

New Biomarkers of AKI

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Acute kidney injury (AKI) is a common and potentially life-threatening complication in hospitalized patients. The current paradigm for diagnosis of AKI relies largely on serum creatinine or urine output. However, these markers are known to be insensitive and renal dysfunction only becomes evident when more than 50% of the renal mass is compromised. Therefore there may be significant time lag (hours to days), often leading to a late diagnosis of AKI with resultant adverse outcomes. Therefore, earlier detection of AKI necessitates the use of other more accurate plasma or urinary biomarkers. These biomarkers can be classified into two broad classes representing changes in renal function (e.g., serum creatinine or cystatin C, and urine output) and those reflecting kidney damage (e.g., proteinuria, urine and serum neutrophil gelatinase-associated lipocalin [NGAL], kidney injury molecule 1 [KIM-1] and liver-type fatty-acid binding protein [LFABP]). Concurrent utilization of functional and renal tissue damage biomarkers may permit improved understanding of the mechanism and pathophysiology of AKI, and facilitate the determination of prognosis and guide therapeutic interventions. AKI affects multiple complex molecular pathways involving immunity, inflammation, apoptosis, and cell cycle pathways. Renal tubular cells enter a period of G1 cell-cycle arrest after ischemia or sepsis. Recent study demonstrated that urine tissue inhibitor of metalloproteinases-2 (TIMP-2) and insulin-like growth factor-binding protein 7 (IGFBP7), markers of cell-cycle arrest, performed better than any other biomarker reported to date for predicting development of moderate to severe AKI. Taken together, recent discoveries of new biomarkers for AKI are changing the landscape of how we can detect and treat AKI. However, these novel biomarkers need to be validated through future studies, and additional evidence will be required to establish the best combinations of biomarkers for their utilization in every day clinical practice.