HDL Particle Concentration Inversely Associates with Incident Metabolic Syndrome in the Multiethnic Dallas Heart Study

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OBJECTIVE: Metabolic syndrome (MetS) increases atherosclerotic cardiovascular disease (ASCVD) risk. Low HDL cholesterol (HDL-C) is a diagnostic criterion of MetS and a major ASCVD risk factor. HDL particle concentration (HDL-P) associates with incident ASCVD independent of HDL-C, but its association with incident MetS has not been studied. We hypothesized that HDL-P would be inversely associated with incident metabolic syndrome independent of HDL-C and other recognized risk factors.

METHODS: HDL-P was measured by NMR and visceral fat by MRI in participants of the Dallas Heart Study, a probability-based population sample of adults age 30-65. Participants with prevalent MetS, DM, CVD, cirrhosis, cancer, HIV, or renal failure were excluded. Incident MetS as defined by NCEP ATPIII criteria was determined in all participants after median follow-up period of 9.4 years.

RESULTS: Among a cohort of 1120 participants without DM or MetS at baseline (57% women, 45% Black, mean age 43), 22.8% had incident MetS at follow-up. HDL-P and HDL-C were modestly correlated \( r=0.54, \ p<0.0001 \). The lowest quartile of HDL-P was associated with younger age, men, Hispanic ethnicity, lower total, HDL, and LDL cholesterol levels and particle sizes, and less reported alcohol intake. Participants in the lowest sex and race stratified quartile of HDL-P had the highest incidence of MetS (Figure). In models adjusted for traditional risk factors, HDL-C, visceral fat, HOMA-IR, and hs-CRP, the lowest quartile of HDL-P was associated with 65% increased risk of incident MetS (Figure).

CONCLUSION: HDL-P is independently associated with incident MetS after adjustment for HDL-C, adiposity, inflammation, and markers of insulin sensitivity. Further studies are warranted to validate these findings and elucidate the mechanisms underpinning this association.

P. Mani: None. I.J. Neeland: None. D.K. McGuire: Honoraria; Modest; Roche, Eli Lilly, Merck, AstraZeneca. C. Ayers: None. A. Khera: None. A. Rohatgi: Research Grant; Significant; Merck. Speakers Bureau; Modest; AstraZeneca.