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COMMENT

Prognostic value of target organ damage in patients with cardiovascular risks

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Hypertension is a critical public health issue because of its association with several significant diseases and adverse outcomes [1]. For the follow-up of patients with hypertension, several blood pressure (BP) guidelines recommend screening for subclinical target organ damage (TOD) to quantify cardiovascular (CV) risks [2–4]. For example, the European Society of Cardiology/European Society of Hypertension guidelines recommend measuring the urinary albumin/creatinine ratio (UACR) to screen for renal organ damage, left ventricular mass index (LVMI) for cardiac organ damage, and pulse wave velocity (PWV) for vascular organ damage [4]. The American College of Cardiology (ACC) and American Heart Association guidelines also recommended both UACR and LVMI [3]. However, several studies have investigated the association between these TOD indicators and CV events independent of BP [5–7], indicating the benefit of the follow-up of patients with hypertension by the assessment of both BP and TOD indicators. In most studies, this association has been based on the assessment of office BP. In the modern era of home BP for the management of hypertension, data are lacking on whether TOD indicators provide a superior prediction of CV events beyond home BP.

In the current issue of *Hypertension Research*, Waki et al. [8] reported an observational study of superior CV event prediction independent of and beyond home BP using the Japan Morning Surge-Home Blood Pressure study, a general practice-based national home BP registry of outpatients with CV risk factors. Waki et al. [8] enrolled 1641 patients (mean age 64.8 ± 11.7 years) with CV disease (CVD) risk factors who performed home BP measurements over 14 days and evaluated TOD indicators, such as UACR, LVMI, and brachial-arterial PWV, at baseline. There were 115 incident CV events (stroke, $n = 47$; CAD, $n = 48$; heart failure, $n = 20$) over an average follow-up period of 8.4 ± 2.9 years. When performing the Cox proportional hazards model adjusted for demographic variables and clinical characteristics, increased log UACR (hazard ratio [HR], 1.30; 95% confidence interval [CI], 1.11–1.52, $P < 0.01$), LVMI (HR, 1.27; 95% CI, 1.04–1.56, $P < 0.05$), and baPWV (HR, 1.25; 95% CI, 1.11–1.40, $P < 0.05$) were associated with CVD incidence (Model 1). Concerning the discrimination of predictive models, the C-statistic for the base model was 0.774 (95% CI, 0.733–0.816), which significantly increased to 0.789 (95% CI, 0.750–0.829) when LVMI was added but changed only slightly with the addition of log UACR or baPWV (both $P =$ NS). Next, when performing the Cox proportional hazards model adjusted for adding home SBP to Model 1, the association between log UACR (HR, 1.24; 95% CI, 1.06–1.46, $P < 0.01$), LVMI (HR, 1.24; 95% CI, 1.09–1.41, $P < 0.01$), and CVD incidence remained, while this association was not found for baPWV (Model 2). Concerning the discrimination of predictive models, the C-statistic for the base model was 0.783 (95% CI 0.743–0.824), which significantly increased to 0.795 (95% CI 0.757–0.834) with the addition of LVMI but changed only slightly with the addition of log UACR or baPWV.

A hypertrophic heart, for example, is associated with diastolic dysfunction (and thus with reduced ventricular filling), depressed ventricular contractility, impaired coronary reserve, and alteration of the conduction of electrical stimuli that makes atrial and ventricular arrhythmias more common [9]. Subsequently, atrial fibrillation and left atrial enlargement are risk factors for ischemic stroke [10]. Furthermore, markers of inflammation have previously been related to left ventricular hypertrophy (LVH) in patients with uremia and hypertension and may contribute to increased all-cause and CV deaths (Fig. 1). Although observational and intervention studies have reported that

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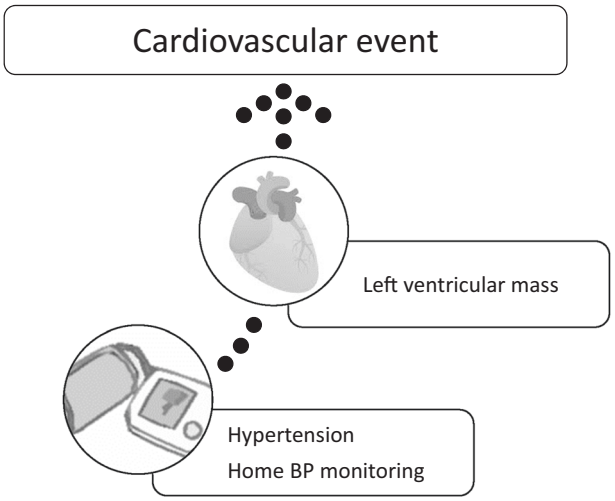

Fig. 1 Prognostic value of left ventricular mass in patients with cardiovascular risks. BP Blood pressure

LVH is a risk factor for CV morbidity and mortality in both general and hypertensive populations, independent of the concomitance of other risk factors and BP values, only one study reported that cardiac organ damage assessed by the presence of LVH using echocardiography was associated with a risk of CV events independent of home BP [11]. The results of Waki et al. may demonstrate that cardiac organ damage is an important risk factor for CV events independent of home BP in clinical practice, but in light of the study's limitations, further interpretation of the findings may be needed.

First, since this was an observational study, the authors could not demonstrate a causal link underlying the association between TOD and increased CV events. They could not rule out residual confounding by the duration or severity of associated or unknown risk factors. Second, they had only a modest number of events; therefore, they lacked power to examine threshold models or analyze specific types of CV events. Third, they could not exclude the possibility that with a longer follow-up or larger sample, other risk factors may have been related to CV events. Finally, they enrolled a Japanese clinical population with high CV risk; therefore, their findings may not be generalizable to the general population or other races.

In conclusion, TOD indicators, especially LVMI, provided superior prediction of CV events independent of and beyond home BP. In the treatment of hypertension with increased LVMI in the modern era of home BP for the management of hypertension, we need to not only be aware of home BP control but also determine the cause of increased LVMI and perform appropriate interventions. Further data are required to assess the association between TOD indicators and CV events independent of BP for healthy longevity in patients with hypertension.

Compliance with ethical standards

Conflict of interest The author declares no competing interests.

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