Pre-Donation Serum NGAL to Assess the Quality of DBD and DCD Kidneys – A Pilot Study

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INTRODUCTION

- A successful renal transplant is associated with a significant improvement to a patient's quality-of-life and, for most, also results in a prolonged life expectancy¹.
- Delayed graft function and primary non-function are unwanted outcomes in some transplanted kidneys, with DCD organs being affected more than DBD².
- The major reason for this trend is a longer warm ischaemic time in DCD donors leading to hypoxic injury and acute tubular necrosis (ATN)³.
- There is ongoing interest in discovering biomarkers to assess kidney graft function prior to donation to predict outcomes^{4,5}.
Neutrophil Gelatinase-Associated Lipocalin (NGAL) is a biomarker which has been shown to be sensitive in detecting acute kidney injury (AKI)⁶. Levels rise acutely in kidney injuries many hours before a change in eGFR will be apparent. An accepted diagnostic serum level is 150ng/ml.

METHOD

- A retrospective study was designed to assess correlation between NGAL levels in serum of DBD/DCD donors immediately prior to retrieval and post-transplant kidney function.
- The source of serum samples was the *QUOD* tissue bank and donor samples were selected according to recipients' kidney function 12 months after transplant. The authors applied to the tissue bank in September 2015 for the procurement of 40 serum samples.
- In total 20 DBD and 20 DCD samples were analysed; half of the samples in each group had **good function** 12 months post-transplantation (GFR >50) and half had **poor function** (GFR <25).
- Serum NGAL levels were measured using an Alpha Laboratories NGAL ELISA assay kit (human).
- Results were tabulated alongside detailed donor information and analysed using IBM SPSS Statistics 23.
- The primary outcome measured was the recipient's eGFR at 12 months.

RESULTS

	Group 1	Group 2	Group 3	Group 4
Group Description	DBD 12-m GFR <25	DBD 12-m GFR >50	DCD 12-m GFR <25	DCD 12-m GFR >50
Donor Age (Yrs)	Median 54.5 Mean 57.8	Median 57 Mean 51.7	Median 58.5 Mean 56.2	Median 39.5 Mean 38.5
12 month GFR	Median 19 Mean 18.4	Median 67.5 Mean 75.1	Median 20 Mean 19.1	Median 66.5 Mean 75.1

- Across the four sub-groups there was a 50:50 split of standard criteria (SCD) and extended criteria donors (ECD).
- 42.5% of all donors had an AKI diagnosed by serum NGAL levels (NGAL-AKI, serum concentration >150ng/ml), but only 12.5% had an AKI based on serum creatinine.
- There was no statistically significant difference in serum NGAL levels between groups 1&2 ($p=0.741$) and groups 3&4 ($p=0.396$).
- In kidneys with poor 12-month function (GFR <25), 60% were from ECDs (80% in the DBD group, 40% in DCDs).
- 66.7% of kidneys with poor 12-month function and NGAL-AKI, were from ECD donors.
–This was the case for both DBD and DCD donors.
- In contrast, only 35% of kidneys that achieved good function at 12 months were from ECDs (50% in the DBD group, 20% in DCDs).
- Only 18.2% of kidneys with good function at 12-months had NGAL-AKI
–20% in DBDs
–17.7% in DCDs

CONCLUSIONS

- A high proportion of deceased donors have an NGAL confirmed AKI despite having a 'normal' pre-donation serum creatinine level.
- Graft kidneys with poor 12-month outcomes are more likely to be from ECDs. This effect appears to be more marked in DBDs.
- ECD kidneys with AKI diagnosed by serum NGAL are more likely to have a poor outcome at 12 months.
- This is in-keeping with current evidence and outcomes within the transplant community.
- To carry this pilot study forward, the authors will investigate the benefit of serum NGAL testing in ECD donors in order to better predict outcomes.
- Power calculations suggest a minimum sample size of 80 patients in each arm would be required to provide results with a power value of 90%.

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