ARIC Manuscript Proposal # 1076r

PC Reviewed: _05/13//05 Status: _A__ Priority: _2__
SC Reviewed: _05/13/05_ Status: _A___ Priority: _2__

1.a. Full Title: **Left Ventricular Geometric Patterns in African-Americans: Clinical Correlates and Influences on Systolic and Diastolic Dysfunction**

b. Abbreviated Title (Length 26 characters): **LV Geometric patterns**

2. Writing Group:
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3. Timeline:

Complete Analysis	June 2005
Submit first draft to publications committee	November 2005

4. Rationale:
The left ventricle is known to undergo anatomic adaptation to different geometric patterns according to left ventricular mass index (LVMI) and relative wall thickness (RWT) due to hypertension. Abnormal left ventricular geometry has been shown to be associated with a higher level of cardiovascular morbidity and mortality than normal geometry. Previous studies have shown associations between age, race, blood pressure, and cigarette smoking and increased left ventricular mass and abnormal cardiac geometry.

However, studies exploring the correlates of left ventricular geometric patterns and the influence of these patterns on systolic and diastolic function have not been well documented in a population-based African-American cohort. We attempt to examine clinical predictors (e.g. blood pressure, smoking, cholesterol) and possible associations with both abnormal left ventricular geometry and systolic/diastolic dysfunction. By utilizing the echocardiographic component of the ARIC study, we hope to add to existing literature in elucidating links between abnormal left ventricular geometric patterns and

cardiac dysfunction.

There is evidence that systolic and diastolic function are predictors of mortality. It is unclear whether geometric patterns are strongly related to left ventricular function and outcomes particularly in African Americans. This study investigates the importance of LV geometric patterns as they relate to function in this hypertensive, obese population with a high prevalence of left ventricular hypertrophy.

5. Main Hypothesis/Study Questions:
1) What are the associations between left ventricular geometric patterns and systolic and diastolic dysfunction in African-Americans?

2) What clinical predictors (e.g., blood pressure, smoking, cholesterol, diabetes) are associated with abnormal left ventricular geometry and systolic and diastolic dysfunction in the African-American community?

6. Data (variables, time window, source, inclusions/exclusions):
Study population will include African-American participants of the ARIC cohort who have undergone 2D and M-mode echocardiographic exams. Echocardiograms for the ARIC Study were performed only in the Jackson cohort and were obtained during the third examination between 1993 and 1995 (n = 2445). Those with missing echocardiographic measurements, prosthetic valves, or moderate to severe mitral and/or aortic disease (regurgitation or stenosis) will be excluded.

Demographic variables will include age and gender.

Clinical predictors will include HDL/total cholesterol, LDL, smoking status, systolic and diastolic blood pressures measured over multiple visits, diabetes status, physical activity and hypertensive medications. Blood pressure measurements will be derived from the first three visits prior to the echocardiogram.

Echocardiographic variables will include heart rate, LV internal dimension, septal thickness, posterior wall thickness, left atrial dimension, relative wall thickness, LVMI. E/A ratios and percent ejection fraction will be used to determine diastolic and systolic dysfunction, respectively.

Four different left ventricular geometric patterns: normal geometry, concentric remodeling, eccentric hypertrophy, and concentric hypertrophy will be identified according to left ventricular mass index (LVMI) and relative wall thickness (RWT).

Left ventricular mass (LVM) will be estimated using the formula from Devereux and Reichek: LVM (g) = 1.04 x [(LVEDD + LVPWTd + IVSTd)^3 - LVEDD^3] - 13.6. The left ventricular mass will be indexed to height$^{2.7}$ (LVMI –LVM/height$^{2.7}$ (g/m$^{2.7}$)). Relative wall thickness (RWT) will be calculated as follows: RWT = (LVPWTd + IVSTd)/LVEDD. A normal left ventricular mass index will be defined as 51 g/m$^{2.7}$ in

males and females. A partition value of 0.45 for RWT will be used to distinguish normal from concentric geometry in males in females. All patients will be divided into four groups based on LVMI and RWT according to the method of Ganau *et al.* Patients with increased LVMI and increased RWT will be considered to have concentric hypertrophy, and those with increased LVMI and normal RWT will be considered to have eccentric hypertrophy. Those with normal LVMI and increased or normal RWT will be considered to have concentric remodeling or normal geometry, respectively.

For this investigation, diastolic function will be classified into three subgroups based on the transmitral diastolic inflow early to late velocity ratio (E/A ratio). The three subgroups of diastolic function based on the E/A ratio will be: E/A ratio < 0.7 (impaired relaxation), E/A ratio = 0.7 – 1.5 (normal), and E/A ratio > 1.5 (restrictive).

Multiple logistic regression analysis will be used to assess the association of LVH pattern to systolic dysfunction (EF < 40%), and diastolic dysfunction (normal vs. impaired relaxation vs. restrictive).

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

b. If Yes, is the author aware that the file ICTDER02 must be used to exclude persons with a value RES_OTH = "CVD Research" for non-DNA analysis, and for DNA analysis RES_DNA = "CVD Research" would be used? ____ Yes __x__ No
(This file ICTDER02 has been distributed to ARIC PIs, and contains the responses to consent updates related to stored sample use for research.)

8.a. Will the DNA data be used in this manuscript? ____ Yes __x__ No

8.b. If yes, is the author aware that either DNA data distributed by the Coordinating Center must be used, or the file ICTDER02 must be used to exclude those with value RES_DNA = "No use/storage DNA"? ____ Yes __x__ No

9.The lead author of this manuscript proposal has reviewed the list of existing ARIC Study manuscript proposals and has found no overlap between this proposal and previously approved manuscript proposals either published or still in active status.
ARIC Investigators have access to the publications lists under the Study Members Area of the web site at: http://www.cscc.unc.edu/ARIC/search.php

__x__ Yes _____ No

10. What are the most related manuscript proposals in ARIC (authors are encouraged to contact lead authors of these proposals for comments on the new proposal or collaboration)?

LVH prognosis in ARIC, Combined and Separate Influences of Blood Pressure and Body

Mass Index on LVM and LV Geometry

Lead authors from both proposals/manuscripts are on this proposal.

11. a. Is this manuscript proposal associated with any ARIC ancillary studies or use any ancillary study data? ____ Yes __x__ No

11.b. If yes, is the proposal

___ A. primarily the result of an ancillary study (list number* _____)

___ B. primiarly based on ARIC data with ancillary data playing a minor role (usually control variables; list number(s)* _____ _____ _____)

*ancillary studies are listed by number at http://www.cscc.unc.edu/aric/forms/

12. Manuscript preparation is expected to be completed in one to three years. If a manuscript is not submitted for ARIC review at the end of the 3-years from the date of the approval, the manuscript proposal will expire.

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