ARIC Manuscript Proposal

1. Full Title: Electrocardiographic left ventricular growth associated with anemia and moderate kidney dysfunction

   Abbreviated Title: Anemia, kidney dysfunction, and LV growth

2. Writing Group
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3. Timeline: The data are available as part of ARIC visits 1 through 4. We project that analyses and manuscript preparation will take place over the next year.

4. Rationale:

   The incidence and prevalence of kidney failure in the United States have increased substantially in the past 20 years, with the number of patients treated for kidney failure with dialysis or transplantation reaching over 300,000 by the end of 1997. The number is projected to exceed 650,000 by 2010. There is growing recognition of the much larger number of individuals with moderate kidney dysfunction, recently estimated at 5.6 million (serum creatinine levels 1.6 mg/dL or greater in men and 1.4 mg/dL in women). We recently reported on the association between kidney function and hemoglobin levels in the general population, using data from NHANES III. We found that below an estimated glomerular filtration rate (GFR) of 60 ml/min/1.73m², lower kidney function was strongly associated with lower hemoglobin levels and a higher prevalence of anemia.

   Analyses of echocardiography data from ARIC (MS #863) demonstrate that moderately reduced kidney function is independently associated with concentric hypertrophy (i.e., greater LV wall thickness and LV mass), and that lower hemoglobin levels are independently associated with eccentric hypertrophy (i.e., greater LV diameter and LV mass) among African Americans (manuscript submitted). These analyses, however, are limited by the fact that echocardiography was performed only at one visit and only among African Americans at the Jackson, Mississippi, field center. The proposed analysis will expand upon the previous study to include the entire ARIC cohort.
and utilize longitudinal data on LV mass, as estimated from electrocardiography performed at each visit. This will allow us to examine changes in LV mass over time, and assess differences in associations by race.

Serum creatinine, as measured at Visits 1 and 2, will be used in conjunction with demographic information to estimate GFR as a measure of kidney function. Hemoglobin was also measured at visits 1 and 2 on the entire ARIC cohort. We propose to assess the prospective associations between kidney function and hemoglobin at Visits 1 and 2 with changes in LV mass, as assessed by electrocardiography at each visit. The Cornell voltage or other electrocardiographic criteria will be used to estimate LV mass.

5. Main hypothesis/study questions:

What are the prospective associations between moderate kidney dysfunction, hemoglobin level, and ECG measures of LV growth? What other factors influence these associations?

Does the presence of both moderate kidney dysfunction and anemia predict greater ECG measures of LV growth? (we will test for an interaction between these conditions)

Do these associations differ by race?

6. Data: The following variables will be needed for these analyses: age, sex, race, center, serum creatinine, hemoglobin, electrocardiographic results to estimate LV mass (including Cornell voltage: S amplitude in lead V3 and R amplitude in lead aVL). Covariates of interest include blood pressure, anthropometric data, diabetes status, and smoking status.

7. Will the data be used for non-CVD analysis in this manuscript? No

8. Will the DNA data be used in this manuscript? No

9. Review of existing ARIC Study manuscript proposals: No overlapping proposals were found.
Reference List


