

Urine Test Identifies High-Risk Prostate Cancers

The test can distinguish between slow-growing prostate cancers that pose little risk and more aggressive cancers that need treatment.

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Prostate cancer is a leading cause of cancer death among men nationwide. Screening for prostate cancer typically includes a blood test to measure levels of a substance called prostate specific antigen (PSA), which is produced by the prostate gland. PSA levels can be elevated in men who have prostate cancer or certain non-cancerous conditions, like inflammation of the prostate.

Elevated PSA levels can lead to additional tests that may include a biopsy. The biopsy involves removing about a dozen small tissue samples from several areas of the prostate gland to look for cancer cells. Although biopsies are generally safe, they can be painful. They can also lead to fever, urinary tract infection, or other side effects. In many cases, the biopsy identifies slow-growing prostate cancers that would benefit from close monitoring but do not need immediate treatment.

Researchers have been searching for ways to avoid unnecessary biopsies by finding noninvasive ways to distinguish between aggressive prostate cancers that need treatment and slow-growing cancers that may never need treatment.

About a decade ago, an NIH-supported research team led by Dr. Arul M. Chinnaiyan of the University of Michigan developed a urine-based test called MyProstateScore (MPS) that is still in use. Based on two genes that are often found at high levels in the urine of men who have prostate cancer, MPS enables early detection of prostate cancer. But it does not distinguish between low-grade and more serious cancers.

In their latest study, a team led by Chinnaiyan and Dr. Jeffrey Tosoian of Vanderbilt University worked to identify a set of urine-based genes that could distinguish aggressive prostate cancers. Their findings appeared on April 18, 2024, in [JAMA Oncology](#).

The researchers first analyzed RNA sequencing data from nearly 59,000 genes to identify a set of 54 candidate markers. All were linked to either prostate cancer overall or uniquely linked to high-grade cancers, and all were detectable in urine. Further analyses and modeling in 761 patients narrowed down the options to a combination of 17 genes that best predicted the presence of high-grade cancers. A reference gene associated with general prostate tissue was also added. The new

18-gene test was dubbed MyProstateScore 2.0 (MPS2).

MPS2 was validated by analyzing urine samples from another group of 743 men. Each received a biopsy because of elevated PSA levels. The biopsies showed that 20% of them had high-grade prostate cancer.

Validation analysis showed that MPS2 could rule out the presence of high-grade cancer with 97% accuracy. The researchers also compared MPS2 to results from other biomarker tests, including the original MPS test. The analysis showed that MPS2 was better able to identify high-grade cancers. The researchers estimated that it could help patients avoid up to 51% of unnecessary biopsies.

“In nearly 800 patients with an elevated PSA level, the new test was capable of ruling out the presence of clinically significant prostate cancer with remarkable accuracy,” Tosoian says. “This allows patients to avoid more burdensome and invasive tests, like MRI and prostate biopsy, with great confidence that we are not missing something.”

This [research summary](#) was published by the National Institutes of Health on May 7, 2024.