



## Is it necessary to set a lower limit target for blood pressure control for the advanced-age population?

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The prevalence of high blood pressure (BP) or hypertension is extremely high in elderly individuals, and it significantly increases the risk of cardiovascular disease onset [1]. The SPRINT trial demonstrated the effectiveness of intensive BP control in avoiding cardiovascular-related adverse events. To establish the JSH2019, a unique systematic review was performed in the elderly population (aged  $\geq 75$  years), showing that lowering systolic BP (SBP) to less than 140 mmHg is more effective for reducing cardiovascular and all-cause deaths than is a more gradual BP-lowering regimen [2]. Based on this review, the JSH2019 specifies that the target BP for antihypertensive therapy for elderly individuals is less than 140/90 mmHg. Intensive BP lowering is particularly recommended in patients with coronary artery disease (CAD) to reduce death risk [3]. The JSH2019 clearly states that for patients with CAD, the target of lowering SBP to less than 130 mmHg should be a priority over avoiding the decrease in the diastolic BP (DBP) to less than 80 mmHg. We studied the association between BP and cerebral microbleeds in relatively elderly patients (mean age of 72 years) with CAD. The results revealed that patients with an SBP of 132 mmHg or higher and a DBP of 74 mmHg or higher were more likely to develop cerebral microbleeds, and the incidence of subsequent cardiovascular events was extremely high in patients with cerebral microbleeds [4]. Thus, most of the evidence supports the argument ‘the lower, the better’ with respect to BP control in elderly patients with CAD.

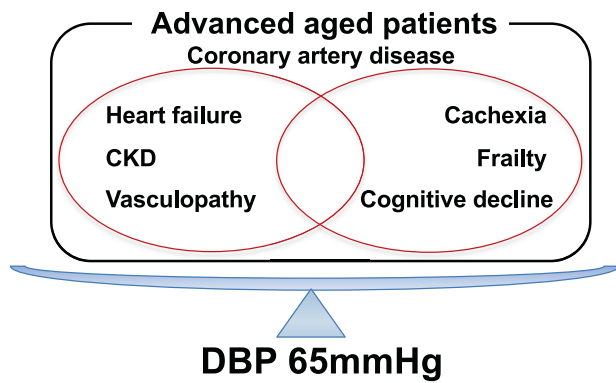
Conversely, it has been reported that lowering extreme BP elevates the incidence of cardiovascular diseases and all-cause mortality, which is known as the J-curve phenomenon. Paying attention to reducing DBP below a certain threshold in patients with CAD has been shown to be associated with an increased incidence of cardiovascular events. Different values for the lower limit of DBP have been identified across different trials: 70 mmHg by the Syst-Eur trial and the CLARIFY trial, 60 mmHg by the INVEST trial and the ARIC trial, and 55 mmHg by the SPRINT trial. However, the CREDO-Kyoto Registry Cohort-1 Study, which included revascularized CAD patients, has shown that although cardiovascular death increased in patients with a DBP of less than 70 mmHg, low DBP was not a significant determining factor [5]. Moreover, the J-curve phenomenon between low BP and cardiovascular death was not observed in patients aged  $\geq 75$  years with a DBP of less than 60 mmHg [6]. Thus, low DBP is a risk factor for cardiovascular events but may not be a significant factor with a direct causal relationship.

However, if only an advanced-age population (aged  $\geq 80$  years) is examined, the findings may differ. Patients with CAD in this age group have an extremely high incidence of other comorbidities, such as polyvascular disease, heart failure, chronic kidney disease, and cachexia, in addition to myocardial ischemia due to coronary stenotic lesions. Thus, critical organs such as the heart, brain, and kidneys are considered to be in an ischemic state in many advanced-age patients. Moreover, the presence or absence of conditions, including frailty, cognitive decline, and orthostatic hypotension, affects the strategies of antihypertensive therapy [7]. Zhang et al. conducted a prospective cohort study involving patients aged  $\geq 80$  years with acute myocardial infarction to examine how mean BP within 48 h after hospitalization affected cardiovascular death [8]. In their study, ischemic heart disease patients with concomitant hypertension accounted for 77.3% of the participants, and the results showed that cardiovascular mortality was 1.5 times higher in

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**Fig. 1** Heart failure, CKD and vasculopathy are thought to be complications in patients with CAD in the advanced-age group. The presence or absence of conditions, including cachexia, frailty and cognitive decline, also affects the antihypertensive therapy strategy. In light of Zhang et al.'s article, a DBP of 65 mmHg may be a suitable reference lower limit of target for the advanced-age population. CKD chronic kidney disease, DBP diastolic blood pressure

patients with a DBP of less than 65 mmHg. This indicated that low DBP is an independent predictor of cardiovascular death. The results of their study suggest that in Japan, a superaged society, setting the lower limit of target DBP ahead of the world may be beneficial in the extension of healthy life expectancy. For the advanced-age population, particularly those with concomitant CAD, a DBP of 65 mmHg may be a suitable reference lower limit of target BP (Fig. 1).

### Compliance with ethical standards

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