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Guide to Preventive Cardiology for Women

Lori Mosca, MD, PhD, Chair; Scott M. Grundy, MD, PhD; Debra Judelson, MD; Kathleen King, PhD, RN; Marian Limacher, MD; Suzanne Oparil, MD; Richard Pasternak, MD; Thomas A. Pearson, MD, PhD; Rita F. Redberg, MD; Sidney C. Smith, Jr, MD; Mary Winston, EdD, RD; Stanley Zinberg, MD

Endorsed by American Medical Women's Association, American College of Nurse Practitioners, American College of Obstetricians and Gynecologists, and Canadian Cardiovascular Society

Coronary heart disease (CHD) is the single leading cause of death and a significant cause of morbidity among American women.¹ Risk factors for CHD in women are well documented.² Compelling data from epidemiological studies and randomized clinical trials show that CHD is largely preventable. Assessment and management of several risk factors for CHD are cost-effective.³ Despite these facts, there are alarming trends in the prevalence and management of risk factors in women.² Smoking rates are declining less for women than for men. The prevalence of obesity is increasing, and ≈25% of women report no regular sustained physical activity.⁴ Approximately 52% of women >45 years old have elevated blood pressure, and ≈40% of women >55 years old have elevated serum cholesterol.⁵ The purpose of this statement is to highlight risk factor management strategies that are appropriate for women with a broad range of CHD risk. A more detailed description, including the scientific basis for these recommendations, is available in the 1997 American Heart Association scientific statement "Cardiovascular Disease in Women."²

Recently, the Centers for Disease Control and Prevention National Ambulatory Medical Care Survey⁶ showed clinicians are missing opportunities to prevent CHD. In this study of 29 273 routine office visits, women were counseled less often than men about exercise, nutrition, and weight reduction. In the multicenter Heart and Estrogen/progestin Replacement Study (HERS),⁷ only 10% of women enrolled with documented CHD had baseline LDL-cholesterol levels below a National Cholesterol Education Program (NCEP) target of 100 mg/dL. A recent national survey showed that women were significantly less likely than men to enroll in cardiac rehabilitation after an acute myocardial infarction (MI) or bypass surgery.⁸ This finding is especially important because post-MI patients not enrolled in cardiac rehabilitation are less likely to receive aggressive risk factor management.

Recommendations for the primary and secondary prevention of CHD have been published.^{9,10} Although those recommendations apply to women, there are aspects of risk factor management that are unique to women. Pregnancy and the preconception period are optimal times to review a woman's risk factor status and health behaviors to reduce future cardiovascular disease. Pregnant women should be strongly encouraged to discontinue smoking and not to relapse in the postpartum period. Avoidance of excess weight gain during pregnancy may reduce the risk of developing CHD in the future. An emphasis on prevention of CHD in postmenopausal women is particularly important because the incidence of CHD rises with age. The use of estrogen replacement therapy (ERT) to prevent CHD, osteoporosis, and possibly dementia is a difficult health decision for postmenopausal women. The potential benefits of therapy must be weighed against the possible risks, including breast cancer, gallbladder disease, thromboembolic disease, and endometrial cancer, although the last is reduced by concomitant use of a progestin.

The recent findings from HERS¹¹ have challenged previous observational data regarding the role of hormones in preventing subsequent cardiovascular events. HERS was the first large-scale, randomized, clinical trial in older postmenopausal women with confirmed coronary disease to test the efficacy and safety of hormone replacement therapy on clinical cardiovascular outcome in postmenopausal women. The study population included 2763 women (mean age 66.7 years) with established CHD randomly assigned to 0.625 mg conjugated equine estrogens (CEE) plus 2.5 mg of medroxyprogesterone acetate (MPA) per day or placebo. Participants were monitored for an average of 4.1 years for the main end point of nonfatal MI or CHD death. At study completion, no significant differences existed between groups for any cardiovascular end points.

Surprisingly, after 1 year, HERS showed an increase in cardiovascular events in the treatment arm, but in years 4 and 5, fewer events occurred than in the placebo arm. It has been hypothesized that possible early adverse effects of estrogen in women with CHD may be due to a procoagulant effect that may later be offset by an antiatherogenic benefit. MPA may also have adverse cardiovascular effects and may mitigate some of the beneficial effects of estrogen.² Although these hypotheses deserve further investigation, the overall null result from HERS does not support initiation of CEE combined with MPA in older postmenopausal women with confirmed coronary disease. For women with CHD already on ERT for ≥1 year, it may be reasonable to continue therapy while awaiting the results of a HERS follow-up study and other ongoing trials of ERT with clinical end points. The results of the HERS trial apply to women with preexisting CHD and may not apply to women free of vascular

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disease. Furthermore, this study does not take into consideration the other potential benefits of this therapeutic protocol, which are beyond the scope of this statement.

Data are lacking for determining the long-term cardiovascular effects of testosterone administered with ERT. Alternatives to traditional hormone replacement therapy are available, including soy phytoestrogens and selective estrogen receptor modulators (SERMs); however, a recommendation regarding their use for prevention of CHD has not been made at this time because of a lack of sufficient data.

Several other aspects of risk factor management are of heightened importance for women. Diabetes is a powerful risk factor in women, increasing CHD risk 3-fold to 7-fold compared with a 2-fold to 3-fold increase in risk in men.¹² This difference may be due to a particularly deleterious effect of diabetes on lipids and blood pressure in women.^{2,12} Therefore, recommendations are provided for management of diabetes with an emphasis on controlling concomitant risk factors.¹³ Low levels of HDL cholesterol are predictive of CHD in women and appear to be a stronger risk factor for women >65 years old than for men >65.¹⁴ Women tend to have higher HDL-cholesterol levels than men, and triglyceride levels may be a significant risk factor in women, especially older women. The current NCEP guidelines are outlined in the Table with a notation to consider more aggressive targets for HDL cholesterol and triglycerides in women.¹⁵ The NCEP also recommends the use of ERT before cholesterol-lowering drugs to reduce LDL cholesterol in postmenopausal women. In this statement, the recommendation has been modified to consider statins a first-line therapy in postmenopausal women on the basis of recent data that suggest women may have at least as much benefit from LDL-cholesterol reduction with statins as men.¹⁶

Recommendations for aggressive risk factor management are based on the future probability of a cardiovascular event. This strategy allows high-risk patients who have not yet had an event to be considered for more intensive treatment.¹⁷ It also recognizes that CHD is not a categorical event but rather a continuum of a progressive disease process. As the availability and use of noninvasive tools to detect asymptomatic CHD increase, the line between primary and secondary prevention may become less distinct. Substantial data support aggressive risk factor management in the setting of secondary prevention. However, because first cardiovascular events are often fatal in women, careful consideration should be given to individual risk factor management before onset of clinical CHD in women. The current recommendations are developed from previous guidelines and consensus panel statements along with newer gender-specific data when available.^{2,9,10,13,15,18–23} The recommendations can serve as a guide to risk factor management but cannot replace clinical judgment. As new knowledge is acquired, revised strategies for the prevention of CHD in women should reflect new science.

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KEY WORDS: AHA Scientific Statements ■ prevention ■ women ■ coronary disease

Guide to Risk Reduction for Women

Lifestyle Factors	Goal(s)	Screening	Recommendations
Cigarette smoking	<ol style="list-style-type: none"> 1. Complete cessation. 2. Avoid passive cigarette smoke. 	<ol style="list-style-type: none"> 1. Ask about current smoking status and exposure to others' cigarette smoke as part of routine evaluation. 2. Assess total exposure to cigarette smoke (pack-years) and prior attempts at quitting. 3. Evaluate readiness to stop smoking. 	<ol style="list-style-type: none"> 1. At each visit, strongly encourage patient and family to stop smoking. If complete cessation is not achievable, a reduction in intake is beneficial as a step toward cessation. 2. Reinforce nonsmoking status. 3. Provide counseling, nicotine replacement, and other pharmacotherapy as indicated in conjunction with behavioral therapy or a formal cessation program.
Physical activity	<ol style="list-style-type: none"> 1. Accumulate ≥ 30 min of moderate-intensity physical activity on most, or preferably all, days of the week. 2. Women who have had recent cardiovascular events or procedures should participate in cardiac rehabilitation, a physician-guided home exercise program, or a comprehensive secondary prevention program. 	<ol style="list-style-type: none"> 1. Ask about physical activity (household work as well as occupational and leisure-time physical activity) as part of routine evaluation. 2. In women with symptoms that suggest CVD or in previously sedentary women >50 y old with ≥ 2 risk factors for CVD, consider a stress test* to establish safety of exercise and to guide the exercise prescription. 	<ol style="list-style-type: none"> 1. Encourage a minimum of 30 min of moderate-intensity dynamic exercise (eg, brisk walking) daily. This may be performed in intermittent or shorter bouts (≥ 10 min) of activity throughout the day. 2. Women who already meet minimum standards may be encouraged to become more physically active or to include more vigorous activities. 3. Incorporate physical activity in daily activities (eg, using stairs). 4. Muscle strengthening and stretching exercises should be recommended as part of an overall activity program. 5. Recommend medically supervised programs for women who have had a recent MI or revascularization procedure.
Nutrition	<ol style="list-style-type: none"> 1. AHA Step I Diet in healthy women ($\leq 30\%$ fat, 8–10% saturated fat, and <300 mg/d cholesterol). 2. AHA Step II Diet in women with CVD or if a further reduction in cholesterol is needed ($\leq 30\%$ fat, $<7\%$ saturated fat, and <200 mg/d cholesterol). 3. Limit sodium chloride (salt) intake to 6 g/d. Women with high blood pressure may require further restriction. 4. Total dietary fiber intake of 25–30 g/d from foods. 5. Consume ≥ 5 servings of fruits and vegetables per day. 	<ol style="list-style-type: none"> 1. Assess nutritional habits as part of a routine evaluation in all women. 2. Consider formal dietary assessment in women with hyperlipidemia, diabetes, obesity, and hypertension. 	<ol style="list-style-type: none"> 1. Encourage a well-balanced and diversified diet that is low in saturated fat and high in fiber. 2. Use skim milk instead of milk with a higher fat content. 3. Diets rich in antioxidant nutrients (eg, vitamin C, E, and beta-carotene) and folate are preferred over nutritional supplements. Note: Daily supplements of 0.4 mg of folic acid are recommended for women of child-bearing age to help prevent neural tube defects. 4. Limit alcohol intake to ≤ 1 glass of alcohol per day. (1 glass=4 oz wine, 12 oz beer, or 1½ oz 80-proof spirits.) Pregnant women should abstain from drinking alcohol.
Weight management	<ol style="list-style-type: none"> 1. Achieve and maintain desirable weight. 2. Target BMI (weight in kilograms divided by height in meters squared) between 18.5 and 24.9 kg/m² (BMI of 25 kg/m²=110% of desirable body weight). 3. Desirable waist circumference <88 cm (<35 inches) in women with a BMI of 25–34.9 kg/m². 	<p>Measure patient's weight and height, calculate BMI, and measure waist circumference as part of a periodic evaluation.</p> <p>Note: BMI and waist circumference are used for diagnosis, and measurement of height and weight are used for follow-up.</p>	<ol style="list-style-type: none"> 1. Encourage gradual and sustained weight loss in persons whose weight exceeds the ideal weight for their height. 2. Formal nutritional counseling is encouraged for women with hypertension, hyperlipidemia, or elevated glucose levels associated with overweight. 3. The recommended weight gain during pregnancy is 25–35 lb if the patient's prepregnancy weight is normal. Adjust for multiple gestation and prepregnancy weight (eg, overweight women should gain 15–25 lb, obese women, <15 lb).

Continued

Lifestyle Factors (continued)	Goal(s)	Screening	Recommendations																		
Psychosocial factors	<ol style="list-style-type: none"> 1. Positive adaptation to stressful situations. 2. Improved quality of life. 3. Maintain or establish social connections. 	<ol style="list-style-type: none"> 1. Assess presence of stressful situations and response to stress as part of a routine evaluation. 2. Evaluate for depression, especially in women with recent cardiovascular events. 3. Assess social support system and evaluate for social isolation. 	<ol style="list-style-type: none"> 1. Encourage positive coping mechanisms for stress (eg, substitute physical activity for overeating or excessive smoking in response to stress). 2. Encourage adequate rest and relief for women who are caretakers of others. 3. Consider treatment of depression and anxiety when appropriate. 4. Encourage participation in social activities or volunteer work for socially isolated women. 																		
Risk Factors	Goals	Screening	Recommendations																		
Blood pressure	<ol style="list-style-type: none"> 1. Achieve and maintain blood pressure <140/90 mm Hg and lower if tolerated (optimal <120/80). 2. In pregnant women with hypertension, the goal of treatment is to minimize short-term risk of elevated blood pressure in the mother while avoiding therapy that may compromise the well-being of the fetus. 	<ol style="list-style-type: none"> 1. Measure blood pressure as part of a routine evaluation. 2. Follow-up is based on initial measurement as follows: <table border="1"> <thead> <tr> <th>SBP, mm Hg</th> <th>DBP, mm Hg</th> <th>Follow-up</th> </tr> </thead> <tbody> <tr> <td><130</td> <td><85</td> <td>Recheck in 2 y</td> </tr> <tr> <td>130–139</td> <td>85–89</td> <td>Recheck in 1 y</td> </tr> <tr> <td>140–159</td> <td>90–99</td> <td>Confirm in 2 mo</td> </tr> <tr> <td>160–179</td> <td>100–109</td> <td>Evaluate in 1 mo</td> </tr> <tr> <td>≥180</td> <td>≥110</td> <td>Evaluate in 1 wk</td> </tr> </tbody> </table> (Follow-up screening may be modified on the basis of prior history, symptoms, presence of other risk factors, and end organ damage.) 3. In pregnant women with hypertension, evaluate for preeclampsia. 	SBP, mm Hg	DBP, mm Hg	Follow-up	<130	<85	Recheck in 2 y	130–139	85–89	Recheck in 1 y	140–159	90–99	Confirm in 2 mo	160–179	100–109	Evaluate in 1 mo	≥180	≥110	Evaluate in 1 wk	<ol style="list-style-type: none"> 1. Promote the lifestyle behaviors described above (weight control, physical activity, moderation in alcohol intake) and moderate sodium restriction. 2. If blood pressure remains ≥140/90 mm Hg after 3 months of lifestyle modification or if initial level is >160 mm Hg systolic or 100 mm Hg diastolic, then initiate and individualize pharmacotherapy based on the patient's characteristics. 3. In pregnant women with hypertension, reduction of diastolic blood pressure to 90–100 mm Hg is recommended.
SBP, mm Hg	DBP, mm Hg	Follow-up																			
<130	<85	Recheck in 2 y																			
130–139	85–89	Recheck in 1 y																			
140–159	90–99	Confirm in 2 mo																			
160–179	100–109	Evaluate in 1 mo																			
≥180	≥110	Evaluate in 1 wk																			
Lipids, lipoproteins	<p>Primary goal:</p> <p>Women without CVD Lower risk (<2 risk factors) LDL goal <160 mg/dL (optimal <130 mg/dL) Higher risk (≥2 risk factors) LDL goal <130 mg/dL</p> <p>Women with CVD LDL ≤100 mg/dL</p> <p>Secondary goals: HDL >35 mg/dL Triglycerides <200 mg/dL</p> <p>Note: In women, the optimal level of triglycerides may be lower (≤150 mg/dL) and the HDL higher (≥45 mg/dL).</p>	<p>Women without CVD† Measure nonfasting total and HDL cholesterol and assess nonlipid risk factors. Follow-up is based on the following initial measurements: TC <200, HDL ≥45, follow-up in 5 years; TC <200, HDL <45, follow-up with fasting lipoprotein analysis. TC 200–239, HDL ≥45, and <2 risk factors, follow-up in 1–2 years. TC 200–239, HDL <45 or ≥2 risk factors, follow-up with fasting lipoprotein analysis. (All cholesterol values in mg/dL.)</p> <p>Women with CVD Fasting lipoprotein analysis (may take 4–6 wk to stabilize after cardiovascular event or bypass surgery).</p>	<ol style="list-style-type: none"> 1. Promote lifestyle approach in all women (diet, weight management, smoking avoidance, and exercise as described above). Rule out other secondary causes of dyslipidemia. 2. Suggested drug therapy for high LDL levels (defined as [a] ≥220 mg/dL in low-risk, premenopausal women, [b] ≥190 mg/dL in postmenopausal women with <2 risk factors, and [c] ≥160 mg/dL with ≥2 risk factors) is based on triglyceride level as follows: TG <200 mg/dL Statin, Resin, Niacin Note: ERT is an option for postmenopausal women, but treatment should be individualized and considered with other health risks. TG 200–400 mg/dL Statin, Niacin TG >400 mg/dL 3. Consider monotherapy with statin, niacin, fibrate, or a combination of the above. 																		
Diabetes	<p>For patients with diabetes:</p> <ol style="list-style-type: none"> 1. Maintain blood glucose: preprandial=80–120 mg/dL bedtime=100–140 mg/dL. 2. Maintain Hb A_{1c} <7%. 3. LDL <130 mg/dL (<100 mg/dL if established CVD). Note: Many authorities believe that LDL should be <100 mg/dL in all patients with diabetes. 4. Triglycerides <150 mg/dL. 5. Control blood pressure. 	<ol style="list-style-type: none"> 1. Monitor glucose and hemoglobin A_{1c} as part of a routine periodic evaluation in women with diabetes. 2. Screen for diabetes (fasting glucose >125 mg/dL or >200 mg/dL 2 h after 75 g glucose) as part of a periodic examination in women with risk factors for diabetes, such as obesity. 	<ol style="list-style-type: none"> 1. Encourage adoption of American Diabetes Association Diet (<30% fat, <10% saturated fat, 6–8% polyunsaturated fat, cholesterol <300 mg/d). 2. A low-calorie diet may be recommended for weight loss. 3. Encourage regular physical activity. 4. Pharmacotherapy with oral agents or insulin should be used when indicated. 																		

Continued

Pharmacological Interventions	Goal(s)	Screening	Recommendations
Hormone replacement therapy	<ol style="list-style-type: none"> 1. Initiation or continuation of therapy in women for whom the potential benefits may exceed the potential risks of therapy. (Short-term therapy is indicated for treatment of menopausal symptoms.) 2. Minimize risk of adverse side effects through careful patient selection and appropriate choice of therapy. 	<ol style="list-style-type: none"> 1. Review menstrual status of women >40 y old. 2. If menopausal status is unclear, measure FSH level. 	<ol style="list-style-type: none"> 1. Counsel all women about the potential benefits and risks of HRT, beginning at age 40 or as requested. 2. Individualize decision based on prior history and risk factors for CVD as well as risks of thromboembolic disease, gallbladder disease, osteoporosis, breast cancer, and other health risks. 3. Combination therapy with a progestin is usually indicated to prevent endometrial hyperplasia in a woman with an intact uterus and prescribed estrogen. The choice of agent should be made on an individual basis.
Oral contraceptives	<ol style="list-style-type: none"> 1. Minimize risk of adverse cardiovascular effects while preventing pregnancy. 2. Use the lowest effective dose of estrogen/progestin. 	Determine contraindications and cardiovascular risk factor status of women who are considering using oral contraceptives.	<ol style="list-style-type: none"> 1. Use of oral contraceptives is relatively contraindicated in women ≥ 35 y old who smoke. 2. Women with a family history of premature heart disease should have lipid analysis before taking oral contraceptives. 3. Women with significant risk factors for diabetes should have glucose testing before taking oral contraceptives. 4. If a woman develops hypertension while using oral contraceptives, she should be advised to stop taking them.
Antiplatelet agents/anticoagulants	Prevention of clinical thrombotic and embolic events in women with established CVD.	<ol style="list-style-type: none"> 1. Determine if contraindications to therapy exist at the time of the initial cardiovascular event. 2. Evaluate ongoing compliance, risk, and side effects as part of a routine follow-up evaluation. 	<ol style="list-style-type: none"> 1. If no contraindications, women with atherosclerotic CVD should use aspirin 80–325 mg/d. 2. Other antiplatelet agents, such as newer thienopyridine derivatives, may be used to prevent vascular events in women who cannot take aspirin.
β -blockers	To reduce the reinfarction rate, incidence of sudden death, and overall mortality in women after MI.	<ol style="list-style-type: none"> 1. Determine if contraindications to therapy exist at the time of the initial cardiovascular event. 2. Evaluate ongoing compliance, risk, and side effects as part of a routine follow-up evaluation. 	Start within hours of hospitalization in women with an evolving MI without contraindications. If not started acutely, treatment should begin within a few days of the event and continue indefinitely.
ACE inhibitors	To reduce morbidity and mortality among MI survivors and patients with LV dysfunction.	<ol style="list-style-type: none"> 1. Determine if contraindications to therapy exist at the time of the initial cardiovascular event. 2. Evaluate ongoing compliance, risk, and side effects as part of a routine follow-up evaluation. 	<ol style="list-style-type: none"> 1. Start early during hospitalization for MI unless hypotension or other contraindications exist. Continue indefinitely for all with LV dysfunction (ejection fraction $\leq 40\%$) or symptoms of congestive heart failure; otherwise, ACE inhibitors may be stopped at 6 wk. 2. Discontinue ACE inhibitors if a woman becomes pregnant.

CVD indicates cardiovascular disease; BMI, body mass index; SBP, systolic blood pressure; DBP, diastolic blood pressure; TC, total cholesterol; TG, triglycerides; HRT, hormone replacement therapy; and FSH, follicle-stimulating hormone.

*The choice of test modality should be based on the resting ECG, physical ability to exercise, and local expertise and technologies.

†The ACC and the AHA recommend cholesterol screening guidelines as outlined by the National Cholesterol Education Panel (measure total and HDL cholesterol at least once every 5 years in all adults ≥ 20 y old. The consensus panel recognizes that some organizations use other guidelines, such as the US Preventive Services Task Force, which recommends that cholesterol screening in women without risk factors begin at age 45 y.