Abstract

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Lipoprotein particle profiles by nuclear magnetic resonance compared with standard lipids and apolipoproteins in predicting incident cardiovascular disease in women.

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BACKGROUND: Nuclear magnetic resonance (NMR) spectroscopy measures the number and size of lipoprotein particles instead of their cholesterol or triglyceride content, but its clinical utility is uncertain.

METHODS AND RESULTS: Baseline lipoproteins were measured by NMR in 27 673 initially healthy women followed up for incident cardiovascular disease (n=1015) over an 11-year period. After adjustment for nonlipid risk factors, hazard ratios and 95% confidence intervals for the top versus the bottom quintile of NMR-measured lipoprotein particle concentration (measured in particles per liter) were 2.51 (1.91 to 3.30) for low-density lipoprotein (LDL(NMR)), 0.91 (0.75 to 1.12) for high-density lipoprotein (HDL(NMR)), 1.71 (1.38 to 2.12) for very low-density lipoprotein (VLDL(NMR)), and 2.25 (1.80 to 2.81) for the LDL(NMR)/HDL(NMR) ratio. Similarly adjusted results for NMR-measured lipoprotein particle size (measured in nanometers) were 0.64 (0.52 to 0.79) for LDL(NMR) size, 0.65 (0.51 to 0.81) for HDL(NMR) size, and 1.37 (1.10 to 1.70) for VLDL(NMR) size. Hazard ratios for NMR measures were comparable but not superior to standard lipids (total cholesterol 2.08 [1.63 to 2.67], LDL cholesterol 1.74 [1.40 to 2.16], HDL cholesterol 0.52 [0.42 to 0.64], triglycerides 2.58 [1.95 to 3.41], non-HDL cholesterol 2.52 [1.95 to 3.25], total/HDL cholesterol ratio 2.82 [2.23 to 3.58]) and apolipoproteins (B(100) 2.57 [1.98 to 3.33], A-1 0.63 [0.52 to 0.77], and B(100)/A-1 ratio 2.79 [2.21 to 3.54]). Essentially no reclassification improvement was found with the addition of the LDL(NMR) particle concentration or apolipoprotein B(100) to a model that already included the total/HDL cholesterol ratio and nonlipid risk factors (net reclassification index 0% and 1.9%, respectively), nor did the addition of either variable result in a statistically significant improvement in the c-index.

CONCLUSIONS: In this prospective study of healthy women, cardiovascular disease risk prediction associated with lipoprotein profiles evaluated by NMR was comparable but not superior to that of standard lipids or apolipoproteins.

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