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## To Understand the Disparities in Living Kidney Transplantation Outcomes, Look to the Community

**J. Daryl Thornton, MD, MPH**

Center for Reducing Health Disparities, The MetroHealth Campus of Case Western Reserve University, Cleveland, Ohio; Population Health Research Institute, The MetroHealth Campus of Case Western Reserve University, Cleveland, Ohio; Division of Pulmonary, Critical Care, and Sleep Medicine, The MetroHealth Campus of Case Western Reserve University, Cleveland, Ohio

Despite clear evidence of benefit, the rates of living kidney transplantation in the United States have remained relatively flat over the last few decades. Living kidney transplantation confers greater survival and quality of life compared with cadaveric kidney transplantation and hemodialysis.<sup>1</sup> However, few patients with end-stage kidney disease receive this superior modality, largely due to an inability to find suitable donors. Because the first living successful kidney transplant to remain functional for several years was performed in 1954 between identical twins,<sup>2</sup> it has been assumed that relatedness between donors and recipients leads to superior outcomes. Husain et al<sup>3</sup> challenge that assumption.

Husain et al<sup>3</sup> examined the donor and recipient characteristics associated with death-censored allograft failure among 98 419 transplantation procedures performed over the last 20 years. They found that the proportion of donors with no biological relationship with their recipient increased from 32% in the period between 2000 and 2004 to 50% in the period between 2010 and 2014. On the surface, it may appear that related donor-recipient pairs would have better allograft function. Related pairs were younger in age and had higher degrees of HLA-A, HLA-B, and HLA-DR antigen matching compared with unrelated pairs. Lower levels of HLA matching were associated with an increased risk of allograft failure.

However, after adjusting for HLA matching, related donor-recipient pairs had a 26% increased risk of allograft failure compared with unrelated donor-recipient pairs. When donor and recipient sociodemographic and clinical characteristics were added to the model, the increased risk of allograft failure persisted among related donor-recipient pairs. This association was modestly attenuated after the era when the surgery was performed was added to the model. Thus, temporal factors, such as improvements in transplantation surgery and posttransplantation care, were not the primary reasons for the observed differences.

What could be responsible for these surprising findings? The clues may be found in Table 3 of the study by Husain et al.<sup>3</sup> When the donor was African American, the hazard ratio

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**Corresponding Author:** J. Daryl Thornton, MD, MPH, Center for Reducing Health Disparities, The MetroHealth Medical Campus of Case Western Reserve University, 2500 MetroHealth Dr, Cleveland, OH 44109 (daryl.thornton@case.edu).

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of allograft failure was 1.12 (95% CI, 1.01-1.23), but when the donor was not African American, the hazard ratio was no longer significant (hazard ratio, 1.03; 95% CI, 0.98-1.08). These added findings suggest that additional factors common to African American donors beyond what was measured were negatively associated with allograft survival.

In the absence of reliable patient-level measures of socioeconomic position and other factors that may affect patient outcomes, investigators often use area-based measures.<sup>4</sup> These measures group people by the immediate area in which they reside by joining census tract area-based measures of socioeconomic position (eg, median annual household income) with publicly available data from other administrative databases, such as the National Center for Health Statistics and the Behavioral Risk Factor Surveillance System.<sup>5</sup> In study after study, these measures have been found to be associated with patient outcomes. Specifically, in regions where most inhabitants have a lower socioeconomic position, morbidity and mortality are increased compared with regions where most of the inhabitants have a higher socioeconomic position.<sup>6</sup>

An area-based measure used in transplantation is the community risk score. The community risk score is a composite measure derived from community indicators that serve as surrogates for community health, socioeconomic position, environmental and behavioral risks, and access to care.<sup>7</sup> Examples of community indicators include the proportion of people residing in the community who smoke, the proportion who report poor or fair health, and the proportion with low birth weights. The more community indicators present in a region, the higher the community risk scores and the poorer the community health. In a study of 100 164 living and deceased adult kidney donors and their recipients, higher community risk scores were found to be independently associated with recipient mortality following transplantation and allograft failure.<sup>7</sup> In addition, community risk scores accounted for more of the variation in observed outcomes than donor race and HLA matching. Overall, these findings lend further evidence that communities where donors and recipients live convey risks before and after transplantation that may be greater than the other biological factors that we commonly assess.

To better understand the disparities found in transplantation outcomes, we need to incorporate data on the socioeconomic factors that donors and recipients face on a daily basis individually and within their communities. Area-based measures can be linked with robust data collected directly from individuals to help design effective, tailored interventions and policies to eliminate these disparities.

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