

Simple urine test could significantly improve early detection of bladder cancer, say researchers

Lyon, France, 20 February 2020 – A new study conducted by researchers from the International Agency for Research on Cancer (IARC) in collaboration with international partners shows that bladder cancer mutations in a specific gene can be detected in the urine of individuals up to 10 years before clinical diagnosis of the disease. The test is based on the detection of mutations in the telomerase reverse transcriptase (*TERT*) gene; these are the most common mutations in bladder cancer. The new results, described in an article in *EBioMedicine*,¹ a journal published by *The Lancet*, could significantly improve the early detection of bladder cancer through a simple urine DNA test.

“A simple urine test has recently been developed, and these new results are another exciting step towards the validation of a non-invasive early detection tool,” says Dr Florence Le Calvez-Kelm, the IARC scientist who is the principal investigator of the study. “This test could significantly improve and simplify the way in which bladder cancer is detected.”

The ability to detect these *TERT* mutations in pre-diagnostic urine samples has enormous potential as a non-invasive tool for the early detection of bladder cancer and potentially for the cost-effective screening of individuals at high risk of developing the disease. It is particularly important given that none of the urine tests currently available are recommended by urological societies, because of a lack of evidence about their efficiency for early detection. Therefore, the diagnosis of bladder cancer still relies largely on invasive and expensive procedures, such as cystoscopy.

Last year, IARC scientists showed that the UroMuTERT urine DNA test had the required clinical performance to detect bladder cancer at the time of diagnosis.² To assess the ability of the test to detect the mutations in urine samples before any clinical symptoms of bladder cancer occur, IARC researchers collaborated with the Tehran University of Medical Sciences (Islamic Republic of Iran) and the United States National Cancer Institute to design a unique pilot study within the Golestan Cohort Study. “With the collection of urine samples at enrolment for 50 045 Iranian individuals and a follow-up of more than 10 years, the Golestan Cohort Study is one of the few prospective population-based cohorts that provide the opportunity to assess urinary biomarkers for the pre-clinical detection of bladder cancer,” says Professor Reza Malekzadeh, the principal investigator of the Golestan Cohort Study and a co-senior author of the article.

¹ Hosen MI, Sheikh M, Zvereva M, Scelo G, Forey N, Durand G, et al. (2020). Urinary *TERT* promoter mutations are detectable up to 10 years prior to clinical diagnosis of bladder cancer: evidence from the Golestan Cohort Study. *EBioMedicine*. Published online 17 February 2020; <https://doi.org/10.1016/j.ebiom.2020.102643>

² Avogbe PH, Manel A, Vian E, Durand G, Forey N, Voegele C, et al. (2019). Urinary *TERT* promoter mutations as non-invasive biomarkers for the comprehensive detection of urothelial cancer. *EBioMedicine*. 44:431–438. <https://doi.org/10.1016/j.ebiom.2019.05.004> PMID:31122840

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The researchers evaluated the performance of *TERT* promoter mutations as early detection biomarkers for bladder cancer in urine samples that were collected up to 10 years before clinical diagnosis from 38 asymptomatic individuals who later developed bladder cancer as well as 152 matched cancer-free controls. The results showed that *TERT* promoter mutations could be detected up to 10 years before clinical diagnosis in 46.7% of the asymptomatic individuals who later developed bladder cancer and in none of the matched controls.

“Our results provide the first evidence from a prospective population-based cohort study of the potential of urinary *TERT* promoter mutations as promising non-invasive biomarkers for the early detection of bladder cancer,” says the study’s co-first author Dr Md Ismail Hosen, who was a postdoctoral researcher at IARC and is now an assistant professor in the Department of Biochemistry and Molecular Biology at the University of Dhaka in Bangladesh.

IARC scientists are now collaborating with other large prospective cohort studies to validate the findings from this study. “If the findings are validated, large trials conducted in individuals at high risk of developing bladder cancer should be designed to address the health and cost benefits of screening for *TERT* promoter mutations for the global bladder cancer burden,” says Dr Mahdi Sheikh, a postdoctoral scientist at IARC and the co-first author of the study.

Note to the editor: IARC’s international partners include researchers at Tehran University of Medical Sciences (Islamic Republic of Iran), Golestan University of Medical Sciences (Islamic Republic of Iran), National Cancer Institute (USA), Morgan State University (USA), Tisch Cancer Institute, Icahn School of Medicine at Mount Sinai (USA), University of Bologna (Italy), University of Cambridge (United Kingdom), Protestant Clinic of Lyon (France), University of Dhaka (Bangladesh), and Lomonosov Moscow State University (Russian Federation).

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The International Agency for Research on Cancer (IARC) is part of the World Health Organization. Its mission is to coordinate and conduct research on the causes of human cancer, the mechanisms of carcinogenesis, and to develop scientific strategies for cancer control. The Agency is involved in both epidemiological and laboratory research and disseminates scientific information through publications, meetings, courses, and fellowships. If you wish your name to be removed from our press release e-mailing list, please write to com@iarc.fr.