Feasibility of the CellDetect platform added on cytology for bladder cancer monitoring in a clinical setting

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Introduction

In the bladder cancer (BC) monitoring, cytology still plays an important role as a cost-effective, non-invasive urine test, however of limited validity. CellDetect®, a new histochemical platform, is based on adding color discrimination to cytology. CellDetect® combines a plant extract with generic stains and showed efficacy in multicenter trials. However, there is few data on test applicability in routine use for the monitoring of Urothelial Carcinoma (UC).
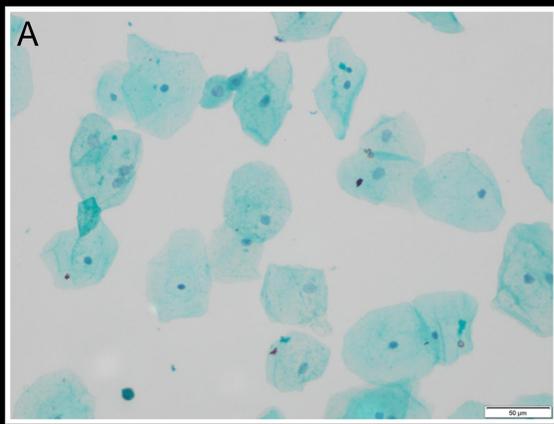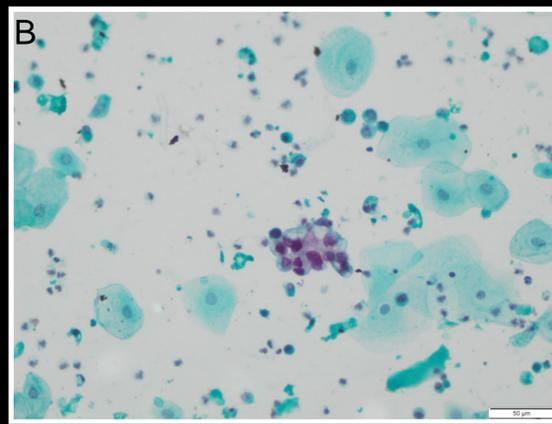
A	B	C
Negative urine	Low grade UC	High grade UC
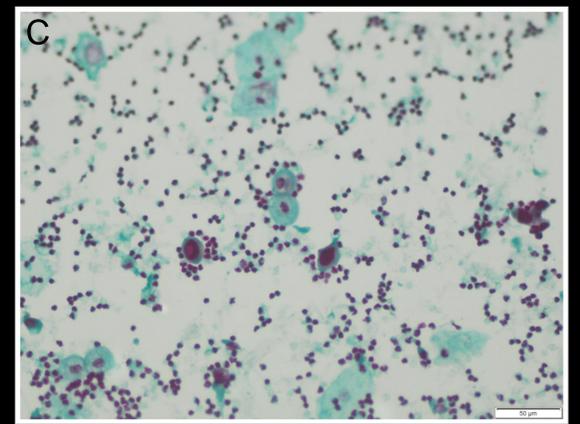
Urine smears stained by CellDetect®. Epithelial cells are stained in green while dysplastic cells exhibit purple nuclei

Methods

47 patients monitored for BC recurrence were prospectively enrolled. Split-samples of voided urine obtained before cystoscopy were processed by cytospin and stained by either Papanicolaou or CellDetect®. For both procedures, classification of the diagnosis was 1. negative; 2. reactive; 3. suspicious; 4. highly suspicious or positive; 5. inconclusive. In the study, suspicious and highly suspicious were considered positive. As CellDetect® relies on both color and morphology, the impact of the CellDetect® color alone was also determined.

Results

Among 47 patients included in the study, 21 showed recurrence of UC (12 low grade and 9 high grade) while 26 were negative by either cystoscopy (12) or biopsy (14). Sensitivity and specificity of routine cytology (Papanicolaou-stained) were 42.1% and 92.0% compared to 76.2% and 69.2% for CellDetect®, respectively. NPV, PPV and accuracy for routine cytology were 66%, 75% and 68% respectively and for CellDetect® NPV was 78%, PPV 71% and accuracy 75%. Higher sensitivity was observed for CellDetect® stain versus routine cytology for both low grade (50% verses 16.7%) and high grade (100% verses 71.4%). The usefulness of the CellDetect® staining discrimination platform was also evaluated; in 28 cases the diagnosis was based mostly on the color of CellDetect®. In 14 cases the diagnosis relayed both on morphology and CellDetect® colors and only in 4 cases diagnosis was based solely on morphology.

Tests Sensitivity

The Usefulness of CellDetect Staining Platform

- Mostly Color — 61%
- Morphology and Color — 30%
- Mostly Morphology — 9%
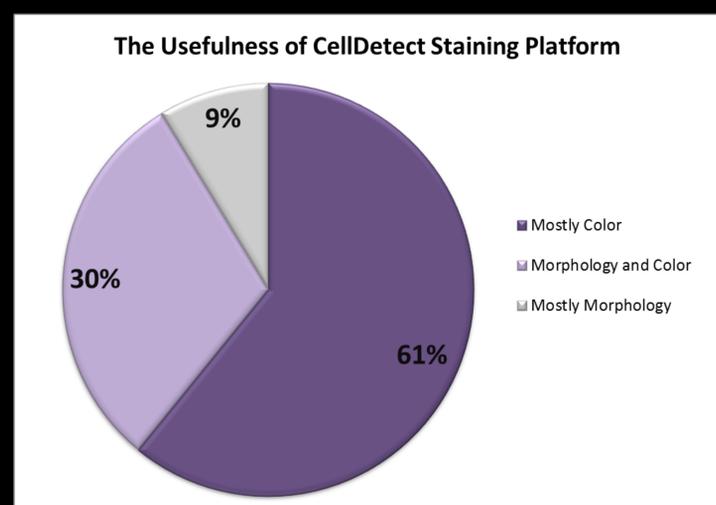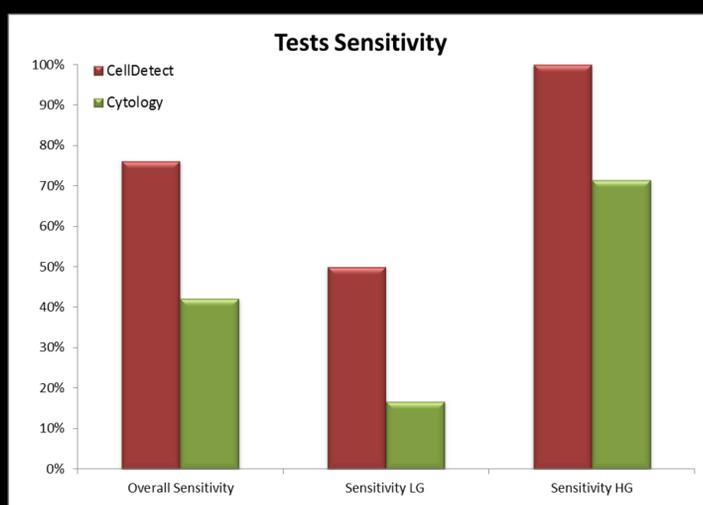
n=	47
Positive cases	21
Negative cases	26

The usefulness of the CellDetect® staining discrimination platform was evaluated:
In the majority of the cases (61%) the diagnosis was mostly based on color (80% color; 20% morphology or 100% color; 0% morphology). In 30% of the cases the diagnosis was equally based on color and morphology (50% morphology; 50% color) and only in 9% of the cases the diagnosis was mostly based on morphology (80% morphology; 20% color).

Conclusion

CellDetect® technological platform provides differential staining which improves the ability to identify cancerous cells in urine smears compared to standard cytology stain, particularly for low-grade tumors. The present study also reveals that in more than 90% of the cases, the colors of CellDetect® stain acted as a major component in the diagnosis process.