

Comparison of Nonfasting and Fasting Lipoprotein Subfractions and Size in 15,397 Apparently Healthy Individuals: An Analysis from the VITamin D and Omega-3 Trial (VITAL)

Background

- Cardiovascular disease (CVD) risk assessment has traditionally relied on cholesterol and triglyceride (TG) levels determined after fasting.
- Recent studies have shown that, compared to fasting TG levels, nonfasting TG levels correlate equally or more strongly with CVD-associated outcomes.^{1,2}
- Elevated TG levels after eating can indicate issues with TG-rich lipoprotein metabolism, which may contribute to CVD events.
- A comprehensive analysis of lipid and lipoprotein levels with and without fasting could provide clues to whether and how postprandial TG elevations contribute to CVD risk.
- **Objective:** The investigators assessed the association of fasting with TG and cholesterol profiles, including lipoprotein levels and particle subfractions.

Methods

- This nested cross-sectional analysis included 15,397 apparently healthy participants (10,135 fasting; 5,262 nonfasting) from the completed VITamin D and Omega-3 Trial (VITAL).³
- Baseline plasma levels of multiple markers were measured.
 - TGs were measured enzymatically
 - Cholesterol levels were measured directly by vertical auto profile method; fractions included very low-density lipoprotein (VLDL), intermediate density lipoprotein (IDL), small dense lipid depleted LDL particles (sdLDL), and high density lipoprotein (HDL).
 - Particle subfractions were measured directly by ion mobility.
- For all markers, differences between the fasting and nonfasting groups were evaluated by multivariable linear regression, which was adjusted for traditional CVD risk factors and lipoprotein modifying factors.

Results

- The study population had a mean age of 68 years, and 51% were women.
- Mean TG levels were 17.8% higher among nonfasting participants than fasting participants.
- Compared to fasting participants, nonfasting participants had higher VLDL levels (+3.5%) and total VLDL particle numbers (+2.0%).
- In contrast, nonfasting participants had lower levels of LDL (-4.5% levels; -2.6% particles) and IDL (-7.8% levels; -2.7% particles).
- sdLDL and total HDL levels did not differ significantly between nonfasting and fasting participants.

Conclusions

- This study is one of the first to describe cholesterol levels and particle subfractions by fasting status in a large, apparently healthy population.
- The finding that VLDL levels and particle numbers were elevated in nonfasting participants, while IDL and sdLDL were not, suggests that VLDLs may contribute to atherogenicity of TG elevations after eating.
- However, the absolute differences were small, and further studies are warranted.

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Authors

Zareen M Farukhi,^{1,2} Olga V Demler,^{1,2} Michael P Caulfield,³ Krishnaji Kulkarni,⁴ Jay Wohlgemuth,³ Michael Cobble,⁴ Heike Luttmann-Gibson,^{2,5} Chunying Li,² John R Nelson,⁶ Nancy R Cook,² Julie E Buring,² Ronald M Krauss,⁷ JoAnn E Manson,² Samia Mora^{1,2,8}

Affiliations

¹ Center for Lipid Metabolomics, Division of Preventive Medicine, Brigham and Women's

Hospital, Harvard Medical School, Boston, MA

² Division of Preventive Medicine, Brigham and Women's Hospital, Boston, MA

³ Quest Diagnostics, San Juan Capistrano, CA

⁴ VAP Diagnostics Laboratory, Birmingham, AL

⁵ Department of Environmental Health, Harvard T.H. Chan School of Public Health, Boston, MA

⁶ California Cardiovascular Institute, Fresno, CA

⁷ Children's Hospital Oakland Research Institute, Oakland, CA

⁸ Division of Cardiovascular Medicine, Brigham and Women's Hospital and Harvard Medical School, Boston, MA

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