NGAL: a biomarker to assess AKI risk & severity in critically ill children

Integration of urinary neutrophil gelatinase-associated lipocalin with serum creatinine delineates acute kidney injury phenotypes in critically ill children

- Increased urinary NGAL identifies patients likely to have persistent kidney injury.
- Low urinary NGAL predicts reversible kidney injury.
- Use of biomarkers may permit a personalized and proactive approach to management.

Urine neutrophil gelatinase-associated lipocalin is an early marker of acute kidney injury in critically ill children: a prospective cohort study

- uNGAL concentrations rose 48 hours before a 50% or greater rise in SCr, in a heterogeneous group of critically ill children.
- uNGAL is good diagnostic marker of AKI in settings in which the timing of kidney injury is unknown.

Urinary neutrophil gelatinase-associated lipocalin (NGAL) and serum cystatin C measurements for early diagnosis of acute kidney injury in children admitted to PICU

- uNGAL and s-Cys-C predicts AKI early in critically ill children: uNGAL SN=0.73 | SP=0.90 | AUC=0.76


Impact of near real-time urine neutrophil gelatinase-associated lipocalin assessment on clinical practice

- The uNGAL$_{\text{DYN}}$ can guide management, serving as clinical decision support.
- NGAL is not dialyzed, and thus uNGAL$_{\text{DYN}}$ can be used to track renal recovery or disease progression during renal replacement therapy.
- Positive uNGAL$_{\text{DYN}}$ predicts tubular damage–associated AKI and oliguria at a time when concurrent sequential measurements of creatinine are decreased.
- Negative uNGAL$_{\text{DYN}}$ is indicative of tubular recovery and responsiveness (with associated urine production) and thus indicates AKI prognosis.
- Negative uNGAL$_{\text{DYN}}$ predicts response to therapy in response to loop diuretic administration (theragnosis).


- Incorporation of urinary biomarkers into the RAI model predicts severe and persistent AKI with an AUC-ROC of 0.97
- Day$_3$ AKI is associated with worse clinical outcomes including ICU mortality, increased duration of ICU LOS, prolonged mechanical ventilation and was associated with a greater number of organ failure days than the absence of AKI.
- Testing of a biomarker in a targeted, risk-stratified patient (i.e. renal angina positive) offers a real-time predictive advantage for a treating clinician.


- uNGAL concentration predicted AKI development correctly in 84% of children, up to 24 hours before a rise in SCr became apparent: uNGAL SN=0.84 | SP=0.86 | NPV=0.93 | AUC=0.815
- uNGAL concentrations at admission seems to be a reliable marker for identifying children who will develop AKI within 48 hours following admission.