

Abstract Submission No.: A-0187

Urinary Cystatin C as a Potential Risk Marker for Predicting Kidney Outcomes in Type 2 Diabetes Mellitus

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Objectives : Early identification of patients with progressive chronic kidney disease (CKD) might offer opportunities for interventions. Currently, limited surrogate biomarkers reliably predict CKD progression. Urinary cystatin C levels have been recognized as a marker of renal tubular dysfunction independent of changes in kidney function. This study aims to elucidate the association between urinary cystatin C and kidney disease progression in patients with type 2 diabetes mellitus (T2DM).

Methods : A prospective cohort study involving 257 patients with T2DM was conducted. Baseline values of the urine cystatin C-creatinine ratio (UCCR) were measured. The composite kidney outcome considered patients who developed progressive DKD (ESKD, a 40% decline in eGFR, or death).

Results : The median follow-up was 7 years. Progressive DKD was noted in 34.2% of patients. Among those with T2DM, the UCCR was significantly higher in the progressive DKD group than in the non-progressive DKD group. After adjusting for covariable factors, the highest quartile of UCCR showed a significant association with the composite kidney outcome (adjusted hazard ratio, 3.34; 95% CI 1.69 to 6.62) when compared to the lowest quartile of UCCR. The Kaplan–Meier curves for progressive DKD revealed a clear separation between patients stratified by high versus low baseline urine biomarker concentrations (urinary cystatin C above 3.34 mcg/g; $P < 0.001$, log-rank test). The diagnostic performance of UCCR for the composite kidney outcome remained significant (AUC = 0.70; CI, 0.63 to 0.77; $P < 0.0001$), with optimal cut-off values at 3.35 mcg/g of UCCR (sensitivity 67.0%, specificity 70.2%).

Conclusions : This study demonstrates that elevated urinary tubular levels of cystatin C are significantly associated with kidney progression and long-term kidney outcomes in patients with T2DM. The data from this study suggest that urinary cystatin C could serve as a CKD risk factor in T2DM patients.