CORONARY ARTERIAL DISEASE:
SCREENING, PREVENTION, PROGNOSIS

Screening
1. The U.S. Preventive Services Task Force (UPSTF):
   o Recommends against routine screening with:
     ▪ resting electrocardiography (ECG),
     ▪ exercise treadmill test, or
     ▪ electron-beam computerized tomography (EBCT) scanning for coronary calcium for either severe coronary artery stenosis (CAS) or prediction of coronary heart disease events in adults at low risk for CHD events (D Recommendation) ¹
   o Found insufficient evidence to recommend for or against routine screening with ECG, ETT, or EBCT scanning for coronary calcium for either severe CAS or the prediction of CHD events in adults at increased risk for CHD events. (I Recommendation) ¹
   o For people in certain occupations, such as pilots and heavy equipment operators (for whom sudden incapacitation or sudden death may endanger others), consideration other than individual patient health benefit may influence decision to screen for CHD. ¹

2. MDCT (Multi-Detector Computed Tomography) for coronary artery disease screening
   o Does not meet World Health Organization criteria for screening. ²
   o Coronary artery calcification measured by MDCT good predictor of future cardiovascular events; however, only moderately high sensitivity and specificity for detection of CAD in asymptomatic population. ²

3. CT (Computed Tomography) examination of coronary arteries. The higher the CAC (coronary artery calcification) score, the higher the risk of coronary event.
   o Pros
     ▪ Can detect calcification indicative of arterial disease in asymptomatic people, many of whom would be at low risk when assessed by traditional risk factors ³
   o Cons
     ▪ False-negative results: because not yet calcified, screening would miss many of the most dangerous patches of arterial disease
       • Normal CT followed by heart attack. ³
     ▪ Also false positive results: many calcified arteries will have normal blood flow and will not be affected by clinically apparent thrombosis:
       • Abnormal CT not followed by heart attack. ³

4. Routine screening for inducible ischemia in asymptomatic patients with type 2 diabetes (T2DM) cannot be advocated for 4 reasons:
   o Yield of detecting significant inducible ischemia relatively low.
   o Overall cardiac event rate low.
   o Routine screening does not appear to affect overall outcome.
   o Routine screening of asymptomatic diabetic patients prohibitively expensive. (4)
Prognosis
1. Women:
   - More likely to die of first myocardial infarction.  
   - Experience more long-term disability.  
   - Have more comorbidity (because they are usually older on presentation)  
   - Coronary disease more likely fatal in women with diabetes.  
2. Diabetic patients:
   - Mortality rate of CAD higher.  
   - No significant reductions in cardiovascular events or mortality with intensive glucose control.  
3. Overall:
   - According to many CHD rehabilitation studies, lifestyle change interventions significantly reduce mortality.  
4. Prognostic biomarker: CRP (C-reactive protein)
   - Insufficient evidence to recommend routine measurement  
   - Because of multiple types of reporting and publication bias, uncertainty about magnitude of independent association between CRP and prognosis among patients with stable coronary disease makes clinical practice recommendations impractical.  
5. Multi-slice computed tomography coronary angiography (MSCT):
   - Combination of both anatomical and functional imaging.  
   - Possible association between the anatomical and functional information obtained with MSCT and myocardial perfusion imaging (MPI) using single-photon emission computed tomography (SPECT).  
   - Independent predictor of events; provides incremental prognostic value to MPI (Myocardial perfusion imaging).  
   - MSCT may have an important advantage over invasive coronary angiography due to its ability to provide information on plaque composition in addition to stenosis severity.  

Prevention
1. Lifestyle modifications: weight management, regular physical activity, prudent alcohol consumption, low-sodium diet.  
2. Increased physical activity - greater benefit in total functional scores and quality of life - elderly versus younger patients.  
   - Exercise training- positive impact on CHD risk factors: obesity, hypertension, insulin resistance, also in patients older than 75 years.  
   - 30 to 45 minutes of walking three times weekly - reduction the risk of MI by 50% in women.-Investigators in the Nurses’ Health Study  
   - Goal for all patients: 30 to 60 minutes of moderate intensity physical activity (brisk walking, biking) on most or all, days of the week.  
3. Weight loss indicated for patients classified as overweight or obese according to their BMI.  
   - The most effective treatment for obesity in women not determined  
   - Exercise - less effective in promoting weight loss in women than in men
Lipid management through therapeutic lifestyle changes recommended for all patients with CAD-AHA and ATP III.

4. Aggressive control of hypertension and hyperlipidemia does reduce the risk of reinfarction in women with diabetes.

5. Efficacy of beta blockers and thiazide diuretics in reduction coronary disease and stroke demonstrated by major long-term trials.

6. ACE inhibitors beneficial in secondary prevention of CAD (two large randomized trials: HOPE and EUROPA).

**Evidence-based recommendations**

1. Lipid lowering with statins in elderly patients with CHD advisable for reducing morbidity and mortality. (SOR:A)

2. LDL levels of less than 100 mg per dL, with an optimal goal of less than 70 mg per dL recommended by ATP III.

3. For LDL level greater than 130 mg/dL, cholesterol lowering medications indicated in addition to lifestyle changes. Statins should be the initial medication choice.

4. For women seeking to quit smoking, combination therapy with bupropion (Zyban®) and nicotine patch.

5. Exercise-based cardiac rehabilitation reduces morbidity and mortality in patients with CAD. (SOR:A)

6. Weight management recommended by AHA for secondary prevention of CAD. (SOR:C)

7. Smoking cessation reduces mortality by at least one third in patients after MI or cardiac surgery. (SOR:A)

8. Blood pressure control goal of less than 140/90 mm Hg, or less than 130/80 mm Hg in patients with diabetes mellitus or chronic kidney disease. (SOR:B). (The AHA and Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure)

9. Beta-blocker therapy reduces recurrent MI, sudden cardiac death, and mortality in patients after MI. (SOR:A)

10. Aspirin therapy (81 to 162) mg reduces recurrent vascular events by one fourth in patients with previous vascular event. (SOR:A)

11. Clopidogrel is effective alternative to aspirin.

12. Statins reduce recurrent vascular events and all-cause mortality in patients following acute coronary syndromes. (SOR:A)

13. Percutaneous coronary interventions - no superiority to optimal medical treatment alone for death or recurrent cardiovascular events in patients with stable CAD. (SOR:B)

14. Screening for depression during secondary prevention of CAD and, if diagnosed, beginning appropriate treatment -recommended by AHA.

**References**

1. Calonge N. Screening for Coronary Heart Disease U.S. Preventive Services Task Force
2. Toronto Medical Advisory Secretariat Volume 7(3) 2007, Health Technology Assessment.
4. Young LH, et al, Cardiac Outcomes After Screening for Asymptomatic Coronary Artery Disease in Patients With Type 2 Diabetes, 2009 American Medical Association


Authors: Izabela Jankowska, MD, & Jose Lopez, MD,  
Bronx Lebanon Hospital Center FPRP, NY

Editor: Robert Marshall, MD, MPH, MISM, CMIO,  
Madigan Army Medical Center, Tacoma, WA