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Editorial

The Prostate Screening EpiSwitch (PSE) Blood Test: A New Evolving Test

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Researchers at the University of East Anglia have developed a new blood test to detect prostate cancer with greater accuracy than current methods [1]. New research shows that the Prostate Screening EpiSwitch *(*PSE) blood test is 94 per cent accurate -- beating the currently used Prostate-Specific Antigen (PSA) blood test. The research team says that the new test shows significant potential as an accurate and rapid cancer screening diagnostic. The test was developed by Oxford Biodynamics in partnership with Imperial College London and Imperial College NHS Trust. Prostate cancer is the most common cancer in men and kills one man every 45 minutes in the UK. There is currently no single test for prostate cancer, but PSA blood tests are among the most used, alongside physical examinations, MRI scans and biopsies. Only about a quarter of people who have a prostate biopsy due to an elevated PSA level are found to have prostate cancer. There is an initiative to create a new blood test with greater accuracy.

Teams evaluated the new PSE test, which combines the traditional PSA test with an epigenetic EpiSwitch test, in a pilot study involving 147 patients. They compared its results with those of the standard PSA test -- and found that PSE significantly enhances overall detection accuracy for at-risk men [1]. Further results showed that combining the standard PSA data with circulating chromosome conformations (PSE test) permits enhanced PSA accuracy for PCa detection. The PSE test is accurate, rapid, minimally invasive, and inexpensive, suggesting significant screening potential to minimize unnecessary referrals for expensive and invasive MRI and/or biopsy testing [2]. When tested in the context of screening a population at risk, the PSE test yields a rapid and minimally invasive prostate cancer diagnosis with impressive performance. This suggests a real benefit for both diagnostic and screening purposes" [3]. Although prostate cancer affects one out of six men at some time during their life, currently there is no accepted screening program. The new test has the potential to reduce the number of unnecessary biopsies and MRIs, which would both prevent anxiety and complications, and it brings huge cost savings to health services" [4]. Further studies identified subsets of chromosomal forms in patients' peripheral blood mononuclear cells (PBMCs) that are strongly indicative of PCa presence and prognosis. These signatures have significant potential for the development of quick diagnostic and prognostic blood tests for PCa and significantly exceed the specificity of the currently used PSA test [5].

Results from Imperial College London, United Kingdom demonstrated for the first time a proof of concept for horizontal transfer of chromosome shapes without direct cell-cell contact. This carries high clinical relevance as it was previously observed with chromatin conformations in circulating cells of patients with melanoma and carcinoma of prostate similar to ones in their primary tumors. These changes can be used as highly specific biomarkers for diagnosis and prognosis. Further studies are required to clarify the specific mechanism of chromosome conformations transfer and its clinical significance in particular diseases [6]. Gene regulatory networks help researchers understand how genes and regulatory elements interact to control cellular gene expression, offering a more promising molecular mechanism in biological research. Interactions between the genes and regulatory elements involve different promoters, enhancers, transcription factors, silencers, insulators, and long-range regulatory elements. In this way, three-dimensional chromatin conformation and structural biology are critical for interpreting the biological effects and the gene regulatory networks [7].

The 16 years follow-up of the European Randomized study of Screening for Prostate Cancer (ERSPC) that was initiated in 1993 and previously published with 9, 11, and 13 years of follow-up. This line tries to explain the effect of regular Prostate-Specific Antigen (PSA) screening on prostate cancer (PCa) mortality. This study shows that the absolute reduction in PCa mortality still increases with longer follow-up, while the relative risk reduction remains at 20% since the initial report. There is still a 41% excess incidence in the screening arm. The median follow-up from diagnosis is modest (8.8 years in the screening arm and 5.4 years in the control arm) given the natural course of PCa. The number needed to diagnose for preventing one PCa death was 18 in this study and was much higher in the previous ones. This high-level evidence publication shows that the absolute effect of screening on PCa mortality increases with longer follow-up [8]. In a Slovak study most of the CaP patients were diagnosed in the early stages with low-risk tumors. The study showed that by detecting CaP in earlier stages makes it possible to achieve an overall survival in patients comparable to healthy population. However, it is necessary to find a reasonable balance between benefits and unnecessary overtreatment. There is a need for better understanding of PSA test and applying new biomarkers in diagnostics, which will contribute to a better indication of patients for biopsies in the future [9]. Epigenetic (heritable changes) abnormalities in addition to genomic mutations are linked to the development and progression of various cancers, including PC. DNA methylation and histone modifications are important in the development and progression of PC. The importance of epigenetic alterations in PC has recently been generally accepted. Further clarification of epigenetic regulatory mechanisms will lead to a deeper understanding of PC and discovery of novel epigenetic biomarkers of cancer incidence risk, to predict drug response or poor prognosis [10]. In summary, the new prostate screening EpiSwitch PSE blood test is a recent achievement that carries an accuracy of 94 per cent. It is precise, rapid and minimizes the need for further tests.

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