

On the horizon: Painless way to check for bladder cancer

April 27 2023, by Laurie Fickman



Credit: CC0 Public Domain

A University of Houston biomedical engineer and his team are reporting the discovery of new biomarkers for early detection of bladder cancer (BC), among the most common cancers diagnosed in men in the U.S.

According to the American Cancer Society, more than 62,000 cases have been diagnosed in men and nearly 20,000 in women so far in 2023.

The current gold standard for the diagnosis of BC is invasive cystoscopy wherein a thin camera is inserted into the tiny urethra to peer inside. It is associated with complications including pain, [urinary tract infection](#) and hematuria, or blood in the [urine](#). It also often lacks the sensitivity to correctly identify the disease.

Soon, a simple urine test, with examination of collected cells, may be the new standard. "Using aptamer-based screening, we analyzed the expression of 1,317 proteins in the urine of bladder [cancer](#) patients and found that D-dimer—a [protein fragment](#) from the breakdown of a blood clot—may have a role in the initial diagnosis or detection of cancer recurrence," reports Chandra Mohan, Hugh Roy and Lillie Cranz Cullen Endowed Professor of biomedical engineering, in [BMC Medicine](#).

As opposed to previous studies in the field examining a handful of proteins selected based on their known properties, in this work Mohan reports the first and largest use of the comprehensive aptamer-based proteomic screen of urine samples from 42 subjects.

Aptamers are short, single-stranded DNA or RNA. In recent years, aptamers have come to replace antibodies in high throughput experiments. The aptamer-based biomarker screening technology is capable of examining thousands of proteins in a very small sample volume. For more than a decade Mohan has been proving the success of this method, using it to discover disease biomarkers.

During the screening, of the 21 urine proteins discriminating BC from urology clinic controls, urine D-dimer displayed the highest accuracy (96%) and sensitivity of 97%.

Also in the present study, Mohan executed the largest ELISA (Enzyme-Linked Immunosorbent Assay) validation study in BC, examining 30 [protein](#) biomarkers in an independent cohort consisting of 68 subjects. ELISA is a powerful tool that has fueled the engineering of hundreds of [diagnostic tests](#) used in hospitals today. It allows for detection of a wide range of molecules with high sensitivity and specificity.

Mohan also found eight urine proteins significantly discriminated muscle invasive bladder cancer from non-muscle invasive bladder cancer with IL-8 and IgA being the best performers.

"Urine IL-8 and IgA may have the potential in identifying disease progression during patient follow-up. The use of these biomarkers for initial triage could have a significant impact as the current cystoscopy-based diagnostic and surveillance approach is costly and invasive when compared to a simple urine test," said Mohan.

Urine samples for this study were obtained from the University of Texas Southwestern Medical Center and Bioreclamation, Inc. These studies were carried out by graduate student Jessica Castillo and senior researcher Kamala Vanarsa in collaboration with Dr. Yair Lotan at University of Texas Southwestern Medical Center.

More information: Kamala Vanarsa et al, Comprehensive proteomics and platform validation of urinary biomarkers for bladder cancer diagnosis and staging, *BMC Medicine* (2023). [DOI: 10.1186/s12916-023-02813-x](https://doi.org/10.1186/s12916-023-02813-x)

Provided by University of Houston

Citation: On the horizon: Painless way to check for bladder cancer (2023, April 27) retrieved 2

May 2024 from <https://medicalxpress.com/news/2023-04-horizon-painless-bladder-cancer.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.