1.a. Full Title: Body Fat Distribution and Left Ventricular Structure and Function in African Americans: the Atherosclerosis Risk in Communities Study

b. Abbreviated Title (Length 26 characters): Body Fat Distribution and LV Structure and Function

2. Writing Group:
   Writing group members: Ervin Fox, Herman Taylor, Alan Penman, Kenneth Butler, William Johnson and Robert Garrison

I, the first author, confirm that all the coauthors have given their approval for this manuscript proposal. __JL__ [please confirm with your initials electronically or in writing]

First author: Jiankang Liu, MD, Ph.D.
Address: University of Mississippi Medical Center, Cardiology Division
         2500 N. State Street
         Jackson, MS 39216

Phone: (601) 368-4629  Fax: (601) 368-7311
E-mail: jliu@physiology.umsmed.edu

Corresponding/senior author (if different from first author correspondence will be sent to both the first author & the corresponding author): Thomas Mosley, Jr., Ph.D.

Address: Department of Medicine (Geriatrics)
         University of Mississippi Medical Center
         2500 North State St.
         Jackson, MS 39216-4505
Phone: 601-984-2763  Fax: 601-815-3422
E-mail: tmosley@umsmed.edu

3. Timeline: Complete Analysis November 2006
   Submit first draft to publications committee January 2007
4. **Rationale:**

Obesity is a major cause of mortality and morbidity through the development of insulin resistance, dyslipidemia and hypertension leading to cardiovascular diseases (CVD). A strong relationship between obesity and development of CVD, diabetes and dyslipidemia in men and women, and in diverse race/ethnic groups has been established in epidemiological studies (1-4). Many mechanisms have been postulated for obesity, but they remain speculative.

Obesity is defined by a body mass index (BMI) value ≥ 30 kg/m², an indicator of total body fat that refers to the excess body weight compared with height. Waist circumference (WC) is an index of body fat distribution that refers to excess body fat accumulation on abdominal areas. Several studies suggested that body fat distribution (defined by WC) rather than total body fat (BMI) is a better predictor and more strongly associated with increased risk for CVD (5-6), diabetes (7) and other health problems (8). Recent guidelines recommend WC over BMI as a predictor of obesity-related diseases as WC is simple to measure and interpret and is highly correlated with visceral fat as measured by computed tomography (9). Yet, WC is also highly associated with BMI and thus reflects general, and abdominal, obesity.

There is supportive evidence that abdominal obesity is an important risk factor for subclinical cardiac abnormalities and subsequent heart failure (5-8). Recent data from the Jackson Heart Study demonstrated that abdominal obesity, hypertension and low HDL-C concentration are central features of the metabolic syndrome (data not published), which may contribute to higher mortality and morbidity from CVD in African Americans. Another study also indicated that African-Americans have a higher prevalence of left ventricular hypertrophy than European Americans (10). However, it is unclear whether the higher prevalence of abdominal obesity (body fat distribution) in African-Americans is a major risk factor leading to changes in LV structure and function in African Americans with or without metabolic syndrome. Also, there are few data available to demonstrate whether abdominal obesity can synergize the other risk factors to cause LV structure and function. One possibility is an interrelation among body fat distribution, especially on abdominal area, and left ventricle geometric patterns, which might help to explain the excess risk associated with abdominal obesity. Therefore, it is important to understand the effect of body fat distribution on LV structure and function and to determine the relation between body fat distribution patterns and left ventricular LV structure and function in ARIC.

**REFERENCES**


5. Main Hypothesis/Study Questions:

1. What is the distribution of BMI in African Americans in the Jackson cohort; what are the most prevalent obesity patterns (according to the table of definitions below) - overweight, obesity class I, II, III (regular vs. abdominal obesity) - in African Americans?

2. What is the association between LV structure and function and obesity patterns?

3. What is the role of abdominal obesity in the interaction of various CVD risk factors in causing LV structure and function?

6. Design and analysis (study design, inclusion/exclusion, outcome and other variables of interest with specific reference to the time of their collection, summary of data analysis, and any anticipated methodologic limitations or challenges if present).

Study population will include African-American participants of the ARIC cohort who have undergone 2D and M-mode echocardiographic exams (N=2,445). Those with missing values for individual parameters will be excluded.

Demographic variables will include age, gender, and education.

Clinical variables that will need to be adjusted for in the regression model include HDL/total cholesterol, LDL, triglycerides, smoking and drinking status, hypertension status, systolic and diastolic blood pressures measured over multiple visits, diabetes status, and physical activity.

Echocardiographic variables that will be measured or calculated include LV internal diameter, septal wall thickness, posterior wall thickness, left atrial diameter, relative wall thickness, LVMI, LV systolic function, and LV diastolic function.

Definition of Overweight and Obesity (10):

<table>
<thead>
<tr>
<th>Overweight and Obesity (Body Mass Index)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>&lt; 18.5</td>
</tr>
<tr>
<td>Normal</td>
<td>18.5-24.9</td>
</tr>
<tr>
<td>Overweight</td>
<td>25.0-29.9</td>
</tr>
<tr>
<td>Obesity, class</td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>30.0-34.9</td>
</tr>
<tr>
<td>II</td>
<td>35.5-39.9</td>
</tr>
<tr>
<td>III (extreme obesity)</td>
<td>≥ 40</td>
</tr>
</tbody>
</table>
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    ____ 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    ____ 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)?

1. Correlates of body fat distribution - variation across categories of race, sex and body mass in the Atherosclerosis Risk in Communities Study (MS#059A)  
2. Reliability of body fat distribution measurements: The ARIC Study. (MS#058)  
3. Prospective associations of fasting insulin, body fat distribution, and diabetes with risk of ischemic stroke (MS#445)  

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. primarily 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.