

A Promising Breakthrough for Prostate Cancer Screening

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Abstract- Prostate cancer is a major cause of morbidity and mortality among men worldwide. While traditional screening methods, such as Prostate Specific Antigen (PSA) testing and Digital Rectal Examinations (DRE), have facilitated early detection, they face limitations, including false results and difficulty distinguishing aggressive from non-aggressive cancers. Recent advancements in urine-based testing offer a non-invasive, accurate alternative that improves diagnostic precision and reduces unnecessary biopsies. These tests analyze genetic and RNA biomarkers, providing personalized risk scores to guide biopsy decisions without requiring a DRE. They also address cultural barriers to screening and promote higher participation rates, particularly in underserved populations. Urine-based tests have the potential to optimize healthcare resources, reduce costs, and improve public health outcomes through early detection and intervention. However, equitable access, patient education, and data privacy protections remain critical considerations. As these tests become more widely available, they may transform prostate cancer screening and care.

Index Terms- Mens Health, Genitourinary Cancers, Metastatic Disease, Disease Screening, Public Health.

I. INTRODUCTION

Prostate cancer is a leading cause of cancer-related morbidity and mortality among men worldwide. Traditional screening methods, such as the prostate-specific antigen (PSA) blood test and digital rectal examination (DRE), have been instrumental in early detection. However, these methods have limitations, including false positives, false negatives, and the inability to distinguish between non-aggressive and aggressive forms of the disease. Recent advancements in urine-based testing offer a promising alternative that could revolutionize prostate cancer screening and management.

II. URINE BASED PROSTATE CANCER SCREENING

One notable technology is the ability to analyze eighteen genes associated with high-grade prostate cancer. Studies have demonstrated that this technology outperforms traditional PSA testing in detecting clinically significant cancers, thereby reducing unnecessary biopsies and associated risks. VUMC News3 highlighted a publication where researchers confirmed that this test provided higher accuracy for detecting significant prostate cancers compared to existing biomarker tests.

Another significant advancement is an exosome-based urine assay that evaluates RNA biomarkers linked to high-grade prostate cancer. This test does not require a Digital Rectal

Exam (DRE) and offers an individualized risk score to guide biopsy decisions. Clinical evaluations have shown that this test can effectively stratify patients based on their risk, aiding in the decision-making process for potential biopsies. 2

III. IMPLICATIONS FOR PATIENT CARE

The advent of urine-based tests holds several implications for patient care. Unlike biopsies, urine tests are non-invasive, reducing patient discomfort and the risk of complications. Also, by focusing on specific genetic markers, these tests enhance the accuracy of detecting aggressive cancers, thereby improving patient outcomes. The added benefit of personalized treatment with the help of accurate risk stratification will ensure that patients receive appropriate interventions based on tumor aggressiveness.

IV. CULTURAL CONSIDERATIONS

In certain cultures, procedures like the DRE are viewed with discomfort, leading to reluctance to undergo prostate cancer screening. Studies show that some African American men avoid DREs due to embarrassment or misconceptions about the procedure.¹ Looking ahead, the introduction of non-invasive urine-based tests could mitigate these cultural barriers, encourage more men to participate in screening programs, and facilitate early detection across diverse populations.

Impact on Health Systems

The integration of urine-based tests into healthcare systems could have several positive effects.

Resource Allocation

By reducing unnecessary biopsies and treatments, this breakthrough could allow healthcare resources to be allocated more efficiently, focusing on patients with clinically significant cancers.

Cost-Effectiveness

Early and accurate detection can lead to cost savings by preventing the progression of aggressive cancers and reducing the need for extensive treatments.

Public Health Outcomes

Widespread adoption of non-invasive screening methods could lead to improved prostate cancer survival rates and overall public health outcomes.

V. ETHICAL CONSIDERATIONS

While promising, the implementation of urine-based tests raises ethical considerations. Ensuring equitable access to these advanced tests is crucial to prevent disparities in healthcare outcomes. Patients must also be adequately informed about the benefits and limitations of these tests to make educated decisions regarding their care. Lastly, like other health data, the genetic information obtained from these tests necessitates stringent data protection measures to safeguard patient privacy.

VI. CONCLUSION

Urine-based tests represent a significant advancement in prostate cancer screening, offering the potential to enhance detection accuracy, reduce unnecessary procedures, and personalize patient care. As research progresses and these tests become more widely available, they may play a pivotal role in improving prostate cancer outcomes and transforming current screening paradigms.

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AUTHOR PROFILE

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Dr. Jalene Jacob is a healthcare professional, educator, medical and design entrepreneur, with a deep passion for healthcare systems advancement, innovation, and excellence in patient care delivery. She is committed to driving transformative change in the industry and is a dedicated health equity advocate, championing accessible and inclusive healthcare solutions along with organizations that work towards improving health outcomes globally.

She is a practicing physician in Trinidad and Tobago and holds a Doctor of Medicine (MD) degree, an MBA in Healthcare Management, a Bachelor of Science in Biology, and an Executive Diploma in Public Health Administration and Leadership.