The Predictive Value of Serum Urea and Renal Function in Patients with Heart Failure

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Background: Renal function as well as urea are frequently abnormal in patients with heart failure and are predictive of increased mortality. The relative importance of each parameter is less clear.
Objectives: To prospectively compare the predictive value of renal function and serum urea on clinical outcome in patients with HF.
Methods: We prospectively enrolled 362 patients hospitalized with clinical HF. Patients were followed for short term (1 year) and long term (mean 6.5 years) clinical outcome.
Results: Discharge serum urea and BUN/Creatinine ratio were significant predictors of reduced survival at one year and of long term follow-up on multivariate Cox regression analysis, e.g. Log Urea: HR 3.0, 95% CI 1.7-5.4, P<0.00001. Reduced survival was seen in each of the tertiles of serum urea with 86% mortality in the highest tertile, compared with 55% in the lowest tertile at long term follow-up (Figure 1). Decreasing tertiles of discharge estimated glomerular filtration rate (eGFR) were a significant predictor of reduced long term but not short term survival. Including eGFR and serum urea together in the multivariate analysis demonstrated that serum urea remained a significant predictor of reduced survival while eGFR was no longer significant. Inclusion of eGFR and BUN/Creatinine demonstrated that BUN/Creatinine was independently significant in addition to eGFR suggesting that urea has additional significance as a predictor even after adjusting for renal function. Decreasing tertiles of serum urea was also a significant independent predictor of the probability of heart failure re-hospitalization and the combined end point of death and heart failure re-hospitalization.
Conclusions: Serum urea is a more powerful predictor of outcome compared to eGFR in patients with HF. Serum urea represents several biological parameters including renal function, intravascular volume, hemodynamics and the neurohormonal axis. Urea may be a more comprehensive marker of the general clinical status of patients with HF.

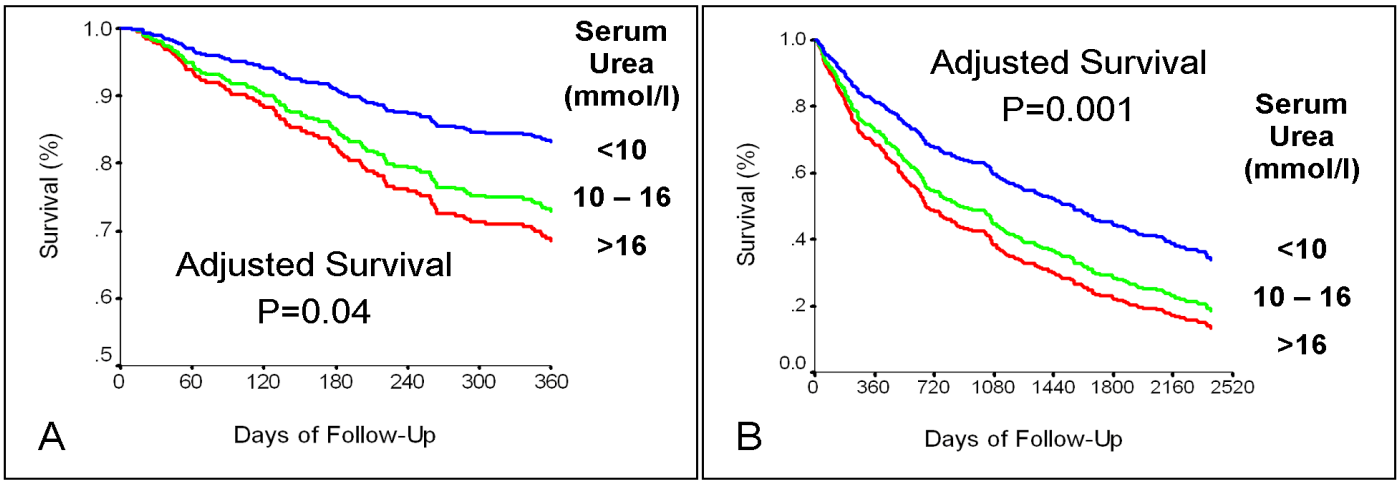

Figure 1: Cox regression adjusted one year (A) and long term (B) survival curves according to tertiles of discharge serum urea. Higher urea tertiles predicted reduced survival.