

Kidney Donor Risk Index

Topic & Clinical Relevance

- The Kidney Donor Risk Index (KDRI) is a prognostic algorithm that predicts the likelihood of kidney graft rejection based on ten organ donor characteristics (Age, Weight, Height, Ethnicity/Race, History of Hypertension, History of Diabetes, Cause of Death, Serum Creatinine, Hepatitis C Virus Serology, and Donation after Cardiac Death Criteria).¹
- The purpose of the KDRI is to aid clinicians in making decisions regarding organ allocation for deceased donor kidney transplants by assigning a relative risk score for graft rejection to a particular donor.²
- A KDRI greater than 1 indicates a higher expected risk of graft rejection than the median kidney donor from the previous year.³
- The KDPI and KDRI are provided in DonorNet[®], the United Network for Organ Sharing (UNOS) database that allows transplant centers to view information regarding transplant organs. **It aids in the decision to accept or decline organ offers.**⁴
- The predicted risk of kidney graft failure is higher when the potential donor is identified as Black (coefficient, 0.179).⁵

Frequent Misconceptions

- “The original KDRI, as well as subsequent models identified race as a major predictor of kidney allograft survival. How can a predictive algorithm be wrong?”
 - The answer is as simple as the fact that correlation \neq causation. Predictive algorithms are complex mathematical calculations that analyze patterns in selected data to predict future outcomes. They are subject to the same biases as their human architects. They can not be used to make inferences about the relationship between a variable and an outcome. For example, the Cox Regression Model used in the KDRI shows donor race to be a major predictive factor in kidney allograft survival, but it does not explain *why* that is. It cannot tell us whether the cause of these inequitable outcomes is biological or non-biological (socioeconomic status, access to care, etc.).^{6,7}
- “Don’t Black patients have twice the risk of end-stage renal disease as compared to white patients after correcting for socioeconomic and clinical risk factors, implicating differences in disease progression based on race?”
 - This difference in disease progression can be attributed to specific variations in the APOL1 allele between individuals, which have been linked to more rapid progression of kidney disease, and a higher rate of end-stage kidney disease.⁸ It is important to emphasize, however, that the APOL1 high-risk genotype is only seen in 13% of Black patients.⁹

Author: Aleisha Khan (she/her/hers), MD Class of 2025, Medical College of Georgia at Augusta University (Augusta, GA)

Reviewers: Sudheesha Perera (he/him/his), MD Class of 2024, Brown University (Providence, RI)

Please credit authors, reviewers, and Institute of Healing and Justice in Medicine when duplicating or citing this work.

How Adjustment Contributes to Health Inequity

- The use of race in the KDRI/KDPI reduces the pool of available kidney donors, particularly for Black patients. Thus the use of DKRI/KDPI assessment system places Black patients at a disadvantage when seeking potentially life-saving kidney transplants.

Possible Solutions

- On an individual level:
 - We suggest providers remain cognizant of the racial bias embedded within this tool, and utilize it with appropriate consideration.
- On a systemic level:
 - Some have suggested replacing the use of race with Apolipoprotein L1 genotype in the Kidney Donor Risk index¹⁰, to move away from socially constructed race and towards a genetic marker with a proven biological association with kidney risk.
 - Others suggest simply removing race from the existing algorithm¹¹.
 - Neither of the above solutions have been implemented in the Kidney Donor Risk Index, and to our knowledge there is no existing tool or revised index that accounts for this racial bias.

Takeaway Points

- The existing Kidney Donor Risk Index incorporates race as one of its input variables, and this use of race results in a reduced pool of available kidney donors for Black patients.
- Although suggestions have been made to remove race from the tool, and/or replace it with a genetic marker, to our knowledge there is no such revised algorithm available.
- With no established alternative, providers are urged to remain cognizant of the racial bias embedded within the Kidney Donor Risk Index, and utilize it with appropriate consideration to ensure equitable care for Black patients.

References

1. https://journals.lww.com/transplantjournal/Fulltext/2009/07270/A_Comprehensive_Risk_Quantification_Score_for.13.aspx
2. <https://optn.transplant.hrsa.gov/data/allocation-calculators/kdpi-calculator/>
3. <https://optn.transplant.hrsa.gov/resources/allocation-calculators/kdpi-calculator/>
4. <https://unos.org/technology/unet/>

Author: Aleisha Khan (she/her/hers), MD Class of 2025, Medical College of Georgia at Augusta University (Augusta, GA)

Reviewers: Sudheesha Perera (he/him/his), MD Class of 2024, Brown University (Providence, RI)

Please credit authors, reviewers, and Institute of Healing and Justice in Medicine when duplicating or citing this work.

5. https://journals.lww.com/transplantjournal/Fulltext/2009/07270/A_Comprehensive_Risk_Quantification_Score_for.13.aspx
6. https://jamanetwork.com/journals/jamainternalmedicine/article-abstract/2697394?casa_token=oFlkCcUbykEAAAAA:msGhPCmEgUDB1L0NltpwYcJAzqVDf3O1em2KXUOqNoMvxwKFx--4xS1JHD3GgpOF7IMVXQvsNeQ
7. <https://www.nature.com/articles/s41591-019-0726-6>
8. <https://www.nejm.org/doi/full/10.1056/NEJMoa1310345>
9. <https://jasn.asnjournals.org/content/27/9/2842#:~:text=The%20APOL1%20high%2Drisk%20genotype,decline%20in%20populations%20with%20CKD.>

Author: Aleisha Khan (she/her/hers), MD Class of 2025, Medical College of Georgia at Augusta University (Augusta, GA)

Reviewers: Sudheesha Perera (he/him/his), MD Class of 2024, Brown University (Providence, RI)

Please credit authors, reviewers, and Institute of Healing and Justice in Medicine when duplicating or citing this work.