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Editorial

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The Estimated Absolute Risk of Coronary Artery Disease and Subclinical Atherosclerosis

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Over several decades, epidemiological and experimental studies have revealed that atherosclerotic diseases are multifactorial diseases. Traditionally, their risk has been expressed using relative risks[1]. However, because atherosclerotic risk factors frequently co-exist in a single individual, global assessment of atherosclerotic risk is considered to be clinically preferable, leading to the evaluation of absolute risk that takes multiple risk factors into account. Thus, several organizations including the European Society of Cardiology and European Atherosclerosis Society (ESC/EAS), and the American College of Cardiology and the American Heart Association (ACC/AHA) have proposed guidelines using risk charts to estimate the absolute risk[2, 3]. These changes have resulted in an increased awareness about the importance of absolute risk assessment and comprehensive management of risk factors. Japan Atherosclerosis Society (JAS) also proposed the comprehensive risk management guidelines for prevention of atherosclerotic cardiovascular diseases[4, 5]. In the JAS Guidelines 2012, the 10-year absolute risk of death due to coronary artery disease (CAD), based on the NIPPON DATA80 Risk Assessment Chart, was applied to stratify individuals into different levels of risk categories, which were used to determine interventions for primary prevention of CAD. In 2017, JAS Guidelines 2017 applied the 10-year absolute risk of CAD incidence based on the Suita score for the stratification[6, 7].

Numerous equations have been invented for the estimation of absolute risk and published globally. In addition to the predictivity of the outcome, there are several points that need to be considered when we apply the equation to clinical guidelines. First, the equation should be developed based on the representative population samples to which the equation is to be applied, because the absolute risk would be estimated from the model that incorporates the average levels of risk factors in the population. The outcome criteria, such as the subtypes of atherosclerotic cardiovascular diseases to be included and whether the incidence and/or mortality are to be assessed, are key factors that need to be considered when we apply an equation. Furthermore, the differences between the population for which the risk assessment score had been created and the present population to which the score would be applied should be noted, as there may be differences in the level of atherosclerosis or the incidence and mortality of CAD. For example, NIPPON DATA80 Risk Assessment Chart was based on the study (NIPPON DATA80) for which baseline survey was conducted in 1980 when statin was not available, and CAD mortality was assessed as the outcome when the coronary intervention procedures were limited. Thus, newly applying the established estimation equation to guidelines requires a set of processes that clarifies the existence or non-existence of discrepancies between the current and previous populations.

Subclinical atherosclerosis could be a possible parameter to be used to assess the existence of such discrepancies between populations, because it shares risk factors with hard cardiovascular events such as myocardial infarction and stroke, and it strongly predicts the risks of occurrence of such events. Thus, subclinical atherosclerosis parameters such as coronary artery calcification and carotid intima-media thickness have been examined to be concordant with the historically established estimation equations that were applied in the guidelines[8, 9]. In this issue of the Journal of Atherosclerosis and Thrombosis, Sata *et al.* have provided additional evidence regarding the categories in the comprehensive lipid and risk management guidelines proposed by the JAS (JAS

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Guidelines 2017)[10], using a measure of subclinical atherosclerosis. They investigated the association of the cardio-ankle vascular index (CAVI), an arterial stiffness parameter, to the estimated 10-year absolute risk of CAD and the risk categories of JAS Guidelines 2017, in 1,973 general Japanese. Their cross-sectional data obtained in 2014 showed that the mean CAVI (proportion of CAVI ≥ 9.0 and multivariable adjusted Odds ratio of CAVI ≥ 9.0) was concordant with the estimated 10-year absolute risk of CAD when JAS Guidelines 2017 were employed. These findings suggest that the 10-year absolute risk of CAD estimation equation in JAS Guidelines 2017 was almost applicable to the contemporary populations, even though the baseline survey of the Suita study (in which Suita score was developed) had been conducted around 1990. They also studied about the appropriateness of category Ⅲ of the guidelines which includes individuals with diabetes mellitus, chronic kidney disease, non-cardiogenic cerebral infarction, and peripheral artery disease all together irrespective of the estimated absolute risk value. For men, they observed that the mean CAVI values, proportion of CAVI ≥ 9.0 and multivariable adjusted Odds ratio of CAVI ≥ 9.0 were similar between the groups with/without diabetes mellitus, chronic kidney disease, and peripheral artery disease. Their findings supported the classification in JAS Guidelines 2017. However, for women, those in category Ⅲ with diabetes mellitus had higher mean CAVI than those without diabetes mellitus, although the mean CAVI were similar between the groups with/without chronic kidney disease. These diseases were very heterogeneous in severity. Because their study population largely consisted of relatively healthy individuals, further studies are required to clarify whether patients with severe conditions are to be classified into category Ⅲ or into secondary prevention groups which require more rigorous risk factor control.

In summary, Sata *et al.* presented that a subclinical measure of atherosclerosis, or arterial stiffness assessed by CAVI was concordant with the estimated 10-year absolute risk of CAD as described in JAS Guidelines 2017, suggesting that the estimation equation could be applicable for the present population. Further studies, using other subclinical atherosclerosis parameters in the present population, are also recommended in order to support the estimated absolute risk equation and classification of JAS Guidelines 2017. However, lipid and comprehensive risk management would be beneficial, and the individuals classified in the higher risk category should have their risk factors adequately controlled in order to prevent cardiovascular disease.

Conflict of Interest

None.

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