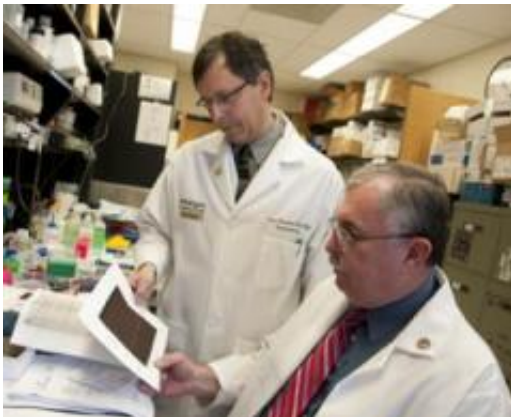


Urine test for kidney cancer a step closer to development

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Evan Kharasch, M.D., Ph.D., (left) and Jerry Morrissey, Ph.D., in the lab where they discovered that two key proteins are elevated in the urine of patients with the most common forms of kidney cancer, and the findings may be used to develop a screening test for the early diagnosis of kidney cancer. Credit: Robert Boston

Studying patients with kidney cancer, a team of researchers at Washington University School of Medicine in St. Louis has identified a pair of proteins excreted in the urine that could lead to earlier and more accurate diagnosis of the disease.

The research, published online in the May issue of *Mayo Clinic Proceedings*, is the first to identify proteins secreted in urine that appear to accurately reveal the presence of about 90 percent of all kidney

cancers.

Currently, there is no diagnostic test for kidney cancer. About 80 percent of kidney tumors are discovered incidentally, during a [CT scan](#) or ultrasound test that has been ordered for an unrelated abdominal complaint.

"Kidney cancer is a silent and frequently fatal cancer," says principal investigator Evan D. Kharasch, MD, PhD. "More than 80 percent of patients die within two years of diagnosis, and more than 95 percent die within five years because by the time the cancer is detected, it often has spread beyond the kidney. When it is identified early, however, kidney cancer is curable in a very high percentage of individuals."

Kharasch and co-investigator Jeremiah J. Morrissey, PhD, looked at urine samples from 42 patients who became aware that they had kidney cancer during an abdominal imaging test and from 15 individuals who did not have cancer but were scheduled for surgery. Another 19 healthy volunteers were included who were not having surgery of any kind.

The researchers focused on two proteins that previously had been found in kidney tumors: aquaporin-1 (AQP1) and adipophilin (ADFP). They discovered large amounts of those proteins in urine samples from kidney cancer patients.

The AQP1 or ADFP proteins were not elevated in healthy individuals or surgery patients without cancer. The researchers also found that when the kidney tumors were removed, AQP1 and ADFP levels in the urine declined precipitously.

"We believe that in the same way we use [mammograms](#) to screen for [breast cancer](#) and blood tests to screen for prostate cancer, we may have the opportunity to detect these proteins in urine as a way to screen for

kidney cancer," Kharasch says.

Kharasch, vice chancellor for research at Washington University, the Russell D. and Mary B. Sheldon Professor of Anesthesiology and director of the Division of Clinical and Translational Research in the Department of Anesthesiology, has been working with lead author Morrissey, a research professor of anesthesiology, to detect kidney cancer at an earlier stage.

"When patients come to surgery, it tends to be late in the process, and many already have progressed to a stage where the prognosis is pretty bleak," says Morrissey. "Screening patients to find kidney cancer when it is still small and treatable could save a number of lives and preserve kidney function in many people. It also may represent the difference between losing an entire kidney or extracting only a tumor while sparing healthy portions of the organ."

About 50,000 patients are diagnosed with kidney cancer each year. And about 13,000 people die from the disease annually in the United States alone. A test that could lead to earlier diagnosis could make a big dent in those numbers, according to Timothy J. Eberlein, MD, director of the Alvin J. Siteman Cancer Center at Barnes-Jewish Hospital and Washington University School of Medicine.

"One of the goals of the Siteman Cancer Center is to diagnose tumors as early as possible, when they are more curable," Eberlein says. "Most kidney tumors are found in more advanced stages, when the patient is symptomatic and less likely to be cured. These new findings open the door for a quick, noninvasive test and could revolutionize our approach to the early, accurate diagnosis of kidney cancer."

Morrissey says further testing will be required to determine whether people with other types of kidney disease also have high levels of AQP1

and ADFP in their urine, too. But based upon their findings, Kharasch and Morrissey have filed a patent application through Washington University's Office of Technology Management for use of aquaporin-1 and adipophilin to diagnose kidney cancer.

Because this study looked only at patients who already had a cancer diagnosis following an imaging test, Kharasch and Morrissey say more research will be needed to see how early in the disease process levels of the AQP1 or ADFP proteins rise and whether the concentration of those proteins in the urine might correspond to the size of a [kidney tumor](#).

If the research continues to demonstrate that AQP1 and ADFP urine levels are good markers of [kidney cancer](#), it may someday be possible for routine screening for the disease in a doctor's office, using a noninvasive [urine test](#) to determine whether or not they have the disease.

More information: Morrissey JJ, London AN, Luo J, Kharasch ED. Urinary biomarkers for the early diagnosis of kidney cancer, Mayo Clinic Proceedings, vol. 85, number 5. May 2010.
[doi:10.4065/mcp.2009.0709](https://doi.org/10.4065/mcp.2009.0709)

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