Testing the Asymptomatic CAD Patient: When and Why?

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Conflict of Interest Disclosure

Dr. Bateman declares that the following relationships constitute a potential conflict of interest with respect to this presentation:

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David J. Cohen, M.D., M.Sc. and John A. Spertus, M.D., M.P.H., named as two of the World’s Most Influential Scientific Minds 2014

Dr. Spertus’ research focuses on methods for assessing patients’ health outcomes, measuring health care quality, and the use of information technology to guide medical decision-making based on risk-prediction models so that treatment can be safer, more cost-effective, evidence-based, and patient-centered.

Thomson Reuters analysis based on publishing the highest number of articles that rank among those most frequently cited by fellow researchers.

John A. Spertus, M.D., M.P.H., presented a rare and prestigious “Lifetime Achievement Award” of the American Heart Association at its November 2018 National Scientific Meeting
Testing Selected Asymptomatic Patients is Widely Accepted in Medicine

Some Examples

- Colonoscopy for men & women age 50, and q 10 yrs
- Mammography
- PSA
- Lung cancer screening for high-risk individuals
Coronary Artery Disease

- Asymptomatic
- Sudden Cardiac Death
- Angina/Dyspnea
  - Unstable CAD
  - NSTEMI
  - STEMI
  - Arrhythmias
  - CHF
Coronary Artery Disease

- 1 in every 4 deaths in the U.S. is from CAD
- Most common cause of death in whites, blacks, & hispanics
- Every year, ~ 735,000 Americans have a STEMI
- 525,000 of these are 1st MI’s
- 47% of SCD’s occur outside of hospitals
- Almost half of the U.S. population has at least one of HTN, high cholesterol, or smoking

Does the controversy boil down to $?
The Challenge of Linking a Test Result to an Improved Patient Outcome

Imaging result +/-

Referring MD adherence?

Pt adherence to recs?

Therapy:
? appropriate
? quality

Follow-up?

Patient outcome 1 – 10 yrs later
Prospective Randomized Study of Standard Care vs PET-Assisted Mgmt in 420 pts with CAD & LVEF ≤ 35%, 9 sites

Entire Group (PET findings not followed in 24%)

Hazard ratio = 0.82
(95% CI 0.62–1.07; P=0.15)

McCardle, Circ Cardiovasc Img 2016; 9: doi:10.1161

PET-adherent Group

Abraham, J Nucl Med 2010;51:567-574
Prospective Randomized vs Large Retrospective Imaging Studies: Reaching Consensus on Standards of Care

Prospective Randomized Imaging Studies

• Relatively rare
• Difficult to recruit into
• Rarely verified
• So far, none have defined a “standard of care”

Retrospective Studies

• Most of what is known about value of imaging is from retrospective studies
• Easily verified: similar results from multiple centers carry weight
• Large data-bases/meta-analyses permit sophisticated statistical analyses
• Historically, such studies have defined “standards of care”
Benefits of CAD Testing in Asymptomatic Patients

1. Make a diagnosis
   - In patients with or without known CAD
   - In patients whose status has changed

2. Risk stratify
   - Short-term
   - Longer-term

3. Administer optimal therapy
Risk-Assessment Tools (FRS)

Define Levels of Risk for CV Death or MI Over 10 Years

Low: < 6% risk
Intermediate: 6 – 20%
High: > 20%

Caution:
- Population-based
- Exclude FH, obesity, inactivity, connective tissue diseases, hx pre-eclampsia
- Included variables are +/-
Relevant Issues in Patient-Clinician Discussions About Testing When the Patient is Asymptomatic

1. Primary or secondary prevention?
2. Low, intermediate, or high risk for major adverse coronary events?
3. Are risk factors at target?
4. Is the patient truly asymptomatic?
Common Scenarios In Asymptomatic Patients That Warrant Discussion About Testing

1. No known CAD
2. Known CAD
3. Known CAD, has never had symptoms
4. Known CAD, incompletely revascularized
52 y/o asymptomatic man with no CAD history. No Rx meds. Referred because his 58 y/o brother recently had an MI. Sedentary because of an arthritic knee.

Normal P/E. ECG with borderline LVH.

BP 145/95, LDL cholesterol 115.

1. No testing indicated. Educate about healthy living to address mild RF’s. Make f/u appointment.

2. Recommend a TMET?

3. Recommend a pharmacologic stress echo or stress MPI?

4. Refer for a CACS?
2.5.8. Recommendation for Stress Echocardiography
Class III: No Benefit
Stress echocardiography is not indicated for CV risk assessment in low- or intermediate-risk asymptomatic adults. (Exercise or pharmacologic stress echo is primarily used for its role in advanced cardiac evaluation of symptoms suspected of representing CHD and/or estimation of prognosis in patients with known CAD) (Level of Evidence: C)

2.5.9.1. Recommendations for Myocardial Perfusion Imaging
Class IIb: May be useful
Stress MPI may be considered for CV risk assessment in asymptomatic adults with diabetes or with a strong family history of CHD or when previous risk assessment testing suggests high risk of CHD, such as a CAC score of 400 or greater. (Level of Evidence: C)
Class IIa indication for CAC scanning:

- Asymptomatic adults with FRS of 10-20% 10-year risk
- Asymptomatic diabetics >40 years

Class IIb indication:

- Asymptomatic adults with FRS 6-10% FRS
CAC Scores and Mortality

Budoff et al, JACC, 2007; 49: 1860
52 y/o asymptomatic man with no CAD history. No Rx meds. Referred because his 58 y/o brother recently had an MI. Sedentary because of an arthritic knee.

Normal P/E. ECG with borderline LVH.  
CACS = 360

BP 145/95, LDL cholesterol 115.

1. No further testing indicated at this time.

2. Recommend a TMET?

3. Recommend a pharmacologic stress echo or stress MPI?

4. Refer for a coronary CTA?
Calcium Score & Myocardial Ischemia
(Berman et al, JACC, 2004)
52 y/o asymptomatic man with no CAD history. No Rx meds. Referred because his 58 y/o brother recently had an MI. Sedentary because of an arthritic knee.

Normal P/E. ECG with borderline LVH.  

BP 145/95, LDL cholesterol 115.  

CACS = 360

1. Recommend a statin.
2. Recommend aspirin 81 mg
3. Recommend both a statin and aspirin
4. No treatment currently indicated
Impact of Statins on Outcomes in Relation to CAC Scores

Mitchell et al, JACC 2018, on-line
Impact of Statins on Outcomes in Relation to CAC Scores

Mitchell et al, JACC 2018, on-line
The Use of Coronary Artery Calcium Testing to Guide Aspirin Utilization for Primary Prevention: Estimates from the Multi-Ethnic Study of Atherosclerosis

Estimated Risk/Benefit of Aspirin

Miedema et al, Circ CV Qual Outcomes, 2014; 7: 453-460
Common Scenarios In Asymptomatic Patients That Warrant Discussion About Testing

1. No known CAD

2. Known CAD

3. Known CAD, has never had symptoms

4. Known CAD, incompletely revascularized
78 y/o asymptomatic woman, diffuse mild-moderate CAD on coronary angiography 4 years prior after a type 2 MI in relation to gynecologic surgery. Currently on OMT including coreg 25 mg BID, aspirin 81 mg OD, atorvastatin 80 mg OD, Lisinopril 20 mg OD. Smokes ½ pack/day. A1C is 6.9

ECG = NSR, LBBB (chronic)

She walks her dog twice daily without symptoms

1. No testing indicated.

2. Recommend a TMET to determine if truly asymptomatic

3. Recommend a pharmacologic SPECT MPI

4. Recommend a pharmacologic PET MPI
SNMMI & ASNC Joint Position Statement on the Clinical Indications for Myocardial Perfusion PET

- Evidence-based

- Categorize indications for PET:
  - Preferred: all pts who cannot exercise
  - Recommended: specific pt subsets

Hazard Ratio for Death With Early Revascularization Compared to Medical Therapy Based on % of Ischemic Myocardium by SPECT MPI

10, 627 pts (mean f/u= 1.9 yrs)
No prior MI or revascularization
Exercise or pharm SPECT MPI

Figure 4. Log hazard ratio for revascularization (Revasc) vs medical therapy (Medical Rx) as a function of % myocardium ischemic based on final Cox proportional hazards model. Model, P<0.0001; interaction, P=0.0305.
Hazard Ratio for Death With Early Revascularization Compared to Medical Therapy Based on % of Ischemic Myocardium by PET MPI

16,029 consecutive pts
Median f/u 3.7 yrs

Pts with ≥ 6% ischemic myocardium had improved survival with revascularization vs medical tx

Patel et al, manuscript under review, JACC
Common Scenarios In Asymptomatic Patients That Warrant Discussion About Testing

1. No known CAD
2. Known CAD
3. Known CAD, has never had symptoms
4. Known CAD, incompletely revascularized
72 y/o asymptomatic man, 20 years post-CABG. CAD was discovered on an MPI performed following a syncopal spell. He has never had chest pain. He is on OMT. Also on methotrexate for RA. No exercise routine.

RF's: HTN, dyslipidemia, +FH.

ECG = NSR.

1. No testing indicated.

2. Recommend a TMET to determine if truly asymptomatic

3. Recommend an exercise SPECT MPI

4. Recommend a pharmacologic PET MPI
National Trends in Visits to Physician Offices and Outpatient Clinics for Angina 1995 to 2010

Julie C. Will, PhD, MPH; Fleetwood Loustalot, PhD, FNP; Yuling Hong, MD, MSc, PhD, FAHA
Analysis of Probability as an Aid in the Diagnosis of CAD

Californians
Mostly men
All could exercise
Estimating Pre-Test Probability of CAD Based on Age, Sex, and Gender

14,048 pts participating in the international multicenter CONFIRM Registry

Cheng et al, Circ 2011; 124: 2423 - 2432
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Common Scenarios In Asymptomatic Patients That Warrant Discussion About Testing

1. No known CAD
2. Known CAD
3. Known CAD, has never had symptoms
4. Known CAD, incompletely revascularized
65 y/o asymptomatic man with known CAD. At coronary angiography 10 years earlier, performed following a type 2 MI in association with septicemia, he was found to have a completely occluded dominant RCA and a 75% stenosis in the proximal LAD. The LAD was providing collaterals to the RCA. He walks on the treadmill for 30 minutes at a stretch 5 days a week, at a pace of 3.5 MPH. He is on OMT.

ECG = NSR.

1. No testing indicated.

2. Recommend a TMET to determine if truly asymptomatic

3. Recommend an exercise SPECT MPI

4. Recommend a pharmacologic PET MPI
True “silent” ischemia

MPI from 2 years prior