

Estimating Residual Kidney Function in haemodialysis patients using serum biomarkers.

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BACKGROUND:

Residual kidney function (RKF) can contribute significantly to overall solute clearance in patients receiving haemodialysis (HD) and has been shown to provide a number of clinical benefits. Measurement of RKF is required to safely perform incremental dialysis but is cumbersome, entailing regular inter-dialytic urine collections. If serum markers could be used to estimate RKF it would eliminate the need for these collections. We have previously demonstrated that RKF can be estimated using serum Beta-2microglobulin (B2M) and Beta-Trace Protein (BTP). We have also demonstrated strong correlations between residual GFR and another middle molecule, Tumour Associated Trypsin inhibitor (TATI), and a number of Protein-bound solutes (PBS), particularly, Indoxyl sulphate (IS), Indole Acetic Acid (IAA). This study was carried out to ascertain whether the addition of serum levels of any of these biomarkers to models of residual GFR based on B2M and BTP, improved estimates of residual GFR.

METHODS:

We measured glomerular filtration rate GFR (mean of urea and creatinine clearance) using inter-dialytic urine collection. Pre-dialysis blood samples were collected to measure serum creatinine BTP, B2M, TATI and plasma PBS molecules in 100 HD patients. Linear regression models were constructed of residual GFR incorporating serum biomarker levels and other relevant demographic and clinical variables.

RESULTS:

Mean age of participants was 67.3 ± 15.6 years. Sixty-one were male, and 74 white. Median GFR was 3.0 (IQR 4.1) ml/min. Eleven were anuric – defined as passing less than 100ml/day of urine. The best model of residual GFR based on serum B2M and BTP levels is shown in the table (adjusted R square 0.690)

We then explored adding reciprocals of measured serum levels of TATI and PBS to this model. The best improvements to the model occurred with reciprocal TATI (adjusted R square 0.701), reciprocal free Indoxyl sulphate (adjusted R square 0.707) and reciprocal free IAA (adjusted R square 0.709)

CONCLUSION:

The addition of the reciprocal of serum TATI, free IS and free IAA to a model based on serum B2M and BTP levels provided a marginally better estimate of residual GFR. Findings require confirmation in a larger group of patients and potential clinical applications explored