Racial Differences in Medication Utilization for Secondary Prevention of Cardiovascular Disease in Kidney Transplant Recipients: A Post Hoc Analysis of the FAVORIT (Folic Acid for Vascular Outcome Reduction in Transplantation) Trial Cohort

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Racial Differences in Medication Utilization for Secondary Prevention of Cardiovascular Disease in Kidney Transplant Recipients: A Post Hoc Analysis of the FAVORIT (Folic Acid for Vascular Outcome Reduction in Transplantation) Trial Cohort

Mohammad Kazem Fallahzadeh, MD, MAS1,2; Elaine Ku, MD, MAS1,3; Chi D. Chu, MD, MAS1; Charles E. McCulloch, PhD3; Delphine S. Tuot, MDCM, MAS1

Complete author and article information provided before references.
Abstract

Rationale & Objective: Black kidney transplant recipients have higher prevalence of cardiovascular disease (CVD) risk factors and less intensive risk factor control compared to White kidney transplant recipients. Our objective was to evaluate racial disparities in receipt of statins and aspirin for secondary CVD prevention among kidney transplant recipients in the Folic Acid for Vascular Outcome Reduction in Transplantation (FAVORIT) trial.

Study Design: Cohort study.

Setting & Participants: FAVORIT participants of White, Black and Other race from the U.S. and Canada with a history of CVD at study entry or who experienced a nonfatal CVD event during follow-up.

Predictor: Race.

Outcome: Receipt of statins and aspirin for secondary CVD prevention.

Analytical Approach: We used parametric (Weibull), proportional hazards, interval-censored survival models to evaluate the independent association of race with receipt of statins and aspirin for secondary CVD prevention.

Results: Of the 4110 kidney transplant recipients enrolled in FAVORIT, 978 met the inclusion criteria (78% White, 17% Black, 6% Other race). Compared with White race, Black and Other race were associated with a lower hazard of receiving statins (Black: adjusted Hazard Ratio 0.76, 95% CI: 0.60-0.97; Other: 0.87, 0.60-1.27) and aspirin (Black: 0.85, 0.67-1.08; Other: 0.63, 0.43-0.94).

Limitations: Lack of granular information on potential indications or contraindications for aspirin or statin use for secondary CVD prevention.
**Conclusions:** Post-hoc findings from FAVORIT demonstrated that Black race was associated with lower likelihood of receiving statins, and Other race with lower likelihood of receiving aspirin for secondary CVD prevention. This represents a potential target to improve CVD care in non-White kidney transplant recipients.

**Index Words:** Platelet Aggregation Inhibitors, Healthcare Inequality, Heart Disease, Hydroxymethylglutaryl-CoA Reductase Inhibitors, Renal Transplantation.

**Plan language summary**

Black kidney transplant recipients have higher prevalence of cardiovascular disease (CVD) risk factors and less intensive risk factor control compared to White kidney transplant recipients. We conducted this study to evaluate racial disparities in receipt of statins and aspirin for secondary CVD prevention among 978 kidney transplant recipients with history of CVD. Our study showed that Black kidney transplant recipients were less likely to receive statin and Other race kidney transplant recipients were less likely to receive aspirin for secondary CVD prevention, compared with White kidney transplant recipients. Equitable prescription of aspirin and statin for secondary CVD prevention represents an important potential target to improve CVD care among non-white kidney transplant recipients.
Introduction

Kidney transplantation is the optimal treatment for individuals with kidney failure and substantially improves quality of life and decreases early mortality compared to dialysis.\(^1\) Cardiovascular disease (CVD) is the most common cause of death with a functioning graft among kidney transplant recipients.\(^2,3\) The high risk of CVD in kidney transplant recipients is multifactorial and includes non-modifiable risk factors such as age and family history, as well as modifiable risk factors such as hypertension, dyslipidemia, obesity, diabetes mellitus, and immunosuppression. Many kidney transplant recipients do not receive guideline-concordant CVD care after transplant to manage these modifiable factors, with some studies suggesting only a small portion of prevalent kidney transplant recipients receive optimal CVD management.\(^4-6\)

Compared to White kidney transplant recipients, Black kidney transplant recipients have a greater burden of comorbid conditions at time of transplant including CVD and CVD risk factors such as hypertension, diabetes, and dyslipidemia.\(^7-10\) Furthermore, single-center observational studies and one larger study from the Veterans Affairs (VA) Healthcare System have shown that Black kidney transplant recipients have worse control of these CVD risk factors after transplant.\(^6,8-10\) Preventive care to mitigate CVD risk may thus be of particular importance among Black kidney transplant recipients to improve health outcomes. In this study, we examined receipt of statins and aspirin for secondary prevention of CVD by race in kidney transplant recipients enrolled in the FAVORIT trial. We specifically looked at secondary prevention of CVD because at the time FAVORIT was conducted (2002-2009), primary CVD prevention with statins and
aspirin in kidney transplant recipients was controversial and not universally recommended. The Kidney Disease Improving Global Outcomes (KDIGO) Clinical Practice Guideline for Lipid Management in Chronic Kidney Disease published in 2013 was the first guideline that suggested treating all adult kidney transplant recipients with a statin.11 There continues to be no recommendation regarding aspirin use for primary CVD prevention in kidney transplant recipients.12 Although secondary CVD prevention with statins and aspirin has not been well-studied in kidney transplant recipients, the benefits of the secondary CVD prevention with these medications have been long well-established in the general population.13 Given that kidney transplant recipients are at higher risk for CVD than general population,11,14 secondary prevention of CVD with statins and aspirin in kidney transplant recipients is critically important and is the focus of our study. While the FAVORIT clinical trial was completed over a decade ago, our results could identify missed opportunities to improve health outcomes among non-White kidney transplant recipients and encourage more examination of this aspect of modern CVD care delivery.

Methods

We conducted a post hoc analysis of the FAVORIT trial, a study testing folate supplementation for CVD prevention among kidney transplant recipients. Details of FAVORIT design have previously been described.15 Kidney transplant recipients were enrolled in FAVORIT from 30 clinical sites (27 in the United States, 2 in Canada, and 1 in Brazil) from 2002 to 2007; follow-up concluded in 2009. Enrolled kidney transplant recipients were 35-75 years old with functioning allografts who were at least 6 months post-transplant. Written informed consent was obtained from all participants. FAVORIT
did not show statistically significant differences in graft loss or all-cause mortality between the treatment groups.\textsuperscript{16} Therefore, for this post-hoc analysis, we combined the data from both treatment groups and treated this as a cohort study. FAVORIT participants were followed by alternating telephone and in-person clinic visits every 6 months to ascertain study outcomes, including CVD events. Medications were self-reported by participants at each follow up visit. Follow-up ended with death, loss to follow up, or trial conclusion on 6/24/2009.

\textit{Study population}

To identify individuals who would be eligible for statin and aspirin prescription for secondary prevention of CVD, we assembled two analytic cohorts, one for analysis of statin initiation, and one for analysis of aspirin initiation. Each cohort included FAVORIT trial participants from the US and Canada who had CVD at study entry, and participants without a history of CVD at baseline who experienced a nonfatal CVD event during follow up. We excluded kidney transplant recipients from Brazil as racial differences in presence of modifiable CVD risk factors has been documented primarily in North America.\textsuperscript{7–10} Baseline CVD was self-reported or extracted from medical records and was defined as history of myocardial infarction, coronary artery revascularization, stroke, aortic aneurysm repair, lower extremity arterial revascularization, or amputation above the ankle. Nonfatal CVD during follow-up was defined as myocardial infarction, resuscitated sudden death, stroke, coronary artery revascularization, or peripheral, carotid, aortic or renal artery procedures, as previously defined by FAVORIT.\textsuperscript{17}

\textit{Study Variables}
The primary predictor was self-reported race, categorized as White, Black, and Other, which included Asian, Mixed, Native Hawaiian/Pacific Islander, and American Indian/Alaska Native race. Primary outcomes were aspirin and statin use. Medication use was ascertained through self-report, and review of participant medication lists and container labels during baseline and follow-up study visits. If a medication was ascertained to be used based on any of these 3 sources, that medication was recorded as being used. Ethnicity was self-reported and recorded as Hispanic or not Hispanic. Sources of medical history included the patients themselves, the patients’ families, and the patients’ medical records. Documentation from participants’ transplant clinic charts superseded any information provided by verbal report. Seated blood pressure was measured twice at 5-10 minute intervals in each clinic visit; we report the average blood pressure at the baseline study visit. Estimated glomerular filtration rate was calculated using the Chronic Kidney Disease-Epidemiology Collaboration (CKD-EPI) equation.

Statistical analysis

Baseline demographic and clinical characteristics were compared by race using chi-square, ANOVA, and Kruskal–Wallis H tests. Our goal was to compare time to initiation of secondary preventive care following development of CVD; however, many participants had prevalent CVD at the time of enrollment. To account for the uncertainty in the time of onset of CVD among these patients, we used an interval censored approach that allowed us to improve power by combining patients having prevalent CVD at enrollment with those developing incident CVD during the follow up period. We used a parametric survival model (Weibull) to accommodate interval censoring. Goodness of fit for survival models was assessed graphically using Cox-Snell residual plots. The time
scale in our study was years from first CVD event. When CVD was present at the time of FAVORIT enrollment, we treated CVD onset as occurring in the interval between age 30 and age at enrollment, given that CVD is rare before the age of 30 among patients with kidney failure. For participants who had incident CVD onset during follow up, time-to-event is either known (if medication was initiated in a later follow up) or right-censored (if medication was not initiated during follow up), corresponding to definitions in conventional survival analysis. Time-to-event definitions for our interval censored survival analysis are shown in Table S1. As a sensitivity analysis, we repeated our analyses excluding participants with prevalent CVD at baseline.

All models were adjusted for age, sex, ethnicity, country of enrollment (U.S. or Canada), and graft vintage. In addition, we controlled for baseline cyclosporin use in the model assessing statin use due to potential clinician concern for drug-drug interaction between cyclosporin and statins. In aspirin model, we also controlled for baseline use of non-aspirin anti-platelet agents (e.g., clopidogrel), and for baseline anticoagulation use (e.g., warfarin). We performed a sensitivity analysis to account for variation in prescription patterns by transplant center by calculating cluster robust standard errors and including them in the model.

Study data were obtained from the National Institute of Diabetes and Digestive and Kidney Diseases Central Repository in de-identified form. The University of California, San Francisco Institutional Review Board considers this study not human subjects research. All analyses were performed using Stata version 16.1 (Stata Corp, College Station, TX, US).

**Results**
Of the 4110 kidney transplant recipients enrolled in FAVORIT, 978 (759 [78%] White, 162 [17%] Black, 57 [6%] Other race) met study inclusion criteria; 722 (74%) had baseline CVD, and 256 (26%) had no CVD at enrollment and developed nonfatal CVD during follow-up (Figure 1). Baseline characteristics for this population at the time of enrollment are shown in Table 1. Compared to White participants, Black participants were more likely to be female and to be from the US (p<0.001 for both comparisons). Nearly 95% of participants had hypertension, but individuals of Black and Other race had higher prevalence of diabetes compared to White participants. Median estimated glomerular filtration rate was not different between different racial groups. However, individuals of Black race had higher urine albumin/creatinine ratio levels compared to their White and Other race counterparts.

Among the 978 participants with CVD at baseline or during follow-up, 222 (23%) and 217 (22%) individuals were excluded from statin and aspirin analytic cohorts, respectively (Figure 1). Baseline characteristics of the population included in each model at the time of enrollment are shown in Tables S2 and S3. The main reason for exclusion was receiving statin or aspirin at baseline without history of CVD or being started on statin or aspirin during follow-up before developing CVD. Racial distribution of patients included and excluded from, the two analytic cohorts were similar (Table S4).

Among 756 kidney transplant recipients included in the final statin analytic cohort, 453 (60%) had CVD and were on statin at the time of enrollment, and 140 (19%) initiated statin during follow-up. In total 593 (78%) patients included in the statin model received statin. As shown in Figure 2, the prevalence of statin use differed by race, with 471 (81%) of White participants, 88 (69%) of Black participants, and 34 (77%) of Other race
participants reporting statin use (p=0.01). Black race was independently associated with a significantly lower adjusted hazard of receiving a statin for secondary CVD prevention compared with White race (aHR=0.76, 95% CI: 0.60-0.97). Other race was associated with a statistically non-significant lower hazard of receiving statin compared with White race (aHR=0.87, 95% CI: 0.60-1.27) (Table 2).

Among 761 kidney transplant recipients included in the final aspirin analytic cohort, 458 (60%) had CVD and were on aspirin at the time of enrollment, and 120 (16%) initiated aspirin during follow-up. In total 578 (76%) patients included in the aspirin model received aspirin including 460 (79%) of White participants, 89 (68%) of Black participants, and 29 (66%) of Other race (p=0.01; Figure 2). While Black race was associated with a lower hazard of receiving aspirin compared with White race, results did not achieve statistical significance (aHR=0.85, 95% CI: 0.67-1.08). Other race was associated with a statistically significant lower hazard of receiving aspirin compared with White race (aHR=0.63, 95% CI: 0.43-0.94) (Table 3). The residual plots (Figures S1 and S2) showed good agreement with the assumed Weibull model, with discrepancies only in the longest times, where there is little data, and the plots are imprecise.

There was variation between different transplant centers in terms of percentage of patients who received statin and aspirin for secondary CVD prevention. Statin use ranged from 50% to 100% (median: 79.2%, IQR: 71.4%-92.3%). Aspirin use ranged from 50% to 100% (median: 80.9%, IQR: 69.8%-86.5%). Results from analyses performed with cluster robust standard errors to account for variation in prescription patterns by transplant center showed similar differences in use of statins and aspirin for secondary CVD prevention by race (Table S5). When analyses were restricted to include only U.S.
participants, we found similar differences in use of statins and aspirin for secondary CVD prevention by race (Tables S6).

In a sensitivity analysis wherein participants with baseline CVD and aspirin or statin use were excluded, we found similar results to our main analyses albeit with greater uncertainty, as we would expect due to limited power (Table S7).

Discussion

Our results demonstrate that compared with White race, Black race was independently associated with a lower hazard of receiving statin, and Other race was associated with a lower hazard of receiving aspirin among kidney transplant recipients with established CVD enrolled in FAVORIT.

There are several potential reasons for less CVD medication use among participants of Black and Other race compared to their White counterparts. Clinicians may prescribe CVD medications differently by race, due to underestimation of CVD risk among racial minorities, implicit bias, or focus on non-CVD strategies like immunosuppression to maximize allograft health. This is consistent with findings from a post-hoc analysis of the Patient Outcomes in Renal Transplantation (PORT) study, which evaluated CVD risks and medications in 23,575 kidney transplant recipients from 14 centers worldwide (including some in the US and Canada). In the PORT study, Black and Asian patients had lower odds of being prescribed statins compared with White patients, and Black patients had lower odds of being prescribed anti-platelet medications compared to White patients. In a study that used Organ Procurement and Transplantation (OPTN) registry data linked to records from a US pharmaceutical claims clearinghouse to evaluate medication use at first transplant anniversary of 16,157 kidney transplant recipients,
Black race was associated with higher prevalence of antihypertensive medication use but lower prevalence of statin use in adjusted analysis.\textsuperscript{21} In a single-center cohort of 987 kidney transplant recipients in South Carolina,\textsuperscript{10} there was not a statistically significant difference in prescription of statins and β-blockers among Black versus White kidney transplant recipients when there was a compelling indication for receiving these medications. Similarly, in a study of 3139 US Veteran kidney transplant recipients, Black Veterans compared to White Veterans were more likely to be prescribed an angiotensin-converting enzyme inhibitor or β-blocker at 1, 3, and 5 years post-transplant. Moreover, there was not a statistically significant racial difference in prescription of insulin, oral hypoglycemic agents, and statins in that study.\textsuperscript{7} These studies did not differentiate between prescriptions for primary versus secondary prevention of CVD risk. Further research is needed to understand clinician prescription patterns for CVD risk reduction among non-White kidney transplant recipients.

Patient-level factors that could influence racial differences in CVD medication use include differences in social and economic factors, understanding of complicated post-transplant medication regimens, and access to social support to maximize medication adherence.\textsuperscript{22,23} Previously reported factors contributing to racial disparities in access to transplantation and post-transplant outcomes include miscommunication and mistrust between patients and clinicians, patients’ lower education and health literacy level, and lower income.\textsuperscript{24–26} While data about health literacy, education, and income are not available in FAVORIT, such factors could translate into lower utilization of CVD medications by non-White study participants, independent of clinician prescription patterns.\textsuperscript{27,28} For example, in the aforementioned VA study,\textsuperscript{7} while prescription of
angiotensin-converting enzyme inhibitors, \( \beta \)-blockers, statins, and insulin were similar or higher among Black compared to White Veterans, medication possession ratio (the percentage of time a patient has access to a medication based on refill data) was lower among Black Veterans, as was education level.

Although we found racial differences in medication use for secondary CVD risk reduction in FAVORIT kidney transplant recipients, a prior study found no differences in all-cause mortality or a composite of CVD events and CVD death between Black versus White FAVORIT participants.\(^{29}\) This apparent discrepancy could be explained by insufficient follow-up time in FAVORIT to detect racial differences in CVD mortality and morbidity, given that our study cohort included participants who developed CVD during follow up. It could also suggest that use of CVD risk reduction medications may not be as protective in kidney transplant recipients as they are in the general population. While the efficacy of statins and aspirin in secondary CVD prevention in general population is well established,\(^{13}\) the efficacy of these medications in secondary CVD prevention in kidney transplant recipients has not been well-studied. The only randomized trial evaluating the effect of statin use for dyslipidemia on CVD outcomes in kidney transplant recipients is the Assessment of LEscol in Renal Transplantation (ALERT) study, in which treatment with fluvastatin compared with placebo led to a non-statistically significant decrease in the primary composite outcome of fatal and non-fatal CVD after a mean follow-up of 5.1 years.\(^{14} \quad 30\) In a 2-year, open label extension of this study, fluvastatin led to a statistically significant reduction in fatal and non-fatal CVD. Fluvastatin was mainly used for primary prevention in this trial. All patients with history of myocardial infarction within 6 months before enrollment were excluded from ALERT.
and only a small number of enrolled patients had established history of CVD. In a post-hoc analysis of FAVORIT examining kidney transplant recipients with no known history of CVD, there was not a statistically significant difference in risk for CVD events or all cause mortality between kidney transplant recipients who were receiving aspirin for primary prevention at baseline compared with those who were not receiving aspirin.\textsuperscript{31}

Given that kidney transplant recipients are at increased risk of CVD related morbidity and mortality compared with general population, studies that explicitly examine the role of medications for secondary CVD prevention are needed to guide practice.

While other studies evaluating racial disparities in receipt of CVD medications have been cross-sectional, a strength of our study was the use of an interval censoring design to account for prevalent CVD upon enrollment in a time-to-event analysis for secondary CVD prevention. However, the results of this study must be taken in context of its limitations. The FAVORIT trial was conducted more than a decade ago. Since then, CVD has been increasingly recognized as a major cause of morbidity and mortality in kidney transplant recipients and CVD risk management in this population has intensified.\textsuperscript{12} Therefore, the descriptive results of our study may not be directly reflective of modern-day practice, and this is an important limitation of our study. However, compared to other studies that have evaluated racial disparities in CVD care in kidney transplant recipients, the advantage of FAVORIT is that it is a multi-center trial designed to study CVD in kidney transplant recipients who reported medication use during regular follow-ups. Although there is not enough contemporary data about racial disparities in CVD care in kidney transplant recipients, the reasons driving these disparities may not have changed as much over time. Understanding where there are racial differences in
CVD care delivery (i.e., primary prevention, secondary prevention, use of diagnostic testing) and the mechanisms underlying disparate care delivery is key to developing targeted interventions to mitigate these disparities. Other limitations include a small number of participants included in our final analyses and that the majority of patients (60% in both models) had a diagnosis of CVD and were on statin or aspirin at the time of enrollment, though we accounted for this uncertainty by using interval censoring. Also, lack of granular information on transplant center specific practices, side effects of aspirin and statin, and potential indications, or contraindications for their use for secondary CVD prevention poses the risk for residual confounding and limits interpretation of the results. We did not have information about clinicians’ medication prescription or patients’ adherence. Therefore, the reasons for racial differences in statin or aspirin use for secondary CVD prevention cannot be ascertained. Additionally, the diagnosis of CVD and the receipt of statins and aspirin were largely ascertained through participant self-report which is prone to recall bias or social desirability bias. However, investigator confirmation with medical records, medication lists, and bottle labels likely mitigated this potential bias. Also, our study population had a small number of patients with Hispanic ethnicity, precluding any meaningful analyses for this important minority population.

In summary, post-hoc findings from a large multicenter cohort showed that non-White kidney transplant recipients with CVD had a lower hazard of using statin and aspirin compared to their White counterparts. Since participants in research studies are often more engaged in their care and receive greater guideline-concordant care than the general population, the existence of racial disparities in CVD care delivery in FAVORIT is particularly concerning as it may underestimate the magnitude of disparities
in the general population. While over a decade old, these data highlight the importance of optimizing CVD risk reduction medications as they represent a potential target to improve CVD care in non-White kidney transplant recipients. Further research should examine modern patterns in CVD care delivery and factors contributing to racial disparities for deployment of targeted interventions.

**Supplementary Material**

**Figure S1.** Goodness of fit plot for statin model.

**Figure S2.** Goodness of fit plot for aspirin model.

**Table S1.** Definition of censoring intervals for enrolled patients.

**Table S2.** Baseline characteristics of FAVORIT study participants who were included in the statin model.

**Table S3.** Baseline characteristics of FAVORIT study participants who were included in the aspirin model.

**Table S4.** Racial distribution of patients meeting inclusion criteria who were included in and excluded from the analytic models.

**Table S5.** Results of parametric, proportional hazards, interval-censored survival model with clustering by transplant centers to evaluate the association of race with self-reported receipt of statins and aspirin in kidney transplant recipients.

**Table S6.** Results of parametric, proportional hazards, interval-censored survival model to evaluate the association of race with self-reported receipt of statins and aspirin in kidney transplant recipients enrolled in the U.S.

**Table S7.** Results of parametric, proportional hazards, interval-censored survival model to evaluate the association of race with self-reported receipt of statins and aspirin in
kidney transplant recipients after excluding patients who had baseline history of cardiovascular disease and were receiving a statin or aspirin at the time of enrollment.

*Descriptive Text for Online Delivery*

Supplementary File (PDF)

Figure S1-S2, Table S1-S7

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References:


### Table 1. Baseline characteristics of FAVORIT study patients meeting inclusion criteria.

<table>
<thead>
<tr>
<th></th>
<th>White (n=759)</th>
<th>Black (n=162)</th>
<th>Other race (n=57)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (Years)¹</td>
<td>55.5 ± 9.2</td>
<td>56.0 ± 7.8</td>
<td>56.7 ± 8.1</td>
<td>0.57</td>
</tr>
<tr>
<td>Male sex</td>
<td>555 (73.1%)</td>
<td>91 (56.2%)</td>
<td>40 (70.2%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Hispanic Ethnicity</td>
<td>14 (1.8%)</td>
<td>0 (0%)</td>
<td>10 (17.5%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Country (U.S.)</td>
<td>666 (87.8%)</td>
<td>160 (98.8%)</td>
<td>49 (86.0%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Graft Vintage (years)</td>
<td>4.41 [1.80 - 8.04]</td>
<td>2.99 [1.59 - 6.75]</td>
<td>2.49 [1.05 - 5.41]</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Follow-up duration (years)</td>
<td>3.18 [2.05 - 4.83]</td>
<td>2.95 [1.09 - 4.13]</td>
<td>2.87 [2.03 - 4.88]</td>
<td>0.01</td>
</tr>
<tr>
<td>History of diabetes</td>
<td>456 (60.1%)</td>
<td>112 (69.1%)</td>
<td>40 (70.2%)</td>
<td>0.04</td>
</tr>
<tr>
<td>History of hypertension</td>
<td>713 (93.9%)</td>
<td>157 (96.9%)</td>
<td>54 (94.7%)</td>
<td>0.33</td>
</tr>
<tr>
<td>Systolic blood pressure (mmHg)</td>
<td>136.1 ± 19.7</td>
<td>141.4 ± 20.4</td>
<td>135.7 ± 19.9</td>
<td>0.008</td>
</tr>
<tr>
<td>Diastolic blood pressure (mmHg)</td>
<td>73.8 ± 11.0</td>
<td>76.9 ± 11.5</td>
<td>75.0 ± 9.7</td>
<td>0.006</td>
</tr>
<tr>
<td>Body Mass Index (Kg/m²)</td>
<td>28.6 [25.3 - 32.8]</td>
<td>30.0 [26.9 - 35.6]</td>
<td>28.7 [25.0 - 34.0]</td>
<td>0.002</td>
</tr>
<tr>
<td>eGFR (mL/min/1.73m²)</td>
<td>43.5 [34.8 - 54.4]</td>
<td>44.7 [37.5 - 55.5]</td>
<td>45.0 [34.8 - 55.3]</td>
<td>0.25</td>
</tr>
<tr>
<td>Urinary albumin creatinine ratio (mg/g)</td>
<td>25.6 [9.6 - 117.2]</td>
<td>58.3 [14.8 - 242.2]</td>
<td>27.3 [10.7 - 106.0]</td>
<td>0.008</td>
</tr>
<tr>
<td>Immunosuppressive medications</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cyclosporin</td>
<td>402 (53.0%)</td>
<td>75 (46.3%)</td>
<td>33 (57.9%)</td>
<td>0.20</td>
</tr>
<tr>
<td>Tacrolimus</td>
<td>269 (35.4%)</td>
<td>74 (45.7%)</td>
<td>21 (36.8%)</td>
<td>0.05</td>
</tr>
<tr>
<td>Sirolimus</td>
<td>62 (8.2%)</td>
<td>13 (8.0%)</td>
<td>5 (8.8%)</td>
<td>0.98</td>
</tr>
<tr>
<td>Mycophenolate mofetil (%)</td>
<td>512 (67.5%)</td>
<td>128 (79.0%)</td>
<td>37 (64.9%)</td>
<td>0.01</td>
</tr>
<tr>
<td>Azathioprine</td>
<td>97 (12.8%)</td>
<td>15 (9.3%)</td>
<td>7 (12.3%)</td>
<td>0.46</td>
</tr>
<tr>
<td>Prednisone</td>
<td>687 (90.5%)</td>
<td>146 (90.1%)</td>
<td>48 (84.2%)</td>
<td>0.31</td>
</tr>
</tbody>
</table>

¹ Continuous data are presented as mean ± standard deviation if normally distributed, and as median [interquartile range] if not normally distributed, and categorical data are presented as n (%).
**Table 2.** Results of parametric, proportional hazards, interval-censored survival model to evaluate the association of race with self-reported receipt of statins in kidney transplant recipients.

<table>
<thead>
<tr>
<th></th>
<th>Adjusted Hazard Ratio</th>
<th>95% CI</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black Race</td>
<td>0.76</td>
<td>0.60-0.97</td>
<td>0.03</td>
</tr>
<tr>
<td>Other Race</td>
<td>0.87</td>
<td>0.60-1.27</td>
<td>0.47</td>
</tr>
<tr>
<td>Age (Year)</td>
<td>0.93</td>
<td>0.91-0.94</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Female Sex</td>
<td>1.04</td>
<td>0.86-1.26</td>
<td>0.70</td>
</tr>
<tr>
<td>Hispanic Ethnicity</td>
<td>1.24</td>
<td>0.70-2.20</td>
<td>0.47</td>
</tr>
<tr>
<td>Canada as country of residence</td>
<td>0.88</td>
<td>0.65-1.19</td>
<td>0.40</td>
</tr>
<tr>
<td>Graft vintage (Year)</td>
<td>1.02</td>
<td>1.00-1.04</td>
<td>0.08</td>
</tr>
<tr>
<td>Baseline cyclosporin use</td>
<td>1.10</td>
<td>0.93-1.32</td>
<td>0.27</td>
</tr>
</tbody>
</table>
Table 3. Results of parametric, proportional hazards, interval-censored survival model to evaluate the association of race with self-reported receipt of aspirin in kidney transplant recipients.

<table>
<thead>
<tr>
<th></th>
<th>Adjusted Hazard Ratio</th>
<th>95% CI</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black Race</td>
<td>0.85</td>
<td>0.67-1.08</td>
<td>0.18</td>
</tr>
<tr>
<td>Other Race</td>
<td>0.63</td>
<td>0.43-0.94</td>
<td>0.02</td>
</tr>
<tr>
<td>Age (Year)</td>
<td>0.94</td>
<td>0.93-0.96</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Female Sex</td>
<td>0.88</td>
<td>0.73-1.07</td>
<td>0.21</td>
</tr>
<tr>
<td>Hispanic Ethnicity</td>
<td>1.23</td>
<td>0.69-2.20</td>
<td>0.48</td>
</tr>
<tr>
<td>Canada as country of residence</td>
<td>1.20</td>
<td>0.87-1.64</td>
<td>0.27</td>
</tr>
<tr>
<td>Graft vintage (Year)</td>
<td>0.99</td>
<td>0.98-1.01</td>
<td>0.57</td>
</tr>
<tr>
<td>Baseline non-aspirin antiplatelet use</td>
<td>0.83</td>
<td>0.64-1.06</td>
<td>0.14</td>
</tr>
<tr>
<td>Baseline Anticoagulant use</td>
<td>0.62</td>
<td>0.45-0.86</td>
<td>0.004</td>
</tr>
</tbody>
</table>
Figure Legends

Figure 1. Study flow diagram.

Figure 2. Percentage of participants with different races who received statin or aspirin for secondary cardiovascular disease prevention.
FAVORIT participants: N = 4110

- From Brazil: n = 612
- No CVD at baseline and no incident nonfatal CVD at follow-up: n = 2495
- No data on presence or absence of CVD at baseline: n = 15
- No data on race: n = 10

Met inclusion criteria: n = 978
(CVD at baseline: n = 722, incident nonfatal CVD at follow-up: n = 256)

Patients included in aspirin model: n = 761

- Patients on aspirin at baseline with no history of CVD: n = 113
- Patients with no history of CVD at baseline who started on aspirin before developing CVD: n = 100
- No data on graft vintage: n = 4

Patients included in statin model: n = 756

- Patients on statin at baseline with no history of CVD: n = 136
- Patients with no history of CVD at baseline who started on statin before developing CVD: n = 81
- No data on graft vintage: n = 5
The image shows two bar charts comparing the usage of Statin and Aspirin among different racial groups:

**Statin**
- White: 81%
- Black: 69%
- Other: 77%

**Aspirin**
- White: 79%
- Black: 68%
- Other: 66%