

# Age, Blood Pressure Targets, and Guidelines

## Rift Between Those Who Preach, Those Who Teach, and Those Who Treat?

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That blood pressure (BP) increases with age has been known for almost a century. To what extent this increase in BP is physiological continues to be debated. The observation that in some isolated populations there is little if any BP slope with age is often taken as an argument that any increase in BP should be considered pathological. Conversely, once upon a time, textbook wisdom (those who taught) such as “the elevation of blood pressure may be a natural response to guarantee a more normal circulation to the heart, brain and kidneys”<sup>1</sup> or “the hypertension might be a compensatory mechanism that should not be tampered with”<sup>2</sup> has continued to spook physicians until this very day and seemed to attest to the “essentiality” of essential hypertension. This concept also instigated fear that, in susceptible patients, BP could be lowered too much.

The thorough meta-analysis by Lewington et al<sup>3</sup> alleviated these concerns by concluding that “usual BP is strongly and directly related to vascular (and overall) mortality without any evidence of a threshold down to at least 115/75 mm Hg.” However, closer scrutiny documents BP to gradually become a less powerful risk factor with age. At ages 40 to 49 years, a 20-mm Hg lower systolic BP was associated with a >2-fold difference in cardiovascular mortality (hazard ratios of 0.36 for stroke, 0.49 for ischemic heart disease, and 0.43 for other vascular mortality), whereas at ages 80 to 89 years it was considerably less (hazard ratios of 0.67, 0.67, and 0.70, respectively). Thus, the proportional differences in cardiovascular mortality associated with a given difference in BP remain greater in middle age than in old age.

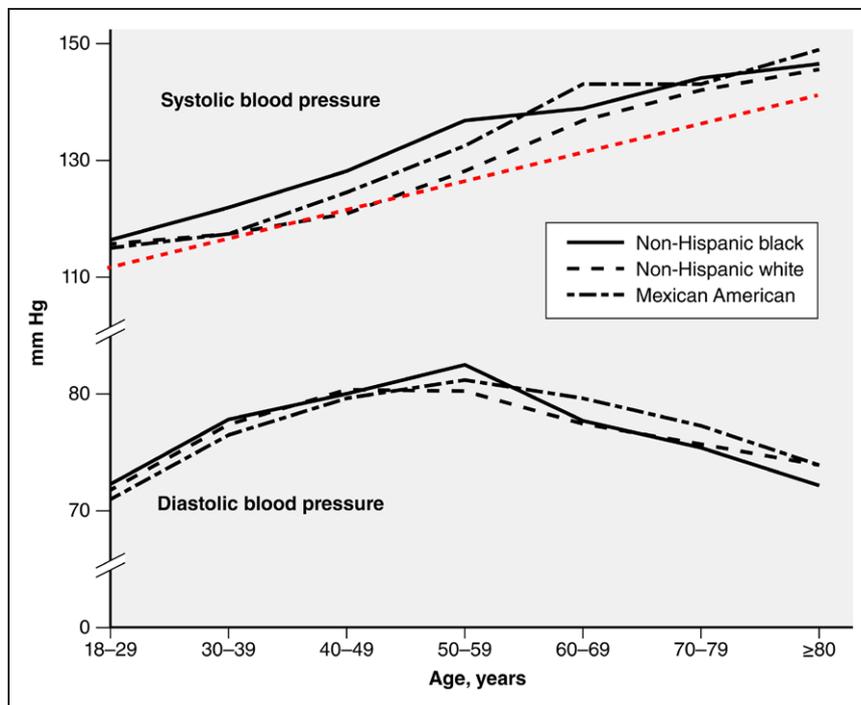
There is no debate that lowering BP in the elderly confers impressive cardiovascular benefits, as was documented in SHEP, Syst-Eur, HYVET, and SPRINT. However, as shown in the REGARDS cohort, in longstanding hypertension there may be a point of no, or at least lesser, return.<sup>4</sup> Despite systolic BP having been reduced by antihypertensive therapy to <120 mm Hg, risk of stroke was 2.5 times higher in those on 3 antihypertensive drugs than in those with same BP on no medication. We can safely assume that in comparison with patients aged 30 to 39 years, octogenarians have been exposed to the ravages of hypertension for a longer period of time. Their pathological alterations in target organs and in the vascular tree are less amenable to regression, and despite a lowered, even normal, BP will continue to provide a fertile ground for the sprouting of cardiovascular events. Those who teach are proud to indicate that now, with our powerful modern pharmaceutical armamentarium, BP can be normalized within hours and days, even if it has been elevated for years and decades. However, to expect that such a swift BP normalization would eo ipso normalize cardiovascular risk is futile. As Page<sup>5</sup> stated half a century ago, “There are times when we think antihypertensive therapy has been simply a Pyrrhic victory, because the residual atherosclerotic damage remains.” With longstanding hypertension, this residual atherosclerotic damage becomes

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**Figure.** Mean systolic blood pressure (BP) by age and race/ethnicity for men in the US population aged  $\geq 18$  years.

Red dotted line: Systolic BP according to formula  $100 + 1/2$  age. Data derived from the National Health and Nutrition Examination Survey (NHANES; <https://www.nchs.gov/nhanes/nhanes3/default.aspx>).

an increasingly more powerful risk factor, and hemodynamic normalization of BP confers increasingly less benefit.

These above considerations indicate that high BP in older adults is a complex and heterogeneous pathological condition. However, with very few exceptions, recent guidelines (those who preach) have disregarded age when defining hypertension and on treatment BP targets. American College of Cardiology/American Heart Association guidelines indicate that those aged 30 years and octogenarians should have the same BP target. Achieving a BP level  $<130/80$  mm Hg may be impossible for some older patients, especially those with isolated systolic hypertension and poor vascular compliance. Not uncommonly, these patients experience dizziness and poor cognition when systolic BP hovers below 140 mm Hg.

The numeric definition of hypertension is not a mere academic question. Labeling a healthy person with a disease comes at a cost. Before now a patient aged 76 years with a BP of 133/75 mm Hg has been labeled with the diagnosis of systolic hypertension, as the recent American College of Cardiology/American Heart Association guidelines dictate; we propose to consider a simple age/BP formula: optimal adult BP levels should be about 100 plus  $1/2$  the patient's age. This would correspond to 120 mm Hg for patients aged 40 years, 130 mm Hg for patients aged 60 years, and 140 mm Hg for patients aged 80 years (Figure). Of note, the above formula is not based on outcome evidence and is therefore horrible dictum, entirely arbitrary. Although we are by no means suggesting that it replaces clinical judgment, the age/BP formula may serve as a simple guide-

post for the legion of healthcare providers dealing with antihypertensive therapy (ie, those who treat).

When attempting to establish evidence-based on-treatment BP targets with randomized trials and meta-analyses, one rapidly arrives at the humbling conclusion that one size may not fit all. To lower BP of all hypertensive patients regardless of age to  $<130/80$  mm Hg has to be considered absurd, regardless of the 2017 American College of Cardiology/American Heart Association hypertension guidelines. However, it would be equally absurd to lower BP levels to only  $<150/90$  mm Hg in all patients aged  $>60$  years as the 2017 American College of Physicians/American Academy of Family Physicians hypertension guidelines are preaching.

Part of this confusing scenario may result from the fact that those very few who preach rarely treat, those few more who teach only sometimes treat, and those many who treat do not always listen, neither to those who preach nor to those who teach. Clearly more consideration needs to be given to the effects of age on hypertensive cardiovascular disease as to bridge the rift between those who preach, those who teach, and those who treat.

## ARTICLE INFORMATION

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### Disclosures

None.

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