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Pre- and post-donation kidney function in donors of a kidney paired donation with unique criteria for donor glomerular filtration rate

Original article

(Running Title: Kidney paired donation and GFR)

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Australian paired Kidney Exchange (AKX)

Glomerular filtration rate (GFR)

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ABSTRACT

Baseline pre-donation eGFR appears to predict the risk of post-donation chronic kidney disease in live donors. New KIDGO guidelines recommend an eGFR ≥ 90 ml/min/1.73m² as an acceptable level of GFR for kidney donation. In the Australian Paired Kidney Exchange (AKX) program, all donors with a raw measured GFR (mGFR) ≥ 80 ml/min are deemed suitable for donation, but the significance of this selection indicator is unclear. We analysed the first 129 live donors in the AKX program with at least 1-year follow-up linking records in the AKX database and ANZDATA. There were 73 male and 56 female donors; mean ($\pm$ SD) age was 53 $\pm$ 11 years. Pre-donation eGFR was 94 $\pm$ 13 ml/min/1.73m², mGFR 99 $\pm$ 17 ml/min/1.73m² and raw mGFR 108 $\pm$ 18 ml/min. Baseline eGFR was <80 ml/min/1.73m² in 19 donors, and <90 ml/min/1.73m² in 42 donors. At 1 year post-donation eGFR was 68 $\pm$ 15 ml/min/1.73m² and the predicted eGFR at 30 years post-donation was 50 ml/min/1.73m². The hypothetical mean age at ESKD was estimated to be 145 (95%CI 120-263) years. Over 30% of AKX live donors would have been excluded from donation using KDIGO guidelines. Using AKX donor guidelines, the majority of donors with predicted eGFR <30 ml/min/1.73m² 30-year post-donation were aged ≥ 50 years. Long-term outcome data on AKX donors with low eGFR will need careful monitoring.

Key words: Living donor kidney transplantation; kidney paired donation; glomerular filtration rate.

INTRODUCTION

Living donor kidney transplantation is known to be associated with favourable recipient outcomes compared to deceased donor kidney transplant. In Australia, living donor kidney transplantation accounts for nearly one third of all kidney transplants¹. Although the absolute risk of end-stage kidney disease (ESKD) of living donors after donation remains significantly lower than that of the general population², the relative risk of ESKD increases after donation compared to pre-donation^{3, 4}. There is widespread support for the use of a pre-donation glomerular filtration rate (GFR)

threshold of 80ml/ min/ 1.73m² in living donors ^{2, 5-9} and in some cases to consider acceptance of an age-dependent GFR thresholds as low as 50ml/ min/ 1.73m² for donors older than 80 years ⁸. Because of the concern on long-term consequences of living donation, integration of ESKD risk evaluation in the living kidney donor screening have recently been proposed ¹⁰⁻¹², and a new screening strategy using ESKD risk calculators was included in the new recommendations on living kidney donor screening by the kidney disease improving global outcome group (KDIGO) ¹³. These guidelines also recommend to routinely accept a living kidney donor with GFR of ≥ 90 ml/min/1.73m² while candidates with GFR < 60 ml/min/1.73m² should not donate. This recommended pre-donation GFR value differs from previous thresholds found in the literature. Furthermore, the significance of these thresholds in older donors is unknown, given the well-recognized relationship between age and GFR as well as the uncertainty around the pathogenicity of age-related GFR decline ^{14, 15}.

Kidney paired donation (KPD) is an effective strategy to avoid antibody-incompatible live donor transplant as a result of the recipient having preformed donor-specific antibodies to human leucocyte antigen (HLA) or being blood group incompatible with their intended donor ¹⁶⁻¹⁹. Adequate donor pre-donation renal function is essential to preserve graft survival and donor renal outcomes ^{20, 21}. The Australian KPD program, also known as the Australian Paired Kidney Exchange (AKX) program, has adopted a practice for donor acceptance that requires donors to have a measured GFR of > 80 ml/min, not corrected for body surface area (BSA) ^{18, 19, 22}. This is to provide reassurance to participating units and pairs that the recipient will receive a kidney with a minimum GFR of 40ml/min ^{18, 19, 22}. Referring units have the discretion to accept or discard a living donor with an eGFR of < 80 ml/min/1.73m².

The purpose of this study was to assess pre- and post-donation eGFR in donors participating in the Australian KPD program, the proportion of donors satisfying the mGFR requirements that did not meet the new KDIGO guidelines of GFR ≥ 90 ml/min/1.73m² or the previous clinical practice guidelines of ≥ 80 ml/min/1.73m² and the relationship between age and eGFR level that may be considered acceptable for kidney donation.

MATERIALS AND METHODS

Study design

This study was a longitudinal cohort analysis of the first 129 living donor kidney transplants conducted through the Australian Kidney paired eXchange (AKX) program between October 2010 and August 2015. All donors complied with the AKX Living Donor Evaluation Guidelines (<http://www.donatelife.gov.au/akx-user-manual-august-2015-0>). These do not allow donors with

diabetes, but allow for enrolment of donors with impaired fasting glucose or impaired glucose tolerance at the discretion of the referring units. The program does not accept a registration for any donor who had a previous history of recurrent renal stone disease, but a remote history of a single kidney stone is acceptable. Basic donor demographics, including baseline serum creatinine, estimated GFR (eGFR) and measured GFR (mGFR) and other factors known to affect suitability to live kidney donation were retrieved from the AKX registry. Follow-up serum creatinine and eGFR at 1 year after donation were obtained from the Australia and New Zealand Dialysis and Transplant (ANZDATA) live donor registry.

Measurement of kidney function

All donors in the AKX program had raw $mGFR \geq 80 \text{ ml/min}$. The mGFR was measured using the slope-intercept method either after injection of Cr-51 EDTA (3MBq) or Tc-99m DTPA (10MBq) using at least three venous blood samples taken at between 2 and 5 hours post injection²³. Although small systematic differences have been observed between GFR measurements obtained from EDTA and DTPA^{24, 25}, these are sufficiently small to recommend DTPA as a suitable alternative radiopharmaceutical.

Statistical Analysis

Statistical analysis was performed with STATA 13.1 (StataCorp. 2013. STATA statistical software. College Station, TX: StataCorp LP). Data were expressed as numbers (percentages) for categorical data, means and standard deviations (SD) for normally distributed continuous data, with comparisons between age categories using chi-square test and analysis of variance (ANOVA), respectively where appropriate. The pre-donation and post-donation eGFR was calculated using CKD-EPI equation²⁶. We also compared the percentage of lost kidney function as follows: $GFR \text{ difference (\%)} = (eGFR_{1yr} - eGFR_{baseline}) / eGFR_{baseline}$. The annual decline in eGFR post donation was derived by linear regression analysis of the post-donation eGFR of the cohort as a function of age, adjusted for the pre-donation body mass index (BMI), urine protein creatinine ratio (uPCR), presence of hypertension and pre-diabetes, defined as impaired fasting glucose or impaired glucose tolerance. The linearity was verified graphically and by multivariable fractional polynomial analysis (supplemental figure 1). The eGFR at 30 years post-donation was extrapolated by the average accumulated decline in eGFR (annual average decline multiplied by 29 years) from eGFR at 1 year post donation. Moreover, the 95th percentile in annual eGFR decline was also used to estimate the predicted strongest loss in eGFR. Finally, the predicted age at ESKD (defined as $eGFR < 10 \text{ ml/min/1.73m}^2$) was estimated as follows: $\text{age at ESKD} = \text{age at 1-year post-donation} + (10 - eGFR_{\text{at 1 year post-donation}}) / \text{estimated annual eGFR decline post-}$

donation. All P-values are 2-sided and a P-value ≤ 0.05 was considered to be statistically significant. The 95%CI are for individual predictions.

RESULTS

Baseline characteristics

There were 73 male and 56 female donors; mean ($\pm$ SD) age was 53 ± 11 years. The cohort was categorised into four age groups: <40 years, 40-49 years, 50-59 years, ≥ 60 years, a third of donors were aged 60 years or over ($n=43$, 33%). Mean BMI was 26.6 ± 3.5 kg/m² and 23 donors (18%) had BMI >30 kg/m². Mean blood pressure ($\pm$ SD) was 123/75 $\pm$ 11/7 mmHg. There were 23 donors (18%) with controlled hypertension, and the proportion increased by age group with 28% of those over 60 years of age diagnosed with hypertension. All donors with hypertension had well controlled blood pressure. Eight donors (6%) were classified as having pre-diabetes (either impaired fasting glucose or impaired glucose tolerance) and 9 donors (7%) had a history of non-recurrent kidney stones. Mean uPCR was 7.9 ± 4.6 mg/mmol, and maximum uPCR was 30 mg/mmol. All donors had complete 12 months follow up information. Basic demographic data of participating donors by age-group is summarised in Table 1.

Baseline renal function

The uncorrected mGFR by age groups ranged from 121 ± 17 ml/min in donors <40 years to 99 ± 13 ml/min in those ≥ 60 years ($p<0.001$) (Figure 1). The mean corrected mGFR decreased with age on average by -0.69 ml/min/1.73m² (95% CI 0.44-0.96) per year and ranged from 112 ± 17 ml/min/1.73m² in donors <40 years to 90 ± 13 ml/min in those ≥ 60 years ($p<0.001$). Baseline eGFR by CKD-EPI was lower than mGFR in all age groups, ranging from 104 ± 14 ml/min/1.73m² in donors <40 years, to 85 ± 10 ml/min/1.73m² in those ≥ 60 years ($p<0.001$) (Table 2, Figure 1). The age-related decline averaged 0.64 ml/min/1.73m² (95% CI 0.39-0.89) per year. In 19 donors baseline eGFR was <80 ml/min/1.73m², and in 42 it was <90 ml/min/1.73m².

Post-donation renal function

At 1-year post kidney donation, the mean eGFR by CKD-EPI was 68 ± 15 ml/min/1.73m². For donors aged <40 years, mean post-donation eGFR was 84 ± 18 ml/min/1.73m², 73 ± 14.4 ml/min/1.73m² for donors aged 40-49 years, 66 ± 14 ml/min/1.73m² for donors aged 50-59 years, and 61 ± 0.2 ml/min/1.73m² for donors aged ≥ 60 years (Table 2, Figure 2). The absolute eGFR

difference 12 months post-donation was $-25.2 \pm 10.4 \text{ ml/min/1.73m}^2$. The percentage change in eGFR at 1-year averaged $-27.2 \pm 10.5\%$ (Figure 3) and in 75% of donors post-donation eGFR dropped by $\leq 35\%$ compared to pre-donation. The eGFR 1-year post-donation was $< 60 \text{ ml/min/1.73m}^2$ in 39 donors (range 41-59.9 ml/min/1.73m^2). Of these, 17 donors had a pre-donation eGFR $< 80 \text{ ml/min/1.73m}^2$ and 29 donors an eGFR of $< 90 \text{ ml/min/1.73m}^2$.

Prediction of post donation long-term eGFR and ESKD risk

The adjusted age-related eGFR 1 year post-donation declined on average by $-0.64 \text{ ml/min/1.73m}^2$ (95% CI 0.39-0.89) for every year increase in age. Based on the observed eGFR at 1-year post kidney donation, the predicted eGFR at 30 years post donation for the entire cohort was $50 \text{ ml/min/1.73m}^2$ (95% CI 43-57). The predicted eGFR 30 years post donation by age group is shown in Figure 2. Donors were older in the group with pre-donation eGFR $< 80 \text{ ml/min/1.73m}^2$ (59 ± 8 years), compared to those in the eGFR 80-90 group (54 ± 10 years) or $> 90 \text{ ml/min/1.73m}^2$ group (51 ± 11 years) ($P < 0.01$). The predicted eGFR 30 years post-donation was lower in donors with eGFR < 80 , ($32 \text{ ml/min/1.73m}^2$, 95% CI 22-49), compared to those with eGFR 80-90 ($42 \text{ ml/min/1.73m}^2$, 95% CI 32-56) or $> 90 \text{ ml/min/1.73m}^2$ ($55 \text{ ml/min/1.73m}^2$, 95% CI 36-87) at the time of donation (Figure 4). When the predicted loss of eGFR at 30 years was estimated using the 95th percentile, rather than average, of the annual eGFR decline, this revealed that 30 donors (23%) would achieve an eGFR $< 30 \text{ ml/min/1.73m}^2$ and 4 donors would achieve an eGFR $< 20 \text{ ml/min/1.73m}^2$ although none would have a predicted eGFR $< 15 \text{ ml/min/1.73m}^2$ (CKD-stage 5) 30 years post-donation. Of the 30 donors with 30 years post-donation predicted eGFR $< 30 \text{ ml/min/1.73m}^2$ (CKD-stage 4) 26 were aged 50 years or over at time of donation. The hypothetical mean age at ESKD was estimated to be 125 years (95% CI 107-200) in donors with baseline eGFR < 80 , compared to 135 years (95% CI 113-235) in those with eGFR 80-90 and 153 years (95% CI 124-284) in those with eGFR $> 90 \text{ ml/min/1.73m}^2$ ($P = < 0.001$).

DISCUSSION

Our study is an analysis of Australian practices on the selection of kidney living donors with a particular focus on the pre-donation uncorrected mGFR threshold that is used to define

acceptance into the AKX program and the significance with regard to pre- and post-donation eGFR.

The first key observation of this study is that by adopting the newly recommended KDIGO minimal eGFR threshold of 90ml/min/1.73m^2 ¹³ for unrestricted donor acceptance, 33% of our donors would be considered high risk or unsuitable depending on the adherence to, and interpretation of the guidelines. Using the more widely established minimal acceptable threshold of 80ml/min/1.73m^2 ^{2, 5-9}, there were still 15% of donors who had an eGFR $<80\text{ml/min/1.73m}^2$, who donated a kidney and 95% of these were older than 50 years of age. The AKX does not prescribe a minimum donor eGFR, as the decision on long-term donor risk related to baseline kidney function is left to participating units. However, AKX mandates that all donors undergo a measurement of GFR by nuclear method and donors who have an uncorrected mGFR of $<80\text{ml/min}$ are excluded from donating in the program. This rule was chosen to guarantee that recipients can be assured they will receive an organ of good quality and a mGFR of at least 40ml/min , which will provide in all instances an adequate allograft function, independently of donor age²⁷. It's also important to stress that all donors also under nuclear split function studies prior to donation²⁸. For donors with mGFR $80\text{--}90\text{ml/min}$, the donated kidney right/left split must be $50\pm 5\%$. The observation that 15% of donors in our study were accepted despite an eGFR $<80\text{ml/min/1.73m}^2$ could have several reasons. First, nuclear mGFR studies were reported to referring clinicians with both uncorrected and corrected mGFR, and corrected mGFR was on average $5.7\pm 1.9\text{ml/min/1.73m}^2$ higher than eGFR ($P<0.001$) in this cohort. Indeed, corrected mGFR was $\geq 80\text{ml/min/1.73m}^2$ in 13 cases of donors with eGFR $<80\text{ml/min/1.73m}^2$. Second, because donors with eGFR $<80\text{ml/min/1.73m}^2$ were almost exclusively older than 50 years of age, acceptance of lower eGFR may reflect some units policies tolerating a more liberal approach that takes into account GFR thresholds lower than 80ml/min/1.73m^2 for older donors⁸. The recent KDIGO recommendations recognizes also in the setting of live donors that 90ml/min/1.73m^2 is part of the CKD classification and defines stage 1. However, in our view, it is misleading to discount donor's age from the evaluation of pre-donation renal function, rather this decision should consider whether the donor candidate has a GFR value within the range of values similar to those of age-matched healthy individuals, as well as taking into consideration other factors. In fact, all things being equal, the life-time risk of ESKD in a 35 year old donor with eGFR 95ml/min/1.73m^2 is higher than that of a 65 year old donor with eGFR 70ml/min/1.73m^2 (0.39% vs. 0.15%)¹⁰. Therefore, ignoring the physiological age-related decline in kidney function may have important implications for selecting living kidney donors.

The second key observation of our analysis is that kidney donation has acceptable short-term functional consequences, even for donors with low pre-donation GFR ($<80\text{ml/min/1.73m}^2$). The

relative change in eGFR in elderly donors with lower eGFR is similar to the one observed in younger donors with higher eGFR. Notably, the level of pre-donation eGFR does not influence the relative post-donation GFR loss, with a relative reduction of less than one third for all ages and baseline GFR groups, suggesting that the ability to compensate the post-nephrectomy loss of renal function in older donors is similar to that of younger ones, as previously reported by others

29.

The third key observation of this study is that the hypothetical age of reaching ESKD in our donor population is always far beyond any of the donors expected life expectancy, regardless of pre-donation eGFR, age or gender, even though donors with pre-donation eGFR $<80\text{ml/min/1.73m}^2$ will reach ESKD 20-25 years earlier than those with pre-donation eGFR $\geq 90\text{ml/min/1.73m}^2$. Finally, in addition to the hypothetical age of reaching ESKD, estimation of eGFR 30 years post-donation could be an even more important long-term prognostic marker post kidney donation, since low eGFR has been associated with cardiovascular morbidity and mortality³⁰. Among the 30 donors who are predicted to reach stage 4 CKD after 30 years, 87% of them would be over 90 years of age at the time their eGFR would drop $<30\text{ml/min/1.73m}^2$. The predicted incidence of CKD stage 4 in donors reaching 90 years of age is 3-fold higher than that reported in a geriatric population over 85 years of age³¹. Interestingly, the presence of complications such as anemia, an elevated PTH or an elevated serum phosphorus level are uncommon in the very elderly with reduced kidney function^{32, 33}, thus suggesting that the low eGFR in older age without other evidence of kidney damage may not necessarily represent disease.

It is essential to keep in mind that the donor eligibility criteria of the AKX program introduce a selection bias because of the competing interests between quality of the donated kidney and donor safety. For a donor to be accepted, the AKX program must guarantee that the quality of the kidney being offered is sufficiently high, with at least an absolute nGFR of 40ml/min , in order to reassure the transplanting unit that they can accept the organ that is donated to their recipient. Thus, all stakeholders in Australia agreed on a minimum absolute GFR of 80ml/min (with less than 55/45 split function if $\text{GFR}<90$). On the other hand, the program's donor eligibility guidelines do not prescribe an actual minimum eGFR for the donor acceptance and this is left at the discretion of the unit that has assessed the donor. Each unit may have a different threshold of a minimum corrected eGFR at which they accept or refuse donor. Generally a tendency to more conservative approach about the lower limit of eGFR in favour of the donor is observed, regardless of nGFR. Therefore, donors with an acceptable nGFR by AKX criteria may not be accepted for donation if their eGFR is low, more so in younger donors, rather than older donors. Thus, although all donors in this study had an absolute nGFR $>80\text{ml/min}$, none of those aged 50 years or younger had pre-donation a eGFR $<80\text{ml/min/1.73m}^2$. This aspect is important, because

we do not advocate that a threshold of nGFR $>80\text{ml/min}$, regardless of eGFR is safe for the donor.

Obviously, even in the healthy non-donor population the individual lifetime risk of developing advanced-stage CDK or ESKD is greater than 0% if variability is properly taken into account. The individual pre-donation projected risk of ESKD in the absence of kidney donation can be estimated using the model proposed by Grams et al. developed for adults in the United States¹⁰. It does not take into account any added risk a donor might incur due to the nephrectomy or resultant single kidney status. However, currently there are no accurate tools to predict the lifetime post-donation risk of ESKD according to pre-donation donor candidate's characteristics and post donation eGFR. Our study has some limitations. First, the sample size is relatively small and the follow-up is limited to 1-year post-donation. Nevertheless, it has been demonstrated that single kidney function remains stable from early (median, 0.8 years) to late (median, 6.1 years) after kidney donation³⁴. Second, our donor cohort may not be representative of the broad population of live donors. In the AKX program, in addition to require an uncorrected mGFR $\geq 80\text{ml/min}$ for donor candidates to be accepted, the program strictly excludes patients with urinary protein/creatinine ratio $>20\text{mg/mmol}$, age ≥ 70 years, BMI $>35\text{kg/m}^2$, diabetes mellitus, treated hypertension requiring >2 agents to control, which differs from the risk-profile of the general donor population in Australia³⁵, and, consequently, our data may not be sufficiently generalizable. Nevertheless, in relation to age and GFR our cohort is similar to many other previously studied cohorts of healthy individuals³⁶⁻³⁸. In conclusion, data from the Australian KPD living donor cohort, selected based on a raw mGFR of at least 80ml/min , demonstrates that kidney donation has acceptable short-term functional consequences, even for donors with low pre-donation eGFR ($<80\text{ml/min/1.73m}^2$), with 75% of donors showing a drop of $\leq 35\%$ in post-donation eGFR compared to pre-donation and 70% having an eGFR $\geq 60\text{ml/min/1.73m}^2$ at 1-year post-donation. Over 30% of these donors accepted in the AKX program would have been excluded from live kidney donation using KDIGO guidelines. Prediction of long-term kidney function indicate that up to 23% of donors who meet the AKX kidney function acceptance criteria would reach an eGFR of $<30\text{ml/min/1.73m}^2$ 30-year post-donation and that the majority of these donors were aged ≥ 50 years, reaching CKD stage 4 at a median age of 90 years (95%CI 74-102). Although these data are reassuring, long-term outcome data on AKX donors with low eGFR will need careful monitoring.

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Table 1: Baseline donor characteristics Results are reported as mean $\pm$ SD or number (and percentage).

	Total (n=129)	<40 (n=16)	40-49 (n=33)	50-59 (n=37)	≥ 60 (n=43)	p-value
Age (years)	53 $\pm$ 11	34 $\pm$ 4	45 $\pm$ 3	55 $\pm$ 3	64 $\pm$ 3	
Male gender (n, %)	73 (57%)	7 (44%)	18 (54%)	18 (49%)	30 (70%)	0.16
Weight (kg)	77 $\pm$ 14	73 $\pm$ 14	78 $\pm$ 17	77 $\pm$ 15	77 $\pm$ 9	0.61
Height (cm)	170 $\pm$ 10	172 $\pm$ 7	171 $\pm$ 11	168 $\pm$ 10	170 $\pm$ 9	0.41
BMI (kg/m²)	26.6 $\pm$ 3.5	25.0 $\pm$ 4.0	26.7 $\pm$ 4.1	27.2 $\pm$ 3.3	26.6 $\pm$ 2.6	0.21
Blood pressure (mmHg)	123/ 75 $\pm$ 11/ 7	117/ 72 $\pm$ 8/ 6	121/ 76 $\pm$ 10/ 6	123/ 74 $\pm$ 13/ 9	126/ 75 $\pm$ 10/ 7	0.05/ 0.34
Hypertension (n, %)	23 (18%)	-	3 (9%)	8 (22%)	12 (28%)	0.04
Impaired glucose tolerance (n, %)	1 (0.8%)	-	1 (3%)	-	-	0.39
Impaired fasting glucose	7 (5%)	2 (13%)	-	1 (0.8%)	4 (3%)	0.15
Renal stones (n, %)	9 (7%)	-	-	5 (13%)	4 (9%)	0.09
uPCR (mg/mmol)	7.9 $\pm$ 4.6	7.6 $\pm$ 4.2	8.2 $\pm$ 4.2	7.3 $\pm$ 4.3	8.4 $\pm$ 5.2	0.71

BMI = body mass index, uPCR = urine protein creatinine ratio

Impaired fasting glucose was defined as glucose levels of 5.6 to 6.9 mmol/l in fasting patients.

Impaired glucose tolerance was defined as two-hour glucose levels of 7.8 to 11.0 mmol/l on the 75-g oral glucose tolerance test.

Table 2: Measured and calculated GFR at baseline, calculated GFR at 12 months and extrapolated eGFR at 30 years post-kidney donation. Results are reported as mean $\pm$ SD or 95%confidence interval or number (and percentage), respectively.

	Total (n=129)	<40 (n=16)	40-49 (n=33)	50-59 (n=37)	≥60 (n=43)	p-value
Measured GFR						
Raw (ml/ min)	108±18	121±17	116±15	107±19	99±13	<0.001
Corrected (ml/ min/ 1.73m ²)	99±18	112±17	106±17	98±18	90±13	<0.001
Pre-donation eGFR						
eGFR (ml/ min/ 1.73m ²)	94 ±13	104±14	101±9	92±11	85±10	<0.001
eGFR<80 (n, %)	19 (15%)	1 (6%)	-	5 (13%)	13 (30%)	<0.005
eGFR<90 (n, %)	42 (33%)	3 (19%)	4 (12%)	16 (43%)	19 (44%)	<0.01
eGFR 12 months post-donation						
eGFR (ml/ min/ 1.73m ²)	68±15	84 ±18	73±14	66±15	61±10	<0.001
eGFR<60 (n, %)	39 (30%)	2 (12%)	6 (18%)	12 (32%)	19 (44%)	<0.05
eGFR Difference between pre-donation and 12-month post-donation eGFR						
Absolute reduction (ml/ min/ 1.73m ² , 95%CI)	25 (23-27)	20 (16-25)	28 (24-32)	26 (22-30)	24 (22-27)	0.089
Relative reduction (% 95%CI)	27 (25-29)	20 (16-25)	28 (24-32)	28 (25-32)	28 (25-31)	0.047
eGFR 30 years post-donation						
eGFR (ml/ min/ 1.73m ² , 95%CI)	50 (29-83)	63 (35-99)	52 (35-86)	46 (29-78)	43 (25-59)	<0.001
eGFR<30 (n, %)	9 (7%)	-	1 (3%)	3 (8%)	5 (12%)	0.32

Figure Legend

Figure 1: Pre-donation glomerular filtration rate GFR by age groups: measured GFR not corrected for body surface are in ml/ min (white boxes), corrected measured GFR in ml/ min/ 1.73m² (light grey boxes) and estimated GFR by CKD-EPI in ml/ min/ 1.73m² (dark grey boxes).

Figure 2: Post-donation glomerular filtration rate (eGFR) by age groups: eGFR at 1-year post-donation (light grey boxes) and predicted eGFR at 30 years post-donation (dark grey boxes).

Figure 3: Difference between pre- and 1-year post-donation glomerular filtration rate (eGFR) by pre-donation eGFR groups: absolute eGFR difference (light grey boxes) and percentage eGFR difference (dark grey boxes).

Figure 4: Post-donation glomerular filtration rate (eGFR) by pre-donation eGFR groups: eGFR at 1-year post-donation (light grey boxes) and predicted eGFR at 30 years post-donation (dark grey boxes).

References

Fig. 1

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Fig. 3

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Fig. 4

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Fig. 2

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