LDL Subfractions Are Associated with Incident Cardiovascular Disease in the Malmö Prevention Project Study

Background

- Cardiovascular disease (CVD) risk assessment using established risk factors, including low-density lipoprotein cholesterol (LDL-C), high-density lipoprotein cholesterol (HDL-C), and triglycerides is used to assess lipid-lowering treatment decisions.
- Lipoprotein subfraction levels (particle concentration of lipoprotein size categories) have also been shown to be associated with CVD independent of traditional risk factors.[1,2]
- However, it is not known if measuring lipoprotein subfraction levels could aid in CVD risk assessment in patients for whom decisions regarding lipid-lowering treatment are uncertain.
- **Objectives:** The investigators examined whether levels of lipoprotein subfractions are associated with incident CVD events in populations of special clinical interest: those with low/intermediate CVD risk and those with very high CVD risk.

Methods

- Participants included 5,764 men and women without CVD at baseline drawn from participants in the Malmö Prevention Project (MPP) study between 2002 and 2006; 1,784 incident CVD events occurred during a median follow-up period of 8 years.
- Ion mobility, which physically separates lipoprotein particles based on size, was used to measure lipoprotein subfraction levels.[1]
- Associations of lipoprotein subfractions with incident CVD events were evaluated with Cox proportional hazards regression models.
  - The models adjusted for traditional risk factors with and without controlling for baseline levels of standard lipids (LDL-cholesterol, high-density lipoprotein [HDL]-cholesterol, and triglycerides).

Results

- With adjustment for traditional risk factors, levels of LDL subfractions ranging in size from very small (LSL-VS) to large (LDL-L) were predictive of incident CVD ($P \leq 0.001$).
- With additional adjustment for standard lipids, the levels of the following subfractions were predictive of incident CVD:
  - For all participants: LDL-VS subfractions ($P =0.03$)
  - For participants at low/intermediate CVD risk: Small LDL (LDL-S) ($P =0.03$), LDL-VS ($P =0.0007$), and 3 LDL-VS subfractions (all $P \leq 0.004$)
  - For participants at very high CVD risk: LDL-VS and 3 LDL-VS subfractions (all $P \leq 0.01$)

Conclusions

- For study participants with low/intermediate or very high risk of CVD, levels of smaller LDL subfractions were predictive of incident CVD, independent of traditional risk factors and standard blood lipids.
- Measurement of LDL subfractions may improve risk assessment for CVD and therefore aid in lipid-lowering treatment decisions in populations of special clinical interest.

References
1. Mora, S, Caulfield, MP, Wohlgemuth, J, et al. *Circulation.* 2015;132:2220-2229.
2. Melander O, Shiffman D, Caulfield MP, et al. *J Am Coll Cardiol.* 2015;65:2571-2573.