

Seeing kidney injury, as it happens

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The current check for kidney disease is a simple blood test for serum creatinine, but it can take longer than two days for this metabolite to accumulate to levels that are significant enough to indicate kidney damage - and by then it may be too late to intervene.

To close the gap between injury and diagnosis, a team of basic scientists and physicians led by Dr. Jonathan Barasch, M.D., Ph.D., associate professor of medicine and cell biology, Dr. Neal Paragas, a postdoctoral fellow, and Dr. Andong Qiu, an associate research scientist at Columbia University Medical Center, has created a "reporter mouse" - a genetically engineered bioluminescent animal capable of illuminating the onset and the time course of [kidney damage](#) by the generation of light.

In a paper published online this month in the journal *Nature Medicine*, Drs. Barasch, Paragas and Qiu report a technique to detect in a living mouse the appearance of a protein that is activated only when the kidney is bombarded with stimuli that cause sudden kidney injury.

The NGAL (neutrophil gelatinase-associated lipocalin) gene was selected for the creation of the bioluminescent mouse because of the many clinical studies performed at Columbia and Cincinnati Children's Hospital by Drs. Barasch and P. Devarajan, at Kyoto University by Dr. K. Mori, and at the Charite' Universitätsmedizin Berlin by Dr. K.M. Schmidt-Ott that show NGAL can report toxic cellular stresses rather than simple and reversible changes in kidney function.

Drs. Barasch, Paragas and Qiu also set out to determine whether NGAL

met the rigorous criteria of a true "biomarker," which requires the simultaneous appearance of the protein at the site of organ damage and in the serum or urine in proportion to the stimulus - and within a timeframe that allows a physician to intervene in a clinically meaningful way.

"The hope is not only to show further evidence that NGAL immediately detects and measures kidney injury, but to design the fastest and most precise test that will allow physicians to make evidence-based and potentially lifesaving drug treatment decisions, watching the [kidney](#) in real time to see if therapies are working," Dr. Paragas said.

Provided by Columbia University Medical Center

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