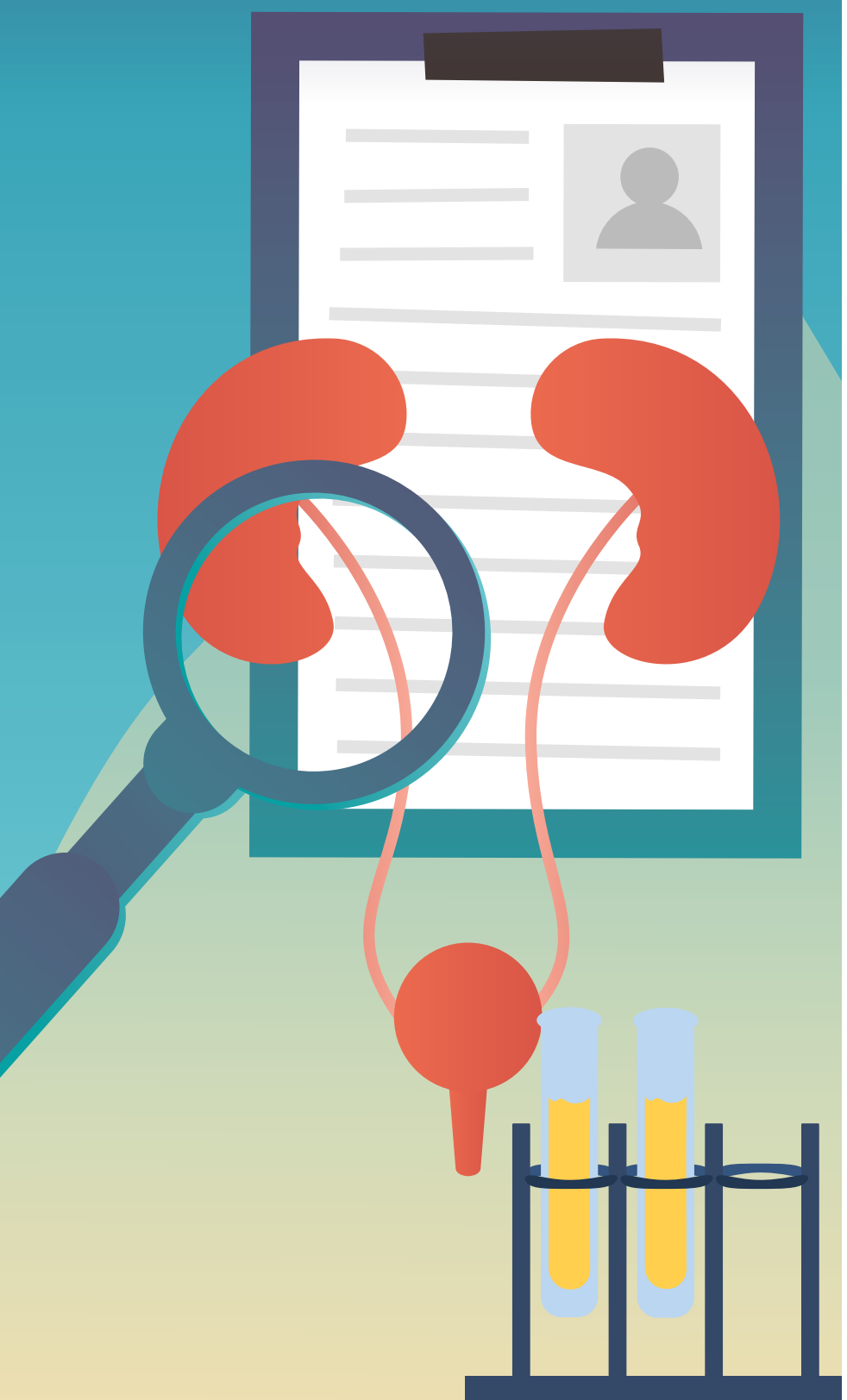
Reenvisioning the Kidney Donor Risk Index without Race

By Samira Farouk



Black individuals, who are at a two- to fourfold higher risk of developing end stage kidney disease in the United States, are simultaneously less likely to be referred for transplantation, to be waitlisted, or to receive a kidney transplant (KT) (1–3).

The murders of countless Black individuals sparked uprisings in 2020 throughout the United States. This included efforts spearheaded by medical students around the country to remove race as a factor in estimated glomerular filtration rate (eGFR) calculation at their institutions (4). Racialized algorithms, which include race in eGFR equations, result in higher values for individuals identified as Black, potentially delaying KT eligibility (5). As described by the following points, race: 1) lacks biological meaning, 2) is dynamic and contextually sensitive in how and by whom it is defined, and 3) often reinforces erroneous beliefs regarding the inferiority and "otherness" of minoritized groups (6, 7). Race-based medicine perpetuates race as a biological variable, rather than a social construct, contributing to inequities and healthcare disparities (6).

In fall 2021, the final report from a National Kidney Foundation and American Society of Nephrology Task Force to reassess inclusion of race in eGFR recommended "immediate implementation of the Chronic Kidney Disease Epidemiology Collaboration creatinine equation refit without the race variable" (8).

Unfortunately, the eGFR calculation is not the only arena within nephrology that must implement "race correction." The kidney donor risk index (KDRI), implemented in 2014, uses 10 donor characteristics (Table 1), including self-reported race, to predict the relative risk of allograft failure. The kidney donor profile index (KDPI), derived from the KDRI, maps the KDRI relative risk to a cumulative percentage scale (i.e., a KDPI of 85% indicates a KDRI greater than 85% of recovered kidneys). Higher KDPI values are associated with lower longevity and donor quality and thus can impact organ acceptance practices by transplant clinicians. Furthermore, deceased donor kidneys with low KDPIs are allocated to those individuals with longer estimated posttransplant survival (EPTS), which is calculated using the recipient's age, dialysis vintage, diabetes status, and history of prior organ transplants (9).

The KDRI was the result of a 2009 study in which a multivariable Cox regression model was estimated using allograft outcomes from 69,440 deceased donor KT recipients in the United States from 1995 to 2005 (Table 1) (10). Although not explained in the manuscript, race was likely included as a variable due to the prior observation that kidneys from Black donors were associated with a higher risk of allograft loss (11). Like eGFR equations that include race, inclusion in the KDRI calculation similarly implicates race as a biological variable. Rather than race, it is likely that these differences may be better explained by biological factors and unequal social determinants of health. The KDRI hazard ratio for Black race was estimated to be 1.20—**higher than that for a donor with a history of hypertension or diabetes, donation after cardiac death, or cerebrovascular accident as the cause of death**—increasing the risk of estimated allograft failure by 20%. The liver donor risk index (LDRI) similarly includes race, with a 1.2 hazard ratio for Black versus White donors (12). As we seek an unbiased and more accurate and precise model toward eGFR, we must do the same to assess kidney donor quality to improve equity in kidney transplantation. One potential solution is the inclusion of the apolipoprotein L1 (*APOL1*) genotype, as allografts with high kidney risk variants (KRVs) have been associated with early allograft failure (13). A 2017 retrospective cohort study of 1149 KT recipients concluded that replacing

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race with the *APOL1* genotype (0/1 KRV vs. 2 KRVs) improved risk estimation for kidneys from Black donors and improved the KDRI for 85%–90% of kidneys offered (14). In current clinical practice, waiting for deceased donor *APOL1* genotyping results for KDRI calculation may significantly prolong cold ischemia time. The APOL1 Long-term Kidney Transplantation Outcomes Network (APOLLO) study may shed further light on the impact of KRVs on allograft outcomes (15). Furthermore, a recent analysis of Scientific Registry of Transplant Recipients data from 2000 to 2017 found that removal of race from the KDRI calculation did not alter the overall predictability of allograft failure or patient survival (16).

Until these newer models and coefficients can be estimated without race, transplant centers may consider re-calculation of KDRI without the race coefficient when making decisions regarding acceptance of organs or immunosuppression regimens. Furthermore, advances in the treatment of hepatitis C virus (HCV) that have allowed for the transplantation of kidneys from HCV-infected donors into HCV-negative recipients beg for a new donor quality assessment tool (17). It is imperative that the

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Organ Procurement and Transplant Network (OPTN) and United Network for Organ Sharing (UNOS) interrogate the current calculation of the KDRI and its potential impact on organ allocation and inequity in transplantation (Table 2) (18). ■

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Table 1. Variables included in the KDRI model, with estimated coefficients

Donor characteristic	Hazard ratio
Age	
All ages	1.013
<18 years	0.98
>50 years	1.011
Height (per 10 cm increased)	0.96
Weight (per 5 kg increased below 80 kg)	0.98
Race (Black)	1.20
History of HTN	1.13
History of diabetes	1.14
CVA as cause of death	1.09
Serum creatinine	
All	1.25
>1.5 mg/dL	0.81
Positive HCV status	1.27
Donation after cardiac death	1.14

KDRI, kidney donor risk index; HTN, hypertension; CVA, cerebrovascular accident; HCV, hepatitis C virus. Adapted from Rao et al. (10).

Table 2. Comparison of KDPI among four hypothetical donors

Donor characteristic	Donor 1	Donor 2	Donor 3	Donor 4
Age (years)	50	50	50	50
Height (inches)	63	63	63	63
Weight (kg)	70	70	70	70
Race	Black	Non-Black	Black	Non-Black
History of HTN	No	No	No	No
History of diabetes	No	No	No	No
CVA as cause of death	No	No	No	No
Serum creatinine	1.0	1.0	1.0	1.0
Positive HCV status	Yes	Yes	No	No
Donation after cardiac death	No	No	No	No
KDPI (%)	85	70	65	46

KDPI, kidney donor profile index; HTN, hypertension; CVA, cerebrovascular accident; HCV, hepatitis C virus. Adapted from OPTN (18).