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RNA sequencing opens door to accurate, highly specific test for prostate cancer

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A study on non-coding RNA (Ribonucleic Acid) from prostate cancer patients has identified a series of new prostate cancer markers which can be found in urine. Combining these RNA markers into a single test potentially opens the door for simple, accurate non-invasive testing for prostate cancer. This work is presented at the European Association of Urology Congress in Munich.

Current tests for prostate cancer, such as the PSA and PCA3 tests, are not particularly accurate, leading to a high level of missed cancers or false positives. A test with greater specificity and accuracy may make population screening much more viable.

A group of German researchers, led by Professor Friedemann Horn (of the University of Leipzig and the Fraunhofer Institute for Cell Therapy and Immunology IZI, Leipzig) and Professor Manfred Wirth (of the University of Dresden) has taken a systematic approach to identify new biomarkers, which can offer greater prostate cancer specificity.

A particular focus is non-coding RNAs. RNA serves as part of the mechanism which regulates the production of proteins from the genetic material, but until recently most scientists had felt that the great majority of RNA ('non-coding RNA') had no real function, and was simply accumulated 'clutter'. Now, greater understanding of non-coding RNAs indicates that they can regulate a number of physiological and pathological processes, including development and progression of cancer, and so might serve as markers of these processes.

The team took 64 prostate biopsy samples and read 200 million sequences from each sample. They were able to identify more than 2000 genes that showed a significant difference between tumour and control samples. Several of these showed higher specificity and sensitivity than established prostate markers. One of these non-coding RNAs, designated TAPIR (Tumour-Associated Proliferation-Inducing RNA), also showed significant promise in halting cancer cell growth, although it is too early to know if this will translate into a clinically-useful target.

These biomarkers were found in urine samples of prostate cancer patients as well, and first measurements show that they allow a precise detection of prostate cancer. Based on these results, the team is working to develop a highly specific and sensitive urine-based test for the early diagnosis of prostate cancer. This test will be based on a combination of several biomarkers, as this will give greater specificity than a single marker.

Commenting, Professor Wirth (author and EAU Treasurer) said:

"This is early work, but it is already showing results. This is a new approach to developing diagnostic tests, and comes from applying real basic science to a practical clinical problem. Given that our initial results show a high specificity for prostate cancer in urine tests, the prospects are good that we will be able to translate this into a better test for prostate cancer. We have several good candidate biomarkers, however we are aiming to design a test which utilises a combination of biomarkers. This will give significantly better specificity than existing tests. Our work on RNAs is allowing us to design a completely new kind of prostate cancer test."

The program is part of RIBOLUTION (RIBOnucleic acid-based diagnostic soLUTIONs), a consortium funded by the Fraunhofer Future Foundation. In this interdisciplinary consortium, five Fraunhofer

institutes and several universities have collaborated to identify new RNA biomarkers and to develop novel diagnostic tests.

Provided by European Association of Urology