

# Abstract

J Clin Lipidol. 2007 Dec;1(6):583-592

## LDL particle number and risk of future cardiovascular disease in the Framingham Offspring Study—Implications for LDL management.

William C. Cromwell, MD, James D. Otvos, PhD, Michelle J. Keyes, PhD, Michael J. Pencina, PhD, Lisa Sullivan, PhD, Ramachandran S. Vasan, MD, Peter W.F. Wilson, MD, Ralph B. D'Agostino, PhD

**BACKGROUND:** The cholesterol content of low-density lipoprotein (LDL) particles is variable, causing frequent discrepancies between concentrations of LDL cholesterol (LDL-C) and LDL particle number (LDL-P). In managing patients at risk for cardiovascular disease (CVD) to LDL target levels, it is unclear whether LDL-C provides the optimum measure of residual risk and adequacy of LDL-lowering treatment.

**OBJECTIVE:** To compare the ability of alternative measures of LDL to provide CVD risk discrimination at relatively low levels consistent with current therapeutic targets.

**METHODS:** Concentrations of LDL-C and non-HDL-C were measured chemically and LDL-P and VLDL-P were measured by nuclear magnetic resonance in 3066 middle-aged white participants (53% women) without CVD in the Framingham Offspring cohort. The main outcome measure was incidence of first CVD event.

**RESULTS:** At baseline, the cholesterol content per LDL particle was negatively associated with triglycerides and positively associated with LDL-C. On follow-up (median 14.8 years), 265 men and 266 women experienced a CVD event. In multivariable models adjusting for nonlipid CVD risk factors, LDL-P was related more strongly to future CVD in both genders than LDL-C or non-HDL-C. Subjects with a low level of LDL-P (<25th percentile) had a lower CVD event rate (59 events per 1000 person-years) than those with an equivalently low level of LDL-C or non-HDL-C (81 and 74 events per 1000 person-years, respectively).

**CONCLUSIONS:** In a large community-based sample, LDL-P was a more sensitive indicator of low CVD risk than either LDL-C or non-HDL-C, suggesting a potential clinical role for LDL-P as a goal of LDL management.