Racial Differences of Lipoprotein Subclass Distributions in Postmenopausal Women

Background: We assessed racial differences in lipoprotein particle size, a marker of atherosclerosis risk, among women with coronary disease.

Methods: We studied 378 women (33% non-White, predominantly African American) at the baseline visit of the Women’s Angiographic Vitamin and Estrogen Trial (WAVE), a multi-center trial of hormone replacement and antioxidant vitamin therapy in postmenopausal women with established coronary artery disease. Average particle sizes for high-density lipoprotein (HDL), low-density lipoprotein (LDL), and very low-density lipoprotein were measured by nuclear magnetic resonance in these women, and angiography was performed at baseline and followup.

Results: Adjusted for age, race, diabetes, smoking, blood pressure, and use of lipid-lowering and antihypertensive medications, non-White women had larger LDL particle size (difference .2 nm, 95% CI .1–.3 nm) and HDL particle size (difference: .2 nm, 95% CI .1–.2 nm). Neither angiographic disease progression nor survival without myocardial infarction (median follow-up time of 2.8 years) was associated with lipoprotein particle size or race.

Conclusions: Non-White women have a less atherogenic profile of lipoprotein particle sizes than do White women. However, this difference did not affect event-free survival or angiographic progression of coronary atherosclerosis.

Key Words: Lipoprotein Subclass Distributions, Race Differences, Postmenopausal Period

INTRODUCTION

During metabolism of lipoproteins, lipid components are added and removed by the liver, in peripheral organs and by enzymes in circulation, which results in particles of different density and size. Smaller, denser low-density lipoprotein (LDL) particles, also known as “phenotype B,” have been shown to confer more atherogenic risk than do their larger, more buoyant counterparts in some but not all studies. This risk is thought to result from a greater susceptibility to oxidative modification. Small, dense LDL particles are also usually associated with higher triglyceride and lower high-density lipoprotein (HDL) cholesterol levels, and lipoprotein particle size distribution is affected by insulin resistance. Lipo-protein subclass differences may partially account for the widely varying coronary artery disease (CAD) incidence in patients with similar classical lipid profiles.

In addition to the phenotype B pattern and its increased risk of CAD, other lipoprotein subclass measures can also help assess disease risk. Large, buoyant HDL particles protect against coronary atherosclerosis, while increasing concentrations of small HDL or large very low-density lipoprotein (VLDL) particles correlate with disease. Racial and sex differences have been noted with respect to lipoprotein patterns; Blacks tend to have higher HDL cholesterol, lower LDL cholesterol, and lower triglyceride levels than do Whites, and women tend to have higher HDL cholesterol and lower triglyceride levels than do men. The Studies of a Targeted Risk Reduction Intervention through Defined Exercise (STRRIDE) study showed that, compared to Blacks, Whites had significantly more intermediate-density lipoprotein (IDL), small LDL, medium VLDL, and large VLDL with less large LDL.

Whether these racial differences persist in older women with CAD is not known. We examined the differences in lipoprotein subclasses by race in postmenopausal women with known CAD enrolled in the Women’s Angiographic Vitamin and Estrogen (WAVE) trial and whether these differences underlay any racial differences in angiographic progression or the risk of incident myocardial infarction or death.

Methods

Subjects and Study Design

The WAVE trial (1997–1999) was a randomized, double-blind, placebo-controlled study designed to test whether hormone therapy or antioxidant vitamins (vitamins C and E) could prevent angiographic CAD progression. The study design, 2×2 factorial randomization to hormone therapy or placebo and active vitamins C and E or placebo, has been previously de-