Blood Pressure-Adjusted Values of Markers of Arterial Stiffness: Three Brothers or also Others?

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Here, I would like to comment as a member of the editorial team of the Journal of Atherosclerosis and Thrombosis. Arterial stiffness, as assessed by pulse wave velocity (PWV), has been used as a risk marker for cardiovascular disease (CVD) and also as a marker for vascular damage. Arterial stiffness comprises two components, namely functional arterial stiffness, which is affected by the blood pressure (BP), and structural arterial stiffness. Hemodynamic abnormalities related to increased arterial stiffness are thought to be risk factors for the development of CVD, and both functional and structural stiffness might have important roles as risk markers for CVD. On the other hand, while structural arterial stiffness is thought to be associated with atherosclerotic vascular damage, elevated BP may disturb the assessment of the severity of structural arterial stiffness because elevated BP is associated with increased functional arterial stiffness. In this regard, the cardio-ankle vascular index (CAVI) has been proposed as a marker for arterial stiffness that is influenced to a lesser degree by BP (i.e., as a marker for structural arterial stiffness). However, this parameter can also be influenced by BP. Recently, Spronck et al. proposed CAVI0, which is influenced to a lesser degree by BP as compared to CAVI, using a simulation model. Thus, two modified markers for arterial stiffness are now available. In this issue, based on the data from a large sample size (i.e., not a simulation model), Shirai et al. demonstrated differences in the associations of BP variables with CAVI and CAVI0; they showed that diastolic BP was differently associated with CAVI and CAVI0. These findings need to be taken into account while measuring the values of BP-adjusted markers. However, there are several limitations. While PWV is a marker for segmental arterial stiffness, the stiffness index-beta, the base concept for CAVI and CAVI0, is a marker for regional, and not segmental, arterial stiffness. In addition, the existence of a BP gradient in the arterial tree is well known; therefore, the use of brachial BP for calculating the BP-adjusted value of the segmental arterial stiffness has not yet been fully validated. Finally, it has not been fully clarified how closely the arterial stiffness values, adjusted and not adjusted for BP, reflect atherosclerotic vascular damage related to the development of CVD. Therefore, as mentioned in the scientific statement, “criteria for evaluation of novel markers of cardiovascular risk”, further study is needed to clarify whether the use of these modified markers (i.e., CAVI and CAVI0) can improve the risk prediction over that using the original marker (i.e., heart-ankle PWV). Notwithstanding, Dr. Spronck mentioned that measurement of these markers could be easily incorporated into the device used to measure CAVI. Therefore, clarification of the merits and demerits of these markers is needed before they can perhaps be applied in a complementary manner in clinical practice.

Conflict of Interest

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References

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