

Highly reliable urine test developed for the early detection of a common type of bladder cancer

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Urine test kits as simple to use as the pregnancy test could soon be available for a common type of bladder cancer. Credit: AlexRaths/iStock/Thinkstock

A panel of five biomarkers that can detect the presence of transitional cell bladder carcinoma in urine with 100 per cent specificity has been developed by A*STAR researchers. The noninvasive technique could be developed into simple home kits for routine screening of the disease, which accounts for nine out of ten patients with bladder cancer.

Prashant Kumar, who led the study with Jean Paul Thiery, both formerly at the A*STAR Institute of Molecular Cell Biology, said early diagnosis and vigilant monitoring for recurrence could save lives. "So we wanted to design something similar to the pregnancy test," Kumar says.

Current methods for diagnosing bladder cancer are painful, expensive and not very effective in that they cannot detect an early, yet fast-spreading transitional cell carcinoma called 'carcinoma in situ' that grows like moss along the bladder lining. Cystoscopy, for example, is performed by inserting

a tube through the urethra to carve out tissue samples, and urine cytology relies on trained lab technicians. Commercially available biomarkers approved by the US Food and Drug Administration are more convenient but less reliable: they often result in false-positives (low sensitivity) or false-negatives (low specificity), particularly when blood appears in the urine.

Kumar and his colleagues used advanced mass-spectrometry-based quantitative proteomics to compare the proteins present in urine samples of healthy individuals with that of patients at various stages of the disease. They identified five proteins that were secreted by the cancer patients at much higher levels. "We chose five biomarkers to account for the heterogeneity of [bladder cancer](#)," says Kumar.

The researchers extended their analysis to hundreds more patients, including those with chronic ailments such as bladder inflammation, [benign prostatic hyperplasia](#), diabetes, hypertension, asthma and gastritis, and many different types of cancer, from lung to prostate, tongue, colon, pancreas, breast and renal cancer.

"Our results were really promising," says Kumar. The protein biomarkers showed high sensitivity and specificity for early and late stage transitional bladder carcinoma, even detecting cases of carcinoma in situ. They were not affected by blood proteins in urine, which can occur in cases of infection, inflammation, or injury of the urinary tract.

The researchers plan to conduct follow-up studies on a larger cohort of thousands of patients internationally. They are also in discussion with biomedical and pharmaceutical companies to develop monoclonal antibodies for detecting the biomarkers using a simple dipstick. "We want to

create an affordable diagnostic kit that can be used for routine home screening by at-risk individuals."

More information: Prashant Kumar et al. Highly sensitive and specific novel biomarkers for the diagnosis of transitional bladder carcinoma, *Oncotarget* (2015). [DOI: 10.18632/oncotarget.3841](https://doi.org/10.18632/oncotarget.3841)

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