

## Early Prediction of Acute Renal Injury Following Cardiac Catheterization

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**Background:** Contrast agents are well known nephrotoxins, and the incidence of acute renal failure (ARF) is estimated to be 15% of all patients following cardiac catheterization. In clinical settings, ARF is typically diagnosed by measuring serum creatinine. This is an unreliable indicator during ARF. The lack of early biomarkers for ARF in humans has crippled our ability to effectively treat patients in a timely manner. Recent studies have identified neutrophil gelatinase-associated lipocalin (NGAL) as a novel predictive biomarker of ARF following cardiopulmonary bypass surgery.

Apart from elevated levels of urinary biomarker after contrast administration, there is a possibility that protective proteins in the kidney might help renal tubule cells escape injury, which could be identified before catheterization. Identification of these protective proteins may have immense value not only for risk stratification prior to contrast administration, but also for identification of novel therapies.

**Hypothesis and aims:** (a) Patients who undergo cardiac catheterization and contrast administration will have elevated levels of a panel of urinary biomarkers, including NGAL, and (b) There exist protective proteins in the kidney that may prevent ARF after contrast administration. Identification and characterization of these novel biomarker proteins is anticipated to provide a more accurate and precise way to identify the early onset of ARF.

**Methods:** Urine and serum samples were analyzed for NGAL using a validated ELISA technique. Urinary Proteomic Profiling was performed using Surface-Enhanced Laser Desorption-Ionization (SELDI-TOF) Mass Spectroscopy.

**Results:** All patients who subsequently developed ARF had increased levels of urine and serum NGAL, detected by ELISA within 2 hours of the procedure.

Apart from elevated levels of urinary biomarkers after contrast administration 7 out of 8 examined by proteomic screening who did NOT develop ARF (control patients) had elevated levels of an as-yet unidentified protective protein (4500 Da).

**Conclusion:** Concentrations of NGAL in the serum and urine are novel, predictive biomarkers of ARF following contrast administration. The presence of a 4500 Da protein in the urine predicts protection from ARF following contrast administration.