Donor Tubular Phosphate Handling and Recipient Outcomes after Living Kidney Transplantation

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Introduction

- Identification of pre-transplantation (pre-Tx) donor factors associated with recipient outcomes may help to improve prognosis after kidney transplantation
- The extent of tubulo-interstitial damage is a strong prognostic determinant after kidney transplantation
- Tubular injury reduces NaPi cotransporters and phosphate transport

Objective

To investigate whether pre-Tx parameters of phosphate metabolism in living donors are associated with recipient outcomes after transplantation

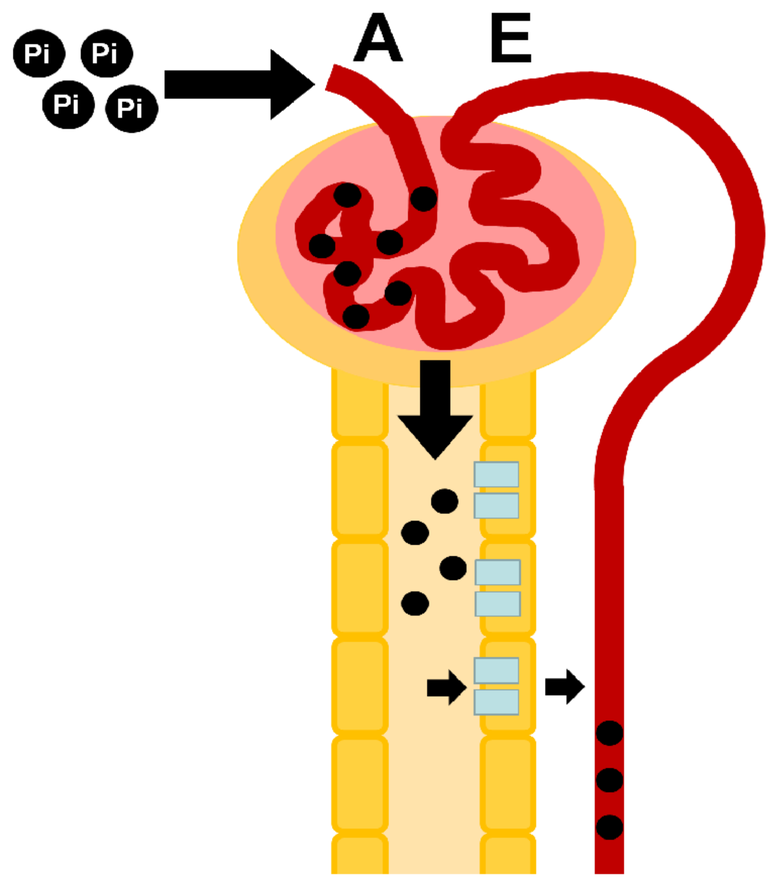

Fig 1: Renal phosphate handling

Methods

In living kidney donors (*n=130*) ***before transplantation***, we determined renal function (^{125}I-iothalamate GFR), NGAL and KIM-1, and several parameters of phosphate metabolism including TmP-GFR (tubular maximum phosphate reabsorption per GFR):

TRP = 1 – ((Uphosphate / Pphosphate) * (Pcreatinine /Ucreatinine * 1000))
- If TRP was <= 0.86, TmP-GFR was calculated as:
TmP/GFR = TRP * Pphosphate
- If TRP was > 0.86, TmP-GFR was calculated as:
0.3 * TRP/(1-(0.8*TRP)) * Pphosphate

Primary outcome: GFR (^{125}I-iothalamate) in matched recipients at 1 year post-Tx

Associations between pre-Tx donor factors and recipient post-Tx GFR were tested by multivariate linear regression

	St. Beta	P value
Serum phosphate	0.75	<0.001
Urine phosphate	-0.39	<0.001
PTH	-0.27	0.002

Table 2: Multivariate determinants of TmP-GFR

Results

	Recipient GFR 1 yr post-Tx	
	St. Beta	P
Donor pre-Tx TmP-GFR	0.28	0.000
+ donor age and gender	0.24	0.003
+ donor predonation GFR	0.23	0.003
+ donor predonation SBP	0.22	0.005
+ donor predonation PTH, FGF23	0.25	0.01
+ recipient age, gender	0.27	0.02
+ LR vs LUR	0.28	0.01

Table 1: Multivariate regression: consistent association between donor pre-Tx TmP-GFR and recipient post-Tx GFR

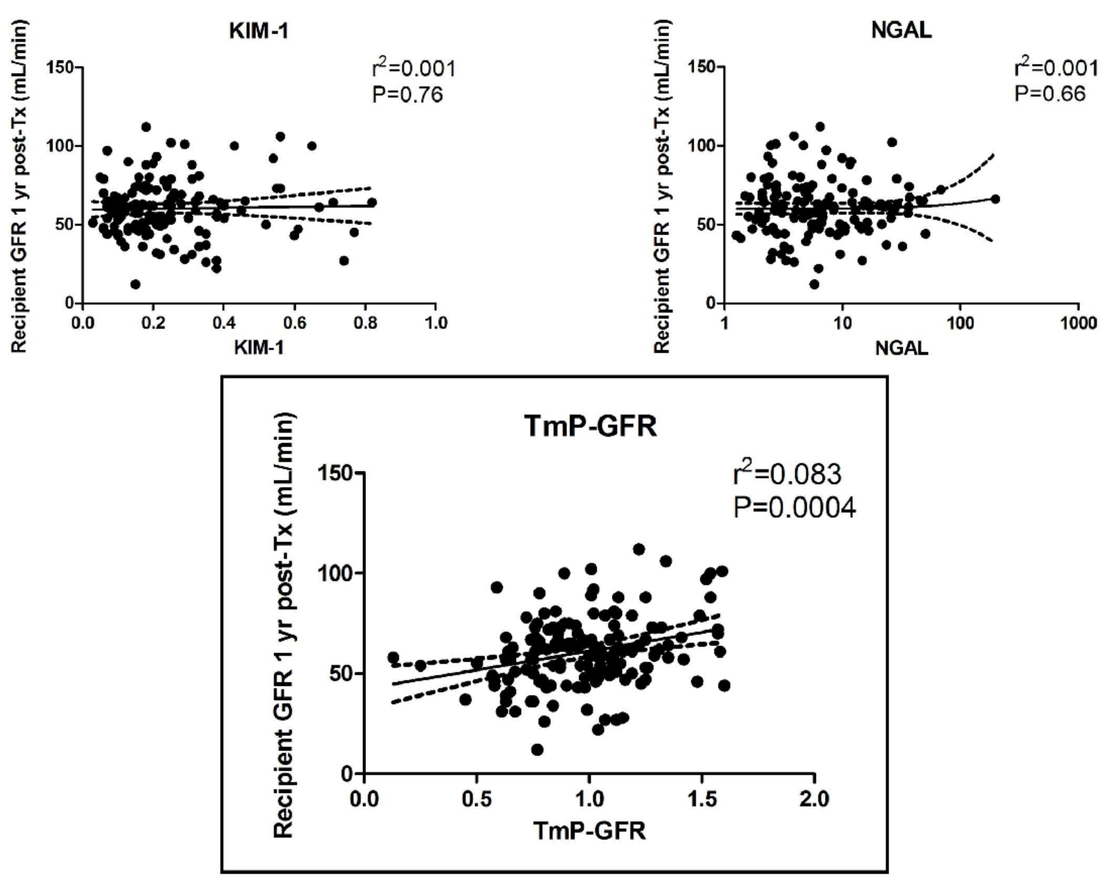

Fig 2: Donor pre-Tx TmP-GFR, but not KIM-1 or NGAL, are associated with post-Tx recipient GFR

Conclusion:

To our knowledge, donor predonation TmP-GFR is the first functional tubular marker that can predict recipient outcome after transplantation, independent of recipient age and GFR

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