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Until the 2017 ACC/AHA Hypertension Guidelines were released, the target blood pressure (BP) for adults with hypertension (HTN) was 140/90 mmHg in most of the guidelines. The new 2018 ESC/ESH, Canadian, Korean, Japan, and Latin American hypertension guidelines have maintained the <140/90 mmHg for the primary target in the general population and encourage reduction to <130/80 if higher risk. This is more in keeping with the 2018 American Diabetes Association guidelines. However, the 2017 ACC/AHA guidelines classify HTN as BP ≥130/80 mmHg and generally recommend target BP levels below 130/80 mmHg for hypertensive patients independently of comorbid disease or age. Although the new guidelines mean that more people (nearly 50% of adults) will be diagnosed with HTN, the cornerstone of therapy is still lifestyle management unless BP cannot be lowered to this level; thus, more people will require BP-lowering medications. To date, there have been many controversies about the definition of HTN and the target BP. Targeting an intensive systolic BP goal can increase the adverse effects of multiple medications and the cardiovascular disease risk by excessively lowering diastolic BP, especially in patients with high risk, including those with diabetes, chronic kidney disease, heart failure, and coronary artery disease, and the elderly. In this review, we discuss these issues, particularly regarding the optimal target BP.

Key Words: Blood pressure; Cardiovascular diseases; Guidelines; Hypertension

Un till the 2017 ACC/AHA hypertension guidelines were released, the target blood pressure (BP) for adults with hypertension (HTN) was 140/90 mmHg in most of the guidelines (Table 1). Although there were differences among the guidelines, more intensive BP-lowering had been recommended for those with proteinuric chronic kidney disease (CKD; target BP: 130/80 mmHg) or diabetes mellitus (DM). The more recent 2018 ESC/ESH, Canadian and Latin American guidelines, as well as the American Diabetes Association (ADA) guidelines, recommend <140/90 mmHg for everyone and <130/80 mmHg for those with high CV risk.

However, the new ACC/AHA guidelines classify HTN as a BP reading of ≥130/80 mmHg and generally recommend target BP levels below 130/80 mmHg in all hypertensive patients independently of comorbid disease or age. Although the new guidelines recommend that more people (nearly 50% of adults) will be diagnosed with HTN, a large proportion of these are recommended for treatment with lifestyle modification alone, not with antihypertensive drugs, for achieving target BP.

To date, there has been much controversy about the definitions of HTN and target BP, including for Asians. In this review, we discuss these issues, particularly regarding the optimal target BP.

Definition of HTN

The greatest change in the new ACC/AHA guidelines relates to the definition of HTN. The new guidelines define stage I as 130–139 mmHg systolic BP (SBP) or 80–89 mmHg diastolic BP (DBP), which was previously defined as prehypertension. This reclassification increases the prevalence of HTN in US adults to approximately 46% as compared with approximately 32% under the previous definition of HTN (≥140/90 mmHg). According to the 2016
Korean National Health and Nutrition Examination Survey (KNHANES), the age-standardized prevalence of HTN, defined as SBP/DBP of ≥140/90 mmHg, and prehypertension (120–139/80–89 mmHg) was approximately 33.5% and 25.8%, respectively, among adults over 30 years of age. Therefore, the prevalence of HTN in Korean adults under the new ACC/AHA hypertension guidelines (≥130/80 mmHg) would be 53.5%. Thus, the new ACC/AHA guidelines would classify half of the adult population as hypertensive even if they have a low risk of cardiovascular (CV) disease.

In the 2013 Korean Society of Hypertension (KSH) guidelines, prehypertension is further classified as stage 1 (SBP: 120–129 mmHg; DBP: 80–84 mmHg) and stage 2 (SBP: 130–139 mmHg; DBP: 85–89 mmHg). According to Korean Medical Insurance Corporation (KMIC) data,7 the hazard ratio for cerebrovascular and coronary artery disease (CAD) during a 6-year follow-up period was 2.6 for the HTN group relative to the persons with BP <130/85 mmHg. Furthermore, the risk of CAD was 2.5-fold higher in the stage 2 prehypertension group than that in the stage 1 prehypertension group. The probability of progressing to HTN and the risk for CVD events were higher in the prehypertension group than in the normal BP group and lifestyle tended to be worse with respect to CV health in persons with prehypertension than in those with normal BP.9 When considering BP-related CVD risks and the benefits of BP reduction, the classification in the 2013 KSH guidelines8 may be reasonable. The BP classification in the 2018 ESC/ESH guidelines remains unchanged from the 2013 ESH/ESC Guidelines8 and is the same as the 2014 JSH guidelines.10

### ASCVD Risk Scoring

Another concern is the method of risk stratification for the prediction of CVD. The new ACC/AHA hypertension guidelines recommend using the ACC/AHA Pooled Cohort Equations11 [ASCVD calculator] to estimate 10-year risk of ASCVD to establish the BP threshold for treatment. However, the ACC/AHA Pooled Cohort Equations create some problems. The 2017 ACC/AHA hypertension guidelines used the same risk estimator as the ACC/AHA cholesterol guidelines, but have been criticized for lacking proper calibration and for overestimating risk, particularly in young or Asian individuals. Over 12 years of follow-up, in comparison with the Chinese equations, the Pooled Cohort Equations had lower C statistics and much higher calibration values in men.12 On the other hand, among patients with vascular disease, there is very substantial variation in the estimated 10-year risk of recurrent vascular events. If all modifiable risk factors were at guideline-recommended targets, half of the patients would have a 10-year risk <10%. However, even with optimal treatment, many patients with vascular disease will remain at >20%, and even >30% 10-year risk, clearly delineating an area of substantial unmet medical need.13 This may lead to more low-risk people being administered aggressive drug treatment with questionable benefit-to-harm ratios. The effect of the ACC/AHA strategy is huge because of the strong effect of age. Further, other factors included in the Pooled Cohort Equations differ by region and country. Therefore, the ACC/AHA ASCVD risk calculator may not apply to adults with a variety of comorbidities or ethnicities.

The 2017 ACC/AHA hypertension guidelines selected a 10% 10-year ASCVD risk threshold for antihypertensive drug treatment based on the 2013 ACC/AHA guideline on the assessment of CV risk.14 In the guidelines for high blood cholesterol in US adults, high risk was classified as ≥7.5% 10-year ASCVD risk.14 In the SPRINT trial, high risk was defined as ≥15% 10-year ASCVD risk using the Framingham Risk Score.15 Therefore, the thresholds of high risk of CVD are very different from each other.

### Limitations of Meta-Analysis

The Evidence Review Committee of the 2017 ACC/AHA hypertension guidelines reviewed the literature and carried out systematic reviews and meta-analyses of randomized controlled trials (RCT) that sought to identify the optimal target for BP lowering.16 They included the recent SPRINT17 and ACCORD18 trials that targeted more intensive (SBP <120 mmHg) compared with standard (SBP <140 mmHg) goals and SPSP3,18 with a more intensive target of ≤130/80 mmHg. In ACCORD and SPSP3, more intensive BP-lowering group failed to demonstrate a significant reduction in the primary outcome unlike SPRINT trial. The Evidence Review Committee concluded that the results of their meta-analysis showed that BP lowering to

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**Table 1. BP Classification Guidelines**

<table>
<thead>
<tr>
<th>SBP and DBP (mmHg)</th>
<th>2017 JNC7</th>
<th>2017 ACC/AHA8</th>
<th>2013 KSH9</th>
<th>2016 KSH9</th>
<th>2014 JSH10</th>
<th>2019 JSH11</th>
<th>2018 ESH2</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;120 and &lt;80</td>
<td>Normal BP</td>
<td>Normal BP</td>
<td>Normal BP</td>
<td>Normal BP</td>
<td>Optimal</td>
<td>Normal</td>
<td>Optimal</td>
</tr>
<tr>
<td>120–129 and/or</td>
<td>Elevated BP</td>
<td>Elevated BP</td>
<td>Stage 1 hypertension</td>
<td>Stage 2 hypertension</td>
<td>Prehypertension</td>
<td>Normal</td>
<td>Normal</td>
</tr>
<tr>
<td>80–84′</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>130–139 and/or</td>
<td>Prehypertension</td>
<td>Stage 1 hypertension</td>
<td>Stage 2 hypertension</td>
<td>Prehypertension</td>
<td>High normal</td>
<td>High BP</td>
<td>High normal</td>
</tr>
<tr>
<td>80–89 (85–89″)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>140–159 and/or</td>
<td>Stage 1 hypertension</td>
<td>Stage 1 hypertension</td>
<td>Stage 1 hypertension</td>
<td>Grade 1 hypertension</td>
<td>Grade 1 hypertension</td>
<td>Grade 1 hypertension</td>
<td>Grade 1 hypertension</td>
</tr>
<tr>
<td>90–99</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>160–179 and/or</td>
<td>Stage 2 hypertension</td>
<td>Stage 2 hypertension</td>
<td>Stage 2 hypertension</td>
<td>Grade 2 hypertension</td>
<td>Grade 2 hypertension</td>
<td>Grade 2 hypertension</td>
<td>Grade 2 hypertension</td>
</tr>
<tr>
<td>100–109</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥180 and/or ≥110</td>
<td>Stage 3 hypertension</td>
<td>Stage 3 hypertension</td>
<td>Stage 3 hypertension</td>
<td>Grade 3 hypertension</td>
<td>Grade 3 hypertension</td>
<td>Grade 3 hypertension</td>
<td>Grade 3 hypertension</td>
</tr>
</tbody>
</table>

*2013 KSH, 2014 JSH and 2018 ESH guidelines (120–129/80–84 mmHg or 130–139/85–89 mmHg). †New guidelines (2018 KSH) released at the annual KSH Scientific Meeting in Jeju on May 18–19, 2018. ‡New guidelines (2019 JSH) released at the annual JSH Scientific Meeting in Asahikawa on September 14–16, 2018. It will be launched in 2019. ACC/AHA, American College of Cardiology/American Heart Association; BP, blood pressure; DBP, diastolic blood pressure; ESH, European Society of Hypertension; JNC, Joint National Committee; JSH, Japanese Society of Hypertension; KSH, Korean Society of Hypertension; SBP, systolic blood pressure.
a target of <130 mmHg may significantly reduce the risk of several important outcomes for hypertensive patients regardless of their comorbidities and age.16

As the Committee mentioned, conclusions from systematic reviews and meta-analyses are dependent on the selection of studies and their quality, the statistical methods applied, the standardization of the results, and the use of individual data. Therefore, it is sometimes difficult to apply the conclusion of meta-analysis to guidelines.

The meta-analysis most frequently mentioned in the 2017 ACC/AHA guidelines randomly assigned participants to different BP treatment targets and identified a significant reduction in CVD events, myocardial infarction, and stroke in those assigned to an intensive (average achieved SBP/DBP was 133/76 mmHg) vs. a usual BP treatment target.19 However, the target SBP of the intensive BP-lowering group was not 120–130 mmHg, which is generally considered, but various target SBP ranging from 120 to 150 mmHg, and the patient groups of 140–150 mmHg in the intensive BP-lowering group could belong to a usual BP-lowering group. Furthermore, the mean SBP in the intensive BP-lowering is 133 mmHg, which is higher than 130 mmHg.

Methods of BP Measurement

In SPRINT, automated office BP (AOBP) measurement was carried out according to a standard procedure after 5 min of rest; 3 BP measurements were made at 1-min intervals, and the mean of these was taken as the patient’s BP for the visit.18 This BP measurement is not a routine clinical BP measurement. Some researchers reported that the AOBP yields BP values 10–15 mmHg lower than those BP values taken by routine clinical measurement.20 Thus, the Committee suggested that the achievement of strict SBP control of 120 mmHg is postulated to be comparable to 130 mmHg by routine clinical assessment. However, in fact, there are various differences between AOBP and routine clinic BP values and a big difference in the BP values between individuals according to many studies.20

Is a Target BP of <130/80 mmHg Appropriate for All Patients?

Universal Recommended BP Goal

In the new ACC/AHA hypertension guidelines, the target BP is <130/80 mmHg for all patients independent of age, comorbidity and estimated CV risk. Although this recommendation may be simple for clinical application, it lacks rigorous scientific evidence. For example, I studied estimated that if the SPRINT intensive SBP treatment goal were implemented in all eligible US adults, intensive SBP treatment could prevent 107,500 deaths per year, but would also increase serious adverse events.21 There have been no studies that provide strong evidence for this uniform target BP (<130/80 mmHg) in all hypertensive patients. In addition, in a recent analysis, it was shown that you need at least an 18% 10-year ASCVD risk to get benefit from intensive treatment.22 In other words, in SPRINT those with lower baseline CVD risk had more harm than benefit from intensive treatment, whereas those with higher risk had more benefit. Additionally, the ADA guidelines, which also differs from the ACC/AHA guidelines, make the distinction between BP thresholds used to diagnose HTN vs. treatment targets.23 Findings that ACCORD patients failed to reach a primary endpoint with lower BP and a post-hoc analysis that showed a benefit may support the argument but they were all at much higher than a 15% 10-year ASCVD risk.24 Indeed, the findings of HOPE-3 that no benefit was seen if BP was <140/90 in low-risk people supports this speculation.25

Low Risk vs. High Risk

The same target BP that applies to high-risk patients may not be applied to low-risk patients. The Heart Outcomes Prevention Evaluation (HOPE-3) study did not show benefit of antihypertensive therapy in persons with BP <140/90 mmHg, but did show the benefit of statins,26 which would be related to the multiple effects of statins beyond BP-lowering effects.26-27 Combination therapy with candesartan plus hydrochlorothiazide decreased BP by 6/3 mmHg from a mean of 138.1/81.9 mmHg, but the reduction in BP did not lower the incidence of the primary outcome compared with placebo (4.1% vs. 4.4%). Compared with placebo, active treatment was associated with a slightly higher risk of symptomatic hypotension, dizziness and light-headedness. Active treatment did lower the incidence of stroke in the subgroup with highest baseline SBP (>143.5 mmHg). A meta-analysis found a benefit of BP-lowering treatment in patients with mild HTN (140–160/90–100 mmHg) with low to moderate CV risk to achieve BP <140/90 mmHg. However, achieving BP <130/80 mmHg did not significantly reduce CV events.28 Therefore, it is problematic to set the target BP below 130/80 mmHg in low-risk patients based on previous observational studies.

For these reasons, that target BP in low risk patients without CVD (estimated 10 year ASCVD risk <10%) of <130/80 mmHg receives a softer recommendation (IIb: expert opinion) in the 2017 ACC/AHA hypertension guidelines.

Young vs. Old Age

Although the SPRINT-Senior subgroup demonstrated substantial benefit of targeting SBP <120 mmHg,29 controversy persists regarding the aggressive BP target (<130 mmHg) in elderly hypertensive patients. The DBP rises until the age of 50 years and decreases thereafter, producing a progressive rise in pulse pressure by changes in arterial structure and function accompanied aging. Large arteries become less distensible, which increases pulse wave velocity, causing late SBP augmentation and increasing myocardial oxygen demand. Isolated systolic HTN with a widened pulse pressure is the most common type of HTN seen in persons older than 65 years of age. In addition, elderly patients tend to have CVD such as CAD, left ventricular hypertrophy, and autonomic dysfunction, all the preceding comorbidities cause orthostatic hypotension and renal impairment. Therefore, achieving an aggressive BP goal is very difficult for elderly hypertensive patients with poor vascular compliance, who typically have dizziness, orthostatic hypotension, renal impairment and cognitive impairment as their SBP approaches 130 mmHg. The SPRINT-Senior trial showed a high incidence of hypotensive symptoms and renal impairment in the intensive group, but there was no statistical significance.29 However, a recent meta-analysis involving SPRINT-Senior showed that more intensive BP-lowering in the elderly hypertensives increased the risk of serious side effects.30
Concerns Related to DBP

Very little information from clinical trials was available to guide the new recommendations on DBP reduction, and the recommendation for the DBP goal in the 2017 ACC/AHA guidelines was based on expert opinion. The ACC/AHA guidelines focus only on the SBP goal, ignoring the clinical importance of DBP and do not consider isolated systolic HTN, a major problem in elderly persons. In patients with DM and CAD, DBP is especially important for maintaining coronary perfusion and aggressive treatment for achieving a low SBP goal may increase the progression of ischemic heart disease because of the excessive lowering of DBP. These events have been explained by hypoperfusion during diastole, particularly in patients with CAD. The J- or U-curve phenomenon between low DBP and CV events has been reported in treated hypertensive patients, especially those with CAD.31

A recent prospective cohort study of the Korean general population, including 22.5 million person-years, showed a consistently increased mortality or CV risk in the lowest DBP (<60 mmHg) group, particularly in elderly persons.32 A post-hoc analysis of the SHEP (Systolic Hypertension in the Elderly Program) trial suggested that a treatment-induced decrease in DBP was associated with an increased risk of stroke, coronary events and major CV events.33 In addition, a recent study that used data form the Korean Acute Heart Failure (KorAHF) prospective registry demonstrated that BP <130/70 mmHg at hospital discharge and during follow-up was associated with worse survival in HF patients.34 This suggests that it may be dangerous to lower DBP below 70 mmHg in patients with HF. In the analysis of data from the TOPCAT (Treatment of Preserved Cardiac Function Heart Failure With an Aldosterone Antagonist) trial, DBP values ≥90 and <60 mmHg were associated with a significant risk of adverse outcomes in patients with HF with preserved ejection fraction who were treated for HTN.35 Thus, in HF patients with or without reduced EF, excessively low DBP is associated with adverse CV outcomes. An international cohort study also demonstrated that in the hypertensive patients with CAD, DBP <70 mmHg was associated with adverse CV outcomes.31

It is clinically challenging not to lower DBP to <60 mmHg in the general population including the elderly, and to <70 mmHg in patients with DM, CAD or HF.

Appropriate BP Targets for Asian Populations

The prevalence of HTN in most Asian countries has been increasing because of social and westernized lifestyle changes. The risk and incidence of CVD in the Asian population are different from those in Western populations. For Asian populations, the risk of stroke compared with CAD is higher. In addition, the relationship between BP levels and stroke incidence is stronger in Asian populations and the slope of association between BP levels and CVD events has also been shown to be steeper in Asian compared with Western populations.36–38

With respect to lifestyle interventions, reduction of salt intake is important. However, the estimated daily intake of Koran population according to KNHANES is approximately 12 g, which is higher than the recommendation of WHO (<6 g). Asian populations tend to have a high salt intake and salt sensitivity. Obesity and metabolic syndrome are known to increase salt sensitivity. The cutoff value for the definition of obesity is lower for Asian populations (body mass index ≥23 kg/m²) than for Western populations, because Asians have a higher percentage of body fat than do Westerners.39,40 Eventually, Asian populations tend to increase in salt sensitivity, caused by even mild obesity, and HTN is easily caused by high salt intake.41 Therefore, reductions in salt intake and body weight are more effective interventions, especially in Asian populations.

There are some racial differences in the indices of BP variability. Asian hypertensive persons are likely to have a masked HTN, nocturnal HTN and exaggerated morning BP surge compared with Western hypertensive subjects. Nocturnal HTN is associated with high salt intake and salt sensitivity and is a strong predictor of stroke incidence, in addition to masked HTN and a morning BP surge.42 Therefore, these BP variabilities might be important predictors for the management of HTN to prevent stroke in Asian populations.

There are few well-controlled RCTs related to target BP in Asians but there are some cohort data related to target BP in special populations of Asians. The recent post-hoc analysis of the CSPTT (China Stroke Primary Prevention Trial) showed that among adult hypertensive patients without a history of stroke or myocardial infarction, DM, or renal function decline, a lower SBP goal of 120–130 mmHg as compared with a target SBP of 130–140 mmHg or <120 mmHg, resulted in the lowest risk of first stroke.43 This finding may have some benefits for Asian populations in respect to stroke prevention, but are consistent with previous meta-analysis studies44,45 that showed the beneficial effect of intensive BP-lowering (<130/80 mmHg) on only stroke reduction in hypertensive patients with low to moderate CVD risk. Although Asian populations have a high incidence of stroke, there is still a lack of evidence to support intensive BP-lowering (<130/80 mmHg) using antihypertensive drugs in Asian hypertensive patients without CVD based only on post-hoc analysis of the CSPTT.

The recent study of Korean cohort data in diabetic hypertensive patients without underlying CVD at baseline showed that a mean BP <140/80 mmHg was associated with further lowering of the risk for all-cause death, CV death, and nonfatal CV events, but the additional clinical benefit of a mean SBP <130 mmHg was unclear.46

For elderly Asians, a Korean cohort study in elderly hypertensive persons (aged ≥60 years) demonstrated that mean BP <140/90 mmHg was associated with lowest all-cause and CV death without any further benefit with mean BP <130/80 mmHg.47 In addition, a prospective cohort study in elderly hypertensive patients (aged ≥65 years) from northern China showed that SBP between 130 and 140 mmHg was associated with lowest cumulative incidence of CVD but SBP <130 mmHg was not associated significantly with a reduced risk of developing adverse outcomes.48 These findings are consistence with previous studies of elderly Asian populations.49,50 and a BP target <140/90 mmHg could be appropriate for elderly hypertensive Asians.

Among the hypertensive patients with high risk, a recent Korean cohort study reported that BP <130/80 mmHg was associated with improved all-cause and CV death in hypertensive patients with previous stroke.51

We summarize these findings in Table 2.
Controversies in 2017 ACC/AHA HTN Guidelines

Table 2. Recent Asian Studies Related to Optimal BP Goals

<table>
<thead>
<tr>
<th>First author (year)</th>
<th>Type of study (Acronym)</th>
<th>Patient population (n)</th>
<th>Mean follow-up (years)</th>
<th>Primary outcome</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fan (2017)&lt;sup&gt;43&lt;/sup&gt;</td>
<td>Post-hoc analysis from CSPPT</td>
<td>Chinese hypertensive adults (45–75 years old) without stroke, CVD, DM or renal function decline (n=17,720)</td>
<td>4.5</td>
<td>First stroke</td>
<td>SBP goal of 120–130 mmHg, as compared with the target SBP of 130–140 mmHg or &lt;120 mmHg had lowest risk of first stroke</td>
</tr>
<tr>
<td>Lee (2018)&lt;sup&gt;45&lt;/sup&gt;</td>
<td>Cohort from KNHISHE</td>
<td>Korean newly diagnosed hypertensive and type 2 DM adults (≥40 years old) without other CVD (n=7,926)</td>
<td>9.0</td>
<td>All-cause and CV death</td>
<td>Mean BP &lt;140/80 mmHg was associated with reduction in risk of all-cause death, CV death, and nonfatal CV events in diabetic hypertensive patients compared with higher levels of BP</td>
</tr>
<tr>
<td>Guo (2018)&lt;sup&gt;47&lt;/sup&gt;</td>
<td>Cohort from Kailuan Study in northern China</td>
<td>Chinese elderly hypertensive patients (≥65 years old) without history of MI, cerebral stroke, and/or tumor (n=9,655)</td>
<td>7.2</td>
<td>MI, stroke, and all-cause death</td>
<td>130–139 mmHg was associated with the lowest cumulative incidence of composite outcome in the northern China area</td>
</tr>
<tr>
<td>Seo (2018)&lt;sup&gt;46&lt;/sup&gt;</td>
<td>Cohort from KNHISHE</td>
<td>Korean elderly adults (≥60 years old) with newly diagnosed HTN (exclusions: malignancy, DM, CVD, and CKD) (n=23,523)</td>
<td>9.3</td>
<td>All-cause and CV death</td>
<td>Mean BP &lt;140/90 mmHg was associated with lowest all-cause and CV death without any further benefit with BP &lt;130/80 mmHg</td>
</tr>
<tr>
<td>Lee (2017)&lt;sup&gt;50&lt;/sup&gt;</td>
<td>Cohort from KNHISHE</td>
<td>Korean newly diagnosed hypertensive and stroke adults (≥40 years old) without other CVD (n=2,320)</td>
<td>8.5</td>
<td>All-cause and CV death</td>
<td>BP &lt;130/80 mmHg was associated with improved all-cause death and CV death in hypertensive subjects with previous stroke</td>
</tr>
</tbody>
</table>

BP, blood pressure; CKD, chronic kidney disease; CSPPT, China Stroke Primary Prevention Trial; CVD, cardiovascular disease; DM, diabetes mellitus; HTN, hypertension; KNHISHE, Korean National Health Insurance Service Health Examinee.

Table 3. Most Acceptable Recommendations<sup>a</sup>

1. Younger patients with high risk: target BP <130/80 mmHg
2. Younger patients with low or intermediate risk, patients with diabetes and no evidence of end-organ injury, or elderly patients: target BP <140/90 mmHg
3. A target diastolic BP of 60–70 mmHg should be maintained to avoid serious side effects, especially in patients with high risk including diabetes, CKD, HF, CAD and the elderly

<sup>a</sup> All recommendations must start with lifestyle modifications focused on a healthy diet, especially low salt intake, good quality sleep duration<sup>57,58</sup> (i.e., at least 6 h) and exercise. BP, blood pressure; CAD, coronary artery disease; HF, heart failure.

For Whom Are the New ACC/AHA Hypertension Guidelines Applicable?

Evidence is lacking on the benefit of treating low-risk, young hypertensive patients to a target level of <140/90 mmHg or <130/80 mmHg. Because the development of CV events is delayed for many years in young adults with HTN, controlled trials of antihypertensive treatment with CVD outcomes have excluded young patients. Therefore, evidence on which treatment of young hypertensive patients is based is limited to observational studies and epidemiologic data rather than clinical trials.

Although recent guidelines are based on the results of RCT or meta-analyses of RCTs, most of the HTN guidelines recommend a BP target <140/90 mmHg for young and middle-aged adults. However, there are suggestions that a lower target BP may be necessary to maximally protect against the development and progression of CVD and diabetic renal disease, particularly in persons at high risk.

A meta-analysis of data from a large number of observational studies showed that CVD risk increases as BP increases, even within the normal BP range, thus suggesting that long-term exposure to higher BP levels may lead to end-organ damage.<sup>51</sup> The CARDIA (Coronary Artery Risk Development in Young Adults) cohort study, which is a multicenter longitudinal study that enrolled 5,115 black and white women and men aged 18–30 years at the baseline examination in 1985–1986 who were free of CVD, showed that early detection of HTN and controlling BP to <120/80 mmHg may prevent target organ damage.<sup>52</sup>

In contrast, in a recent Korean nationwide cohort study showed that in Korean young adults aged 20–39 years, BP of 130–139/80–89 mmHg was associated with an increased risk of subsequent CVD (hazard ratio, 1.25 for men; 1.27 for women).<sup>53</sup>

In addition, a recent Korean nationwide cohort study showed that in Korean young adults aged 20–39 years, BP of 130–139/80–89 mmHg was associated with an increased risk of subsequent CVD (hazard ratio, 1.25 for men; 1.27 for women).<sup>54</sup> In particular, no reduction in CVD risk was observed between the groups with achieved SBP <130 and <140 mmHg among older adults (aged ≥65 years). However, younger patients (age <65 years) in the SBP <130 mmHg group had significantly lower CVD risk when compared with those in the SBP <140 mmHg group.<sup>54</sup> These findings suggest that tighter SBP targets may be more applicable for younger patients. Therefore, a lower BP target (<130/80 mmHg) might be appropriate for younger patients, especially those with high risk, as long as it can be achieved without undue treatment burden. It is very important to strengthen lifestyle modification, which is more effective for younger than older
patients, together with antihypertensive drugs.

According to the 2017 ACC/AHA hypertension guidelines, in line with the changes in the definition and treatment threshold of HTN, adopting the universally recommended BP target of <130/80 mmHg for most hypertensive patients simplifies practice by eliminating the need for setting individualized BP goals based on patients’ CV risk, comorbidities and age, as recommended by earlier guidelines.

Tightening BP control to a target of <130/80 mmHg may ultimately prevent CV events. However, targeting an intensive SBP goal can increase both the adverse effects of multiple medications and the CVD risk by excessively lowering DBP, especially in patients with high risk including DM, CKD, HF, and CAD and the elderly. Therefore, clinicians should consider the balance between efficacy and safety of tightening BP control and the J-curve phenomenon of DBP. In most patients with HTN, a target DBP of 60–70 mmHg may be beneficial and safe. Considering the undue treatment burden and early prevention of target organ damage from increasing BP, the 2017 ACC/AHA hypertension guidelines might be more applicable to younger patients with high risk than to older or low risk patients.55

It is reasonable to apply intensive BP-lowering to high-risk patients based on clinical trial data, but clinicians should consider serious adverse events of hypotension, syncope, falls, electrolyte abnormalities and acute kidney injury in the intensive treatment group and carefully monitor patients’ BP in the office and at home.

Guidelines are just guidelines and patients are genetically, physiologically, metabolically, pathologically, psychologically, and culturally heterogeneous.56 Clinicians should take into account the balance between benefits and risks for individualized patients.

We recommend a most acceptable guideline in Table 3.57,58

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Conflict of Interest

K.K.K. holds a certificate of patent, 10-1579656 (pravastatin + valsartan).

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Controversies in 2017 ACC/AHA HTN Guidelines


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