Utility of Estimated Glomerular Filtration Rate in Live Kidney Donation

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Live kidney donation is considered safe; nevertheless, data supporting such claims are almost exclusively of white origin with very limited long-term outcomes in ethnic minority donors. This prospective observational study consisted of a total of 103 previous kidney donors (54 black and 49 white) with mean follow-up days of 743.5 ± 603.9 for white and 845.1 ± 668.5 for black donors. The black donors had a statistically significant greater loss of estimated GFR (eGFR; 39.8 ml/min per 1.73 m²) in comparison with white donors (30.4 ml/min per 1.73 m²; \( P = 0.001 \)). In multivariate analysis, predonation eGFR of <100 ml/min and age at the time of donation were the significant predictors for postdonation eGFR <60 ml/min among black donors. Because eGFR using the Modification of Diet in Renal Disease 4 formula is not validated in live kidney donors, the significance of eGFR <60 ml/min per 1.73 m² in previous kidney donors is unclear. Long-term prospective study with a gold standard method such as iothalamate GFR measurement is needed to define the actual decrease in eGFR after kidney donation.


This is in response to a previously published Controversies in Nephrology on the pros and cons of the application of formulas for estimation of GFR and its utility in staging of chronic kidney disease (CKD) (1). We share our unpublished data with respect to use of estimated GFR (eGFR) in monitoring live kidney donors before and after donation and to bring out the limitations of the eGFR when applied to this population. The transplant team in our center started a dedicated clinic for live kidney donors 4 yr ago. We noted that many live donors >2 yr after donation have eGFR of <60 ml/min per 1.73 m² (using the Modification of Diet in Renal Disease [MDRD] 4 formula) without any significant proteinuria or sediment abnormalities. Our donor population consisted of 103 previous kidney donors (54 black and 49 white) with mean prospective follow-up days of 743.5 ± 603.9 for white and 845.1 ± 668.5 for black donors after donation. Figure 1 shows that black donors had a statistically significant greater loss of eGFR after donation even though they had higher baseline eGFR before donation.

In multivariate analysis, predonation eGFR of <100 ml/min per 1.73 m² and age at the time of donation were the significant predictors for postdonation eGFR <60 ml/min per 1.73 m² among black but not white donors. Black donors had a follow-up eGFR of <60 ml/min per 1.73 m² in 13 (59.1%) of 22 donors when their predonation eGFR was <100 ml/min per 1.73 m² (24-h urine creatinine clearance >80 ml/min) as compared with four (12.5%) of 32 donors with predonation eGFR of ≥100 ml/min per 1.73 m² (\( P < 0.001 \)) as shown in Figure 2.

The interpretation of our observations and their significance depend critically on whether the MDRD formula for eGFR is reliable in the potential donor population and in previous kidney donors. If it is assumed that the MDRD eGFR accurately reflects the actual GFR in these patients, then the following conclusions are inescapable:

1. Black donors have less renal reserve and compensatory hypertrophy of the remnant kidney than white donors.
2. It may be advisable to exclude potential black donors from donation with predonation eGFR of <100 ml/min because many of these donors will end up with postdonation eGFR <60 ml/min.
3. It may be advisable to exclude black potential donors who are obese or have strong family history of diabetes, hypertension, and CKD because of a possible lower renal reserve.

These conclusions may be justified on the basis of the recent findings that more black previous kidney donors are currently on the national waiting list for deceased-donor transplantation (2) and that probably many more are on dialysis or died of complications of CKD; however, because eGFR seems to be less reliable in individuals with serum creatinine levels at or near normal range (3), drawing these conclusions may not be appropriate because it will further disadvantage the potential black recipients who are overrepresented in the dialysis population and underrepresented in the transplant population by decreasing the number of living donors who are available to them.

Our observation highlights another patient population for which the application of eGFR formulas creates serious problems in clinical decision making. We believe that in the present...
state of uncertainty regarding the reliability of eGFR formulas, the following measures are prudent:

1. eGFR formulas should not be used to make clinical decisions for kidney donors until it is validated with "gold standard" tests such as iothalamate GFR.
2. Standardization of serum creatinine measurements is nationwide.
3. Cost of more accurate GFR determination (iothalamate) in all potential donors is covered by insurance.
4. Funding for long-term indefinite follow-up of all live donors should be made available.

It is our opinion that utility of eGFR may be applicable only to certain groups of patient populations, and further evidence should be obtained to avoid confusion both to the nephrology community and to the patient population at large.

References

Figure 1. Degree of loss of estimated GFR (eGFR) between pre- and postdonation eGFR at last follow-up.

Figure 2. Effect of race and predonation eGFR on follow-up eGFR of >60 or <60 ml/min per 1.73 m². AA, African American (black); CA, Caucasian (white).