SUPPLEMENTARY MATERIAL

Hypertension and Alterations in Left Ventricular Structure and Geometry in African Americans: The Jackson Heart Study

Authors: Marwah Abdalla[a], John N. Booth III[b], Keith M. Diaz[a], Mario Sims[c], Paul Muntner[b], Daichi Shimbo[a]

[a]Department of Medicine, Columbia University Medical Center, New York, NY, US
[b]Department of Epidemiology, University of Alabama at Birmingham, Birmingham, Alabama, US
[c]Department of Medicine, University of Mississippi Medical Center, Jackson, MS, US

Corresponding Author:
Marwah Abdalla, MD, MPH
Center for Behavioral Cardiovascular Health
622 West 168th Street
PH 9-321
Columbia University Medical Center
New York, NY 10032
USA
Telephone: 212-342-1275
Fax: 212-342-3431
Email: ma2947@cumc.columbia.edu

Coauthor Email addresses: John N. Booth-jnbooth@uab.edu; Keith M. Diaz-kd2442@cumc.columbia.edu; Mario Sims-msims2@umc.edu; Paul Muntner-pmuntner@uab.edu; Daichi Shimbo-ds2231@cumc.columbia.edu

Conflict of Interest: Dr. Paul Muntner received an institutional grant from Amgen Inc. There are no other potential conflicts of interest.

SUPPLEMENTAL METHODS

Clinical Covariates: During clinical examination, trained African American interviewers administered standardized questionnaires to assess selected demographic and behavior characteristics: age, sex, education, marital status, socioeconomic status, alcohol consumption, current smoking, and physical activity.[1] Education was measured as the highest level of schooling completed and classified into two categories within this study as “less than high school” or “greater than high school”. Current smoking status was defined as any participant who had smoked at least 400 cigarettes in their lifetime and was currently smoking at the time of their baseline examination. Daily alcohol consumption was assessed from a validated food frequency questionnaire[2] and in our study defined as “none”: 0 drinks/week, “moderate” consumption: 1-14 and 1-7 alcoholic drinks/week for men and women respectively, and “heavy” consumption: >14 and >7 alcoholic drinks/week for men and women respectively.[3] Physical activity over the past 12 months was assessed using the JHS Physical Activity Cohort (JPAC) survey, a 30-item validated questionnaire.[4, 5] The JPAC has four index scores that correspond to four physical activity domains (active living, work, sport, and home/life). Most of the JPAC items ask for a 5-level categorical Likert-style response. Responses for each item are assigned a number ranging from 1 to 5 with 1 indicating lowest activity and summed within each index. The total physical activity score was calculated as the sum of the four index scores with work scores set to 0 for participants who reported no paid or volunteer work during the past year.

Participants completed a survey regarding all medications, vitamins, mineral supplements, and herbal or home remedies used within the 2 weeks prior to clinic exam. Participants were also asked to bring any medications taken within 2 weeks prior to the baseline examination to the clinic

visit and were transcribed verbatim. Medication coding was performed by a pharmacist using the Medispan dictionary and classified into categories according to the Therapeutic Classification System.[1] During clinical examination, weight and height were measured for each participant. Body mass index was calculated as the weight in kilograms divided by height in meters squared (kg/m^2). Fasting blood samples and urinary samples were collected according to standardized procedures[6] and processed at the two central laboratories (University of Mississippi Medical Center and the University of Minnesota).[6] Plasma glucose, serum creatinine, hemoglobin A1c, lipid profile (including total cholesterol, low density lipoprotein: LDL cholesterol, and high density lipoprotein: HDL cholesterol) were assessed. Estimated glomerular filtration rate (eGFR) was calculated via the Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) equation.[7] The presence of hypercholesterolemia was defined as an elevated fasting total cholesterol (≥ 200 mg/dL) and/or use of lipid-lowering medications. The presence of diabetes mellitus was defined as one or more of the following: a measured fasting plasma glucose of ≥126 mg/dL, the use of antidiabetic medications within 2 weeks of the clinic visit, or history of physician-diagnosed diabetes.

SUPPLEMENTAL RESULTS

Supplemental Table 1. Characteristics of Participants with Prevalent Hypertension, Overall and with Concurrent Normal Pattern, Concentric Remodeling, Eccentric Hypertrophy, and Concentric Hypertrophy

	Participants with Prevalent Hypertension	**Normal Pattern**	**Concentric Remodeling**	**Eccentric Hypertrophy**	**Concentric Hypertrophy**
	(n= 2,841)	**(n=2,107)**	**(n=416)**	**(n=155)**	**(n=163)**
Demographic Characteristics					
Age, years	59.6 ± 11.2	58.5 ± 11.2	59.9 ± 11.7	63.3 ± 10.1	64.1 ± 10.3
Female Sex, %	65.6	66.0	54.6	78.7	76.7
Education < HS, %	24.4	22.2	27.4	36.1	33.1
Clinical Characteristics					
Body mass index (kg/m^2)	32.5 ± 7.2	32.4 ± 7.2	32.8 ± 7.3	31.8 ± 6.8	32.6 ± 6.9
Diabetes, %	22.4	28.5	33.8	32.9	38.9
Fasting Glucose, mg/dL	104.0 ± 34.9	102.5 ± 31.5	109.6 ± 48.2	106.1 ± 39.7	107.7 ± 32.0
Hemoglobin A1c, %	6.2 ± 1.3	6.1 ± 1.2	6.4 ± 1.5	6.3 ± 1.5	6.3 ± 1.3

Total Cholesterol, mg/dL	200.5 ± 40.0	199.6 ± 39.2	201.4 ± 40.9	204.2 ± 41.9	205.6 ± 45.5
LDL, mg/dL	126.0 ± 36.1	125.6 ± 36.0	127.5 ± 36.3	126.8 ± 36.1	127.3 ± 36.7
HDL, mg/dL	52.1 ± 15.0	52.0 ± 14.9	50.3 ± 15.6	55.2 ± 14.6	54.6 ± 15.4
eGFR <60 ml/min/1.73 m^2	11.3	9.6	14.3	18.5	19.5
Health Behaviors					
Alcohol consumption, %	38.9	39.3	41.8	34.2	31.1
Current Smoking, %	11.8	11.3	9.7	18.1	16.8
Total Physical activity score	7.9 ± 2.6	8.0 ± 2.6	7.9 ± 2.6	7.4 ± 2.6	7.3 ± 2.8
Blood pressure measures					
Mean clinic SBP, mmHg	134.1 ± 18.7	132.3 ± 17.5	137.3 ± 20.2	142.5 ± 21.3	141.8 ± 21.2
Mean clinic DBP, mmHg	80.9 ± 11.4	80.9 ± 11.2	81.8 ± 11.9	80.6 ± 12.0	79.5 ± 12.2
Antihypertensive medication use, %	81.0	80.4	83.2	81.9	81.6
Class of Antihypertensive Medication					
Diuretics	53.5	66.0	62.4	67.7	66.2
Beta-blocker	19.4	22.8	23.4	31.5	27.8

Calcium Channel Blockers	32.9	38.4	44.5	44.9	51.1
ACE-I	32.6	38.7	43.9	44.9	36.8
ARBs	14.5	18.0	17.6	14.2	18.1
Echocardiographic measures					
Interventricular septum thickness in diastole, mm	9.4 ± 2.1	8.8 ± 1.2	10.6 ± 1.4	10.6 ± 1.3	12.9 ± 5.7
Left ventricular internal dimension in diastole, mm	48.6 ± 4.8	48.8 ± 4.1	44.4 ± 4.0	55.9 ± 6.0	48.9 ± 5.7
Posterior wall thickness in diastole, mm	8.9 ± 1.7	8.3 ± 1.0	10.4 ± 1.1	9.8 ± 1.2	12.4 ± 2.8
Relative wall thickness	0.37 ± 0.08	0.34 ± 0.04	0.47 ± 0.06	0.35 ± 0.05	0.51 ± 0.13
Left ventricular mass index (g/m^2)	78.5 ± 26.6	71.5 ± 13.8	80.0 ± 14.8	117.2 ± 20.8	128.5 ± 65.8

Data are expressed as percentage or mean ± SD

ACE-I=angiotensin converting enzyme inhibitors, ARBs=angiotensin II receptor blockers, DBP= diastolic blood pressure, eGFR= estimated glomerular filtration ratio, HDL= high density lipoprotein, HS= high school, LDL= low density lipoprotein, SBP=systolic blood pressure

LVH: left ventricular hypertrophy, LVMI: left ventricular mass index, RWT: relative wall thickness

LVH is defined as increased LVMI $\geq$ 96 g/m^2 in females and $\geq$ 116 g/m^2 in males. Normal LVMI is defined as < 96 g/m^2 in females and < 116 g/m^2 in males. Increased RWT is defined as RWT > 0.42. Normal RWT is defined as RWT $\leq$ 0.42.

Normal pattern is defined as: normal LVMI and normal RWT.

Concentric remodeling is defined as: normal LVMI and increased RWT.

Eccentric hypertrophy is defined as: LVH and normal RWT.

Concentric hypertrophy is defined as: LVH and increased RWT.

Supplemental Table 2. Characteristics of Participants with Eccentric Non-dilated Hypertrophy, Eccentric Dilated Hypertrophy, Concentric Non-dilated Hypertrophy, and Concentric Dilated Hypertrophy

	Eccentric Hypertrophy (n=204)		**Concentric Hypertrophy (n=185)**	
	Non-dilated (n= 94)	**Dilated (n= 110)**	**Non-dilated (n= 163)**	**Dilated (n= 22)**
Demographic Characteristics				
Age, years	63.1 ± 11.2	63.0 ± 10.5	64.5 ± 10.2	60.9 ± 11.8
Female Sex, %	73.4	77.3	71.2	95.5
Education < HS, %	31.9	37.3	34.4	40.9
Clinical Characteristics				
Body mass index (kg/m^2)	29.8 ± 4.8	33.2 ± 7.5	31.8 ± 5.7	37.5 ± 10.2
Diabetes, %	25.8	32.7	39.1	27.3
Fasting Glucose, mg/dL	104.0 ± 44.6	106.2 ± 31.6	107.6 ± 31.1	102.5 ± 30.2
Hemoglobin A1c, %	6.2 ± 1.7	6.2 ± 1.2	6.4 ± 1.4	6.0 ± 0.9
Total Cholesterol, mg/dL	205.8 ± 41.7	201.4 ± 42.9	202.7 ± 36.7	216.9 ± 80.5

LDL, mg/dL	128.6 ± 38.3	124.4 ± 34.6	126.6 ± 34.9	128.2 ± 49.9
HDL, mg/dL	55.6 ± 14.7	55.5 ± 16.9	54.7 ± 15.3	52.6 ± 13.1
eGFR <60 ml/min/1.73 m^2	18.3	16.2	16.5	36.4
Health Behaviors				
Alcohol consumption, %	31.9	40.2	31.7	22.7
Current Smoking, %	21.3	12.7	16.8	13.6
Total Physical activity score	7.3 ± 2.5	7.6 ± 2.6	7.4 ± 2.7	5.9 ± 2.3
Blood pressure measures				
Mean clinic SBP, mmHg	135.2 ± 20.5	138.3 ± 22.8	140.5 ± 21.2	133.1 ± 19.8
Mean clinic DBP, mmHg	79.4 ± 9.5	77.7 ± 13.4	78.6 ± 11.9	81.0 ± 10.8
Antihypertensive medication use, %	59.6	64.6	69.9	86.4
Class of Antihypertensive Medication				
Diuretics	64.3	70.4	67.5	57.9
Beta-blocker	33.9	29.6	24.6	47.4
Calcium Channel Blockers	42.9	46.5	46.5	79.0

ACE-I	39.3	49.3	36.8	36.8
ARBs	12.5	15.5	17.5	21.1
Prevalent hypertension, %	75.5	76.4	87.1	95.5
Echocardiographic measures				
Interventricular septum thickness in diastole, mm	11.0 ± 1.3	10.5 ± 1.5	12.9 ± 5.7	12.2 ± 1.6
Left ventricular internal dimension in diastole, mm	52.2 ± 2.8	59.4 ± 6.0	48.2 ± 4.1	55.2 ± 2.1
Posterior wall thickness in diastole, mm	9.8 ± 0.8	9.6 ± 1.5	12.6 ± 3.8	12.4 ± 0.7
Relative wall thickness	0.38 ± 0.03	0.33 ± 0.6	0.53 ± 0.16	0.45 ± 0.02
Left ventricular mass index (g/m^2)	110.7 ± 15.4	123.6 ± 23.0	128.3 ± 68.6	138.3 ± 25.9

Data are expressed as percentage or mean ± SD

ACE-I=angiotensin converting enzyme inhibitors, ARBs=angiotensin II receptor blockers, DBP= diastolic blood pressure, eGFR= estimated glomerular filtration ratio, HDL= high density lipoprotein, HS= high school, LDL= low density lipoprotein, SBP=systolic blood pressure

LVEDD: LV internal diameter at end diastole, LVH: left ventricular hypertrophy, LVMI: left ventricular mass index, RWT: relative wall thickness

LVH is defined as increased LVMI $\geq$ 96 g/m^2 in females and $\geq$ 116 g/m^2 in males. Normal LVMI is defined as < 96 g/m^2 in females and < 116 g/m^2 in males. Increased RWT is defined as RWT > 0.42. Normal RWT is defined as RWT $\leq$ 0.42.

Dilated LV chamber is defined as increased LVEDD $\geq$ 5.3 cm in females and LVEDD $\geq$ 5.9 cm in males. Non-dilated LV chamber is defined as normal LVEDD < 5.3 cm in females and LVEDD < 5.9 cm in males.

Eccentric non-dilated hypertrophy is defined as: LVH, normal RWT, and normal LVEDD.

Eccentric dilated hypertrophy is defined as: LVH, normal RWT, and increased LVEDD.

Concentric non-dilated hypertrophy is defined as LVH, increased RWT, and normal LVEDD.

Concentric dilated hypertrophy: LVH, increased RWT, and increased LVEDD.

Supplemental Table 3. Characteristics of Participants with Prevalent Hypertension and Eccentric Non-dilated Hypertrophy, Eccentric Dilated Hypertrophy, Concentric Non-dilated Hypertrophy, and Concentric Dilated Hypertrophy

	Eccentric Hypertrophy (n=155)		**Concentric Hypertrophy (n=163)**	
	Non-dilated (n= 71)	**Dilated (n= 84)**	**Non-dilated (n= 142)**	**Dilated (n= 21)**
Demographic Characteristics				
Age, years	64.3 ± 10.0	62.5 ± 10.2	64.7 ± 10.0	60.2 ± 11.7
Female Sex, %	78.9	78.6	73.9	95.2
Education < HS, %	35.2	36.9	31.7	42.9
Clinical Characteristics				
Body mass index (kg/m^2)	29.7 ± 4.4	33.5 ± 7.9	31.8 ± 5.8	37.8 ± 10.4
Diabetes, %	28.6	36.6	40.4	28.6
Fasting Glucose, mg/dL	104.2 ± 45.4	108.0 ± 33.7	108.7 ± 32.2	101.5 ± 30.6
Hemoglobin A1c, %	6.2 ± 1.8	6.3 ±1.2	6.4 ±1.3	6.0 ± 0.9
Total Cholesterol, mg/dL	206.8 ± 42.1	201.8 ± 41.9	203.9 ± 36.4	216.0 ± 82.3

LDL, mg/dL	127.1 ± 38.6	126.6 ± 33.9	127.4 ± 34.3	126.4 ± 50.4
HDL, mg/dL	57.3 ± 14.4	53.3 ± 14.6	54.8 ± 15.8	53.1 ± 13.1
eGFR <60 ml/min/1.73 m^2	20.0	17.3	16.7	38.1
Health Behaviors				
Alcohol consumption, %	31.0	36.9	32.1	23.8
Current Smoking, %	21.1	15.5	17.1	14.3
Total Physical activity score	7.2 ± 2.5	7.5 ± 2.6	7.5 ± 2.8	6.0 ± 2.3
Blood pressure measures				
Mean clinic SBP, mmHg	140.8 ± 19.9	143.9 ± 22.4	143.0 ± 21.1	133.5 ± 20.2
Mean clinic DBP, mmHg	81.1 ± 9.4	80.1 ± 13.8	79.2 ± 12.3	81.3 ± 11.0
Antihypertensive medication use, %	78.9	84.5	80.3	90.5
Class of Antihypertensive Medication				
Diuretics	64.3	70.4	67.5	57.9
Beta-blocker	33.9	29.6	24.6	47.4
Calcium Channel Blockers	42.9	46.5	46.5	79.0

ACE-I	39.3	49.3	36.8	36.8
ARBs	12.5	15.5	17.5	21.1
Echocardiographic measures				
Interventricular septum thickness in diastole, mm	10.8 ± 1.3	10.5 ± 1.4	13.1 ± 6.0	12.2 ± 1.6
Left ventricular internal dimension in diastole, mm	51.9 ± 2.7	59.3 ± 6.0	48.0 ± 4.0	55.5 ± 2.1
Posterior wall thickness in diastole, mm	9.8 ± 0.7	9.8 ± 1.5	12.4 ± 3.0	12.4 ±0.7
Relative wall thickness	0.38 ± 0.02	0.33 ± 0.06	0.52 ± 0.14	0.45 ± 0.02
Left ventricular mass index (g/m^2)	109.4 ± 13.5	123.8 ± 23.5	127.1 ± 69.7	138.1 ± 26.5

Data are expressed as percentage or mean ± SD

ACE-I=angiotensin converting enzyme inhibitors, ARBs=angiotensin II receptor blockers, DBP= diastolic blood pressure, eGFR= estimated glomerular filtration ratio, HDL= high density lipoprotein, HS= high school, LDL= low density lipoprotein, SBP=systolic blood pressure

LVEDD: LV internal diameter at end diastole, LVH: left ventricular hypertrophy, LVMI: left ventricular mass index, RWT: relative wall thickness

LVH is defined as increased LVMI $\geq$ 96 g/m^2 in females and $\geq$ 116 g/m^2 in males. Normal LVMI is defined as < 96 g/m^2 in females and < 116 g/m^2 in males. Increased RWT is defined as RWT > 0.42. Normal RWT is defined as RWT $\leq$ 0.42.

Dilated LV chamber is defined as increased LVEDD $\geq$ 5.3 cm in females and LVEDD $\geq$ 5.9 cm in males. Non-dilated LV chamber is defined as normal LVEDD < 5.3 cm in females and LVEDD < 5.9 cm in males.

Eccentric non-dilated hypertrophy is defined as: LVH, normal RWT, and normal LVEDD.

Eccentric dilated hypertrophy is defined as: LVH, normal RWT, and increased LVEDD.

Concentric non-dilated hypertrophy is defined as LVH, increased RWT, and normal LVEDD.

Concentric dilated hypertrophy: LVH, increased RWT, and increased LVEDD.

Supplemental Table 4. Association of Prevalent Hypertension with Eccentric Non-dilated Hypertrophy, Eccentric Dilated Hypertrophy, Concentric Non-dilated Hypertrophy, and Concentric Dilated Hypertrophy versus Normal Pattern

	Odds Ratio (95% Confidence Interval)		
	Crude	**Model 1**	**Model 2**
Normal Pattern	1 (Referent)	1 (Referent)	1 (Referent)
Eccentric Non-dilated Hypertrophy	2.44 (1.52 - 3.93)	1.67 (1.01 - 2.76)	1.77 (1.03 - 3.04)
Eccentric Dilated Hypertrophy	2.56 (1.64 - 3.99)	1.50 (0.94 - 2.38)	1.58 (0.95 - 2.63)
Concentric Non-dilated Hypertrophy	5.35 (3.37 - 8.50)	3.21 (1.99 - 5.18)	3.58 (2.08 - 6.18)
Concentric Dilated Hypertrophy	16.61 (2.23 - 123.63)	11.26 (1.47 - 86.44)	8.57 (1.06 - 69.27)

Model 1- adjusted for age, sex, body mass index.
Model 2- adjusted for age, sex, body mass index, diabetes, education less than high school, alcohol consumption (none: 0 drinks/week; moderate consumption: 1-14 and 1-7 alcoholic drinks/week for men and women; heavy consumption: >14 and >7 alcoholic drinks/week for men and women), current smoking status, physical activity, and estimated glomerular filtration rate <60 ml/min/1.73 m^2.
LVEDD: LV internal diameter at end diastole, LVH: left ventricular hypertrophy, LVMI: left ventricular mass index, RWT: relative wall thickness
LVH is defined as increased LVMI $\geq$ 96 g/m^2 in females and $\geq$ 116 g/m^2 in males. Normal LVMI is defined as < 96 g/m^2 in females and < 116 g/m^2 in males. Increased RWT is defined as RWT > 0.42. Normal RWT is defined as RWT $\leq$ 0.42. Dilated LV chamber is defined as increased LVEDD $\geq$ 5.3 cm in females and LVEDD $\geq$ 5.9 cm in males. Non-dilated LV chamber is defined as normal LVEDD < 5.3 cm in females and LVEDD < 5.9 cm in males.
Normal pattern is defined as: normal LVMI and normal RWT.
Eccentric non-dilated hypertrophy is defined as: LVH, normal RWT, and normal LVEDD.
Eccentric dilated hypertrophy is defined as: LVH, normal RWT, and increased LVEDD.
Concentric non-dilated hypertrophy is defined as LVH, increased RWT, and normal LVEDD.
Concentric dilated hypertrophy: LVH, increased RWT, and increased LVEDD.

Supplemental Table 5. Correlates of Eccentric Non-dilated Hypertrophy, Eccentric Dilated Hypertrophy, Concentric Non-dilated Hypertrophy, and Concentric Dilated Hypertrophy versus Normal Pattern among Participants with Prevalent Hypertension

Participant Characteristics	**Odds Ratio[a] (95% Confidence Interval)**			
	Eccentric Hypertrophy		**Concentric Hypertrophy**	
	Non-dilated	**Dilated**	**Non-dilated**	**Dilated**
	(n= 71)	**(n= 84)**	**(n= 142)**	**(n= 21)**
Age (per 10 year increase)	1.52 (1.07 - 2.17)	1.35 (0.95 - 1.92)	1.49 (1.16 - 1.93)	0.63 (0.34 - 1.17)
Sex (male vs. female)	0.35 (0.16 - 0.76)	0.59 (0.29 - 1.22)	0.83 (0.51 - 1.35)	[b]
BMI (per 5 kg/m^2 increase)	0.75 (0.58 - 0.95)	1.12 (0.93 - 1.37)	0.93 (0.79 - 1.09)	1.32 (0.97 - 1.80)
Education less than high school (yes vs. no)	1.16 (0.61 - 2.21)	1.33 (0.73 - 2.42)	0.89 (0.56 - 1.42)	4.59 (1.35 - 15.59)
Alcohol consumption				
None	1 (ref)	1 (ref)	1 (ref)	1 (ref)
Moderate	0.92 (0.46 - 1.84)	0.96 (0.50 - 1.87)	0.65 (0.39 - 1.08)	0.79 (0.19 - 3.34)
Heavy	0.58 (0.07 - 4.91)	[c]	0.52 (0.11 - 2.43)	[c]

Current smoking (yes vs. no)	2.52 (1.16 - 5.48)	2.16 (0.97 - 4.83)	2.10 (1.16 - 3.80)	2.27 (0.53 - 9.66)
Diabetes (yes vs. no)	0.82 (0.33 - 2.06)	0.98 (0.43 - 2.23)	1.67 (0.93 - 3.00)	1.08 (0.21 - 5.56)
Hemoglobin A1c (per 1% increase)	1.15 (0.85 - 1.55)	1.02 (0.75 - 1.40)	1.03 (0.84 - 1.27)	0.57 (0.25 - 1.28)
Total Physical activity score (per unit increase)	1.00 (0.89 - 1.13)	1.06 (0.95 - 1.18)	1.05 (0.97 - 1.14)	0.72 (0.55 - 0.94)
Total Cholesterol, mg/dL (per 10mg/dL increase)	1.08 (0.84 - 1.40)	0.99 (0.76 - 1.29)	1.02 (0.84 - 1.23)	1.31 (0.85 - 2.01)
LDL, mg/dL (per 10mg/dL increase)	0.92 (0.70 - 1.22)	1.01 (0.77 - 1.34)	1.01 (0.82 - 1.24)	0.76 (0.48 - 1.20)
HDL, mg/dL (per 10mg/dL increase)	1.01 (0.78 - 1.32)	0.99 (0.75 - 1.31)	1.05 (0.87 - 1.28)	0.67 (0.40 - 1.14)
eGFR <60 ml/min/1.73 m^2 (yes vs. no)	1.63 (0.75 - 3.52)	1.23 (0.58 - 2.60)	1.09 (0.60 - 1.97)	4.84 (1.53 - 15.29)
Clinic SBP (per 10 mmHg increase)	1.15 (0.96 - 1.37)	1.51 (1.30 - 1.75)	1.35 (1.20 - 1.52)	1.00 (0.72 - 1.41)
Clinic DBP (per 5 mmHg increase)	1.08 (0.92 - 1.26)	0.86 (0.74 - 1.00)	0.92 (0.83 - 1.03)	1.27 (0.93 - 1.73)

Number of classes of antihypertensive medications				
0	1 (ref)	1 (ref)	1 (ref)	1 (ref)
1	1.04 (0.45 - 2.43)	1.61 (0.66 - 3.93)	1.14 (0.63 - 2.06)	0.87 (0.12 - 6.50)
2	1.19 (0.52 - 2.71)	1.64 (0.68 - 3.92)	1.04 (0.57 - 1.90)	1.31 (0.21 - 8.15)
3	0.94 (0.32 - 2.79)	1.65 (0.60 - 4.54)	1.06 (0.52 - 2.16)	2.34 (0.34 - 16.18)
≥ 4	1.29 (0.90 - 1.86)	1.67 (1.23 - 2.26)	1.06 (0.76 - 1.48)	1.70 (0.96 - 3.04)

[a]All participant characteristics are included in the multivariable adjusted model: age, sex, body mass index, diabetes, education less than high school, alcohol consumption (none: 0 drinks/week; moderate consumption: 1-14 and 1-7 alcoholic drinks/week for men and women; heavy consumption: >14 and >7 alcoholic drinks/week for men and women), current smoking status (yes vs. no), physical activity, total cholesterol, low density lipoprotein cholesterol, high density lipoprotein cholesterol, estimated glomerular filtration rate <60 ml/min/1.73 m^2, clinic systolic blood pressure, clinic diastolic blood pressure, and number of classes of antihypertensive medications.
[b]There were too few men for a stable estimate to be calculated.
[c]There were too few heavy drinkers for a stable estimate to be calculated.
DBP: diastolic blood pressure, eGFR: estimated glomerular filtration rate, HDL: high density lipoprotein cholesterol, HS: high school, LDL: low density lipoprotein cholesterol, SBP: systolic blood pressure.
LVEDD: LV internal diameter at end diastole, LVH: left ventricular hypertrophy, LVMI: left ventricular mass index, RWT: relative wall thickness
LVH is defined as increased LVMI ≥ 96 g/m^2 in females and ≥ 116 g/m^2 in males. Normal LVMI is defined as < 96 g/m^2 in females and < 116 g/m^2 in males. Increased RWT is defined as RWT > 0.42. Normal RWT is defined as RWT ≤ 0.42. Dilated LV chamber is defined as increased LVEDD ≥ 5.3 cm in females and LVEDD ≥ 5.9 cm in males. Non-dilated LV chamber is defined as normal LVEDD < 5.3 cm in females and LVEDD < 5.9 cm in males.
Normal pattern (referent) is defined as: normal LVMI and normal RWT.

Eccentric non-dilated hypertrophy is defined as: LVH, normal RWT, and normal LVEDD.
Eccentric dilated hypertrophy is defined as: LVH, normal RWT, and increased LVEDD.
Concentric non-dilated hypertrophy is defined as LVH, increased RWT, and normal LVEDD.
Concentric dilated hypertrophy: LVH, increased RWT, and increased LVEDD.

Supplemental Table 6. Association of Prevalent Hypertension with Concentric Remodeling, Eccentric Hypertrophy, and Concentric Hypertrophy versus Normal Pattern using Left Ventricular Mass Indexed to Height$^{2.7}$ Instead of Body Surface Area

	Odds Ratio (95% Confidence Interval)		
	Crude	**Model 1**	**Model 2**
Normal Pattern	1 (Referent)	1 (Referent)	1 (Referent)
Concentric Remodeling	2.19 (1.77 - 2.71)	1.63 (1.30 - 2.04)	1.63 (1.28 - 2.08)
Eccentric Hypertrophy	2.57 (2.03 - 3.24)	1.58 (1.23 - 2.03)	1.56 (1.19 - 2.04)
Concentric Hypertrophy	5.63 (3.93 - 8.08)	3.35 (2.31 - 4.87)	3.92 (2.55 - 6.02)

Model 1- adjusted for age, sex, body mass index.
Model 2- adjusted for age, sex, body mass index, diabetes, education less than high school, alcohol consumption (none: 0 drinks/week; moderate consumption: 1-14 and 1-7 alcoholic drinks/week for men and women; heavy consumption: >14 and >7 alcoholic drinks/week for men and women), current smoking status, physical activity, and estimated glomerular filtration rate <60 ml/min/1.73 m^2.
LVH: left ventricular hypertrophy, LVMI: left ventricular mass index, RWT: relative wall thickness
LVH is defined as increased LVMI $\geq$ 45 g/$m^{2.7}$ in females and $\geq$ 49 g/$m^{2.7}$ in males. Normal LVMI is defined as < 45 g/$m^{2.7}$ in females and < 49 g/$m^{2.7}$ in males. Increased RWT is defined as RWT > 0.42. Normal RWT is defined as RWT $\leq$ 0.42.
Normal pattern is defined as: normal LVMI and normal RWT.
Concentric remodeling is defined as: normal LVMI and increased RWT.
Eccentric hypertrophy is defined as: LVH and normal RWT.
Concentric hypertrophy is defined as: LVH and increased RWT.

Supplemental Table 7. Association of Prevalent Hypertension with Eccentric Non-dilated Hypertrophy, Eccentric Dilated Hypertrophy, Concentric Non-dilated Hypertrophy, and Concentric Dilated Hypertrophy versus Normal Pattern using Left Ventricular Mass Indexed to Height $^{2.7}$ Instead of Body Surface Area

	Odds Ratio (95% Confidence Interval)		
	Crude	**Model 1**	**Model 2**
Normal Pattern	1 (Referent)	1 (Referent)	1 (Referent)
Eccentric Non-dilated Hypertrophy	2.56 (1.89 - 3.46)	1.55 (1.12 - 2.14)	1.53 (1.08 - 2.16)
Eccentric Dilated Hypertrophy	2.58 (1.82 - 3.66)	1.59 (1.10 - 2.31)	1.57 (1.05 - 2.35)
Concentric Non-dilated Hypertrophy	5.26 (3.64 - 7.60)	3.11 (2.12 - 4.55)	3.68 (2.37 - 5.71)
Concentric Dilated Hypertrophy	18.23 (2.45 - 135.38)	12.17 (1.59 - 93.10)	10.01 (1.24 - 80.45)

Model 1- adjusted for age, sex, body mass index.
Model 2- adjusted for age, sex, body mass index, diabetes, education less than high school, alcohol consumption (none: 0 drinks/week; moderate consumption: 1-14 and 1-7 alcoholic drinks/week for men and women; heavy consumption: >14 and >7 alcoholic drinks/week for men and women), current smoking status, physical activity, and estimated glomerular filtration rate <60 ml/min/1.73 m^2.
LVEDD: LV internal diameter at end diastole, LVH: left ventricular hypertrophy, LVMI: left ventricular mass index, RWT: relative wall thickness
LVH is defined as increased LVMI $\geq$ 96 g/m^2 in females and $\geq$ 116 g/m^2 in males. Normal LVMI is defined as < 96 g/m^2 in females and < 116 g/m^2 in males. Increased RWT is defined as RWT > 0.42. Normal RWT is defined as RWT $\leq$ 0.42. Dilated LV chamber is defined as increased LVEDD $\geq$ 5.3 cm in females and LVEDD $\geq$ 5.9 cm in males. Non-dilated LV chamber is defined as normal LVEDD < 5.3 cm in females and LVEDD < 5.9 cm in males.
Normal pattern is defined as: normal LVMI and normal RWT.
Eccentric non-dilated hypertrophy is defined as: LVH, normal RWT, and normal LVEDD.
Eccentric dilated hypertrophy is defined as: LVH, normal RWT, and increased LVEDD.
Concentric non-dilated hypertrophy is defined as LVH, increased RWT, and normal LVEDD.
Concentric dilated hypertrophy: LVH, increased RWT, and increased LVEDD.

Supplemental Table 8. Correlates of Concentric Remodeling, Eccentric Hypertrophy and Concentric Hypertrophy versus Normal Pattern among Participants with Prevalent Hypertension using Left Ventricular Mass Indexed to Height $^{2.7}$ Instead of Body Surface Area

Participant Characteristics	**Odds Ratio[a] (95% Confidence Interval)**		
	Concentric Remodeling	**Eccentric Hypertrophy**	**Concentric Hypertrophy**
Age (per 10 year increase)	1.38 (1.18 - 1.63)	1.36 (1.13 - 1.63)	1.35 (1.10 - 1.65)
Sex (male vs. female)	1.44 (1.06 - 1.95)	0.41 (0.27 - 0.61)	0.84 (0.57 - 1.24)
BMI (per 5 kg/m^2 increase)	1.02 (0.91 - 1.13)	1.47 (1.34 - 1.62)	1.30 (1.16 - 1.45)
Education less than high school (yes vs. no)	0.98 (0.70 - 1.37)	1.27 (0.90 - 1.78)	1.06 (0.73 - 1.55)
Alcohol consumption			
None	1 (ref)	1 (ref)	1 (ref)
Moderate	1.44 (1.07 - 1.94)	1.04 (0.74 - 1.47)	0.71 (0.47 - 1.05)
Heavy	2.28 (1.08 - 4.81)	0.37 (0.08 - 1.69)	0.34 (0.07 - 1.58)
Current smoking (yes vs. no)	0.54 (0.32 - 0.92)	2.01 (1.28 - 3.17)	1.97 (1.20 - 3.21)
Diabetes (yes vs. no)	1.11 (0.73 - 1.68)	0.99 (0.63 - 1.53)	1.31 (0.81 - 2.10)

Hemoglobin A1c (per 1% increase)	1.04 (0.89 - 1.20)	0.98 (0.83 - 1.16)	0.99 (0.83 - 1.17)
Total Physical activity score (per unit increase)	1.03 (0.97 - 1.08)	1.04 (0.98 - 1.10)	1.03 (0.96 - 1.10)
Total Cholesterol, mg/dL (per 10mg/dL increase)	1.07 (0.95 - 1.21)	1.05 (0.92 - 1.20)	1.02 (0.88 - 1.19)
LDL, mg/dL (per 10mg/dL increase)	0.95 (0.83 - 1.08)	0.94 (0.82 - 1.09)	0.99 (0.85 - 1.16)
HDL, mg/dL (per 10mg/dL increase)	0.90 (0.79 - 1.03)	0.96 (0.83 - 1.10)	0.99 (0.84 - 1.16)
eGFR <60 ml/min/1.73 m^2 (yes vs. no)	1.19 (0.76 - 1.85)	1.68 (1.10 - 2.56)	1.35 (0.84 - 2.17)
Clinic SBP (per 10 mmHg increase)	1.09 (1.00 - 1.19)	1.24 (1.13 - 1.35)	1.35 (1.23 - 1.48)
Clinic DBP (per 5 mmHg increase)	1.03 (0.95 - 1.11)	0.97 (0.89 - 1.05)	0.96 (0.88 - 1.05)
Number of classes of antihypertensive medications			
0	1 (referent)	1 (referent)	1 (referent)
1	1.35 (0.90 - 2.02)	1.25 (0.79 - 1.97)	1.38 (0.84 - 2.26)
2	1.19 (0.79 - 1.80)	0.99 (0.62 - 1.57)	1.31 (0.80 - 2.15)

3	1.21 (0.73 - 2.01)	1.57 (0.94 - 2.63)	1.65 (0.93 - 2.93)
≥ 4	1.06 (0.83 - 1.34)	1.37 (1.13 - 1.67)	1.30 (1.03 - 1.64)

[a]All participant characteristics are included in the multivariable adjusted model: age, sex, body mass index, diabetes, education less than high school, alcohol consumption (none: 0 drinks/week; moderate consumption: 1-14 and 1-7 alcoholic drinks/week for men and women; heavy consumption: >14 and >7 alcoholic drinks/week for men and women), current smoking status (yes vs. no), physical activity, total cholesterol, low density lipoprotein cholesterol, high density lipoprotein cholesterol, estimated glomerular filtration rate <60 ml/min/1.73 m^2, clinic systolic blood pressure, clinic diastolic blood pressure, and number of classes of antihypertensive medications.
DBP: diastolic blood pressure, eGFR: estimated glomerular filtration rate, HDL: high density lipoprotein cholesterol, HS: high school, LDL: low density lipoprotein cholesterol, SBP: systolic blood pressure.
LVH: left ventricular hypertrophy, LVMI: left ventricular mass index, RWT: relative wall thickness
LVH is defined as increased LVMI ≥ 45 $g/m^{2.7}$ in females and ≥ 49 $g/m^{2.7}$ in males. Normal LVMI is defined as < 45 $g/m^{2.7}$ in females and < 49 $g/m^{2.7}$ in males. Increased RWT is defined as RWT > 0.42. Normal RWT is defined as RWT ≤ 0.42.
Normal pattern (referent) is defined as: normal LVMI and normal RWT.
Concentric remodeling is defined as: normal LVMI and increased RWT.
Eccentric hypertrophy is defined as: LVH and normal RWT.
Concentric hypertrophy is defined as: LVH and increased RWT.

SUPPLEMENTAL FIGURE LEGEND

Supplemental Figure 1: Classifications of Left Ventricular Structural Patterns [8-12]

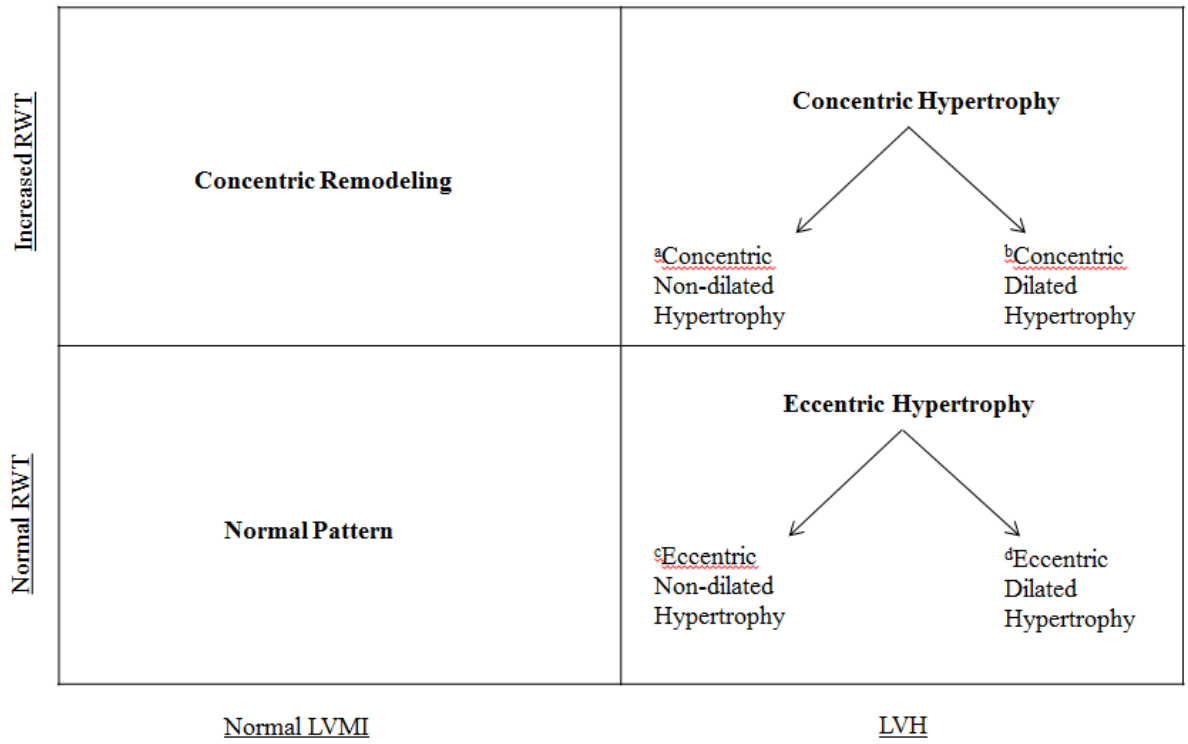
[a]Defined as: LVH, increased RWT, and normal LVEDD.
[b]Defined as: LVH, increased RWT, and increased LVEDD.
[c]Defined as: LVH, normal RWT, and normal LVEDD.
[d]Defined as: LVH, normal RWT, and increased LVEDD.

Abbreviations: LVEDD=left ventricular internal diameter at end diastole; LVH=left ventricular hypertrophy; LVMI=left ventricular mass index; RWT=relative wall thickness

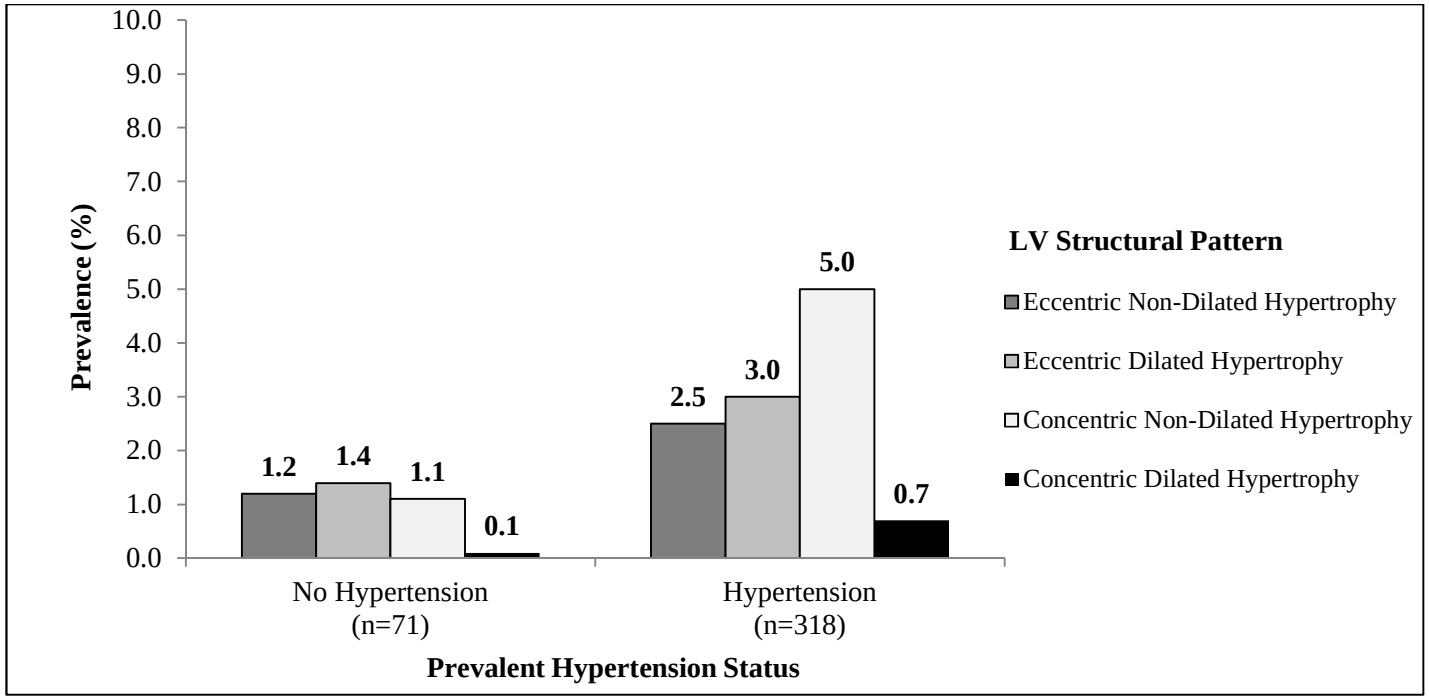
Supplemental Figure 2. Prevalence of Eccentric Non-dilated Hypertrophy, Eccentric Dilated Hypertrophy, Concentric Non-dilated Hypertrophy, and Concentric Non-dilated Hypertrophy Stratified by Prevalent Hypertension Status

Abbreviations: LV=Left ventricular

Supplemental Figure 1



Supplemental Figure 2



SUPPLEMENTAL REFERENCES

1. Taylor HA, Jr., Wilson JG, Jones DW, Sarpong DF, Srinivasan A, Garrison RJ, et al. Toward resolution of cardiovascular health disparities in African Americans: design and methods of the Jackson Heart Study. Ethn Dis. 2005;15(4 Suppl 6):S6-4-17.

2. Carithers T, Dubbert PM, Crook E, Davy B, Wyatt SB, Bogle ML, et al. Dietary assessment in African Americans: methods used in the Jackson Heart Study. Ethn Dis. 2005;15(4 Suppl 6):S6-49-55.

3. Dietary Guidelines for Americans Washington, D.C: US Government Printing Office; 2010. Available from: http://www.health.gov/dietaryguidelines/dga2010/DietaryGuidelines2010.pdf -last accessed April 6, 2016.

4. Smitherman TA, Dubbert PM, Grothe KB, Sung JH, Kendzor DE, Reis JP, et al. Validation of the Jackson Heart Study Physical Activity Survey in African Americans. J Phys Act Health. 2009;6 Suppl 1:S124-32.

5. Dubbert PM, Carithers T, Ainsworth BE, Taylor HA, Jr., Wilson G, Wyatt SB. Physical activity assessment methods in the Jackson Heart Study. Ethn Dis. 2005;15(4 Suppl 6):S6-56-61.

6. Carpenter MA, Crow R, Steffes M, Rock W, Heilbraun J, Evans G, et al. Laboratory, reading center, and coordinating center data management methods in the Jackson Heart Study. Am J Med Sci. 2004;328(3):131-44.

7. Levey AS, Stevens LA, Schmid CH, Zhang YL, Castro AF, 3rd, Feldman HI, et al. A new equation to estimate glomerular filtration rate. Ann Intern Med. 2009;150(9):604-12.

8. Chinali M, Aurigemma GP. Refining patterns of left ventricular hypertrophy using cardiac MRI: "brother, can you spare a paradigm?". Circ Cardiovasc Imaging. 2010;3(2):129-31.

9. Ganau A, Devereux RB, Roman MJ, de Simone G, Pickering TG, Saba PS, et al. Patterns of left ventricular hypertrophy and geometric remodeling in essential hypertension. J Am Coll Cardiol. 1992;19(7):1550-8.

10. Kahan T, Persson H. The importance of left ventricular geometry in hypertensive heart disease. J Hypertens. 2015;33(4):690-2.

11. Khouri MG, Peshock RM, Ayers CR, de Lemos JA, Drazner MH. A 4-tiered classification of left ventricular hypertrophy based on left ventricular geometry: the Dallas heart study. Circ Cardiovasc Imaging. 2010;3(2):164-71.

12. Sehgal S, Drazner MH. Left ventricular geometry: does shape matter? Am Heart J. 2007;153(2):153-5.