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A Scoring System For the Progression of Chronic Kidney Disease Progression Based on Urinary Electrolytes: Results from KNOW-CKD

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Objectives: Urinary electrolytes can signify kidney tubular function and some of these may also mirror dietary patterns. Here, we developed a novel scoring system based on urinary electrolytes and tested whether this system could predict the progression of chronic kidney disease (CKD).

Methods: A total of 2,115 patients with CKD G1 to G5 without kidney replacement therapy were enrolled from KNOW-CKD (KoreaN Cohort Study for Outcomes in Patients With CKD). Using cause-specific model, we obtained a beta coefficient for four urinary electrolytes: sodium, potassium, chloride, and calcium. The scoring system was based on the sum of the beta coefficient multiplied by each electrolyte concentration. We then categorized into low, intermediate, and high score groups according to the tertile of total score. The primary outcome was CKD progression, which was a composite of a ≥50% decline from baseline estimated glomerular filtration rate (eGFR) or kidney failure with replacement therapy. The predictive performance was tested with C-statistics and compared among eGFR, proteinuria, and electrolyte score-based models. The final model was internally validated using 1,000 bootstrap samples.

Results: The mean age of study subjects was 53.6±12.2 years and 1,292 (61.1%) were male. During a median follow-up of 5.5 years, the primary outcome events occurred in 736 (34.9%) patients: 63 (8.9%), 207 (29.4%), and 466 (66.3%) in low, intermediate, and high score groups, respectively. In cause-specific model after adjustment of confounding factors, the hazard ratios (95% confidence intervals) for the intermediate and high groups were 3.50 (2.63-4.67) and 6.61 (4.90-8.92), respectively, compared with the low score group. C-statistics was highest for eGFR-based model, but comparable between proteinuria- and electrolyte score-based models. Internal validation of 1,000 bootstrap samples showed good discrimination and calibration.

Conclusions: In this prospective cohort study, a scoring system using four urinary electrolytes may aid in predicting the progression of CKD.