A Novel Urine Exosome Gene Expression Assay to Predict High-grade Prostate Cancer at Initial Biopsy.


Abstract

IMPORTANCE: Overdiagnosis and overtreatment of indolent prostate cancer (PCA) is a serious health issue in most developed countries. There is an unmet clinical need for noninvasive, easy to administer, diagnostic assays to help assess whether a prostate biopsy is warranted.

OBJECTIVE: To determine the performance of a novel urine exosome gene expression assay (the ExoDx Prostate IntelliScore urine exosome assay) plus standard of care (SOC) (ie, prostate-specific antigen [PSA] level, age, race, and family history) vs SOC alone for discriminating between Gleason score (GS)7 and GS6 and benign disease on initial biopsy.

DESIGN, SETTING, AND PARTICIPANTS: In training, using reverse-transcriptase polymerase chain reaction (PCR), we compared the urine exosome gene expression assay with biopsy outcomes in 499 patients with prostate-specific antigen (PSA) levels of 2 to20 ng/mL. The derived prognostic score was then validated in 1064 patients from 22 community practice and academic urology clinic sites in the United States. Eligible participants included PCA-free men, 50 years or older, scheduled for an initial or repeated prostate needle biopsy due to suspicious digital rectal examination (DRE) findings and/or PSA levels (limit range, 2.0-20.0 ng/mL).

MAIN OUTCOMES AND MEASURES: Evaluate the assay using the area under receiver operating characteristic curve (AUC) in discrimination of GS7 or greater from GS6 and benign disease on initial biopsy.

RESULTS: In 255 men in the training target population (median age 62 years and median PSA level 5.0 ng/mL, and initial biopsy), the urine exosome gene expression assay plus SOC was associated with improved discrimination between GS7 or greater and GS6 and benign disease: AUC 0.77 (95% CI, 0.71-0.83) vs SOC AUC 0.66 (95% CI, 0.58-0.72) (P < .001). Independent validation in 519 patients Urine exosome gene expression assay plus SOC AUC 0.73 (95% CI, 0.68-0.77) was superior to SOC AUC 0.63 (95% CI, 0.58-0.68), (P < .001). Using a predefined cut point, 138 of 519 (27%) biopsies would have been avoided, missing only 5% of patients with dominant pattern 4 high-risk GS7 disease.

CONCLUSIONS AND RELEVANCE: This urine exosome gene expression assay is a noninvasive, urinary 3-gene expression assay that discriminates high-grade (≥ GS7) from low-grade (GS6) cancer and benign disease. In this study, the urine exosome gene expression assay was associated with improved identification of patients with higher-grade prostate cancer among men with elevated PSA levels and could reduce the total number of unnecessary biopsies.