Development of a Novel Method for Detecting Renal Cell Carcinoma Circulating Tumor Cells
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Background
• To date, the isolation of circulating tumor cells (CTCs) from patients with renal cell carcinoma (RCC) has been met with limited success.¹
• This is due to the fact that most available CTC isolation technologies rely on the positive selection of cells using the surface protein EpCAM, an epithelial marker which is expressed in a minority of RCCs.²
• ApoStream is a novel technology which utilizes dielectrophoresis and microfluidics for the antibody-free isolation of CTCs.³
• In this study, we developed a novel method for detecting RCC CTCs using the ApoStream platform and fluorescence in situ hybridization (FISH) for loss of the VHL gene. This assay was then tested in a cohort of patients with metastatic clear cell RCC (ccRCC).

Methods
• The optimal operating frequency for enrichment of RCC CTCs was determined using fluorescently labeled 786-0 cells spiked in blood cells from healthy donors.
• In parallel, conditions were optimized for performing FISH for the VHL gene on isolated cells.
• Following assay development, CTCs (defined as any non-diploid cell) were enumerated in a cohort of patients with untreated or progressive metastatic ccRCC as well as healthy donors.

Conclusions
• Antibody-independent isolation with dielectrophoresis and subsequent FISH for the VHL gene is a promising novel method for CTC detection in patients with metastatic ccRCC.
• Future work aims to validate this assay in larger patient cohort.

Figures / Data

Figure 1. Theory of ApoStream operation

Figure 2. Crossover frequency optimization for recovery of 786-0 cells

Figure 3. Assay validation in patients with metastatic ccRCC

Figure 4. Representative images of isolated cells following FISH

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References

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