**Doxazosin was associated with more stroke and cardiovascular disease events than chlorthalidone in high-risk hypertension**


**Question**
In high-risk hypertensive patients, is doxazosin (an α-adrenergic blocker) or chlorthalidone (a diuretic) more effective in reducing cardiovascular disease (CVD) events?

**Design**
Randomized (allocation concealed*), blinded (clinicians and patients), *controlled trial with median 3.3-year follow-up.

**Setting**
625 centers in the United States and Canada.

**Patients**
24 335 patients who were ≥ 55 years of age (mean age 67 y, 53% men, 49% white non-Hispanic), had systolic blood pressure (BP) ≥ 140 mm Hg or diastolic BP ≥ 90 mm Hg, took medication for hypertension, and had ≥ 1 other risk factor for coronary heart disease (CHD). [Exclusion criteria included myocardial infarction (MI), stroke, or angina pectoris in the past 6 months; congestive heart failure (CHF) or ejection fraction < 35%; or serum creatinine level ≥ 177 µmol/L.]† 97% of patients were included in the analysis.

**Intervention**
Patients were allocated to doxazosin, 2 to 8 mg/d (n = 9067), or chlorthalidone, 12.5 to 25 mg/d (n = 15 268).

**Main outcome measures**
The primary outcome was a composite end point of fatal CHD and nonfatal MI. Secondary outcomes were all-cause mortality, combined CVD events (CHD death, nonfatal MI, revascularization, and angina requiring hospitalization), stroke, or combined CVD events (CHD death, nonfatal MI, stroke, revascularization, angina, CHF, and peripheral arterial disease).

**Main results**
Treatment with doxazosin was discontinued early. Analysis was by intention to treat. A proportional hazards model was used. At the stopping point, the groups did not differ for the primary outcome (relative risk [RR] 1.03, 95% CI 0.99 to 1.07; P = 0.71).

However, for secondary outcomes, the doxazosin group had an increased risk for stroke (RR 1.19, 95% CI 1.01 to 1.40; P = 0.04) and combined CVD events (RR 1.25, CI 1.17 to 1.33; P < 0.001), which included an increase in CHF (RR 2.04, CI 1.79 to 2.32; P < 0.001) and angina (RR 1.16, CI 1.05 to 1.27; P < 0.001).

**Conclusion**
In high-risk hypertensive patients, doxazosin was associated with a higher incidence of stroke and cardiovascular disease events, especially congestive heart failure, than was chlorthalidone.

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*See Glossary.

**Commentary**
ALLHAT is a study of astonishing methodologic beauty. A practice-based trial, ALLHAT used both concealed allocation and double blinding in 625 centers; participants were randomized to one of several first-line agents, doxazosin or chlorthalidone in this report; and the outcomes included all the major disease end points associated with uncontrolled hypertension. This study thus provides essential information about the optimal treatment strategy for patients with high BP.

Although chlorthalidone and doxazosin have a similar effect on BP lowering, they have different effects on the risks for stroke, angina, and CHF. In retrospect, it may seem obvious that drugs with such different mechanisms of action might well have different effects on various outcomes. The U.S. Food and Drug Administration and other regulatory bodies, however, approve antihypertensive drugs on the basis of how well they lower BP (1). In light of the ALLHAT results, the assumption that the effect an antihypertensive agent has on BP lowering is a valid and adequate surrogate for the effect of the agent on the occurrence of major disease end points is no longer tenable. The criteria for antihypertensive-drug approval ought to change.

The Sixth Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure recommended diuretics as first-line agents but also included a section titled “May Have Favorable Effects on Comorbid Conditions,” which advocates the use of α-blockers in patients with dyslipidemia or prostatism (2). Although heavily promoted, these “surrogate” arguments for favoring unproven antihypertensive therapies are not good evidence-based medicine (3). Despite beneficial effects on lipid levels, doxazosin was associated with an increased risk for CVD events. This study reinforces a key question for clinicians: If your patient with drug-treated hypertension is not on a low-dose diuretic, why not?

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**References**