

Sugars could be the key to an earlier, more accurate test for prostate cancer

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

A new type of test that uses complex sugars to detect prostate cancer earlier and with greater accuracy is being developed by researchers at the University of Birmingham.

The test works by identifying sugars, known as glycans, in blood. These sugars are attached to [protein molecules](#) called PSA and are known to

undergo distinct but subtle changes when [cancer](#) is present in the body.

Particular types of glycans are associated with different cancers—but until now, there has been no technology available to detect the glycans in an accurate, timely and sufficiently specific way.

Research led by a team in the University of Birmingham's School of Chemical Engineering, has now developed a technique that can identify glycans associated with cancer with unprecedented accuracy. The technology has been patented by University of Birmingham Enterprise.

It works by using a synthetic carbohydrate material to create a mold of the specific [glycan](#). These 'receptors' are then fixed in position on a surface so they bind to that glycan, but not to any others.

Professor Paula Mendes, in the University of Birmingham's School of Chemical Engineering, is lead author on the paper. She explains: "What is really exciting about the technique we've developed is the ability to pinpoint glycans with such specificity. A PSA molecule can have 56 different sugars attached to it, but only four are associated with [prostate cancer](#). With this test, we're able to identify those four with certainty."

The number of glycans identified in this way will show not only if cancer is present, but how aggressive or advanced the cancer is. The research results are published in *Advanced Functional Materials* and the team expects to begin applying the technique to clinical samples in the laboratory later this year.

A new test for prostate cancer is urgently needed because current tests are only able to give an indication of increased PSA in blood samples. This can give false positive results in around 50 per cent of cases. This is because a man's PSA level can become elevated for a number of different reasons, not necessarily related to cancer. In addition, around

25 per cent of men who do have prostate cancer do not have elevated PSA, so the test fails to diagnose these patients.

Professor Mendes says: "Many patients undergoing the PSA test will be falsely diagnosed, causing them be sent for further, more invasive tests, and this places a lot of stress on the patient, as well as being very expensive for health services. Just as worrying, many men have low levels of PSA that do not show up well in tests. By measuring the glycans, however, we can offer diagnoses that are much more precise, not only detecting cancer at an earlier stage, but identifying how aggressive it is too."

The team also hopes to be able to apply the technology to detecting other cancers and has already started to develop a test for ovarian cancer.

"Ovarian cancer is typically detected at a very late stage, when treatment options are very limited, and so [survival rates](#) are very low," explains Professor Mendes. "Because our test is highly specific, it should be possible to apply it to a number of different types of cancer."

The research was funded by Prostate Cancer UK, as part of the charity's Research Innovation Awards Scheme.

Dr. David Montgomery, Director of Research at Prostate Cancer UK, said: "Early and accurate diagnosis of prostate cancer is critical to ensuring we cure more men of prostate cancer while reducing side effects from over treatment. While PSA can be a helpful [test](#), It is often elevated in people who don't have prostate cancer and tells us nothing about how aggressive the disease might be in people who do.

"While at an early stage, this research could make PSA a much more specific and accurate way not only to diagnose prostate cancer, but also to tell who needs urgent treatment and whose cancer is less aggressive

and can safely be watched. Ultimately, this could help us cure more men and harm fewer.

"What we need now is for fantastic research like this to be able to continue beyond the current Covid-19 pandemic. With labs closed and much of this research coming to a standstill, Prostate Cancer UK is asking for people to donate now to ensure we can continue to fund ground-breaking research to help more men with [prostate](#) cancer."

More information: Stefano Tommasone et al. Targeting Oligosaccharides and Glycoconjugates Using Superselective Binding Scaffolds. *Advanced Functional Materials*. First published: 28 May 2020 doi.org/10.1002/adfm.202002298

Provided by University of Birmingham

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