Editorial

Evaluation of Cardiovascular Risk Prediction for the Guidelines of Cardiovascular Diseases Prevention in Japan

Tetsuya Ohira

Department of Epidemiology, Fukushima Medical University School of Medicine, Fukushima, Japan

See article vol. 23: 176-195

Currently, heart disease and stroke are the second and fourth leading causes of death in Japan, respectively, and remain the leading causes of death worldwide. In Western countries, risk prediction equations, such as the Framingham risk score (FRS)\(^1\) and the Systematic Coronary Risk Evaluation (SCORE)\(^2\), derived from epidemiologic cohort studies have been widely used in the primary prevention of cardiovascular disease (CVD)\(^3\). Furthermore, the American College of Cardiology (ACC)/American Heart Association (AHA) guidelines for the assessment of cardiovascular risk and the European guidelines on cardiovascular disease prevention applied these risk prediction equations to prevent CVD. Because these risk prediction equations were applicable to Caucasians, other risk prediction tools for Japanese have been also developed in recent years\(^4-6\) to identify individuals at high risk of CVD in Japan.

The NIPPON DATA80 risk charts\(^4\) were created using the data obtained from a 19-year prospective cohort study of the general Japanese population, and its model is based on the classical risk factors of age, sex, systolic blood pressure, total cholesterol, glucose, and smoking habits (Table 1). The Japan Atherosclerosis Society (JAS) released the guidelines (2012 version) in 2012 for the assessment of cardiovascular risk and the European guidelines on cardiovascular disease prevention applied these risk prediction equations to prevent CVD. Because these risk prediction equations were applicable to Caucasians, other risk prediction tools for Japanese have been also developed in recent years\(^4-6\) to identify individuals at high risk of CVD in Japan.

The NIPPON DATA80 risk charts\(^4\) were created using the data obtained from a 19-year prospective cohort study of the general Japanese population, and its model is based on the classical risk factors of age, sex, systolic blood pressure, total cholesterol, glucose, and smoking habits (Table 1). The Japan Atherosclerosis Society (JAS) released the guidelines (2012 version) in 2012 for the diagnosis and prevention of atherosclerotic cardiovascular diseases in Japan\(^7\), and a 10-year probability (absolute risk) of coronary artery disease (CAD) death derived from the NIPPON DATA80 was applied in the guidelines. Although many studies have analyzed whether FRS and/or SCORE were applicable to different populations, few studies have reported whether NIPPON DATA80 Risk Assessment Chart was applicable to external populations in Japan.

Nakai et al. reported the calibration between the estimated CAD/stroke mortality calculated by the NIPPON DATA80 Risk Assessment Chart and the actual CAD/stroke mortality in external populations, using the data of the large pooled database of cohorts in Japan, including Tanno-Sobetsu, Ohsaki, Ohasama, YKK workers, Suita, Radiation Effects Research Foundation, Hisayama, NIPPON DATA90, and Osaka\(^8\). However, they found that the estimated CAD mortality by the NIPPON DATA80 Risk Assessment Chart tended to be higher than the actual mortality in the external populations.

Several reasons may explain the discrepancy between the estimated CVD mortality by an existing risk prediction equation and the actual CVD mortality in external populations. Firstly, lifestyles and CVD risk factors are different among race/ethnicities, cultures, genders, and age groups. Secondly, the heterogeneity of the end point definitions across studies should be taken into account. Thirdly, the actual CVD mortality may be modified by the representativeness of the external populations. Finally, the difference of baseline period could explain the discrepancy when incidence and/or mortality rate of CVD vary across the ages. In Japan, advances in medical treatment for CVD, such as percutaneous coronary intervention, reduced the proportion of in-hospital death in the 1980s and the 2000s by half\(^9\), and this could lead overestimation for cardiovascular outcomes, especially for CVD mortality. Because the NIPPON DATA80 risk chart is limited to death due to CVD, the risk charts may be susceptible to a change with time.

The work group of the 2013 ACC/AHA guideline on the assessment of cardiovascular risk made the decision to develop new equations to estimate the 10-year risk of developing a first atherosclerotic CVD event\(^10\), and the group used data from several large, racially and geographically diverse, community-based cohort studies, including the Atherosclerosis in Com-
Table 1. Comparison of a Sample of Risk Assessment Tools: Framingham, SCORE, and NIPPON DATA80

<table>
<thead>
<tr>
<th>Sample size</th>
<th>Framingham</th>
<th>SCORE</th>
<th>NIPPON DATA80</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (year)</td>
<td>30 to 74</td>
<td>19 to 80</td>
<td>30 years and older</td>
</tr>
<tr>
<td>Risk factors</td>
<td>Age, sex, total cholesterol, HDL cholesterol, smoking status, systolic blood pressure, antihypertensive medications</td>
<td>Age, sex, total cholesterol, smoking status, systolic blood pressure</td>
<td>Age, sex, total cholesterol, smoking status, systolic blood pressure, casual glucose level</td>
</tr>
<tr>
<td>Outcomes</td>
<td>10-year risk of myocardial infarction and coronary heart disease-related death</td>
<td>10-year risk of cardiovascular disease-related death</td>
<td>10-year risk of cardiovascular disease-related death</td>
</tr>
<tr>
<td>Points</td>
<td>&lt;10%: low risk, 10%-20%: moderate risk, &gt;20%: high risk</td>
<td>&lt;1%: low risk, 1%-5%: moderate risk, &gt;5%: high risk</td>
<td>&lt;1%: low risk, 1%-2%: moderate risk, &gt;2%: high risk</td>
</tr>
</tbody>
</table>


Conflicts of Interest

None.

References