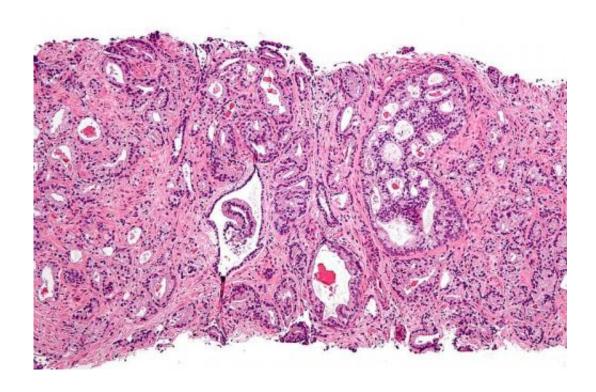# Prostate cancer urine test shows who needs treatment and when

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Micrograph showing prostatic acinar adenocarcinoma (the most common form of prostate cancer) Credit: Wikipedia, CC BY-SA 3.0

Researchers at the University of East Anglia and the Norfolk and Norwich University Hospital have developed a urine test to diagnose aggressive prostate cancer and predict whether patients will require treatment up to five years earlier than standard clinical methods.

The experimental new test called 'PUR' (Prostate Urine Risk) also

identifies men who are up to eight times less likely to need [treatment](#) within five years of diagnosis.

It is hoped that the breakthrough could help large numbers of men avoid an unnecessary initial biopsy and repeated invasive follow-ups for 'low risk' patients on [active surveillance](#).

Prostate [cancer](#) is the most common cancer in men in the UK. It usually develops slowly and the majority of cancers will not require treatment in a man's lifetime. However, doctors struggle to predict which tumours will become aggressive, making it hard to decide on treatment for many men.

The most commonly used tests for prostate cancer include blood tests, a [physical examination](#) known as a digital rectal examination (DRE), an MRI scan or a biopsy.

Lead author Shea Connell from UEA's Norwich Medical School, said: "Prostate cancer is more commonly a disease men die with rather than from. Unfortunately, we currently lack the ability to tell which men diagnosed with prostate cancer will need radical treatment and which men will not.

"Current practice assesses a patient's disease using a PSA [blood test](#), prostate biopsy and MRI. But up to 75 per cent of men with a raised PSA level are negative for prostate cancer on biopsy. Meanwhile 15 per cent of patients who do not have a raised PSA are found to have prostate cancer—with a further 15 per cent of these cancers being aggressive.

"A policy of 'active surveillance' has been developed as a way to combat this uncertainty, but it requires invasive follow-ups and constant reminders that a patient has a cancer with an uncertain natural history."

"This results in up to 50 per cent of men on active surveillance self-electing for treatment—whether they need it or not.

"It's clear that there is a considerable need for additional, more accurate, tests."

The research team was led by Prof Colin Cooper, Dr. Daniel Brewer and Dr. Jeremy Clark, all from UEA's Norwich Medical School, with the support and expertise of Rob Mills, Marcel Hanna and Prof Richard Ball at the NNUH.

They developed the Prostate Urine Risk (PUR) test using machine learning to look at gene expression in urine from samples collected from 537 men.

By examining the cell-free expression of 167 genes in urine samples, the team found a mathematical combination of 35 different genes that could be used to produce the PUR risk signatures.

Previous urine biomarker tests have been designed specifically for single purposes such as the detection of prostate cancer on re-biopsy (PCA3 test). But this new test uses four PUR signatures to provide a simultaneous assessment of non-cancerous tissue and risk groups (low, intermediate and high-risk) to show how aggressive the cancer is.

Dr. Clark said: "This research shows that our urine test could be used to not only diagnose prostate cancer without the need for an invasive needle biopsy but to identify a patient's level of risk. This means that we could predict whether or not prostate cancer patients already on active surveillance would require treatment.

"The really exciting thing is that the test predicted disease progression up to five years before it was detected by standard clinical methods.

"Furthermore, the test was able to identify men that were up to eight times less likely to need treatment within five years of diagnosis.

"If this test was to be used in the clinic, large numbers of men could avoid an unnecessary initial biopsy and the repeated, invasive follow-up of men with low-risk disease could be drastically reduced."

Robert Mills, Consultant Surgeon in Urology at the Norfolk and Norwich University Hospital, said: "Currently diagnostic tests for prostate cancer are too non-specific to differentiate those without prostate cancer, those with low risk disease that is unlikely to be of clinical significance and those with disease that should be treated. This test has the potential to improve clinical decision making by helping to differentiate these three groups."

Dr. Mark Buzza, global director of biomedical research programs at the Movember Foundation, which funded the study, said: "The PUR test has enormous potential to transform the diagnosis and treatment of prostate cancer. We are delighted to have supported this important work under our Global Action Plan (GAP1) Biomarker project which fosters collaboration between researchers across the globe. Bringing researchers together to collaborate rather than compete for funding allows research findings to be fast-tracked for the benefit of men."

  More information: 'A Four-Group Urine Risk Classifier for Predicting Outcome in Prostate Cancer Patient' is published in the journal *BJU International* on Wednesday, June 26, 2019.

Provided by University of East Anglia