

Non-White donors and kidney transplant outcomes: a population-cohort study

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Abstract

It is unclear if non-White donors achieve the same outcomes after kidney transplantation for White versus non-White recipients and we undertook this national study to investigate this further. This study analysed all kidney-alone transplants performed in the UK between 2003 and 2015. Multivariate Cox regression models were used to analyse the effect of donor-recipient ethnicity combinations on outcomes post-transplant, with sensitivity analyses to differentiate between matched and mismatched ethnicity combinations. In total, there were 27,893 kidney transplant recipients in the study cohort (White=23,148, Black=1,672, south Asian=3,073). Deceased-donor kidney transplants comprised 64.5% of the total cohort (n=17,991). Black and south Asian donors comprised a bigger proportion of living-donors (3.8% versus 6.9% respectively) versus deceased-donors (1.1% and 1.7% respectively). In unadjusted analyses, matched ethnicities between donors and recipients resulted in better outcomes for graft survival, 1-year creatinine, delayed graft function and patient survival. However, compared to White-to-White transplants (reference), Black-to-Black was associated with worse death-censored graft survival (HR 1.48, 95% CI 1.16-1.89, p=0.002) but better patient survival (HR 0.67, 95% CI 0.44-1.01, p=0.057) and Asian-to-Asian was associated similar death-censored graft survival (HR 0.95, 95% CI 0.76-1.18, p=0.620) but better patient survival (HR 0.65, 95% CI 0.48-0.87, p=0.004). In a multi-variable Cox regression model, compared to White donors' we observed worse graft survival with both south Asian (HR 1.365, 95%CI 1.105-1.685, p=0.004) and Black (HR 1.611, 95%CI 1.265-2.053, p<0.001) donated kidneys. Kidneys from non-White donors are associated with worse graft survival after kidney transplantation, although matched donor-recipient ethnicities have better outcomes. Our data supports living-kidney donation amongst non-White communities but, regardless of recipient ethnicity, we believe deceased-donor kidneys from any ethnicity will have superior outcomes compared to dialysis.

Introduction and objective

- Minority ethnics make up 22.4% of total kidney transplants performed in the United Kingdom but only 5% of donors on the Organ Donor Register (1).
- However, kidney's from non-White donors have been shown to have inferior outcomes post transplant.
- The limitations with these published studies include:
 - Studies are non-UK based.
 - Matched ethnicities has been shown to have superior outcomes after heart (2), lung (3) and liver (4) transplantation, but the effect of donor versus recipient ethnicity has not been explored in kidney transplantation.
- To explore outcomes for kidney transplant recipients stratified by donor versus recipient ethnicity to test the hypothesis that non-White donors achieve poorer outcomes for kidney transplant patients regardless of recipient ethnicity.

Methods

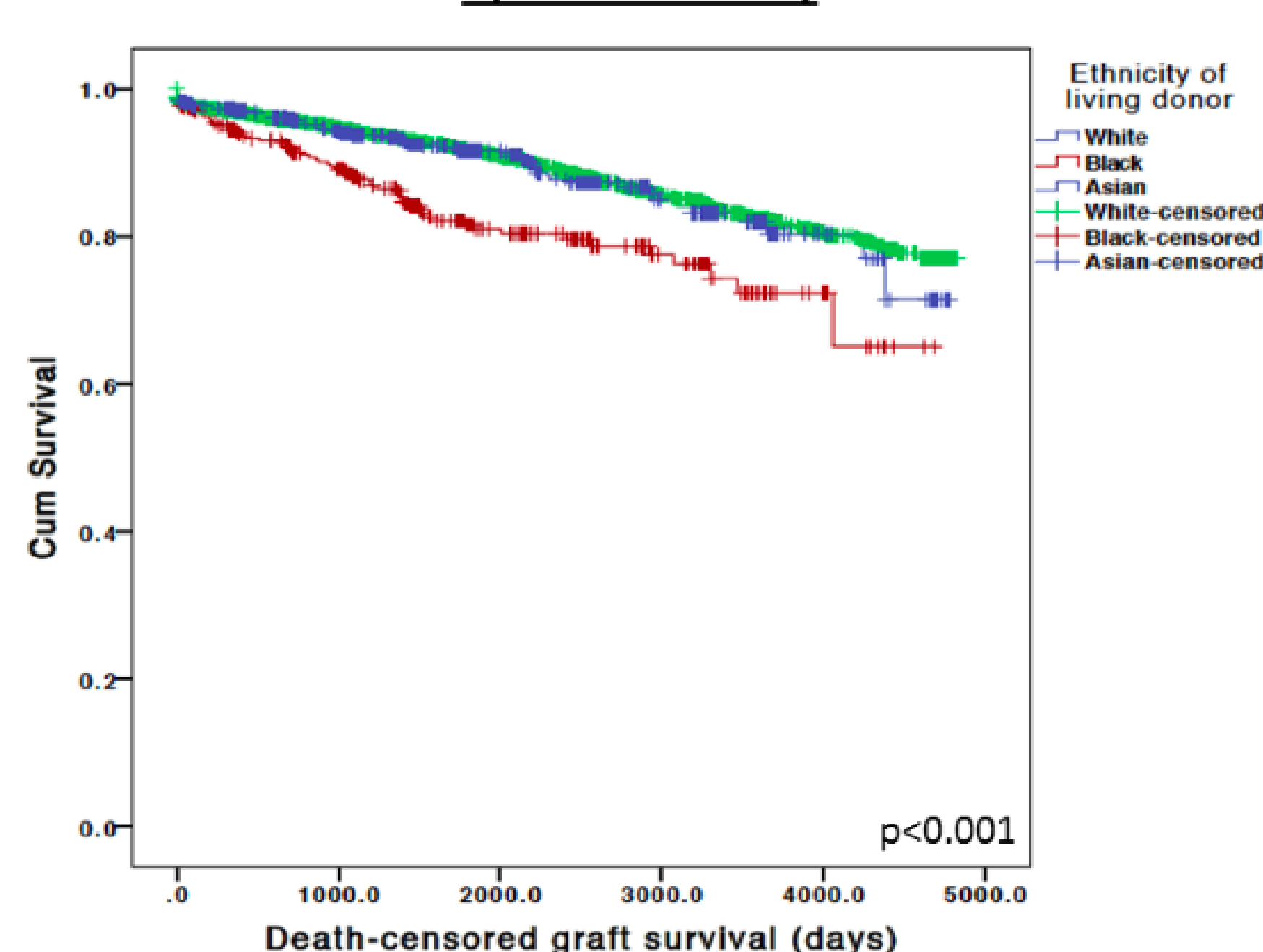
- Retrospective analysis of UK Transplant Registry data for all kidney-alone allograft recipients between April 1st 2003 and March 31st 2015 (data censored at 1st October 2016).
- Study cohort of 27,970 where donor or recipient ethnicity was white, black or south Asian.
- Survival analysis was performed with Cox proportional hazards models to estimate risk for kidney allograft loss or patient death.

Results

- 27,970 kidney transplant recipients were available for analysis, following exclusion (23,215, 1,679 and 3,076 kidney transplant recipients of white, black and south Asian ethnicity respectively).
- Median follow up time from kidney transplantation was 1,676 days (IQR 716 to 2,869 days).

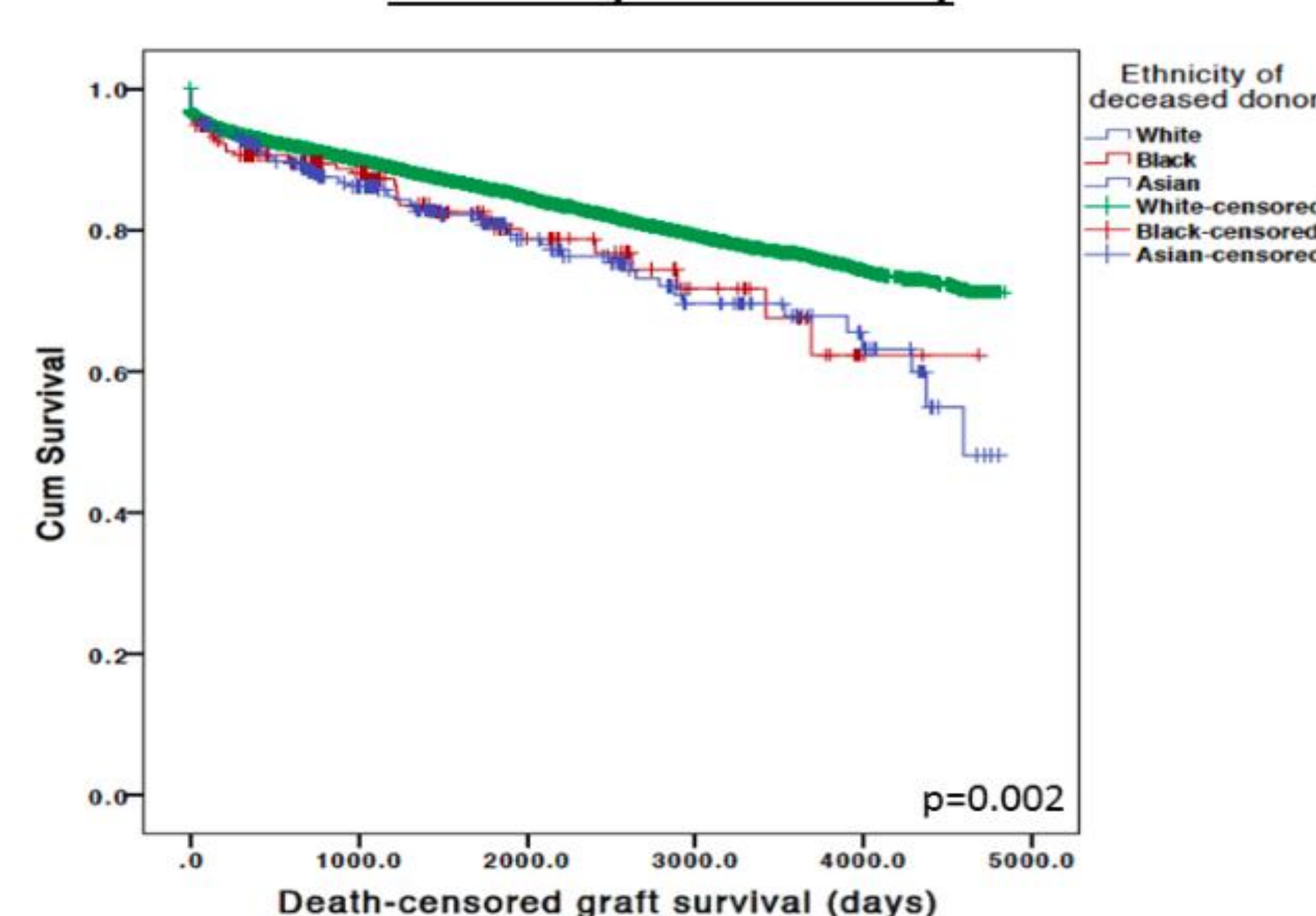
Figure 1 shows unadjusted Kaplan-Meier graft survival plots after (a) living or (b) deceased donor kidney stratified by donor ethnicity.

Figure 1a. Graft survival after living donor kidney transplantation, stratified by donor ethnicity



Numbers at risk	8987	6282	3762	1644	519	0	White
	395	264	130	60	13	0	Black
	754	514	281	95	30	0	Asian

Figure 1b. Graft survival after deceased donor kidney transplantation, stratified by donor ethnicity



Numbers at risk	17952	11425	6828	3422	1371	0	White
	212	124	54	24	3	0	Black
	365	200	103	54	25	0	Asian

Conclusions

- Findings consistent with existing literature showing inferior outcomes associated with kidneys from non-White donors, regardless of deceased or living kidney donation.
- No survival benefits following donor-recipient ethnicity matched transplants as shown in non-renal transplant literature.
- Kidney transplantation from any donor ethnicity is likely to still have superior survival outcomes compared to dialysis for patients with kidney failure.

References

- http://www.odt.nhs.uk/pdf/activityreport/bame_organ_donation_and_transplantation.pdf
- Kanter et al. Donor-Recipient Race Mismatch and Graft Survival After Pediatric Heart Transplantation. *Ann Thorac Surg* 2009; 87: 204-210
- Allen et al. Impact of Donor-Recipient Race Matching on Survival After Lung Transplantation: Analysis of Over 11,000 Patients. *J Heart Lung Transplant* 2009; 28: 1063-1071
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- The following tables show risk for graft loss or death in unadjusted and adjusted Cox regression models (adjusted for donor, recipient and transplant-related variables):

Table 1. Unadjusted analyses of risk for graft loss with ethnicity matches

Donor to Recipient Ethnicity	n	Graft survival		Patient survival	
		HR (95% CI)	p value	HR (95% CI)	p value
Asian to Asian	734	0.95 (0.76-1.18)	0.62	0.65 (0.48-0.87)	0.004
Asian to Black	50	1.86 (1.03-3.36)	0.040	0.43 (0.11-1.73)	0.24
Asian to White	196	1.42 (1.00-2.03)	0.051	0.88 (0.53-1.46)	0.61
Black to Asian	62	1.46 (0.76-2.81)	0.26	2.04 (1.02-4.09)	0.044
Black to Black	387	1.48 (1.16-1.89)	0.002	0.67 (0.44-1.01)	0.057
Black to White	132	1.33 (0.86-2.06)	0.21	1.08 (0.61-1.90)	0.79
White to Asian	2280	1.26 (1.12-1.41)	<0.001	1.22 (1.07-1.40)	0.004
White to Black	1242	1.56 (1.36-1.79)	<0.001	0.97 (0.79-1.18)	0.75
White to White	22887	1.00	-	1.00	-

Table 2. Cox proportional hazards model for risk of graft loss and death*

Parameter	Risk for graft loss (HR)		
	HR	95% CI	P value
Donor ethnicity	White	1.00 (reference)	-
	Black	1.66	1.30-2.11 <0.001
	South Asian	1.38	1.12-1.70 0.003
Parameter	Risk for death (HR)		
	HR	95% CI	P value
Donor ethnicity	White	1.00 (reference)	-
	Black	1.68	1.21-2.35 0.002
	South Asian	0.88	0.64-1.21 0.423

*Adjusted for donor age, donor smoker, donor sex, donor ethnicity, recipient age, recipient sex, recipient ethnicity, recipient diabetes, waiting time, cold ischemic time, sensitization (calculated reaction frequency), graft number, HLA mismatch, delayed graft function, rejection, type of donor and ethnicity matching between donors/recipients.



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