The incidence of cardiovascular disease (CVD) is still increasing globally, but prevention and treatment have improved considerably during the last 20 years. As treatment is not curative, prevention is preferable although it calls for intervention in many more subjects. In order not to treat many subjects unnecessarily, it is important to identify those at highest risk of developing CVD in the future. For this purpose, several tools for cardiovascular risk estimation have been developed. In Europe, the most widely used scoring systems are SCORE [1] in subjects without known CVD or diabetes, and the cardiovascular risk stratification chart of the European Society of Hypertension (ESH) [2] in subjects with hypertension. However, many of these risk scores will, in general, overestimate the cardiovascular risk (3% because primary and secondary cardiovascular prevention has reduced both the incidence of myocardial infarctions and case fatalities (4%) in many Western countries.

The SCORE system as a basis for strategies of prevention

Like the ESH, the European Society of Cardiology (ESC) has focused on CVD prevention, as reflected in their guidelines for clinical practice [5]. In subjects without known CVD, type 2 diabetes, type 1 diabetes with microalbuminuria, or very high levels of individual risk factors, the risk of developing fatal atherosclerotic events is calculated using the SCORE system, available in chart form (Figure 1) or as an interactive tool (HeartScore) on the ESC website (on-line version or PC-based program) (http://www.escardio.org/Policy/prevention/tools/health-tool-kit/Pages/HeartScore.aspx). HeartScore is based on data from European population surveys, and national versions are available in several countries. Absolute risk of cardiovascular death within 10 years < 1% is defined as low risk; 1–4% risk is defined as moderate; 5–9% as increased, and ≥10% as high. Generally, there are two SCORE chart versions: for populations with low (Belgium, France, Italy, Luxembourg, Portugal, Spain, and Switzerland) or high CVD risk. In addition, each of the SCORE charts is based either on total cholesterol or the total cholesterol/HDL-cholesterol ratio. The treatment goals for blood pressure as well as other cardiovascular risk factors depend on this risk stratification, but there are no universal thresholds for initiation of drug treatment. For subjects with a 10-year risk of cardiovascular events as predicted by age, gender, smoking habits and serum cholesterol in subjects without diabetes or cardiovascular disease (CVD)
cular risk is dependent on all the risk factors; and 3) Treatment indications and goals are determined by the absolute cardiovascular risk and are thereby dependent on cardiovascular risk factors, subclinical cardiovascular damage, and CVD. Therefore, to identify these patients, the ESC guidelines for antihypertensive treatment follow, to a large extent, the ESH guidelines, but they are somewhat more restrictive regarding initiation of antihypertensive drug treatment.

Special considerations

The following three groups of patients are often debated: Hypertensive patients at low added risk, subjects with high normal blood pressure and several additional cardiovascular risk factors or subclinical cardiovascular damage, and normotensive patients with CVD.

Hypertensive patients at low added risk (20% of the middle-aged, healthy population [12])

In patients with grade 1 hypertension without other cardiovascular risk factors, the ESH primarily recommends lifestyle changes, but, if hypertension persists after six months, antihypertensive drug treatment is recommended not based on clear scientific evidence but based on the fact that the patients eventually will develop additional risk factors, and on the assumption that early prevention is better than late [13]. However, the ESC guidelines do not recommend antihypertensive drug treatment in patients with grade 1 hypertension and SCORE < 1%, due to their low cardiovascular risk. As the SCORE often underestimates the risk for non-fatal stroke in women, the risk associated with not treating middle-aged women with hypertension and SCORE < 1% should be carefully considered. Before making this decision, it is crucial to assess all cardiovascular risk factors and to follow these patients because, over time, the 10-year absolute risk of cardiovascular death will increase above 1% thus requiring drug treatment. This risk of undertreatment in middle-aged women may explain the relatively high number of cardiovascular deaths in 40-year-old women in the Västerbotten Intervention Program of northern Sweden [3].

Subjects with high normal blood pressure (15% of the middle-aged, healthy population [12])

Healthy subjects with high normal blood pressure have only slightly elevated cardiovascular risk compared to healthy subjects with grade 1 blood pressure of 120-130/80 mm Hg [14]. However, a large proportion of cardiovascular events occur in this rather large group, and, since risk assessment is often perceived as complicated, they deserve special attention. In subjects with high normal blood pressure and SCORE < 5%, no diabetes and no sign of subclinical cardiovascular damage, lifestyle advice is recommended by the ESC [5] and ESH [2]. In subjects with high normal blood pressure and diabetes, these societies recommend lifestyle changes as well as antihypertensive drug treatment. In the intermediate group of subjects with high normal blood pressure and SCORE ≥ 5% or with high normal blood pressure and high risk by the SCORE (Figure 1), a description of any of these other cardiovascular risk factors, metabolic syndrome or subclinical cardiovascular damage, they recommend lifestyle changes and the consideration of antihypertensive drug treatment. However, antihypertensive treatment in subjects with high normal blood pressure and diabetes or at subjects with high added risk has never been possible to target and monitor treatment on a more individual basis [15]. As blockage of the renin-angiotensin-aldosterone system is associated with regression of subclinical cardiovascular damage without metabolic side effects, typical treatment may include an angiotensin II receptor blocker (ACE inhibitor) or an angiotensin II-receptor blocker (ARB) [16].

Normotensive patients with CVD

Despite evidence, the ESC recommended in their 2007 guidelines (2) antihypertensive drug treatment, especially ACE-inhibitors or ARBs, in patients with CVD or renal insufficiency independently of blood pressure. However, the clear scientific evidence for a more aggressive treatment in patients with CVD is lacking [13], and post-hoc analyses from the OnTarget-study [17] have demonstrated a worse prognosis in patients receiving a very low blood pressure, indicating a threshold for how low blood pressure may be reduced in patients with CVD. Therefore, the ESH have modified their other aggressive recommendation for a treatment goal just below 130/80 mm Hg [13] which is also used by the ESC [5]. The first line of antihypertensive drug treatment is dependent on the type of CVD. In diabetes with microalbuminuria or renal insufficiency, ACE inhibitors or ARBs should be included in the treatment.

Practical use of risk stratification

In general, the SCORE should be used in healthy, normotensive subjects, and the ESH risk chart in hypertensive patients. However, physicians are still reluctant to use risk stratification tools, and the differences between the ESH risk chart and the SCORE, if used as recommended by the ESC, are only small [18]. Therefore, it is more important that doctors use a risk stratification tool with which they are familiar and less important which tool they use. General assessment of subclinical cardiovascular damage in normotensive subjects with SCORE < 5% is an overwhelming task without a substantial clinical impact [19]. However, assessment of subclinical cardiovascular damage in normotensive subjects with 1% < SCORE < 5% may have some clinical impact. In subjects with high normal blood pressure, assessment of subclinical cardiovascular damage may increase the sensitivity for identifying subjects experiencing later cardiovascular events [12]. However, as approximately 80% of healthy subjects with high normal blood pressure and SCORE ≥ 5% have low blood pressure, measurement of subclinical cardiovascular damage may increase the sensitivity for detecting patients with high normal blood pressure [12]. As the SCORE should be used preferentially in middle-aged men, and the ESC guidelines are used preferentially in women, the SCORE could be considered instead of measuring subclinical cardiovascular damage in this group.

Summary

Estimation of absolute cardiovascular risk is important for the choice of primary as well as secondary cardiovascular prevention. In general, physicians are advised to use the SCORE in apparently healthy subjects with optimal or normal blood pressure, and either one or, better still, a combination of the two instruments in apparently healthy subjects with high normal blood pressure.

References


12. Sehestedt T, Jørgensen I, Hansen TW, et al. Which markers of subclinical organ damage to measure for non-fatal stroke in women, the risk associated with not treating middle-aged women with hypertension and SCORE < 1% should be carefully considered. Before making this decision, it is crucial to assess all cardiovascular risk factors and to follow these patients because, over time, the 10-year absolute risk of cardiovascular death will increase above 1% thus requiring drug treatment. This risk of undertreatment in middle-aged women may explain the relatively high number of cardiovascular deaths in 40-year-old women in the Västerbotten Intervention Program of northern Sweden [3].


