Guidelines for the Management of Coronary Artery Disease

American Heart Association (AHA)/American College of Cardiology (ACC) Secondary Prevention for Patients with Coronary and Other Vascular Disease: 2006 Update

Goals	Intervention recommendations with class of recommendation and level of evidence
Smoking Complete cessation No exposure to environmental tobacco smoke	• Ask about tobacco use status at every visit. **I (B)** • Advise every tobacco user to quit. **I (B)** • Assess the tobacco user's willingness to quit. **I (B)** • Assist by counseling and developing a plan for quitting. **I (B)** • Arrange follow-up, referral to special programs, or pharmacotherapy (including nicotine replacement and bupropion). **I (B)** • Urge avoidance of exposure to environmental tobacco smoke at work and home. **I (B)**
Blood pressure control <140/90 mm Hg or <130/80 mm Hg if patient has diabetes or chronic kidney disease Women: An optimal blood pressure of <120/80 mm Hg through lifestyle	**For all patients:** • Initiate or maintain lifestyle modification – weight control; increased physical activity; alcohol moderation; sodium reduction; and emphasis on increased consumption of fresh fruits, vegetables, and low-fat dairy products. **I (B)** **For patients with blood pressure ≥140/90 mm Hg (or ≥130/80 mm Hg for individuals with chronic kidney disease or diabetes):** • As tolerated, add blood pressure medication, treating initially with ß-blockers and/or ACE inhibitors, with addition of other drugs such as thiazides as needed to achieve goal blood pressure. **I (A)** Women: Note: ACE inhibitors are contraindicated in pregnancy and ought to be used with caution in women who may become pregnant. For compelling indications for individual drug classes in specific vascular diseases, see Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7).[4]
Lipid management LDL-C <100 mg/dL If triglycerides are 200 mg/dL, non-HDL-C should be <130 mg/dL[†] Women: Optimal levels encouraged through lifestyle approaches: LDL-C <100 mg/dL, HDL-C >50 mg/dL, triglycerides <150 mg/dL, non–HDL-C (total cholesterol minus HDL) <130 mg/dL (Class I; Level of Evidence B)	**For all patients:** • Start dietary therapy. Reduce intake of saturated fats (to <7% of total calories), trans-fatty acids, and cholesterol (to <200 mg/d). **I (B)** • Adding plant stanol/sterols (2 g/d) and viscous fiber (>10 g/d) will further lower LDL-C. • Promote daily physical activity and weight management. **I (B)** • Encourage increased consumption of omega-3 fatty acids in the form of fish[‡] or in capsule form (1 g/d) for risk reduction. For treatment of elevated triglycerides, higher doses are usually necessary for risk reduction. **IIb (B)** **For lipid management:** Assess fasting lipid profile in all patients, and within 24 hours of hospitalization for those with an acute cardiovascular or coronary event. For hospitalized patients, initiate lipid-lowering medication as recommended below before discharge according to the following schedule: • LDL-C should be <100 mg/dL **I (A)**, and • Further reduction of LDL-C to <70 mg/dL is reasonable. **IIa (A)** • If baseline LDL-C is ≥100 mg/dL, initiate LDL-lowering drug therapy.[§] **I (A)** • If on-treatment LDL-C is 100 mg/dL, intensify LDL-lowering drug therapy (may require LDL-lowering drug combination).[‖] **I (A)** • If baseline LDL-C is 70 to 100 mg/dL, it is reasonable to treat to LDL-C <70 mg/dL. **IIa (B)** • If triglycerides are 200 to 499 mg/dL, non-HDL-C should be <130 mg/dL. **I (B)**, and • Further reduction of non-HDL-C to <100 mg/dL is reasonable. **IIa (B)** • Therapeutic options to reduce non-HDL-C are: – More intense LDL-C-lowering therapy **I (B)**, or – Niacin[¶] (after LDL-C-lowering therapy) **IIa (B)**, or – Fibrate therapy[#] (after LDL-C-lowering therapy) **IIa (B)** • If triglycerides are ≥500 mg/dL,[#] therapeutic options to prevent pancreatitis are fibrate[¶] or niacin[¶] before LDL-lowering therapy; and treat LDL-C to goal after triglyceride-lowering therapy. Achieve non-HDL-C <130 mg/dL if possible. **I (C)** Women: A reduction to <70 mg/dL is reasonable in very-high-risk women (e.g., those with recent ACS or multiple poorly controlled cardiovascular risk factors) with CHD and may require an LDL-lowering drug combination *(Class IIa; Level of Evidence B)*. LDL-C-lowering with lifestyle therapy is useful if LDL-C level is ≥130 mg/dL, there are multiple risk factors, and the 10-y absolute CHD risk is 10% to 20%; or if LDL-C level is ≥160 mg/dL with multiple risk factors even if 10-y absolute CHD risk is <10%; or if LDL ≥190 mg/dL regardless of the presence or absence of other risk factors or CVD *(Class I; Level of Evidence B)*. Women: LDL-C-lowering drug therapy is recommended simultaneously with lifestyle therapy in women with CHD to achieve an LDL-C < 100 mg/dL *(Class I; Level of Evidence A)* and is also indicated in women with other atherosclerotic CVD or diabetes mellitus or 10-year absolute risk >20% *(Class I; Level of Evidence B)*.

Physical activity 30 minutes, 7 days per week (minimum 5 days per week)	• For all patients, assess risk with a physical activity history and/or an exercise test, to guide prescription. **I (B)** • For all patients, encourage 30 to 60 minutes of moderate-intensity aerobic activity, such as brisk walking, on most, preferably all, days of the week, supplemented by an increase in daily lifestyle activities (e.g., walking breaks at work, gardening, household work). **I (B)** • Encourage resistance training 2 days per week. **IIb (C)** • Advise medically supervised programs for high-risk patients (e.g., recent acute coronary syndrome or revascularization, heart failure). **I (B)** Women should be advised to accumulate at least 150 min/wk of moderate exercise, 75 min/wk of vigorous exercise, or an equivalent combination of moderate- and vigorous-intensity aerobic physical activity. Aerobic activity should be performed in episodes of at least 10 min, preferably spread throughout the week *(Class I; Level of Evidence B)*. Women should also be advised that additional cardiovascular benefits are provided by increasing moderate-intensity aerobic physical activity to 5 h (300 min)/wk, 2 1/2 h/wk of vigorous-intensity physical activity, or an equivalent combination of both *(Class I; Level of Evidence B)*. Women should be advised to engage in muscle-strengthening activities that involve all major muscle groups performed on ≥2 d/wk *(Class I; Level of Evidence B)*.
Weight management Body mass index: 18.5 to 24.9 kg/m^2 Waist circumference: men <40 inches, women <35 inches	• Assess body mass index and/or waist circumference on each visit and consistently encourage weight maintenance/reduction through an appropriate balance of physical activity, caloric intake, and formal behavioral programs when indicated to maintain/achieve a body mass index between 18.5 and 24.9 kg/m.^{2} **I (B)** • If waist circumference (measured horizontally at the iliac crest) is ≥35 inches in women and 40 inches in men, initiate lifestyle changes and consider treatment strategies for metabolic syndrome as indicated. **I (B)** • The initial goal of weight loss therapy should be to reduce body weight by approximately 10% from baseline. With success, further weight loss can be attempted if indicated through further assessment. **I (B)** Women who need to lose weight or sustain weight loss should be advised to accumulate a minimum of 60 to 90 min of at least moderate-intensity physical activity (e.g., brisk walking) on most, and preferably all, days of the week *(Class I; Level of Evidence B)*.
Diabetes management: HbA1c <7%	• Initiate lifestyle and pharmacotherapy to achieve near-normal HbA_{1C}. **I (B)** • Begin vigorous modification of other risk factors (e.g., physical activity, weight management, blood pressure control, and cholesterol management as recommended above). **I (B)** • Coordinate diabetic care with patient's primary care physician or endocrinologist. **I (C)**
Antiplatelet agents/anticoagulants	• Start aspirin 75 to 162 mg/d and continue indefinitely in all patients unless contraindicated. **I (A)** – For patients undergoing coronary artery bypass grafting, aspirin should be started within 48 hours after surgery to reduce saphenous vein graft closure. Dosing regimens ranging from 100 to 325 mg/d appear to be efficacious. Doses higher than 162 mg/d can be continued for up to 1 year. **I (B)** • Start and continue clopidogrel 75 mg/d in combination with aspirin for up to 12 months in patients after acute coronary syndrome or percutaneous coronary intervention with stent placement (≥1 month for bare metal stent, ≥3 months for sirolimus-eluting stent, and ≥6 months for paclitaxel-eluting stent). **I (B)** – Patients who have undergone percutaneous coronary intervention with stent placement should initially receive higher-dose aspirin at 325 mg/d for 1 month for bare metal stent, 3 months for sirolimus-eluting stent, and 6 months for paclitaxel-eluting stent. **I (B)** • Manage warfarin to international normalized ratio=2.0 to 3.0 for paroxysmal or chronic atrial fibrillation or flutter, and in post-myocardial infarction patients when clinically indicated (e.g., atrial fibrillation, left ventricular thrombus). **I (A)** • Use of warfarin in conjunction with aspirin and/or clopidogrel is associated with increased risk of bleeding and should be monitored closely. **I (B)** If a high-risk woman has an indication but is intolerant of aspirin therapy, clopidogrel should be substituted *(Class I; Level of Evidence B)*. For women with chronic or paroxysmal atrial fibrillation, warfarin should be used to maintain the INR at 2.0 to 3.0 unless they are considered to be at low risk for stroke (<1%/y or high risk of bleeding) *(Class I; Level of Evidence A)*. Aspirin: high-risk women Aspirin therapy (75-325 mg/d) should be used in women with CHD unless contraindicated *(Class I; Level of Evidence A)*. Aspirin therapy (75-325 mg/d) is reasonable in women with diabetes mellitus unless contraindicated *(Class IIa; Level of Evidence B)*. Aspirin: other at-risk or healthy women Aspirin therapy can be useful in women >65 y of age (81 mg daily or 100 mg every other day) if blood pressure is controlled and benefit for ischemic stroke and MI prevention is likely to outweigh risk of gastrointestinal bleeding and hemorrhagic stroke *(Class IIa; Level of Evidence B)* and may be reasonable for women >65 y of age for ischemic stroke prevention *(Class IIb; Level of Evidence B)*. Aspirin: atrial fibrillation Aspirin 75-325 mg should be used in women with chronic or paroxysmal atrial fibrillation with a contraindication to warfarin or at low risk of stroke (<1%/y or CHADS2 score of <2) *(Class I; Level of Evidence A)*. Dabigatran: atrial fibrillation Dabigatran is useful as an alternative to warfarin for the prevention of stroke and systemic thromboembolism in patients with paroxysmal to permanent AF and risk factors for stroke or systemic embolization who do not have a prosthetic heart valve or hemodynamically significant valve disease, severe renal failure (creatinine clearance <15 mL/min), or advanced liver disease (impaired baseline clotting function) *(Class I; Level of Evidence B)*.

Renin-angiotensin-aldosterone system blockers	**ACE inhibitors** • Start and continue indefinitely in all patients with left ventricular ejection fraction ≤40% and in those with hypertension, diabetes, or chronic kidney disease, unless contraindicated. **I (A)** • Consider for all other patients. **I (B)** • Among lower-risk patients with normal left ventricular ejection fraction in whom cardiovascular risk factors are well controlled and revascularization has been performed, use of ACE inhibitors may be considered optional. **IIa (B)** **Angiotensin receptor blockers** • Use in patients who are intolerant of ACE inhibitors and have heart failure or have had a myocardial infarction with left ventricular ejection fraction ≤40%. **I (A)** • Consider in other patients who are ACE inhibitor intolerant. **I (B)** • Consider use in combination with ACE inhibitors in systolic-dysfunction heart failure. **IIb (B)** **Aldosterone blockade** • Use in post–myocardial infarction patients, without significant renal dysfunction** or hyperkalemia,†† who are already receiving therapeutic doses of an ACE inhibitor and ß-blocker, have a left ventricular ejection fraction ≤40%, and have either diabetes or heart failure. **I (A)** Women: ACE inhibitors are contraindicated in pregnancy and ought to be used with caution in women who may become pregnant. Use of aldosterone blockade (e.g., spirololactone) after MI is indicated in women who do not have significant hypotension, renal dysfunction, or hyperkalemia who are already receiving therapeutic doses of an ACE inhibitor and ß-blocker and have LVEF≤40% with symptomatic heart failure *(Class I; Level of Evidence B)*.
ß-blockers	• Start and continue indefinitely in all patients who have had myocardial infarction, acute coronary syndrome, or left ventricular dysfunction with or without heart failure symptoms, unless contraindicated. **I (A)** • Consider chronic therapy for all other patients with coronary or other vascular disease or diabetes unless contraindicated. **IIa (C)** Women: ß-blockers should be used for up to 12 mo (Class I; Level of Evidence A) or up to 3 y *(Class I; Level of Evidence B)* in all women after MI or ACS with normal left ventricular function unless contraindicated.
Influenza vaccination	Patients with cardiovascular disease should have an influenza vaccination. **I (B)**

Classification of Recommendations	Class I: Conditions for which there is evidence and/or general agreement that a given procedure or treatment is beneficial, useful, and effective. Class II: Conditions for which there is conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of a procedure or treatment. Class IIa: Weight of evidence/opinion is in favor of usefulness/efficacy. Class IIb: Usefulness/efficacy is less well established by evidence/opinion. Class III: Conditions for which there is evidence and/or general agreement that a procedure/treatment is not useful/effective and in some cases may be harmful.
Level of Evidence	Level of Evidence A: Data derived from multiple randomized clinical trials or meta-analyses. Level of Evidence B: Data derived from a single randomized trial or nonrandomized studies. Level of Evidence C: Only consensus opinion of experts, case studies, or standard-of-care.
Classification of Recommendations and Level of Evidence are expressed in the ACC/AHA format.	

* Patients covered by these guidelines include those with established coronary and other atherosclerotic vascular disease, including peripheral arterial disease, atherosclerotic aortic disease, and carotid artery disease. Treatment of patients whose only manifestation of cardiovascular risk is diabetes will be the topic of a separate AHA scientific statement. ACE indicates angiotensin-converting enzyme.

† Non-HDL-C=total cholesterol minus HDL-C.

‡ Pregnant and lactating women should limit their intake of fish to minimize exposure to methylmercury.

§ When LDL-lowering medications are used, obtain at least a 30% to 40% reduction in LDL-C levels. If LDL-C <70 mg/dL is the chosen target, consider drug titration to achieve this level to minimize side effects and cost. When LDL-C <70 mg/dL is not achievable because of high baseline LDL-C levels, it generally is possible to achieve reductions of >50% in LDL-C levels by either statins or LDL-C–lowering drug combinations.

ǁ Standard dose of statin with ezetimibe, bile acid sequestrant, or niacin.

¶ The combination of high-dose statin+fibrate can increase risk for severe myopathy. Statin doses should be kept relatively low with this combination. Dietary supplement niacin must not be used as a substitute for prescription niacin.

Patients with very high triglycerides should not consume alcohol. The use of bile acid sequestrant is relatively contraindicated when triglycerides are >200 mg/dL.

** Creatinine should be <2.5 mg/dL in men and <2.0 mg/dL in women.

†† Potassium should be <5.0 mEq/L.