

Kidney damage diagnosis may be inaccurate for many, suggests study

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This image shows a cross section of a kidney. Credit: Holly Fischer/Wikipedia

Researchers from Columbia University Medical Center (CUMC) have found that, for many patients, an initial diagnosis of "acute kidney injury" may have been inaccurate. Their finding, based on an analysis of patient records, suggests that the current method of assessing kidney

function may be misleading during the initial evaluation of a patient.

The study, which also identified sets of biomarkers in mouse models that could potentially detect [kidney damage](#) more reliably, was published online in the December 2016 issue of the *Journal of the American Society of Nephrology*.

In a related Comment published today in *The Lancet*, Jonathan Barasch, MD, PhD, professor of medicine and pathology and cell biology at CUMC, and colleagues Drs. Joseph Bonventre (Harvard Medical School, Brigham and Women's Hospital) and Richard Zager (University of Washington Medicine) explain that the [blood test](#), which measures serum creatinine—a waste product that is removed by the kidneys and excreted in urine—only offers a snapshot of the kidney's function at a given moment, which can vary depending on individual factors such as body size and muscle mass.

Each year, an estimated 5-7 percent of patients admitted to hospitals in the U.S. and 30-50 percent of patients in critical or intensive care settings, are diagnosed with [acute kidney injury](#) (AKI). However, the true degree of injury cannot be known for many days because creatinine tests only provide a retrospective look at the kidney's response to possible injury. In addition, the blood test can register "positive" for AKI even when the kidney may not have been injured.

"Nephrologists are trained to evaluate a constellation of factors in determining whether or not a patient has a condition that may temporarily affect kidney function, such as dehydration or heart failure, and to distinguish these temporary conditions from true kidney cell damage," said Dr. Barasch, one of the authors of the study. "But in a busy, time-pressured setting such as the emergency room or [intensive care unit](#), doctors rely to a greater extent on the blood test used as a proxy for measuring [kidney function](#) in order to make an immediate

diagnosis. Unfortunately, the initial creatinine tests can lead to misdiagnosis and inappropriate treatment."

Misdiagnoses appear to be common, according to the researchers' review of the electronic health records of 3.8 million emergency and [intensive care patients](#). The researchers detected more than 61,000 diagnoses of AKI, as defined by rising creatinine level. Within three days, however, 73 percent of patients with an AKI diagnosis had creatinine levels that returned to normal, suggesting that many of these patients may not have had kidney damage.

"Previous studies have shown that a small but persistent change in creatinine level is a greater predictor of morbidity and mortality than a large, but transient, increase," said Dr. Barasch. "But because the course of creatinine cannot be known when first seeing a patient, it is possible to deliver the wrong diagnosis. An initial misdiagnosis can lead to mistreatment, with potentially dangerous consequences."

Failure to treat dehydration can quickly lead to irreversible kidney damage. In patients who already have kidney damage, rehydration therapy can cause pulmonary edema, a buildup of fluid in the lungs.

In the study, the investigators sought a more precise and timely method of identifying patients with kidney damage. They looked for biomarkers to distinguish between kidney damage and a transient condition, both of which activate a rise in the creatinine blood test. The researchers performed genomic analyses of mice with kidney damage and those with dehydration and a similar rise in creatinine levels. Their analyses revealed more than a thousand biomarkers (proteins) distinguishing these two conditions, with minimal overlap.

"Our ongoing studies may help to determine if these biomarkers can be deployed in the emergency or [intensive care](#) setting to improve the initial

diagnosis and treatment plan when kidney damage is in doubt," said Katherine Xu, a PhD candidate in Columbia's Institute of Human Nutrition and lead author of the study.

More information: Katherine Xu et al, Unique Transcriptional Programs Identify Subtypes of AKI, *Journal of the American Society of Nephrology* (2016). DOI: [10.1681/ASN.2016090974](https://doi.org/10.1681/ASN.2016090974)

Provided by Columbia University Medical Center

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