ETHNICITY AND SEX MODIFY THE ASSOCIATION OF SERUM C-REACTIVE PROTEIN WITH MICROALBUMINURIA

Objectives: To study the association between serum C-reactive protein (CRP) and urinary albumin excretion in the Multi-Ethnic Study of Atherosclerosis and to assess whether the association is modified by ethnicity, sex, or systolic blood pressure.

Methods: This was a cross-sectional study of 6675 participants who were free from macroalbuminuria and clinical cardiovascular disease (mean age 62.1 years, 53% female; 39% White, 27% African American, 22% Hispanic, and 12% Chinese). Urinary albumin excretion was measured by spot urine albumin-to-creatinine ratio (ACR). Effect modifications were tested after adjusting for age, diabetes, body mass index, smoking, use of angiotensin-converting enzyme inhibitor or angiotensin-receptor blocker, other antihypertensive drugs, estrogens, statins, and high-density lipoprotein cholesterol and triglyceride levels.

Results: The association between CRP and ACR was modified by ethnicity (P<.01) and sex (P<.001), but not by systolic blood pressure. After multivariate adjustment, the association remained in Chinese, African American, and Hispanic men and African American women (P<.02 for African American men, and P<.04 for the other subgroups).

Conclusions: The association between CRP and ACR was modified by ethnicity and sex; it was stronger in non-White men and African American women. These interactions have not been reported before, and future studies should consider them. (Ethn Dis. 2008;18:324–329)

Key Words: Albuminuria, C-Reactive Protein, Ethnicity, Sex

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INTRODUCTION

Microalbuminuria predicts cardiovascular morbidity and mortality1–5 and progression to renal failure.6,7 Serum C-reactive protein (CRP) is also an independent predictor of cardiovascular morbidity and mortality8,9 and renal failure.10,11 Given that traditional cardiovascular risk factors are associated with the development of microalbuminuria, interest has grown in the association between CRP levels and microalbuminuria. Several cross-sectional12–15 and one longitudinal study16 have reported a significant association. However, whether the strength of the association differs by ethnicity is not known. The only study in a multiethnic population found no evidence of effect modification by ethnicity, but their statistical power was limited.12

The population distribution of CRP levels17,18 and urinary albumin excretion rates19,20 vary by sex. Furthermore, the association of CRP with insulin resistance and the metabolic syndrome21 and with carotid atherosclerosis22,23 appears to differ by sex. Therefore, whether sex modifies the association between CRP and urinary albumin excretion should be determined.

We studied a large multiethnic cohort, free from clinical cardiovascular disease and macroalbuminuria, to determine whether CRP levels were independently associated with urinary albumin excretion and whether ethnicity and sex modified the association. We also tested whether blood pressure levels modified that relationship, as previously reported.24

METHODS

Study Sample
The Multi-Ethnic Study of Atherosclerosis (MESA) is a prospective cohort study to investigate the prevalence, correlates, and progression of subclinical cardiovascular disease in individuals without clinical cardiovascular disease.25 Classification of ethnicity was based on self-identification, and it was categorized as White (non-Hispanic), African American (non-Hispanic), Chinese, and Hispanic. The current study used data obtained at the baseline visit of MESA, performed between August 1, 2000, and July 30, 2002. Participants who did not have a urinary albumin and creatinine measurement and those