1.a. Full Title: The Impact of Treatment and Adequate Control of Blood Pressure for Hypertension on Left Ventricular Hypertrophy

b. Abbreviated Title (Length 26 characters): LVH & Hypertension BP Control

2. Writing Group (list individual with lead responsibility first):

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Timeline:

   Complete analysis            Fall, 2003
   Submit first draft to publications committee  Spring, 2004
   Submit to Journal            Summer, 2004

3. Rationale:

Hypertension is a major risk factor for the development of congestive heart failure and coronary heart diseases. As Americans age, more and more people become hypertensive. According to NHANES III survey, hypertension affects about 50 million Americans and approximately 1 billion worldwide. The treatment of hypertension is the most common reason in the United Stated for office visits to physicians and for use of prescription drugs. Despite the importance of hypertension in the practice of medicine and advances in antihypertensive therapy, control of hypertension is far from adequate. Recent data from 1999-2000 indicates that only 59% of hypertensives were treated. Among those treated, only 34% reached the goal levels of <140/90 mm Hg, far below the goal of 50% proposed by Health People 2010 project.

Numerous findings have demonstrated that hypertensive patients develop a wide spectrum of cardiac structural changes such as left ventricular hypertrophy (either concentric or eccentric), isolated septal thickness, or increased left ventricular mass. These conditions are more apparent especially for hypertensive patients who either do not seek medication, or who take antihypertensive medications but fail to control their blood
pressure successfully. The data from echocardiographic component of ARIC study on the African Americans in Jackson site provides excellent resource in elucidating the left ventricular structural change to the success of blood pressure control.

In addition, the recently announced JNC VII guidelines recommend that individuals with BP 120-139/80-89 mmHg should be considered as “prehypertensives” and require health-promoting lifestyle modifications to prevent CVD. This data can provide information to accommodate the new guidelines in terms of echocardiographically evaluated left ventricular structure.

5. **Main Hypothesis/Study Questions:**

   Our main interest is to evaluate the prevalence of left ventricular hypertrophy for different groups of individuals based on their hypertension status and blood pressure control level. Four groups will be generated, which are: 1) Non-hypertensive group, 2) Untreated hypertensive group, 3) Group of treated hypertensives with adequate blood pressure control, 4) Group of treated hypertensives with inadequate blood pressure control. The following hypothesis will be investigated:

   1) For hypertensive patients, is the prevalence of LVH impacted by successful blood pressure control?
   2) For untreated hypertensive group and group of treated hypertensives with poorly-controlled blood pressure, are their LV structures different from the group of hypertension patients with adequate blood pressure control?
   3) Within the Non-hypertensive group, do the prehypertensive people (120-139/80-89 mmHg) have elevated left ventricular mass compared to normotensive people (<120/80 mmHg)?

   For a second analysis, we would like to compare the differential control of different components of blood pressure. Only hypertensive patients will be used for this purpose, who will be grouped by different control of SBP, DBP, or both. The following hypothesis will be investigated:

   1) What is LVH and LV mass more closely related, control of SBP or control of DBP?
   2) What are the LVH patterns for the hypertensive patients who did not reach their SBP goal?
   3) What are the LVH patterns for the hypertensive patients who did not reach their DBP goal?

6. **Data (variables, time window, source, inclusions/exclusions):**

   **Study population:** Only people who have valid blood pressure data on both baseline and subsequent clinical visits (visit 2 and visit 3) and people who have undergone the echocardiographic exam will be included in this study. There are approximately 2400 participants for this study, who are all African Americans of the Jackson site of the ARIC cohort.
Echocardiographic variables: Echo M-mode derived measurements including LV mass, left ventricular hypertrophy, patterns of left ventricular hypertrophy (concentric LVH, eccentric LVH, LV remodeling), left ventricular geometry.

Analysis Plan and the Blood Pressure Control Classification: Office blood pressure measurements and information of taking anti-hypertensive agents are available in visit 1, visit 2 and visit 3 (the time of echocardiogram measurement).

For the purpose of first analysis, the population will be divided into four groups. The “Non-hypertensive” group includes those SBP < 140 mmHg and DBP < 90 mmHg at baseline and remain so in subsequent clinic visits. People who are hypertensive (SBP > 140 mmHg or DBP > 90 mmHg) at baseline will be further divided into three groups based on whether they take anti-hypertensive medication and whether their blood pressure level at subsequent visits reach goal level of <140/90 mmHg, or <130/80 for patients with diabetes or chronic kidney disease. These three groups will be called “Untreated Hypertensive” group, “Treated HT with Adequate BP Control” group, and “Treated HT without Adequate BP Control” group. Contrasts of LVH, LV geometry among these groups will be made. The incident hypertension (people who develop HTN after baseline visit) will not be included in this analysis due to short follow up period.

Only hypertensive patients will be used for the purpose of second analysis. Success of hypertension control to the goal of SBP, to the goal of DBP, or both will be investigated. Success in SBP control is defined as SBP < 130 mmHg for concomitant diabetes/chronic kidney disease patients, and <140 mmHg otherwise. Success in DBP control is defined as DBP < 80 mmHg for concomitant diabetes/chronic kidney disease patients, and <90 mmHg otherwise. Success in overall control is defined as joint control of SBP and DBP. The rate of LVH in adequately controlled vs inadequately controlled will be compared.

Key covariates to be adjusted for: Age, gender, race, diabetics, body mass index, serum LDL, serum HDL, serum total cholesterol, anemia, etc.

Exclusion criteria: Missing data on blood pressure measurements, missing relevant data on echocardiograph measurements.

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://bios.unc.edu/units/cscc/ARIC/stdy/studymem.html

___ 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)?

There are no directly overlapped proposals. Here are the most related proposals:
MS 674 Ervin Fox et al. Independent and combined influences of body mass index and blood pressure on left ventricular mass index and geometry in African Americans.
MS 452 Arnett DK et al. The longitudinal relationship between diastolic and isolated systolic hypertension.

11. 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.

REFERENCES

7. Rywik SL, Davis CE, Pajak A, Broda G, Folsom AR, Kawalec E, Williams OD; Poland and U.S. collaborative study on cardiovascular epidemiology hypertension in the community: prevalence, awareness, treatment, and control of hypertension in the Pol-


