

Could non-HDL cholesterol replace total/HDL cholesterol ratio to estimate coronary heart disease risk in the UKPDS risk engine?

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Background and aims: The UKPDS Risk Engine is a diabetes-specific coronary heart disease (CHD) risk calculator for use in patients without known CHD. It estimates CHD risk (fatal and non-fatal myocardial infarction including sudden cardiac death) using conventional CHD risk factors, HbA_{1c}, duration of diabetes and total/HDL cholesterol ratio. It has been suggested that non-HDL cholesterol (total cholesterol - HDL cholesterol) might be a simpler measure than the total/HDL cholesterol ratio and might better reflect CHD risk. We have constructed a UKPDS Risk Engine model that uses non-HDL cholesterol to compare with that using the total/HDL cholesterol ratio.

Materials and methods: 4,540 of 5,102 UKPDS patients with type 2 diabetes had sufficient data for this analysis. Survival models for CHD risk, adjusted for age, sex, race, smoking status, HbA_{1c}, and systolic blood pressure, were developed that adjusted also for total/HDL cholesterol or non-HDL cholesterol. Model fit was measured by Akaike's Information Criterion, with higher values indicating better fit. To determine whether differences in Akaike's Information Criterion correspond to statistically significant differences between models, we also conducted likelihood ratio tests of the two models against a reference model that contained both total cholesterol and HDL cholesterol.

Results: 517 CHD events occurred during 29,878 person-years of follow-up. Akaike's Information Criterion was 9.20 and 3.76 for total/HDL cholesterol and non-HDL cholesterol respectively, indicating that total/HDL cholesterol is a better predictor of CHD risk than non-HDL cholesterol. The total/HDL cholesterol model was equivalent to the reference model ($p=0.38$) but the non-HDL cholesterol model was significantly worse ($p<0.0001$). The risk ratio for total/HDL cholesterol was 1.23 (95% confidence interval 1.17-1.29) per mmol/L.

Conclusions: Total/HDL cholesterol is a superior measure of CHD risk than non-HDL cholesterol. It captures the protective effect of HDL cholesterol as well as the harmful effects of non-HDL cholesterol in a single parameter and remains the dyslipidaemic measure of choice in the UKPDS Risk Engine (www.dtu.ox.ac.uk/riskengine).