1. Title:
The influence of anthropometric indices and fasting insulin on changes in the components of the multiple metabolic syndrome

2. Writing Group:
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3. Timeline:
The target date for a complete manuscript is November 1995

4. Rationale:
It has been postulated that insulin resistance is the underlying cause of the clustering of obesity, hypertension, dyslipidemias, and diabetes commonly observed among middle-aged and older adults [deFronzo et al. 1991]. This phenomenon has been termed the insulin resistance syndrome, syndrome X, or the multiple metabolic syndrome [Haffner et al. 1992, Reaven 1988, Kesäniemi et al. 1992].

The associations between insulin and diabetes, hypertension, and dyslipidemias have predominantly been studied cross-sectionally. Most have focused on the associations among these metabolic abnormalities [Ferrannini et al. 1991, deFronzo et al. 1991]. In the ARIC cohort cross-sectional analyses of the characteristics and distribution of the multiple metabolic syndrome have been completed on Visit 1 data by Schmidt et al. (ARIC Ms# 27). The contribution of family histories of diabetes and hypertension [Wing et al. 1992] have rarely been incorporated into these studies, but may provide additional insight into the multiple metabolic syndrome.

To our knowledge, the only prospective studies of insulin and metabolic and hemodynamic cardiovascular risk factors in middle-aged adults are the Helsinki Policemen Study [Pyörälä et al. 1985] and the San Antonio Heart Study [Mitchell et al. 1992]. In the latter insulin levels were correlated with 8-year changes in triglycerides and HDL-cholesterol in both sexes and among Mexican-Americans and Non-Hispanic whites. The association with changes in blood pressure were less consistent. Haffner et al. [1992] reported significant associations of fasting insulin with incident elevated triglycerides, decreased LDL-cholesterol, and non-insulin dependent diabetes independent of age, ethnicity, sex, BMI, and centrality. Incident hypertension was significantly associated with insulin levels only in lean and otherwise healthy individuals.

The ARIC population offers an important opportunity to study the association of insulin, waist-to-hip ratio, and BMI with changes in blood pressure, blood lipid levels, fasting glucose, and uric acid, in African-American and white men and women.

5. Main Hypothesis:
(1) Visit 1 levels of BMI, waist-to-hip ratio, and fasting plasma insulin are associated with changes in levels of blood pressure, triglycerides, HDL-cholesterol, LDL-cholesterol, total cholesterol, uric acid, and serum glucose.

(2) Visit 1 levels of BMI, waist-to-hip ratio, and fasting plasma insulin are associated with the incidence of hypertension, diabetes, dyslipidemias, and elevated uric acid
(3) Visit 1 levels of BMI, waist-to-hip ratio, and fasting plasma insulin are associated with newly developed clusters of metabolic abnormalities in the pattern of the multiple metabolic syndrome.

Note: The study questions for this manuscript proposal do not include incident cardiovascular, nor cerebrovascular events.

6. Plan of Analysis:
Analyses will be race, and gender-specific. The consistency between Visit 1 and Visit 2 in the frequency and pattern of the multiple metabolic syndrome will be examined briefly. The analysis will consider the measurement variability characteristics at Visits 1 and 2, the relationship between the baseline and re-examination levels of the variables which comprise the multiple metabolic syndrome. Variables considered for their potential confounding and effect-modifying role will be age and family history of diabetes and hypertension.

7. Data Requested:
Fasting plasma insulin; entire family history of diabetes, hypertension; for Visit 1 and 2 variables requested are demographic characteristics, field center, dates of examination, anthropometric measurements, fasting status, blood pressure, hypertension, glucose, diabetes, triglycerides, total, HDL, and LDL cholesterol, uric acid (unavailable for Visit 2), medications affecting blood pressure, total cholesterol, HDL-cholesterol, serum triglycerides, serum glucose, uric acid, and all derived variables for Visit 2.

REFERENCES


Wing RR, Matthews KA, Kuller LH et al.: Environmental and Familial Contributions to Insulin Levels and Change in Insulin Levels in Middle-aged Women. JAMA 1992; 268 (14): 1890-5.