Does diagnosis of the metabolic syndrome detect further men at high risk of cardiovascular death beyond those identified by a conventional cardiovascular risk score? The DECODE Study.

The Decode Study Group

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Abstract

Background **It is not known whether the metabolic syndrome detects further individuals at high risk of cardiovascular (CVD) mortality, beyond those identified by a conventional cardiovascular risk score.**

Design **A prospective study**

Methods **2790 non-diabetic men, aged 50-69 years from seven population-based European cohorts participating in the DECODE Study, were followed for CVD mortality over 10 years.**

Results **51% of the men had an estimated 10-year risk of fatal CVD under 5%, using the European SCORE project equation, and 22% of them had the metabolic syndrome, as defined by the National Cholesterol Education Program Adult Treatment Panel III. In the low risk men, the hazards ratio for fatal CVD, after adjusting for age and study centre, was 2.71 (1.33-5.51) for men with the syndrome ($p < 0.01$) compared to men without the syndrome. A large waist circumference (> 102 cm) carried an odds ratio of 2.24 (1.05-4.76) in the low CVD risk men**

Conclusions **Men with a low cardiovascular risk score *and* the metabolic syndrome had a significantly higher risk of fatal CVD than those without the syndrome. Use of the metabolic syndrome in clinical practice is thus justified in men, but the waist circumference provided a simpler diagnostic tool with similar fatal CVD risk in these low risk men. A large waist circumference could be used for pre-screening, and could be included in CVD risk scores.**

Key words: cardiovascular diseases, epidemiology, obesity, risk factors

Introduction

Identification of the metabolic or insulin resistance syndrome is currently being recommended to identify people at risk for cardiovascular disease (CVD), and for diabetes [1-5]. Numerous studies have shown that both prevalent and incident diabetes and CVD are associated with the syndrome, as defined by the World Health Organization (WHO)[1], by the European Group for the study of Insulin Resistance (EGIR)[6], by the National Cholesterol Education Program, Adult Treatment Panel III (NCEP-ATP III)[2] or by adaptations of these definitions [7-24]. Further, in 2005 two additional definitions of the metabolic syndrome have been published, one by the International Diabetes Federation (IDF)[25], and a second, a revised version of the NECP-ATP III definition, by the American Heart Association/National Heart, Lung, and Blood Institute (AHA/NHLBI) [26].

However, while the syndrome may predict diabetes, this is mainly due to those subjects with the syndrome who have high glucose concentrations (impaired glucose tolerance or impaired fasting glucose) at baseline [9,11,18,19,21,22]. A combination of other diabetes risk factors (glucose and insulin at both fasting and 2 hours post load, triglycerides, HDL-cholesterol, systolic and diastolic blood pressure, weight, height) has been shown to better predict diabetes than either the WHO or the NCEP-ATP III defined syndromes [16,19]. For cardiovascular mortality, there are many studies [7-17,22-24], and the syndrome is significantly predictive, even after adjusting for the traditional CVD risk factors (blood pressure, cholesterol, smoking as well as age) [10,11,13,15,17,23,24]. However, the Framingham Risk equation appears to have a better predictive value than the metabolic syndrome [16].

If the syndrome is to be a useful concept in clinical practice it should identify individuals at risk of CVD beyond those who can already be identified by a cardiovascular risk score. The European SCORE project risk equation [27] is appropriate for identifying those at low and high risk of fatal CVD (10-year risk under and over 5%) in European populations [28].

In the DECODE cohort, we study whether the syndrome identified individuals who died within 10 years of CVD among those a) at low CVD risk, b) at high CVD risk. Further we study in these two groups the predictive value of the syndrome abnormalities taken singly and as a combination of the two clinical variables, waist circumference and arterial blood pressure, and of the hyper-triglyceridaemic waist, which has been proposed as a simple tool for the diagnosis of the syndrome [29].

Methods

Study population

The methods used to recruit cohorts into the DECODE Study have been reported in previous publications [14,30-32]. Briefly, coordinators of studies with data on mortality from population-based studies or large studies on occupational groups in Europe, and with measured glucose concentrations at fasting and 2 hours after a 75g OGTT, were contacted and invited to participate. Data were collated and analyzed in the Diabetes and Genetic Epidemiology Unit of the National Public Health Institute in Helsinki, Finland.

We analyze data from seven population-based studies from the DECODE study cohorts, 2790 men aged 50 to 69 years with measures of fasting glucose, triglycerides, HDL-cholesterol concentrations, waist circumference and systolic and diastolic blood pressures. There were too few cardiovascular events in this DECODE population with the syndrome variables to permit analysis outside this age range. Women were included in the DECODE cohort, but the number of CVD deaths was small, and so results have not been included in this report. Diabetic men, both known and screened (fasting plasma glucose $\geq$ 7.0 mmol/l) were excluded [1]. All glucose concentrations were transformed to plasma glucose concentrations, as already documented in other DECODE Study publications [14,30-32].

Each study had ethical approval in accord with local requirements.

Score Risk Equation for CVD risk stratification

The probability of 10-year CVD mortality was calculated for all men in the study, using the formulae developed by the European SCORE project, summing the probabilities of CHD and CVD-non-CHD deaths [27]. This score includes sex, age, smoking status, total cholesterol and systolic blood pressure. These risk equations do not take into account diabetes or glucose concentrations, nor obesity measures. The coefficients for 'low risk countries' were used for Spain, Italy, the Netherlands, and 'high risk countries' for Finland, Sweden, Poland and the UK. Men with a 10-year cardiovascular mortality risk under 5% were identified as being at 'low risk' and men with a risk over 5% as 'high risk', in line with the European guidelines [27].

The metabolic syndrome

The NCEP-ATP III defined metabolic was used, modified to include treatment for hypertension [2]. This definition requires the presence of at least three of the following five abnormalities: hyperglycaemia: fasting plasma glucose $\geq$ 6.1 mmol/l; high arterial blood pressure: systolic $\geq$ 130 mmHg and/or diastolic $\geq$ 85 mmHg or treatment for hypertension; hypertriglyceridaemia: triglycerides $\geq$ 1.7 mmol/l; hypo-HDL cholesterolaemia: HDL-cholesterol < 1.04mmol/l; central adiposity: waist circumference > 102 cm.

Vital status

Vital status was followed for the men who attended the baseline examination. Those who emigrated, for whom vital status could not be confirmed, were censored at the time of emigration. Follow-up was almost complete. Fatal events were classified using the International Classification of Diseases: CVD was defined by codes 401-448 of the Eighth or Ninth Revisions and codes I10-

I79 for the Tenth Revision [33,34]. Causes of death were either classified by an independent panel, or death certificates were used.

Statistical Analyses

SPSS for Windows 11.0 has been used for all statistical analyses.

Men were divided into four groups according to < 5%/≥ 5% estimated CVD risk and absence/presence of the NCEP-ATP III metabolic syndrome. The mean values of risk factors and the ranges over the studies, are presented (Table 1).

The Cox proportional hazards model was used to estimate the 10-year hazards ratios for fatal CVD, using men without the syndrome and at low CVD risk, as the reference group. The 10-year CVD cumulative hazards curves were calculated for these four risk groups. Because the syndrome and the CVD risk score include the same variables (arterial blood pressures), and age is included in the SCORE risk equation, models were build successively, with initially no adjustment, and then successive adjustment for centre, for centre and age and finally for centre, age and the estimated CVD risk from the SCORE equation [27]. The final adjustment for the estimated CVD risk aimed to examine whether the residual risk in the men with the syndrome was due to the traditional CVD risk factors or to other factors included in the syndrome, such as abdominal obesity, hyperglycemia and the specific lipid abnormalities.

In order to examine the CVD mortality linked with the syndrome in the high CVD risk group, the hazards ratios were also determined separately, in the groups with low and high CVD risk scores.

To determine which of the syndrome abnormalities was driving the CVD risk, hazards ratios for the individual syndrome abnormalities were estimated, within the two CVD risk groups, with the

abnormalities defined according to the NCEP-ATP III thresholds. Finally, the risk associated with the combination of the two clinically determined variables, large waist circumference and high arterial blood pressure was evaluated, and also the risk associated with the combination of high triglycerides and large waist circumference [29].

Results

The characteristics of the men, aged 50 to 69 years, included in this study are shown (Table 1). The follow-up in this analysis was limited to ten years. The most frequent abnormality contributing to the metabolic syndrome was high arterial blood pressure, with a frequency of 72% and the syndrome was present in 24% of the men.

The SCORE CVD risk equation identified 51% of the men (n=1416) as having a risk of fatal CVD under 5% over the next 10 years (Table 2). Of these, 22% (n=306) had the metabolic syndrome.

Overall 4.2% (n=118) of the men died of CVD, 2.2% (33/1416) of those at low CVD risk and 6.2% (85/1374) of those at high CVD risk. In both the low and the high CVD risk groups, the mean values of all variables indicated a higher risk in those with the metabolic syndrome (Table 2). This was particularly true for the syndrome variables.

The primary objective of this analysis was to determine, in men at low CVD risk, whether those with the metabolic syndrome had significantly higher CVD mortality than those without the syndrome. The hazards ratios changed little after adjustment, and even after adjusting for the estimated CVD risk, the metabolic syndrome remained predictive with a hazards ratio (95% confidence interval) of 2.42 (1.20-4.88) ($p < 0.05$) (Table 3). For the high CVD risk men, the hazards ratios were more affected by the adjustments: when adjusted for centre alone, the risks of fatal CVD were higher than for the low CVD risk men with the syndrome, but after adjustment for

age and centre, the hazards ratios were similar to the men with low CVD risk and the syndrome. Further, adjusting for the estimated 10-year CVD risk using the SCORE equation, the observed hazards ratio in the high risk men was greatly reduced, showing that the risk was due to high values of the classical CVD risk factors. Analyzing the two CVD risk groups separately, showed that the metabolic syndrome did not predict CVD mortality in the high risk men, with hazards ratios very close to one.

The cumulative hazards for the four groups of men are shown in Figure 1, and illustrate the similar risks in men at high CVD risk, with and without the syndrome and in men at low CVD risk with the syndrome.

Among the individual syndrome abnormalities, for the men in the low CVD risk group, large waist, high blood pressure, low HDL-cholesterol were predictive of fatal CVD with similar hazards ratios of 2.24 (1.05-4.76), 2.67 (1.21-5.88) and 2.72 (1.35-5.45) respectively (Table 4). The highest hazards ratio was associated with the combination of large waist and high arterial blood pressure, 3.54 (1.65-7.59). These men were 13% of those at low CVD risk, a smaller target group for potential intervention than the 22% with the metabolic syndrome in this group.

The individual metabolic syndrome variables were not predictive of 10 year CVD mortality in the high CVD risk men.

Discussion

In men with a low risk of fatal CVD, as estimated by the SCORE project risk equations [27], presence of the metabolic syndrome at baseline increased the chances of fatal CVD over the 10-year follow-up, using the clinical definition of the metabolic syndrome given by the NCEP-ATP III [2]. This risk was related to syndrome abnormalities and not to the risk identified by the SCORE equation for CVD mortality, as the syndrome remained predictive after adjustment by the estimated CVD risk. The positive predictive values for fatal CVD in men using the waist circumference alone was 4.1% and for the metabolic syndrome 4.2%, with hazards ratios of 2.24 and 2.71 respectively; the waist criteria provides a simpler alternative to the syndrome as screening could be targeted towards a smaller fraction of the population, 17% versus 22% of the men at low CVD risk. The high blood pressure, large waist criteria had an associated hazards ratio of 3.54, a positive predictive value of 5.3% and screened 13% of the low risk population: these two variables are readily available in general practice.

Limitations of the Study

Our study is limited by the small number of cardiovascular deaths. In contrast to other studies, we have limited the analysis to subjects between 50 and 69 years, as there were too few men with an estimated risk of fatal CVD deaths over 5% before 50 years of age and too few subjects over 69 years, thus there has been no extrapolation of the results to other age groups, based on few deaths in these age groups. Unfortunately we do not have access to cardiovascular morbidity in most of these DECODE populations. The CVD risk score developed for Europe is appropriate, but scores such as the Framingham risk equation should provide similar results, and would rank subjects similarly, although many of these score are for morbidity and not mortality. Of the men identified by the SCORE risk equation as being at high fatal CVD risk, 6.1% died of CVD, in contrast to the expected 5%. However, the SCORE equation is not country specific, and only stratifies according

to ‘high’ and ‘low’ risk countries. The data were also analyzed deleting the 44 men who were diabetic according to the 2-hour post-load glucose criteria. The hazards ratios were little altered.

A further limitation is the use of the NCEP-ATP III criteria for the definition of the metabolic syndrome, which we have already discussed [35]. This definition was designed for clinical use, and our study was designed to provide practical answers. It was a consensus definition from an expert committee in the United States, where the blood pressure levels are lower than in Europe [36] and the waist circumferences are larger [35]. Using the thresholds of the NCEP-ATP III syndrome, we classified two thirds of our population as having high arterial blood pressure. In almost all populations, the waist circumference criteria of the NCEP-ATP III screen more women than men. These thresholds were not chosen on the basis of CVD mortality, and given the higher rate of CVD in men, waist circumference thresholds which screen more men than women would seem appropriate. With better adapted thresholds, the waist circumference might provide a very convenient first screening tool, without the need for taking a blood sample. The syndrome criteria are not optimal, and indeed it would be preferable to have a continuous metabolic score rather than a dichotomous classification [37].

We have chosen to study only the NCEP-ATP III syndrome [2], so that these results can be compared with other publications, most of which use this syndrome definition. This study is only of mortality as morbidity data were not available in all of the populations in this study. Further the follow-up is limited to 10 years. The metabolic syndrome may be a risk factor for a higher lifetime risk of cardiovascular consequences, and studying only mortality and for only 10 years, may limit findings on the utility of the metabolic syndrome. Altough Type 2 diabetes has been identified as a CVD risk equivalent to established CVD [2], we have studied only one outcome of the metabolic syndrome in these analyses, fatal CVD and not progression to diabetes, which in the long term would have CVD consequences, although not necessarily yet within a 10-year period. [38]. Using a

combined endpoint, diabetes and CVD events may have an important impact on the risk associated with the syndrome. Information on incident diabetes is not available in these populations. It should be noted, that these results are for European Caucasians aged 50 to 69 years, thus similar analyses are required in other populations and age groups to determine whether they can be generalized.

Other Studies

A previous analysis of the DECODE cohort [14] examined the risk associated with the metabolic syndrome, using adaptations of the WHO syndrome definition, and using various combinations of the abnormalities. Indeed, all syndrome definitions used were predictive of CVD mortality in men, in accord with our results.

One published study analyzed major CVD events, stratifying subjects on the 10-year CVD risk (fatal and non-fatal events) estimated from the Framingham score, with high risk being a > 20% probability of an event [13]. Participants were from the placebo groups of two clinical trials (4S and AFCAPS/TexCAPS) on cholesterol lowering in high risk individuals, average age 58 years, and more than 75% were men. In men at low CVD risk, those with the syndrome had a higher cumulative incidence of a major coronary event than those without the syndrome, but this was not formally tested. In these two clinical trials, the metabolic syndrome conferred statistically significant age-adjusted hazards ratios of 1.5 and 1.4 for a major coronary event. In our study, the corresponding fatal CVD hazards ratio for the syndrome was higher in men at low CVD risk, being 2.7.

Data from the population based San Antonio Study [16] show that while the metabolic syndrome had an odds ratio of almost 4 for CVD events, after adjustment by the Framingham CVD risk score, this risk was reduced to non-significant 1.14 (0.76-1.71). These data were not analyzed by sex, and could well be compatible with our results, where the metabolic syndrome was only found to be

predictive in the low risk men. ROC curves show that the Framingham risk score has higher sensitivity/specificity for CVD events than the metabolic syndrome, but this is not surprising given that the Framingham score has been specifically developed to include variables that best predict CVD events, in contrast to the metabolic syndrome which is a combination of potential risk factors, published by an expert committee.

In the ARIC cohort, more than 1000 incident events in men and women 45 to 64 years, over a follow-up of 11 years, were registered [17]. The metabolic syndrome was found to be predictive of CVD events, both in men and women, but as in the San Antonio Study, the metabolic syndrome did not improve the coronary risk prediction beyond the level achieved by the Framingham risk score.

The Hoorn Study, a European cohort of middle aged men and women, adjusting for the Framingham category reduced the hazards ratio of fatal and non-fatal CVD events associated with the metabolic syndrome, to 1.64 (1.11-2.44) in men and 1.17 (0.73-1.87) in women [23].

Analyses need to be repeated in other studies with more subjects and so more CVD deaths and with an extended age range. The sensitivity of the results to the actual thresholds used in the metabolic syndrome definition should also be studied.

Conclusions

Our study has shown that the metabolic syndrome, as defined by NCEP-ATP III, is predictive of fatal cardiovascular disease, but only in the men with a low risk of fatal CVD. The syndrome provides no further predictive information in men at high CVD risk. Of note is the predictive value of the waist circumference with similar odds ratios to the NCEP-ATP III syndrome in the low risk men. It is a simple screening tool and it could be included as a risk factor in CVD risk scores.

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Conflict of Interest
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The DECODE Study (Diabetes Epidemiology: Collaborative analysis Of Diagnostic Criteria in Europe) was undertaken in 1997 upon the initiative of the European Diabetes Epidemiology Group.

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Legend to Figure:

Cumulative hazards of 10 year cardiovascular mortality in non-diabetic men aged 50 to 69 years, stratified according to the estimated cardiovascular risk from the SCORE project equation (10 year fatal risk of CVD </≥ 5%) and absence/presence of the NCEP-ATP III metabolic syndrome. Note: the curves for the two groups of men with a high CVD risk score, with and without the syndrome, are superimposed, and that the scale for the hazards for women and men differ. The DECODE Study.

Table 1 Characteristics (numbers, % and means (SD)) of 2790 non-diabetic men aged 50 to 69 years, according to sex. The DECODE Study.

	Mean or percentage	Range across centres
Maximum follow-up (years)	10.0	6.9 – 10 (10 years in 73% of the men)
Age (years)	50-69	50-64 to 50-69
Smoking	32%	18% - 43%
Waist (cm)	95	92 - 98
Waist > 102 cm	20%	13% – 31%
Fasting plasma glucose (mmol/l)	5.53	5.23 – 5.85
Impaired fasting glucose (fasting plasma glucose 6.1 – 6.9 mmol/l)	19%	10% - 38%
Triglyceride (mmol/l)	1.65	1.42 – 1.82
Triglyceride ≥ 1.70 mmol/l	37%	27% - 43%
Total cholesterol (mmol/l)	6.20	5.52 – 6.59
HDL cholesterol (mmol/l)	1.25	1.18 – 1.40
HDL cholesterol < 1.04 mmol/l)	28%	11% - 35%
Systolic Blood Pressure (mmHg)	139	133 - 148
SBP/DBP ≥ 130/85 mmHg or treated for hypertension	72%	61% - 87%
NCEP-ATP III syndrome	26%	16% – 37%

Table 2 Characteristics (mean (SD)) of the non-diabetic men aged 50-69 years, according to the estimated cardiovascular risk from the SCORE project equation and absence/presence of the NCEP-ATP III metabolic syndrome. The DECODE Study.

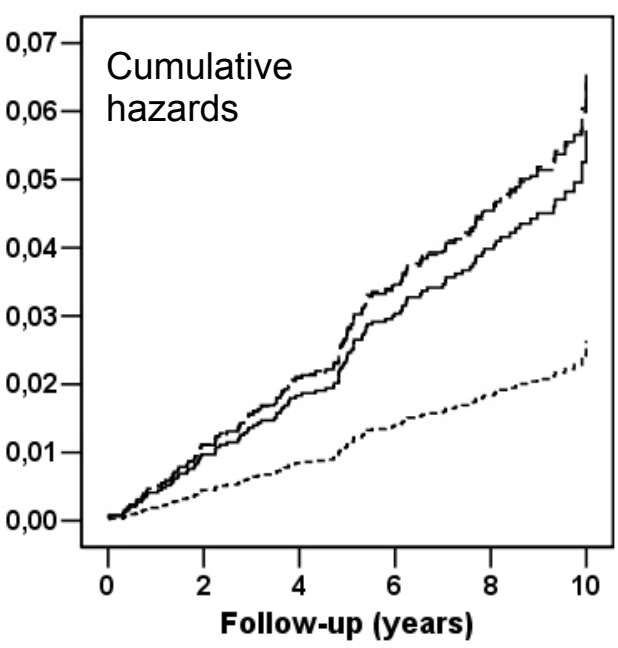
	CVD risk over 10 years from the SCORE project equation			
	< 5%		≥ 5%	
	no syndrome 20 deaths, 1110 men	syndrome 13 deaths, 306 men	no syndrome 57 deaths, 941 men	syndrome 28 deaths, 433 men
Age (years)	56 (5)	56 (4)	62 (5)	61 (5)
Waist (cm)	92 (8)	102 (9)	93 (8)	103 (9)
BMI (kg/m²)	25.6 (2.8)	29.0 (3.6)	25.8 (3.0)	29.1 (3.5)
Systolic blood pressure (mmHg)	128 (15)	139 (14)	146 (21)	153 (18)
Fasting glucose (mmol/l)	5.4 (0.5)	5.8 (0.6)	5.4 (0.5)	5.9 (0.6)
Total cholesterol (mmol/l)	6.0 (1.1)	6.1 (1.1)	6.3 (1.1)	6.5 (1.2)
HDL-cholesterol (mmol/l)	1.3 (0.3)	1.0 (0.2)	1.4 (0.3)	1.0 (0.2)
Triglycerides (mmol/l)	1.3 (0.6)	2.4 (1.2)	1.4 (0.6)	2.5 (1.3)

Table 3 Hazards ratios (95% confidence intervals) of the 118 fatal cardiovascular events in 2790 non-diabetic men aged 50-69 year, according to the estimated cardiovascular risk from the SCORE project equation and absence/presence of the NCEP-ATP III metabolic syndrome. The DECODE Study.

	CVD risk over 10 years from the SCORE project equation			
	< 5%		≥ 5%	
	no syndrome 20 deaths, 1110 men	with syndrome 13 deaths, 306 men	no syndrome 57 deaths, 941 men	with syndrome 28 deaths, 433 men
No adjustments				
	1	**2.36 (1.17-4.74)**	**3.44 (2.06-5.73)**	**3.52 (1.98-6.27)**
Adjusting for centre				
	1	**2.44 (1.21-4.91)**	**3.65 (2.16-6.16)**	**3.97 (2.20-7.17)**
Adjusting for centre, age				
	1	**2.47 (1.22-4.99)**	**2.17 (1.20-3.93)**	**2.50 (1.31-4.74)**
Adjusting for centre, age and the estimated 10-year CVD risk				
	1	**2.42 (1.20-4.88)**	1.70 (0.91-3.17)	1.87 (0.95-3.68)
Dividing men according to CVD risk group				
No adjustments				
	1	**2.37 (1.17-4.76)**	1	1.02 (0.65-1.62)
Adjusting for centre				
	1	**2.52 (1.24-5.09)**	1	1.10 (0.69-1.74)
Adjusting for centre and age				
	1	**2.71 (1.33-5.51)**	1	1.13 (0.71-1.80)
Adjusting for centre, age and the estimated 10-year CVD risk				
	1	**2.26 (1.09-4.68)**	1	1.08 (0.68-1.72)

Table 4 Hazards ratios of the 118 fatal cardiovascular events in 2790 non-diabetic men aged 50-69 years, according to the estimated cardiovascular risk from the SCORE project equation and the NCEP-ATPIII defined abnormalities. Adjustment has been made for age and study centre. The DECODE Study.

	CVD risk over 10 years from the SCORE project equation			
	< 5%		≥ 5%	
WAIST	WC < 102 cm	WC ≥ 102 cm	WC < 102 cm	WC ≥ 102 cm
	23 deaths, 1174 men	10 deaths, 242 men	67 deaths, 1060 men	18 deaths, 314 men
	1	**2.24 (1.05-4.76)**	1	0.93 (0.54-1.58)
BLOOD PRESSURE	SBP/DBP < 130/85	SBP/DBP ≥ 130/85	SBP/DBP < 130/85	SBP/DBP ≥ 130/85
	9 deaths, 576 men	24 deaths, 840 men	8 deaths, 192 men	77 deaths, 1182 men
	1	**2.67 (1.21-5.88)**	1	1.82 (0.86-3.83)
FASTING GLUCOSE	Glucose < 6.1 mmol/l	Glucose ≥ 6.1 mmol/l	Glucose < 6.1 mmol/l	Glucose ≥ 6.1 mmol/l
	25 deaths, 1195 men	8 deaths, 221 men	62 deaths, 1056 men	23 deaths, 318 men
	1	1.73 (0.76-3.91)	1	1.05 (0.99-1.11)
HDL-CHOLESTEROL	HDL-C ≥ 1.04 mmol/l	HDL-C < 1.04 mmol/l	HDL-C ≥ 1.04 mmol/l	HDL-C < 1.04 mmol/l
	15 deaths, 997 men	18 deaths, 419 men	59 deaths, 1020 men	26 deaths, 354 men
	1	**2.72 (1.35-5.45)**	1	1.30 (0.81-2.09)
TRIGLYCERIDE	TRIG < 1.70 mmol/l	TRIG ≥ 1.70 mmol/l	TRIG < 1.70 mmol/l	TRIG ≥ 1.70 mmol/l
	21 deaths, 940 men	12 deaths, 476 men	53 deaths, 824 men	32 deaths, 550 men
	1	1.29 (0.63-2.65)	1	0.96 (0.61-1.50)
BLOOD PRESSURE & WAIST	SBP/DBP < 130/85 &/or WC < 102 cm	SBP/DBP ≥ 130/85 & WC ≥ 102 cm	SBP/DBP < 130/85 &/or WC < 102 cm	SBP/DBP ≥ 130/85 & WC ≥ 102 cm
	23 deaths, 1229 men	10 deaths, 187 men	68 deaths, 1077 men	17 deaths, 297 men
	1	**3.54 (1.65-7.59)**	1	0.93 (0.54-1.59)
TRIGLYCERIDE & WAIST	TRIG < 1.7 mmol/l &/or WC < 102 cm	TRIG ≥ 1.7 mmol/l & WC ≥ 102 cm	TRIG < 1.7 mmol/l &/or WC < 102 cm	TRIG ≥ 1.7 mmol/l & WC ≥ 102 cm
	29 deaths, 1299 men	4 deaths, 117 men	78 deaths, 1205 men	7 deaths, 169 men
	1	1.91 (0.66-5.54)	1	0.69 (0.31-1.51)



high CVD risk score, syndrome

curve coincident with high CVD risk score, no svndrome

low CVD risk score, syndrome

low CVD risk score, no syndrome