2013 CVD Guidelines: Recommendation Summaries.

The item labelled “Table 1” below is actually duplicated on each individual guideline. The color codes for the ACC/AHA COR and LOE columns correspond to the level of evidence descriptions on this table.

Table 1. Applying Classification of Recommendation and Level of Evidence

SIZE OF TREATMENT EFFECT

ESTIMATE OF CERTAINTY (PRECISION) OF TREATMENT EFFECT	CLASS I *Benefit >>> Risk* Procedure/Treatment **SHOULD** be performed/ administered	CLASS IIa *Benefit >> Risk* *Additional studies with focused objectives needed* **IT IS REASONABLE** to perform procedure/administer treatment	CLASS IIb *Benefit ≥ Risk* *Additional studies with broad objectives needed; additional registry data would be helpful* Procedure/Treatment **MAY BE CONSIDERED**	CLASS III *No Benefit* or CLASS III *Harm* Procedure/ Test / Treatment COR III: No benefit — Not Helpful — No Proven Benefit COR III: Harm — Excess Cost w/o Benefit or Harmful — Harmful to Patients
LEVEL A Multiple populations evaluated* Data derived from multiple randomized clinical trials or meta-analyses	■ Recommendation that procedure or treatment is useful/effective ■ Sufficient evidence from multiple randomized trials or meta-analyses	■ Recommendation in favor of treatment or procedure being useful/effective ■ Some conflicting evidence from multiple randomized trials or meta-analyses	■ Recommendation's usefulness/efficacy less well established ■ Greater conflicting evidence from multiple randomized trials or meta-analyses	■ Recommendation that procedure or treatment is not useful/effective and may be harmful ■ Sufficient evidence from multiple randomized trials or meta-analyses
LEVEL B Limited populations evaluated* Data derived from a single randomized trial or nonrandomized studies	■ Recommendation that procedure or treatment is useful/effective ■ Evidence from single randomized trial or nonrandomized studies	■ Recommendation in favor of treatment or procedure being useful/effective ■ Some conflicting evidence from single randomized trial or nonrandomized studies	■ Recommendation's usefulness/efficacy less well established ■ Greater conflicting evidence from single randomized trial or nonrandomized studies	■ Recommendation that procedure or treatment is not useful/effective and may be harmful ■ Evidence from single randomized trial or nonrandomized studies
LEVEL C Very limited populations evaluated* Only consensus opinion of experts, case studies, or standard of care	■ Recommendation that procedure or treatment is useful/effective ■ Only expert opinion, case studies, or standard of care	■ Recommendation in favor of treatment or procedure being useful/effective ■ Only diverging expert opinion, case studies, or standard of care	■ Recommendation's usefulness/efficacy less well established ■ Only diverging expert opinion, case studies, or standard of care	■ Recommendation that procedure or treatment is not useful/effective and may be harmful ■ Only expert opinion, case studies, or standard of care
Suggested phrases for writing recommendations	should is recommended is indicated is useful/effective/beneficial	is reasonable can be useful/effective/beneficial is probably recommended or indicated	may/might be considered may/might be reasonable usefulness/effectiveness is unknown/unclear/uncertain or not well established	COR III: No Benefit is not recommended is not indicated should not be performed/ administered/ other is not useful/ beneficial/ effective
Comparative effectiveness phrases†	treatment/strategy A is recommended/indicated in preference to treatment B treatment A should be chosen over treatment B	treatment/strategy A is probably recommended/indicated in preference to treatment B it is reasonable to choose treatment A over treatment B		COR III: Harm potentially harmful causes harm associated with excess morbidity/mortality should not be performed/ administered/ other

A recommendation with Level of Evidence B or C does not imply that the recommendation is weak. Many important clinical questions addressed in the guidelines do not lend themselves to clinical trials. Even when randomized trials are unavailable, there may be a very clear clinical consensus that a particular test or therapy is useful or effective.

2013 ACC/AHA Guideline on the Assessment of Cardiovascular Risk

Table 4. Summary of Recommendations for Risk Assessment

Recommendations	NHLBI Grade	NHLBI Evidence Statements	ACC/AHA COR	ACC/AHA LOE
1. The race- and sex-specific Pooled Cohort Equations* to predict 10-year risk for a first hard ASCVD event should be used in nonHispanic African Americans and nonHispanic Whites, 40 to 79 years of age.	B (Moderate)	N/A	I	B (4-8)

2. Use of the sex-specific Pooled Cohort Equations for nonHispanic Whites may be considered when estimating risk in patients from populations other than African Americans and nonHispanic Whites.	E (Expert Opinion)	Appendix 2 CQ2/ES1	IIb	C
3. If, after quantitative risk assessment, a risk-based treatment decision is uncertain, assessment of 1 or more of the following—family history, hs-CRP, CAC score, or ABI—may be considered to inform treatment decision making.	E (Expert Opinion)	Appendix 1	IIb†	B (9-17)
4. The contribution to risk assessment for a first ASCVD event using ApoB, CKD, albuminuria, or cardiorespiratory fitness is uncertain at present.	N (No Recommendation For or Against)	Appendix 1	N/A	N/A
5. CIMT is not recommended for routine measurement in clinical practice for risk assessment for a first ASCVD event.	N (No Recommendation For or Against)	Appendix 1	III: No Benefit†	B (12,16,18)
6. It is reasonable to assess traditional ASCVD risk factors‡ every 4 to 6 years in adults 20 to 79 years of age who are free from ASCVD and to estimate 10-year ASCVD risk every 4 to 6 years in adults 40 to 79 years of age without ASCVD.	B (Moderate)	Appendix 2 CQ2/ES7	IIa	B (19,20)
7. Assessing 30-year or lifetime ASCVD risk based on traditional risk factors‡ may be considered in adults 20 to 59 years of age without ASCVD and who are not at high short-term risk.	C (Weak)	Appendix 2 CQ2/ES2, CQ2/ES3, CQ2/ES4, CQ2/ES5, CQ2/ES6	IIb	C (20-22)

A downloadable spreadsheet enabling estimation of 10-year and lifetime risk for ASCVD and a web-based calculator are available at http://my.americanheart.org/cvriskcalculator and http://www.cardiosource.org/science-and-quality/practice-guidelines-and-quality-standards/2013-prevention-guideline-tools.aspx.

*Derived from the ARIC study (8), CHS (5), CARDIA study (23), Framingham original and offspring cohorts (4,6).
†Based on new evidence reviewed during ACC/AHA update of evidence.
‡Age, sex, total and HDL–cholesterol, systolic BP, use of antihypertensive therapy, diabetes, and current smoking.

ABI indicates ankle-brachial index; ACC, American College of Cardiology; AHA, American Heart Association; ApoB, Apolipoprotein B; ASCVD, atherosclerotic cardiovascular disease; BP, blood pressure; CAC, coronary artery calcium;; CKD, chronic kidney disease; CIMT, carotid intima-media thickness; COR, Class of Recommendation; CQ, critical question, ES, evidence statement; HDL–C, high-density lipoprotein cholesterol; hs-CRP, high-sensitivity C-reactive protein; LOE, Level of Evidence; and NHLBI, National Heart, Lung, and Blood Institute.

2013 AHA/ACC Guideline on Lifestyle Management to Reduce Cardiovascular Risk

Table 5. Summary of Recommendations for Lifestyle Management

Recommendations	NHLBI Grade	NHLBI Evidence Statements	ACC/AHA COR	ACC/AHA LOE
DIET				

LDL–C - Advise adults who would benefit from LDL–C lowering* to:				
1. Consume a dietary pattern that emphasizes intake of vegetables, fruits, and whole grains; includes low-fat dairy products, poultry, fish, legumes, nontropical vegetable oils and nuts; and limits intake of sweets, sugar-sweetened beverages and red meats. a. Adapt this dietary pattern to appropriate calorie requirements, personal and cultural food preferences, and nutrition therapy for other medical conditions (including diabetes mellitus). b. Achieve this pattern by following plans such as the DASH dietary pattern, the USDA Food Pattern, or the AHA Diet.	A (Strong)	**CQ1:** ES4 (high), ES6 (low), ES8 (moderate), ES9 (moderate)	I	A
2. Aim for a dietary pattern that achieves 5% to 6% of calories from saturated fat.	A (Strong)	**CQ1:** ES11(high)	I	A
3. Reduce percent of calories from saturated fat.	A (Strong)	**CQ1:** ES11(high), ES12 (moderate), ES13 (moderate)	I	A
4. Reduce percent of calories from *trans* fat.	A (Strong)	**CQ1:** ES14 (moderate), ES15 (moderate)	I	A
BP - Advise adults who would benefit from BP lowering to:				
1. Consume a dietary pattern that emphasizes intake of vegetables, fruits, and whole grains; includes low-fat dairy products, poultry, fish, legumes, nontropical vegetable oils and nuts; and limits intake of sweets, sugar-sweetened beverages and red meats. a. Adapt this dietary pattern to appropriate calorie requirements, personal and cultural food preferences, and nutrition therapy for other medical conditions (including diabetes mellitus). b. Achieve this pattern by following plans such as the DASH dietary pattern, the USDA Food Pattern, or the AHA Diet.	A (Strong)	**CQ1:** ES1 (low) ES3 (high), ES5 (high), ES6 (low), ES7 (low), ES8 (moderate)	I	A
2. Lower sodium intake.	A (Strong)	**CQ2:** ES1 (high), ES2 (moderate), ES3 (high), ES4 (high), ES5 (high), ES8 (low), ES9 (low)	I	A
3. a. Consume no more than 2,400 mg of sodium/day; b. Further reduction of sodium intake to 1,500 mg/day is desirable since it is associated with even greater reduction in BP; and c. Reduce intake by at least 1,000 mg/day since that will lower BP, even if the desired daily sodium	B (Moderate)	**CQ2:** ES2 (moderate), ES3 (high)	IIa	B

intake is not yet achieved.				
4. Combine the DASH dietary pattern with lower sodium intake.	A (Strong)	**CQ1:** ES3 (high), ES5 (high), ES8 (moderate) **CQ2:** ES1 (high), ES2 (moderate), ES3 (high), ES4 (high), ES5 (high), ES6 (moderate)	I	A
PHYSICAL ACTIVITY				
Lipids 1. In general, advise adults to engage in aerobic physical activity to reduce LDL–C and non-HDL–C: 3 to 4 sessions a week, lasting on average 40 minutes per session, and involving moderate-to-vigorous intensity physical activity.	B (Moderate)	**CQ3:** ES1 (moderate), ES2 (moderate), ES5 (low)	IIa	A
BP 1. In general, advise adults to engage in aerobic physical activity to lower BP: 3 to 4 sessions a week, lasting on average 40 minutes per session, and involving moderate-to-vigorous intensity physical activity.	B (Moderate)	**CQ3:** ES1 (high)	IIa	A

*Refer to 2013 Blood Cholesterol Guideline for guidance on who would benefit from LDL–C lowering (5).

ACC indicates American College of Cardiology; AHA, American Heart Association; BP, blood pressure; COR, Class of Recommendation; CQ, critical question; DASH, Dietary Approaches to Stop Hypertension; ES, evidence statement; HDL–C, high-density lipoprotein cholesterol; LDL–C, low-density lipoprotein cholesterol; LOE, Level of Evidence; NHLBI, National Heart, Lung, and Blood Institute; and USDA, U.S. Department of Agriculture.

2013 AHA/ACC/TOS Guideline for the Management of Overweight and Obesity in Adults

Table 4. Summary of Recommendations for Obesity

Recommendations	NHLBI Grade	NHLBI ES	ACC/AHA COR	ACC/AHA LOE
Identifying Patients Who Need to Lose Weight (BMI and Waist Circumference)				
1a. Measure height and weight and calculate BMI at annual visits or more frequently.	E (Expert Opinion)	CQ2	I	C
1b. Use the current cutpoints for overweight (BMI >25.0-29.9 kg/m^2) and obesity (BMI ≥30 kg/m^2) to identify adults who may be at elevated risk of CVD and the current cutpoints for obesity (BMI ≥30) to identify adults who may be at elevated risk of mortality from all causes.	A (Strong)	CQ2	I	B
1c. Advise overweight and obese adults that the greater the BMI, the greater the risk of CVD, type 2 diabetes, and all-cause mortality.	A (Strong)	CQ2	I	B
1d. Measure waist circumference at annual visits or more frequently in overweight and obese adults. Advise adults that the greater the waist circumference, the greater the risk of CVD, type 2 diabetes, and all-cause mortality. The cutpoints currently in common use (from either NIH/NHLBI or WHO/IDF) may continue to be used to identify patients who may be at increased risk until further evidence becomes available.	E (Expert Opinion)	CQ2	IIa	B

Matching Treatment Benefits With Risk Profiles (Reduction in Body Weight Effect on CVD Risk Factors, Events, Morbidity and Mortality)				
2. Counsel overweight and obese adults with CV risk factors (high BP, hyperlipidemia and hyperglycemia), that lifestyle changes that produce even modest, sustained weight loss of 3%-5% produce clinically meaningful health benefits, and greater weight losses produces greater benefits. a. Sustained weight loss of 3%-5% is likely to result in clinically meaningful reductions in triglycerides, blood glucose, HbA1C, and the risk of developing type 2 diabetes; b. Greater amounts of weight loss will reduce BP, improve LDL–C and HDL–C, and reduce the need for medications to control BP, blood glucose and lipids as well as further reduce triglycerides and blood glucose.	A (Strong)	CQ1	I	A
Diets for Weight Loss (Dietary Strategies for Weight Loss)				
3a. Prescribe a diet to achieve reduced calorie intake for obese or overweight individuals who would benefit from weight loss, as part of a comprehensive lifestyle intervention. Any 1 of the following methods can be used to reduce food and calorie intake: a. Prescribe 1,200–1,500 kcal/day for women and 1,500–1,800 kcal/day for men (kcal levels are usually adjusted for the individual's body weight); b. Prescribe a 500 kcal/day or 750 kcal/day energy deficit; or c. Prescribe one of the evidence-based diets that restricts certain food types (such as high-carbohydrate foods, low-fiber foods, or high-fat foods) in order to create an energy deficit by reduced food intake.	A (Strong)	CQ3	I	A
3b. Prescribe a calorie-restricted diet, for obese and overweight individuals who would benefit from weight loss, based on the patient's preferences and health status and preferably refer to a nutrition professional* for counseling. A variety of dietary approaches can produce weight loss in overweight and obese adults, as presented in CQ3, ES2.	A (Strong)	CQ3	I	A
Lifestyle Intervention and Counseling (Comprehensive Lifestyle Intervention)				
4a. Advise overweight and obese individuals who would benefit from weight loss to participate for ≥6 months in a comprehensive lifestyle program that assists participants in adhering to a lower calorie diet and in increasing physical activity through the use of behavioral strategies.	A (Strong)	CQ4	I	A
4b. Prescribe on site, high-intensity (i.e., ≥14 sessions in 6 months) comprehensive weight loss interventions provided in individual or group sessions by a trained interventionist.†	A (Strong)	CQ4	I	A
4c. Electronically delivered weight loss programs (including by telephone) that include personalized feedback from a trained interventionist† can be	B (Moderate)	CQ4	IIa	A

prescribed for weight loss but may result in smaller weight loss than face-to-face interventions.				
4d. Some commercial-based programs that provide a comprehensive lifestyle intervention can be prescribed as an option for weight loss, provided there is peer-reviewed published evidence of their safety and efficacy.	B (Moderate)	CQ4	IIa	A
4e. Use a very low calorie diet (defined as <800 kcal/day) only in limited circumstances and only when provided by trained practitioners in a medical care setting where medical monitoring and high intensity lifestyle intervention can be provided. Medical supervision is required because of the rapid rate of weight loss and potential for health complications.	A (Strong)	CQ4	IIa‡	A
4f. Advise overweight and obese individuals who have lost weight to participate long-term (≥1 year) in a comprehensive weight loss maintenance program.	A (Strong)	CQ4	I	A
4g. For weight loss maintenance, prescribe face-to-face or telephone-delivered weight loss maintenance programs that provide regular contact (monthly or more frequent) with a trained interventionist† who helps participants engage in high levels of physical activity (i.e., 200-300 minutes/week), monitor body weight regularly (i.e., weekly or more frequent), and consume a reduced-calorie diet (needed to maintain lower body weight).	A (Strong)	CQ4	I	A
Selecting Patients for Bariatric Surgical Treatment for Obesity (Bariatric Surgical Treatment for Obesity)				
5a. Advise adults with a BMI ≥40 or BMI ≥35 with obesity-related comorbid conditions who are motivated to lose weight and who have not responded to behavioral treatment with or without pharmacotherapy with sufficient weight loss to achieve targeted health outcome goals that bariatric surgery may be an appropriate option to improve health and offer referral to an experienced bariatric surgeon for consultation and evaluation.	A (Strong)	CQ5	IIa§	A
5b. For individuals with a BMI <35, there is insufficient evidence to recommend for or against undergoing bariatric surgical procedures.	N (No Recommendation)	CQ5	N/A	N/A
5c. Advise patients that choice of a specific bariatric surgical procedure may be affected by patient factors, including age, severity of obesity/BMI, obesity-related comorbid conditions, other operative risk factors, risk of short- and long-term complications, behavioral and psychosocial factors, and patient tolerance for risk as well as provider factors (surgeon and facility).	E (Expert Opinion)	CQ5	IIb	C

*Nutrition professional: In the studies that form the evidence base for this recommendation, a registered dietitian usually delivered the dietary guidance; in most cases, the intervention was delivered in university nutrition departments or in hospital medical care settings where access to nutrition professionals was available.
†Trained Interventionist: In the studies reviewed, trained interventionists included mostly health professionals (e.g., registered dietitians, psychologists, exercise specialists, health counselors, or professionals in training) who adhered to formal protocols in weight management. In a few cases, lay persons were used as trained interventionists; they received instruction in weight management protocols (designed by health professionals) in programs that have been validated in high quality trials published in peer-reviewed journals.

2013 ACC/AHA Guideline on the Treatment of Blood Cholesterol to Reduce Atherosclerotic Cardiovascular Risk in Adults

Table 4. Recommendations for Treatment of Blood Cholesterol to Reduce Atherosclerotic Cardiovascular Risk in Adults—Statin Treatment
(High-, moderate-, and low-statin intensities are defined in Table 5)

Recommendations	NHLBI Grade	NHLBI Evidence Statements	ACC/AHA COR	ACC/AHA LOE
Treatment Targets				
1. The panel makes no recommendations for or against specific LDL–C or non-HDL–C targets for the primary or secondary prevention of ASCVD.	N (No recommendation)	1-4	N/A	N/A
Secondary Prevention				
1. High-intensity statin therapy should be initiated or continued as first-line therapy in women and men ≤75 years of age who have *clinical ASCVD**, unless contraindicated.	A (Strong)	1, 6-8, 10-23, 26-28	I	A
2. In individuals with *clinical ASCVD** in whom high-intensity statin therapy would otherwise be used, when high-intensity statin therapy is contraindicated† or when characteristics predisposing to statin-associated adverse effects are present, moderate-intensity statin should be used as the second option if tolerated (Table 8 for Safety of Statins, Recommendation 1).	A (Strong)	13-22, 24, 27, 28	I	A
3. In individuals with *clinical* ASCVD >75 years of age, it is reasonable to evaluate the potential for ASCVD risk-reduction benefits and for adverse effects, drug-drug interactions and to consider patient preferences, when initiating a moderate- or high-intensity statin. It is reasonable to continue statin therapy in those who are tolerating it.	E (Expert Opinion)	---	IIa	B (16,20-43)
Primary Prevention in Individuals ≥21 Years of Age With LDL–C ≥190 mg/dL				
1. Individuals with LDL–C ≥190 mg/dL or triglycerides ≥500 mg/dL should be evaluated for secondary causes of hyperlipidemia (Table 6).	B (Moderate)	75	I‡	B (44,45)
2. Adults ≥21 years of age with primary LDL–C ≥190 mg/dL should be treated with statin therapy (10-year ASCVD risk estimation is not required): • Use high-intensity statin therapy unless contraindicated. • For individuals unable to tolerate high-intensity statin therapy, use the maximum tolerated statin	B (Moderate)	6, 19, 28, 33-35, 37, 38	I§	B

intensity.				
3. For individuals ≥21 years of age with an untreated primary LDL–C ≥190 mg/dL, it is reasonable to intensify statin therapy to achieve at least a 50% LDL–C reduction.	E (Expert Opinion)	---	IIa	B (20,46-50)
4. For individuals ≥21 years of age with an untreated primary LDL–C ≥190 mg/dL, after the maximum intensity of statin therapy has been achieved, addition of a nonstatin drug may be considered to further lower LDL–C. Evaluate the potential for ASCVD risk reduction benefits, adverse effects, drug-drug interactions, and consider patient preferences.	E (Expert Opinion)	---	IIb	C (51)
Primary Prevention in Individuals With Diabetes Mellitus and LDL–C 70-189 mg/dL				
1. Moderate-intensity statin therapy should be initiated or continued for adults 40 to 75 years of age with diabetes mellitus.	A (Strong)	19, 29-34, 40	I	A
2. High-intensity statin therapy is reasonable for adults 40 to 75 years of age with diabetes mellitus with a ≥7.5% estimated 10-year ASCVD risk ‖ unless contraindicated.	E (Expert Opinion)	---	IIa	B (49,52)
3. In adults with diabetes mellitus, who are <40 or >75 years of age, it is reasonable to evaluate the potential for ASCVD benefits and for adverse effects, for drug-drug interactions, and to consider patient preferences when deciding to initiate, continue, or intensify statin therapy.	E (Expert Opinion)	---	IIa	C (53-62)
Primary Prevention in Individuals Without Diabetes Mellitus and With LDL–C 70 to 189 mg/dL				
1. The Pooled Cohort Equations should be used to estimate 10-year ASCVD ‖ risk for individuals with LDL–C 70 to 189 mg/dL without *clinical ASCVD** to guide initiation of statin therapy for the primary prevention of ASCVD.	E (Expert Opinion)	---	I	B (11)
2. Adults 40 to 75 years of age with LDL–C 70 to 189 mg/dL, without *clinical* ASCVD* or diabetes and an estimated 10-year ASCVD ‖ risk ≥7.5% should be treated with moderate- to high-intensity statin therapy.	A (Strong)	28, 34-36, 38, 42-44, 47, 49-56, 76	I	A
3. It is reasonable to offer treatment with a moderate-intensity statin to adults 40 to 75 years of age, with LDL–C 70 to 189 mg/dL, without *clinical* ASCVD* or diabetes and an estimated 10-year ASCVD ‖ risk of 5% to <7.5%.	C (Weak)	28, 34-36, 38, 42-44, 47, 49-56, 76	IIa	B
4. Before initiating statin therapy for the primary prevention of ASCVD in adults with LDL–C 70-189 mg/dL without *clinical* ASCVD* or diabetes it is reasonable for clinicians and patients to engage in a discussion which considers the potential for ASCVD risk reduction benefits and for adverse effects, for drug-drug interactions, and patient preferences for treatment.	E (Expert Opinion)	---	IIa	C (63)
5. In adults with LDL–C <190 mg/dL who are not otherwise identified in a statin benefit group, or for whom after quantitative risk assessment a risk-	E (Expert Opinion)	---	IIb	C (11,13)

based treatment decision is uncertain, additional factors¶ may be considered to inform treatment decision making. In these individuals, statin therapy for primary prevention may be considered after evaluating the potential for ASCVD risk reduction benefits, adverse effects, drug-drug interactions, and discussion of patient preferences.				
Heart Failure and Hemodialysis				
1. The Expert Panel makes no recommendations regarding the initiation or discontinuation of statins in patients with NYHA class II–IV ischemic systolic heart failure or in patients on maintenance hemodialysis.	N (No Recommendation)	71, 72	---	---

*Clinical ASCVD includes acute coronary syndromes, history of MI, stable or unstable angina, coronary or other arterial revascularization, stroke, TIA, or peripheral arterial disease presumed to be of atherosclerotic origin.
† Contraindications, warnings, and precautions are defined for each statin according to the manufacturer's prescribing information (64-70).
‡Individuals with secondary causes of hyperlipidemia were excluded from RCTs reviewed. Triglycerides >500 mg/dL were an exclusion criteria for almost all RCTs. Therefore, ruling out secondary causes is necessary to avoid inappropriate statin therapy.
§No RCTs included only individuals with LDL–C ≥190 mg/dL. However, many trials did include individuals with LDL–C ≥190 mg/dL and all of these trials consistently demonstrated a reduction in ASCVD events. In addition, the CTT meta-analyses have shown that each 39 mg/dL reduction in LDL–C with statin therapy reduced ASCVD events by 22%, and the relative reductions in ASCVD events were consistent across the range of LDL–C levels. Therefore, individuals with primary LDL–C ≥190 mg/dL should be treated with statin therapy.
‖Estimated 10-year or "hard" ASCVD risk includes first occurrence of nonfatal MI, CHD death, and nonfatal and fatal stroke as used by the Risk Assessment Work Group in developing the Pooled Cohort Equations.
¶These factors may include primary LDL–C ≥160 mg/dL or other evidence of genetic hyperlipidemias, family history of premature ASCVD with onset <55 years in a first degree male relative or <65 years in a first degree female relative, high sensitivity-C-reactive protein >2 mg/L, CAC score ≥300 Agatston units or ≥75 percentile for age, sex, and ethnicity (for additional information, see http://www.mesa-nhlbi.org/CACReference.aspx.), ABI <0.9, or lifetime risk of ASCVD. Additional factors that may aid in individual risk assessment may be identified in the future.

ALT indicates alanine transaminase; ACC, American College of Cardiology; AHA, American Heart Association; ASCVD, atherosclerotic cardiovascular disease; AST, aspartate aminotransferase; CAC, coronary artery calcium; CK, creatine kinase; COR, Class of Recommendation; HDL–C, high-density lipoprotein cholesterol; LDL–C, low-density lipoprotein cholesterol; LOE, Level of Evidence; NHLBI, National Heart, Lung, and Blood Institute; NYHA, New York Heart Association; RCTs, randomized controlled trials; TIA, transient ischemic attack; ULN, upper limit of normal; and ---, not applicable.

Table 8. Summary of Statin Safety Recommendations

Recommendations	NHLBI Grade	NHLBI Evidence Statements	ACC/AHA COR	ACC/AHA LOE
Safety				
1. To maximize the safety of statins, selection of the appropriate statin and dose in men and nonpregnant/nonnursing women should be based on patient characteristics, level of ASCVD* risk, and potential for adverse effects.	A (Strong)	46-55	I	B

Moderate-intensity statin therapy should be used in individuals in whom high-intensity statin therapy would otherwise be recommended when characteristics predisposing them to statin-associated adverse effects are present. Characteristics predisposing individuals to statin adverse effects include, but are not limited to: • Multiple or serious comorbidities, including impaired renal or hepatic function. • History of previous statin intolerance or muscle disorders. • Unexplained ALT elevations >3 times ULN. • Patient characteristics or concomitant use of drugs affecting statin metabolism. • >75 years of age. Additional characteristics that may modify the decision to use higher statin intensities may include, but are not limited to: • History of hemorrhagic stroke. • Asian ancestry.				
2a.CK should not be routinely measured in individuals receiving statin therapy.	A (Strong)	45, 49-51, 54, 55	III: No Benefit	A
2b.Baseline measurement of CK is reasonable for individuals believed to be at increased risk for adverse muscle events based on a personal or family history of statin intolerance or muscle disease, clinical presentation, or concomitant drug therapy that might increase the risk for myopathy.	E (Expert Opinion)	---	IIa	C (90)
2c.During statin therapy, it is reasonable to measure CK in individuals with muscle symptoms, including pain, tenderness, stiffness, cramping, weakness, or generalized fatigue.	E (Expert Opinion)	---	IIa	C (90)
3a.Baseline measurement of hepatic transaminase levels (ALT) should be performed before initiating statin therapy.	B (Moderate)	46, 52, 53	I†	B
3b.During statin therapy, it is reasonable to measure hepatic function if symptoms suggesting hepatotoxicity arise (e.g., unusual fatigue or weakness, loss of appetite, abdominal pain, dark-colored urine or yellowing of the skin or sclera).	E (Expert Opinion)	---	IIa	C (91)
4. Decreasing the statin dose may be considered when 2 consecutive values of LDL–C levels are <40 mg/dL.	C (Weak)	45	IIb	C
5. It may be harmful to initiate simvastatin at 80 mg daily or increase the dose of simvastatin to 80 mg daily.	B (Moderate)	6, 54	III: Harm	A (67,92)
6. Individuals receiving statin therapy should be evaluated for new-onset diabetes mellitus according to the current diabetes screening guidelines (93). Those who develop diabetes mellitus during statin therapy should be encouraged to adhere to a heart healthy dietary	B (Moderate)	44	I‡	B

pattern, engage in physical activity, achieve and maintain a healthy body weight, cease tobacco use, and continue statin therapy to reduce their risk of ASCVD events.				
7. For individuals taking any dose of statins, it is reasonable to use caution in individuals >75 years of age, as well as in individuals that are taking concomitant medications that alter drug metabolism, taking multiple drugs, or taking drugs for conditions that require complex medication regimens (e.g., those who have undergone solid organ transplantation or are receiving treatment for HIV). A review of the manufacturer's prescribing information may be useful before initiating any cholesterol-lowering drug.	E (Expert Opinion)	---	IIa	C (16,64-70,94-97)
8. It is reasonable to evaluate and treat muscle symptoms, including pain, tenderness, stiffness, cramping, weakness, or fatigue, in statin-treated patients according to the following management algorithm: • To avoid unnecessary discontinuation of statins, obtain a history of prior or current muscle symptoms to establish a baseline before initiating statin therapy. • If unexplained severe muscle symptoms or fatigue develop during statin therapy, promptly discontinue the statin and address the possibility of rhabdomyolysis by evaluating CK, creatinine, and a urinalysis for myoglobinuria. • If mild to moderate muscle symptoms develop during statin therapy: – Discontinue the statin until the symptoms can be evaluated. – Evaluate the patient for other conditions that might increase the risk for muscle symptoms (e.g., hypothyroidism, reduced renal or hepatic function, rheumatologic disorders such as polymyalgia rheumatica, steroid myopathy, vitamin D deficiency, or primary muscle diseases.) – If muscle symptoms resolve, and if no contraindication exists, give the patient the original or a lower dose of the same statin to establish a causal relationship between the muscle symptoms and statin therapy. – If a causal relationship exists, discontinue the original statin. Once muscle symptoms resolve, use a low dose of a different statin. – Once a low dose of a statin is tolerated, gradually increase the dose as tolerated. – If, after 2 months without statin treatment, muscle symptoms or elevated CK levels do not resolve completely, consider other	E (Expert Opinion)	---	IIa	B (15,90,98-100)

causes of muscle symptoms listed above. – If persistent muscle symptoms are determined to arise from a condition unrelated to statin therapy, or if the predisposing condition has been treated, resume statin therapy at the original dose.				
9. For individuals presenting with a confusional state or memory impairment while on statin therapy, it may be reasonable to evaluate the patient for nonstatin causes, such as exposure to other drugs, as well as for systemic and neuropsychiatric causes, in addition to the possibility of adverse effects associated with statin drug therapy.	E (Expert Opinion)	---	IIb	C (38,95,101,102)

*Based on the presence of clinical ASCVD, diabetes mellitus, LDL–C >190 mg/dL, or level of estimated 10-year ASCVD risk.

†Individuals with elevated ALT levels (usually >1.5 or 2 times ULN) were excluded from RCT participation. Unexplained ALT >3 times ULN is a contraindication to statin therapy as listed in manufacturer's prescribing information.

‡Statins use is associated with a very modest excess risk of new onset diabetes in RCTs and meta-analyses of RCTs (i.e., 0.1 excess case per 100 individuals treated 1 year with moderate-intensity statin therapy and 0.3 excess cases per 100 individuals treated for 1 year with high-intensity statin therapy. The increased risk of new onset diabetes appears to be confined to those with risk factors for diabetes. These individuals are also at higher risk of ASCVD due to these risk factors. Therefore, if a statin-treated individual develops diabetes as detected by current diabetes screening guidelines, they should be counseled to adhere to a heart healthy dietary pattern, engage in physical activity, achieve and maintain a healthy body weight, cease tobacco use, and continue statin therapy to reduce their risk of ASCVD events.

ALT indicates alanine transaminase; ACC, American College of Cardiology; AST, aspartate aminotransferase; CK, creatine kinase; AHA, American Heart Association; COR, Class of Recommendation; LDL–C, low-density lipoprotein cholesterol; LOE, Level of Evidence; ASCVD, atherosclerotic cardiovascular disease; NHLBI, National Heart, Lung, and Blood Institute; RCTs, randomized controlled trials; TIA, transient ischemic attack; ULN, upper limit of normal; and ---, not applicable.

Table 9. Summary of Nonstatin Safety Recommendations

Recommendations	NHLBI Grade	NHLBI Evidence Statements	ACC/AHA COR	ACC/AHA LOE
Safety of Niacin				
1. Baseline hepatic transaminases, fasting blood glucose or hemoglobin A1c, and uric acid should be obtained before initiating niacin, and again during up-titration to a maintenance dose and every 6 months thereafter.	B (Moderate)	77	I	B
2. Niacin should not be used if: • Hepatic transaminase elevations are higher than 2 to 3 times ULN. • Persistent severe cutaneous symptoms, persistent hyperglycemia, acute gout or unexplained abdominal pain or gastrointestinal symptoms occur. • New-onset atrial fibrillation or weight loss occurs.	A (Strong)	79	III: Harm	B
	B (Moderate)	78,79	III: Harm	B
	C (Weak)	80	III: Harm	B
3. In individuals with adverse effects from niacin, the potential for ASCVD benefits and the potential for adverse effects should be reconsidered before reinitiating niacin therapy.	E (Expert)	---	I	B (9,103-106)
4. To reduce the frequency and severity of adverse cutaneous symptoms, it is reasonable to: • Start niacin at a low dose and titrate to a higher dose over a period of weeks as tolerated. • Take niacin with food or premedicating with aspirin 325 mg 30 minutes before niacin dosing to alleviate flushing symptoms. • If an extended-release preparation is used, increase the dose of extended-release niacin from 500 mg to a maximum of 2,000 mg/day over 4 to 8 weeks, with the dose of extended-release niacin increasing not more than weekly. • If immediate-release niacin is chosen, start at a dose of 100 mg 3 times daily and up-titrate to 3 g/day, divided into 2 or 3 doses.	E (Expert)	---	IIa	C (9,103-106)
Safety of BAS				

1. BAS should not be used in individuals with baseline fasting triglyceride levels ≥300 mg/dL or type III hyperlipoproteinemia, because severe triglyceride elevations might occur. (A fasting lipid panel should be obtained before BAS is initiated, 3 months after initiation, and every 6 to 12 months thereafter.)	C (Weak)	60	III: Harm	B
2. It is reasonable to use BAS with caution if baseline triglyceride levels are 250 to 299 mg/dL, and evaluate a fasting lipid panel in 4 to 6 weeks after initiation. Discontinue the BAS if triglycerides exceed 400 mg/dL.	E (Expert)	---	IIa	C (107)
Safety of Cholesterol-Absorption Inhibitors				
1. It is reasonable to obtain baseline hepatic transaminases before initiating ezetimibe. When ezetimibe is coadministered with a statin, monitor transaminase levels as clinically indicated, and discontinue ezetimibe if persistent ALT elevations >3 times ULN occur.	C (Weak)	61-64	IIa	B
Safety of Fibrates				
1. Gemfibrozil should not be initiated in patients on statin therapy because of an increased risk for muscle symptoms and rhabdomyolysis.	B (Moderate)	46	III: Harm	B
2. Fenofibrate may be considered concomitantly with a low- or moderate-intensity statin only if the benefits from ASCVD risk reduction or triglyceride lowering when triglycerides are >500 mg/dL, are judged to outweigh the potential risk for adverse effects.	E (Expert)	---	IIb	C (14)
3. Renal status should be evaluated before fenofibrate initiation, within 3 months after initiation, and every 6 months thereafter. Assess renal safety with both a serum creatinine level and an eGFR based on creatinine.			I	B
• Fenofibrate should not be used if moderate or severe renal impairment, defined as eGFR <30 mL/min per 1.73 m2, is present. • If eGFR is between 30 and 59 mL/min per 1.73 m2, the dose of fenofibrate should not exceed 54 mg/day. • If, during follow-up, the eGFR decreases persistently to ≤30 mL/min per 1.73 m2, fenofibrate should be discontinued.	B (Moderate)	66, 67	III: Harm	B
Safety of Omega-3 Fatty Acids				
1. If EPA and/or DHA are used for the management of severe hypertriglyceridemia, defined as triglycerides ≥500 mg/dL, it is reasonable to evaluate the patient for gastrointestinal disturbances, skin changes, and bleeding.	C (Weak)	70	IIa	B

ALT indicates alanine transaminase; ACC, American College of Cardiology; ASCVD, atherosclerotic cardiovascular disease; BAS, bile acid sequestrants; AHA, American Heart Association; COR, Class of Recommendation; DHA, docosahexanoic acid; EPA, eicosapentaenoic acid; eGFR, estimated glomerular filtration rate; LOE, Level of Evidence; NHLBI, National Heart, Lung, and Blood Institute; ULN, upper limit of normal; and ---, not applicable.

Table 10. Summary of Recommendations for Monitoring, Optimizing, and Insufficient Response to Statin Therapy

Recommendations	NHLBI Grade	NHLBI Evidence Statements	ACC/AHA COR	ACC/AHA LOE
Monitoring Statin Therapy				
1. Adherence to medication and lifestyle, therapeutic response to statin therapy, and safety should be regularly assessed. This should also include a fasting lipid panel performed within 4 to 12 weeks after initiation or dose adjustment, and every 3 to 12 months thereafter. Other safety measurements should be measured as clinically indicated.	A (Strong)	45	I	A

Optimizing Statin Therapy				
1. The maximum tolerated intensity of statin should be used in individuals for whom a high- or moderate-intensity statin is recommended, but not tolerated.	B (Moderate)	25, 26, 27, 45	I*	B
Insufficient Response to Statin Therapy				
1. In individuals who have a less-than-anticipated therapeutic response or are intolerant of the recommended intensity of statin therapy, the following should be performed: • Reinforce medication adherence. • Reinforce adherence to intensive lifestyle changes. • Exclude secondary causes of hyperlipidemia.	A (Strong)	45	I	A
2. It is reasonable to use the following as indicators of anticipated therapeutic response to the recommended intensity of statin therapy. Focus is on the intensity of the statin therapy. As an aid to monitoring: • High-intensity statin therapy† generally results in an average LDL–C reduction of ≥50% from the untreated baseline; • Moderate-intensity statin therapy generally results in an average LDL–C reduction of 30 to <50% from the untreated baseline; • LDL–C levels and percent reduction are to be used only to assess response to therapy and adherence. They are not to be used as performance standards.	E (Expert Opinion)	—	IIa	B (46-48,79,108,109)
3. In individuals at higher ASCVD risk receiving the maximum tolerated intensity of statin therapy who continue to have a less-than-anticipated therapeutic response, addition of a nonstatin cholesterol-lowering drug(s) may be considered if the ASCVD risk-reduction benefits outweigh the potential for adverse effects. Higher-risk individuals include: • Individuals with *clinical* ASCVD‡ <75 years of age. • Individuals with baseline LDL–C ≥190 mg/dL. • Individuals 40 to 75 years of age with diabetes mellitus. Preference should be given to nonstatin cholesterol-lowering drugs shown to reduce ASCVD events in RCTs.	E (Expert Opinion)	—	IIb	C (9,14,110-112)
4. In individuals who are candidates for statin	E (Expert	—	IIa	B (90,103,113-

treatment but are completely statin intolerant, it is reasonable to use nonstatin cholesterol-lowering drugs that have been shown to reduce ASCVD events in RCTs if the ASCVD risk-reduction benefits outweigh the potential for adverse effects.	Opinion)			118)

*Several RCTs found that low and low-moderate intensity statin therapy reduced ASCVD events. In addition, the CTT meta-analyses found each 39 mg/dL reduction in LDL–C reduces ASCVD risk by 22%. Therefore, the Panel considered that submaximal statin therapy should be used to reduce ASCVD risk in those unable to tolerate moderate- or high-intensity statin therapy.

†In those already on a statin, in whom baseline LDL–C is unknown, an LDL–C <100 mg/dL was observed in most individuals receiving high-intensity statin therapy.

‡*Clinical* ASCVD includes acute coronary syndromes, or a history of MI, stable or unstable angina, coronary or other arterial revascularization, stroke, TIA, or peripheral arterial disease presumed to be of atherosclerotic origin.

ACC indicates American College of Cardiology; AHA, American Heart Association; ASCVD, atherosclerotic cardiovascular disease; COR, Class of Recommendation; LDL–C, low-density lipoprotein cholesterol; LOE, Level of Evidence; NHLBI, National Heart, Lung, and Blood Institute; RCTs, randomized controlled trials; and ---, not applicable.

2014 Evidence-Based Guideline for the Management of High Blood Pressure in Adults

Report from the Panel Members Appointed to the Eighth Joint National Committee (JNC 8) *(JAMA*. doi:10.1001/jama.2013.284427. Published online December 18, 2013.)

Box. Recommendations for Management of Hypertension

Recommendation 1
In the general population aged ≥60 years, initiate pharmacologic treatment to lower blood pressure (BP) at systolic blood pressure (SBP) ≥150 mm Hg or diastolic blood pressure (DBP) ≥90 mm Hg and treat to a goal SBP <150 mm Hg and goal DBP <90 mm Hg. (Strong Recommendation – Grade A)

Corollary Recommendation
In the general population aged ≥60 years, if pharmacologic treatment for high BP results in lower achieved SBP (eg, <140 mm Hg) and treatment is well tolerated and without adverse effects on health or quality of life, treatment does not need to be adjusted. (Expert Opinion – Grade E)

Recommendation 2
In the general population <60 years, initiate pharmacologic treatment to lower BP at DBP ≥90 mm Hg and treat to a goal DBP <90 mm Hg. (For ages 30-59 years, Strong Recommendation – Grade A; For ages 18-29 years, Expert Opinion – Grade E)

Recommendation 3
In the general population <60 years, initiate pharmacologic treatment to lower BP at SBP ≥140 mm Hg and treat to a goal SBP <140 mm Hg. (Expert Opinion – Grade E)

Recommendation 4
In the population aged ≥18 years with chronic kidney disease (CKD), initiate pharmacologic treatment to lower BP at SBP ≥140 mm Hg or DBP ≥90 mm Hg and treat to goal SBP <140 mm Hg and goal DBP <90 mm Hg. (Expert Opinion – Grade E)

Recommendation 5
In the population aged ≥18 years with diabetes, initiate pharmacologic treatment to lower BP at SBP ≥140 mm Hg or DBP ≥90 mm Hg and treat to a goal SBP <140 mm Hg and goal DBP <90 mm Hg. (Expert Opinion – Grade E)

Recommendation 6
In the general nonblack population, including those with diabetes, initial antihypertensive treatment should include a thiazide-type diuretic, calcium channel blocker (CCB), angiotensin-converting enzyme inhibitor (ACEI), or angiotensin receptor blocker (ARB). (Moderate Recommendation – Grade B)

Recommendation 7
In the general black population, including those with diabetes, initial antihypertensive treatment should include a thiazide-type diuretic or CCB. (For general black population: Moderate Recommendation – Grade B; for black patients with diabetes: Weak Recommendation – Grade C)

Recommendation 8
In the population aged ≥18 years with CKD, initial (or add-on) antihypertensive treatment should include an ACEI or ARB to improve kidney outcomes. This applies to all CKD patients with hypertension regardless of race or diabetes status. (Moderate Recommendation – Grade B)

Recommendation 9
The main objective of hypertension treatment is to attain and maintain goal BP. If goal BP is not reached within a month of treatment, increase the dose of the initial drug or add a second drug from one of the classes in recommendation 6 (thiazide-type diuretic, CCB, ACEI, or ARB). The clinician should continue to assess BP and adjust the treatment regimen until goal BP is reached. If goal BP cannot be reached with 2 drugs, add and titrate a third drug from the list provided. Do not use an ACEI and an ARB together in the same patient. If goal BP cannot be reached using only the drugs in recommendation 6 because of a contraindication or the need to use more than 3 drugs to reach goal BP, antihypertensive drugs from other classes can be used. Referral to a hypertension specialist may be indicated for patients in whom goal BP cannot be attained using the above strategy or for the management of complicated patients for whom additional clinical consultation is needed. (Expert Opinion – Grade E)

to increase. In 2 of the trials that provide evidence supporting an SBP goal lower than 150 mm Hg, the average treated SBP was 143 to 144 mm Hg.[2,3] Many participants in those studies achieved an SBP lower than 140 mm Hg with treatment that was generally well tolerated. Two other trials[9,10] suggest there was no benefit for an SBP goal lower than 140 mm Hg, but the confidence intervals around the effect sizes were wide and did not exclude the possibility of a clinically important benefit. Therefore, the panel included a corollary recommendation based on expert opinion that treatment for hypertension does not need to be adjusted if treatment results in SBP lower than 140 mm Hg and is not associated with adverse effects on health or quality of life.

While all panel members agreed that the evidence supporting recommendation 1 is very strong, the panel was unable to reach unanimity on the recommendation of a goal SBP of lower than 150 mm Hg. Some members recommended continuing the JNC 7 SBP goal of lower than 140 mm Hg for individuals older than 60 years based on expert opinion.[12] These members concluded that the evidence was insufficient to raise the SBP target from lower than 140 to lower than 150 mm Hg in high-risk groups, such as black persons, those with CVD including stroke, and those with multiple risk factors. The panel agreed that more research is needed to identify optimal goals of SBP for patients with high BP.

Recommendation 2

In the general population younger than 60 years, initiate pharmacologic treatment to lower BP at DBP of 90 mm Hg or higher and treat to a goal DBP of lower than 90 mm Hg.
For ages 30 through 59 years, Strong Recommendation – Grade A
For ages 18 through 29 years, Expert Opinion – Grade E

Recommendation 2 is based on high-quality evidence from 5 DBP trials (HDFP, Hypertension-Stroke Cooperative, MRC, ANBP, and VA Cooperative) that demonstrate improvements in health outcomes among adults aged 30 through 69 years with elevated BP.[13-18] Initiation of antihypertensive treatment at a DBP threshold of 90 mm Hg or higher and treatment to a DBP goal of lower than 90 mm Hg reduces cerebrovascular events, heart failure, and overall mortality (question 1, evidence statements 10, 11, 13; question 2, evidence statement 10). In further support for a DBP goal of lower than 90 mm Hg, the panel found evidence that there is no benefit in treating patients to a goal of either 80 mm Hg or lower or 85 mm Hg or lower compared with 90 mm Hg or lower based on the HOT trial, in which patients were randomized to these 3 goals without statistically significant differences between treatment groups in the primary or secondary outcomes (question 2, evidence statement 14).[19]

In adults younger than 30 years, there are no good- or fair-quality RCTs that assessed the benefits of treating elevated DBP on health outcomes (question 1, evidence statement 14). In the absence of such evidence, it is the panel's opinion that in adults younger than 30 years, the DBP threshold and goal should be the same as in adults 30 through 59 years of age.

Recommendation 3

In the general population younger than 60 years, initiate pharmacologic treatment to lower BP at SBP of 140 mm Hg or higher and treat to a goal SBP of lower than 140 mm Hg.
Expert Opinion – Grade E