Performance of a novel urine-based biomarker for the monitoring of bladder cancer recurrence

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Introduction and Objective:
The accurate detection of low-grade (LG) urothelial cell carcinoma (UCC) may be challenging, particularly in cases where cytomorphologic features overlap with those of non-neoplastic changes.
CellDetect® is a unique histochemical stain which enables color discrimination, in addition to morphological examination, for the differentiation between benign and malignant cells in urine specimens. A multi-institutional blinded study has recently shown that this color feature significantly improves the sensitivity for LG tumors when compared to standard urine cytology. The objective of the present reproducibility study was to confirm this performance in an independent cytology laboratory.

Methods:
Voided urine samples were collected from a first cohort of patients undergoing routine cystoscopic surveillance. To enrich the study with positive cases, a second cohort of patients scheduled for transurethral resection (TURBT) was also enrolled. The patients from both cohorts had a documented history of bladder cancer.
Urine samples were processed into two cytocentrifuge smears and each slide was stained with either CellDetect® or standard cytology stain. Both specimens were observed by a cytopathologist blinded to the final diagnosis. The results were then compared to the gold standard (biopsy for positive cases and biopsy or cystoscopy for negative cases).

Results:
73 patients were enrolled in this study, among which 51 were UCC-negative and 22 UCC-positive. The sensitivity of CellDetect® was 82% compared to 59% for standard cytology ($p<0.05$) while the specificity was not significantly different (86% versus 94%). Moreover, CellDetect® was able to detect 73% of the LG tumors compared to 45% by standard cytology. In addition, CellDetect® correctly diagnosed 91% of the HG tumors compared to 73% for standard stain.

Conclusions:
This study validates the usability of CellDetect® in clinical settings. Particularly, it confirms its ability to accurately identify UCC recurrence throughout all cancer grades. This could be particularly useful in LG cases where cytomorphologic criteria overlap with benign reactive conditions.

*** $p<0.05$**