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Medical Outcomes in African American Live Kidney Donors: A Matched Cohort Study

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It is uncertain if live kidney donation increases future risk of hypertension and kidney disease in African Americans. We conducted a cohort study across two transplant centers enrolling African Americans who donated between 1993 and 2006. A comparison group of African American nondonors were selected from healthy participants in the Coronary Artery Risk Development in Young Adults (CARDIA) prospective cohort study. A total of 103 donors and 235 matched nondonors were assessed at mean (± SD) of 6.8 ± 2.3 and 6.4 ± 2.2 years after donation or cohort entry, respectively. The primary outcome was risk of hypertension in donors at follow-up. The secondary outcomes were proportion of donors with eGFR <60 mL/min/1.73 m2 and microalbuminuria. Hypertension risk was higher in donors compared to nondonors (42/103 [40.8%] vs. 42/235 [17.9%]), absolute risk difference 22.9% (95% confidence interval 12.2–33.6%) and relative risk 2.4 (95% confidence interval 1.7–3.4). Of the 42 donors with hypertension, 22 (52.4%) were untreated. Sixteen donors (15.5%) had an eGFR <60 mL/min/1.73 m^2, 6 (5.8%) had microalbuminuria and none were on dialysis. Our retrospective study shows that live kidney donation is associated with increased risk of hypertension in African Americans and emphasizes the importance of donor follow-up.

Key words: African American, hypertension, kidney function, live kidney donors, race

Abbreviation: CARDIA, Coronary Artery Risk Development in Young Adults.

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Introduction

Kidney transplantation, particularly from a living donor, is the preferred treatment for patients with end stage kidney failure (1). The shortage of deceased donor kidneys for transplantation and the superior results achieved with living donor kidney transplantation has resulted in marked increase in the number of live donor kidney transplants performed world-wide (2,3). Live kidney donation is acceptable on the premise that the procedure carries minimal surgical and long-term medical risks to the donor. These risks are offset by personal satisfaction and improvement in recipient health. The immediate morbidity and mortality associated with donor nephrectomy have been well studied and reported to be acceptably low (4–6). There have been two large studies from the United States reporting that the long-term survival of live kidney donors is similar to those in the general population. While one study had less than 1% nonwhite donors (7), the other study which included 27% nonwhite donors suggested that there could be racial differences in long-term survival among donors with African American donors having slightly inferior survival than the Caucasian donors (5). However, their survival was not different than age-, sex- and comorbidity-matched African Americans from the general population. The third large study from the United States on living donors used a private insurance database to compare the prevalence of hypertension, diabetes, chronic kidney disease and end-stage kidney disease among donors by race (8). African Americans were reported to have a higher incidence of hypertension, diabetes and chronic kidney disease than Caucasian live kidney donors almost 8 years after donation, but the prevalence of these comorbidities was similar to that in the general population.

It is well known that racial differences exist in the general population with regard to development of hypertension and kidney disease, with African Americans carrying greater burden of disease than Caucasians (9–11). However, whether kidney donation further increases the risk of hypertension and kidney disease in African Americans remains uncertain. The few studies that have examined these issues are limited by either their small sample size, short duration of follow-up or lack of suitable comparison group (12–17). The outcomes of African American donors have usually been compared to general population-based estimates. While this may have been the most practical

approach, living donors go through a detailed selection process and are inherently healthier than the general population. As highlighted by others, choosing the best type of nondonors to which donors can be compared, is central to any study evaluating relative risks associated with donor nephrectomy (18). This prompted us to conduct the current study where evidence of hypertension, reduced renal function, microalbuminuria and diabetes in African American kidney donors was compared to a carefully selected group of African American nondonors who would have been likely accepted as live kidney donors at most transplant centers.

Methods

Design and setting

We conducted a cohort study retrospectively enrolling subjects who had donated a kidney between 1993 and 2006 at one of two transplant centers in Detroit, Michigan (Detroit Medical Center and Henry Ford Hospital). The study protocol was approved by the Institutional Review Board at both sites (approval numbers 015907MP4F and 5901 respectively). The primary and secondary study outcomes were prespecified. The reporting of this study follows guidelines set out for observational studies (19).

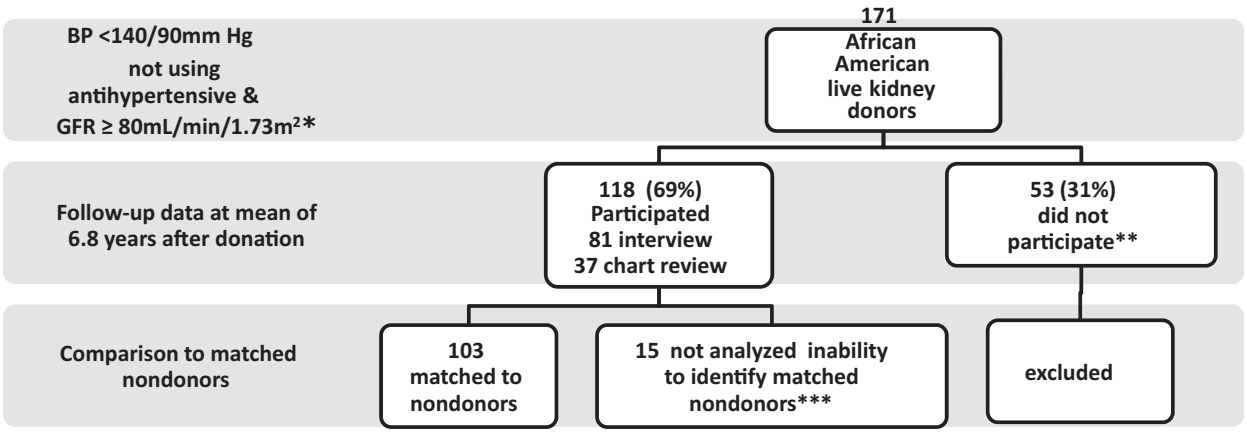
Patients

Donors: A total of 171 African American live kidney donors with a blood pressure <140/90 mmHg (average of three readings), not using antihypertensive medications, fasting blood sugar less than 126 mg/dL, not using antihyperglycemic agents and an estimated glomerular filtration rate (GFR) $\geq$80 mL/min/1.73 m^2 at the time of donation, were invited to participate in the study. The race determination was based on 'self-declaration'. Predonation GFR was estimated using the Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) formula (20,21). Of these, 118 (69%) donors agreed to participate in this follow-up study. Of the 53 (31%) that did not participate, 9 (17%) refused, 32 (60%) were unable to be contacted and 12 (33%) could not come for in-person interview and had no recent medical follow-up or records (Figure 1).

Of the 118 donors that agreed to participate, 81 (69%) donors came to the study site for an interview and the rest gave us permission to obtain recent medical records (latter described below).

All participants who came in-person were asked to refrain from smoking, exercising and eating at least 8 h prior to the visit. They answered a health questionnaire and had their weight and height measured. Their blood pressure was measured in accordance with JNC 7 (22) guidelines on three occasions and mean values were recorded. Blood and urine specimens from all participants were collected and stored at −70°C. Upon completion of the study, these samples were sent to a single laboratory for measurement of serum creatinine, blood sugar, urine albumin and urine creatinine to minimize inter- and intralaboratory variability in the measurements. Creatinine determinations were calibrated in accordance with the CKD-EPI guidelines (21). The postdonation GFR was estimated using the CKD-EPI equation (eGFR) on a single serum creatinine measurement. The urinary albumin excretion rate was estimated using the albumin to creatinine ratio expressed as μg of albumin to mg of creatinine in a single random spot urine sample. Donors who came in for the study visit were offered an option of measuring their kidney function via the abbreviated nonradiolabeled iothalamate clearance (iGFR). This method correlates very well with GFR measured via ^{125}I-labeled-iothalamate (23). Thirty-four donors agreed and their timed plasma and urine samples were sent to a reference laboratory for GFR measurement.

The 37 donors (31%) were not able to come for a personal interview, consented for chart review. Their most recent height, weight, blood pressure, kidney function, fasting blood sugar, urinalysis and medication use were obtained by reviewing records from their primary care physician's office (all but five within one year of the follow-up date). We presumed that the blood pressure measurements in such a clinic setting would be performed in accordance with clinical practice guidelines.



*GFR was estimated using the Chronic Kidney Disease Epidemiology Collaboration equation
** 9 (17%) refused, 32 (60%) unable to contact, 12 (33%) could not come for in-person interview but had no recent medical follow-up or records
***15 donors could not be matched due older donor age and/or follow-up time > 12 years

Figure 1: Donor selection chart.

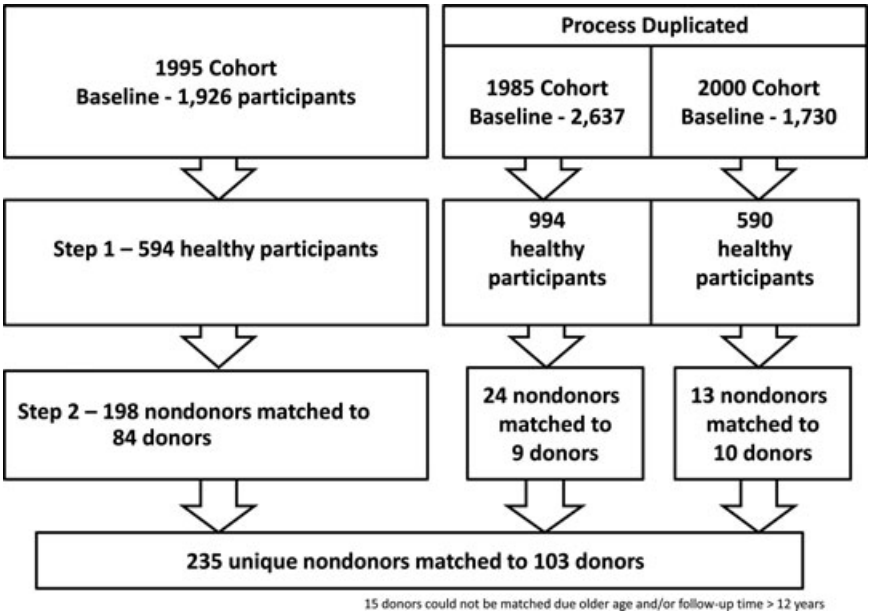


Figure 2: Selection of nondonors from CARDIA cohort.

Nondonors: A comparison group of African American nondonors was selected from the Coronary Artery Risk Development in Young Adults (CARDIA) cohort study (fully detailed elsewhere [24]). In brief, the study, initiated in 1985, enrolled 2637 African Americans aged 18–30 years to examine the etiology and natural history of cardiovascular disease. The participants were examined at baseline and prospectively at 5 years intervals, with follow-up data available as of 2005. At each visit, the participants answered a detailed questionnaire regarding their medical history. Their height, weight and blood pressure (in accordance with JNC 7 (22) guidelines) were measured. Blood pressure was checked three times by trained personnel and the mean values were recorded. Blood and urine specimens were collected at prespecified intervals and were processed by a single laboratory (25).

We used techniques of restriction and matching to select a healthy comparison group of nondonors from the CARDIA cohort. In order to be contemporary with the age of donors (interquartile range: 30–42 years), visits from the CARDIA year 10 exam (1995) was first used for the baseline assessment (range of participant age was 28–40 years). The first step restricted the sample to healthy participants and the criteria for selection were based on current practices for donor acceptance (26), i.e. blood pressure <140/90 mmHg, fasting blood sugars <126 mg/dL, absence of antihypertensive and diabetic medications, GFR ≥80 mL/min/1.73 m^2 via CKD-EPI, negative urinalysis and body mass index (BMI) <35 kg/m^2. Additional exclusion criteria were a history of heart, liver or kidney disease, cancer or current pregnancy. After reviewing records of 1926 participants, only 594 (31%) of CARDIA participants fulfilled our restriction criteria to be considered suitable for live kidney donation. The second step consisted of finding matched nondonors to the donors with regard to age (within five years), gender, systolic blood pressure (within 5 mmHg) and duration of follow-up (within 2 years). We used nearest neighbor (greedy algorithm, [27]) matching without replacement with a maximum matching ratio of 3:1. As a result 198 nondonors were initially matched to 84 donors. There were 34 donors that lacked matched nondonors (9 were younger than 25 years, 21 were older than 45 years and 9 had donated more than 10 years ago and therefore did not match with regard to follow-up). In order to find matched nondonor controls for younger and older donors, visits from the CARDIA year 0 exam (1985, participant age ranged from 18 to 30 years) and the year 15 exam (2000, participant age ranged 33–45 years) were used respectively for baseline assessment. Please refer to (Supplement S1 and S2) for illustration of the methods and algorithm described above. At the end, 235 nondonors were successfully matched to 103 donors (Figure 2). Fifteen donors were excluded from the main analyses due to an inability to identify matched nondonors primarily due to old age (>50 years) and long duration of follow-up (>12 years). The date of baseline assessment served as the start date of follow-up for the nondonors.

Outcomes

The primary outcome was the risk of hypertension in donors compared to nondonors at follow-up, defined by a systolic blood pressure ≥140 mmHg, a diastolic blood pressure ≥90 mmHg, or the use of antihypertensive medications. We also examined the following secondary outcomes at follow-up: (1) systolic and diastolic blood pressure in mmHg regardless of antihypertensive agent use, (2) renal function assessed by eGFR, proportion with eGFR < 60 mL/min/1.73 m^2 and the proportion with eGFR <45 mL/min/1.73 m^2, (3) albuminuria assessed by urinary albumin excretion, and the proportion with microalbuminuria, and macroalbuminuria and (4) the presence of diabetes mellitus. Microalbuminuria was defined as value of 20–200 μg/mg in men and 30–300 μg/mg in women (SI units: 2.3–22.6 mg/mmol in men; 3.4–33.9 mg/μmol in women) (28). Macroalbuminuria defined as >200 μg/mg in men and >300 μg/mg in women. Diabetes was defined as fasting blood sugar of ≥126 mg/dL (7 μmol/L) or the use of antihyperglycemic agent (29). We considered the predonation or baseline assessment (which depended on the year of selection) as time zero (i.e. start of follow-up) for the donors and nondonors respectively. The two groups were assessed for outcomes at follow-up.

Statistical analysis

We assessed differences in baseline characteristics between participant and nonparticipant donors via independent samples t-tests or Fisher's exact tests as appropriate. The donor sample size was determined by the number of available eligible donors. We decided to find matched controls in at least 3:1 ratio, as there is only a minimal gain in power when matching ratio goes above 3 or 4 (30). Each control was only used once to avoid correlated measurements. We used the Poisson regression model with robust error variance (modified Poisson regression) to determine the relative risk of hypertension after donation (31). The signed rank test and conditional

logistic regression were used, as appropriate, to compare blood pressure, renal function, urinary albumin excretion and presence of diabetes between the donors and nondonors. All tests of statistical significance were two-tailed tests, and we interpreted a $\alpha \leq 0.05$ as statistically significant. We used SAS v 9.2 (SAS Institute Inc., Cary, NC, USA) to perform the analyses.

Results

The predonation characteristics of donors that did and did not participate in the study were similar including socioeconomic variables and family history of hypertension (Supplement S3). The donors that did not participate in the study were more likely to be a first degree relative of the kidney transplant recipient (88% vs. 72%; $p = 0.05$).

Of the 118 donors, 103 had a suitable matched nondonor control and were considered for further analysis. Table 1 shows comparison of the baseline characteristics of the donors that were included in subsequent analyses and the donors that did not participate in the study. Again, the two groups were similar on most of the baseline characteristics except for their relationship to the recipient. The nonparticipant donors were more likely to be a first degree relative of the kidney transplant recipient (88% vs. 70%; $p = 0.03$).

The baseline characteristics of 103 donors and 235 matched nondonors are summarized in Table 2. The groups were very well matched on all characteristics except that donors had a lower eGFR than nondonors (109 ± 20 vs. 115 ± 10 mL/min/1.73 m^2) and were less likely to have medical insurance (72% vs. 85%). The donors and nondonors were assessed at a mean of 6.8 ± 2.3 years (interquartile range: 5.2–7.9 years) and 6.4 ± 2.2 years (interquartile range: 5.0–9.3 years) after donation or cohort entry respectively. The weight gain from baseline to follow-up was not different between the donors and nondonors (5.1 ± 17 vs. 6 ± 5 kg; $p = 0.73$).

Table 1: Comparison of predonation characteristics of the donors that did not participate in the study and the donors that were analyzed for outcomes

	Nonparticipant donors (n = 53)	Donors (n = 103)	p-Value
Age (years)	35 (8)	35 (8)	0.48
Female gender, (%)	57	63	0.43
Body-mass index (kg/m^2)	30 (7)	28 (5)	0.50
Systolic blood pressure (mmHg)	119 (13)	117 (10)	0.58
Diastolic blood pressure (mm Hg)	74 (8)	72 (8)	0.60
Fasting blood sugars (mg/dL)	84 (22)	81 (13)	0.01
Serum creatinine (mg/dL)	0.9 (0.2)	0.9 (0.2)	0.80
GFR (mL/min/1.73 m^2)	108 (21)	109 (20)	0.80
Medical insurance (yes), %	71	72	0.99
Education, %			0.96
0–8 grade	0	2	
9–11 grade	8	6	
High school	31	32	
Some college	37	34	
Bachelors	20	22	
Postgraduate	4	3	
Income,%			0.31
<12.5 K	14	13	
12.5–25 K	26	16	
>25 K	60	71	
Employment (yes), %	84	88	0.61
Family history of hypertension (yes), %	67	64	0.86
First degree relative of the recipient (yes), %	88	70	0.03

Data are reported as mean (standard deviation) unless stated otherwise.

To convert serum creatinine from mg/dL to umol/L, multiply by 88.4.

GFR—estimated glomerular filtration rate via the Chronic Kidney Disease Epidemiology (CKD-EPI) Collaboration equation.

Primary outcome

At follow-up 42 (40.8%) donors were noted to be hypertensive. Of the 70 donors that came in person for the study visit, 29 (41.4%) were hypertensive while of the 33 donors on whom follow-up information was gathered via chart review 13 (39.4%) were hypertensive. The proportion of donors who were hypertensive did not differ by type of follow-up ($p = 0.84$). The prevalence of hypertension was higher in the donors compared to the nondonors (42/103 [40.8%] vs. 42/235 [17.9%]; $p < 0.001$), and the absolute difference in risk between the two groups was 22.9% (95% confidence interval 12.2–33.6%). The relative risk of hypertension (2.3, 95% confidence interval 1.6–3.3) was not meaningfully reduced after adjusting for baseline differences in medical insurance and eGFR between the two groups (2.4, 95% confidence interval 1.7–3.4). Of the 42 donors with hypertension, 22 (52.4%) were without treatment, while another 7 (16.7%) had inadequately controlled blood pressure on medication, i.e. systolic blood pressure ≥140 and/or diastolic blood pressure ≥90 mmHg. Of the 42 nondonors with hypertension, 26 (61.9%) were without treatment, while another 6 (14.3%) had inadequately controlled blood pressure on medication. Six of the 103 donors (5.8%) and 12 of the 235 nondonors (5.1%) had stage II hypertension, i.e. systolic blood pressure ≥160 and/or diastolic blood pressure ≥100 mmHg at follow-up. Of the 15 donors that were not included in the analyses due to the lack of suitable matched nondonor controls, 8 were hypertensive (53.3%).

Secondary outcomes

Disregarding any antihypertensive medication use, both the systolic and diastolic blood pressure levels were higher in donors compared to nondonors (125 ± 15 vs.

Table 2: Baseline characteristics of donors and matched nondonors

	Donors (n = 103)	Nondonors (n = 235)
Age (years)	35(8)	34(6)
Female gender, (%)	63	63
Weight (kg)	82.4(17)	83.4(19)
Body mass index (kg/m^2)	28(5)	29(4)
Systolic blood pressure (mm Hg)	117(10)	115(10)
Diastolic blood pressure (mm Hg)	72(8)	74(7)
Fasting blood sugar (mg/dL)	81(13)	88(6)
Serum creatinine (mg/dL)	0.9(0.2)	0.9(0.1)
GFR (mL/min/1.73 m^2)	109(20)	115(10)
Medical insurance (yes), %	72	85
Education, %		
0–8 grade	2	0
9–11 grade	6	7
High school	32	28
Some college	34	36
Bachelors	22	25
Postgraduate	3	5
Income,%		
<12.5 K	13	14
12.5–25 K	16	21
>25 K	71	75
Employment (yes), %	88	89
Family history of hypertension (yes), %	64	62
Follow-up time (years)	6.8(2.3)	6.4(2.2)

Data reported as mean (standard deviation).
To convert weight from kg to lbs, multiply by 2.2.
To convert serum creatinine from mg/dL to umol/L, multiply by 88.
GFR—estimated glomerular filtration rate via the Chronic Kidney Disease Epidemiology Collaboration equation.

118 ± 14 mmHg; $p < 0.001$ and 80 ± 11 vs. 77 ± 11 mmHg; $p = 0.005$).

As expected, after the removal of one kidney, the average serum creatinine increased in the donors from 0.9 ± 0.2 to 1.2 ± 0.3 mg/dL and, correspondingly, the average eGFR fell from 109 ± 20 to 77 ± 19 mL/min/1.73 m^2. In nondonors, both serum creatinine and eGFR remained stable at 0.9 ± 0.2 mg/dL and 109 ± 17 mL/min/1.73 m^2, respectively. The number (proportion) of donors with an eGFR < 60 and < 45 mL/min/1.73 m^2 was 16 (15.5%) and 6 (6%), respectively. None of the donors had an eGFR < 30 mL/min/1.73 m^2. None of the nondonors had an eGFR <60 mL/min/1.73 m^2. Of the 16 donors with an eGFR < 60 mL/min/1.73 m^2, 8 (50%) demonstrated concurrent hypertension. Of the 34 donors who agreed to undergo iothalamate GFR measurement, 6 (17.6%) and 3 (8.8%) had an iGFR <60 and < 45 mL/min/1.73 m^2 respectively.

The mean urinary albumin excretion rate was higher in donors than nondonors (15 ± 41 vs. 7 ± 11 μg/mg; $p = 0.06$), but in most cases remained within normal limits. The incidence of microalbuminuria was not different between the two groups (6 [5.8%] vs. 9 [3.8%]; $p = 0.30$). One donor developed macroalbuminuria with an absolute value of 290 μg/mg.

Evidence of diabetes was low and not different between the two groups (2 [1.9%] donors vs. 4 [1.7%] nondonors; $p = 0.33$).

Discussion

Our study shows that live kidney donation is associated with increased risk of hypertension in African Americans. At an average of 6 years after donation, 42% of the donors developed hypertension, and in absolute terms, one in five more donors (22.9%) demonstrated hypertension compared to healthy matched nondonors. In relative terms, the risk was about twofold higher in comparison with healthy matched nondonors. Half the donors who developed hypertension were not on treatment.

The prevalence of hypertension in our cohort (42% at 6 years) was similar to that reported in the study by Nogueira et al. (12) which was restricted to African American live kidney donors, but higher than that reported in Caucasian kidney donors (32.1% at 12 years after donation) (7). We report a twofold higher risk of hypertension in African American live donors than carefully selected and matched African American nondonors. This finding is not in line with the study by Lentine et al. (8) where age-, gender- and race-matched population estimates were used to determine the risk of hypertension in the donors. In the absence of baseline screening for normal blood pressure, the prevalence of hypertension in the controls was higher than that observed in our cohort. In addition to the differences in selection of the controls, the two studies differed in their selection of the donors and method of ascertaining a diagnosis of hypertension. Lentine et al. (8) limited their study to donors that were enrolled with a national private medical insurer. A third of our donors lacked insurance and it is well known that donors without medical insurance are less likely to seek follow-up care after live kidney donation (32). In contrast to our study where the blood pressure was actually measured and the diagnosis of hypertension was made based on standardized criterion, the ascertainment of hypertension in the study by Lentine et al. (8) was based on billing claims generated by physician or pharmacy. The accuracy of the estimated prevalence of hypertension is dependent on proportion of donors that were seeking medical care. The median duration of insurance coverage in the study was only 2 years, resulting in a narrow window of opportunity to capture the diagnosis. In our study half of the donors were not seeing a primary care physician since donation and therefore relying only on physician or pharmacy billing could underestimate the true incidence of hypertension. Many donors in our study were aware of their hypertension only through the study visit.

The lack of treatment in half of the hypertensive donors and suboptimal blood pressure control in a third of donors on antihypertensive medications are both concerning. However, they appear to be a population-based problem, as these issues occurred with similar frequency in our cohort of donors and nondonors. This emphasizes the need for better access/utilization of primary care services for both donors and nondonors to prevent cardiovascular disease. Reassuringly, only 5% of the donors and nondonors had stage II hypertension.

Renal function, as assessed by eGFR, decreased from predonation mean of 109 ± 20 to 77 ± 19 mL/min/1.73 m^2, well within anticipated range of 70–75% of the predonation value. Around 84% of donors in our study cohort had an eGFR > 60 mL/min/1.73 m^2 at follow-up which is similar to that reported in African American (82%) and Caucasian live kidney donors (85%) (7,12). When GFR was estimated via the African American Study of Hypertension and Kidney Disease study equation (33) the proportion of donors with GFR > 60 mL/min/1.73 m^2 was 90.3%. The proportion of patients with reduced renal function was similar in those who underwent more rigorous GFR measurement. None of the donors had developed end-stage kidney disease. The occurrence of microalbuminuria was low and not different than nondonors, and was lower than that reported in the literature (7,12,34). The absence of significant urinary albumin excretion makes a case against progressive damage from hyperfiltration but rather suggests that low eGFR postdonation may primarily reflect loss of renal mass at a single point in time.

The strength of our study lies in the careful selection and matching of nondonor controls. Over two-thirds of CARDIA participants were excluded, illustrating the potential bias with use of population-based estimates. The donors and matched nondonors were very similar with regard to baseline and socioeconomic parameters. The blood pressure measurements in both groups were performed in accordance with JNC 7 guidelines. The use of a central laboratory with simultaneous testing of all samples minimized errors in the reporting of serum creatinine. We verified postdonation GFR values using an accurate measurement in a subset of our donors. Finally, this study focuses on African American live kidney donors that were eligible to donate by current guidelines with applicable results to modern practice.

The major limitations are the retrospective study design and modest ascertainment rate. We were able to gather follow-up data on 69% of the donors which is a substantial improvement over the 36% reported in the study by Nogueira et al. (12). Reassuringly, most of the predonation characteristics of participant and nonparticipant donors were not meaningfully different, minimizing the risk of selection bias. Of the 118 who agreed to participate, 81 (69%) came for a personal interview, which is again better than the 14.3% of participants with a site visit for GFR measurement in the study by Ibrahim et al. (7). The retrospective study design, low-ascertainment rate, and lack of in-person visits have been the Achilles heel for all US studies that have evaluated long-term outcomes in live kidney donors. Although the family history of hypertension was similar between donors and nondonors, they differed in the family history of end-stage kidney disease. The higher risk of hypertension that was observed in our study could be a reflection of familial/genetic tendency that the donor shared with their related recipients. The results of our study should be verified by a prospective study, controlling family history of end-stage kidney disease. Instead of only using self-reported race as a risk factor for the development of hypertension, information on the presence of risk alleles like APOL1 variants could also be collected to improve risk stratification (35). Lastly, the nondonors in our study were active participants of a formal study which could increase their awareness to health problems and in turn influence their lifestyle choices and eventually their study outcomes. However, the magnitude of this impact on behavior of nondonors would be hard to quantify, especially when the study spans over 20 years. On the other hand, the donors are also advised to follow a healthier life-style, including regular visits to their primary care physician.

Hypertension is a treatable condition and 95% of the donors had stage 1 hypertension. Optimal blood pressure control is important in preventing kidney and cardiovascular disease. The result of our study supports the current policy of careful donor selection and emphasizes the need for donor counseling with regard to importance of long-term follow-up after donation. The results also bring up the issue as to whether individuals without medical insurance should be considered eligible for live kidney donation due to concerns that they may be at risk of inadequate follow-up to maintain good health. Donor protections are clearly needed in this regard. For donors lacking insurance, policies that reimburse donors for out of pocket hypertension-related expenses should also be considered (36).

Conclusion

The data from our retrospective study demonstrates that live kidney donation is associated with increased risk of hypertension in African Americans. There are limitations to the study design and the findings should be verified by a rigorously conducted prospective study. Nonetheless, at this time results of the current study should not dissuade African Americans from being a live kidney donor, but does raise awareness about the importance of donor follow-up. In our study half of the donors were untreated for elevated blood pressure, which may serve as a call to action to monitor past and future donors for hypertension and provide prompt treatment to prevent cardiovascular and renal complications. Reassuringly, the renal function of African American donors appears to be preserved and similar to that reported in Caucasian live kidney donors.

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Disclosure

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Supporting Information

Additional Supporting Information may be found in the online version of this article:

Supporting S1: Follow-up for CARDIA cohort by exam years.

Supporting S2: Matching nondonors to donors.

Supporting S3: Comparison of predonation characteristics of the donors that did and did participate in the study.

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