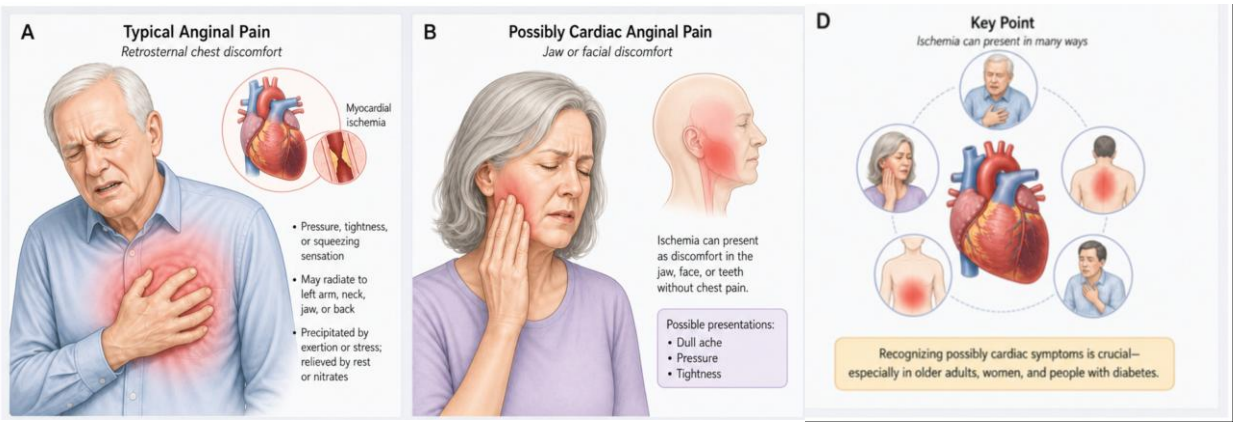
Gulati M, et al. 2021 AHA/ACC Chest Pain Guideline. Circulation. 2021;144:e368-e454.

22

2021 CHEST PAIN GUIDELINES

Chest Pain Means More than Pain in the Chest

School of Medicine



Pain, pressure, tightness or discomfort in any of these sites, and **shortness of breath or fatigue**, should all be treated as anginal equivalents.

Gulati M, et al. 2021 AHA/ACC Chest Pain Guideline. Circulation. 2021;144:e368-e454.

23

Stable Angina versus ACS

School of Medicine

	Stable angina	Acute coronary syndrome
Mechanism	Fixed plaque; supply–demand mismatch with increased demand	Plaque rupture or erosion with acute thrombosis
Onset	Predictable; provoked by exertion	Sudden; at rest or with minimal exertion
Duration	Short; crescendos and resolves over minutes	Prolonged, usually > 20 minutes; may not resolve
Pattern	Chronic and predictable over weeks to years	New, crescendo, or a change from a prior stable pattern
Urgency	Outpatient evaluation; elective workup	Emergency evaluation; ECG within 10 minutes

Gulati M, et al. 2021 AHA/ACC Chest Pain Guideline. Circulation. 2021;144:e368-e454.

24

ACUTE VERSUS STABLE

The First Fork in the Road

School of Medicine

Patient with chest pain

ACUTE — new, ongoing, or worsening

- ECG within 10 minutes of arrival
- Serial high-sensitivity troponin
- Emergency department clinical decision pathway
- Rule out STEMI, then risk stratify
- Do not send these patients home to await outpatient testing

STABLE — chronic, predictable

- Estimate pretest probability of obstructive CAD
- Low risk → CAC or exercise ECG, or no testing
- Intermediate-to-high risk → CCTA or stress imaging
- Choose the test by age, likely disease burden, and local expertise

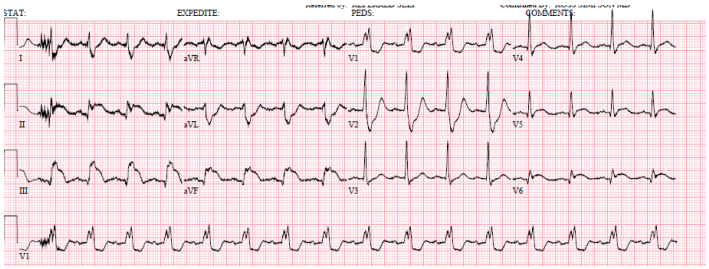
Gulati M, et al. 2021 AHA/ACC Chest Pain Guideline. Circulation. 2021;144:e368-e454.

25

ACUTE PATHWAY

What Is a STEMI?

School of Medicine



ECG criteria

New ST elevation at the J point in two contiguous leads:

- ≥ 0.1 mV in all leads except V2–V3
- V2–V3: ≥ 0.2 mV in men ≥ 40 y; ≥ 0.25 mV in men < 40 y; ≥ 0.15 mV in women

PLUS symptoms consistent with acute myocardial ischemia — the ECG alone is not the diagnosis

Similar patterns that are worth knowing - early repolarization, pericarditis, left ventricular hypertrophy, left bundle branch block, Brugada pattern, and takotsubo. When in doubt, compare with an old ECG and repeat it.

Fourth Universal Definition of Myocardial Infarction. J Am Coll Cardiol. 2018;72:2231-2264.

26

Differential Diagnosis for Chest Pain

School of Medicine

Emergency causes	Examination findings
ACS	Diaphoresis, tachypnea, tachycardia, hypotension, crackles, S3, MR murmur. Often normal.
Heart failure	JVD, pulmonary rales, lower extremity edema, tachypnea.
Pulmonary embolism	Tachycardia and dyspnea in >90%; pain with inspiration.
Aortic dissection	Pulse differential in 30%; abrupt severe pain plus widened mediastinum means >80% probability; AR in 40–75% of type A.
Esophageal rupture	Emesis, subcutaneous emphysema, pneumothorax in 20%.

Other causes	Examination findings
AS, AR, HCM	Systolic murmur with parvus carotid; diastolic murmur; displaced LV impulse.
Pericarditis, myocarditis	Fever, pleuritic pain worse supine, friction rub; S3 and heart failure.
Esophagitis, ulcer, gallbladder	Epigastric tenderness; RUQ tenderness with Murphy sign.
Pneumonia	Fever, focal dullness, egophony, friction rub.
Pneumothorax	Dyspnea, unilateral absent breath sounds.
Chest wall, herpes zoster	Costochondral tenderness; dermatomal pain with rash.

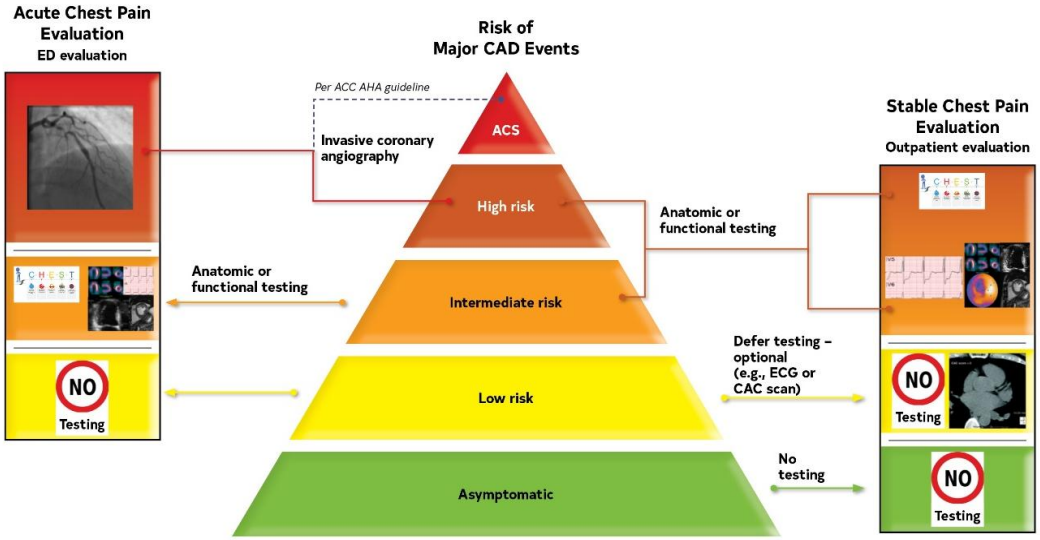
Gulati M, et al. 2021 AHA/ACC Chest Pain Guideline, Table 4.

27

CHEST PAIN AND CARDIAC TESTING

Testing Follows the Risk of Major CAD Events

School of Medicine



Gulati M, et al. 2021 AHA/ACC Chest Pain Guideline, Figure 5.

28

ACUTE CHEST PAIN IN THE EMERGENCY DEPARTMENT

Clinical Decision Pathways

School of Medicine

LOW RISK

< 1% 30-day risk of death or MACE

- No urgent diagnostic testing needed
- Discharge with outpatient follow-up is appropriate
- Serial hs-cTn and ECG must be non-ischemic first

INTERMEDIATE RISK

The group in whom testing changes management

- CCTA — Class 1, Level A — to exclude plaque and obstructive CAD
- Stress imaging — Class 1, Level B-NR — as an alternative
- Choice depends on prior testing, age, and local expertise

HIGH RISK

Ischemic ECG, elevated troponin, instability

- Invasive coronary angiography
- No role for further non-invasive risk stratification first
- Manage per the 2025 ACS guideline

Gulati M, et al. 2021 AHA/ACC Chest Pain Guideline. Circulation. 2021;144:e368-e454.

29

STABLE CHEST PAIN

Outpatient Evaluation of Chest Pain

School of Medicine

COR	LOE	Recommendations
1	B-NR	1. Unless a noncardiac cause is evident, an ECG should be performed for patients seen in the office setting with stable chest pain; if an ECG is unavailable the patient should be referred to the ED so one can be obtained.
1	C-LD	2. Patients with clinical evidence of ACS or other life-threatening causes of acute chest pain seen in the office setting should be transported urgently to the ED, ideally by EMS.

30

PRETEST PROBABILITY

Risk Stratification – Office Based

School of Medicine

Pre-test probabilities of obstructive CAD in symptomatic patients according to age, sex, and symptoms

Age, y	Chest Pain		Dyspnea	
	Men	Women	Men	Women
30–39	≤4	≤5	0	3
40–49	≤22	≤10	12	3
50–59	≤32	≤13	20	9
60–69	≤44	≤16	27	14
70+	≤52	≤27	32	12

Gulati M, et al. 2021 AHA/ACC Chest Pain Guideline. Circulation. 2021;144:e368-e454.

31

STABLE CHEST PAIN | THE OUTPATIENT PATHWAY

Start with Pretest Probability

School of Medicine

Before Choosing a Test, Place the Patient in a Risk Band. Age, Sex, and the Character of the Symptoms Do Most of the Work.

LOW

< 15% pretest probability

- CAC scoring is reasonable as a first-line test
- Exercise ECG without imaging is reasonable
- Deferring testing is also reasonable
- A CAC of zero makes obstructive disease very unlikely

INTERMEDIATE TO HIGH

≥ 15% pretest probability

- CCTA used for diagnosis, risk stratification, and guiding therapy (Class 1, Level A)
- Stress imaging with echo, PET, SPECT, or CMR also reasonable (Class 1, Level B-R)
- PET is preferred over SPECT where available

Gulati M, et al. 2021 AHA/ACC Chest Pain Guideline. Circulation. 2021;144:e368-e454.

32

CCTA or Stress Imaging?

School of Medicine

Pretest likelihood of CAD						
Low	→	No testing necessary	→	Option for CAC for ASCVD risk stratification		
Intermediate-high	→	Younger patient (<65 y of age)	OR	Less obstructive CAD suspected	→	CCTA favored
Intermediate-high	→	Older patient (≥65 y of age)	OR	More obstructive CAD suspected	→	Stress testing favored

Favor coronary CT angiography

- Younger patient, generally under 65
- Goal is to rule out obstructive disease
- Evaluation of non-obstructive plaque
- Suspected anomalous coronary anatomy
- Plaque burden to guide prevention
- Heart rate controllable on beta blockade

Favor stress imaging

- Older patient, 65 and above
- Obstructive disease likely; ischemia will guide management
- Heavy calcification, or prior CCTA inconclusive
- Contrast limited by renal impairment
- PET preferred over SPECT where available

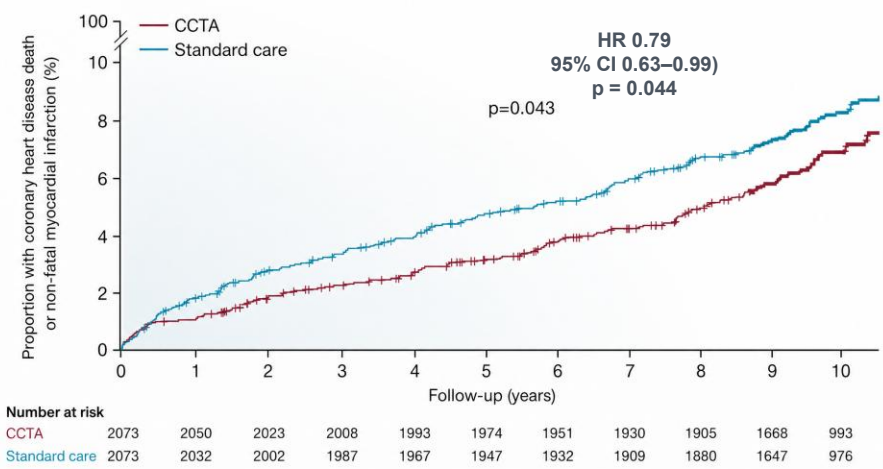
Gulati M, et al. 2021 AHA/ACC Chest Pain Guideline. Circulation. 2021;144:e368-e454.

33

SCOT-HEART | 10-YEAR OUTCOMES

Evaluation with CCTA Reduces CV Events

School of Medicine



- 4,146 patients with stable chest pain
- Adding CCTA to standard care reduced coronary death or MI at 10 years
- Benefit likely from preventive therapy started after seeing the plaque, not from more revascularization

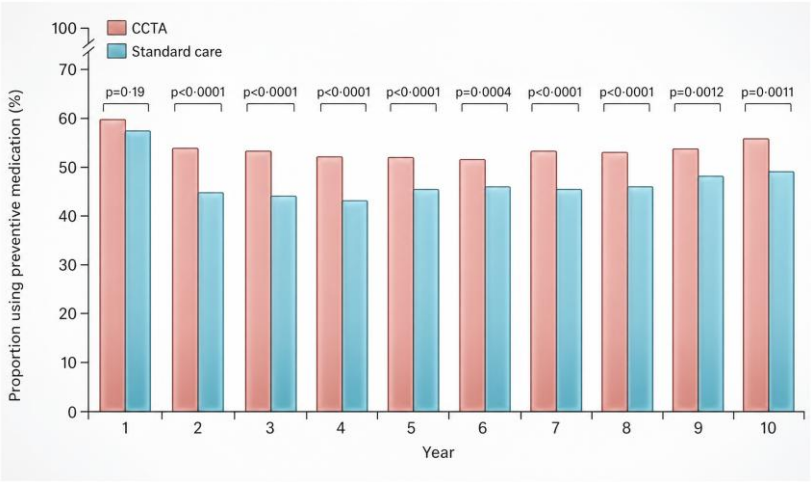
Williams MC, et al. Lancet. 2025;405:329-337.

34

SCOT-HEART | PREVENTIVE THERAPY

CCTA Put More Patients on Preventive Therapy

School of Medicine



- 4,146 patients with stable chest pain
- Adding CCTA to standard care reduced coronary death or MI at 10 years
- Benefit likely from preventive therapy started after seeing the plaque, not from more revascularization

Williams MC, et al. Lancet. 2025;405:329-337.

35

ARS Question #2

A 58-Year-Old Woman Has Exertional Chest Pressure. ECG and Troponin Are Normal.

Next Step?

A. Exercise ECG without imaging, because she can walk on a treadmill

B. CCTA or stress imaging, chosen by her pretest probability

C. Invasive coronary angiography

D. No testing; start a statin and a beta-blocker empirically

Gulati M, et al. 2021 AHA/ACC Chest Pain Guideline. Circulation. 2021;144:e368-e454.

THE RESULT

CCTA Results

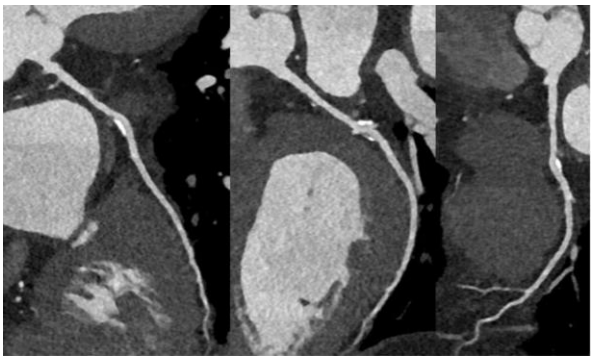
School of Medicine

Why CCTA in this patient

- Age 45, under 65
- No known coronary disease
- Intermediate pretest probability
- Rate controllable; normal renal function
- Plaque burden will drive prevention

CCTA report

- Coronary calcium score 118
- Proximal LAD: 50–69% stenosis, partly calcified
- Mid LAD and circumflex: mild, <50%
- Right coronary: mild non-obstructive plaque
- CT-FFR across the LAD lesion: 0.81



37

Overview

School of Medicine

1. **Stress Testing in Patients Without Symptoms**
   Why more testing is not better care
2. **Approach to the patient with chest pain**
   2021 ACC/AHA chest pain guideline
3. **Medical therapy for coronary artery disease**
   Focus on anti-anginal therapy and lipid lowering
4. **Who benefits from revascularization**
   Symptoms, survival, and the evidence for each
5. **Therapies needed after revascularization**
   Anti-platelets, which one and how long?

38

MEDICAL THERAPY FOR CHRONIC CORONARY DISEASE

Medical Therapy for Stable CAD

School of Medicine

Prevent events

- Antiplatelet therapy (aspirin 81 mg daily)
- High-intensity statin, to goal
- Non-statin agents when goal is not met
- ACE inhibitor or ARB if hypertension, diabetes, CKD, or LVEF < 40%
- SGLT2 inhibitor or GLP-1 receptor agonist in selected patients
- Blood pressure control, smoking cessation, cardiac rehabilitation

Relieve symptoms

- Beta blocker or calcium channel blocker — either is first-line
- Sublingual nitroglycerin, with instructions for use
- Long-acting nitrate as a second agent
- Ranolazine when the above are insufficient or not tolerated
- Revascularization when symptoms persist despite therapy or when prompt relief of angina is valued

These two columns are not interchangeable. Antianginal drugs do not prevent infarction, and preventive drugs do not relieve angina.

Virani SS, et al. 2023 AHA/ACC Chronic Coronary Disease Guideline. Circulation. 2023;148:e9-e119.

39

2026 LDL-C AND NON-HDL-C GOALS

The Numbers to Remember

School of Medicine

	LDL-C	Non-HDL-C	
Very high risk ASCVD Recent MI, multiple prior events, or event plus high-risk features	< 55	< 85	mg/dL
Established ASCVD Any clinical atherosclerotic cardiovascular disease	< 70	< 100	mg/dL
High risk, primary prevention 10-year PREVENT risk ≥ 10%	< 70	< 100	mg/dL
Borderline to intermediate 10-year PREVENT risk 3–10%	< 100	< 130	mg/dL

Aim for at least a 50% reduction from baseline LDL-C in most high-risk groups, in addition to reaching the absolute goal.

2026 ACC/AHA Multisociety Dyslipidemia Guideline. Circulation. 2026;153:e—.

40

STEPWISE LIPID-LOWERING THERAPY

Getting to Goal

School of Medicine

1. **High-Intensity Statin** — Atorvastatin 40–80 mg or rosuvastatin 20–40 mg, at maximally tolerated dose, with diet — ≈ 50%
2. **Add ezetimibe** — 10 mg daily. Inexpensive, well tolerated, and the preferred first add-on — ≈ 25% more
3. **Add a PCSK9 inhibitor** — Alirocumab or evolocumab. Class 1 when goals are not met on maximally tolerated statin — ≈ 45–64% more
4. **Alternatives at any step** — Bempedoic acid, or inclisiran twice yearly after the loading year — ≈ 20–50%

Recheck lipids 4–12 weeks after any change, then every 3–12 months. Escalate until the goal is met — "on a statin" is not the endpoint.

2026 ACC/AHA Multisociety Dyslipidemia Guideline. Circulation. 2026;153:e—.

41

PART 4 — MEDICAL THERAPY

What We Started, and What Happened Next

School of Medicine

Regimen after the CCTA

- Aspirin 81 mg daily
- Atorvastatin escalated to 80 mg; ezetimibe 10 mg added
- LDL-C falls from 96 to 48 mg/dL
- Lp(a) measured: 38 nmol/L — not elevated
- Metoprolol succinate 50 mg for exertional symptoms
- Sublingual nitroglycerin, with instructions on use

Six months later

- Still has chest pressure at a half mile, earlier than before
- Now limits his activity to avoid symptoms
- Taking medications reliably; blood pressure and heart rate at goal
- No rest symptoms, no change in pattern otherwise
- Asks whether "a stent would fix this"

Persistent, lifestyle-limiting angina despite guideline-directed medical therapy. Now the revascularization question is a fair one.

42

Overview

School of Medicine

1. **Stress Testing in Patients Without Symptoms**
   Why more testing is not better care
2. **Approach to the patient with chest pain**
   2021 ACC/AHA chest pain guideline
3. **Medical therapy for coronary artery disease**
   Focus on anti-anginal therapy and lipid lowering
4. **Who benefits from revascularization**
   Symptoms, survival, and the evidence for each
5. **Therapies needed after revascularization**
   Anti-platelets, which one and how long?

43

GOALS OF REVASCULARIZATION

Symptoms, Not Survival, Drive Most Revascularization

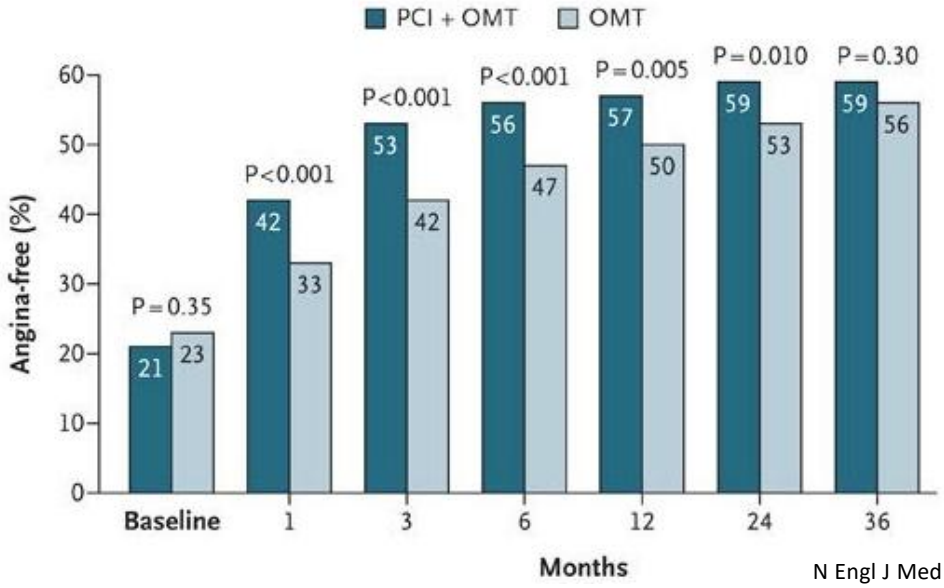
School of Medicine

COR	LOE	Recommendation
1	A	Chronic coronary disease with lifestyle-limiting angina despite guideline-directed medical therapy, and stenoses amenable to revascularization: revascularize to improve symptoms.
1	B-R	Significant left main disease, or multivessel disease with LVEF ≤35%: CABG added to medical therapy improves survival over medical therapy alone.

Modified from the 2021 ACC/AHA/SCAI Coronary Revascularization Guideline.

44

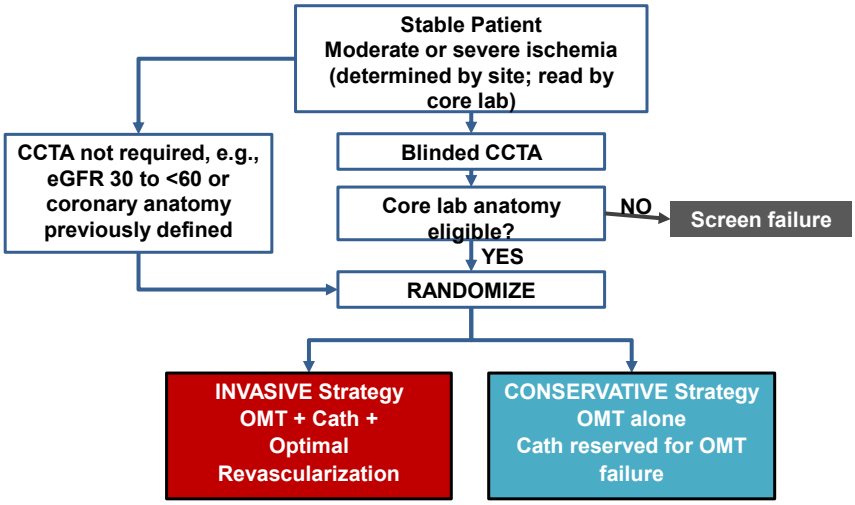
Changes in Angina with PCI vs Medtx (COURAGE)
n=2287 Patients with Stable CAD Randomized to PCI or OMT



N Engl J Med 2008;359:677-687

45

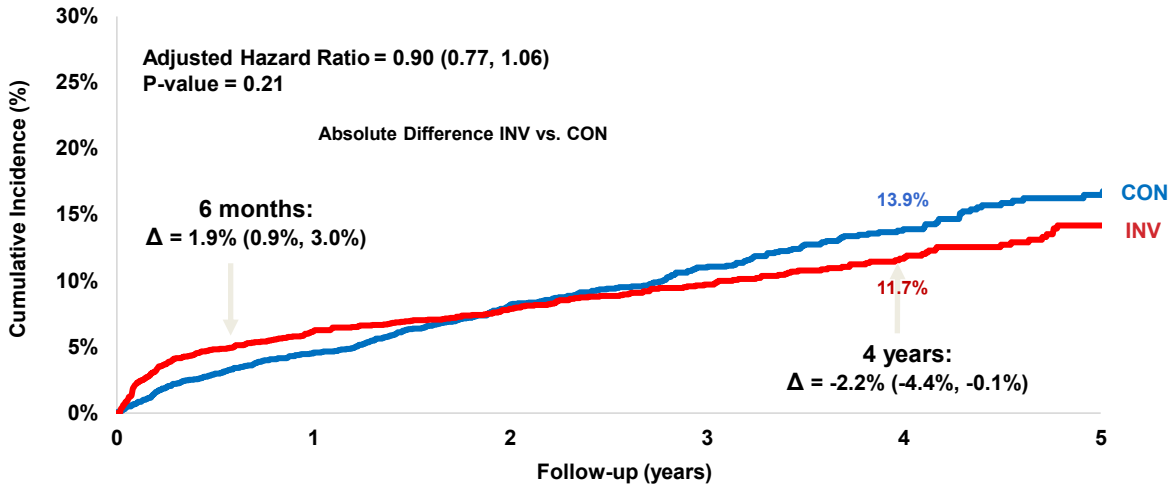
Study Design



Maron DJ, et al. American Heart Journal. 2018; 201;124-135.

46

Major Secondary: CV Death or MI

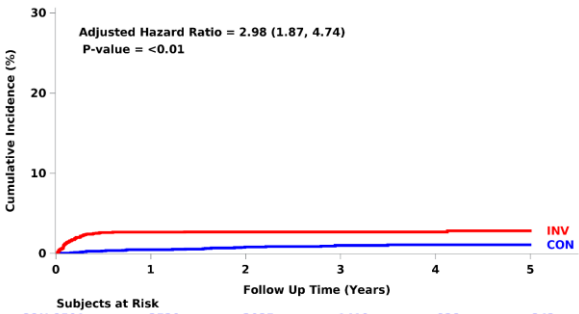


Subjects at Risk

CON	2591	2453	1933	1325	746	298
INV	2588	2383	1933	1314	752	282

47

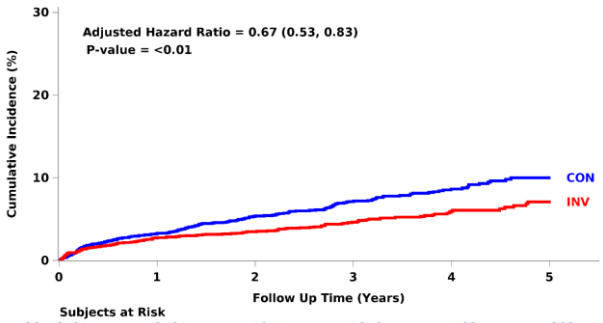
Procedural MI
Type 4a or 5 MI



Subjects at Risk

CON	2591	2529	2035	1419	828	342
INV	2588	2439	2000	1380	794	304

Spontaneous MI
Types 1, 2, 4b, or 4c MI



Subjects at Risk

CON	2591	2464	1951	1340	762	303
INV	2588	2438	1987	1355	768	291

48

ISCHEMIA

School of Medicine

Design

- 5,179 patients
- Stable coronary disease with moderate or severe ischemia on stress testing
- Randomized to an initial invasive strategy versus optimal medical therapy with catheterization reserved for failure
- Left main disease excluded by CCTA before randomization
- Median follow-up 3.2 years

What it found

No reduction in the primary composite endpoint
Cardiovascular death, MI, resuscitated arrest, or hospitalization for unstable angina or heart failure

No reduction in all-cause mortality
Confirmed on extended follow-up

Fewer spontaneous myocardial infarctions
Offset early by more procedural infarctions

Better and more durable angina relief
The benefit was greatest in those with the most frequent baseline angina, and absent in those without angina

Revascularization in stable disease improves symptoms and lowers spontaneous myocardial infarction

Maron DJ, et al. N Engl J Med. 2020;382:1395-1407
Hochman JS, et al. Circulation. 2023;147:8-19.

49

THE EXCEPTIONS THAT MATTER

When Revascularization Does Change Survival

School of Medicine

Acute coronary syndrome	STEMI and high-risk NSTE-ACS. Time-dependent mortality benefit. Complete revascularization is now recommended.	Class 1
Left main disease	Significant left main stenosis. CABG improves survival versus medical therapy; PCI is reasonable in selected anatomy.	Class 1
Multivessel disease with reduced EF	Surgical revascularization in ischemic cardiomyopathy improved 10-year survival in STICHES.	Class 2a
Three-vessel disease, normal EF	CABG may be reasonable to improve survival. The benefit of PCI on survival remains uncertain.	Class 2b
Stable single- or two-vessel disease	Revascularization for symptom relief when angina persists despite medical therapy. Not for survival.	Symptoms

Lawton JS, et al. 2021 ACC/AHA/SCAI Coronary Artery Revascularization Guideline. Circulation. 2022;145:e18-e114.

50

ARS Question #3

An Active 58-Year-Old Has Chest Pressure that Limits His Running and CCTA that Shows Obstructive CAD. He Is Frustrated and Wants to Run Again.

What Is the Next Best Step?

A. Anti-anginal therapy + revascularization

B. Aggressive lipid control

C. Anti-platelet therapy

D. All of the above

Continuing Education Company

51

THE DECISION

Shared Decision-Making, and What Followed

School of Medicine

What we told him

- A stent will likely improve his angina
- It will not lower his risk of dying or of having a heart attack
- It commits him to dual antiplatelet therapy and its bleeding risk
- His medical therapy has not yet been fully optimized — a second antianginal is a reasonable next step
- Either path is defensible; the choice is his

What he chose, and what happened

- Elected catheterization for lifestyle-limiting symptoms
- Angiography: 70% proximal LAD stenosis, FFR 0.74
- Drug-eluting stent to the proximal LAD via radial access
- Intravascular imaging used to optimize the result
- Discharged the following morning, angina free

52

Overview

School of Medicine

1. **Stress Testing in Patients Without Symptoms**
   Why more testing is not better care
2. **Approach to the patient with chest pain**
   2021 ACC/AHA chest pain guideline
3. **Medical therapy for coronary artery disease**
   Focus on anti-anginal therapy and lipid lowering
4. **Who benefits from revascularization**
   Symptoms, survival, and the evidence for each
5. **Therapies needed after revascularization**
   Anti-platelets, which one and how long?

53

AND THE REASON FOR EACH

Typical Discharge Medications After PCI

School of Medicine

Aspirin 81 mg daily	Indefinitely
P2Y12 inhibitor	Ticagrelor or prasugrel preferred over clopidogrel after ACS; at least 12 months in most patients
High-intensity statin ± ezetimibe	Atorvastatin 80 mg or rosuvastatin 20–40 mg, titrated to an LDL-C below 55 mg/dL
PCSK9 inhibitor or inclisiran	When LDL-C remains at or above goal on maximally tolerated statin and ezetimibe
Sublingual nitroglycerin	For every patient, with explicit instructions on when to use it and when to call 911
Beta blocker	If LVEF below 50%, recent MI, or another indication — no longer routine indefinitely otherwise
ACE inhibitor, ARB, or ARNI	If LVEF below 40%, hypertension, diabetes, or chronic kidney disease

Note the change from prior practice: the LDL-C target is now an absolute number, and beta blockade is no longer automatic.

2025 ACC/AHA ACS Guideline | 2026 ACC/AHA Dyslipidemia Guideline

54

2025 ACS GUIDELINE

How Long to Continue Dual Antiplatelet Therapy

School of Medicine

The default

Aspirin plus an oral P2Y12 inhibitor for at least 12 months after acute coronary syndrome. Ticagrelor or prasugrel are preferred over clopidogrel in PCI-treated NSTE-ACS and STEMI.

After elective PCI for stable disease

A shorter course is reasonable. Selected patients can move to P2Y12 inhibitor monotherapy after 1 to 3 months to reduce bleeding without increasing ischemic events.

When bleeding risk is high…

Add a proton pump inhibitor

For patients at risk of gastrointestinal bleeding

De-escalate at one month

Transition to ticagrelor monotherapy after one month post-PCI

Drop aspirin

In patients who also require oral anticoagulation, continue the P2Y12 inhibitor alone

2025 ACC/AHA/ACEP/NAEMSP/SCAI ACS Guideline. Circulation. 2025;151:e—.

55

THE PRIMARY CARE CHECKLIST AFTER PCI

What Comes Back to Your Clinic

School of Medicine

- ✓ **Confirm the antiplatelet plan and its end date**
  Know which P2Y12 inhibitor, and the intended duration. Do not stop it early for elective procedures without calling cardiology.
- ✓ **Drive the lipids to goal**
  LDL-C below 55 mg/dL for very high risk. Recheck at 4–12 weeks after any change and escalate until the goal is met.
- ✓ **Refer to cardiac rehabilitation**
  Class 1, mortality benefit, and consistently under-used. Refer at the first post-discharge visit.
- ✓ **Reassess the beta blocker at one year**
  If the ejection fraction is normal and there is no other indication, continuing indefinitely is no longer recommended.
- ✓ **Ask about angina at every visit**
  Recurrent symptoms warrant reassessment. Routine periodic stress testing in the absence of symptoms does not (Class 3).
- ✓ **Address the risk factors that caused this**
  Tobacco, blood pressure, weight, glucose, activity. Consider an SGLT2 inhibitor or GLP-1 receptor agonist where indicated.

2025 ACC/AHA ACS Guideline | 2023 AHA/ACC Chronic Coronary Disease Guideline

56

Summary - Take Back to Clinic

1. Do not screen asymptomatic adults with stress testing. Estimate risk, check lipids and Lp(a) [one time], consider calcium scoring, and treat what you find.
2. In chest pain, sort acute from stable and let pretest probability choose the test.
3. Both CCTA and stress imaging are Class 1 at intermediate-to-high risk. CCTA is favored because assessing plaque burden will change your prevention plan.
4. In stable disease, revascularization treats angina, not mortality. Optimize medical therapy, and use revascularization to improve symptoms and quality of life
5. After revascularization, get LDL-C goal below 55 mg/dL, send patients to cardiac rehab is Class 1, and there is no need for routine surveillance stress testing

School of Medicine