

## Editorial



# Implications of Simultaneously Measured Inter-Arm Difference

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### Conflict of Interest

The author has no financial conflicts of interest.

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► See the article "Comparison between Right and Left Upper Arms in Detection of Hypertension" in volume 49 on page 267.

In hypertension practice guidelines, it is recommended that blood pressures (BPs) should be measured in both arm to determine the arm with higher BP for the following measurement and to detect inter-arm difference (IAD) to screen vascular obstruction by subclavian artery stenosis, aortic aneurism, aortic coarctation, vasculitis, fibromuscular hyperplasia, connective tissue disorders, and thoracic outlet compression.<sup>1)</sup> With the same cut-off value, it was reported that sequential measurement IAD (seq-IAD) could result in two-fold higher abnormal IAD than simultaneously measured IAD (sim-IAD).<sup>2)</sup> But the guidelines did not recommend or prefer between seq-IAD and sim-IAD. When considering clinical reproducibility or consistency during multiple visits, cut-off value of IAD seems to be >20 mmHg in systolic BP even using sim-IAD to detect vascular obstruction.<sup>3)</sup>

In the study done by Song, et al., they reported the prevalence of sim-IAD in Korean general population.<sup>4)</sup> It is meaningful because, in terms of method of IAD measurement, repeated simultaneous measurement with crossover has been being adopted by most papers of IAD in epidemiological field.<sup>2)</sup> Their study is consistent with the previous meta-analysis reporting lower IAD prevalence in East Asia than western countries and increased hypertension prevalence depending on the level of BP. Moreover, it showed the individual or patient level IAD.<sup>5)</sup> In an epidemiological survey, BP usually has been measured in a fixed single arm or arm with higher BP determined by sequential measurements, but the additional value of simultaneous measurement is still uncertain.<sup>1)</sup> As speculated by the study,<sup>4)</sup> when BP is measured only in right arm in epidemiologic study such as national health survey, the extent for underestimation of hypertension prevalence can be estimated by at least 10% and 5% for men and women, respectively.

Apart from the screening of vascular obstruction and accuracy of hypertension diagnosis, IAD can be the predictor for future cardiovascular events even in the subject without peripheral arterial disease (PAD). Even so, the precise mechanism of IAD to predict future cardiovascular events is not clearly defined. Potential mechanisms of sim-IAD can be related to order effect by inadequate synchronization, difference in arm circumferences, and the difference in the dynamics of oscillation for automated devices. Additional mechanism of short-term BP variability explained by arterial stiffness, baroreflex sensitivity, and/or

emotional status could be applied to seq-IAD.<sup>6)</sup> Endothelial function, arterial stiffness and wave reflection could be the mechanism for both methods.<sup>7)</sup>

Simultaneous methods can save time and discomfort of the patient compared to sequential method because the number of measurements could be reduced to a half. As validated oscillometric devices are more and more available in the primary clinic situation, IAD can be more feasibly measured in repeated simultaneous crossover methods using two independent devices. In addition to simultaneous measurement method, clinical factors related to increased IAD such as consistency of IAD, arm circumference, obesity, or BP level should be recognized to avoid unnecessary referral for suspicious vascular obstruction.<sup>8)</sup>

In conclusion, sim-IAD could be more feasible standard for accurate diagnosis of hypertension, screening of PAD, and to predict future cardiovascular events than seq-IAD.

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