

## Pre-operative predictors of 3 month post- liver transplant renal function

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### Introduction

Post-operative renal function has a major impact on quality of life and long-term survival post liver transplant. Predicting post-operative renal function from pre-operative data is important in the informed consent process, choosing immunosuppression, and may have a role in identifying those needing combined renal-hepatic allografting.

### Aim

To identify pre-operative predictors of 3 month post-liver transplant renal function.

### Methods

We performed a 5-year retrospective service improvement exercise to identify those at risk of post-graft renal dysfunction. Data were collected on adult (>18 years of age) liver transplant recipients in Leeds, UK between 1st January 2010 and 31 December 2014, as part of the UKT audit set, the ICNARC audit set and an automated electronic patient record. Data bases were combined in anonymised form in an Excel spreadsheet and were manually and electronically checked for errors. Missing data points were replaced where possible from source data. No data from our paediatric program were included. The data set was copied into IBM SPSS statistics version 23. We then grouped data into significant outcomes, pre-operative factors, and peri-operative factors. Data were analysed by backward multiple regression analysis modelling 3 month post-operative creatinine against pre-operative data.

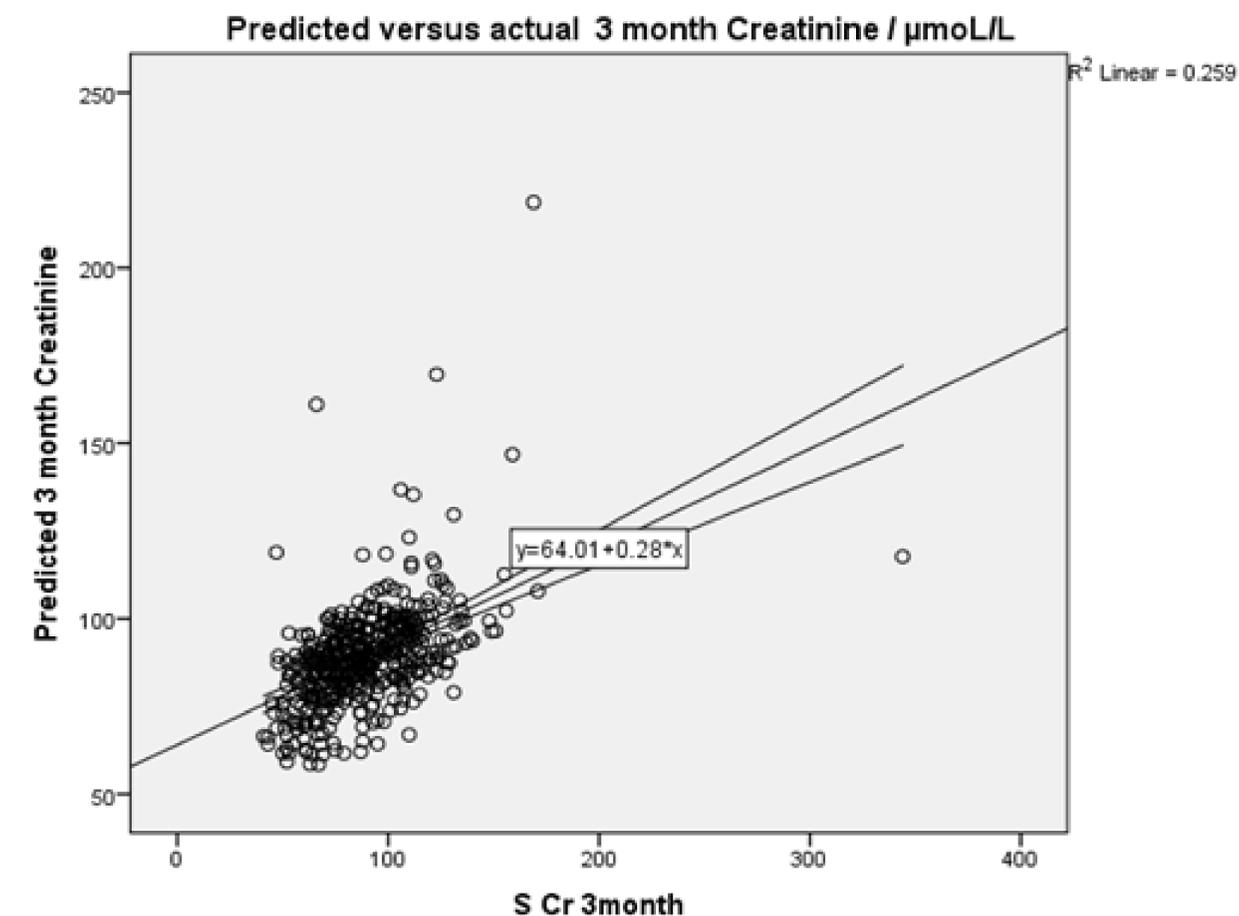
### Results

During the period we conducted 497 orthotopic adult liver transplants (323 male, 174 female) across all diagnostic categories. Median age was 53 years (interquartile range 45-60). Grafts from brain-stem dead (401), non-heart-beating (79) and living donors (17) were employed. Indications were broadly classified into: primary biliary cirrhosis, primary sclerosing cholangitis, Alcoholic liver disease, hepatitis B cirrhosis, hepatitis C cirrhosis, Acute hepatic failure, Cancers, Metabolic liver disease, Others.

Mean pre-operative serum creatinine was 91 (SD 62.1)  $\mu\text{mol/l}$ , and 54 patients were dialysis-dependent at the time of transplantation. Mean 3-month post-transplant creatinine was 89.21 (SD 26.83)  $\mu\text{mol/l}$ .

We considered a total of 30 predictor variables for a model with 435 degrees of freedom. Of these, 6 pre-operative variables were independently predictive of 3-month serum creatinine. For the overall model,  $r=0.503$ ,  $r^2=0.253$ ,  $P<0.001$ . Predictive variables were: age, history of hypertension, metabolic disorder, use of diuretic therapy, preoperative serum creatinine and serum bilirubin.  
3 month creatinine =  $0.67(\text{age}) - 6.34(\text{if history of hypertension}) + 0.21(\text{preoperative creatinine } \mu\text{mol/l}) + 7.3(\text{if metabolic liver disease}) - 0.028(\text{serum bilirubin } \mu\text{mol/l}) - 6.0(\text{if diuretic therapy}) + 43.31$ .

The predictive model compares with actual outcomes as shown in the graph:



### Conclusions

Our data is helpful to predict 3-month post-operative renal function from purely pre-operative data. This is potentially valuable in preoperative planning and decision making. Our model accounts for 25% of the variability in post-operative creatinine at 3 months. Other variability is likely to be explained by intra-operative factors (blood loss etc) and post-operative factors. However these in general are not “knowable” at the time of planning and decision making. Further work is required to establish whether potentially modifiable perioperative factors such as ischaemic time have a useful bearing on post-operative renal function at 3 months.

### References

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- 3: Hilmi IA et al. Acute kidney injury following orthotopic liver transplantation: incidence, risk factors, and effects on patient and graft outcomes. Br J Anaesth. 2015 Jun;114(6):919-26.