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From Microscopic to Macroscopic View

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In this session we will go through the topic AKI in two aspects. Microscopically, we will focus on the potential new AKI biomarker development and macroscopically, we will discuss the regional AKI epidemiology of hospitalized patients.

Over the last decade there is significant progress in the development of biomarkers. Many novel AKI biomarkers have emerged as potentially promising predictors of AKI development and outcome. It might guide the diagnosis and management of AKI. Mitochondrial dysfunction has been found to contribute to the pathogenesis of acute kidney injury (AKI). The urinary mitochondrial DNA (mtDNA) level was previously shown to predict renal function recovery in AKI following cardiac surgery. Herein, we determine whether urinary mtDNA is a marker of severity and predictor of recovery in AKI due to other etiologies. We recruited 107 AKI patients and their urinary mtDNA level was measured. The severity of AKI was quantified, and the patients were followed for 90 days. We found that the urinary mtDNA level had modest but statistically significant correlations with the peak serum creatinine level (Spearman's $r = -0.248$, $p = 0.010$) and the duration of hospital stay ($r = -0.217$, $p = 0.025$). Patients who required temporary dialysis also tended to have higher urinary mtDNA levels than those without dialysis (22.6 ± 4.5 vs. 24.9 ± 5.7 cycles, $p = 0.06$). There was no definite relation between the urinary mtDNA level and renal function recovery. The urinary mtDNA level is a marker of AKI severity, as reflected by its significant correlation with the peak serum creatinine level, duration of hospital stay, and probably the need for temporary dialysis. Our study suggests that urinary mtDNA has the potential to serve as a biomarker of AKI.

Acute kidney injury is a common problem in hospitalized patients and is associated with poor clinical outcome. We studied the incidence, severity, and short-term outcome of AKI amongst patients admitted to a general hospital in Hong Kong. All hospital admission to a regional hospital of Hong Kong in 2012 were reviewed in a retrospective cohort study. Serum creatinine levels before, during, and after the hospitalization were retrieved from the electronic health record. AKI episodes were identified by the serum creatinine criteria of the Kidney Disease: Improving Global Outcomes (KDIGO) AKI guideline. We found that among the 125,517 adult hospital admissions, AKI was present in 11456 episodes (9.1%) of 6280 patients. With a catchment of 523,831 adults, the annual population incidence of AKI was 2.2%. Amongst the stage 2 or 3 episodes, 806 (56.4%) were admitted to the medical unit, 144 (4.5%) required temporary dialysis support, median hospital stay was 8 days (Inter-Quartile Range [IQR] 4 to 16 days), and only 68.9% had complete recovery. Recurrent AKI episode developed in 2326 patients (37.0%), and 1129 (18.0%) had more than one recurrent episode. The median time to the recurrent AKI episode was 26 days (IQR 12 to 58 days). AKI was present in 9.1% of all adult hospital admissions in Hong Kong. A substantial proportion of patients developed recurrent AKI episodes or did not have complete recovery. Further research should be directed to the identification of risk factors and prevention measures for AKI recurrence.