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CKD in Hispanics: Baseline Characteristics From the CRIC (Chronic Renal Insufficiency Cohort) and Hispanic-CRIC Studies

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Abstract

Background—Little is known regarding chronic kidney disease (CKD) in Hispanics. We compared baseline characteristics of Hispanic participants in the Chronic Renal Insufficiency Cohort (CRIC) and Hispanic-CRIC (H-CRIC) Studies with non-Hispanic CRIC participants.

Study Design—Cross-sectional analysis

Setting and Participants—Participants were aged 21–74 years with CKD using age-based glomerular filtration rate (eGFR) at enrollment into the CRIC/H-CRIC Studies. H-CRIC included Hispanics recruited at the University of Illinois from 2005–2008 while CRIC included Hispanics and non-Hispanics recruited at seven clinical centers from 2003–2007.

Factor—Race/ethnicity

Outcomes—Blood pressure, angiotensin-converting enzyme (ACE) inhibitor/angiotensin receptor blocker (ARB) use, CKD-associated complications

Measurements—Demographic characteristics, laboratory data, blood pressure, and medications were assessed using standard techniques and protocols

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Results—Among H-CRIC/ CRIC participants, 497 were Hispanic, 1650 non-Hispanic Black, and 1638 non-Hispanic White. Low income and educational attainment were nearly twice as prevalent in Hispanics compared with non-Hispanics ($p<0.01$). Hispanics had self-reported diabetes (67%) more frequently than non-Hispanic Blacks (51%) and Whites (40%) ($p<0.01$). Blood pressure > 130/80 mmHg was more common in Hispanics (62%) compared with Blacks (57%) and Whites (35%) ($p<0.05$), and abnormalities in hematologic, metabolic, and bone metabolism parameters were more prevalent in Hispanics ($p<0.05$), even after stratifying by entry eGFR. Hispanics had the lowest receipt of ACE inhibitor/ARB among high-risk subgroups, including participants with diabetes, proteinuria, and blood pressure > 130/80 mmHg. Mean eGFR ($ml/min/m^2$) was lower in Hispanics (39.6) than in Blacks (43.7) and Whites (46.2), while median proteinuria was higher in Hispanics (0.72 g/d) than in Blacks (0.24 g/d) and Whites (0.12 g/d) ($p<0.01$).

Limitations—Generalizability; observed associations limited by residual bias and confounding

Conclusions—Hispanics with CKD in CRIC/H-CRIC Studies are disproportionately burdened with lower socioeconomic status, more frequent diabetes mellitus, less ACE inhibitor/ARB use, worse blood pressure control, and more severe CKD and associated complications than their non-Hispanic counterparts.

Keywords

chronic kidney disease; Hispanics; epidemiology

Hispanics are now the largest minority group in the United States (U.S.) (1). Of interest, there has also been a particularly rapid concomitant increase in the incidence and prevalence of end-stage renal disease (ESRD) in Hispanics observed in the United States over the last two decades (2). Compared with non-Hispanic Whites, the incidence of ESRD in Hispanics is nearly two fold higher (2). Because of the high frequency of risk factors for ESRD among U.S. Hispanics (e.g., diabetes mellitus), it is anticipated that Hispanic ESRD population will continue to undergo substantial growth (3–4).

Despite the magnitude of this public health problem, little is known regarding earlier stages of chronic kidney disease (CKD) in Hispanics (5). A few prior reports have noted that although the prevalence of eGFR < 60 $ml/min/1.73m^2$ is similar among Hispanics and non-Hispanics, Hispanic ethnicity is associated with higher levels of microalbuminuria and proteinuria, and almost a two-fold higher risk of ESRD in comparison with non-Hispanic Whites and Blacks (6–10). Hispanics have not been well represented in most large prospective studies and clinical trials of CKD; therefore, our understanding of the risk factors, complications, and outcomes associated with CKD among Hispanics is limited (11–15). One exception was a post-hoc analysis of the RENAAL (Reduction in End Points in Non-Insulin-Dependent Diabetes With the Angiotensin II Antagonist Losartan) trial, which focused on the role of ethnicity and found that while baseline proteinuria and the risk of ESRD were higher in Hispanics compared with non-Hispanic Whites and Blacks, all ethnic groups achieved renoprotection from losartan after baseline differences in albuminuria where taken into account (16).

The Hispanic Chronic Renal Insufficiency Cohort (H-CRIC) Study, an ancillary study to the multi-center National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK)-sponsored Chronic Renal Insufficiency Cohort (CRIC) Study, is the first prospective longitudinal study examining risk factors for the progression of CKD and cardiovascular disease in a sizable cohort of U.S. Hispanics with a broad range of kidney dysfunction (17–18). The H-CRIC Study was initiated because of less-than-anticipated recruitment of Hispanics in the CRIC Study, and it was conducted at the University of Illinois at Chicago

because of disproportionately successful Hispanic recruitment into the CRIC Study at this clinical site (18). In this article, we compare baseline characteristics among Hispanic and non-Hispanic participants in the CRIC and H-CRIC studies, especially as they pertain to risk factors, complications, and management of CKD.

Methods

Study Sample and Design

We conducted a cross-sectional comparative analysis of Hispanic and non-Hispanic participants at enrollment into the Chronic Renal Insufficiency Cohort (CRIC) and Hispanic-CRIC (H-CRIC) Studies. The CRIC study is a prospective multicenter cohort study of adult individuals with chronic kidney disease (CKD). Details of the design and methods of the CRIC study have been previously published (17–18). Major eligibility criteria for the CRIC study included adults aged 21 to 74 years with mild to moderate CKD using age-based estimated glomerular filtration rate (eGFR). Exclusion criteria included inability to consent, New York Heart Association Class III or IV heart failure, cirrhosis, HIV/AIDS, polycystic kidney disease, prior dialysis or transplant, immunosuppressive therapy within 6 months, or chemotherapy for cancer within 2 years. The H-CRIC Study adopted identical eligibility and exclusion criteria as the parent CRIC Study. However, while CRIC included 169 Hispanics and 3289 non-Hispanics recruited at seven clinical centers from May 2003 through March 2007, H-CRIC included 327 Hispanics recruited at the University of Illinois at Chicago and Chicago metropolitan area from October 2005 through June 2008. Recruitment sites included university-, community-, and private-based health clinics. Both studies were approved by the Institutional Review Boards of the participating centers and the research was conducted in accordance with the principles of the Declaration of Helsinki. All study participants provided written informed consent.

Variables and Data Sources

H-CRIC Study participants underwent the same evaluation and test strategy as CRIC Study participants, which have been fully described previously (17–18), as well as additional evaluations (only for H-CRIC participants) focusing on primary language (19). Sociodemographic characteristics (e.g., age, gender, race/ethnicity, education, annual household income, smoking, health insurance) were self-reported and recorded at the baseline visit. Medical conditions (e.g., hypertension, high cholesterol, chronic heart failure, peripheral arterial disease, diabetes, myocardial infarction or coronary revascularization) were also self-reported at baseline. Anthropometric measures (height, weight, body mass index, waist circumference) were measured by trained study personnel and recorded. Current medications were reviewed and documented. As previously noted, blood pressure measurements and ankle brachial indices were obtained using standard and validated protocols (17–18). For each participant at baseline, the urine creatinine and protein was determined from a 24 hour urine collection and an eGFR was calculated by the CKD-EPI estimating equation, using a locally measured serum creatinine calibrated to the Roche Enzymatic Method (20). GFR was assessed by the renal clearance of 125-iodine iothalamate (measured GFR [mGFR]) in a select subcohort (17–18).

Statistical Analysis

Baseline participant characteristics were summarized using means with standard deviations, or medians (25th–75th percentile) for continuous variables; and frequency distribution with percentages for categorical variables. Missing values occurred very infrequently and generally under the following circumstances: i) when a participant failed to answer a question on a reporting form, ii) when a physical measure was not obtained, iii) when a laboratory test was not performed. The only variables with > 3% missing values were:

primary language spoken (17%) [percentage missing in Hispanics since language only assessed in this group], health insurance (12%), and urine studies (6%). Analyses for each variable included only the observed values. Baseline participant characteristics were compared between groups using t-tests, chi-squared tests, or analysis of variance, as appropriate. Two-sided p-values less than 0.05 were considered statistically significant. All statistical analyses were conducted using SAS, version 9.1 (Cary, NC).

Results

Baseline Demographic and Clinical Characteristics

H-CRIC and Hispanic CRIC Participants—Among a total of 497 H-CRIC and CRIC Hispanic participants, 69% were Mexican American, 16% were Puerto Rican, and 25% had other Latin American ancestry (Table 1). The proportion of participants with low annual household income (<$20,000/year), low educational attainment (< high school diploma), and lack of health insurance was significantly higher among Mexican Americans than among Puerto Rican Americans and other Latin Americans ($p<0.02$). Mexican Americans more often spoke primarily Spanish (76%) relative to other Hispanic groups (≈43%) ($p<0.001$). Compared with other Hispanic subgroups, the prevalence of diabetes and blood pressure > 130/80 mmHg was more frequent in Mexican Americans. Mean eGFR was significantly lower in Mexican Americans (37.4 ml/min/1.73m^2) compared with Puerto Rican Americans (43.3 ml/min/1.73m^2) and other Latin Americans (45.6 ml/min/1.73m^2) ($p<0.001$), and mGFR results on select participants were consistent with these findings. Median 24 hour urine protein and spot urine albumin-creatinine ratios were substantially higher in Mexican Americans compared to Puerto Rican Americans and other Latin Americans, and these trends persisted in both diabetic and non-diabetic subgroups. Compared with other Hispanic subgroups, Mexican Americans had significantly lower serum hemoglobin and calcium and higher serum phosphorus and total parathyroid hormone values ($p<0.05$).

Comparison with Non-Hispanic White and Black CRIC Participants—Mean age was approximately 2 years lower in the 497 Hispanic H-CRIC/CRIC participants than in the 1638 Non-Hispanic White and 1650 Non-Hispanic Black CRIC participants (Table 2). Compared with non-Hispanic Whites and Blacks, Hispanics more often had low annual household income, low educational attainment, lack of health insurance, and less current and former tobacco use ($p<0.05$). The prevalence of diabetes was highest among Hispanics (67%), while the self-reported history of myocardial infarction/prior revascularization was least prevalent among Hispanics (18%). The prevalence of self-reported hypertension for Hispanics (89%) was between that for non-Hispanic Whites (79%) and Blacks (93%), while blood pressure > 130/80 mmHg at cohort entry was more common among Hispanics (62%) than among non-Hispanic Whites (35%) and non-Hispanic Blacks (57%) ($p<0.05$). Mean glycosylated hemoglobin in Hispanics (7.0%) was significantly higher than in non-Hispanic Whites (6.3%) ($p<0.05$) and similar to non-Hispanic Blacks (6.9%) ($p>0.05$). Mean eGFR was significantly lower in Hispanics (39.6 ml/min/1.73m^2) compared with non-Hispanic Whites (46.2 ml/min/1.73m^2) and Blacks (43.7 ml/min/1.73m^2) ($p<0.001$), and mGFR results on select participants were consistent with these findings. Median 24 hour urine protein and spot urine albumin-creatinine ratios were substantially higher in Hispanics compared to Non-Hispanic Whites and Blacks, and these trends persisted in both diabetic and non-diabetic subgroups ($p<0.001$). Lipoprotein levels, hemoglobin concentration, and bone metabolism parameters were less favorable in Hispanics compared with non-Hispanic Whites and similar to those in non-Hispanic Blacks.

Baseline Frequency of Blood Pressure Medication Use

Overall, use of angiotensin-converting enzyme (ACE) inhibitor or angiotensin receptor blocker (ARB) medications was not significantly different among H-CRIC/CRIC participants (Table 3). However, among important subgroups, including those with blood pressure > 130/80 mmHg, diabetes, or urine protein > 0.3 g/d, Hispanics consistently had the lowest receipt of ACE inhibitor/ARB compared with Non-Hispanic Whites and Blacks ($p<0.05$)

Blood Pressure by eGFR and Albuminuria strata

Across all eGFR categories and albuminuria strata, the proportion of participants with blood pressure > 130/80 mmHg was significantly higher for Hispanics compared with non-Hispanic White participants ($p<0.05$) (Table 4). However, only in the eGFR < 30 ml/min/m^2 strata was the percentage of Hispanics with blood pressure > 130/80 mmHg significantly higher than that of non-Hispanic Blacks ($p<0.05$), whereas this percentage was not significantly different between these two groups for all other eGFR strata. No significant differences were found between proportions of Hispanic and non-Hispanic Blacks with blood pressure > 130/80 mmHg across strata of albuminuria.

Laboratory Parameters by eGFR and Albuminuria strata

Across all eGFR categories and albuminuria strata, Hispanic participants had significantly lower serum sodium and bicarbonate levels compared with non-Hispanic Whites and Blacks ($p<0.05$), while less pronounced differences existed for serum potassium levels among these groups (Table 5). There were no significant differences in hemoglobin levels between Hispanics and non-Hispanic Blacks, but levels were significantly lower in Hispanics compared with non-Hispanic Whites across eGFR and albuminuria ($p<0.05$). Calcium levels were lower and serum phosphorus levels higher in Hispanics versus non-Hispanics with eGFR < 45 ml/min/1.73m^2 or albumin-creatinine ratio > = 30 (mg/g) ($p<0.05$). Total intact parathyroid hormone (PTH) levels for Hispanics were generally significantly higher than non-Hispanic Whites but lower than those in non-Hispanic Blacks across eGFR and albuminuria levels. Serum albumin was consistently the lowest in Hispanics compared with non-Hispanics, regardless of eGFR or albuminuria group.

Discussion

We found that among participants with CKD in the CRIC and H-CRIC Studies, Hispanics were disproportionately burdened with lower socioeconomic status, more frequent diabetes mellitus, worse blood pressure control, lower receipt of ACE inhibitor/ARB medications, and more severe CKD compared with non-Hispanic Whites and Blacks. In particular, in the setting of CKD, Mexican Americans had especially unfavorable sociodemographic and clinical parameters relative to Puerto Rican Americans and other Latin Americans. Even when level of eGFR was taken into account, Hispanics with CKD more often had uncontrolled blood pressure, lower serum hemoglobin levels, and worse metabolic and bone metabolism parameters than non-Hispanic Whites and Blacks.

In contrast to prior reports and studies that focused chiefly on populations with ESRD (2–4), this work is one of the few systematic evaluations of CKD in Hispanics, who constitute a growing high-risk population well-known to be affected by health disparities (21–27). The CRIC and H-CRIC studies were designed to examine prospectively risk factors for CKD progression and CVD incidence and progression among a large diverse representative cohort of individuals with CKD (17–18). By capturing a wide array of data on a broad range of demographic factors and clinical exposures, the H-CRIC and CRIC studies will further elucidate the reasons for health disparities in Hispanics with CKD and will inform clinical

trials of therapeutic interventions that may potential lead to improvements in clinical outcomes (28).

A few prior studies examined differences in the burden of CKD among Hispanics and non-Hispanics. Although analyses from NHANES have found the prevalence of eGFR < 60 ml/min/m^2 to be similar among Mexican Americans and non-Hispanic Whites, they have generally noted a higher prevalence of micro- and macroalbuminuria (6, 9–10). In a large cohort of adults with stage 3–4 CKD from Kaiser Permanente of Northern California, higher levels of proteinuria were also observed among Hispanics compared with non-Hispanic Whites, which is consistent with our observations in the H-CRIC/CRIC Studies (7). Less is known about complications of CKD. Similar to our findings, a recent analysis from NHANES found that several metabolic abnormalities, including those involving hemoglobin, phosphorus, potassium, and bicarbonate, were more common in Hispanic than White adults with an eGFR < 60 ml/min/m^2 (29). Differences in socioeconomic status may explain some of these observed differences. For example, two recent studies found that low socioeconomic status was strongly associated with higher serum phosphorus in adults with CKD regardless of race/ethnicity (30–31). The impact of these complications on health outcomes will be assessed in future longitudinal analyses.

Optimal control of blood pressure and use of renoprotective medications was also found to be inferior in Hispanics compared with non-Hispanic Whites in H-CRIC/CRIC, despite evidence supporting these measures to attenuate CKD progression (16). Similar patterns of greater uncontrolled blood pressure in Hispanics with and without CKD have also been observed in samples from NHANES (29, 32) and MESA (the Multi-Ethnic Study of Atherosclerosis) (33), which appear in part due to socioeconomic differences. Only one prior study has examined the relationship between race/ethnicity and ACE inhibitor/ARB use among individuals at high risk for progressive CKD. Among near 40,000 diabetic adults in the Kaiser Permanente of Northern California Diabetes Registry, 59% of Latinos received an ACE inhibitor/ARB, including 54% with albuminuria, and this proportion was not significantly different from that observed among Whites (34). Although we observed a similar proportion of Hispanics receiving ACE inhibitor/ARB in H-CRIC/CRIC overall, we found that Hispanics had a significantly lower receipt of these medications in high risk groups (e.g., diabetes, proteinuria, and blood pressure > 130/80 mmHg) compared with non-Hispanic Whites and Blacks. In addition to local clinical practice patterns, the lower prevalence of health insurance among Hispanics in H-CRIC/CRIC likely contributes to these observed differences. Although not specifically evaluated in regard to categories of race and ethnicity, lack of health insurance has been associated with decreased access to regular care, worse control of hypertension, and lesser receipt of ACE inhibitor/ARB among adults with diabetes and CKD (35–36). Because of its robust data collection, future H-CRIC/ CRIC analyses will delineate the relationships between race/ethnicity, socioeconomic status (e.g., income, health insurance, access to healthcare), risk factors for CKD, and CKD progression.

There is notable heterogeneity among Hispanics in the U.S. with regard to race, country of origin, language, health beliefs, and social customs (37). The H-CRIC and CRIC Studies also afford an initial examination of differences among subgroups of Hispanics with CKD, finding that Mexican Americans had more severe CKD (i.e., lower eGFR, higher proteinuria), a disproportionate burden of unfavorable CKD risk factors, and a higher prevalence of CKD-related metabolic complications compared with Puerto Rican Americans and other Latin Americans. Only a few prior studies have investigated differences in CKD parameters and outcomes among Hispanic subgroups. In a prospective observational study of nearly 5,000 Hispanics receiving long-term dialysis, Mexican Americans were found to have significantly lower mortality than their Puerto Rican Americans counterparts over two years (38). An analysis of NHANES data revealed that Cuban Americans were more likely

to have an estimated creatinine clearance < 60 ml/min/1.73m^2 compared with Mexican Americans or Puerto Ricans (39). Recently, findings from the MESA demonstrated the while Puerto Ricans had levels of albuminuria similar to non-Hispanic Whites, Mexicans and Dominicans had much higher albuminuria than Whites, which appeared to be related to the heterogeneity in genetic admixture between European, African, and Native American ancestry among these groups (40). Further analyses are needed to better understand the diversity among Hispanic subgroups in the United States and to delineate the clinical implications of these baseline findings.

The causes of racial and ethnic inequities among individuals with CKD are speculated to be of diverse origins, including patient (e.g., biologic, socioeconomic, environmental), provider (e.g., bias, communication), and healthcare system-related (e.g., access to services) factors (22–23). Reasons for these reported disparities in Hispanics have been infrequently examined. Some have argued that differences in sociodemographic and recognized clinical factors account for much of observed disparities in health outcomes (27). Others have contended that intrinsic biologic and genetic predispositions toward CKD and its complications along with differential responses to treatment may contribute substantially to these disparities for Hispanics (7). Moreover, few studies incorporated detailed data on socioeconomic status, health insurance and access to care (3, 8). Of those that did, the observed disparities in regard to higher rates of ESRD among Hispanics appear to be only partially explained by these factors (7). By virtue of its prospective longitudinal design and detailed collection of patient level data, the H-CRIC and CRIC studies are poised to identify additional genetic, biologic, and sociocultural factors that contribute to racial/ethnic differences in CKD-related outcomes.

As in other observational analyses, inferences regarding causality are limited by residual bias and confounding. However, methodologic strategies have been adopted to minimize these concerns (17–18). Another potential limitation pertains to the generalizability of findings from the CRIC and H-CRIC participants. As previously described (17–18), the CRIC cohort oversampled certain subgroups (i.e., African Americans) and recruited participants from select geographic sites, and therefore is not a population-based sample like the NHANES CKD cohort. Similarly, a large majority of Hispanic participants in CRIC/H-CRIC were comprised of Mexican Americans (69%) and recruited from the Chicago metropolitan area (85%). While many characteristics of our Hispanic cohort, including country of origin, education, income, and primary language are similar to representative samples such as those in NHANES (21, 41–42), it is important to recognize that our Hispanic cohort does not include robust representation from all Hispanic subgroups and geographic regions of the U.S.; therefore, findings reported here may not fully generalize to all U.S. Hispanics with CKD. Lastly, although a recent study has indicated that the CKD-EPI equation for eGFR is relatively accurate among Hispanics (43), this equation has not been validated in large diverse samples of Hispanics. Hence, eGFR findings reported here across racial/ethnic groups may be subject to bias.

In conclusion, Hispanics with CKD in CRIC/H-CRIC Studies are disproportionately burdened with lower socioeconomic status, more frequent diabetes mellitus, worse blood pressure control, lower receipt of ACE inhibitor/ARB medications, and more severe CKD with disproportionate associated metabolic complications than their non-Hispanic White and Black counterparts. The consequences of these observed differences across racial and ethnic groups are less clear. Although multiple studies have found an increased burden of adverse sociodemographic characteristics, clinical risk factors, and ESRD among Hispanics compared with Whites (2–4, 6–10, 29), a decreased risk of cardiovascular events and death among Hispanics with CKD and ESRD has been observed (7, 24–27), which is consistent with a phenomenon observed elsewhere called the ‘Hispanic Paradox’ (44). Therefore,

longitudinal analyses are critically needed to fully examine the impact of these baseline health disparities as potential mediators of racial/ethnic variation in CKD-related clinical outcomes. Improving our understanding of the causes and consequences of health disparities in Hispanics with CKD has the potential to allow us to more effectively identify and address barriers to health care and improve outcomes for this population (22–23).

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Table 1

Baseline Demographic and Clinical Characteristics of the H-CRIC and Hispanic CRIC Participants[1]

Variable	Overall (N=497)	Mexican American (n=341)	Puerto Rican American (n=81)	Other (n=75)	P		
					Mexican vs. Puerto Rican	Mexican vs. Other	Overall
Age (years)	56.3 +/− 11.7	56.0 +/− 11.5	55.8 +/− 13.4	58.1 +/− 10.9	0.9	0.2	0.4
Male	288 (58%)	194 (57%)	50 (63%)	44 (59%)	0.4	0.8	0.7
Annual Income					<0.01	<0.001	<0.001
$20,000 or under	313 (63%)	234 (69%)	42 (52%)	37 (49%)			
$20,001 – $50,000	92 (19%)	55 (16%)	20 (25%)	17 (23%)	-	-	-
$50,001 – $100,000	24 (5%)	8 (2%)	5 (6%)	11 (15%)	-	-	-
More than $100,000	12 (2%)	4 (1%)	4 (5%)	4 (5%)	-	-	-
No Response	56 (11%)	40 (12%)	10 (12%)	6 (8%)	-	-	-
Education					<0.001	<0.001	<0.001
<7th grade	183 (37%)	160 (47%)	10 (13%)	13 (17%)			
7th to 12th grade	110 (22%)	75 (22%)	26 (32%)	9 (12%)	-	-	-
High school diploma	71 (14%)	45 (13%)	13 (16%)	13 (17%)	-	-	-
Vocational degree	11 (2%)	9 (3%)	1 (1%)	1 (1%)	-	-	-
Some college	67 (13%)	29 (9%)	20 (25%)	18 (24%)	-	-	-
College graduate	35 (7%)	17 (5%)	5 (6%)	13 (17%)	-	-	-
Graduate degree	20 (4%)	6 (2%)	6 (7%)	8 (11%)	-	-	-
Health Insurance					<0.001	<0.02	<0.001
None	113 (23%)	92 (27%)	7 (9%)	14 (19%)			
Medicaid / public aid	80 (16%)	61 (18%)	10 (12%)	9 (12%)	-	-	-
Any Medicare	119 (24%)	80 (23%)	24 (30%)	15 (20%)	-	-	-
VA/military/champus	9 (2%)	1 (0%)	6 (7%)	2 (3%)	-	-	-
Private/commercial	67 (13%)	40 (12%)	8 (10%)	19 (25%)	-	-	-
Unknown/incomplete	47 (9%)	28 (8%)	12 (15%)	7 (9%)	-	-	-
Missing	62 (13%)	39 (11%)	14 (17%)	9 (12%)			

Variable	Overall (N=497)	Mexican American (n=341)	Puerto Rican American (n=81)	Other (n=75)	P		
					Mexican vs. Puerto Rican	Mexican vs. Other	Overall
Primary Language Spoken					<0.001	<0.001	<0.001
English	86 (17%)	56 (16%)	21 (26%)	9 (12%)			
Spanish	327 (66%)	260 (76%)	33 (41%)	34 (45%)	-	-	-
Missing	84 (17%)	25 (7%)	27 (33%)	32 (43%)	-	-	-
Tobacco use					-	-	-
Current Smoker	29 (6%)	19 (6%)	9 (11%)	1 (1%)	0.07	0.1	0.03
>100 Cigarettes	218 (44%)	147 (43%)	38 (47%)	33 (44%)	0.5	0.9	0.8
Medical History					-	-	-
Hypertension	443 (89%)	309 (91%)	72 (89%)	62 (83%)	0.6	0.04	0.1
Diabetes	333 (67%)	240 (70%)	52 (64%)	42 (56%)	0.3	0.02	0.04
MI/Prior revascularization	90 (18%)	55 (16%)	17 (21%)	18 (24%)	0.3	0.1	0.2
Heart Failure	37 (7%)	21 (6%)	10 (12%)	6 (8%)	0.06	0.6	0.1
PVD	35 (7%)	30 (9%)	2 (2%)	3 (4%)	0.05	0.2	0.07
SBP (mm Hg)	136.0 +/− 23.7	138.6 +/− 24.4	130.5 +/− 18.7	130.4 +/− 23.6	0.01	0.01	0.01
DBP (mm Hg)	72.6 +/− 12.8	73.2 +/− 12.8	72.3 +/− 12.6	70.2 +/− 12.6	0.6	0.07	0.2
MAP (mm Hg)	93.7 +/− 14.3	95.0 +/− 14.6	91.7 +/− 12.9	90.3 +/− 13.8	0.07	0.01	0.02
BP>130/80 mm Hg	307 (62%)	223 (66%)	47 (59%)	37 (49%)	0.3	0.01	0.02
Weight (kg)	84.7 +/− 20.1	84.6 +/− 19.9	86.6 +/− 23.8	82.9 +/− 16.6	0.4	0.5	0.5
BMI (kg/m^2)	31.6 +/− 6.6	31.9 +/− 6.5	31.4 +/− 7.4	30.6 +/− 5.8	0.5	0.1	0.3
BMI Category					0.5	0.9	0.9
<25 kg/m^2	58 (12%)	37 (11%)	12 (15%)	9 (12%)			
25 – 29.9 kg/m^2	170 (34%)	116 (34%)	29 (36%)	25 (33%)	-	-	-
>=30 kg/m^2	268 (54%)	187 (55%)	40 (49%)	41 (55%)	-	-	-
Waist Circumference (cm)	102.7 +/− 14.6	103.3 +/− 14.5	102.1 +/− 16.5	100.8 +/− 12.6	0.5	0.2	0.4
Low Ankle Brachial Index *	72 (15%)	46 (14%)	15 (19%)	11 (15%)	0.3	0.9	0.5
Kidney function measures							

Variable	Overall (N=497)	Mexican American (n=341)	Puerto Rican American (n=81)	Other (n=75)	P		
					Mexican vs. Puerto Rican	Mexican vs. Other	Overall
SCr (mg/dL)	1.88 +/− 0.63	1.95 +/− 0.65	1.78 +/− 0.58	1.66 +/− 0.54	0.03	<0.001	<0.001
eGFR (mL/min/1.73m^2)	39.6 +/− 14.9	37.4 +/− 13.2	43.3 +/− 17.5	45.6 +/− 16.9	<0.001	<0.001	<0.001
eGFR category					0.03	<0.001	<0.001
<30 mL/min/1.73m^2	135 (27%)	105 (31%)	19 (23%)	11 (15%)			
30–<45 mL/min/1.73m^2	205 (41%)	149 (44%)	29 (36%)	27 (36%)	-	-	-
45–<60 mL/min/1.73m^2	114 (23%)	67 (20%)	22 (27%)	25 (33%)	-	-	-
>=60 mL/min/1.73m^2	43 (9%)	20 (6%)	11 (14%)	12 (16%)	-	-	-
SCysC	1.6 (1.3, 2.1)	1.7 (1.4, 2.1)	1.5 (1.2, 1.9)	1.3 (1.2, 1.7)	<0.001	<0.001	<0.001
Participants with mGFR	214 (43%)	145 (43%)	35 (43%)	34 (45%)	0.9	0.7	0.9
iothalamate GFR	41.0 +/− 18.8	37.1 +/− 15.0	46.3 +/− 22.0	52.2 +/− 24.1	0.004	<0.001	<0.001
Urine studies							
24h urine Creatinine (g/d)	1.1(0.8, 1.4)	1.1(0.8, 1.4)	1.1(0.9, 1.4)	1.1(0.8, 1.3)	0.8	0.5	0.8
24H Urine Protein (g/d)	0.72(0.12, 3.25)	0.98(0.19, 3.76)	0.39(0.11, 1.90)	0.19(0.07, 2.13)	0.06	0.08	0.05
Diabetics	1.10(0.22, 4.32)	1.67(0.26, 4.62)	0.67(0.18, 2.16)	0.70(0.13, 3.86)	0.2	0.6	0.4
Non-Diabetics	0.26(0.07, 1.17)	0.67(0.10, 1.73)	0.12(0.06, 0.41)	0.11(0.05, 0.17)	0.1	0.1	0.07
UACR (mg/g)[2]	413.5(29.8, 2503.4)	659.9(47.9, 2835.8)	220.6(24.6, 1519.1)	73.6(12.5, 1692.3)	0.1	0.1	0.1
Diabetics	830.0(70.1, 3377.5)	1137.5(77.2, 3613.7)	363.7(62.1, 2309.0)	498.6(64.0, 2825.3)	0.2	0.4	0.3
Non-Diabetics	85.7(10.6, 826.8)	262.2(21.2, 977.7)	43.1(5.5, 423.7)	16.7(8.8, 79.1)	0.7	0.4	0.7
Lipoproteins							
Total Cholesterol (mg/dL)	189.5 +/− 53.7	190.6 +/− 53.9	186.8 +/− 59.0	187.2 +/− 47.0	0.6	0.6	0.8
LDL (mg/dL)	103.7 +/− 40.0	103.6 +/− 40.9	103.6 +/− 40.1	104.1 +/− 36.2	0.9	0.9	0.9
HDL (mg/dL)	43.1 +/− 12.9	42.3 +/− 12.6	44.9 +/− 15.1	44.5 +/− 11.3	0.1	0.2	0.2
Triglycerides (mg/dL)	158.0(120.0, 229.0)	167.0(124.0, 231.0)	136.0(108.0, 201.0)	154.0(115.0, 217.0)	0.05	0.1	0.05
Hemoglobin A1c (%)	7.0 +/− 1.7	7.0 +/− 1.6	7.2 +/− 2.0	6.8 +/− 1.7	0.3	0.3	0.3
Hemoglobin (g/dL)	12.1 +/− 1.9	11.9 +/− 1.9	12.4 +/− 1.6	12.6 +/− 1.8	0.02	0.002	0.002
Bone Metabolism Parameters					-	-	-

Am J Kidney Dis. Author manuscript; available in PMC 2013 February 20.

Variable	Overall (N=497)	Mexican American (n=341)	Puerto Rican American (n=81)	Other (n=75)	P		
					Mexican vs. Puerto Rican	Mexican vs. Other	Overall
Calcium (mg/dL)	9.0 +/− 0.5	8.9 +/− 0.5	9.1 +/− 0.6	9.1 +/− 0.5	0.02	0.001	0.001
Phosphate (mg/dL)	4.0 +/− 0.7	4.1 +/− 0.7	3.7 +/− 0.7	3.8 +/− 0.7	<0.001	<0.001	<0.001
PTH (pg/mL)	62.0(41.0, 102.0)	67.2(46.0, 105.1)	54.0(35.0, 89.0)	54.4(35.0, 91.0)	0.1	0.008	0.02

[1] continous variables are represented by mean +/− standard deviation or median (25th, 75th percentile); categorical variables are given as frequency (percentage)

[2] 8% of values are missing

[*] Ankle Brachial Index <0.9

conversion factors for units: serum creatinine in mg/dL to mmol/L, x88.4; total cholesterol/LDL/HDL in mg/dL to mmol/L, x0.02586; hemoglobin in g/dL to g/L, x10; calcium in mg/dL to mmol/L, x0.2495; phosphate in mg/dL to mmol/L, x0.3229; no conversion necessary for parathyroid hormone in pg/mL and ng/L

BMI, body mass index; BP, blood pressure; DBP, diastolic blood pressure; VA, Veterans Administration; MAP, mean arterial pressure; MI, myocardial infarction; PVD, Peripheral Vascular Disease; SBP, systolic blood pressure; DBP, diastolic blood pressure; PTH, parathyroid hormone; SCr, serum creatinine; SCysC, serum cystatin C; eGFR, estimated glomerular filtration rate; LDL, low-density lipoprotein; HDL, high-density lipoprotein; mGFR, measured glomerular filtration rate; GFR, glomerular filtration rate; UACR, urine albumin-creatinine ratio; CRIC, Chronic Renal Insufficiency Cohort; H-CRIC, Hispanic Chronic Renal Insufficiency Cohort

Am J Kidney Dis. Author manuscript; available in PMC 2013 February 20.

Table 2

Baseline Demographic and Clinical Characteristics of the H-CRIC/Hispanic CRIC Participants compared to Non-Hispanic White and Black CRIC Participants[1]

				P	
Variable	**Hispanic (n=497)**	**Non-Hispanic White (n=1638)**	**Non-Hispanic Black (n=1650)**	**Hispanic vs. White**	**Hispanic vs. Black**
Age (years)	56.3 +/− 11.7	58.9 +/− 11.0	58.1 +/− 10.6	<0.001	0.001
Male	288 (58%)	982 (60%)	806 (49%)	0.4	<0.001
Annual Income				<0.001	<0.001
$20,000 or under	313 (63%)	254 (16%)	646 (39%)		
$20,001 – $50,000	92 (19%)	416 (25%)	417 (25%)	-	-
$50,001 – $100,000	24 (5%)	455 (28%)	215 (13%)	-	-
More than $100,000	12 (2%)	295 (18%)	62 (4%)	-	-
No Response	56 (11%)	218 (13%)	310 (19%)	-	-
Education				<0.001	<0.001
<7th grade	183 (37%)	7 (0%)	20 (1%)		
7th to 12th grade	110 (22%)	83 (5%)	417 (25%)	-	-
High school diploma	71 (14%)	291 (18%)	366 (22%)	-	-
Vocational degree	11 (2%)	73 (4%)	102 (6%)	-	-
Some college	67 (13%)	394 (24%)	465 (28%)	-	-
College graduate	35 (7%)	429 (26%)	180 (11%)	-	-
Graduate degree	20 (4%)	361 (22%)	100 (6%)	-	-
Health Insurance				<0.001	<0.001
None	113 (23%)	48 (3%)	95 (6%)		
Medicaid / public aid	80 (16%)	95 (6%)	317 (19%)	-	-
Any Medicare	119 (24%)	561 (34%)	488 (30%)	-	-
VA/military/champus	9 (2%)	73 (4%)	110 (7%)	-	-
Private/commercial	67 (13%)	290 (18%)	190 (12%)	-	-
Unknown/incomplete	47 (9%)	423 (26%)	216 (13%)	-	-
Missing	62 (13%)	148 (9%)	234 (14%)	-	-

				P	
Variable	**Hispanic (n=497)**	**Non-Hispanic White (n=1638)**	**Non-Hispanic Black (n=1650)**	**Hispanic vs. White**	**Hispanic vs. Black**
Primary Language Spoken				<0.001	<0.001
English	86 (17%)				
Spanish	327 (66%)			-	-
Missing	84 (17%)	1638 (100%)	1650 (100%)	-	-
Tobacco Use				-	-
Current Smoker	29 (6%)	155 (9%)	320 (19%)	0.01	<0.001
>100 Cigarettes	218 (44%)	920 (56%)	955 (58%)	<0.001	<0.001
Medical History				-	-
Hypertension	443 (89%)	1293 (79%)	1533 (93%)	<0.001	0.006
Diabetes	334 (67%)	649 (40%)	848 (51%)	<0.001	<0.001
MI/Prior revascularization	90 (18%)	376 (23%)	361 (22%)	0.02	0.07
Heart Failure	37 (7%)	117 (7%)	217 (13%)	0.8	<0.001
PVD	35 (7%)	105 (6%)	117 (7%)	0.6	0.9
SBP (mm Hg)	136.0 +/− 23.7	121.8 +/− 18.6	132.9 +/− 23.1	<0.001	0.009
DBP (mm Hg)	72.6 +/− 12.8	69.0 +/− 11.4	73.8 +/− 13.8	<0.001	0.08
MAP (mm Hg)	93.7 +/− 14.3	86.6 +/− 11.8	93.5 +/− 14.7	<0.001	0.8
BP>130/80 mm Hg	307 (62%)	573 (35%)	942 (57%)	<0.001	0.05
Weight (kg)	84.7 +/− 20.1	90.5 +/− 22.7	95.8 +/− 24.3	<0.001	<0.001
BMI (kg/m^2)	31.6 +/− 6.6	31.2 +/− 7.6	33.4 +/− 8.3	0.2	<0.001
BMI Category				<0.001	<0.001
<25 kg/m^2	58 (12%)	310 (19%)	217 (13%)		
25–29.9 kg/m^2	170 (34%)	517 (32%)	378 (23%)	-	-
>=30 kg/m^2	268 (54%)	809 (49%)	1048 (64%)	-	-
Waist Circumference (cm)	102.7 +/− 14.6	105.4 +/− 17.6	108.0 +/− 18.2	0.003	<0.001
Low Ankle Brachial Index *	72 (15%)	206 (13%)	333 (20%)	0.2	0.007
Kidney function measures				-	-
SCr (mg/dL)	1.88 +/− 0.63	1.59 +/− 0.46	1.87 +/− 0.63	<0.001	0.8

				P	
Variable	**Hispanic (n=497)**	**Non-Hispanic White (n=1638)**	**Non-Hispanic Black (n=1650)**	**Hispanic vs. White**	**Hispanic vs. Black**
eGFR (mL/min/1.73m^2)	39.6 +/− 14.9	46.2 +/− 14.7	43.7 +/− 14.9	<0.001	<0.001
eGFR category				<0.001	<0.001
<30 mL/min/1.73m^2	135 (27%)	245 (15%)	322 (20%)		
30–<45 mL/min/1.73m^2	205 (41%)	570 (35%)	607 (37%)	-	-
45–<60 mL/min/1.73m^2	114 (23%)	532 (32%)	495 (30%)	-	-
>=60 mL/min/1.73m^2	43 (9%)	291 (18%)	226 (14%)	-	-
SCysC	1.6(1.3, 2.1)	1.3(1.1, 1.7)	1.4(1.1, 1.9)	<0.001	<0.001
Participants with mGFR	214 (43%)	585 (36%)	525 (32%)	0.003	<0.001
iothalamate GFR	41.0 +/− 18.8	50.9 +/− 20.3	47.1 +/− 19.3	<0.001	<0.001
Urine studies					
24h urine Creatinine (g/d)	1.1 (0.8, 1.4)	1.3 (1.0, 1.7)	1.3 (0.9, 1.7)	<0.001	<0.001
24H Urine Protein (g/d)	0.72(0.12, 3.25)	0.12(0.07, 0.51)	0.24(0.08, 1.07)	<0.001	<0.001
Diabetics	1.10(0.22, 4.32)	0.21(0.08, 0.90)	0.42(0.10, 1.63)	<0.001	<0.001
Non-Diabetics	0.26(0.07, 1.17)	0.09(0.06, 0.28)	0.14(0.07, 0.63)	<0.001	<0.001
UACR (mg/g)[2]	413.5(29.8, 2503.4)	24.5(6.1, 208.1)	76.9(11.4, 518.9)	<0.001	<0.001
Diabetics	830.0(70.1, 3377.5)	68.1(14.4, 454.2)	174.9(20.4, 975.2)	<0.001	<0.001
Non-Diabetics	85.7(10.4, 826.8)	13.2(5.0, 98.2)	32.5(7.7, 237.5)	<0.001	<0.001
Lipoproteins					
Total Cholesterol (mg/dL)	189.5 +/− 53.7	180.1 +/− 41.9	185.6 +/− 45.7	<0.001	0.1
LDL (mg/dL)	103.7 +/− 40.0	99.4 +/− 32.1	106.1 +/− 37.2	0.01	0.2
HDL (mg/dL)	43.1 +/− 12.9	47.1 +/− 15.2	49.3 +/− 16.1	<0.001	<0.001
Triglycerides (mg/dL)	158.0(120.0, 229.0)	133.0(91.5, 193.0)	112.0(83.0, 160.0)	<0.001	<0.001
Hemoglobin A1c (%)	7.0 +/− 1.7	6.3 +/− 1.3	6.9 +/− 1.7	<0.001	0.3
Hemoglobin (g/dL)	12.1 +/− 1.9	13.2 +/− 1.7	12.2 +/− 1.7	<0.001	0.2
Bone Metabolism Parameters				-	-
Calcium (mg/dL)	9.0 +/− 0.5	9.2 +/− 0.5	9.2 +/− 0.5	<0.001	<0.001
Phosphate (mg/dL)	4.0 +/− 0.7	3.6 +/− 0.6	3.8 +/− 0.7	<0.001	<0.001

				P	
Variable	**Hispanic (n=497)**	**Non-Hispanic White (n=1638)**	**Non-Hispanic Black (n=1650)**	**Hispanic vs. White**	**Hispanic vs. Black**
PTH (pg/mL)	62.0(41.0, 102.0)	43.0(30.4, 68.6)	67.2(41.2, 114.8)	<0.001	0.01

[1] continous variables are represented by mean +/− standard deviation or median (25th, 75th percentile); categorical variables are given as frequency (percentage)

[2] 4% missing values

[*] Ankle Brachial Index <0.9

conversion factors for units: serum creatinine in mg/dL to mmol/L, x88.4; total cholesterol/LDL/HDL in mg/dL to mmol/L, x0.02586; hemoglobin in g/dL to g/L, x10; calcium in mg/dL to mmol/L, x0.2495; phosphate in mg/dL to mmol/L, x0.3229; no conversion necessary for parathyroid hormone in pg/mL and ng/L

BMI, body mass index; BP, blood pressure; DBP, diastolic blood pressure; VA, Veterans Administration; MAP, mean arterial pressure; MI, myocardial infarction; PVD, Peripheral Vascular Disease; SBP, systolic blood pressure; PTH, parathyroid hormone; SCr, serum creatinine; SCysC, serum cystatin C; eGFR, estimated glomerular filtration rate; LDL, low-density lipoprotein; HDL, high-density lipoprotein; mGFR, measured glomerular filtration rate; GFR, glomerular filtration rate; UACR, urine albumin-creatinine ratio; CRIC, Chronic Renal Insufficiency Cohort; H-CRIC, Hispanic Chronic Renal Insufficiency Cohort

Table 3

Baseline Frequency of ACEi/ARB Use Among H-CRIC/Hispanic CRIC Participants compared to Non-Hispanic White and Black CRIC Participants[1]

				P		
Variable	**Hispanic (n=497)**	**Non-Hispanic White (n=1638)**	**Non-Hispanic Black (n=1650)**	**Hispanic vs. White**	**Hispanic vs. Black**	**Overall**
Overall	67% (332/493)	67% (1088/1627)	71% (1164/1638)	0.8	0.1	0.03
Control of BP						
>130/80 mmHg	62% (189/305)	70% (397/567)	70% (650/934)	0.02	0.01	0.03
<=130/80 mmHg	76% (140/184)	65% (689/1057)	73% (507/696)	0.004	0.4	<0.001
Presence of diabetes						
Yes	72% (238/331)	81% (524/645)	80% (678/843)	<0.001	0.001	0.001
No	58% (94/162)	57% (564/982)	61% (486/795)	0.9	0.5	0.3
Degree of proteinuria						
> 0.3 g/d	67% (172/258)	78% (384/493)	73% (510/701)	<0.001	0.07	0.003
<= 0.3 g/d	71% (110/154)	62% (671/1087)	70% (574/822)	0.02	0.7	<0.001
eGFR level						
<30 ml/min/1.73m2	60% (81/135)	75% (183/244)	67% (215/322)	0.002	0.2	0.009
30–<45 ml/min/1.73m2	74% (149/202)	73% (412/567)	74% (447/605)	0.8	0.9	0.9
45–<60 ml/min/1.73m2	72% (81/113)	68% (358/526)	75% (367/489)	0.5	0.5	0.05
>= 60 ml/min/1.73m2	49% (21/43)	47% (135/290)	61% (135/222)	0.8	0.1	0.01

[1] statistical comparisons made within clinical subgroup strata (e.g., eGFR level) across race/ethnicity

Abbreviations: BP, blood pressure; eGFR, estimated glomerular filtration rate; CRIC, Chronic Renal Insufficiency Cohort; H-CRIC, Hispanic Chronic Renal Insufficiency Cohort; ACEi, angiotensin-converting enzyme inhibitor; ARB, angiotensin receptor blocker

Table 4

BP in H-CRIC/Hispanic CRIC Participants compared to Non-Hispanic White and Black CRIC Participants[1]

				P	
Variable	***Hispanic (n=497)***	***Non-Hispanic White (n=1638)***	***Non-Hispanic Black (n=1650)***	***Hispanic vs. White***	***Hispanic vs. Black***
eGFR Strata					
eGFR<30 (n=702)				-	-
SBP (mmHg)	142.3 +/−23.0	123.4 +/−20.4	135.0 +/−25.1	<0.001	0.004
DBP (mmHg)	73.1 +/−12.7	66.4 +/−12.0	71.6 +/−14.0	<0.001	0.3
MAP (mmHg)	96.2 +/−14.1	85.4 +/−12.7	92.7 +/−15.3	<0.001	0.03
BP>130/80 mmHg	98 (73%)	84 (35%)	191 (60%)	<0.001	0.006
eGFR 30–<45 (n=1382)				-	-
SBP (mmHg)	137.1 +/−24.3	123.8 +/−19.1	134.7 +/−23.8	<0.001	0.2
DBP (mmHg)	72.0 +/−12.9	68.1 +/−11.1	73.1 +/−13.7	<0.001	0.4
MAP (mmHg)	93.7 +/−14.5	86.6 +/−11.6	93.7 +/−15.1	<0.001	0.9
BP>130/80 mmHg	126 (62%)	216 (38%)	349 (58%)	<0.001	0.3
eGFR 45–<60 (n=1141)				-	-
SBP (mmHg)	130.8 +/−22.9	121.6 +/−18.4	131.7 +/−21.0	<0.001	0.7
DBP (mmHg)	72.1 +/−13.3	70.2 +/−11.4	74.0 +/−13.2	0.1	0.2
MAP (mmHg)	91.7 +/−14.4	87.4 +/−12.0	93.2 +/−13.6	<0.001	0.3
BP>130/80 mmHg	62 (55%)	192 (36%)	291 (59%)	<0.001	0.4
eGFR >= 60 (n=560)					
SBP (mmHg)	125.5 +/−18.8	116.9 +/−15.4	127.8 +/−22.0	0.001	0.5
DBP (mmHg)	74.7 +/−11.4	70.6 +/−11.1	78.2 +/−14.2	0.02	0.1
MAP (mmHg)	91.6 +/−12.9	86.0 +/−10.9	94.8 +/−15.5	0.002	0.2
BP>130/80 mmHg	21 (49%)	81 (28%)	111 (50%)	0.005	0.9
Albuminuria Strata					
UACR <30 (n=1564)				-	-
SBP (mmHg)	122.0 +/−20.6	118.0 +/−16.3	124.1 +/−19.4	0.02	0.3
DBP (mmHg)	67.3 +/−12.1	67.8 +/−10.7	70.7 +/−12.5	0.7	0.009

Am J Kidney Dis. Author manuscript; available in PMC 2013 February 20.

				P	
Variable	***Hispanic (n=497)***	***Non-Hispanic White (n=1638)***	***Non-Hispanic Black (n=1650)***	***Hispanic vs. White***	***Hispanic vs. Black***
MAP (mmHg)	85.5 +/−13.2	84.5 +/−10.7	88.5 +/−13.0	0.3	0.03
BP>130/80 mmHg	44 (38%)	228 (27%)	255 (42%)	0.01	0.5
UACR 30–<300 (n=955)				-	-
SBP (mmHg)	133.2 +/−20.0	122.9 +/−18.5	132.6 +/−22.2	<0.001	0.8
DBP (mmHg)	69.6 +/−11.9	68.3 +/−11.4	73.6 +/−14.0	0.3	0.01
MAP (mmHg)	90.8 +/−12.6	86.5 +/−11.6	93.2 +/−14.6	0.001	0.1
BP>130/80 mmHg	51 (54%)	148 (36%)	247 (56%)	0.001	0.7
UACR >=300 (n=1110)				-	-
SBP (mmHg)	143.2 +/−22.9	129.8 +/−21.2	143.2 +/−23.1	<0.001	0.9
DBP (mmHg)	76.0 +/−12.3	72.5 +/−12.2	77.2 +/−13.9	<0.001	0.3
MAP (mmHg)	98.4 +/−13.1	91.6 +/−12.9	99.2 +/−14.2	<0.001	0.5
BP>130/80 mmHg	186 (76%)	183 (53%)	395 (76%)	<0.001	0.8

[1] continous variables are represented by mean +/− standard deviation; categorical variables are given as frequency (percentage)

eGFR given in mL/min/1.73 m2

UACR, urine albumin-creatinine ratio; eGFR, estimated glomerular filtration rate; CRIC, Chronic Renal Insufficiency Cohort; H-CRIC, Hispanic Chronic Renal Insufficiency Cohort; BP, blood pressure; DBP, diastolic blood pressure; SBP, systolic blood pressure; MAP, mean arterial pressure;

Table 5

Laboratory Parameters in H-CRIC/Hispanic CRIC Participants compared to Non-Hispanic White and Black CRIC Participants[1]

				P	
Variable	**Hispanic (n=497)**	**Non-Hispanic White (n=1638)**	**Non-Hispanic Black (n=1650)**	**Hispanic vs. White**	**Hispanic vs. Black**
eGFR					
eGFR<30 (n=702)				-	-
Sodium (mmol/L)	138.1 +/−2.9	139.8 +/−2.9	139.8 +/−3.1	<0.001	<0.001
Potassium (mmol/L)	4.6 +/−0.6	4.6 +/−0.5	4.5 +/−0.6	0.5	0.004
CO2 (mmol/L)	21.7 +/−3.5	23.0 +/−3.3	22.7 +/−3.4	<0.001	0.003
Hemoglobin (g/dL)	11.5 +/−1.8	12.3 +/−1.6	11.5 +/−1.6	<0.001	0.7
Calcium (mg/dL)	8.8 +/−0.6	9.2 +/−0.5	9.1 +/−0.6	<0.001	<0.001
Phosphate (mg/dL)	4.4 +/−0.7	4.0 +/−0.8	4.2 +/−0.7	<0.001	0.09
Total PTH (pg/mL)	102.7(73.1, 171.3)	79.9(50.6, 126.4)	133.6(81.3, 212.6)	0.006	<0.001
Serum Albumin (g/dL)	3.6 +/−0.5	4.0 +/−0.4	3.8 +/−0.5	<0.001	<0.001
eGFR 30–<45 (n=1382)				-	-
Sodium (mmol/L)	137.9 +/−3.0	139.1 +/−2.9	140.0 +/−3.2	<0.001	<0.001
Potassium (mmol/L)	4.4 +/−0.5	4.5 +/−0.5	4.3 +/−0.5	0.2	0.04
CO2 (mmol/L)	22.8 +/−2.8	24.3 +/−2.8	24.5 +/−3.2	<0.001	<0.001
Hemoglobin (g/dL)	11.8 +/−1.7	13.0 +/−1.7	11.9 +/−1.6	<0.001	0.2
Calcium (mg/dL)	8.9 +/−0.5	9.2 +/−0.5	9.2 +/−0.5	<0.001	<0.001
Phosphate (mg/dL)	4.0 +/−0.7	3.7 +/−0.6	3.8 +/−0.6	<0.001	<0.001
Total PTH (pg/mL)	59.5(44.0, 95.0)	48.0(32.0, 76.0)	75.3(48.9, 118.5)	0.09	<0.001
Serum Albumin (g/dL)	3.6 +/−0.5	4.0 +/−0.4	3.9 +/−0.5	<0.001	<0.001
eGFR 45–<60 (n=1141)				-	-
Sodium (mmol/L)	138.3 +/−3.1	139.3 +/−3.0	139.5 +/−3.1	0.002	<0.001
Potassium (mmol/L)	4.3 +/−0.5	4.3 +/−0.5	4.1 +/−0.5	0.4	0.002
CO2 (mmol/L)	24.0 +/−2.9	25.1 +/−2.8	25.7 +/−3.0	<0.001	<0.001
Hemoglobin (g/dL)	12.8 +/−2.1	13.4 +/−1.6	12.5 +/−1.6	<0.001	0.08
Calcium (mg/dL)	9.1 +/−0.5	9.3 +/−0.4	9.2 +/−0.5	0.01	0.08

				P	
Variable	**Hispanic (n=497)**	**Non-Hispanic White (n=1638)**	**Non-Hispanic Black (n=1650)**	**Hispanic vs. White**	**Hispanic vs. Black**
Phosphate (mg/dL)	3.6 +/−0.6	3.5 +/−0.5	3.6 +/−0.6	0.09	0.8
Total PTH (pg/mL)	51.0(37.0, 66.0)	38.0(28.6, 54.0)	52.2(36.0, 77.9)	<0.001	0.05
Serum Albumin (g/dL)	3.8 +/−0.6	4.1 +/−0.4	4.0 +/−0.4	<0.001	0.008
eGFR >= 60 (n=560)				-	-
Sodium (mmol/L)	137.7 +/−2.5	138.7 +/−3.0	139.3 +/−2.6	0.04	<0.001
Potassium (mmol/L)	4.2 +/−0.5	4.2 +/−0.4	4.1 +/−0.4	0.3	0.3
CO2 (mmol/L)	24.8 +/−3.4	25.5 +/−3.0	25.6 +/−2.8	0.1	0.1
Hemoglobin (g/dL)	13.0 +/−1.6	13.7 +/−1.6	13.1 +/−1.6	0.003	0.8
Calcium (mg/dL)	9.1 +/−0.5	9.1 +/−0.4	9.3 +/−0.4	0.4	0.004
Phosphate (mg/dL)	3.7 +/−0.5	3.4 +/−0.5	3.5 +/−0.6	<0.001	0.09
Total PTH (pg/mL)	40.9(27.0, 49.7)	35.0(26.0, 45.0)	38.0(28.5, 55.6)	0.3	0.4
Serum Albumin (g/dL)	3.9 +/−0.6	4.0 +/−0.4	4.0 +/−0.4	0.02	0.02
Albuminuria Strata					
UACR <30 (n=1564)				-	-
Sodium (mmol/L)	138.3 +/−2.9	139.1 +/−3.0	139.8 +/−3.3	0.005	<0.001
Potassium (mmol/L)	4.3 +/−0.5	4.3 +/−0.5	4.2 +/−0.5	0.5	0.03
CO2 (mmol/L)	23.9 +/−3.3	25.1 +/−2.9	25.4 +/−3.1	<0.001	<0.001
Hemoglobin (g/dL)	12.4 +/−1.5	13.4 +/−1.5	12.4 +/−1.6	<0.001	0.7
Calcium (mg/dL)	9.3 +/−0.4	9.3 +/−0.5	9.3 +/−0.5	0.7	0.2
Phosphate (mg/dL)	3.7 +/−0.5	3.5 +/−0.6	3.7 +/−0.6	0.004	0.9
Total PTH (pg/mL)	49.0(35.0, 63.0)	38.0(27.1, 54.1)	52.0(35.0, 77.8)	0.1	0.03
Serum Albumin (g/dL)	4.0 +/−0.4	4.1 +/−0.4	4.1 +/−0.4	0.04	0.4
UACR 30–<300 (n=955)				-	-
Sodium (mmol/L)	138.3 +/−2.7	139.3 +/−3.1	139.8 +/−3.0	0.005	<0.001
Potassium (mmol/L)	4.4 +/−0.6	4.4 +/−0.5	4.3 +/−0.5	0.4	0.06
CO2 (mmol/L)	23.1 +/−3.2	24.1 +/−3.0	24.4 +/−3.4	0.003	<0.001
Hemoglobin (g/dL)	12.2 +/−2.0	13.1 +/−1.7	12.3 +/−1.8	<0.001	0.7

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				P	
Variable	**Hispanic (n=497)**	**Non-Hispanic White (n=1638)**	**Non-Hispanic Black (n=1650)**	**Hispanic vs. White**	**Hispanic vs. Black**
Calcium (mg/dL)	9.1 +/−0.5	9.2 +/−0.5	9.2 +/−0.5	0.01	0.008
Phosphate (mg/dL)	3.9 +/−0.7	3.6 +/− 0.7	3.7 +/−0.6	<0.001	0.02
Total PTH (pg/mL)	57.7(34.0, 90.0)	49.3(32.0, 74.3)	69.4(43.1, 125.0)	0.04	0.005
Serum Albumin (g/dL)	3.9 +/−0.4	4.1 +/−0.4	4.0 +/−0.4	<0.001	0.02
UACR >=300 (n=1110)				-	-
Sodium (mmol/L)	137.9 +/−3.1	139.2 +/−2.8	139.5 +/−3.0	<0.001	<0.001
Potassium (mmol/L)	4.5 +/−0.6	4.5 +/−0.5	4.3 +/−0.5	0.09	0.001
CO2 (mmol/L)	22.5 +/−3.2	24.0 +/−3.1	24.0 +/−3.4	<0.001	<0.001
Hemoglobin (g/dL)	11.8 +/−2.0	12.7 +/−1.8	11.9 +/−1.7	<0.001	0.8
Calcium (mg/dL)	8.8 +/−0.5	9.1 +/−0.5	9.0 +/−0.5	<0.001	<0.001
Phosphate (mg/dL)	4.2 +/−0.8	3.8 +/−0.6	4.0 +/−0.7	<0.001	<0.001
Total PTH (pg/mL)	81.2(50.5, 117.0)	60.1(36.9, 98.4)	92.0(55.7, 157.0)	0.06	<0.001
Serum Albumin (g/dL)	3.5 +/−0.5	3.8 +/−0.5	3.7 +/−0.5	<0.001	<0.001

1 continous variables are represented by mean +/− standard deviation or median (25th, 75th percentile) eGFR given in mL/min/1.73 m2

*** conversion factors for units: hemoglobin in g/dL to g/L, x10; calcium in mg/dL to mmol/L, x0.2495; phosphate in mg/dL to mmol/L, x0.3229; albumin in g/dL to g/L, x10; no conversion necessary for parathyroid hormone in pg/mL and ng/L

UACR, urine albumin-creatinine ratio; eGFR, estimated glomerular filtration rate; CRIC, Chronic Renal Insufficiency Cohort; H-CRIC, Hispanic Chronic Renal Insufficiency Cohort; PTH, parathyroid hormone