Methods for the prediction of coronary heart disease risk

It is indisputable that patients with coronary heart disease (CHD) should generally receive statin treatment, certainly if their serum cholesterol exceeds 5 mmol/l. Patients with peripheral arterial disease or stroke are at a similar level of risk of a subsequent CHD event as are the survivors of myocardial infarction and are also increasingly recommended to receive statin treatment.2

Coronary risk in primary prevention

How to use statins in the primary prevention of CHD, however, remains controversial. The difficulty is not a lack of evidence of the clinical effectiveness of statins in primary prevention; this was established in the West of Scotland coronary prevention study3 and the Air Force/Texas coronary atherosclerosis prevention study.4 Rather it is that there are so many people who could benefit from statin treatment, particularly in Britain, which internationally has one of the worst records for CHD deaths. The cost of treating all those who can benefit would be enormous and require major adjustments to the use of other less cost effective treatment, if it were to be accommodated within the existing National Health Service (NHS) budget. Thus, while the scientific evidence of benefit for statin treatment extends to people with a 10 year CHD risk of less than 10%,6 the NHS framework on CHD prevention recommends the use of statins in primary prevention only when the CHD risk reaches 30% over 10 years. The Joint British Societies (British Cardiac Society, British Diabetic Association, British Hyperlipidaemia Association) recommended statin treatment in primary prevention in people whose 10 year CHD risk exceeds 15%, which is clearly evidence based.2 The Joint European Task Force on Coronary Prevention recommended 20%. This is the level which is cost effective at current statin prices.7 Our study8 comparing the US National Cholesterol Education Program (NCEP) recommendations9 with both the British and European ones, revealed that in the USA the intention was to be increasingly based on cardiovascular risk rather than simply on blood pressure per se. Thus the Joint British Societies charts (Heart version)2 and the European ones,6 which were recommended by SMAC as a possible alternative to the Sheffield tables, are also revealed by the study by Jones and colleagues11 to be less accurate than the Joint British Societies charts. So also are the European ones.6 These findings are confirmed by our own unpublished results in the population, which we previously studied in the evaluation of the NCEP algorithm, the European charts, and the original Sheffield tables10 (table 1).

The Joint British Societies charts are available as a leaflet or as a wall chart from the British Heart Foundation (telephone 020 7487 7142) and are to be found at the back of the British National Formulary.

HDL cholesterol and primary prevention

It is particularly important to note that the study of Jones and colleagues11 once again underlines the importance of measuring high density lipoprotein (HDL) cholesterol as well as total serum cholesterol in the assessment of risk in primary prevention. This is because, as risk factors multiply, HDL cholesterol concentrations fall (fig 1). Thus the people who are at most risk often fail to be identified unless additional risk from their low HDL cholesterol is taken into account.4 The necessity to measure HDL cholesterol is made more emphatic in Britain by the high level of risk which is being advocated before statins can be employed. This is because the inaccuracy of predicting CHD risk without measuring HDL cholesterol becomes progressively greater as higher risk groups are targeted (fig 2). It is probably not widely enough appreciated that the measurement of HDL cholesterol can be undertaken on non-fasting samples2 ( unlike the measurement of triglycerides

Charts and tables in coronary risk prevention

In the article by Jones and colleagues published recently in Heart, eight methods, which have been proposed for CHD (or cardiovascular disease) risk prediction, were compared in a population of patients whose general practitioners wished to assess risk.11 The methods were all based on the Framingham risk equation, because this remains the only published epidemiological study in which there are both men and women and in which a reasonably comprehensive range of risk factors was measured.12 The overall best method in terms of how closely its results matched the original equation was the Joint British Societies coronary risk prediction charts,13 which is gratifying to those of us who designed them, coming as it does from an independent source. The need for the Joint British Societies charts was created by the inaccuracy in the Sheffield tables,14 which was unknown until they were subjected to clinical trial.7 Unfortunately by then their use had been advised by the standing medical advisory committee (SMAC) to the chief medical officer of health.15 The New Zealand charts,16 which were recommended by SMAC as a possible alternative to the Sheffield tables, are also revealed by the study by Jones and colleagues11 to be less accurate than the Joint British Societies charts. So also are the European ones.6 These findings are confirmed by our own unpublished results in the population, which we previously studied in the evaluation of the NCEP algorithm, the European charts, and the original Sheffield tables10 (table 1).

Table 1 The number (n) of patients from a population of 386 referred to a lipid clinic to whom the various charts or tables could be applied, whose risk was correctly classified according to the Framingham risk equation12 on which they are all based.

<table>
<thead>
<tr>
<th>Method</th>
<th>n</th>
<th>Correct Underevaluated (%)</th>
<th>Overevaluated (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joint British charts</td>
<td>340</td>
<td>87.9</td>
<td>5.0</td>
</tr>
<tr>
<td>Joint British charts (BMJ version)</td>
<td>307</td>
<td>88.3</td>
<td>5.5</td>
</tr>
<tr>
<td>New Zealand charts</td>
<td>230</td>
<td>63.0</td>
<td>2.2</td>
</tr>
<tr>
<td>Joint European charts</td>
<td>262</td>
<td>65.6</td>
<td>6.5</td>
</tr>
<tr>
<td>New Sheffield tables</td>
<td>322</td>
<td>81.1</td>
<td>5.9</td>
</tr>
</tbody>
</table>

Coronary heart disease risk was calculated using the Framingham risk equation12 except in the case of the New Zealand charts when cardiovascular risk, which they are designed to predict, was calculated. The percentages are for the patients (n) to whom the charts or tables could be applied.
recommendations. The program is also available from the British Heart Foundation and from the present authors, and it is on the British Hypertension Society website (www.hyp.ac.uk/bhs) and the British National Formulary website (http://bnf.org). In addition to the information provided by the charts, the computer program also allows left ventricular hypertrophy to be taken into account and provides both coronary and stroke risk based on systolic and diastolic blood pressures.

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![Figure 1](http://heart.bmj.com/content/269/5166/490.f1)

**Figure 1** Mean (SE) serum HDL cholesterol in men and women according to the number of GHD risk factors they had.

![Figure 2](http://heart.bmj.com/content/269/5166/490.f2)

**Figure 2** CHD risk computed with a knowledge of the patients’ HDL cholesterol concentrations plotted against the risk calculated with knowing individual HDL cholesterol concentrations.
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