SPECIAL ARTICLE

# Management of High Blood Pressure in African Americans

## *Consensus Statement of the Hypertension in African Americans Working Group of the International Society on Hypertension in Blacks*

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The purpose of this consensus statement is to offer primary care providers (including physicians, nurse practitioners, and physician assistants) a practical, evidence-based clinical tool for achieving blood pressure goals in African American patients. The need for specific recommendations for African Americans is highlighted by compelling evidence of a higher prevalence of hypertension and poorer cardiovascular and renal outcomes in this group than in white Americans. African Americans have disturbingly higher rates of cardiovascular mortality, stroke, hypertension-related heart disease, congestive heart failure, type 2 diabetes mellitus, hypertensive nephropathy, and end-stage renal disease (ESRD).[1,2]

Large population-based studies have demonstrated that as diastolic blood pressure (DBP) and systolic blood pressure (SBP) increase, the risk of cardiovascular events and renal failure also increases continuously.[3-6] Remarkably, this is true even for individuals with normal blood pressure. Framingham Heart Study investigators[7] recently reported that for individuals who had blood pressure lower than 140/90 mm Hg at study entry, only 5% of those with optimal blood pressure (<120/80 mm Hg) developed high blood pressure over the next 4 years, compared with 18% of those with normal blood pressure (120-129/80-84 mm Hg) and 37% of those with high-normal blood pressure (130-139/85-89 mm Hg). Early identification of high-normal blood pressure is especially relevant to African Americans. Studies have also shown that African American children, girls in particular, have significantly higher blood pressure than do age-matched white children, starting before age 10 years.[8-10] An earlier onset of elevated blood pressure undoubtedly makes a substantial contribution to higher rates of cardiovascular and kidney disease and decreased life expectancy in African Americans than in white Americans.[11]

*For editorial comment see page 521*

The goal of management of high blood pressure is to assist patients to achieve and maintain a blood pressure that will optimally reduce cardiovascular and renal morbidity and mortality. Barriers to normalizing blood pressure in African Americans have been largely attributed to biologic and social factors, with an inadequate focus on the role of medical management. Undiagnosed, untreated, and inadequately treated hypertension results in an enormous burden of disease for African Americans. Simply stated, a key obstacle is the failure of medical providers to treat high blood pressure early and to

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continue treating it persistently to reach and maintain an appropriate target blood pressure.[12] This may be related to a common perception that it is medically more difficult to lower blood pressure in African Americans than in other patients. This perception is unjustified. Furthermore, it may lower providers' outcome expectancy for African Americans and thwart their efforts to appropriately manage high blood pressure in these patients.

The recommendations in this article are based on evidence from clinical trials, a synthesis of existing guidelines, current pharmacologic options, and the consensus of the expert opinions of the members of the Hypertension in African Americans Working Group (HAAW Group). In preparation, we evaluated data from clinical trials that have enrolled significant numbers of African Americans, including the Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial (ALLHAT),[13] in which 36% of subjects were African American, and the African American Study of Kidney Disease and Hypertension (AASK).[14] A listing of guidelines and scientific statements that were reviewed for their relevance to African Americans are given in a box at the end of this article. In particular, we considered the relevance of 2 major hypertension guidelines to the management of high blood pressure in African Americans: the "Sixth Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC VI)"[1] and the "1999 World Health Organization–International Society of Hypertension (WHO-ISH) Guidelines for the Management of Hypertension."[15]

The recommendations in the present consensus statement differ from these other guidelines in 2 substantial ways. First, we recommend lower blood pressure goals for patients with diabetes or with nondiabetic renal disease accompanied by proteinuria characterized by more than 1 g/d (<130/80 mm Hg). Second, we recommend the use of combination therapy as first-line therapy for patients with an SBP of 15 mm Hg or more or a DBP of 10 mm Hg or more above target blood pressure.

## GENERAL APPROACH

This article describes "best practice" strategies for assessing cardiovascular risk; setting, achieving, and maintaining appropriate blood pressure levels; assisting patients to implement therapeutic lifestyle changes; and initiating effective pharmacologic interventions early and persistently in nonpregnant African American adults with high blood pressure. The recommendations in this article represent a consensus of the opinions of members of the HAAW Group and are based on data within the public domain.

Identifying an optimal management plan for each patient is the key element for successful blood pressure reduction. In the past decade, there have been 3 major paradigm shifts in treating high blood pressure that are particularly applicable to the management of hypertension in African Americans: (1) urging and supporting therapeutic lifestyle changes; (2) conducting a thorough cardiovascular risk assessment; and (3) achieving and maintaining a target blood pressure that is determined by the individual's level of risk.[1,15] In addition, there is presently a more intense emphasis on lowering SBP than previously, particularly in older adults,[16] and increased use of low-dose combination therapy to achieve target blood pressure goals.[1] Furthermore, there is an increasing amount of data showing that appropriate agent selection is an important factor in providing target-organ protection.[1,15,17-25]

The importance of treating high blood pressure persistently to reach and maintain an appropriate target pressure in African Americans cannot be overstated. To succeed, primary care providers will need to heighten their awareness of cardiovascular risk, recognize early markers of target-organ disease, and set blood pressure goals that are related to the individual's risk profile. Success is generally the result of appropriate interventions, including therapeutic lifestyle changes and drug treatment, while failure often indicates an approach that was not sufficiently intense and persistent. Success also depends on creating a therapeutic alliance between provider and patient; to this end, providers must possess the ability to recognize and alleviate patient- and provider-related barriers as well as economic and social barriers to controlling high blood pressure in African American patients.

## RISK ASSESSMENT

Cardiovascular risk assessment is used to identify high-risk patients who need immediate, intense medical intervention. Risk factors for developing high blood pressure, coronary heart disease (CHD), and cardiovascular disease should be identified in African Americans across the life span in all primary care settings. High blood pressure is an independent risk factor for adverse cardiovascular and renal outcomes; thus, African Americans of all ages should be educated about prevalent behaviors that increase the risk of developing high blood pressure, including smoking, obesity, inactivity, high dietary fat and sodium, low dietary potassium, and moderate or high alcohol intake. Because increased risk for cardiovascular events begins early in life, clinical markers associated with hypertension that are known to be prevalent in African Americans—such as low birth weight[26] and a strong family history for cardiovascular disease, diabetes, and premature heart disease—should be recognized as an important part of the entire clinical picture.

A cardiovascular risk assessment is conducted by evaluating the patient's medical history, family history, and health-related behaviors, along with clinical information obtained from the physical examination and laboratory studies. Elements of the adult risk assessment are outlined in **Table 1**. Analysis of data from the Framingham Heart Study[27] has made it possible to predict the likelihood of a CHD event occurring in an individual who currently does not have CHD. A simple tool based on data from the Framingham Heart Study can be used to assess the relative importance of CHD risk factors and to estimate a risk

level for these individuals.[28] This tool was recently validated for African American men and women.[29]

The major risk factors for CHD are cigarette smoking, elevated blood pressure (whether treated or untreated), elevated serum total cholesterol and low-density lipoprotein cholesterol levels, low serum high-density lipoprotein cholesterol level, diabetes, and advancing age.[1,15,28] Obesity and inactivity, which are known to worsen the impact of other major risk factors, have also been designated as major risk factors for CHD by the American Heart Association.[30,31] African Americans have a high prevalence of obesity and inactivity, both of which should be viewed as major risk factors in this population. It is also relevant to assess the risk for other adverse cardiovascular and renal outcomes in African Americans, particularly stroke and hypertensive nephropathy. Additional risk factors for cardiovascular disease include preexisting cardiovascular or kidney disease, history of a cardiovascular event, central obesity, blood pressure above the appropriate target level, elevated blood glucose level, male sex, postmenopausal status, family history of cardiovascular disease in women younger than 65 years or men younger than 55 years, evidence of target-organ damage, low socioeconomic status, and elevated triglyceride levels[1,15,32] (**Table 2**).

Microalbuminuria (urinary albumin excretion of 30-299 mg/d), even in the nondiabetic, nonhypertensive population, has been shown to be an independent risk factor for cardiovascular and renal disease.[33-35] Therefore, assessment for microalbuminuria should be conducted in patients with diabetes mellitus (type 1 or type 2), longstanding hypertension (controlled or uncontrolled), or renal insufficiency (hypertensive nephrosclerosis),[36] and may also be useful for risk assessment in patients with significant cardiovascular risk factors[33] (Table 2). Screening for microalbuminuria can be performed most efficiently using a random, spot-collection urine sample for measurement of albumin-creatinine ratio.[37]

**Table 1. Elements of an Initial Cardiovascular Risk Assessment in African American Adults**

| |
|---|
| History |
| Family history of high blood pressure, CHD, CVD, or type 2 diabetes mellitus |
| Previous diagnosis of high blood pressure, known duration, levels of blood pressure elevation, treatment |
| Smoking history |
| Current alcohol consumption |
| Leisure-time physical activity |
| Dietary assessment |
| Environmental assessment (neighborhood, housing, employment, workplace) |
| Use of street drugs (in particular, cocaine, amphetamines, phencyclidine) |
| Current medications (including over-the-counter medications, supplements, herbal products, and home remedies) |
| Medical and psychiatric history (particularly those that may affect choice of antihypertensive agent, eg, COPD, erectile dysfunction, depression) |
| Physical examination |
| Measure height and weight (calculate BMI, if indicated) |
| Observe for central adiposity (measure waist circumference if indicated) |
| Perform cardiovascular and pulmonary examination |
| Measure blood pressure using appropriate technique |
| Perform funduscopic retinal examination |
| Laboratory studies |
| Fasting lipid profile (including total cholesterol, LDL-C, HDL-C, and triglycerides) |
| Serum creatinine |
| Random urinalysis for protein or protein-creatinine ratio |
| Fasting plasma glucose |
| Electrocardiogram |
| Echocardiogram (if suspicion of LVH) |
| Microalbuminuria (in patients with type 1 or type 2 diabetes mellitus, longstanding treated or untreated high blood pressure, or renal insufficiency [hypertensive nephrosclerosis]) |

Abbreviations: BMI, body mass index; CHD, coronary heart disease; COPD, chronic obstructive pulmonary disease; CVD, cardiovascular disease; HDL-C, high-density lipoprotein cholesterol; LDL-C, low-density lipoprotein cholesterol; LVH, left ventricular hypertrophy.

Many individuals have a cluster of major risk factors that are referred to as the metabolic syndrome. The clinical characteristics of this syndrome are listed in **Table 3**. A defining characteristic of the metabolic syndrome is insulin resistance, usually associated with increased insulin levels and dyslipidemia. Epidemiologic data from the Third National Health and Nutrition Examination Survey (NHANES III) and reported by the American Heart Association[2] show that predisposing factors for the metabolic syndrome and cardiovascular risk—including type 2 diabetes mellitus, obesity, and inactivity—are more prevalent in African Americans than in whites. Thus, providers should assess patients for clinical signs of the metabolic syndrome when appropriate.

Regardless of the clinical tools used to identify a patient's relative level of cardiovascular risk, labeling a patient as high risk is of no value if appropriate interventions are not immediately initiated and persistently continued. The clinical tasks of the provider that follow cardiovascular risk assessment are to (1) determine the appropriate blood pressure goal; (2) assist the patient to achieve therapeutic lifestyle changes; (3) determine the appropriate intensity of pharmacologic intervention; and (4) select the most appropriate therapeutic regimen. In addition to identifying, achieving, and maintaining an appropriate blood pressure goal, interventions should be initiated for all modifiable risk factors and associated clinical conditions that are identified through risk assessment.

## SETTING BLOOD PRESSURE GOALS

The larger the burden of risk, the more imperative it is to reach blood pressure goals. For patients at high risk for cardiovascular events—in particular, those with type 2 diabetes mellitus (with or without nephropathy) or with nondiabetic renal disease with proteinuria

**Table 2. Major Cardiovascular Risk Factors in African Americans**

| |
|---|
| Behavioral markers that increase risk for development of high blood pressure[1,7] |
| Smoking |
| Obesity |
| Inactivity |
| Excessive alcohol intake |
| High dietary intake of fat and sodium |
| Low dietary intake of potassium |
| Clinical markers associated with high blood pressure[1,7,26] |
| Low birth weight |
| Family history of CVD, diabetes, or premature heart disease |
| High-normal blood pressure (130-139/85-89 mm Hg) |
| Adult weight gain |
| Major risk factors for CHD[28,30,32] |
| Smoking |
| Elevated blood pressure (whether treated or untreated) |
| Elevated serum total cholesterol or LDL-C levels |
| Low serum HDL-C level |
| Diabetes mellitus |
| Advancing age |
| Obesity |
| Inactivity |
| Additional important risk factors for CVD[1,32] |
| History of cardiovascular event (MI, stroke, revascularization) |
| Kidney disease |
| Evidence of target-organ damage (proteinuria, LVH, heart failure, TIA, peripheral arterial disease, atherosclerosis, retinopathy) |
| Male or postmenopausal woman |
| Family history of CVD in women aged <65 y or men aged <55 y |
| Central obesity |
| Elevated blood glucose level |
| Low socioeconomic status |
| Elevated triglyceride levels |
| Microalbuminuria |

Abbreviations: CHD, coronary heart disease; CVD, cardiovascular disease; HDL-C, high-density lipoprotein cholesterol; LDL-C, low-density lipoprotein cholesterol; LVH, left ventricular hypertrophy; MI, myocardial infarction; TIA, transient ischemic attack.

**Table 3. Characteristic Findings Related to the Metabolic Syndrome***

| Risk Factor | Definition |
|---|---|
| Abdominal or central obesity | Waist circumference >40 in (>102 cm) for men or >35 in (>89 cm) for women |
| Atherogenic dyslipidemia | |
| Elevated triglyceride levels | ≥150 mg/dL (≥1.70 mmol/L) |
| Low HDL-C level | <40 mg/dL (<1.04 mmol/L) for men or <50 mg/dL (<1.30 mmol/L) for women |
| High blood pressure | ≥130/85 mm Hg |
| Elevated fasting blood glucose level | ≥110 mg/dL (≥6.1 mmol/L) |

Abbreviation: HDL-C, high-density lipoprotein cholesterol.
*Diagnosis of the metabolic syndrome is made when the patient exhibits 3 or more risk factors.[32]

characterized by more than 1 g/d—the blood pressure target should be lower than 130/80 mm Hg.

Because the relationship between increasing blood pressure and cardiovascular events is continuous, the degree of blood pressure elevation (treated or untreated) over the target goal is a critical element of individual risk assessment. While hypertension is currently defined as blood pressure of 140/90 mm Hg or higher for the purpose of epidemiologic investigations, optimal blood pressure is known to be lower than 120/80 mm Hg.[1,15] Standards for identification of blood pressure stages are outlined in **Table 4**.

Both WHO-ISH[15] and JNC VI[1] guidelines recommend that all individuals with uncomplicated hypertension should at minimum achieve a target SBP of lower than 140 mm Hg and DBP of lower than 90 mm Hg. Patients with uncomplicated hypertension are those who do not have diabetes or evidence of target-organ damage, who have no history of a cardiovascular event, and who are at low or moderate risk for CHD. It is important to lower both SBP and DBP to the target goals. Achieving one component of the blood pressure goal without achieving the other (eg, reducing blood pressure from 180/90 mm Hg to 150/80 mm Hg) does not offer patients adequate protection.

Compelling evidence demonstrates that maintaining lower blood pressure reduces cardiovascular morbidity and mortality and slows the progression of renal disease for patients with diabetes or renal insufficiency.[17,38-42] While JNC VI[1] recommends a target blood pressure goal of lower than 130/85 mm Hg for all patients with diabetes and patients with nondiabetic renal disease with proteinuria characterized by more than 1 g/d, some data suggest that even lower blood pressure goals may be desirable. A report developed by the National Kidney Foundation Hypertension and Diabetes Executive Committees Working Group[43] recommends a target goal of lower than 130/80 mm Hg for all patients with diabetes, renal insufficiency, or both; this report also recommends lower blood pressure levels (<125/75 mm Hg) for individuals who have proteinuria characterized by more than 1 g/d, regardless of etiology.

In January 2002, a position statement issued by the American Diabetes Association[44] regarding treatment of hypertension in adults with diabetes recommended a target blood pressure of lower than 130/80 mm Hg for all patients with diabetes. The present recommendation of the HAAW Group to lower the DBP goal to lower than 80 mm Hg in African Americans with diabetes was based on an evaluation of randomized clinical trials, including several large trials that have been published subsequent to publication of the JNC VI[1] and WHO-ISH[15] guidelines[13,14,17,45,46] and 2 small studies (N=86) that included African American patients with dia-

betic nephropathy. One of these small studies enrolled solely African American patients,[47] and the other enrolled 24% African American patients.[48] Schrier and colleagues[42] recently reported a lower rate of stroke and less progression of albuminuria and diabetic retinopathy in patients with type 2 diabetes mellitus who achieved and maintained a mean blood pressure of 128/75 mm Hg during a mean follow-up period of 5.3 years.

Blood pressure reduction has been shown to slow the progression of renal disease, which is particularly important for African Americans, who are 3 to 4 times more likely to develop ESRD than white Americans.[49] A meta-analysis of long-term clinical trials demonstrated that increasing preservation of renal function is associated with decreasing blood pressure over a continuum of values.[50] However, data from AASK,[14] which enrolled nearly 1094 nondiabetic African American patients with hypertensive renal disease, showed no significant difference in the progression of renal disease between the group of patients assigned to the usual blood pressure goal (mean achieved blood pressure, 140/85 mm Hg) and the group assigned to a lower blood pressure goal (mean achieved blood pressure, 127/77 mm Hg). Because of this, we recommend a target blood pressure of lower than 140/90 mm Hg for nondiabetic patients with hypertensive renal disease accompanied by proteinuria characterized by less than 1 g/d. There were too few participants in AASK with proteinuria characterized by more than 1 g/d to make a blood pressure recommendation for this group. Therefore, based on current recommendations for patients with nondiabetic renal disease and proteinuria characterized by more than 1 g/d, we recommend a blood pressure target that is lower than 130/80 mm Hg.[1,15] A blood pressure target that is set lower than 140/90 mm Hg (eg, <130/80 mm Hg) may also be preferred for patients with a history of a cardiovascular event, stroke, or transient ischemic attacks[51]; evidence of target-organ damage, including microalbuminuria[52-54]; or CHD or high risk for CHD.

**Table 4. Classification of Blood Pressure Stages for Adults 18 Years and Older***

| Category | Systolic Blood Pressure, mm Hg | Diastolic Blood Pressure, mm Hg |
|---|---|---|
| Optimal | <120 | <80 |
| Normal | <130 | <85 |
| High-normal | 130-139 | 85-89 |
| Stage 1 hypertension | 140-159 | 90-99 |
| Stage 2 hypertension | 160-179 | 100-109 |
| Stage 3 hypertension | ≥180 | ≥110 |
| Isolated systolic hypertension† | ≥140 | <90 |

*Classification is based on blood pressure values without antihypertensive therapy. When systolic and diastolic blood pressures fall into different categories, the higher category should be selected to classify blood pressure status. A diagnosis of hypertension should be based on an average of 2 or more measurements taken during each of 3 or more visits.[1,15]

†Isolated systolic hypertension can be categorized according to stages 1 to 3, based on degree of systolic blood pressure and diastolic blood pressure less than 90 mm Hg.[1,15]

## THERAPEUTIC LIFESTYLE CHANGES

It is vital that providers assume the important responsibility of offering ongoing education and support for individuals and families in their efforts to lead healthier lives in the areas of diet, physical activity, smoking, and alcohol use. Weight maintenance or reduction, increased physical activity, moderation of salt and alcohol intake, and tobacco avoidance are important therapeutic lifestyle changes that can lower blood pressure.[1,55-57] Changing health behaviors is not an easy task, and patients deserve ongoing education and support from primary care providers in their efforts. Without an adequate understanding of the causes and consequences of elevated blood pressure, patients are less likely to embark on lifelong lifestyle changes or comply with long-term pharmacologic therapy. Patients should be informed that the risks of untreated hypertension include irreparable damage to any or all of the target organs—heart, blood vessels, brain, kidneys, and eyes.

Because obesity, high sodium and low potassium intake, and inadequate physical activity have been identified as particular obstacles to cardiovascular health in African Americans,[2,58-61] it is appropriate to emphasize their importance. However, a healthy diet is more important than weight loss,[62] and enjoyable physical activity is beneficial even if it is not strenuous or associated with weight loss.[31] Plans for diet, exercise, and other needed changes should be initiated in the primary care setting; realistic, appropriate goals should be established. Recommendations should be specific, individually tailored, and well supported with counseling efforts and effective patient education materials (**Table 5**).[1,15,55,56]

### Dietary Goals

There are several potential nutritional variables that may contribute to lowering blood pressure—weight loss, reduced dietary fats and sodium, increased potassium intake, increased dietary fiber, and reduction of alcohol intake, among others. However, only those dietary changes that individuals and their families can safely and readily follow over a lifetime will actually produce health benefits.[56] The emphasis should be on healthy choices, not dietary restrictions.

Dietary Approaches to Stop Hypertension (DASH)[62] is a randomized, controlled dietary study that compares the effect on blood pressure of the DASH diet (rich in fruits, vegetables, fiber, and low-fat dairy foods; includes meat and poultry, but with reduced saturated and total fats) with a typical, high-fat, control diet (that was either high or low in fruits and vegetables) in 459 adults with normal or elevated blood pressure. After 8 weeks, the DASH diet reduced SBP and DBP significantly more than the other diets, without any weight loss or sodium restriction. Importantly, the DASH diet was particularly beneficial in African American participants and in all participants

**Table 5. Therapeutic Lifestyle Changes**

| Medical Target | Realistic Personal Plan to Achieve Goal |
|---|---|
| Normal weight for height | Lose weight gradually by making permanent changes in daily diet for the entire family. |
| | Set a reasonable weight loss goal (even 5-10 lb [2.2-4.5 kg] can make a difference). |
| | Eat fewer fast food and fried foods, and eat more fruits and vegetables. |
| Dietary goals: | Eat more grains, fresh fruits, and vegetables. |
| Low fat | Eat fewer overall fats and use healthier fats, such as olive oil. |
| Low sodium | Eat fewer processed foods and fast foods. |
| High potassium | Read labels and pay attention to the sodium and fat content of foods. |
| Adequate calcium | Identify high-sodium foods (eg, potato chips or hot dogs) that can be comfortably omitted. |
| | Identify low-sodium, high-potassium snacks (eg, dried fruits, bananas, orange juice, raw vegetables). |
| | Do not salt foods when cooking; instead, taste foods first and add salt at the table if needed. |
| | Use vinegar or lemon juice instead of salt for seasoning. |
| | Do not season foods with smoked meats, such as bacon or ham hocks. |
| | Become more aware of food sources that are rich in calcium. |
| | If lactose intolerant, try lactose-free milk or yogurt, or drink calcium-fortified juices or soy milk. |
| Limit alcohol | Men: no more than 2 beers, 1 glass of wine, or 1 shot of whiskey (or hard liquor) per day. |
| | Women: no more than 1 beer or 1 glass of wine per day (a shot of whiskey exceeds these recommendations). |
| Physical fitness | Increase physical activity as part of the daily routine; eg, if currently sedentary, get off the bus 6 blocks from home, or walk in the evening with a spouse or friend. |
| | Gradually increase time spent at an enjoyable activity to 30-45 min at least 5 times a week. |
| No tobacco use | For nonsmokers, do not start. |
| | For current smokers, attempt smoking cessation, increase tolerance for failure, and be willing to continue the effort until success is achieved. |
| | Be aware that smokeless tobacco products (eg, chewing tobacco) also have associated risks. |

with hypertension, but it was most effective in African Americans with high blood pressure. Among all participants with hypertension (n=133), the DASH diet reduced SBP and DBP by 11.6 mm Hg and 5.3 mm Hg, respectively, and among African American participants with hypertension (n=88), the DASH diet reduced SBP and DBP by 13.2 mm Hg and 6.1 mm Hg, respectively.[62] The DASH diet plus sodium restriction was also studied and was found to be associated with additional lowering of blood pressure, an effect that was also more pronounced in African American patients than in others.[63] It is important to note that this diet, which was based on typically available foods, reduced blood pressure in patients with stage 1 hypertension by about as much as a typical antihypertensive agent.

The DASH diet is a heart-healthy program from which all Americans could benefit. Providers should strongly recommend the low-sodium DASH diet to all African American patients, with or without high blood pressure, and provide educational materials, which are readily available. Patients following the DASH diet, which is based on an intake of 2000 calories a day, maintained a constant body weight; however, the number of calories in the diet can be reduced for overweight individuals. The diet is described in **Table 6**.

In all populations, including African American populations, there appears to be a positive association between sodium excretion and blood pressure.[63-65] Similar to white Americans, salt sensitivity in African Americans has been linked to obesity.[66] However, it has been hypothesized that African Americans may be more salt sensitive and consume less potassium than white Americans. Thus, increasing dietary potassium while moderating sodium chloride intake to the recommended less than 2.4-g/d level is likely to be beneficial in African Americans with hypertension (but without renal failure).[55] For motivated patients who desire greater dietary effects on lowering blood pressure, weight reduction or further sodium reduction is likely to produce further blood pressure lowering. Data from phase 2 of the randomized Trials of Hypertension Prevention (TOHP II)[67] demonstrated that clinically significant long-term reductions in blood pressure and reduced risk for hypertension can be achieved with a modest weight loss of about 10 pounds (4.5 kg).

### Physical Activity Goals

Regular physical activity helps control weight, reduces the risk of developing high blood pressure or diabetes, reduces the likelihood of dying prematurely from heart disease, and reduces feelings of depression.[68] Individualized, realistic plans should be suggested, including taking a walk every day or dancing or moving to music at home. High-intensity and moderate-intensity energy-expending activities such as brisk walking, bicycling, jogging, swimming and sports such as tennis, baseball, and basketball are especially beneficial when performed regularly. Low-intensity activities are possible for almost everyone and also confer long-term health benefits similar to those associated with higher-intensity activities, if the duration of activity is increased. Low-intensity activities include walking, walking a dog, golf, gardening, yard work, housework, yoga, tai chi, stretching, chair exercise, water exercise, and prescribed home exercise adapted to the individual.[31]

### Other "Heart Healthy" Interventions

Smoking cessation should be strongly encouraged and supplemented with support, education, and medical interventions as needed.[69] Cholesterol-lowering therapy, including dietary modifications and

**Table 6. The DASH Diet***

| Food Group | Daily Servings (Except as Noted) | Serving Sizes | Examples for a Typical African American Diet | Significance of Each Food Group to the DASH Diet |
|---|---|---|---|---|
| Grains and grain products | 7-8 | 1 slice bread<br>1 c (0.24 L) ready-to-eat cereal†<br>½ c (0.12 L) cooked rice, pasta, or cereal | Bread, biscuit, cornbread, cereals, oatmeal, grits, rice, pasta, crackers, unsalted pretzels | Major sources of energy and fiber |
| Vegetables | 4-5 | 1 c raw leafy vegetable<br>½ c cooked vegetable<br>6 oz (180 mL) vegetable juice | Fresh, canned or frozen vegetables: tomatoes, corn, potatoes, greens (eg, collards, kale, turnip greens, spinach), yams, squash, carrots, okra | Rich sources of potassium, magnesium, and fiber |
| Fruits | 4-5 | 1 medium-size fruit<br>½ c dried fruit<br>½ c fresh, frozen, or canned fruit<br>6 oz fruit juice | Bananas, grapes, apples, oranges, unsweetened fruit juices, grapefruit, mangoes, melons, peaches, dried fruits | Important sources of potassium, magnesium, and fiber |
| Low-fat or fat-free dairy foods | 2-3 | 8 oz (240 mL) milk<br>1 c yogurt<br>1½ oz (42 g) cheese | Fat-free (skim) or low-fat (1%) milk, fat-free cheeses, low-fat yogurt, low-fat ice cream, or frozen yogurt | Major sources of calcium and protein |
| Lean meats, poultry, and fish | ≤2 | 3 oz (84 g) cooked lean meats, poultry (remove skin), or fish<br>Broil or roast, rather than fry | Chicken, turkey, ground turkey or chicken, chicken sausage, lean pork, or beef<br>Fish and seafood: haddock, halibut, flounder, catfish, salmon, shrimp, crab, oysters, clams | Rich sources of protein and magnesium |
| Nuts, seeds, and beans | 4-5 per week | ⅓ c (0.08 L) or 1½ oz (42 g) nuts<br>1 tbsp (15 mL) or ½ oz (14 g) seeds<br>½ c cooked dry beans | Black beans, kidney beans, navy beans, pigeon peas, pinto beans, split peas, peanuts (roasted or boiled), almonds, pecans, walnuts, hazelnuts | Rich sources of energy, magnesium, potassium, protein, and fiber |
| Fats and oils‡ | 2-3 | 1 tsp (5 mL) soft margarine<br>1 tbsp low-fat mayonnaise<br>2 tbsp (30 mL) light salad dressing<br>1 tsp vegetable oil | Margarine, low-fat mayonnaise, light salad dressing, vegetable oil (olive, corn, canola, or safflower) | Reduced fat from typical diet (>30% of total calories) to 27% of total calories |
| Sweets | 5 per week | 1 tbsp sugar<br>1 tbsp jelly or jam<br>½ oz jelly beans<br>8 oz lemonade | Sugar, jelly, jam, honey, molasses, hard candy, fruit ices | Sweets should be those that are low in fat |

*The Dietary Approaches to Stop Hypertension (DASH) dietary plan shown here is based on 2000 calories a day. The number of daily servings may vary according to the individual's daily caloric requirements.
†Serving size should be based on the product's nutrition label.
‡Fat content may change serving counts for fats and oils: eg, 1 tbsp of regular salad dressing equals 1 serving; 1 tbsp of a low-fat dressing equals one-half serving; 1 tbsp of a fat-free dressing equals 0 serving.

lipid-lowering therapy, should be prescribed, based on recent guidelines and cholesterol target goals published by the National Cholesterol Education Program[32] (**Table 7**).

There is evidence that the rate of bystander-initiated cardiopulmonary resuscitation (CPR), as well as the rate of survival after out-of-hospital sudden cardiac arrest, is significantly lower among African Americans than among whites.[70] Patients should be encouraged to learn CPR. They should also be educated in the benefits of aspirin therapy for acute myocardial infarction (MI). Daily aspirin therapy inhibits platelet aggregation and can reduce the risks of heart attack and stroke in a wide range of patients with cardiovascular disease. Therefore, unless contraindicated, patients with CHD or at high risk for CHD should be prescribed daily aspirin therapy (75-325 mg/d).[71]

## PHARMACOLOGIC INTERVENTIONS

To reach appropriate blood pressure goals, most individuals will likely require combination antihypertensive therapy. The rationale for lowering blood pressure to a specified goal is to protect target organs from hypertension-related damage and to reduce cardiovascular morbidity and mortality. As noted, patients at higher clinical risk for cardiovascular events should have lower blood pressure goals than those with lower risk; however, there are no clinical trial data at present to suggest that lower-than-usual blood pressure targets should be set for high-risk demographic groups such as African Americans.

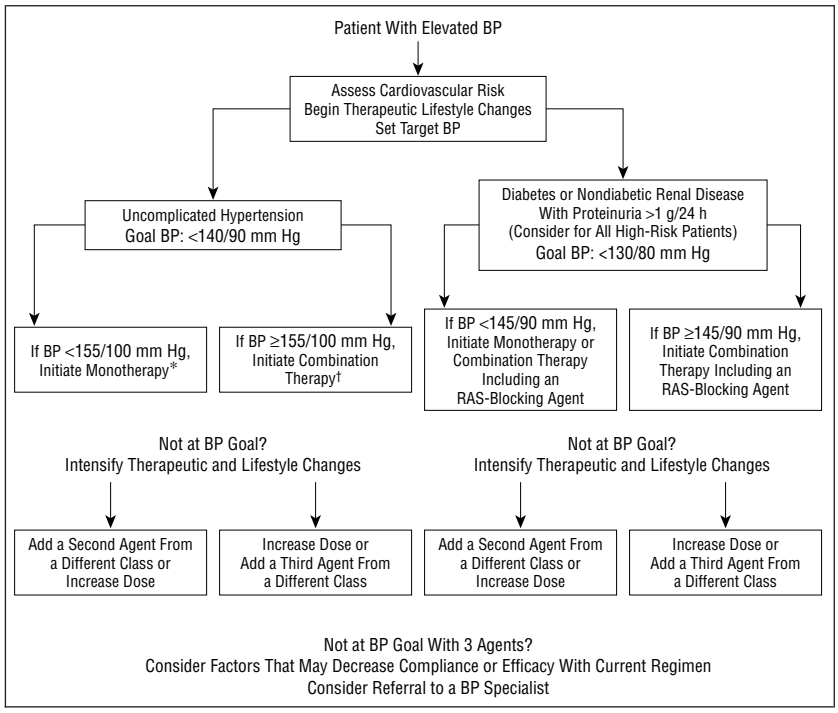
Large, randomized clinical trials[13,14,40,72-74] have demonstrated that 2 to 4 antihypertensive agents are required to achieve DBP and SBP goals in adults with uncomplicated hypertension. Clinical trial data also

**Table 7. NCEP ATP III Classification of Total Cholesterol, LDL-C, and HDL-C***

| Value, mg/dL (mmol/L) | Classification |
|---|---|
| Total cholesterol | |
| <200 (<5.18) | Desirable |
| 200-239 (5.18-6.19) | Borderline high |
| ≥240 (≥6.20) | High |
| LDL-C | |
| <100 (<2.59) | Optimal |
| 100-129 (2.59-3.34) | Near or above optimal |
| 130-159 (3.35-4.12) | Borderline high |
| 160-189 (4.13-4.91) | High |
| ≥190 (≥4.92) | Very high |
| HDL-C | |
| <40 (<1.04) | Low |
| ≥60 (≥1.55) | High |

Abbreviations: HDL-C, high-density lipoprotein cholesterol; LDL-C, low-density lipoprotein cholesterol, NCEP ATP III, National Cholesterol Education Program Adult Treatment Panel III.

*Based on the National Cholesterol Education Program, *Third Report of the Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III)*.[32]




Clinical algorithm for achieving target blood pressure (BP) in African American patients with high BP. RAS indicates renin-angiotensin system. Asterisk indicates to initiate monotherapy at the recommended starting dose with an agent from any of the following classes: diuretics, β-blockers, calcium channel blockers (CCBs), angiotensin-converting enzyme (ACE) inhibitors, or angiotensin II receptor blockers (ARBs). Dagger indicates to initiate low-dose combination therapy with any of the following combinations: β-blocker/diuretic, ACE inhibitor/diuretic, ACE inhibitor/CCB, or ARB/diuretic.

show that patients with diabetes or renal disease will require an average of 2.6 to 4.3 different antihypertensive medications to achieve a blood pressure goal of lower than 130/80 mm Hg.[75] Similarly, in AASK,[14,76-78] 2 to 3 drugs were needed, on average, to reduce mean arterial blood pressure to lower than 92 to 107 mm Hg in African Americans with hypertension and mild-to-moderate renal dysfunction.

In a meta-analysis of controlled clinical trials,[79] the mean change in DBP weighted by sample size for various commonly used antihypertensive agents ranged from 7.2 mm Hg to 12 mm Hg. Thus, it is reasonable to assume that a very large majority of patients with DBP values that are more than 10 mm Hg above the target goal will require additional therapy to achieve their goal.

Until recently, DBP was generally preferred as an outcome measure for efficacy when evaluating the blood pressure–lowering effects of antihypertensive agents. However, large observational epidemiologic studies (eg, the Framingham Heart Study[80]) have consistently indicated that SBP is a better predictor of cardiovascular events than DBP. Randomized, controlled trials have demonstrated that the association between SBP and the risk of CHD, stroke, increased left ventricular mass, and ESRD is continuous, graded, and independent[81] and is typically stronger than the association of DBP with these same outcomes.[82] A meta-analysis of pooled data from randomized controlled trials[83] indicated that an average reduction of 12 mm Hg to 13 mm Hg in SBP over 4 years of follow-up was associated with a 21% reduction in CHD, a 37% reduction in stroke, a 25% reduction in total cardiovascular mortality, and a 13% reduction in all-cause mortality. In a meta-analysis of clinical trials in which the SBP-lowering efficacy of various diuretics as monotherapy was reported,[84] SBP decreased by 13 and 18 mm Hg during treatment with low-dose and high-dose thiazide diuretics, respectively. Based on the importance of lowering SBP to a target goal and the likelihood that thiazide diuretics have efficacy similar to that of other classes of antihypertensive agents, it seems reasonable to assume that patients with SBP values that are more than 15 mm Hg above the target will require more than 1 agent to achieve their goal.

Therefore, we recommend that patients with an SBP that is 15 mm Hg or more above their target or a DBP that is 10 mm Hg or more above their target be treated with combination antihypertensive therapy. This means that patients whose appropriate blood pressure target is lower than 140/90 mm Hg and who have untreated blood pressure that is higher than 155/100 mm Hg, measured properly on 2 separate occasions, should be prescribed 2 drugs as their initial therapy. Patients whose appropriate blood pressure target is lower than 130/80 mm Hg and who have untreated blood pressure that is higher than 145/90 mm Hg should also be prescribed a regimen of combination therapy that includes at least 2 drugs (**Figure**).

### Blood Pressure–Lowering Efficacy

When combination therapy using agents from 2 major drug classes is required to achieve blood pressure goals, based on data from randomized controlled clinical trials, the fol-

lowing combinations may be considered effective: β-blocker/diuretic, angiotensin-converting enzyme (ACE) inhibitor/diuretic, ACE inhibitor/calcium channel blocker (CCB), or angiotensin II receptor blocker (ARB)/diuretic. All antihypertensive drug classes are associated with blood pressure–lowering efficacy in African Americans.[1,15] Thus, in terms of efficacy, there is no rationale for using race as a reason to avoid certain classes of agents in African American patients with high blood pressure.[85,86] Patients whose blood pressure target is lower than 140/90 mm Hg and who have untreated blood pressure that is lower than 155/100 mm Hg may receive the recommended starting dose of an antihypertensive agent from any of the following major antihypertensive classes: diuretics, β-blockers, CCBs (dihydropyridine or nondihydropyridine), and ACE inhibitors. The blood pressure–lowering efficacy of either chlorothalidone (a diuretic) or amlodipine (a dyhydropyridine CCB) was recently confirmed to be superior to that of the ACE inhibitor lisinopril in African Americans.[13] In many cases, a single drug will not achieve the desired blood pressure–lowering effect of 15 mm Hg for SBP and 10 mm Hg for DBP. In these cases, further efforts should be made to help patients reach the target blood pressure (Figure).

Centrally acting agents and direct vasodilators are not well suited for initial monotherapy because they produce annoying adverse effects in many patients.[1,15] Based on data reported from ALLHAT,[24] α-adrenergic blockers should not be used as first-line agents in patients at high risk for hypertension. Potential advantages and disadvantages of antihypertensive drug classes and considerations regarding their use in African American patients with high blood pressure[87-96] are outlined in **Table 8**.

It has been well documented that, as monotherapy or in the absence of a diuretic, β-blockers, ACE inhibitors, and ARBs do not lower blood pressure to the same extent in African American patients that they do in white patients with hypertension.[13,82,97-99] It has also been reported that, as monotherapy, thiazide diuretics and CCBs have greater blood pressure–lowering efficacy than do other drug classes in African Americans.[99,100] However, studies reporting these types of data have certain common limitations: (1) they generally do not report SBP responses; (2) they generally reported response rates based on a reduction of 10 mm Hg or more from baseline DBP rather than achievement of target blood pressure; (3) individual agents cannot be used as a proxy for class effect; and (4) conclusions cannot be drawn regarding the best course of treatment for patients for whom antihypertensive treatment was not efficacious in these studies. Furthermore, high-dose diuretic therapy, frequently used in the past, is no longer recommended.[15]

While β-blockers, ACE inhibitors, and ARBs may not bring patients to a target blood pressure when prescribed as low-dose monotherapy,[94,99,100] the addition of a low dose of a second agent (eg, a diuretic or a CCB) will typically provide sufficient additional blood pressure lowering to help patients reach their blood pressure goals.[101-107]

African American patients with high blood pressure will frequently require at least 2 drugs to achieve blood pressure goals. Combining low doses of 2 antihypertensive medications yields additional blood pressure reductions of about 4 to 6 mm Hg in DBP and 8 to 11 mm Hg in SBP compared with the highest recommended dose of monotherapy.[100,105,108,109] Thus, when a patient is unable to achieve the appropriate blood pressure goal with low-dose monotherapy, it is generally preferable to add a low dose of a second drug rather than increase the dose of the first because adding a second drug to the regimen may produce fewer adverse effects than increasing the dose of a single agent.[1,110] Combination therapy with 2 drugs from the following list may be considered effective in lowering the patient's blood pressure to target: β-blocker/diuretic[104]; ACE inhibitor/diuretic[111]; ACE inhibitor/CCB[102,103,105]; or ARB/diuretic.[101,106,112] Fixed-dose combination products are listed in **Table 9**.[110]

As an alternative, it is also acceptable to increase the dose of the initial monotherapy agent to achieve a blood pressure target, provided the patient tolerates the increased dose. There is no sound rationale for discontinuing treatment with a medication that has provided insufficient blood pressure–lowering effects with a low dose without causing adverse effects[1]; however, if adverse effects are encountered with a low dose of the agent, the patient's treatment can be switched to an agent from another class. When titrating monotherapy, the clinician should give antihypertensive drugs adequate time to manifest their maximum blood pressure–lowering effect. Flack and colleagues[86] showed improved blood pressure control and fewer adverse effects when the ACE inhibitor quinapril was titrated upward every 6 weeks as opposed to every 2 weeks in patients with mild hypertension.

If blood pressure goals are not achieved with combinations of 2 agents, the dosage of 1 agent can be increased or a third agent from a different class may be added to the regimen (Figure). The provider should consider any factors that may be decreasing patient compliance or reducing blood pressure–lowering efficacy. In particular, it is important to determine whether the patient's sodium intake is excessive and to identify whether the patient is using any prescribed or nonprescribed agents, including over-the-counter medications (eg, decongestants or nonsteroidal anti-inflammatory drugs), herbal or supplementary products (eg, licorice), or illicit drugs (eg, cocaine, methamphetamine [speed] or methylenedioxymethamphetamine [Ecstasy]). Secondary causes of hypertension should always be considered in the overall evaluation of adherent patients who do not achieve blood pressure goals. A referral to a hypertension specialist may be considered for a patient whose blood pressure cannot be controlled with intensive efforts in the primary care setting with a combination of 3 agents.

### Target-Organ Protection

Where compelling indications have been identified for prescribing renin-angiotensin system (RAS) blocking agents (either ACE inhibitors or ARBs) or β-blockers, these compel-

**Table 8. Considerations Regarding the Use of Antihypertensive Classes in African American Patients With High Blood Pressure**

| Class | Potential Disadvantages | Potential Benefits | Data Regarding Use in African Americans* |
|---|---|---|---|
| Diuretics[1,13,15] | | | |
| Thiazide diuretics | High doses should be avoided<br>Potential for erectile dysfunction<br>Potential for hypokalemia, particularly if sodium is not restricted<br>Minimal efficacy with decreasing GFR (eg, GFR <45 mL/min per 1.73 $m^2$) | Inexpensive and well tolerated<br>Efficacy and reduction of stroke and CHD events demonstrated in elderly, African American, ISH, and heart failure patients<br>Low-dose thiazide diuretics (eg, hydrochlorothiazide 12.5-25 mg/d) potentiate the blood pressure–lowering effects of other classes of agents, including ACE inhibitors, ARBs, and β-blockers | Efficacy for use in low-dose combination therapy well established for African Americans<br>Chlorthalidone demonstrated cardiovascular benefits for African Americans in ALLHAT |
| Potassium-sparing diuretics[87] | Observe for hyperkalemia | Patients at risk of hypokalemia<br>Potential benefits in heart failure | Recent evidence for blood pressure–lowering efficacy with a selective aldosterone blocker (eplerenone) in African Americans |
| Loop diuretics | Must be taken 2-3 times a day to control volume<br>Risk of hypovolemia or hypokalemia<br>Should not be used in patients with normal kidney function | Reserved for use in patients with renal insufficiency (serum creatinine >2.0 mg/dL [>177 μmol/L] for men and >1.8 mg/dL [>159 μmol/L for women]) | Not available |
| β-Blockers[1,15,18,88,96] | Cautious use in patients with reactive airway diseases or depression | Indicated for post-MI | Evidence of benefits in African American patients post-MI<br>Evidence of less blood pressure–lowering efficacy as monotherapy in African American vs white patients |
| α-Antagonists[1,15,24] | No evidence for CV benefits<br>Risk for postural hypotension | Indicated for benign prostatic hypertrophy | Negative data reported in ALLHAT for doxasozin in African American patients |
| CCBs[1,15,25,47,89-92] | Rapid- or short-acting CCBs contraindicated<br>*Dihydropyridine CCBs:* potential for pedal edema, particularly at higher doses<br>*Non-dihydropyridine CCBs:* potential for conduction abnormalities, constipation; consider potential drug-drug interactions | Dihydropyridine CCBs are potent vasodilators possessing high efficacy at reducing blood pressure<br>CCBs reduce stroke and CV events in a wide range of patients | Evidence of efficacy and benefits in African American patients well established<br>Some evidence of renal benefits in African American patients<br>AASK found that a dihydropyridine CCB (amlodipine) was less renoprotective than ACE inhibitors in African American patients with hypertensive renal insufficiency |
| ACE inhibitors[17,53,86,93,119,127,128] | Adverse effect of bothersome dry cough in some patients<br>Angioedema (rare) | High tolerability<br>Indicated for prevention of CV events and for target-organ protection in patients with diabetes, heart failure, post-MI, diabetic nephropathy | Strong evidence of target-organ protection in African American patients (AASK)<br>Some evidence of less blood pressure–lowering efficacy as monotherapy in African American vs white patients<br>Some evidence of more cough and angioedema related to ACE inhibitor therapy in African American patients compared with white patients |
| ARBs[20-23,86,94,95] | Newest class of agents, so fewer data on clinical outcomes | High tolerability<br>Benefits shown for target-organ protection in patients with diabetic nephropathy or early renal insufficiency<br>Evidence of benefits for patients with heart failure | Small studies show blood pressure–lowering efficacy in African Americans, particularly in combination with hydrochlorothiazide |

Abbreviations: AASK, African-American Study of Kidney Disease and Hypertension; ACE, angiotensin-converting enzyme; ALLHAT, Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial; ARB, angiotensin II receptor blocker; CCB, calcium channel blocker; CHD, coronary heart disease; CV, cardiovascular; GFR, glomerular filtration rate; ISH, isolated systolic hypertension; MI, myocardial infarction; RAS, renin-angiotensin system.

*Contrasts in efficacy for African Americans and white Americans should be viewed with caution, as they have not been established in randomized controlled trials.

ling indications should be applied equally to African American patients. Reducing blood pressure with medications has demonstrated protection against stroke, coronary events, heart failure, progression of

kidney disease, and all-cause mortality.[1] While lowering blood pressure to a target goal is the primary clinical approach to reduce the risk of adverse cardiovascular and renal events, some data also indicate greater benefits with specific classes of agents in high-risk patients. ALLHAT[13,24] compared 4 antihypertensive agents as initial therapy in approximately 42 400 North American patients 55 years or older with hypertension and at least 1 other CHD risk factor; approximately 35% of subjects were African American and approximately 36% had type 2 diabetes mellitus (**Table 10**). In this trial, patients were randomly assigned to initial therapy with a diuretic (chlorthalidone), an ACE inhibitor (lisinopril), an α-blocker (doxazosin), or a dihydropyridine CCB (amlodipine). An interim review by the data and safety monitoring board and an independent review panel determined that doxazosin-treated patients developed congestive heart failure at a greater rate than did diuretic-treated patients, and thus, the doxazosin arm was discontinued in 2000. Based on these data, it appears that α-adrenergic blockers should not be used as first-line agents in high-risk patients.

Chlorthalidone, lisinopril, and amlodipine did not differ in preventing major coronary events, the primary outcome of the trial, or in their effect on overall survival. However, chlorthalidone was associated with significantly fewer combined cardiovascular disease events,

**Table 9. Antihypertensive Therapy Combinations and Available Fixed-Dose Combinations**

| Combination | Fixed-Dose Combination |
|---|---|
| ACE inhibitors and CCBs | Benazepril-amlodipine (Lotrel)<br>Enalapril-felodipine (Lexxel)<br>Trandolapril-verapamil SR (Tarka) |
| ACE inhibitors and diuretics | Benazepril-hydrochlorothiazide (Lotensin HCT)<br>Captopril-hydrochlorothiazide (Capozide)<br>Enalapril-hydrochlorothiazide (Vaseretic)<br>Lisinopril-hydrochlorothiazide (Prinzide) |
| ARBs and diuretics | Candesartan-hydrochlorothiazide (Atacand HCT)<br>Eprosartan-hydrochlorothiazide (Teveten-HCT)<br>Irbesartan-hydrochlorothiazide (Avalide)<br>Losartan-hydrochlorothiazide (Hyzaar)<br>Telmisartan-hydrochlorothiazide (Micardis-HCT)<br>Valsartan-hydrochlorothiazide (Diovan-HCT) |
| β-Blockers and diuretics | Atenolol-chlorthalidone (Tenoretic)<br>Bisoprolol-hydrochlorothiazide (Ziac)<br>Propranolol-hydrochlorothiazide (Inderide)<br>Timolol-hydrochlorothiazide (Timolide)<br>Nadolol-bendrofluthiazide (Corzide) |

Abbreviations: ACE, angiotensin-converting enzyme; ARB, angiotensin II receptor blocker; CCB, calcium channel blocker.

**Table 10. ALLHAT and AASK at a Glance**

| Design | Population | Drugs | Terminated Arm | Final Results |
|---|---|---|---|---|
| | | **ALLHAT*** | | |
| Randomized, double-blind, controlled clinical trial<br>Target blood pressure <130/85 mm Hg<br>Primary outcome: composite of fatal and nonfatal cardiac end points<br>Average follow-up, 6 y | N = 42 448<br>High-risk hypertensives aged ≥55 y<br>36% African American; 47% women; 36% diabetic | Chlorthalidone vs amlodipine or lisinopril or doxazosin | Doxazosin arm was terminated by the data and safety monitoring board because doxazosin-treated patients developed congestive heart failure at a greater rate than diuretic-treated patients† | Expected trial end data: 2002<br>Chlorthalidone, lisinopril, and amlodipine did not differ in preventing major coronary events‡<br>Chlorthalidone was superior to lisinopril in reducing stroke and heart failure and was superior to amlodipine in reducing heart failure |
| | | **AASK§** | | |
| Randomized, double-blind, controlled clinical trial<br>2 Levels of target blood pressure<br>Primary outcome: rate of decline of GFR<br>Average follow-up, 4 y | N = 1094<br>Nondiabetic African Americans with hypertensive renal disease, aged 18-70 y | Amlodipine vs ramipril vs metoprolol | Amlodipine arm was terminated by the data and safety monitoring board because ramipril was determined by have greater renoprotective effects than amlodipine, independent of blood pressure reduction‡ | Ramipril reduced clinical events by 46% compared with amlodipine, and reduced decline in kidney function to a significantly greater extent than amlodipine or metoprolol |

Abbreviations: AASK, African American Study of Kidney Disease and Hypertension; ALLHAT, Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial; GFR, glomerular filtration rate.

*ALLHAT participants with elevated cholesterol levels (n = 10 377) were co-enrolled in a randomized, open-label trial to compare pravastatin therapy with "usual care" in reducing all-cause death.

†ALLHAT trial data suggest that α-adrenergic blockers should not be used as first-line agents in high-risk hypertensive patients.

‡ALLHAT trial data suggest that a thiazide diuretic should be a component of combination therapy in antihypertensive regimens.

§AASK trial data demonstrated that dihydropyridine calcium channel blockers (CCBs) are less renoprotective than angiotensin-converting enzyme inhibitors in the presence of mild-to-moderate renal insufficiency. This finding may not apply to nondihydropyridine CCBs.

including fewer strokes and less heart failure, and better blood pressure control as than lisinopril, and the difference was greater in the African American and other black ALLHAT participants. Amlodipine and chlorthalidone had similar results in terms of these secondary outcomes, with the exception of a higher rate of heart failure with amlodipine. By the completion of the trial, after approximately 5 years of treatment, patients received an average of 2 antihypertensive medications to achieve blood pressures lower than 140/90 mm Hg.

Based on these results, ALLHAT has established that thiazide-type diuretics should be a component of nearly all antihypertensive regimens and further confirms the need for combination therapy in high-risk patients with hypertension. Unfortunately, owing to the trial's design, it was not possible to note clinical outcomes for commonly used combination therapies, such as a diuretic in combination with an ACE inhibitor or CCB, or an ACE inhibitor in combination with a CCB. The ALLHAT data do not support a recommendation for the use of an ACE inhibitor as initial therapy in patients with diabetes without nephropathy. More data from this study will be forthcoming. Meanwhile, other clinical trial data and some current guidelines support the use of ACE inhibitor as initial therapy in patients with diabetes without nephropathy as well as in patients with nondiabetic renal disease, post-MI patients, and patients with heart failure.[1,15,17,25,113-119]

Data also support the use of β-blockers in patients after MI infarction.[18,19,120] Recent clinical trial data support initial therapy with an ARB for patients with type 2 diabetic nephropathy,[20,21] heart failure,[23] or high blood pressure and left ventricular hypertrophy (LVH) with or without diabetes.[121,122] However, until better data are available for clinical outcomes for African Americans with high blood pressure, ACE inhibitors are preferred to ARBs, except in cases where patients exhibit ACE-inhibitor intolerance.

**RAS-Blocking Agents.** Data now clearly support the use of RAS-blocking agents in African Americans with renal disease,[14] and there is also a strong rationale for their use in patients with LVH in the presence or absence of diabetes[121,122] and in diabetic nephropathy.[20,21] The AASK trial[14,25] evaluated the impact of treatment with an ACE inhibitor (ramipril), a β-blocker (metoprolol), and a CCB (amlodipine) on the progression of hypertensive kidney disease in African Americans with mild to moderate renal insufficiency. During the trial, the data and safety monitoring board determined that ramipril had greater renoprotective effects than amlodipine and terminated the amlodipine arm. The final results of AASK[14] showed that ramipril reduced the decline in kidney function to a significantly greater extent than did metoprolol or amlodipine. Furthermore, ramipril reduced clinical events by 46% compared with amlodipine. Differences in blood pressure level did not account for the protective effects on renal function. These data provide strong evidence for including an ACE inhibitor in the antihypertensive regimen for African American patients with renal disease.

Angiotensin II receptor blockers, which inhibit the RAS by blocking the angiotensin II $AT_1$ receptor site, have demonstrated blood pressure–lowering efficacy in African American patients, particularly when combined with hydrochlorothiazide.[94,106,123] Recent trial evidence has shown that in patients with diabetic nephropathy, ARBs slow the rate of progression of nephropathy and proteinuria (irbesartan or losartan)[20,21] and also blunt an increase in microalbuminuria in patients with early diabetic nephropathy (irbesartan).[22] Thus, an ARB may be considered at least as effective as an ACE inhibitor in the treatment of all patients with diabetic nephropathy who have higher than goal blood pressure.[124] The Losartan Intervention for Endpoint Reduction in Hypertension (LIFE) study[121,122] included 9193 patients with high blood pressure and LVH (6% were African American) who were randomized to receive either the ARB losartan or the β-blocker atenelol for a mean of 4.8 years. Patients with LVH were selected because they had evidence of target-organ damage. There was little difference between the 2 groups in the degree of blood pressure reduction; however, losartan reduced the incidence of stroke by 25% more than did atenolol, and 25% fewer losartan-treated patients were diagnosed with new-onset diabetes during the course of the study.[121] Losartan was also more effective than atenolol in reducing cardiovascular morbidity and mortality and all-cause mortality in the subpopulation of patients with high blood pressure, LVH, and diabetes.[122] However, the benefit found in the above studies may not extend to the very small groups of African Americans included in these trials.

Because of the extensive data demonstrating their benefits in reducing cardiac events in patients with heart failure, ACE inhibitors are recommended for the African American population. Data from a recent trial also demonstrated a benefit for adding an ARB to the regimen of patients with heart failure.[23] In this trial, valsartan significantly reduced signs and symptoms of heart failure and hospitalizations for heart failure compared with placebo. These benefits were seen when valsartan was added to an existing regimen except when the existing regimen was a combination of an ACE inhibitor and a β-blocker. Therefore, triple therapy with an ARB, an ACE inhibitor, and a β-blocker cannot be recommended, although this does not preclude the use of any 2 of these 3 drugs in patients with heart failure. When prescribing ACE inhibitors, the clinician should note that compared with whites, African Americans appear to be at increased risk for ACE inhibitor–associated angioedema,[125-127] cough,[128] or both. All patients should be instructed to report any symptoms suggestive of angioedema promptly. Patients who experience the bothersome adverse effect of dry cough with ACE inhibitors can be allowed a brief trial period to determine if this effect lessens with time. Because prostaglandins have been proposed as a cause of dry cough, some clinicians recommend having the patient take aspirin (500 mg/d) concomitantly, if not contraindicated.[129] If the ACE inhibitor–associated cough is intolerable,

an ARB would be a reasonable alternative.

**β-Blockers.** β-Blockers comprise an integral component of recommended treatment for patients with stable and unstable angina[130,131]; thus, African American patients with hypertension and evidence of myocardial ischemia or acute coronary syndromes should receive treatment with β-blockers for short- and long-term management. Likewise, an ACE inhibitor plus a β-blocker should be considered in the regimen of patients at high risk for ischemic heart disease, such as those with diabetes or renal failure.[132]

Studies have confirmed that all post-MI patients (including African Americans) who received β-blockers had a significantly lower mortality than post-MI patients who did not receive β-blockers.[18] Furthermore, in a placebo-controlled study,[19] the β-blocker carvedilol reduced the risk of worsening heart failure to a similar extent (by about 50%) in all groups studied, including African American subjects. Thus, unless otherwise contraindicated, a β-blocker should be considered as an option for post-MI patients or patients with heart failure. β-Blockers may have adverse effects when used in patients with reactive airway disease or depression.

**Additional Risk Factors and Blood Pressure Goals.** Signs of hypertensive target-organ damage may appear in the heart, blood vessels, kidneys, brain, or eyes, and patients with these signs have a poorer prognosis than patients with hypertension who lack signs of target-organ damage. Therefore, patients with diabetes, renal disease, heart failure, LVH, diastolic dysfunction, CHD, vascular diseases, microalbuminuria, transient ischemic attacks, or retinopathy (ie, signs of ongoing target-organ damage) should be considered high-risk patients. For example, data from the Framingham Heart Study[133] have shown that patients with hypertension and LVH have a 5-fold increase in the risk of sudden death and a 3-fold increase in the risk for coronary artery disease compared with patients with hypertension characterized by similar blood pressure but without LVH. Data are not available to demonstrate that achieving a lower target blood pressure (<130/80 mm Hg) reduces cardiovascular mortality in these high-risk patients. Nonetheless, it is not unreasonable for providers to attempt to achieve lower blood pressure goals in all high-risk patients.

## SUMMARY

A new approach is needed to reduce the adverse cardiovascular and renal outcomes associated with high blood pressure in African Americans. More traditional strategies for management of high blood pressure in African Americans—for example, accepting blood pressure levels above target goals, titrating to high-dose monotherapy, abandoning the use of low-dose diuretics, and avoiding RAS-blocking agents—have proven unsuccessful. The "best practice" strategies described in the present consensus statement are intended to achieve efficacy in blood pressure reduction in tandem with protection against target-organ damage (**Table 11**). These strategies involve assessing cardiovascular risk; setting, achieving, and maintaining an appropriate blood pressure target; assisting patients to implement therapeutic lifestyle changes; and administering effective pharmacologic interventions early and persistently.

The African American population is far from homogeneous, and each African American patient should be treated as an individual. Nonetheless, observational data suggest that African Americans are at higher risk than the general population for the negative consequences of hypertension. Therefore, the importance of treating high blood pressure to achieve the appropriate blood pressure goal can-

**Table 11. Treatment Pearls: Management of High Blood Pressure in African Americans**

- Compared with white Americans, African Americans are at greater risk for the development of high blood pressure, type 2 diabetes mellitus, coronary heart disease (CHD), heart failure, left ventricular hypertension, stroke, and end-stage renal disease. These facts suggest the need to obtain blood pressure measurements and assess risk for cardiovascular disease in African Americans at regular intervals across the life span in all primary care settings.
- Clinicians should make concerted efforts to increase awareness among African Americans of the links between lifestyle choices and cardiovascular and renal outcomes.
- Both high dietary sodium and low dietary potassium intake may contribute to excess high blood pressure in African Americans. Clinicians should recommend increasing dietary potassium while moderating sodium intake to the recommended <2.4 g/d.
- Obesity and inactivity are particularly prevalent among African American women and should be viewed as major cardiovascular risk factors in all African Americans.
- The Dietary Approaches to Stop Hypertension (DASH) diet was found to be particularly beneficial in lowering blood pressure in African Americans. Information about this diet is readily available and should be provided to patients.
- African Americans have a high prevalence of type 2 diabetes mellitus. Based on current National Cholesterol Education Program guidelines, patients with type 2 diabetes have a CHD risk that is equivalent to the risk for patients with CHD and require intensive interventions to lower low-density lipoprotein cholesterol levels to the goal of <100 mg/dL (<2.59 mmol/L).
- The perception that it is more medically difficult to lower blood pressure in African Americans than in other patients is unjustified.
- All antihypertensive drug classes are associated with blood pressure–lowering efficacy in African Americans, although combination therapy may frequently be required to achieve and maintain target blood pressure.
- As monotherapy, β-blockers and angiotensin-converting enzyme (ACE) inhibitors may produce less blood pressure–lowering effects in African Americans than in whites.
- Thiazide diuretics and calcium channel blockers may have greater blood pressure–lowering efficacy than do other classes in African Americans.
- Where compelling indications have been identified for prescribing specific classes of agents, such as β-blockers or renin-angiotensin system–blocking agents (ACE inhibitors or angiotensin II receptor blockers), these compelling indications should be applied equally to African American patients.
- When prescribing ACE inhibitors, it is important to note that compared with whites, African Americans appear to be at increased risk for ACE inhibitor–associated angioedema, cough, or both. All patients should be instructed to report any symptoms related to angioedema promptly.

**Recommendations Reviewed by the HAAW Group**

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not be overemphasized. A greater burden of cardiovascular risk requires that providers set lower blood pressure goals and embark on resolute efforts to achieve these goals. For patients with uncomplicated hypertension and nondiabetic renal insufficiency with proteinuria characterized by less than 1 g/d, the target blood pressure goal should be lower than 140/90 mm Hg at the highest. For patients at high risk for cardiovascular events—in particular, those with type 2 diabetes mellitus or renal insufficiency—the target blood pressure goal should be lower than 130/80 mm Hg.

To reach appropriate blood pressure levels, most African Americans will require combination antihypertensive therapy. When combination therapy using agents from 2 major drug classes is required to achieve target blood pressure goals, the following combinations may be considered effective: β-blocker/diuretic, ACE inhibitor/diuretic, ACE inhibitor/CCB, or ARB/diuretic.

There are now persuasive data to support the use of thiazide diuretics, β-blockers, RAS-blocking agents, and dihydropyridine CCBs in African Americans to reduce the risk of target-organ damage and adverse outcomes. Where compelling indications have been identified for prescribing β-blockers or RAS-blocking agents (either ACE inhibitors or ARBs) in certain groups of patients with hypertension, these indications should be applied equally to African American patients.

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