

Quick test for prostate cancer

May 19 2009

A new 3-minute test could help in diagnosing prostate cancer, the most common cancer in men in the UK, according to scientists.

Researchers have developed the test by using light energy to measure the level of citrate in fluid samples from the prostate gland. The technique could provide the basis of a rapid means of detecting [prostate cancer](#) in the future. Almost a quarter of male cancers in the UK are diagnosed as prostate cancer and more than 10,000 men die from the disease each year.

Scientists, led by Prof David Parker from Durham University's Chemistry Department, have worked with experts from the University of Maryland, USA to develop the technique that measures the [wavelength of light](#) as it is shone through diluted samples of body fluids.

The research team, funded by the North East Proof of Concept Fund and the EPSRC, believe that the technique which can measure, with speed and accuracy, how citrate levels fall in the prostate gland as cancer develops, could also find use for the diagnosis of other medical conditions, associated with poor [kidney function](#).

Prof Parker said: "Citrate provides a significant biomarker for disease that may provide a reliable method for screening and detecting prostate cancer, and for the monitoring of people with the disease. This technique could form the basis of a simple screening procedure for prostate cancer that could be used in outpatient departments at local hospitals."

His team have shone light into over 100 different chemical structures to see how they function and respond to the presence of certain important bioactive species. They have looked particularly closely at how citrate and lactate bind to luminescent structures within fluids. Citrate and lactate are vital for our bodies' metabolism for normal function. Citrate provides energy for cells and the amount found in the prostate varies considerably due to an enzyme called m-aconitase which transforms it. This enzyme is very sensitive to zinc and, in prostate cancer sufferers, zinc levels are depressed and the enzyme switches on again.

Prof Leslie Costello from the University of Maryland said: "Citrate is formed in cell metabolism processes which alter as cancers grow. The analysis of the citrate concentration of prostatic fluid can provide an accurate way to screen and diagnose prostate cancer. Since citrate concentrations decrease markedly early in malignancy, this technique makes it possible to analyse what's happening quickly in the early and treatable stage of prostate cancer. It shows much promise as a clinical tool."

The new test requires only a microlitre of fluid and the sample can be easily measured in an optical instrument. Using samples from male volunteers, the researchers have developed a portable instrument that can give results in 3 minutes.

The team's challenge has been how to accurately measure changes in the amount of citrate or lactate in fluid samples using the technique. The early results are promising and the team intends to look at the analysis of other body fluids. A possible way forward is to examine the citrate levels in seminal fluid samples, which are made up of 50% prostate fluid.

The University has launched a spin-out company called FScan Ltd to develop the technique and to seek commercial backing. The team has looked at 20 samples so far and verified the analysis in every case. The

next stage is to work with a local hospital and examine samples from 200 volunteers to see whether the first Durham results correlate.

Prof Parker says: "It's been a complex process to develop the technique but we're very optimistic about it. Ultimately, this could provide an accurate method of screening for prostate cancer in men that could be carried out in 3-minutes once a biopsy has been obtained from the patient at a hospital outpatient department."

The discovery follows the invention in 2006 by Durham University Professor Douglas Newton of a Urine Flow Meter. The UFlow Meter helps men to assess if they have a restricted rate of urine flow - one of the warning signs of prostate problems.

The establishment of FScan Ltd is part of the University's aim to enhance the exploitation of the Intellectual Property generated by high quality research activities.

Tim Hammond, Head of Technology Transfer at Durham University, said: "We quickly realised the potential of this research and have worked closely with Professor Parker and his team to secure initial proof of concept funding through NorthStar Equity Investors and the North East Proof of Concept Fund and to establish FScan Limited as the vehicle to validate and commercialise the technology."

Process for testing:

1. Sample of prostatic fluid taken from patient in hospital using local anaesthetic
2. 200 fold dilution of 1 microlitre of sample with a buffer solution into pre-coated disposable cuvettes.

3. Optical spectroscopy on the sample, using a versatile bench top instrument with easy to use software.
4. Reading of results after 3 min measurement cycle directly reading out actual citrate concentration.

The sample is taken from the [prostate gland](#) - this is part of the biopsy procedure during clinical analysis in urology.

Source: Durham University ([news](#) : [web](#))

Citation: Quick test for prostate cancer (2009, May 19) retrieved 25 April 2024 from <https://phys.org/news/2009-05-quick-prostate-cancer.html>

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